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Sample records for boric acid solutions

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1. The ototoxic effect of boric acid solutions applied into the middle ear of guinea pigs.

   PubMed

   OztÃ¼rkcan, Sedat; DÃ¼ndar, Riza; Katilmis, HÃ¼seyin; Ilknur, Ali Ekber; AktaÅŸ, Sinem; HaciÃ¶meroÄŸlu, Senem

   2009-05-01

   This study analyzed the ototoxic effects of boric acid solutions. Boric acid solutions have been used as otologic preparations for many years. Boric acid is commonly found in solutions prepared with alcohol or distilled water but can also be found in a powder form. These preparations are used for both their antiseptic and acidic qualities in external and middle ear infections. We investigated the ototoxic effect of boric acid solutions on guinea pigs. We are unaware of any similar, previously published study of this subject in English. The study was conducted on 28 young albino guinea pigs. Prior to application of the boric acid solution under general anesthesia, an Auditory Brainstem Response (ABRs) test was applied to the right ear of the guinea pigs. Following the test, a perforation was created on the tympanic membrane of the right ear of each guinea pig and small gelfoam pieces were inserted into the perforated area. Test solutions were administered to the middle ear for 10 days by means of a transcanal route. Fifteen days after inserting the gelfoams in all of the guinea pigs, we anasthesized the guinea pigs and removed the gelfoams from the perforated region of the ear and then performed an ABRs on each guinea pig. The ABRs were within the normal range before the applications. After the application, no significant changes were detected in the ABRs thresholds in neither the saline group nor the group administered boric acid and distilled water solution; however, significant changes were detected in the ABRs thresholds of the

Gentamicine and boric acid and alcohol solution groups. We believe that a 4% boric acid solution prepared with distilled water can be a more reliable preparation than a 4% boric acid solution prepared with alcohol.

2. Liquid Superlubricity of Polyethylene Glycol Aqueous Solution Achieved with Boric Acid Additive.

   PubMed

   Ge, Xiangyu; Li, Jinjin; Zhang, Chenhui; Luo, Jianbin

   2018-03-27

   Boric acid is a weak acid and has been used as a lubrication additive because of its special structure. In this study, we report that boric acid could achieve a robust superlubricity (Î¼ < 0.01) as an additive in polyethylene glycol (PEG) aqueous solution at the Si 3 N 4 /SiO 2 interfaces. The superlow and steady friction coefficient of approximately 0.004-0.006 could be achieved with boric acid under neutral conditions (pH of approximately 6.4), which is different from the acidic conditions leading to superlubricity. The influence of various factors, including boric acid concentration, sliding speed, applied load, PEG molecular weight, and the volume of lubricant on the superlubricity, were investigated. The results reveal that the PEG aqueous solution with the boric acid additive could achieve superlubricity under a wide range of conditions. The surface composition analysis shows that the synergy effect between boric acid and PEG provides sufficient H + ions to realize the running-in process. Moreover, a composite tribochemical film composed of silica and ammonia-containing compounds were formed on the ball surface, contributing to the superlubricity. The film thickness calculation shows that superlubricity was achieved in a mixed lubrication region, and therefore, the superlubricity state was dominated by both the composite tribochemical film formed via the tribochemical reaction on the contact surfaces and the hydrodynamic lubricating film between the contact surfaces. Such a liquid superlubricity achieved under neutral conditions is of importance for both scientific understanding and engineering applications.

3. Effect of boric acid solution on cartilage metabolism.

   PubMed

   Benderdour, M; Hess, K; Gadet, M D; Dousset, B; Nabet, P; Belleville, F

   1997-05-08

   Pelvic cartilage of chick embryo was used to demonstrate that presence of boron in culture medium decreases synthesis of proteoglycans, collagen and total proteins but on the other hand increases the release of these macromolecules. However, when glucose concentration in culture medium is brought to 22mM, the synthesis decrease is no longer observed, whereas release increase persists. Proteins released into the culture medium included heat shock proteins (70 hsp) and tumor necrosis factor alpha (TNF alpha). The amount of phosphorylated proteins was enhanced in presence of boron while endoprotease activity in cartilage and in culture medium was significantly augmented. The in vitro effects of boric acid may explain its in vivo effect on wound healing.

4. Recovery of boric acid from ion exchangers

   DOEpatents

   Pollock, Charles W.

   1976-01-01

   The recovery of boric acid from an anion exchange resin is improved by eluting the boric acid with an aqueous solution of ammonium bicarbonate. The boric acid can be readily purified and concentrated by distilling off the water and ammonium bicarbonate. This process is especially useful for the recovery of boric acid containing a high percentage of .sup.10 B which may be found in some nuclear reactor coolant solutions.

5. Effects of topical oxiconazole and boric acid in alcohol solutions to rat inner ears.

   PubMed

   Ã–zdemir, SÃ¼leyman; Tuncer, Ãœlkü; Tarkan, Ã–zgür; Akar, Funda; SÃ¼rmelioÄŸlu, Ã–zgür

   2013-06-01

   The aim of this study is to evaluate the ototoxicity of topical oxiconazole and boric acid in alcohol solutions. Prospective controlled animal study. Research laboratory. Fifty adult Wistar albino rats were divided into 5 groups consisting of 10 animals each. The right tympanic membranes were perforated, and baseline and posttreatment distortion product otoacoustic emission (DPOAE) measurements were performed. The solutions were applied through the external ear canal to the middle ear twice a day for 14 days. The rats in group I and group II received 0.1 mL of oxiconazole-containing solution drops and 4% boric acid in alcohol solution drops, respectively. Group III received gentamicin solution (40 mg/mL) (ototoxic control), group IV received saline solution, and group V was followed without any medication. The baseline DPOAE results of the right ears of all animals tested were normal. Animals in groups I, II, IV, and V showed no statistically significant change in the DPOAE amplitudes. The rats in the gentamicin group showed a significant decrease. This study demonstrates that topically used oxiconazole and boric acid in alcohol solutions to the middle ear appear to be safe on the inner ear of rats. The safety of these drugs has not yet been confirmed in humans. Caution should be taken when prescribing these drugs, especially to patients who had tympanic membrane perforation. Ear drops should be chosen more carefully in an external ear infection for patients with tympanic membrane perforation to avoid ototoxicity.

6. Boric acid poisoning

   MedlinePlus

   ... effectively treat (adsorb) boric acid. For skin exposure, treatment may include: Surgical removal of burned skin (debridement) Transfer to a hospital that specializes in burn care Washing of the skin (irrigation), possibly every ...

7. Competitive adsorption of boric acid and chromate onto alumina in aqueous solutions.

   PubMed

   Demetriou, A; Pashalidis, I

   2014-01-01

   The competitive adsorption of boric acid and chromate from aqueous solutions by alumina has been investigated by spectrophotometry at pH 8, ionic strength = 0.0, 0.1 and 1.0 M NaClO4, T = 22 Â± 3 Â°C and under normal atmospheric conditions. The experimental data show that addition of excess boric acid in the system leads to the increase of Cr(VI) concentration in solution, indicating the replacement of adsorbed chromate by boron on the alumina surface. Data evaluation results in the determination of the competition reaction constant and the formation constant of the Cr(VI) surface complexes, which are logKCr(VI)-B(III) = -3.5 Â± 0.2 and logÎ²*Cr = 7.6 Â± 0.3, respectively.

8. Nonclinical safety evaluation of boric acid and a novel borate-buffered contact lens multi-purpose solution, Biotrueâ„¢ multi-purpose solution.

   PubMed

Lehmann, David M; Cavet, Megan E; Richardson, Mary E

2010-12-01

Multipurpose solutions (MPS) often contain low concentrations of boric acid as a buffering agent. Limited published literature has suggested that boric acid and borate-buffered MPS may alter the corneal epithelium; an effect attributed to cytotoxicity induced by boric acid. However, this claim has not been substantiated. We investigated the effect of treating cells with relevant concentrations of boric acid using two cytotoxicity assays, and also assessed the impact of boric acid on corneal epithelial barrier function by measuring TEER and immunostaining for tight junction protein ZO-1 in human corneal epithelial cells. Boric acid was also assessed in an in vivo ocular model when administered for 28 days. Additionally, we evaluated Biotrue multi-purpose solution, a novel borate-buffered MPS, alone and with contact lenses for ocular compatibility in vitro and in vivo. Boric acid passed both cytotoxicity assays and did not alter ZO-1 distribution or corneal TEER. Furthermore, boric acid was well-tolerated on-eye following repeated administration in a rabbit model. Finally, Biotrue multi-purpose solution demonstrated good ocular biocompatibility both in vitro and in vivo. This MPS was not cytotoxic and was compatible with the eye when administered alone and when evaluated with contact lenses. We demonstrate that boric acid and a borate-buffered MPS is compatible with the ocular environment. Our findings provide evidence that ocular effects reported for some borate-buffered MPS may be incorrectly attributed to boric acid and are more likely a function of the unique combination of ingredients in the MPS formulation tested. Copyright Â© 2010 British Contact Lens Association. Published by Elsevier Ltd. All rights reserved.

9. Effect of Boric Acid Versus Conventional Irrigation Solutions on the Bond Strength Between Fiber Post â€¨and Root Dentin.

   PubMed

   Culhaoglu, Ahmet Kursad; Ã–zcan, Erdal; Kilicarslan, Mehmet Ali; Seker, Emre

   2017-01-01

   To compare the effect of boric acid solutions of different percentages to conventional irrigation solutions on the adhesive bond strength between fiber posts and radicular dentin surface with different cement types. One hundred fifteen extracted human incisors were endodontically instrumented to a length of 14-15â€¯mm, and 12-mm post spaces were prepared with specific drills. Cylindrical fiber posts (Panavia Post) were luted with two different composite cements (Panavia F 2.0, Panavia SA) and cut into 1-mm-thick slices. These specimens were randomly allocated to 5 groups according to the irrigant applied: 1. control, no irrigant; 2.â€¯10â€¯ml of 2% chlorhexidine; 3. 10â€¯ml of 5.25% NaOCl for 5â€¯min and 10â€¯ml of 17% EDTA for 3â€¯min; 4. 10â€¯ml of 5% boric acid solution at a temperature of 55Â°C for 60â€¯s; 5. 10% boric acid solution, conditions as in group 4. Bond strength was determined using the push-out test. Microscopic assessment and SEM evaluations were performed in combination with push-out tests. The push-out bond strengths of cervical segments were significantly higher than for the middle and apical segments in all groups. The type of irrigation solution used significantly affected the bond strengths of the posts. The 10% boric acid solution and EDTA + NaOCl irrigation solutions provided the highest bond strengths (pâ€¯<â€¯0.005). SEM analysis showed that the dentin tubules were open and the smear layer was completely removed when EDTA/NaOCl and 10% boric acid were used as irrigation agents. Boric acid solutions, especially at a concentration of 10%, can be a viable alternative to the conventional irrigants used during endodontic treatment. The extent to which the 10% boric acid solution successfully removed the smear layer and the ease of rinsing boric acid from the root surface are advantageous.

10. Boric acid solution concentration influencing p-type emitter formation in n-type crystalline Si solar cells

    NASA Astrophysics Data System (ADS)

Singha, Bandana; Singh Solanki, Chetan

2016-09-01

Boric acid (BA) is a spin on dopant (BSoD) source which is used to form p+ emitters in n-type c-Si solar cells. High purity boric acid powder (99.99% pure) when mixed with deionized (DI) water can result in high quality p-type emitter with less amount of surface defects. In this work, we have used different concentrations of boric acid solution concentrations to fabricate p-type emitters with sheet resistance values < 90 Î©/â–¡. The corresponding junction depths for the same are less than 500 nm as measured by SIMS analysis. Boron rich layer (BRL), which is considered as detrimental in emitter performance is found to be minimal for BA solution concentration less than 2% and hence useful for p-type emitter formation.

11. [Raman spectroscopic analysis of dissolution and phase transformation of chloropinnoite in the boric acid aqueous solution].

    PubMed

    Li, Xiao-Ping; Gao, Shi-Yang; Liu, Zhi-Hong; Hu, Man-Cheng; Xia, Shu-Ping

    2005-01-01

    Raman spectroscopy of dissolution and transformation of chloropinnoite in 4.5% (w.t.%) boric acid aqueous solution at 30 degrees C has been recorded. The Raman spectra of kinetics process have been obtained. The phase transformation product is kurnakovite (2MgO x 3B2O3 x 15H2O). The main polyborate anions and their interaction in aqueous solution have been proposed according to the Raman spectrum. Some assignments were tentatively given and the relations between the existing forms of polyborate anions and the crystallizing solid phases have been gained. A mechanisms of dissolution and crystallization reactions and the formation condition of kurnakovite in Qinghai-Tibet plateau were proposed and discussed.

12. LITERATURE REVIEW OF BORIC ACID SOLUBILITY DATA

    SciTech Connect

    Crapse, K.; Kyser, E.

    2011-09-22

    A new solvent system is being evaluated for use in the Modular Caustic-Side Solvent Extraction Unit (MCU) and in the Salt Waste Processing Facility (SWPF). The new system replaces the current dilute nitric acid strip solution with 0.01 M boric acid. This literature study is performed to determine if there is a potential for boric acid to crystallize in the lines with emphasis on the transfer lines to the Defense Waste Processing Facility. This report focuses on the aqueous phase chemistry of boric acid under conditions relevant to MCU and SWPF. Operating and transfer conditions examined for the purpose ofmoreÂ Â» this review include temperatures between 13 C (McLeskey, 2008) and 45 C (Fondeur, 2007) and concentrations from 0 to 3M in nitric acid as well as exposure of small amounts of entrained boric acid in the organic phase to the sodium hydroxide caustic wash stream. Experiments were also conducted to observe any chemical reactions and off-gas generation that could occur when 0.01 M boric acid solution mixes with 3 M nitric acid solution and vice versa. Based on the low concentration (0.01M) of boric acid in the MCU/SWPF strip acid and the moderate operating temperatures (13 C to 45 C), it is unlikely that crystallization of boric acid will occur in the acid strip solution under process or transfer conditions. Mixing experiments of boric and nitric acid show no measurable gas generation (< 1 cc of gas per liter of solution) under similar process conditions.Â«Â less

13. Simultaneous pollutant removal and electricity generation in denitrifying microbial fuel cell with boric acid-borate buffer solution.

    PubMed

    Chen, Gang; Zhang, Shaohui; Li, Meng; Wei, Yan

    2015-01-01

    A double-chamber denitrifying microbial fuel cell (MFC), using boric acid-borate buffer solution as an alternative to phosphate buffer solution, was set up to investigate the influence of buffer solution concentration, temperature and external resistance on electricity generation and pollutant removal efficiency. The result revealed that the denitrifying MFC with boric acid-borate buffer solution was successfully started up in 51 days, with a stable cell voltage of 205.1 Â± 1.96 mV at an external resistance of 50 Î©. Higher concentration of buffer solution favored nitrogen removal and electricity generation. The maximum power density of 8.27 W/m(3) net cathodic chamber was obtained at a buffer solution concentration of 100 mmol/L. An increase in temperature benefitted electricity generation and nitrogen removal. A suitable temperature for this denitrifying MFC was suggested to be 25 Â°C. Decreasing the external resistance favored nitrogen removal and organic matter consumption by exoelectrogens.

14. Dermatitis toxica faciei after boric acid.

    PubMed

    JirÃ¡kovÃ¡, Anna; RajskÃ¡, Lucie; Rob, Filip; GregorovÃ¡, Jana; HercogovÃ¡, Jana

    2015-01-01

    An adverse toxic reaction to the topical application of a 2% boric acid solution is described in a 2-year-old girl. Topical boric acid is licensed for use in children above the age of 10 in the Czech Republic. However, it can be bought over the counter and it is very often used in younger children. Due to its fast absorption and slow elimination, there is a high risk of systemic side effects. On the other hand, topical side effects are not reported in the present literature. Â© 2014 Wiley Periodicals, Inc.

15. Boric Acid in Kjeldahl Analysis

    ERIC Educational Resources Information Center

    Cruz, Gregorio

    2013-01-01

    The use of boric acid in the Kjeldahl determination of nitrogen is a variant of the original method widely applied in many laboratories all over the world. Its use is recommended by control organizations such as ISO, IDF, and EPA because it yields reliable and accurate results. However, the chemical principles the method is based on are notâ€¦

16. Effectiveness of 3 per cent boric acid in 70 per cent alcohol versus 1 per cent clotrimazole solution in otomycosis patients: a randomised, controlled trial.

    PubMed

    Romsaithong, S; Tomanakan, K; Tangsawad, W; Thanaviratananich, S

    2016-09-01

To compare the clinical effectiveness and adverse events for 3 per cent boric acid in 70 per cent alcohol versus 1 per cent clotrimazole solution in the treatment of otomycosis. A total of 120 otomycosis patients were randomly assigned to receive either 1 per cent clotrimazole solution (intervention group) or 3 per cent boric acid in 70 per cent alcohol (control group) at the Khon Kaen Hospital ENT out-patient department. Treatment effectiveness was determined based on the otomicroscopic absence of fungus one week after therapy, following a single application of treatment. After 1 week of treatment, there were data for 109 participants, 54 in the clotrimazole group and 55 in the boric acid group. The absolute difference in cure rates between 1 per cent clotrimazole solution and 3 per cent boric acid in 70 per cent alcohol was 17.9 per cent (95 per cent confidence interval, 2.3 to 33.5; $p = 0.028$) and the number needed to treat was 6 (95 per cent confidence interval, 3.0 to 43.4). Adverse events for the two agents were comparable. One per cent clotrimazole solution is more effective than 3 per cent boric acid in 70 per cent alcohol for otomycosis treatment.

17. Investigation of phase stability of poly(1-oxotrimethylene)-dissolved aqueous solutions containing ZnCl2/CaCl2/LiCl: Influence of boric acid introduction and aging time

    NASA Astrophysics Data System (ADS)

    Chae, Dong Wook; Jang, Han Beol; Kim, Byoung Chul

    2018-02-01

    Poly(1-oxotrimethylene) (POTM) was dissolved in aqueous solutions containing ZnCl2, CaCl2, and LiCl, and the effects of boric acid introduction on the phase stability of the POTM solutions over various aging times were investigated. In the absence of boric acid, aging at 70Â°C for 8 h notably reduced the loss tangent (tanÎ´) for the 7.0 wt.% POTM solutions. Addition of boric acid into unaged solutions had little effect on tanÎ´ over the frequency range measured, regardless of its content, whereas addition of 0.3-1.0 wt.% of boric acid into aged solutions increased tanÎ´. The dynamic viscosity of the POTM solutions with 1.0 wt.% boric acid was affected little by aging time. Conversely, the POTM solutions without boric acid exhibited increased dynamic viscosity in the low-frequency range with aging time. In addition, the slope of the solutions in the Cole-Cole plot decreased with increasing aging time in the absence of boric acid, whereas aging time had little effect in the presence of 1.0 wt.% boric acid. For dilute POTM solutions (i.e., 0.5 g/dL), the reduced viscosity decreased with increasing aging time in the absence of boric acid, while it was affected little in solutions with the addition of 1.0 wt.% boric acid. In the UV-Vis spectra, the aging-time-dependent increase of the absorbance peak at 390 nm was associated with the generation of a chromophoric complex in the POTM solutions. Conversely, the disappearance of the peak due to the addition of boric acid indicated suppression of complex formation.

18. The improvement of the energy resolution in epi-thermal neutron region of Bonner sphere using boric acid water solution moderator.

    PubMed

    Ueda, H; Tanaka, H; Sakurai, Y

    2015-10-01

    Bonner sphere is useful to evaluate the neutron spectrum in detail. We are improving the energy resolution in epi-thermal neutron region of Bonner sphere, using boric acid water solution as a moderator. Its response function peak is narrower than that for polyethylene moderator and the improvement of the resolution is expected. The resolutions between polyethylene moderator and boric acid water solution moderator were compared by simulation calculation. Also the influence in the uncertainty of Bonner sphere configuration to spectrum estimation was simulated. Copyright Â© 2015 Elsevier Ltd. All rights reserved.

19. Chemical Reaction between Boric Acid and Phosphine Indicates Boric Acid as an Antidote for Aluminium Phosphide Poisoning

    PubMed Central

    Soltani, Motahareh; Shetab-Boushehri, Seyed F.; Shetab-Boushehri, Seyed V.

    2016-01-01

    Objectives: Aluminium phosphide (AlP) is a fumigant pesticide which protects stored grains from insects and rodents. When it comes into contact with moisture, AlP releases phosphine (PH3), a highly toxic gas. No efficient antidote has been found for AlP poisoning so far and most people who are poisoned do not survive. Boric acid is a Lewis acid with an empty p orbital which accepts electrons. This study aimed to investigate the neutralisation of PH3 gas with boric acid. Methods: This study was carried out at the Baharlou Hospital, Tehran University of Medical Sciences, Tehran, Iran, between December 2013 and February 2014. The volume of released gas, rate of gas evolution and changes in pH were measured during reactions of AlP tablets with water, acidified water, saturated boric acid solution, acidified saturated boric acid solution, activated charcoal and acidified activated charcoal. Infrared spectroscopy was used to study the resulting probable adduct between PH3 and boric acid. Results: Activated charcoal significantly reduced the volume of released gas ($P < 0.01$). Although boric acid did not significantly reduce the volume of released gas, it significantly reduced the rate of gas evolution ($P < 0.01$). A gaseous adduct was formed in the reaction between pure AlP and boric acid. Conclusion: These findings indicate that boric acid may be an efficient and non-toxic antidote for PH3 poisoning. PMID:27606109

20. Chemical Reaction between Boric Acid and Phosphine Indicates Boric Acid as an Antidote for Aluminium Phosphide Poisoning.

    PubMed

    Soltani, Motahareh; Shetab-Boushehri, Seyed F; Shetab-Boushehri, Seyed V

    2016-08-01

    Aluminium phosphide (AlP) is a fumigant pesticide which protects stored grains from insects and rodents. When it comes into contact with moisture, AlP releases phosphine (PH3), a highly toxic gas. No efficient antidote has been found for AlP poisoning so far and most people who are poisoned do not survive. Boric acid is a Lewis acid with an empty p orbital which accepts electrons. This study aimed to investigate the neutralisation of PH3 gas with boric acid. This study was carried out at the Baharlou Hospital, Tehran University of Medical Sciences, Tehran, Iran, between December 2013 and February 2014. The volume of released gas, rate of gas evolution and changes in pH were measured during reactions of AlP tablets with water, acidified water, saturated boric acid solution, acidified saturated boric acid solution, activated charcoal and acidified activated charcoal. Infrared spectroscopy was used to study the resulting probable adduct between PH3 and boric acid. Activated charcoal significantly reduced the volume of released gas ($P < 0.01$). Although boric acid did not significantly reduce the volume of released gas, it significantly reduced the rate of gas evolution ($P < 0.01$). A gaseous adduct was formed in the reaction between pure AlP and boric acid. These findings indicate that boric acid may be an efficient and non-toxic antidote for PH3 poisoning.

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21. Investigations of kinetics and mechanism of chloropinnoite in boric acid aqueous solution at 303 K by Raman spectroscopy.

    PubMed

    Xiaoping, Li; Shiyang, Gao; Shuping, Xia

    2004-10-01

    Raman spectroscopy of dissolution and transformation of chloropinnoite in 4.5% (wt.%) boric acid aqueous solution at 303 K has been recorded. The Raman spectra of kinetics process have been obtained. The phase transformation product is 2MgO.3B2O3.15H2O (kurnakovite). The main polyborate anions and their interaction in aqueous solution have been proposed according to the Raman spectrum. Some assignments were tentatively given and the relations between the existing forms of polyborate anions and the crystallizing solid phases have been gained. A mechanism of dissolution and crystallization reactions and the formation condition of kurnakovite in Qinghai-Tibet plateau were proposed and discussed.

22. Boric Acid Corrosion of Concrete Rebar

    NASA Astrophysics Data System (ADS)

    Pabalan, R. T.; Yang, L.; Chiang, K.â€“T.

    2013-07-01

    Borated water leakage through spent fuel pools (SFPs) at pressurized water reactors is a concern because it could cause corrosion of reinforcement steel in the concrete structure and compromise the integrity of the structure. Because corrosion rate of carbon steel in concrete in the presence of boric acid is lacking in published literature and available data are equivocal on the effect of boric acid on rebar corrosion, corrosion rate measurements were conducted in this study using several test methods. Rebar corrosion rates were measured in (i) borated water flowing in a simulated concrete crack, (ii) borated water flowing over a concrete surface, (iii) borated water that has reacted with concrete, and (iv) 2,400 ppm boric acid solutions with pH adjusted to a range of 6.0 to 7.7. The corrosion rates were measured using coupled multielectrode array sensor (CMAS) and linear polarization resistance (LPR) probes, both made using carbon steel. The results indicate that rebar corrosion rates are low (~1 Î¼m/yr or less)when the solution pH is ~7.1 or higher. Below pH ~7.1, the corrosion rate increases with decreasing pH and can reach ~100 Î¼m/yr in solutions with pH less than ~6.7. The threshold pH for carbon steel corrosion in borated solution is between 6.8 and 7.3.

23. Boric acid ovicidal trap for the management of Aedes species.

    PubMed

    Bhami, L Charlet; Das, S Sam Manohar

    2015-06-01

The use of low concentrations of boric acid as a potential and effective control agent for the eggs and immature stages of Aedes aegypti L. and Aedes albopictus Skuse (Diptera: Culicidae) is found to be safe and effective as compared to synthetic chemical insecticides. The study aims to determine the ovicidal concentration of boric acid, its effective concentration for oviposition attraction and the larval mortality concentration for Ae. aegypti and Ae. albopictus. The ovicidal concentration of boric acid was determined by incubating the eggs in different concentrations of boric acid (0.1, 0.25, 0.5, 0.75 and 1%). Different dilutions of boric acid were taken in the oviposition cup and the ovicidal concentration, effective concentration for oviposition attraction and the mean survival/mortality rate of III and IV instar Ae. aegypti and Ae. albopictus larvae were determined. The ovicidal concentration of boric acid for 100% mortality in Aedes sp eggs is 1%. Effective concentration for the oviposition attraction is 0.5%. At 1% concentration, larvae of both the species died within 24 h. Boric acid is less toxic compared to different pesticides, and in low concentrations, it attracts the ovipositing female Aedes sp as well as fertile males. Dilute boric acid solution is an effective ovitrap since the eggs laid by mosquitoes either die or the larvae that hatch out from them do not survive in boric acid. Boric acid kills the males that come in contact with the solution, which are attracted to the trap by the females hovering around.

24. Spectrophotometric determination of boric acid in boron powder with curcumin

    SciTech Connect

    Grotheer, E.W.

    1979-12-01

    A rapid and accurate method was needed to determine trace amounts of boric acid for quality control and specification testing of elemental boron. The reaction between boric acid and curcumin occurs at a measurable rate only when the curcumin molecule is protonated. Protonation takes place at the carbonyl groups in the presence of a strong acid and occurs completely and rapidly when sulfuric acid is added to a solution of curcumin in acetic acid. Spectrophotometric measurements were made. The extraction of boric acid from boron powder was found to be complete within 2h when either water or the diol solutionmoreÂ Â» was used. Whatman No. 40 cr 42 filter paper was used to obtain diol samples free of boron particles. The extraction efficiency of 2-ethyl-1,3-hexanediol was evaluated by adding 1 ml of 500 ppM aqueous boric acid and 1 drop of 10% NaOH to accurately weighed samples of boron powder. The water then was evaporated at room temperature and the samples were extracted with diol solution. The data obtained are included. The extraction efficiency also was evaluated by determining the boric acid content of boron which had been recovered from a previous extraction and boric acid determination. The determination of boric acid using curcumin is unaffected by the presence of other compounds, except for fluoride and nitrate ions. 2 tables. (DP)Â«Â less

25. Chronic boric acid poisoning in infants.

    PubMed Central

    O'Sullivan, K; Taylor, M

    1983-01-01

    We report 7 infants suffering from seizures induced by chronic boric acid ingestion. The boric acid was given by dipping a soother in a proprietary borax and honey mixture. The babies have remained well since the mixture was withheld. PMID:6625636

26. The effects of temperature and aeration on the corrosion of A508III low alloy steel in boric acid solutions at 25-95 Â°C

    NASA Astrophysics Data System (ADS)

Xiao, Qian; Lu, Zhanpeng; Chen, Junjie; Yao, Meiyi; Chen, Zhen; Ejaz, Ahsan

2016-11-01

The effects of temperature, solution composition and dissolved oxygen on the corrosion rate and electrochemical behavior of an A508III low alloy steel in boric acid solution with lithium hydroxide at 25-95 Â°C are investigated. In aerated solutions, increasing the boric acid concentration increases the corrosion rate and the anodic current density. The corrosion rate in deaerated solutions increases with increasing temperature. A corrosion rate peak value is found at approximately 75 Â°C in aerated solutions. Increasing temperature increases the oxygen diffusion coefficient, decreases the dissolved oxygen concentration, accelerates the hydrogen evolution reaction, and accelerates both the active dissolution and the film forming reactions. Increasing dissolved oxygen concentration does not significantly affect the corrosion rate at 50 and 60 Â°C, increases the corrosion rate at 70 and 80 Â°C, and decreases the corrosion rate at 87.5 and 95 Â°C in a high concentration boric acid solution with lithium hydroxide.

27. Boric acid and boronic acids inhibition of pigeonpea urease.

    PubMed

    Reddy, K Ravi Charan; Kayastha, Arvind M

    2006-08-01

    Urease from the seeds of pigeonpea was competitively inhibited by boric acid, butylboronic acid, phenylboronic acid, and 4-bromophenylboronic acid; 4-bromophenylboronic acid being the strongest inhibitor, followed by boric acid > butylboronic acid > phenylboronic acid, respectively. Urease inhibition by boric acid is maximal at acidic pH (5.0) and minimal at alkaline pH (10.0), i.e., the trigonal planar B(OH)3 form is a more effective inhibitor than the tetrahedral B(OH)4 -anionic form. Similarly, the anionic form of phenylboronic acid was least inhibiting in nature.

28. Lubrication from mixture of boric acid with oils and greases

    DOEpatents

    Erdemir, Ali

    1995-01-01

    Lubricating compositions including crystalline boric acid and a base lubricant selected from oils, greases and the like. The lubricity of conventional oils and greases can also be improved by adding concentrates of boric acid.

29. Lubrication from mixture of boric acid with oils and greases

    DOEpatents

    Erdemir, A.

    1995-07-11

    Lubricating compositions are disclosed including crystalline boric acid and a base lubricant selected from oils, greases and the like. The lubricity of conventional oils and greases can also be improved by adding concentrates of boric acid.

30. Process for immobilizing radioactive boric acid liquid wastes

DOEpatents

Greenhalgh, Wilbur O.

1986-01-01

A method of immobilizing boric acid liquid wastes containing radionuclides by neutralizing the solution and evaporating the resulting precipitate to near dryness. The dry residue is then fused into a reduced volume, insoluble, inert, solid form containing substantially all the radionuclides.

31. Process for immobilizing radioactive boric acid liquid wastes

    DOEpatents

    Greenhalgh, W.O.

    1984-05-10

    Disclosed is a method of immobilizing boric acid liquid wastes containing radionuclides by neutralizing the solution and evaporating the resulting precipitate to near dryness. The dry residue is then fused into a reduced volume, insoluble, inert, solid form containing substantially all the radionuclides.

32. Evaluation of the smear layer removal and erosive capacity of EDTA, boric acid, citric acid and desy clean solutions: an in vitro study.

    PubMed

    Turk, Tugba; Kaval, Mehmet Emin; Åžen, Bilge Hakan

    2015-09-03

    The purpose of this study was to investigate the smear layer removal and erosive capacity of various irrigation solutions with sequential use of NaOCl on instrumented root canal walls. The root canals of single-rooted teeth were instrumented with ProTaper rotary instrument. Then, the teeth were randomly divided into five experimental groups. The root canals were irrigated with one of the following solutions (5 mL/1 min): 5% EDTA, 5% boric acid (BA), a mixture of BA and CA, 2.5% citric acid (CA) and 5% Desy Clean. After irrigating with 2.5% NaOCl and distilled water, the roots were split into two halves and each half was prepared for SEM examination. Representative photographs were taken from each third at x500 and x1000 magnifications. Double blind scoring was performed by two calibrated observers for smear layer and erosion. The scores were statistically analyzed using Kruskal-Wallis, Dunn's post hoc and Spearman's correlation tests ($p = 0.05$). There were statistically significant differences among the solutions by means of smear layer and erosion ($p < 0.05$). While 2.5% CA solution was the most effective solution in removal of smear layer, it was also the most erosive solution ($p < 0.05$). 5% Desy Clean removed smear layer effectively and caused less erosion. There was a negative, but statistically significant correlation between presence of smear layer and erosion (r =â€‰-0.684; $p < 0.0001$). Desy Clean can be a promising agent as an irrigation solution with optimal smear layer removal capacity and less erosive effects.

33. The antimicrobial effect of boric acid on Trichomonas vaginalis.

    PubMed

    Brittingham, Andrew; Wilson, Wayne A

    2014-12-01

The treatment options for trichomoniasis are largely limited to nitroimidazole compounds (metronidazole and tinidazole). Few alternatives exist in cases of recalcitrant infections or in cases of nitroimidazole hypersensitivity. Recently, the intravaginal administration of boric acid has been advocated as an alternative treatment of trichomoniasis. However, no in vitro studies are available that directly assess the sensitivity of Trichomonas vaginalis to boric acid. We examined the sensitivity of common laboratory strains and recent clinical isolates of T. vaginalis to boric acid. The effect of increasing concentrations of boric acid on parasite growth and viability was determined, and a minimal lethal concentration was reported. The effect of pH on boric acid toxicity was assessed and compared with that of lactic and acetic acid. Boric acid is microbicidal to T. vaginalis, and its antitrichomonal activity is independent of environmental acidification. Unlike acetic acid and lactic acid, boric acid exposure results in growth suppression and lethality over a wide range of pH (5-7) and under conditions that are normally permissible for growth in vitro. The microbicidal effect of boric acid on T. vaginalis, coupled with its previous clinical use in treating vaginal candidiasis, supports the continued inclusion of boric acid in the therapeutic arsenal for treating trichomoniasis.

34. Antifungal mechanisms supporting boric acid therapy of Candida vaginitis.

    PubMed

    De Seta, Francesco; Schmidt, Martin; Vu, Bao; Essmann, Michael; Larsen, Bryan

    2009-02-01

    Boric acid is a commonly cited treatment for recurrent and resistant yeast vaginitis, but data about the extent and mechanism of its antifungal activity are lacking. The aim of this study was to use in vitro methods to understand the spectrum and mechanism of boric acid as a potential treatment for vaginal infection. Yeast and bacterial isolates were tested by agar dilution to determine the intrinsic antimicrobial activity of boric acid. Established microbial physiology methods illuminated the mechanism of the action of boric acid against Candida albicans. C. albicans strains (including fluconazole-resistant strains) were inhibited at concentrations attainable intravaginally; as were bacteria. Broth dilution MICs were between 1563 and 6250 mg/L and boric acid proved fungistatic (also reflected by a decrease in CO(2) generation); prolonged culture at 50,000 mg/L was fungicidal. Several organic acids in yeast nitrogen broth yielded a lower pH than equimolar boric acid and sodium borate but were less inhibitory. Cold or anaerobic incubation protected yeast at high boric acid concentrations. Cells maintained integrity for 6 h in boric acid at 37 degrees C, but after 24 h modest intrusion of propidium iodide occurred; loss of plate count viability preceded uptake of vital stain. Growth at sub-MIC concentrations of boric acid decreased cellular ergosterol. The drug efflux pump CDR1 did not protect Candida as CDR1 expression was abrogated by boric acid. Boric acid interfered with the development of biofilm and hyphal transformation. Boric acid is fungistatic to fungicidal depending on concentration and temperature. Inhibition of oxidative metabolism appears to be a key antifungal mechanism, but inhibition of virulence probably contributes to therapeutic efficacy in vivo.

35. Experimental Study and Reactive Transport Modeling of Boric Acid Leaching of Concrete

    NASA Astrophysics Data System (ADS)

    Pabalan, R. T.; Chiang, K.-T. K.

    2013-07-01

    Borated water leakage through spent fuel pools (SFPs) at pressurized water reactors is a concern because it could cause corrosion of reinforcement steel in the concrete structure, compromise the integrity of the structure, or cause unmonitored releases of contaminated water to the environment. Experimental data indicate that pH is a critical parameter that determines the corrosion susceptibility of rebar in borated water and the degree of concrete degradation by boric acid leaching. In this study, reactive transport modeling of concrete leaching by borated water was performed to provide information on the solution pH in the concrete crack or matrix and the degree of concrete degradation at different locations of an SFP concrete structure exposed to borated water. Simulations up to 100 years were performed using different boric acid concentrations, crack apertures, and solution flow rates. Concrete cylinders were immersed in boric acid solutions for several months and the mineralogical changes and boric acid penetration in the concrete cylinder were evaluated as a function of time. The depths of concrete leaching by boric acid solution derived from the reactive transport simulations were compared with the measured boric acid penetration depth.

36. GEMAS: prediction of solid-solution phase partitioning coefficients (Kd) for oxoanions and boric acid in soils using mid-infrared diffuse reflectance spectroscopy.

    PubMed

    Janik, Leslie J; Forrester, Sean T; Soriano-Disla, JosÃ© M; Kirby, Jason K; McLaughlin, Michael J; Reimann, Clemens

    2015-02-01

    The authors' aim was to develop rapid and inexpensive regression models for the prediction of partitioning coefficients (Kd), defined as the ratio of the total or surface-bound metal/metalloid concentration of the solid phase to the total concentration in the solution phase. Values of Kd were measured for boric acid (B[OH]3(0)) and selected added soluble oxoanions: molybdate (MoO4(2-)), antimonate (Sb[OH](6-)), selenate (SeO4(2-)), tellurate (TeO4(2-)) and vanadate (VO4(3-)). Models were developed using approximately 500 spectrally representative soils of the Geochemical Mapping of Agricultural Soils of Europe (GEMAS) program. These calibration soils represented the major properties of the entire 4813 soils of the GEMAS project. Multiple linear regression (MLR) from soil properties, partial least-squares regression (PLSR) using mid-infrared diffuse reflectance Fourier-transformed (DRIFT) spectra, and models using DRIFT spectra plus analytical pH values (DRIFTâ€‰+â€‰pH), were compared with predicted log K(dâ€‰+â€‰1) values. Apart from selenate (R(2) â€‰=â€‰0.43), the DRIFTâ€‰+â€‰pH calibrations resulted in marginally better models to predict log K(dâ€‰+â€‰1) values (R(2) â€‰=â€‰0.62-0.79), compared with those from PSLR-DRIFT (R(2) â€‰=â€‰0.61-0.72) and MLR (R(2) â€‰=â€‰0.54-0.79). The DRIFTâ€‰+â€‰pH calibrations were applied to the prediction of log K(dâ€‰+â€‰1) values in the remaining 4313 soils. An example map of predicted log K(dâ€‰+â€‰1) values for added soluble MoO4(2-) in soils across Europe is presented. The DRIFTâ€‰+â€‰pH PLSR models provided a rapid and inexpensive tool to assess the risk of mobility and potential availability of boric acid and selected oxoanions in European soils. For these models to be used in the prediction of log K(dâ€‰+â€‰1) values in soils globally, additional research will be needed to determine if soil variability is accounted on the calibration. Â© 2014 SETAC.

37. 40 CFR 415.280 - Applicability; description of the boric acid production subcategory.

    Code of Federal Regulations, 2012 CFR

    2012-07-01

    ... boric acid production subcategory. 415.280 Section 415.280 Protection of Environment ENVIRONMENTAL... SOURCE CATEGORY Boric Acid Production Subcategory Â§ 415.280 Applicability; description of the boric acid... production of boric acid from ore-mined borax and from borax produced by the Trona process. ...

38. Preparation and characterization of (10)B boric acid with high purity for nuclear industry.

    PubMed

Zhang, Weijiang; Liu, Tianyu; Xu, Jiao

2016-01-01

Boric acid is often added into coolant as neutron capture agent for pressurized water reactor, whose amount is influenced by its abundance and purity. Therefore, the preparation of enriched (10)B boric acid with high purity is beneficial to nuclear industry. (10)B is also used in developing tumor-specific boronated drugs in boron neutron capture therapy. The boronated drug can be administered to patient intravenously, intratumorally, or deposited at tumor site in surgical excision. Thus, enriched (10)B boric acid is of practical significance in the field of medicine. Self-made boron trifluoride-methanol-complex solution was selected as one of the experimental reagents, and the preparation of (10)B acid was realized by one-step reaction for the complexes with water and calcium chloride. The determination of electrical conductivity in reaction process proves that the optimum reaction time was 16-20Â h. Furthermore, the effect of reaction time, ratio of calcium chloride to complex as well as the amount of water on the purity and yield of boric acid was investigated. Finally, the optimum reaction time was 20Â h, the optimal solid-liquid ratio (molar ratio) was 3:1, and the amount of water was 1Â L of deionized water for each mol of the complex. H2O2 was added in the reaction process to remove Fe(2+). After recrystallization, IR spectra of (10)B boric acid was measured and compared with standard to verify the product of boric acid. The feasibility of the preparation method was determined by the detection of XRD of boric acid. To observe the morphology by polarizing microscope, crystal structure was obtained. The purity of the final product is 99.95Â %, and the yield is 96.47Â %. The ion concentration of boric acid accords with the national standard of high purity, which was determined by ICP.

39. Hearing loss effects of administering boric alcohol solution prepared with alcohol in various degrees on guinea pigs (an experimental study).

    PubMed

    Aktas, Sinem; Basoglu, Mehmet Sinan; Aslan, Hale; Ilknur, Ali Ekber; Dundar, Riza; Katilmis, Huseyin; Ozturkcan, Sedat

    2013-09-01

    To investigate the ototoxic effect of boric acid solution prepared with different degree of alcohol. This study was performed on 28 young albino guinea pigs. After the animals divided four groups prior to the application of the solution an auditory brainstem response (ABR) test was applied to the each animal under general anesthesia. Their tympanic membranes perforated and test solutions were administrated to the middle ear through the perforation. On 15th day, ABR measurements were carried out and comparison was made with preadministration values. The degrees of hearing loss occurring as a result of the administration of 4% boric alcohol solutions prepared with 60Â° and 40Â° alcohol differed significantly ($p < 0.001$). It was established that 4% boric acid solution prepared with 60 alcohol affected hearing in guinea pigs more negatively and an increase in degree of alcohol also increased the ototoxicity of the boric acid solution. Copyright Â© 2013 Elsevier Ireland Ltd. All rights reserved.

40. Assessment of boric acid and borax using the IEHR evaluative process for assessing human developmental and reproductive toxicity of agents

    SciTech Connect

    Moore, J.A.

    This document presents an evaluation of the reproductive and developmental effects of boric acid, H3BO3 (CAS Registry No. 10043-35-3) and disodium tetraborate decahydrate or borax, Na2B4O2O(CAS Registry No. 1303-96-4). The element, boron, does not exist naturally. In dilute aqueous solution and at physiological pH (7.4), the predominant species in undissociated boric acid (greater than 98%), irrespective of whether the initial material was boric acid of borax. Therefore, it is both useful and correct to compare exposures and dosages to boric acid and borax in terms of `boron equivalents`, since both materials form equivalent species in dilute aqueous solution with similarmoreÂ Â» systemic effects. In order to be clear in this document, the term `boron` will refer to `boron equivalents` or percent boron in boric acid and borax.Â«Â less

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41. 40 CFR 415.280 - Applicability; description of the boric acid production subcategory.

    Code of Federal Regulations, 2013 CFR

    2013-07-01

    ... CATEGORY Boric Acid Production Subcategory Â§ 415.280 Applicability; description of the boric acid... production of boric acid from ore-mined borax and from borax produced by the Trona process. ... 40 Protection of Environment 30 2013-07-01 2012-07-01 true Applicability; description of the boric...

42. 40 CFR 415.280 - Applicability; description of the boric acid production subcategory.

    Code of Federal Regulations, 2014 CFR

    2014-07-01

    ... CATEGORY Boric Acid Production Subcategory Â§ 415.280 Applicability; description of the boric acid... production of boric acid from ore-mined borax and from borax produced by the Trona process. ... 40 Protection of Environment 29 2014-07-01 2012-07-01 true Applicability; description of the boric...

43. 40 CFR 415.280 - Applicability; description of the boric acid production subcategory.

    Code of Federal Regulations, 2011 CFR

    2011-07-01

    ... CATEGORY Boric Acid Production Subcategory Â§ 415.280 Applicability; description of the boric acid... production of boric acid from ore-mined borax and from borax produced by the Trona process. ... 40 Protection of Environment 29 2011-07-01 2009-07-01 true Applicability; description of the boric...

44. 40 CFR 415.280 - Applicability; description of the boric acid production subcategory.

    Code of Federal Regulations, 2010 CFR

2010-07-01

... CATEGORY Boric Acid Production Subcategory Â§ 415.280 Applicability; description of the boric acid... production of boric acid from ore-mined borax and from borax produced by the Trona process. ... 40 Protection of Environment 28 2010-07-01 2010-07-01 true Applicability; description of the boric...

45. The Acid-Base Titration of a Very Weak Acid: Boric Acid

    ERIC Educational Resources Information Center

    Celeste, M.; Azevedo, C.; Cavaleiro, Ana M. V.

    2012-01-01

    A laboratory experiment based on the titration of boric acid with strong base in the presence of d-mannitol is described. Boric acid is a very weak acid and direct titration with NaOH is not possible. An auxiliary reagent that contributes to the release of protons in a known stoichiometry facilitates the acid-base titration. Students obtain theâ€¦

46. A case report of massive acute boric acid poisoning.

    PubMed

    Corradi, Francesco; Brusasco, Claudia; Palermo, Salvatore; Belvederi, Giulio

    2010-02-01

    Boric acid comes as colourless, odourless white powder and, if ingested, has potential fatal effects including metabolic acidosis, acute renal failure and shock. An 82-year-old male was brought to the emergency room 3 h after unintentional ingestion of a large amount of boric acid. Clinical course was monitored by collecting data at admittance, 12 h after admission, every 24 h for 5 days and again 1 week after admission. During the first 132 h, serum and urinary concentrations of boric acid were measured. Serum boric acid levels decreased from 1800 to 530 microg/ml after haemodialysis and from 530 to 30 microg/ml during the forced diuresis period. During dialysis, boric acid clearance averaged 235 ml/min with an extraction ratio of 70%. The overall patient's condition steadily improved over 84 h after admission. In conclusion, early treatment with forced diuresis and haemodialysis may be considered for boric acid poisoning, even if signs of renal dysfunction are not apparent, to prevent severe renal damage and its complications.

47. Boric acid for recurrent vulvovaginal candidiasis: the clinical evidence.

    PubMed

    Iavazzo, Christos; Gkegkes, Ioannis D; Zarkada, Ioanna M; Falagas, Matthew E

    2011-08-01

    Recurrent vulvovaginal candidiasis (VVC) remains a challenge to manage in clinical practice. Recent epidemiologic studies indicate that non-albicans Candida spp. are more resistant to conventional antifungal treatment with azoles and are considered as causative pathogens of vulvovaginal candidiasis. We searched PubMed and Scopus for studies that reported clinical evidence on the intravaginal use of boric acid for vulvovaginal candidiasis. We identified 14 studies (2 randomized clinical trials [RCTs], 9 case series, and 4 case reports) as eligible for inclusion in this review. Boric acid was compared with nystatin, terconazole, flucytosine, itraconazole, clotrimazole, ketoconazole, fluconazole, buconazole, and miconazole; as monotherapy, boric acid was studied in 7 studies. The mycologic cure rates varied from 40% to 100% in patients treated with boric acid; 4 of the 9 included case series reported statistically significant outcomes regarding cure (both mycologic and clinical) rates. None of the included studies reported statistically significant differences in recurrence rates. Regarding the adverse effects caused by boric acid use, vaginal burning sensation (<10% of cases), water discharge during treatment, and vaginal erythema were identified in 7 studies. Our findings suggest that boric acid is a safe, alternative, economic option for women with recurrent and chronic symptoms of vaginitis when conventional treatment fails because of the involvement of non-albicans Candida spp. or azole-resistant strains.

48. Gold Nanoplates for a Localized Surface Plasmon Resonance-Based Boric Acid Sensor

    PubMed Central

    Morsin, Marlia; Mat Salleh, Muhamad; Ali Umar, Akrajas; Sahdan, Mohd Zainizan

    2017-01-01

    Localized surface plasmon resonance (LSPR) properties of metallic nanostructures, such as gold, are very sensitive to the dielectric environment of the material, which can simply be adjusted by changing its shape and size through modification of the synthesizing process. Thus, these unique properties are very promising, particularly for the detection of various types of chemicals, for example boric acid which is a non-permitted preservative employed in food preparations. For the sensing material, gold (Au) nanoplates with a variety of shapes, i.e., triangular, hexagonal, truncated pentagon and flat rod, were prepared using a seed-mediated growth method. The yield of Au nanoplates was estimated to be ca. 63% over all areas of the sensing material. The nanoplates produced two absorption bands, i.e., the transverse surface plasmon resonance (t-SPR) and the longitudinal surface plasmon resonance (l-SPR) at 545 nm and 710 nm, respectively. In the sensing study, these two bands were used to examine the response of gold nanoplates to the presence of boric acid in an aqueous environment. In a typical process, when the sample is immersed into an aqueous solution containing boric acid, these two bands may change their intensity and peak centers as a result of the interaction between the boric acid and the gold nanoplates. The changes in the intensities and peak positions of t-SPR and l-SPR linearly correlated with the change in the boric acid concentration in the solution. PMID:28441323

49. Complexation of Nickel Ions by Boric Acid or (Poly)borates.

    PubMed

    Graff, Anais; Barrez, Etienne; Baranek, Philippe; Bachet, Martin; BÃ©nÃ©zeth, Pascale

    2017-01-01

    An experiment based on electrochemical reactions and pH monitoring was performed in which nickel ions were gradually formed by oxidation of a nickel metal electrode in a solution of boric acid. Based on the experimental results and aqueous speciation modeling, the evolution of pH showed the existence of significant nickel-boron complexation. A triborate nickel complex was postulated at high boric acid concentrations when polyborates are present, and the equilibrium constants were determined at 25, 50 and 70Â Â°C. The calculated enthalpy and entropy at 25Â Â°C for the formation of the complex from boric acid and Ni 2+ ions are respectively equal to (65.6Â Â±Â 3.1)Â kJÂ·mol -1 and (0.5Â Â±Â 11.1)Â JÂ·K -1 Â·mol -1 . The results of this study suggest that complexation of nickel ions by borates can significantly enhance the solubility of nickel metal and nickel oxide depending on the concentration of boric acid and pH. First principles calculations were investigated and tend to show that the complex is thermodynamically stable and the nickel cation in solution should interact more strongly with the [Formula: see text] than with boric acid.

50. Gold Nanoplates for a Localized Surface Plasmon Resonance-Based Boric Acid Sensor.

    PubMed

Morsin, Marlia; Mat Salleh, Muhamad; Ali Umar, Akrajas; Sahdan, Mohd Zainizan

2017-04-25

Localized surface plasmon resonance (LSPR) properties of metallic nanostructures, such as gold, are very sensitive to the dielectric environment of the material, which can simply be adjusted by changing its shape and size through modification of the synthesizing process. Thus, these unique properties are very promising, particularly for the detection of various types of chemicals, for example boric acid which is a non-permitted preservative employed in food preparations. For the sensing material, gold (Au) nanoplates with a variety of shapes, i.e., triangular, hexagonal, truncated pentagon and flat rod, were prepared using a seed-mediated growth method. The yield of Au nanoplates was estimated to be ca. 63% over all areas of the sensing material. The nanoplates produced two absorption bands, i.e., the transverse surface plasmon resonance (t-SPR) and the longitudinal surface plasmon resonance (l-SPR) at 545 nm and 710 nm, respectively. In the sensing study, these two bands were used to examine the response of gold nanoplates to the presence of boric acid in an aqueous environment. In a typical process, when the sample is immersed into an aqueous solution containing boric acid, these two bands may change their intensity and peak centers as a result of the interaction between the boric acid and the gold nanoplates. The changes in the intensities and peak positions of t-SPR and l-SPR linearly correlated with the change in the boric acid concentration in the solution.

51. Influence of boric acid (H3BO3) concentration on the physical properties of electrochemical deposited nickel (Ni) nanowires

    NASA Astrophysics Data System (ADS)

    Kananathan, J.; Sofiah, A. G. N.; Samykano, M.; Ulakanathan, S.; Lah, N. A. C.; Harun, W. S. W.; Sudhakar, K.; Kadirgama, K.; Ngui, W. K.; Siregar, J. P.

    2017-10-01

    Authors have investigated the influence of the stabilizer (Boric Acid) concentration during the template-assisted electrochemical deposition of Nickel (Ni) nanowires in Anodic Alumina Oxide (AAO) templates. The synthesis was performed using Ni Sulfate Hexahydrate (NiSO4.6H2O) as metal salts and Boric Acid (H3BO3) as a stabilizer. The mixture of both solutions creates electrolyte and utilized for the electrochemical deposition of Ni nanowires. During the experiment, the boric acid concentration varied between 5 g/L, 37.5 g/L and 60 g/L with a deposition temperature of 80 Â°C (constant). After the electrochemical deposition process, AAO templates were cleaned with distilled water before dissolution in Sodium Hydroxide (NaOH) solution to obtain the freestanding Ni nanowires. Physical properties of the synthesized Ni nanowires were analyzed using Field Emission Scanning Electron Microscopy (FESEM), Energy Dispersive Spectroscopy (EDX) and X-ray Diffraction (XRD). The physical properties of obtained Ni nanowires has eloborated by taking into account the effect of boric acid concentration on the surface morphology, growth length, elemental composition and crystal orientation crystal of the synthesized nickel nanowires. The finding exposes that the boric acid concentration does not influence all aspects in the physicals properties of the synthesized Ni nanowires. The boric acid concentration did not affect the surface texture and crystal orientation. However, shorter Ni nanowires obtained as the concentration of boric acid increased.

52. PRELIMINARY EVALUATION OF DWPF IMPACTS OF BORIC ACID USE IN CESIUM STRIP FOR SWPF AND MCU

    SciTech Connect

    Stone, M.

    2010-09-28

A new solvent system is being evaluated for use in the Modular Caustic-Side Solvent Extraction Unit (MCU) and in the Salt Waste Processing Facility (SWPF). The new system includes the option to replace the current dilute nitric acid strip solution with boric acid. To support this effort, the impact of using 0.01M, 0.1M, 0.25M and 0.5M boric acid in place of 0.001M nitric acid was evaluated for impacts on the DWPF facility. The evaluation only covered the impacts of boric acid in the strip effluent and does not address the other changes in solvents (i.e., the new extractant, called MaxCalix,moreÂ Â» or the new suppressor, guanidine). Boric acid additions may lead to increased hydrogen generation during the SRAT and SME cycles as well as change the rheological properties of the feed. The boron in the strip effluent will impact glass composition and could require each SME batch to be trimmed with boric acid to account for any changes in the boron from strip effluent additions. Addition of boron with the strip effluent will require changes in the frit composition and could lead to changes in melt behavior. The severity of the impacts from the boric acid additions is dependent on the amount of boric acid added by the strip effluent. The use of 0.1M or higher concentrations of boric acid in the strip effluent was found to significantly impact DWPF operations while the impact of 0.01M boric acid is expected to be relatively minor. Experimental testing is required to resolve the issues identified during the preliminary evaluation. The issues to be addressed by the testing are: (1) Impact on SRAT acid addition and hydrogen generation; (2) Impact on melter feed rheology; (3) Impact on glass composition control; (4) Impact on frit production; and (5) Impact on melter offgas. A new solvent system is being evaluated for use in the Modular Caustic-Side Solvent Extraction Unit (MCU) and in the Salt Waste Processing Facility (SWPF). The new system includes the option to replace

53. Effect of mass transfer processes on accumulation and crystallization of boric acid in WWER core in emergency cases

    NASA Astrophysics Data System (ADS)

    Morozov, A. V.; Pityk, A. V.; Ragulin, S. V.; Sahipgareev, A. R.; Soshkina, A. S.; Shlepkin, A. S.

    2017-09-01

    In this paper the processes of boric acid mass transfer in a WWER-TOI nuclear reactor in case of the accidents with main coolant circuit rupture and operation of passive safety systems (the hydro accumulators systems of the first, second and third stages, as well as the passive heat removal system) are considered. The results of the calculation of changes in the boric acid solution concentration in the core for the WWER emergency mode are presented. According to the results of the calculation a significant excess of the ultimate concentration of boric acid in accidents with main coolant circuit rupture after 43 hours of emergency mode is observed. The positive influence of the boric acid droplet entrainment on the processes of its crystallization and accumulation in the core is shown. The mass of boric acid deposits on the internals is determined. The received results allow concluding that the accumulation and crystallization of boric acid in the core may lead to blocking the flow cross section and to deterioration of heat removal from fuel rods. The necessity of an experimental studies of the processes of boric acid drop entrainment under conditions specific to the WWER emergency modes is shown.

54. Boric acid-phenolic relationships within the Pinus echinata-Pisolithus tinctorius ectomycorrhizal association

    Treesearch

    Mary Anne Sword; Harold E. Garrett

    1994-01-01

    At germination, container-grown shortleaf pine seedlings were inoculated with Pisolithus tinctorius (Pers.) Coker & Couch or left uninoculated, and both groups were fertilized semiweekly with a modified

HoaglandÃ¢Â€Â™s solution supplemented with 0 or 0.4 mM boric acid. After 12, 16 and 24 weeks, seedling root tissue was analyzed for...

55. 40 CFR 721.1875 - Boric acid, alkyl and substituted alkyl esters (generic name).

    Code of Federal Regulations, 2014 CFR

    2014-07-01

    ... 40 Protection of Environment 31 2014-07-01 2014-07-01 false Boric acid, alkyl and substituted... Significant New Uses for Specific Chemical Substances Â§ 721.1875 Boric acid, alkyl and substituted alkyl... chemical substance boric acid, alkyl and substituted alkyl esters (PMN P-86-1252) is subject to reporting...

56. 40 CFR 721.1875 - Boric acid, alkyl and substituted alkyl esters (generic name).

    Code of Federal Regulations, 2012 CFR

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    Code of Federal Regulations, 2010 CFR

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58. 40 CFR 721.1875 - Boric acid, alkyl and substituted alkyl esters (generic name).

    Code of Federal Regulations, 2013 CFR

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59. 40 CFR 721.1875 - Boric acid, alkyl and substituted alkyl esters (generic name).

    Code of Federal Regulations, 2011 CFR

    2011-07-01

    ... 40 Protection of Environment 31 2011-07-01 2011-07-01 false Boric acid, alkyl and substituted... Significant New Uses for Specific Chemical Substances Â§ 721.1875 Boric acid, alkyl and substituted alkyl... chemical substance boric acid, alkyl and substituted alkyl esters (PMN P-86-1252) is subject to reporting...

60. Boric acid inhibits embryonic histone deacetylases: A suggested mechanism to explain boric acid-related teratogenicity

    SciTech Connect

    Di Renzo, Francesca; Cappelletti, Graziella; Broccia, Maria L.

    2007-04-15

    Histone deacetylases (HDAC) control gene expression by changing histonic as well as non histonic protein conformation. HDAC inhibitors (HDACi) are considered to be among the most promising drugs for epigenetic treatment for cancer. Recently a strict relationship between histone hyperacetylation in specific tissues of mouse embryos exposed to two HDACi (valproic acid and trichostatin A) and specific axial skeleton malformations has been demonstrated. The aim of this study is to verify if boric acid (BA), that induces in rodents malformations similar to those valproic acid and trichostatin A-related, acts through similar mechanisms: HDAC inhibition and histone hyperacetylation. Pregnant mice weremoreÂ Â» treated intraperitoneally with a teratogenic dose of BA (1000 mg/kg, day 8 of gestation). Western blot analysis and immunostaining were performed with anti hyperacetylated histone 4 (H4) antibody on embryos explanted 1, 3 or 4 h after treatment and revealed H4 hyperacetylation at the level of somites. HDAC enzyme assay was performed on embryonic nuclear extracts. A significant HDAC inhibition activity (compatible with a mixed type partial inhibition mechanism) was evident with BA. Kinetic analyses indicate that BA modifies substrate affinity by a factor {alpha} = 0.51 and maximum velocity by a factor {beta} = 0.70. This work provides the first evidence for HDAC inhibition by BA and suggests such a molecular mechanism for the induction of BA-related malformations.Â«Â less

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61. Chemical mechanism of fire retardance of boric acid on wood

    Treesearch

    Qingwen Wang; Jian Li; Jerrold E. Winandy

    2004-01-01

    It is commonly accepted that the fire retardant mechanism of boric acid is a physical mechanism achieved by the formation of a coating or protective layer on the wood surface at high temperature. Although a char-forming catalytic mechanism has been proposed by some researchers, little direct experimental support has been provided for such a chemical mechanism. In this...

62. Boric acid-enhanced embedding medium for cryomicrotomy.

    PubMed

    Lim, Jin Ik; Park, Hun-Kuk

    2012-05-01

    A polyvinyl alcohol (PVA)/polyethylene glycol (PEG)-based resin is commonly used as a cryoembedding medium for the histological analysis of frozen tissue sections. However, it is not easy to obtain sufficient numbers of satisfactory reproducible sections owing to the differences between the mechanical properties of the medium and embedded tissue and the low cohesive force of the medium. We describe a modified PVA-based cryoembedding medium, composed of PVA (10wt% and 15wt%) with the addition of boric acid (from 0 to 5wt%), that can improve the sectioning properties and efficiency of frozen tissue for histological analysis. The amount of load under the same compressive displacement as well as cohesive force increased with increasing boric acid and PVA contents. 15wt% PVA and 3wt% boric acid was determined as an optimal composition for cryoembedding material based on the sectioning efficiency measured by the numbers of unimpaired sectioned slices and the amount of load under the same compressive displacement test. On the basis of the results of routine hematoxylin and eosin staining of cryosections of tissue embedded in a medium with 3wt% boric acid and PVA, it was concluded that the modified PVA cryoembedding medium can improve the efficiency of cryosectioning for subsequent histological or histochemical analysis of various tissues. Copyright Ã‚Â© 2011 Elsevier GmbH. All rights reserved.

63. 40 CFR 180.1121 - Boric acid and its salts, borax (sodium borate decahydrate), disodium octaborate tetrahydrate...

    Code of Federal Regulations, 2014 CFR

    2014-07-01

    ... 40 Protection of Environment 24 2014-07-01 2014-07-01 false Boric acid and its salts, borax... salts, borax (sodium borate decahydrate), disodium octaborate tetrahydrate, boric oxide (boric anhydride... its salts, borax (sodium borate decahydrate), disodium octaborate tetrahydrate, boric oxide (boric...

64. 40 CFR 180.1121 - Boric acid and its salts, borax (sodium borate decahydrate), disodium octaborate tetrahydrate...

    Code of Federal Regulations, 2011 CFR

    2011-07-01

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65. 40 CFR 180.1121 - Boric acid and its salts, borax (sodium borate decahydrate), disodium octaborate tetrahydrate...

    Code of Federal Regulations, 2012 CFR

    2012-07-01

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66. 40 CFR 180.1121 - Boric acid and its salts, borax (sodium borate decahydrate), disodium octaborate tetrahydrate...

    Code of Federal Regulations, 2013 CFR

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67. Oral toxicity of abamectin, boric acid, fipronil, and hydramethylnon to laboratory colonies of Argentine ants (Hymenoptera: Formicidae).

    PubMed

    Hooper-Bui, L M; Rust, M K

    2000-06-01

    Comprehensive laboratory baiting studies with the 4 insecticides abamectin, boric acid, fipronil, and hydramethylnon were conducted against Argentine ant, Linepithema humile (Mayr). Serial dilutions of each insecticide prepared in a 25% sucrose solution were provided for 24 h or 14 d to groups of workers and queens. Sucrose-water baits containing 1 x 10(-5)% fipronil and 0.1% hydramethylnon provided complete mortality of L. humile workers baited for 24 h. Baits containing 1 x 10(-4) and 1 x 10(-5)% fipronil provided 100% kill of queens. In the continuous baiting, 0.5% boric acid, 1 x 10(-6)% fipronil, and 0.025% hydramethylnon provided 100% mortality of workers. The queens and workers provided baits containing 1 x 10(-5)% fipronil and 0.5% boric acid all died within 14 d. Low concentrations of fipronil and boric acid in sucrose may be promising candidates for Argentine ant control.

68. The effect of boric acid on acethylcholine, bethanechol and potasssium-evoked responses on ileum of rat.

    PubMed

    Ince, S; Turkmen, R; Yavuz, H

    2011-01-01

    1 The aim of this study was to clarify the effect of boric acid on contractions of rat isolated ileum. 2 Contractile responses expressed as Emax and pD2 for acetylcholine (10(-3)-10(-8) m, Ach), bethanechol (10(-3)-10(-8) m) and potassium (10-80 Ã— 10(-3) m, KCl) were determined in the absence and presence of boric acid (10(-3); 5 Ã— 10(-4); 10(-4) m). 3 The contractile response to Ach in the presence of verapamil (10(-6) or 10(-8) m) or in calcium-free Tyrode's solution was also determined in the absence and presence of boric acid. 4 Boric acid did not affect the contractile response to Ach, bethanechol or KCl. Single or cumulative treatment of boric acid did not affect ileum muscle contraction evoked by KCl. The atropine-resistant component of Ach-induced contraction and 4-diphenyl-acetoxy-N-methyl-piperidine methiodide-resistant component of bethanechol-induced contraction were not inhibited by boric acid (10(-3) m). The contractile response to Ach was reduced in calcium-free Tyrode's solution, and the contractile response was not affected by (10(-8) m). The addition of boric acid (10(-3) m) in combination with verapamil (10(-8) m) did not significantly affect the contractile response to Ach. 5 In conclusion, boric acid does not affect contractions induced by Ach, bethanechol or potassium in rat isolated ileum. Â© 2011 Blackwell Publishing Ltd.

69. Efficacy of Boric Acid as a Treatment of Choice for Chronic Suppurative Otitis Media and Its Ototoxicity.

    PubMed

    Adriztina, Indri; Adenin, Linda Irwani; Lubis, Yuliani Mardiati

    2018-01-01

    Chronic suppurative otitis media (CSOM) is one of the most common chronic infectious diseases worldwide, especially affecting children. The patients or the parents of the affected children are often worried about the cost of medical visits, prescription medicines, or inconsistently effective medication. The complications of CSOM have been greatly reduced because of the development of antibiotics; however, the irrational use of antibiotics has led to the emergence of organisms resistant to the commonly used drugs. Owing to the increase in antibiotic resistance, the development of new treatments that will efficiently eradicate infectious microorganisms has become imperative. Boric acid solutions are effective in the treatment of CSOM because of their acidic effect. Various databases, such as the PubMed, The Cochrane Library, and SciELO, were searched for references related to the efficacy of boric acid in the treatment of mucosal CSOM, as well as its ototoxicity. The search revealed that boric acid is relatively effective in treating CSOM, especially at a high concentration. Boric acid in distilled water was found safe in animal studies. However, the ototoxicity of boric acid concentrations higher than 4% needs further evaluation, considering the effectivity of boric acid at high concentrations.

70. Efficacy of Boric Acid as a Treatment of Choice for Chronic Suppurative Otitis Media and Its Ototoxicity

    PubMed Central

    Adenin, Linda Irwani; Lubis, Yuliani Mardiati

    2018-01-01

    Chronic suppurative otitis media (CSOM) is one of the most common chronic infectious diseases worldwide, especially affecting children. The patients or the parents of the affected children are often worried about the cost of medical visits, prescription medicines, or inconsistently effective medication. The complications of CSOM have been greatly reduced because of the development of antibiotics; however, the irrational use of antibiotics has led to the emergence of organisms resistant to the commonly used drugs. Owing to the increase in antibiotic resistance, the development of new treatments that will efficiently eradicate infectious microorganisms has become imperative. Boric acid solutions are effective in the treatment of CSOM because of their acidic effect. Various databases, such as the PubMed, The Cochrane Library, and SciELO, were searched for references related to the efficacy of boric acid in the treatment of mucosal CSOM, as well as its ototoxicity. The search revealed that boric acid is relatively effective in treating CSOM, especially at a high concentration. Boric acid in distilled water was found safe in animal studies. However, the ototoxicity of boric acid concentrations higher than 4% needs further evaluation, considering the effectivity of boric acid at high concentrations. PMID:29383205

71. Effect of nano-silver and boric acid on extending the vase life of cut rose (Rosa hybrida L.).

    PubMed

    Hashemabadi, Davood; Liavali, Mahbanoo Hoseinzadeh; Kaviani, Behzad; Mousavi, Meysam; Keyghobadi, Saghi; Zahiri, Samaneh

    2014-09-01

    Silver nano-particles (2-5 nm diam.), as antimicrobial agent and boric acid, as ethylene production inhibitor are used for enhancing the quality and vase life of cut flowers. In the present study the effects of a preservative solution containing nano-silver and boric acid on some traits of cut rose (Rosa hybrida L.

cv. Yellow Island) including vase life, ethylene production, dry weight percentage, chlorophyll content, flower opening index, beta-carotene of petals and the number of basal stem end bacteria were investigated. The results showed that the effect of nano-silver and boric acid as either solitary or in combination with each other were significant (p < or = 0.01) on vase life, ethylene production and beta-carotene pigment. The effect of nano-silver on the number of bacteria on the end of stem was significant (p < or = 0.01). The highest cut flower longevity (9.69 day) was obtained in pulse-treated flowers with 100 mg l(-1) boric acid. The least ethylene production (0.59 nl(-1) g(-1) h(-1)) was observed in cut rose treated with 100 mg l(-1) boric acid along with 5 mg l(-1) nano-silver. The lowest number of bacteria in the end of stem was calculated in cut flowers treated with the highest concentrations of boric acid (300 mg l(-1)) and nano-silver (20 mg l(-1)).

72. Effect of application rate and persistence of boric acid sugar baits applied to plants for control of Aedes albopictus.

    PubMed

    Xue, Rui-De; MÃ¼ller, GÃ¼nter C; Kline, Daniel L; Barnard, Donald R

    2011-03-01

    The use of toxic bait to kill adult Aedes albopictus is a safe and potentially effective alternative to the use of synthetic chemical insecticides. This study was carried out to determine effective concentrations of boric acid needed in sugar bait solutions applied to plant surfaces, and to determine its residual effect in reducing adult mosquito densities. In outdoor tests in 1,100-m3 screened enclosures, landing rates of Ae. albopictus on a human subject and the number of female mosquitoes in mechanical traps were significantly reduced by a 1% boric acid bait compared with the other tested concentrations (0.25%, 0.50%, and 0.75%) and untreated control. Studies of the duration of boric acid activity on plant surfaces were made in 1.4-m3 cages in the laboratory and outdoors in 78-m3 screened enclosures. In the laboratory tests, 1% boric acid bait resulted in >96% mortality in male and female Ae. albopictus for 14 days, whereas in outdoor tests, mosquito landing rates in the treated enclosures were significantly lower than in the control enclosures for 7 days. Also, mosquito mortality responses to boric acid baits between plants with flowers and nonflowers (1.4-m3 cages in the laboratory) were not significantly different. The results of this study suggest that boric acid baits applied to plant surfaces may provide specific data related to the development of an effective point-source-based adjunct/alternative to the use of conventional adulticides for mosquito control.

73. Synergistic effect of EDTA and boric acid on corneal penetration of CS-088.

    PubMed

    Kikuchi, Takayuki; Suzuki, Masahiko; Kusai, Akira; Iseki, Ken; Sasaki, Hitoshi

    2005-02-16

    In order to investigate the effects of EDTA and boric acid (EDTA/boric acid) on the corneal penetration of CS-088, an ophthalmic agent, the apparent permeability coefficient of CS-088 in the presence of EDTA/boric acid across the isolated corneal membranes of rabbits was measured using an in vitro penetration chamber system. FITC-dextran (M.W. 4400) and an electrical method based on membrane resistance were used to provide a quantitative assessment of the enhancing effect of EDTA/boric acid. The corneal penetration of CS-088 was significantly enhanced in the presence of EDTA/boric acid by approximately 1.6-fold. The permeability-enhancing effect of EDTA/boric acid was apparently synergistic and concentration-dependent on both EDTA and boric acid. The penetration of FITC-dextran, a paracellular marker, and electrical resistance of corneal membranes were not affected in the presence of EDTA/boric acid. Furthermore, no enhancing effect of EDTA/boric acid was observed in de-epithelialized corneas, although de-epithelialized corneas exhibited a markedly higher permeability of CS-088 that was

24-fold greater than that for intact corneas. In conclusion, EDTA/boric acid synergistically enhances the transcellular permeability of CS-088 in the outer layer but not in the inner layers of the corneal membrane.

74. Boric acid inhibits human prostate cancer cell proliferation.

    PubMed

    Barranco, Wade T; Eckhert, Curtis D

    2004-12-08

    The role of boron in biology includes coordinated regulation of gene expression in mixed bacterial populations and the growth and proliferation of higher plants and lower animals. Here we report that boric acid, the dominant form of boron in plasma, inhibits the proliferation of prostate cancer cell lines, DU-145 and LNCaP, in a dose-dependent manner. Non-tumorigenic prostate cell lines, PWR-1E and RWPE-1, and the cancer line PC-3 were also inhibited, but required concentrations higher than observed human blood levels. Studies using DU-145 cells showed that boric acid induced a cell death-independent proliferative inhibition, with little effect on cell cycle stage distribution and mitochondrial function.

75. Body Weight Reducing Effect of Oral Boric Acid Intake

    PubMed Central

    Aysan, Erhan; Sahin, Fikrettin; Telci, Dilek; Yalvac, Mehmet Emir; Emre, Sinem Hocaoglu; Karaca, Cetin; Muslumanoglu, Mahmut

    2011-01-01

    Background: Boric acid is widely used in biology, but its body weight reducing effect is not researched. Methods: Twenty mice were divided into two equal groups. Control group mice drank standard tap water, but study group mice drank 0.28mg/250ml boric acid added tap water over five days. Total body weight changes, major organ histopathology, blood biochemistry, urine and feces analyses were compared. Results: Study group mice lost body weight mean 28.1% but in control group no weight loss and also weight gained mean 0.09% ($p<0.001$). Total drinking water and urine outputs were not statistically different. Cholesterol, LDL, AST, ALT, LDH, amylase and urobilinogen levels were statistically significantly high in the study group. Other variables were not statistically different. No histopathologic differences were detected in evaluations of all resected major organs. Conclusion: Low dose oral boric acid intake cause serious body weight reduction. Blood and urine analyses support high glucose, lipid and middle protein catabolisms, but the mechanism is unclear. PMID:22135611

76. Body weight reducing effect of oral boric acid intake.

    PubMed

    Aysan, Erhan; Sahin, Fikrettin; Telci, Dilek; Yalvac, Mehmet Emir; Emre, Sinem Hocaoglu; Karaca, Cetin; Muslumanoglu, Mahmut

    2011-01-01

    Boric acid is widely used in biology, but its body weight reducing effect is not researched. Twenty mice were divided into two equal groups. Control group mice drank standard tap water, but study group mice drank 0.28mg/250ml boric acid added tap water over five days. Total body weight changes, major organ histopathology, blood biochemistry, urine and feces analyses were compared. Study group mice lost body weight mean 28.1% but in control group no weight loss and also weight gained mean 0.09% ($p<0.001$). Total drinking water and urine outputs were not statistically different. Cholesterol, LDL, AST, ALT, LDH, amylase and urobilinogen levels were statistically significantly high in the study group. Other variables were not statistically different. No histopathologic differences were detected in evaluations of all resected major organs. Low dose oral boric acid intake cause serious body weight reduction. Blood and urine analyses support high glucose, lipid and middle protein catabolisms, but the mechanism is unclear.

77. Boric acid ingestion clinically mimicking toxic epidermal necrolysis.

    PubMed

    Webb, David V; Stowman, Anne M; Patterson, James W

    2013-11-01

    The ingestion of large amounts of boric acid, a component of household insecticides, is a rare occurrence, characterized by a diffuse desquamative skin eruption, neutropenia, thrombocytopenia, delirium, acute renal failure and prolonged ileus. A 56-year-old male with a history of multiple previous suicide attempts was witnessed ingesting household roach killer and 4 days later presented to the hospital with lethargy, stiffness and a diffuse erythematous and desquamative eruption with bullous formation. He subsequently developed erythema of both palms as well as alopecia totalis. Histopathology from a right arm shave biopsy revealed a mostly intact epidermis with subtle vacuolar alteration of the basal layer, scattered intraepidermal apoptotic keratinocytes, parakeratosis with alternating layers of orthokeratosis and considerable superficial exfoliation; accompanying dermal changes included vasodilatation and mild perivascular inflammation. This report describes the cutaneous and systemic complications in a rare case of boric acid ingestion. There is little published material on the symptoms and histopathology following boric acid ingestion, but knowledge of this entity is important, both to differentiate it from other causes of desquamative skin rashes and to allow the initiation of appropriate clinical care. Â© 2013 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd.

78. 40 CFR 721.3031 - Boric acid (H_3BO_3), zinc salt (2=3).

    Code of Federal Regulations, 2010 CFR

    2010-07-01

    ... 40 Protection of Environment 30 2010-07-01 2010-07-01 false Boric acid (H_3BO_3), zinc salt (2=3... Substances Â§ 721.3031 Boric acid (H_3BO_3), zinc salt (2=3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as boric acid (H_3BO_3), zinc salt (2=3) (PMN P...

79. 40 CFR 721.3032 - Boric acid (H_3BO_2), zinc salt.

    Code of Federal Regulations, 2010 CFR

    2010-07-01

    ... 40 Protection of Environment 30 2010-07-01 2010-07-01 false Boric acid (H_3BO_2), zinc salt. 721... Substances Â§ 721.3032 Boric acid (H_3BO_2), zinc salt. (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as boric acid (H_3BO_2), zinc salt (PMN P-97-553...

80. 40 CFR 721.3031 - Boric acid (H_3BO_3), zinc salt (2=3).

    Code of Federal Regulations, 2011 CFR

    2011-07-01

... 40 Protection of Environment 31 2011-07-01 2011-07-01 false Boric acid (H3BO3), zinc salt (2=3... Substances Â§ 721.3031 Boric acid (H3BO3), zinc salt (2=3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as boric acid (H3BO3), zinc salt (2=3) (PMN P...

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81. 40 CFR 721.3032 - Boric acid (H3BO2), zinc salt.

    Code of Federal Regulations, 2011 CFR

    2011-07-01

    ... 40 Protection of Environment 31 2011-07-01 2011-07-01 false Boric acid (H3BO2), zinc salt. 721... Substances Â§ 721.3032 Boric acid (H3BO2), zinc salt. (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as boric acid (H3BO2), zinc salt (PMN P-97-553...

82. Synthesis and characterization of boric acid mediated metal-organic frameworks based on trimesic acid and terephthalic acid

    NASA Astrophysics Data System (ADS)

    Ozer, Demet; KÃ¶se, Dursun A.; Åžahin, Onur; Oztas, Nursen Altuntas

    2017-08-01

    The new metal-organic framework materials based on boric acid reported herein. Sodium and boron containing metal-organic frameworks were synthesized by one-pot self-assembly reaction in the presence of trimesic acid and terephthalic acid in water/ethanol solution. Boric acid is a relatively cheap boron source and boric acid mediated metal-organic framework prepared mild conditions compared to the other boron source based metal-organic framework. The synthesized compounds were characterized by FT-IR, p-XRD, TGA/DTA, elemental analysis, 13C-MAS NMR, 11B-NMR and single crystal measurements. The molecular formulas of compounds were estimated as C18H33B2Na5O28 and C8H24B2Na2O17 according to the structural analysis. The obtained complexes were thermally stable. Surface properties of inorganic polymer complexes were investigated by BET analyses and hydrogen storage properties of compound were also calculated.

83. Effect of boric acid mass transfer on the accumulation thereof in a fuel core under emergency modes at NPPs with WMR

NASA Astrophysics Data System (ADS)

Morozov, A. V.; Sorokin, A. P.; Ragulin, S. V.; Pityk, A. V.; Sahipgareev, A. R.; Soshkina, A. S.; Shlepkin, A. S.

2017-07-01

Boric acid mass transfer processes in the reactor facilities with WMR are considered for the case of an emergency with breaking of the main circulation pipeline (MCP) and the operation of the passive safety systems, such as first-, second-, and third-stage accumulator tank systems, and a passive heat removal system (PHRS). Calculation results are presented for a change in the boric acid concentration in the fuel core (FC) of a water-moderated reactor (WMR) in the case of an emergency process. The calculations have been performed for different values of drop entrainment of boric acid from the reactor (0, 0.2, 2%). A substantial excess of the maximum concentration of boric acid has been found to occur 24 hours after an emergency event with a break of MCP. It is shown that increasing the droplet entrainment of boric acid causes the crystallization and accumulation thereof in the FC to become slower. The mass of boric acid deposits on the elements of internals is determined depending on the values of drop entrainment. These results allow one to draw a conclusion concerning the possibility of accumulation and crystallization of boric acid in the FC, because the latter event could lead to a blocking of the flow cross section and disturbance in the heat removal from fuel elements. A review of available literature data concerning the thermal properties of boric acid solution (density, viscosity, thermal conductivity) is presented. It is found that the available data are of quite a general character, but it does not cover the entire range of parameters (temperature, pressure, acid concentrations) inherent in a possible emergency situation at nuclear power plants with WMR. It is demonstrated that experimental study of boric acid drop entrainment at the parameters inherent in the emergency mode of WMR operation, as well as the studies of boric acid thermal properties in a wide range of concentrations, are required.

84. Amorphous titania modified with boric acid for selective capture of glycoproteins.

    PubMed

    Jin, Shanxia; Liu, Liping; Zhou, Ping

    2018-05-22

    Amorphous titania was modified with boric acid, and the resulting material was characterized by scanning electron microscopy, Fourier transform infrared spectroscopy, X-ray powder diffraction and X-ray photoelectron spectrometry. The new material, in contrast to conventional boronate affinity materials containing boronic acid ligands, bears boric acid groups. It is shown to exhibit high specificity for glycoproteins, and this was applied to design a method for solid phase extraction of glycoproteins as shown for ribonuclease B, horse radish peroxidase and ovalbumin. Glycoproteins were captured under slightly alkaline environment and released in acidic solutions. The glycoproteins extracted were detected by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry. The binding capacities for ribonuclease B, horse radish peroxidase and ovalbumin typically are 9.3, 26.0 and 53.0Â mg âˆ™ g -1 , respectively. The method was successfully applied to the selective enrichment of ovalbumin from egg white. Graphical abstract Schematic presentation of the capture of glycoproteins by amorphous titania modified with boric acid.

85. Ototoxicity of boric acid powder in a rat animal model.

    PubMed

    Salihoglu, Murat; Dogru, Salim; Cesmeci, Enver; Caliskan, Halil; Kurt, Onuralp; KuÃ§ukodaci, Zafer; Gungor, Atila

2017-04-22

Boric acid, which has antiseptic and acidic properties, is used to treat external and middle ear infections. However, we have not found any literature about the effect of boric acid powder on middle ear mucosa and inner ear. The purpose of this study is to investigate possible ototoxic effects of boric acid powder (BAP) on cochlear outer hair cell function and histological changes in middle ear mucosa in a rat animal model. Twenty healthy, mature Wistar albino rats were used in this study. The rats were divided into two groups, Group A and Group B, each of which consisted of 10 rats. Initially, the animals in each group underwent distortion product otoacoustic emissions (DPOAE) testing of their right and left ears. After the first DPOAE test, a surgical microscope was used to make a small perforation in both ears of the rats in each group, and a second DPOAE test was used to measure both ears in all of the rats. BAP was applied to the right middle ear of the rats using tympanic membrane perforation, and the DPOAEs were measured immediately after the BAP application. The histological changes and DPOAEs were evaluated three days later in GroupÂ A and 40Â days later in GroupÂ B. No significant differences were found at all of the DPOAE frequencies. In Group A, mild inflammation of the middle ear mucosa was found on the thirdÂ day after BAP application. In Group B, BAP caused mild inflammatory changes on the 40thÂ day, which declined over time. Those changes did not lead to significant fibrosis within the mucosa. In rats, BAP causes mild inflammation in middle ear mucosa and it has no ototoxic effects on cochlear outer hair cell function in the inner ear of rats. Copyright Â© 2017 AssociaÃ§Ã£o Brasileira de Otorrinolaringologia e Cirurgia CÃ©rvico-Facial. Published by Elsevier Editora Ltda. All rights reserved.

86. Effect of boric acid supplementation of ostrich water on the expression of Foxn1 in thymus.

    PubMed

    Xiao, Ke; Ansari, Abdur Rahman; Rehman, Zia Ur; Khaliq, Haseeb; Song, Hui; Tang, Juan; Wang, Jing; Wang, Wei; Sun, Peng-Peng; Zhong, Juming; Peng, Ke-Mei

    2015-11-01

    Foxn1 is essential for thymus development. The relationship between boric acid and thymus development, optimal dose of boric acid in ostrich diets, and the effects of boric acid on the expression of Foxn1 were investigated in the present study. Thirty healthy ostriches were randomly divided into six groups: Group I, II, III, IV, V, VI, and supplemented with boric acid at the concentration of 0 mg/L, 40 mg/L, 80 mg/L, 160 mg/L, 320 mg/L, 640 mg/L, respectively. The histological changes in thymus were observed by HE staining, and the expression of Foxn1 analyzed by immunohistochemistry and western blot. TUNEL method was used to label the apoptotic cells. Ostrich Foxn1 was sequenced by Race method. The results were as following: Apoptosis in ostrich thymus was closely related with boric acid concentrations. Low boric acid concentration inhibited apoptosis in thymus, but high boric acid concentration promoted apoptosis. Foxn1-positive cells were mainly distributed in thymic medulla and rarely in cortex. Foxn1 is closely related to thymus growth and development. The nucleotide sequence and the encoded protein of Foxn1 were 2736 bases and 654 amino acids in length. It is highly conserved as compared with other species. These results demonstrated that the appropriate boric acid supplementation in water would produce positive effects on the growth development of ostrich thymus by promoting Foxn1 expression, especially at 80 mg/L, and the microstructure of the thymus of ostrich fed 80 mg/L boric acid was well developed. The supplementation of high dose boron (>320 mg/L) damaged the microstructure of thymus and inhibited the immune function by inhibiting Foxn1 expression, particularly at 640 mg/L. The optimal dose of boric acid supplementation in ostrich diets is 80 mg/L boric acid. The genomic full-length of African ostrich Foxn1 was cloned for the first time in the study.

87. Aquaglyceroporins Are the Entry Pathway of Boric Acid in Trypanosoma brucei.

    PubMed

Marsiccobetre, Sabrina; RodrÃguez-Acosta, Alexis; Lang, Florian; Figarella, Katherine; UzcÃ¡tegui, NÃ©stor L

2017-05-01

The boron element possesses a range of different effects on living beings. It is essential to beneficial at low concentrations, but toxic at excessive concentrations. Recently, some boron-based compounds have been identified as promising molecules against Trypanosoma brucei, the causative agent of sleeping sickness. However, until now, the boron metabolism and its access route into the parasite remained elusive. The present study addressed the permeability of T. brucei aquaglyceroporins (TbAQPs) for boric acid, the main natural boron species. To this end, the three TbAQPs were expressed in Saccharomyces cerevisiae and Xenopus laevis oocytes. Our findings in both expression systems showed that all three TbAQPs are permeable for boric acid. Especially TbAQP2 is highly permeable for this compound, displaying one of the highest conductances reported for a solute in these channels. Additionally, T. brucei aquaglyceroporin activities were sensitive to pH. Taken together, these results establish that TbAQPs are channels for boric acid and are highly efficient entry pathways for boron into the parasite. Our findings stress the importance of studying the physiological functions of boron and their derivatives in T. brucei, as well as the pharmacological implications of their uptake by trypanosome aquaglyceroporins. Copyright Â© 2017 Elsevier B.V. All rights reserved.

88. 40 CFR 721.3032 - Boric acid (H3BO2), zinc salt.

    Code of Federal Regulations, 2012 CFR

    2012-07-01

    ... 40 Protection of Environment 32 2012-07-01 2012-07-01 false Boric acid (H3BO2), zinc salt. 721.3032 Section 721.3032 Protection of Environment ENVIRONMENTAL PROTECTION AGENCY (CONTINUED) TOXIC SUBSTANCES CONTROL ACT SIGNIFICANT NEW USES OF CHEMICAL SUBSTANCES Significant New Uses for Specific Chemical Substances Â§ 721.3032 Boric acid (H3BO2),...

89. 40 CFR 721.3032 - Boric acid (H3BO2), zinc salt.

    Code of Federal Regulations, 2014 CFR

    2014-07-01

    ... 40 Protection of Environment 31 2014-07-01 2014-07-01 false Boric acid (H3BO2), zinc salt. 721.3032 Section 721.3032 Protection of Environment ENVIRONMENTAL PROTECTION AGENCY (CONTINUED) TOXIC SUBSTANCES CONTROL ACT SIGNIFICANT NEW USES OF CHEMICAL SUBSTANCES Significant New Uses for Specific Chemical Substances Â§ 721.3032 Boric acid (H3BO2),...

90. 40 CFR 721.3032 - Boric acid (H3BO2), zinc salt.

    Code of Federal Regulations, 2013 CFR

    2013-07-01

    ... 40 Protection of Environment 32 2013-07-01 2013-07-01 false Boric acid (H3BO2), zinc salt. 721.3032 Section 721.3032 Protection of Environment ENVIRONMENTAL PROTECTION AGENCY (CONTINUED) TOXIC SUBSTANCES CONTROL ACT SIGNIFICANT NEW USES OF CHEMICAL SUBSTANCES Significant New Uses for Specific Chemical Substances Â§ 721.3032 Boric acid (H3BO2),...

91. Ingested boric acid effect on the venom chemistry of Solenopsis invicta Buren (Hymenoptera: Formicidae)

    USDA-ARS?s Scientific Manuscript database

    During a field evaluation of a boric acid bait against the red imported fire ant, Solenopsis invicta Buren, it was observed that workers of intoxicated colonies produced stings with less toxic effects compared to workers from healthy colonies. In this study, the effect of boric acid on the levels o...

92. PERIODS OF VERTEBRAL COLUMN SENSITIVITY TO BORIC ACID TREATMENT IN CD-1 MICE IN UTERO

    EPA Science Inventory

    Periods of vertebral column sensitivity to boric acid treatment in CD-1 mice in utero.

    Cherrington JW, Chernoff N.

    Department of Toxicology, North Carolina State University, Raleigh, NC 27695, USA. jana_cherrington@hotmail.com

    Boric acid (BA) has many uses as...

93. Experimental study on the estrogen-like effect of boric Acid.

    PubMed

    Wang, Yadong; Zhao, Yingzheng; Chen, Xiaoyu

    2008-02-01

    There are now considerable evidences that boric acid has reproductive and developmental toxicity, but it is uncertain whether such toxicity is caused by estrogen-like effect. Our objective is to determine the estrogen-like effect of boric acid. Proliferation assay of MCF-7 human breast cancer cells, uterotrophic assay, measure assay of the estradiol (E2), proliferation assay of mucous membrane cells, and assay of estrogen receptor were conducted in this study. Boric acid could increase the weight of uterus of ovariectomized SD rats and the height of epithelium cells of mucous membrane, enhance the expression of the proliferating cell nucleus antigen, and reduce the density of estrogen receptors. However, boric acid could not affect the level of estradiol in serum and stimulate the proliferation of MCF-7 human breast cancer cells. In this study, boric acid exhibited the estrogen-like effect in vivo.

94. Non-intercalative, deoxyribose binding of boric acid to calf thymus DNA.

    PubMed

    Ozdemir, Ayse; GursaclÄ±, Refiye Tekiner; Tekinay, Turgay

    2014-05-01

    The present study characterizes the effects of the boric acid binding on calf thymus DNA (ct-DNA) by spectroscopic and calorimetric methods. UV-Vis absorbance spectroscopy, circular dichroism (CD) spectroscopy, transmission electron microscopy (TEM), isothermal titration calorimetry (ITC), and Fourier transform infrared (FT-IR) spectroscopy were employed to characterize binding properties. Changes in the secondary structure of ct-DNA were determined by CD spectroscopy. Sizes and morphologies of boric acid-DNA complexes were determined by transmission electron microscopy (TEM). The kinetics of boric acid binding to calf thymus DNA (ct-DNA) was investigated by isothermal titration calorimetry (ITC). ITC results revealed that boric acid exhibits a moderate affinity to ct-DNA with a binding constant (K a) of 9.54â€‰Ã—â€‰10(4) M(-1). FT-IR results revealed that boric acid binds to the deoxyribose sugar of DNA without disrupting the B-conformation at tested concentrations.

95. Effect of application rate and persistence of boric acid sugar baits applied to plants control of Aedes albopictus

    USDA-ARS?s Scientific Manuscript database

    The use of toxic baits to kill adult Aedes albopictus (Skuse) mosquitoes is a safe and potentially effective alternative to the use of synthetic chemical insecticides. This study was made to identify effective application rates for boric acid-sugar solution baits sprayed onto plant surfaces and to ...

96. Study of structural, surface and hydrogen storage properties of boric acid mediated metal (sodium)-organic frameworks

    NASA Astrophysics Data System (ADS)

    Ozer, Demet; KÃ¶se, Dursun A.; Sahin, Onur; Oztas, Nursen A.

    2018-04-01

    Three boric acid mediated metal organic frameworks were synthesized by solution method with using succinic acid, fumaric acid and acetylene dicarboxylic acid as a ligand source and sodium as a metal source. The complexes were characterized by FT-IR, powder XRD, elemental analyses and single crystal measurements. The complexes with the formula, C4H18B2Na2O14, C4H16B2Na2O14 and C4H14B2Na2O14 were successfully obtained. BET surface area of complexes were calculated and found as 13.474 m2/g for catena-(tetrakis(Î¼2-hydroxo)-(Î¼2-trihydrogen borate)-(Î¼2-succinato)-di-sodium boric acid solvate), 1.692 m2/g for catena-(tetrakis(Î¼2-hydroxo)-(Î¼2-trihydrogen borate)-(Î¼2-fumarato)-di-sodium boric acid solvate) and 5.600 m2/g for catena-(tetrakis(Î¼2-hydroxo)-(Î¼2-trihydrogen borate)-(Î¼2-acetylenedicarboxylato)-di-sodium boric acid solvate). Hydrogen storage capacities of the complexes were also studied at 77 K 1 bar pressure and found as 0.108%, 0.033%, 0.021% by mass. When different ligands were used, the pore volume, pore width and surface area of the obtained complexes were changed. As a consequence, hydrogen storage capacities also changed.

97. Effects of boric acid on the healing of Achilles tendons of rats.

    PubMed

    Kaymaz, Burak; GÃ¶lge, Umut Hatay; OzyalvaclÄ±, Gulzade; KÃ¶mÃ¼rcÃ¼, Erkam; Goksel, Ferdi; Mermerkaya, Musa Ugur; Doral, Mahmut Nedim

    2016-12-01

    Tendinous lesions are among the most frequent pathologies encountered in sportsmen. The objectives of new treatments are to improve the healing process and reduce the recovery time. Boron plays an important role in the wound repair process by increasing components of extracellular matrix and angiogenesis. This animal study aimed to investigate the effect of boric acid on healing of the Achilles tendon. The right Achilles tendons of 40 rats were completely sectioned, and the rats were randomly divided into five groups. Each group consisted of eight rats. Groups 1 and 2 were oral boric acid groups with the doses of 4 and 8Â mg/kg/day boric acid, respectively. Group 3 was the local boric acid group (8Â mg/kg boric acid intratendinous injection). Group 4 was administered both oral and local boric acid (8Â mg/kg/day orally and 8Â mg/kg boric acid intratendinous injection), and group 5 was the control group with no boric acid application. At the end of the fourth week, all the rats were killed and histopathological examination of the Achilles tendon repair site was made. Histopathological examination of the tissue sections revealed more properly oriented collagen fibres, more normal cellular distribution of tenocytes and more properly organized vascular bundles in group 1 and group 2, which were the groups administered oral boric acid. Pathological sum scores of groups 1 and 2 were less than those of the other groups, and the differences between the oral boric acid groups (group 1 and group 2) and the other three groups (groups 3, 4 and 5) were statistically significant (pÂ =Â 0.001). As boric acid is safe and toxicity even after very high doses is unusual, oral boric acid may be used as an agent to improve the healing process of tendon injuries. However, biomechanical tests should also be performed to show the effect of boric acid on strength and endurance of the tendon before it can be used in clinical practice.

98. Protective effect of boric acid against carbon tetrachloride-induced hepatotoxicity in mice.

    PubMed

    Ince, Sinan; Keles, Hikmet; Erdogan, Metin; Hazman, Omer; Kucukkurt, Ismail

    2012-07-01

    The protective effect of boric acid against liver damage was evaluated by its attenuation of carbon tetrachloride (CCl(4))-induced hepatotoxicity in mice. Male albino mice were treated intraperitoneally (i.p.) with boric acid (50, 100, and 200 mg/kg) or silymarin daily for 7 days and received 0.2% CCl(4) in olive oil (10 mL/kg, i.p.) on day 7. Results showed that administration of boric acid significantly reduced the elevation in serum levels of aspartate aminotransferase, alkaline phosphatase, alanine aminotransferase, and the level of malondialdehyde in the liver that were induced by CCl(4) in mice. Boric acid treatment significantly increased glutathione content, as well as the activities of superoxide dismutase and catalase in the liver. Boric acid treatment improved the catalytic activity of cytochrome P450 2E1 and maintained activation of nuclear factor kappa light-chain enhancer of activated B cell gene expression, with no effect on inducible nitric oxide synthase gene expression in the livers of mice. Histopathologically, clear decreases in the severity of CCl(4)-induced lesions were observed, particularly at high boric acid concentrations. Results suggest that boric acid exhibits potent hepatoprotective effects on CCl(4)-induced liver damage in mice, likely the result of both the increase in antioxidant-defense system activity and the inhibition of lipid peroxidation.

99. Effect of Boric Acid Concentration on Viscosity of Slag and Property of Weld Metal Obtained from Underwater Wet Welding

    NASA Astrophysics Data System (ADS)

    Guo, Ning; Guo, Wei; Xu, Changsheng; Du, Yongpeng; Feng, Jicai

    2015-06-01

    Underwater wet welding is a crucial repair and maintenance technology for nuclear plant. A boric acid environment raises a new challenge for the underwater welding maintenance of nuclear plant. This paper places emphasis on studying the influence of a boric acid environment in nuclear plant on the underwater welding process. Several groups of underwater wet welding experiments have been conducted in boric acid aqueous solution with different concentration (0-35000 ppm). The viscosity of the welding slag and the mechanical properties of welds, such as the hardness, strength, and elongation, have been studied. The results show that with increasing boric acid concentration, the viscosity of the slag decreases first and then increases at a lower temperature (less than 1441 Â°C). However, when the temperature is above 1480 Â°C, the differences between the viscosity measurements become less pronounced, and the viscosity tends to a constant value. The hardness and ductility of the joints can be enhanced significantly, and the maximum strength of the weld metal can be reached at 2300 ppm.

100. 40 CFR 180.1121 - Boric acid and its salts, borax (sodium borate decahydrate), disodium octaborate tetrahydrate...

Code of Federal Regulations, 2010 CFR

2010-07-01

... 40 Protection of Environment 23 2010-07-01 2010-07-01 false Boric acid and its salts, borax (sodium borate decahydrate), disodium octaborate tetrahydrate, boric oxide (boric anhydride), sodium borate and sodium metaborate; exemptions from the requirement of a tolerance. 180.1121 Section 180.1121 Protection of Environment ENVIRONMENTAL PROTECTION...

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101. The antioxidant and antiapoptotic effect of boric acid on hepatoxicity in chronic alcohol-fed rats.

     PubMed

     Sogut, Ibrahim; Paltun, SÄ±la Ozlem; Tuncdemir, Matem; Ersoz, Melike; Hurdag, Canan

     2018-04-01

     The harmful use of alcohol is a worldwide problem involving all ages. This study aims to investigate chronic alcohol exposure related hepatotoxicity on the rat liver and possible hepatoprotective effects of boric acid. Rats were separated into 4 different groups: control, ethanol, ethanol+boric acid, and boric acid. We measured (i) malondialdehyde (MDA), total sialic acid (TSA), superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPx) levels, which are known to be the markers of alcohol damage; and also (ii) caspase-3, tumor necrosis factor-alpha (TNF-Î±), and the terminal deoxynucleotidyl transferase dUTP nick-end labeling (TUNEL) as the markers of apoptosis. In the ethanol group, MDA, TSA, and TNF-Î± levels increased whereas SOD and CAT levels decreased compared with the control group. Ethanol+boric acid group MDA, TSA, caspase-3, and TNF-Î± levels decreased whereas SOD and CAT levels increased compared with the ethanol group. Using histopathological evaluation of light microscope images, immunohistochemical caspase-3 and TNF-Î± activity in the ethanol+boric acid group were shown to be decreased compared with that in the ethanol group. Our results revealed that ethanol is capable of triggering oxidative stress and apoptosis in the rat liver. We propose that boric acid is an effective compound in protecting the rat liver against ethanol.

102. Detrimental effects of boric-acid-treated soil against foraging subterranean termites (Isoptera: Rhinotermitidae)

     Treesearch

     Bradford M. Kard

2001-01-01

111 laboratory bioassays, boric acid (BA) mixed with soil caused significant subterranean termite mortality. In clloice tests, eastern subterranean and Formosan subterranean tennites were exposed to boric acid mixed with soil at concentrations of 0.05, 0.25, 0.50, 1.00, 2.00, and 4.00 percent Al (wt:wt). Termites could choose to remain in their main nests wit13 non-...

103. [40 CFR 721.3031 - Boric acid (H3BO3), zinc salt (2=3).]

[Code of Federal Regulations, 2014 CFR]

2014-07-01

... 40 Protection of Environment 31 2014-07-01 2014-07-01 false Boric acid (H3BO3), zinc salt (2=3). 721.3031 Section 721.3031 Protection of Environment ENVIRONMENTAL PROTECTION AGENCY (CONTINUED) TOXIC SUBSTANCES CONTROL ACT SIGNIFICANT NEW USES OF CHEMICAL SUBSTANCES Significant New Uses for Specific Chemical Substances Â§ 721.3031 Boric acid (H3BO...

104. [40 CFR 721.3031 - Boric acid (H3BO3), zinc salt (2=3).]

[Code of Federal Regulations, 2012 CFR]

2012-07-01

... 40 Protection of Environment 32 2012-07-01 2012-07-01 false Boric acid (H3BO3), zinc salt (2=3). 721.3031 Section 721.3031 Protection of Environment ENVIRONMENTAL PROTECTION AGENCY (CONTINUED) TOXIC SUBSTANCES CONTROL ACT SIGNIFICANT NEW USES OF CHEMICAL SUBSTANCES Significant New Uses for Specific Chemical Substances Â§ 721.3031 Boric acid (H3BO...

105. [40 CFR 721.3031 - Boric acid (H3BO3), zinc salt (2=3).]

[Code of Federal Regulations, 2013 CFR]

2013-07-01

... 40 Protection of Environment 32 2013-07-01 2013-07-01 false Boric acid (H3BO3), zinc salt (2=3). 721.3031 Section 721.3031 Protection of Environment ENVIRONMENTAL PROTECTION AGENCY (CONTINUED) TOXIC SUBSTANCES CONTROL ACT SIGNIFICANT NEW USES OF CHEMICAL SUBSTANCES Significant New Uses for Specific Chemical Substances Â§ 721.3031 Boric acid (H3BO...

106. [Permeability and channel-mediated transport of boric acid across membrane vesicles isolated from squash roots.]

[PubMed]

Dordas, C; Chrispeels, M J; Brown, P H

2000-11-01

Boron is an essential micronutrient for plant growth and the boron content of plants differs greatly, but the mechanism(s) of its uptake into cells is not known. Boron is present in the soil solution as boric acid and it is in this form that it enters the roots. We determined the boron permeability coefficient of purified plasma membrane vesicles obtained from squash (Cucurbita pepo) roots and found it to be 3 x 10(-7) +/-1.4 x

10(-8) cm s(-1), six times higher than the permeability of microsomal vesicles. Boric acid permeation of the plasma membrane vesicles was partially inhibited (30%-39%) by mercuric chloride and phloretin, a non-specific channel blocker. The inhibition by mercuric chloride was readily reversible by 2-mercaptoethanol. The energy of activation for boron transport into the plasma membrane vesicles was 10.2 kcal mol(-1). Together these data indicate that boron enters plant cells in part by passive diffusion through the lipid bilayer of the plasma membrane and in part through proteinaceous channels. Expression of the major intrinsic protein (MIP) PIP1 in Xenopus laevis oocytes resulted in a 30% increase in the boron permeability of the oocytes. Other MIPs tested (PIP3, MLM1, and GlpF) did not have this effect. We postulate that certain MIPs, like those that have recently been shown to transport small neutral solutes, may also be the channels through which boron enters plant cells.

107. Boric Acid Induced Transient Cross-Links in Lactose-Modified Chitosan (Chitlac).

PubMed

Sacco, Pasquale; Furlani, Franco; Cok, Michela; Travan, Andrea; Borgogna, Massimiliano; Marsich, Eleonora; Paoletti, Sergio; Donati, Ivan

2017-12-11

The present paper explores the effect of boric acid on Chitlac, a lactose-modified chitosan which had previously shown interesting biological and physical-chemical features. The herewith-reported experimental evidences demonstrated that boric acid binds to Chitlac, producing conformational and association effects on the chitosan derivative. The thermodynamics of boric acid binding to Chitlac was explored by means of 11 B NMR, circular dichroism (CD), and UV-vis spectroscopy, while macromolecular effects were investigated by means of viscometry and dynamic light scattering (DLS). The experimental results revealed a chain-chain association when limited amounts of boric acid were added to Chitlac. However, upon exceeding a critical boric acid limit dependent on the polysaccharide concentration, the soluble aggregates disentangle. The rheological behavior of Chitlac upon treatment with boric acid was explored showing a dilatant behavior in conditions of steady flow. An uncommonly high dependence in the scaling law between the zero-shear viscosity and the concentration of Chitlac was found, i.e., Î· 0 âˆ.   C CTL 5.8 , pointing to interesting potential implications of the present system in biomaterials development.

108. Boric Acid Inhibition of Trichophyton rubrum Growth and Conidia Formation.

PubMed

Schmidt, Martin

2017-12-01

Trichophyton rubrum is a common human dermatophyte that is the causative agent of 80-93% of fungal infections of the skin and nails. While dermatophyte infections in healthy people are easily treatable with over-the-counter medications, such infections pose a higher risk for patients with compromised immune function and impaired regenerative potential. The efficacy of boric acid (BA) for the treatment of vaginal yeast infections prompted an investigation of the effect of BA on growth and morphology of T. rubrum. This is of particular interest since BA facilitates wound healing, raising the possibility that treating athlete's foot with BA, either alone or in combination with other antifungal drugs, would combine the benefits of antimicrobial activity and tissue regeneration to accelerate healing of infected skin. The data presented here show that BA represses T. rubrum growth at a concentration reported to be beneficial for host tissue regeneration. Oxygen exposure increases BA toxicity, and mycelia growing under BA stress avoid colonizing the surface of the growth surface, which leads to a suppression of aerial mycelium growth and surface conidia formation. BA penetrates into solid agar matrices, but the relative lack of oxygen below the substrate surface limits the effectiveness of BA in suppressing growth of embedded T. rubrum cells.

109. The effects of boric acid and phosphoric acid on the compressive strength of glass-ionomer cements.

PubMed

Prentice, Leon H; Tyas, Martin J; Burrow, Michael F

2006-01-01

Both boric acid (H_3BO_3) and phosphoric acid (H_3PO_4) are components of dental cements, commonly incorporated into glass (as ingredients in the melt) and occasionally added to the powder or liquid components. This study investigated the effect of boric acid addition to an experimental glass-ionomer powder and the effect of phosphoric acid addition to a glass-ionomer liquid on the 24-h compressive strength. Boric acid powder was added in various concentrations to an experimental glass-ionomer powder and, separately, phosphoric acid was added to an experimental glass-ionomer liquid. Powders and liquids were dosed into capsules at various powder:liquid ratios and cements thus formed were assessed for 24-h compressive strength. Incorporation of boric acid in glass-ionomer powder resulted in a pronounced decrease ($p < 0.05$ at 1% boric acid) in compressive strength. Addition of phosphoric acid produced initially stronger cements (up to 13% increase at 1% phosphoric acid) before also declining. The incorporation of less than 2% w/w phosphoric acid in glass-ionomer liquids may improve cement strengths without compromising clinical usefulness. The incorporation of boric acid in glass-ionomer cements is contraindicated.

110. Effects of Boric Acid on Fracture Healing: An Experimental Study.

PubMed

GÃ¶lge, Umut Hatay; Kaymaz, Burak; Arpaci, Rabia; KÃ¶mÃ¼rcÃ¼, Erkam; GÃ¶ksel, Ferdi; GÃ¼ven, Mustafa; GÃ¼zel, Yunus; Cevizci, Sibel

2015-10-01

Boric acid (BA) has positive effects on bone tissue. In this study, the effects of BA on fracture healing were evaluated in an animal model. Standard closed femoral shaft fractures were created in 40 male Sprague-Dawley rats under general anesthesia. The rats were allocated into five groups (nâ€‰=â€‰8 each): group 1, control with no BA; groups 2 and 3, oral BA at doses of 4 and 8 mg/kg/day, respectively; group 4, local BA (8 mg/kg); and group 5, both oral and local BA (8 mg/kg/day orally and 8 mg/kg locally). After closed fracture creation, the fracture line was opened with a mini-incision, and BA was locally administered to the fracture area in groups 4 and 5. In groups 2, 3, and 5, BA was administered by gastric gavage daily until sacrifice. The rats were evaluated by clinical, radiological, and histological examinations. The control group (group 1) significantly differed from the local BA-exposed groups (groups 4 and 5) in the clinical evaluation. Front-rear and lateral radiographs revealed significant differences between the local BA-exposed groups and the control and other groups (pâ€‰<â€‰0.05). Clinical and radiological evaluations demonstrated adequate agreement between observers. The average histological scores significantly differed across groups (pâ€‰=â€‰0.007) and were significantly higher in groups 4 and 5 which were the local BA (8 mg/kg) and both oral and local BA (8 mg/kg/day orally and 8 mg/kg locally), respectively, compared to the controls. This study suggests that BA may be useful in fracture healing. Further research is required to demonstrate the most effective local dosage and possible use of BA-coated implants.

111. Boric Acid Inhibits Germination and Colonization of Saprolegnia Spores In Vitro and In Vivo

PubMed Central

Ali, Shimaa E.; Thoen, Even; Evensen, Ã˜ystein; Skaar, Ida

2014-01-01

Saprolegnia infections cause severe economic losses among freshwater fish and their eggs. The banning of malachite green increased the demand for finding effective alternative treatments to control the disease. In the present study, we investigated the ability of boric acid to control saprolegniosis in salmon eggs and yolk sac fry. Under in vitro conditions, boric acid was able to decrease Saprolegnia spore activity and mycelial growth in all tested concentrations above 0.2 g/L, while complete inhibition of germination and growth was observed at a concentration of 0.8 g/L. In in vivo experiments using Atlantic salmon eyed eggs, saprolegniosis was controlled by boric acid at concentrations ranging from 0.2â€“1.4 g/L during continuous exposure, and at 1.0â€“4.0 g/L during intermittent exposure. The same effect was observed on salmon yolk sac fry exposed continuously to 0.5 g/L boric acid during the natural outbreak of saprolegniosis. During the experiments no negative impact with regard to hatchability and viability was observed in either eggs or fry, which indicate safety of use at all tested concentrations. The high hatchability and survival rates recorded following the in vivo testing suggest that boric acid is a candidate for prophylaxis and control of saprolegniosis. PMID:24699283

112. Mechanism of body weight reducing effect of oral boric Acid intake.

PubMed

Aysan, Erhan; Sahin, Fikrettin; Telci, Dilek; Erdem, Merve; Muslumanoglu, Mahmut; YardÄ±mcÄ±, Erkan; Bektasoglu, Huseyin

2013-01-01

Objective. The effect of oral boric acid intake on reducing body weight has been previously demonstrated although the mechanism has been unclear. This research study reveals the mechanism. Subjects. Twelve mice were used, in groups of six each in the control and study groups. For five days, control group mice drank standard tap water while during the same time period the study group mice drank tap water which contains 0.28â€‰mg/250â€‰mL boric acid. After a 5-day period, gene expression levels for uncoupling proteins (UCPs) in the white adipose tissue (WAT), brown adipose tissue (BAT), and skeletal muscle tissue (SMT) and total body weight changes were analyzed. Results. Real time PCR analysis revealed no significant change in UCP3 expressions, but UCP2 in WAT (P: 0.0317), BAT (P: 0.014), and SMT (P: 0.0159) and UCP1 in BAT (P: 0.026) were overexpressed in the boric acid group. In addition, mice in the boric acid group lost body weight (mean 28.1%) while mice in the control group experienced no weight loss but a slight weight gain (mean 0.09%, $P < 0.001$). Conclusion. Oral boric acid intake causes overexpression of thermogenic proteins in the adipose and skeletal muscle tissues. Increasing thermogenesis through UCP protein pathway results in the accelerated lipolysis and body weight loss.

113. Boric acid inhibits germination and colonization of Saprolegnia spores in vitro and in vivo.

PubMed

Ali, Shimaa E; Thoen, Even; Evensen, Ã˜ystein; Skaar, Ida

2014-01-01

Saprolegnia infections cause severe economic losses among freshwater fish and their eggs. The banning of malachite green increased the demand for finding effective alternative treatments to control the disease. In the present study, we investigated the ability of boric acid to control saprolegniosis in salmon eggs and yolk sac fry. Under in vitro conditions, boric acid was able to decrease Saprolegnia spore activity and mycelial growth in all tested concentrations above 0.2 g/L, while complete inhibition of germination and growth was observed at a concentration of 0.8 g/L. In in vivo experiments using Atlantic salmon eyed eggs, saprolegniosis was controlled by boric acid at concentrations ranging from 0.2-1.4 g/L during continuous exposure, and at 1.0-4.0 g/L during intermittent exposure. The same effect was observed on salmon yolk sac fry exposed continuously to 0.5 g/L boric acid during the natural outbreak of saprolegniosis. During the experiments no negative impact with regard to hatchability and viability was observed in either eggs or fry, which indicate safety of use at all tested concentrations. The high hatchability and survival rates recorded following the in vivo testing suggest that boric acid is a candidate for prophylaxis and control of saprolegniosis.

114. Temperature-Dependent Effect of Boric Acid Additive on Surface Roughness and Wear Rate

     NASA Astrophysics Data System (ADS)

     Ekinci, Åžerafettin

     Wear and friction hold an important place in engineering. Currently, scientific societies are struggling to control wear by means of studies on lubricants. Boric acid constitutes an important alternative with its good tribological properties similar to MO2S and graphite alongside with low environmental impacts. Boric acid can be used as a solid lubricant itself whereas it can be added or blended into mineral oils in order to yield better mechanical and tribological properties such as low shear stress due to the lamellar structure and low friction, wear and surface roughness rates. In this study, distinguishing from the literature, boric acid addition effect considering the temperature was investigated for the conventional ranges of internal combustion engines. Surface roughness, wear and friction coefficient values were used in order to determine tribological properties of boric acid as an environmentally friendly additive and mineral oil mixture in the present study. Wear experiments were conducted with a ball on disc experimental setup immersed in an oil reservoir at room temperature, 50â˜C and 80â˜C. The evolution of both the friction coefficient and wear behavior was determined under 10N load, at 2m/s sliding velocity and a total sliding distance of 9000m. Surface roughness was determined using atomic-force microscopy (AFM). Wear rate was calculated utilizing scanning electron microscope (SEM) visuals and data. The test results showed that wear resistance increased as the temperature increased, and friction coefficient decreased due to the presence of boric acid additive.

115. combustibility of loose fiber fill cellulose insulation: the role of borax and boric acid

     SciTech Connect

     Day, M.; Wiles, D.M.

     1978-07-01

     The influence of borax and boric acid on the resistance of cellulose insulation to smouldering and flaming combustion has been examined using material treated by a wet application process. Boric acid has been shown to be required at an add-on level of at least 11.6 parts to 100 parts (by weight) of cellulose if resistance to smouldering combustion by cigarette ignition is to be achieved. In order to increase the resistance of the material to flaming combustion, however, it has been shown that borax is required in the formulation. Moreover, in order to maintain the resistance to smouldering combustion itmoreÂ Â» has been found necessary subsequently to increase the add-on of boric acid. the relationship between the amount of boric acid required to maintain resistance to smouldering combustion while providing for resistance to flaming combustion with borax is given by: boric acid required (pph) = 11.6 + (0.185 x (borax used)).Â«Â less

116. High production of D-tagatose by the addition of boric acid.

     PubMed

     Lim, Byung-Chul; Kim, Hye-Jung; Oh, Deok-Kun

2007-01-01

An L-arabinose isomerase mutant enzyme from Geobacillus thermodenitrificans was used to catalyze the isomerization of D-galactose to D-tagatose with boric acid. Maximum production of D-tagatose occurred at pH 8.5-9.0, 60 degrees C, and 0.4 molar ratio of boric acid to D-galactose, and the production increased with increasing enzyme concentration. Under the optimum conditions, the enzyme (10.8 units/mL) converted 300 g/L D-galactose to 230 g/L D-tagatose for 20 h with a yield of 77% (w/w); the production and conversion yield with boric acid were 1.5-fold and 24% higher than without boric acid, respectively. In 24 h, the enzyme produced 370 g/L D-tagatose from 500 g/L D-galactose with boric acid, corresponding to a conversion yield of 74% (w/w) and a production rate of 15.4 g/L.h. The production and yield of D-tagatose obtained in this study are unprecedented.

117. Adsorption and co-precipitation behavior of arsenate, chromate, selenate and boric acid with synthetic allophane-like materials.

PubMed

Opiso, Einstine; Sato, Tsutomu; Yoneda, Tetsuro

2009-10-15

Pollution caused by boric acid and toxic anions such as As(V), Cr(VI) and Se(VI) is hazardous to human health and environment. The sorption characteristics of these environmentally significant ionic species on allophane-like nanoparticles were investigated in order to determine whether allophane can reduce their mobility in the subsurface environment at circum-neutral pH condition. Solutions containing 100 or 150 mmol of AlCl(3)x6H(2)O were mixed to 100 mmol of Na(4)SiO(4) and the pH were adjusted to 6.4+/-0.3. The mineral suspensions were shaken for 1h and incubated at 80 degrees C for 5 days. Appropriate amounts of As, B, Cr and Se solutions were added separately during and after allophane precipitation. The results showed that As(V) and boric acid can be irreversibly fixed during co-precipitation in addition to surface adsorption. However, Cr(VI) and Se(VI) retention during and after allophane precipitation is mainly controlled by surface adsorption. The structurally fixed As(V) and boric acid were more resistant to release than those bound on the surface. The sorption characteristics of oxyanions and boric acid were also influenced by the final Si/Al molar ratio of allophane in which Al-rich allophane tend to have higher uptake capacity. The overall results of this study have demonstrated the role of allophane-like nanoparticles and the effect of its Si/Al ratio on As, B, Cr and Se transport processes in the subsurface environment.

118. Photostabilization of ascorbic acid with citric acid, tartaric acid and boric acid in cream formulations.

PubMed

Ahmad, I; Ali Sheraz, M; Ahmed, S; Shad, Z; Vaid, F H M

2012-06-01

This study involves the evaluation of the effect of certain stabilizers, that is, citric acid (CT), tartaric acid (TA) and boric acid (BA) on the degradation of ascorbic acid (AH(2)) in oil-in-water cream formulations exposed to the UV light and stored in the dark. The apparent first-order rate constants (0.34-0.95 Ã— 10(-3) min(-1) in light, 0.38-1.24 Ã— 10(-2) day(-1) in dark) for the degradation reactions in the presence of the stabilizers have been determined. These rate constants have been used to derive the second-order rate constants (0.26-1.45 Ã— 10(-2) M(-1) min(-1) in light, 3.75-8.50 Ã— 10(-3) M(-1) day(-1) in dark) for the interaction of AH(2) and the individual stabilizers. These stabilizers are effective in causing the inhibition of the rate of degradation of AH(2) both in the light and in the dark. The inhibitory effect of the stabilizers is in the order of CT > TA > BA. The rate of degradation of AH(2) in the presence of these stabilizers in the light is about 120 times higher than that in the dark. This could be explained on the basis of the deactivation of AH(2) -excited triplet state by CT and TA and by the inhibition of AH(2) degradation through complex formation with BA. AH(2) leads to the formation of dehydroascorbic acid (A) by chemical and photooxidation in cream formulations. Â© 2012 The Authors. ICS Â© 2012 Society of Cosmetic Scientists and the SociÃ©tÃ© FranÃ§aise de CosmÃ©tologie.

119. One-pot synthesis of Î²-acetamido ketones using boric acid at room temperature.

 PubMed

 Karimi-Jaberi, Zahed; Mohammadi, Korosh

 2012-01-01

 Î²-acetamido ketones were synthesized in excellent yields through one-pot condensation reaction of aldehydes, acetophenones, acetyl chloride, and acetonitrile in the presence of boric acid as a solid heterogeneous catalyst at room temperature. It is the first successful report of boric acid that has been used as solid acid catalyst for the preparation of Î²-acetamido ketones. The remarkable advantages offered by this method are green catalyst, mild reaction conditions, simple procedure, short reaction times, and good-to-excellent yields of products.

120. One-Pot Synthesis of Î²-Acetamido Ketones Using Boric Acid at Room Temperature

 PubMed Central

 Karimi-Jaberi, Zahed; Mohammadi, Korosh

 2012-01-01

 Î²-acetamido ketones were synthesized in excellent yields through one-pot condensation reaction of aldehydes, acetophenones, acetyl chloride, and acetonitrile in the presence of boric acid as a solid heterogeneous catalyst at room temperature. It is the first successful report of boric acid that has been used as solid acid catalyst for the preparation of Î²-acetamido ketones. The remarkable advantages offered by this method are green catalyst, mild reaction conditions, simple procedure, short reaction times, and good-to-excellent yields of products. PMID:22666168

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121. Effect of Boric Acid on Volatile Products of Thermooxidative Degradation of Epoxy Polymers

 NASA Astrophysics Data System (ADS)

 Nazarenko, O. B.; Bukhareva, P. B.; Melnikova, T. V.; Visakh, P. M.

2016-01-01

The polymeric materials are characterized by high flammability. The use of flame retardants in order to reduce the flammability of polymers can lead to the formation of toxic gaseous products under fire conditions. In this work we studied the effect of boric acid on the volatile products of thermooxidative degradation of epoxy polymers. The comparative investigations were carried out on the samples of the unfilled epoxy resin and epoxy resin filled with a boric acid at percentage 10 wt. %. The analysis of the volatile decomposition products and thermal stability of the samples under heating in an oxidizing medium was performed using a thermal mass-spectrometric analysis. It is found that the incorporation of boric acid into the polymer matrix increases the thermal stability of epoxy composites and leads to a reduction in the 2-2.7 times of toxic gaseous products

122. Boric Acid and Commercial Organoboron Products as Inhibitors of Drug-Resistant Candida albicans.

PubMed

Larsen, Bryan; Petrovic, Marija; De Seta, Francesco

2018-04-01

Clinical use of boric acid as a topical antifungal in women who have failed standard antifungal therapy with azole drugs has been used sporadically for decades. Our previous in vitro work showing inhibition of Candida albicans growth was conducted on clinical isolates without antifungal drug susceptibility profiling. Here, we report that boric acid restricts growth of drug-resistant Candida albicans and inhibits hyphal growth and diminishes cell volume. The availability of over-the-counter organoboron compounds intended for use as oral nutritional supplements led us to determine if these also were inhibitory toward resistant Candida and show here that they also possess antifungal activity. Candida glabrata was also found to be inhibited by boric acid and organoboron compounds. Further development of organoboron compounds as topical therapeutics is of potential value.

123. Thermal and Mechanical Characteristics of Polymer Composites Based on Epoxy Resin, Aluminium Nanopowders and Boric Acid

NASA Astrophysics Data System (ADS)

Nazarenko, O. B.; Melnikova, T. V.; Visakh, P. M.

2016-01-01

The epoxy polymers are characterized by low thermal stability and high flammability. Nanoparticles are considered to be effective fillers of polymer composites for improving their thermal and functional properties. In this work, the epoxy composites were prepared using epoxy resin ED-20, polyethylene polyamine as a hardener, aluminum nanopowder and boric acid fine powder as flame-retardant filler. The thermal characteristics of the obtained samples were studied using thermogravimetric analysis and differential scanning calorimetry. The mechanical characteristics of epoxy composites were also studied. It was found that an addition of all fillers enhances the thermal stability and mechanical characteristics of the epoxy composites. The best thermal stability showed the epoxy composite filled with boric acid. The highest flexural properties showed the epoxy composite based on the combination of boric acid and aluminum nanopowder.

124. Boric acid enhances in vivo Ehrlich ascites carcinoma cell proliferation in Swiss albino mice.

PubMed

Qureshi, S; Al-Shabanah, O A; Al-Harbi, M M; Al-Bekairi, A M; Raza, M

2001-08-13

The influence of boric acid, a boron carrier, on Ehrlich ascites carcinoma (EAC) cell-bearing mice was investigated in view of its importance in the boron neutron capture therapy and the influence of boron on proliferation and progression of cancer cells mediated by proteoglycans and collagen. The present study included the evaluation of boric acid for the effects on total count and viability of EAC cells in addition to their non-protein sulfhydryls (NP-SH) and malondialdehyde (MDA) contents as parameters for conjugative detoxication potency and possible oxidative damage. The EAC cell-bearing animals were also observed for the effect on survival, body weight changes, and histopathological evaluation of the tumors grown at the site of inoculation. The treatment with boric acid significantly increased the total number of peritoneal EAC cells and their viability. A significant increase in the body weight was observed that dose-dependently reached plateau levels by 20 days of treatment. Conversely, a reduction in the duration of survival of these animals was evident with the same protocol. Boric acid treatment resulted in a decrease in NP-SH contents with a concomitant increase in MDA levels in EAC cells as revealed by the results of the biochemical analysis. These data are supported by our results on histopathological investigations, which apparently showed fast growth, in addition to several mitotic figures and mixed inflammatory reaction, after treatment with boric acid. It seems likely that a particular combination of properties of boric acid, rather than a single characteristic alone, will provide useful information on the use of this boron carrier in neutron capture therapy.

125. Effect of Boric Acid Supplementation on the Expression of BDNF in African Ostrich Chick Brain.

PubMed

Tang, Juan; Zheng, Xing-ting; Xiao, Ke; Wang, Kun-lun; Wang, Jing; Wang, Yun-xiao; Wang, Ke; Wang, Wei; Lu, Shun; Yang, Ke-li; Sun, Peng-Peng; Khaliq, Haseeb; Zhong, Juming; Peng, Ke-Mei

2016-03-01

The degree of brain development can be expressed by the levels of brain brain-derived neurotrophic factor (BDNF). BDNF plays an irreplaceable role in the process of neuronal development, protection, and restoration. The aim of the present study was to evaluate the effects of boric acid supplementation in water on the ostrich chick neuronal development. One-day-old healthy animals were supplemented with boron in drinking water at various concentrations, and the potential effects of boric acid on brain development were tested by a series of experiments. The histological changes in brain were observed by hematoxylin and eosin (HE) staining and Nissl staining. Expression of BDNF was analyzed by immunohistochemistry, quantitative real-time PCR (QRT-PCR), and enzyme linked immunosorbent assay (ELISA). Apoptosis was evaluated with Dutp-biotin nick end labeling (TUNEL) reaction, and caspase-3 was detected with QRT-PCR. The results were as follows: (1) under the light microscope, the neuron structure was well developed with abundance of neurites and intact cell morphology when animals were fed with less than 160Â mg/L of boric acid (groups II, III, IV). Adversely, when boric acid doses were higher than 320Â mg/L(groups V, VI), the high-dose boric acid neuron structure was damaged with less neurites, particularly at 640Â mg/L; (2) the quantity of BDNF expression in groups II, III, and IV was increased while it was decreased in groups V and VI when compared with that in group I; (3) TUNEL reaction and the caspase-3 mRNA level showed that the amount of cell apoptosis in group II, group III, and group IV were decreased, but increased in group V and group VI significantly. These results indicated that appropriate supplementation of boric acid, especially at 160Â mg/L, could promote ostrich chicks' brain development by promoting the BDNF expression and reducing cell apoptosis. Conversely, high dose of boric acid particularly in 640Â mg/L would damage the neuron structure of

126. Modulated optical phase conjugation in rhodamine 110 doped boric acid glass saturable absorber thin films

NASA Astrophysics Data System (ADS)

Sharma, Ramesh C.; Waigh, Thomas A.; Singh, Jagdish P.

2008-03-01

The optical phase conjugation signal in nearly nondegenerate four wave mixing was studied using a rhodamine 110 doped boric acid glass saturable absorber nonlinear medium. We have demonstrated a narrow band optical filter (2.56Â±0.15Hz) using an optical phase conjugation signal in the frequency modulation of a weak probe beam in the presence of two strong counterpropagating pump beams in rhodamine 110 doped boric acid glass thin films (10-4m). Both the pump beams and the probe beam are at a wavelength of 488nm (continuous-wave Ar+ laser). The probe beam frequency was detuned with a ramp signal using a piezoelectric transducer mirror.

127. External auditory canal stenosis due to the use of powdered boric acid.

PubMed

DÃ¼ndar, Riza; Soy, Fatih Kemal; Kulduk, Erkan; Muluk, Nuray Bayar; Cingi, Cemal

2014-09-01

Acquired stenosis of the external auditory canal (EAC) may occur because of chronic external otitis, recurrent chronic catarrhal otitis media associated with tympanic membrane perforation, chronic dermatitis, tumors, and trauma. Stenosis occurs generally at the one-third bone part of the external auditory canal. In this article, we present 3 cases of acquired EAC stenosis due to the previous powdered boric acid application. Besides the presentation of surgical intervetions in these cases, we want to notify the physicians not to use or carefully use powdered boric acid because of the complication of EAC stenosis.

128. Hybrid films of chitosan, cellulose nanofibrils and boric acid: Flame retardancy, optical and thermo-mechanical properties.

PubMed

Uddin, Khan M A; Ago, Mariko; Rojas, Orlando J

2017-12-01

Chitosan (CS), cellulose nanofibrils (CNF) and boric acid, the latter of which was used as flame retardant, were combined in transparent, hybrid films that were produced by solvent casting. The flammability and the thermal stability of the films were studied with respect to the loading of the inorganic component. Chitosan films displayed fire retardancy properties, which were enhanced in the presence of boric acid. CNF films, in contrast to those from chitosan, were readily flammable; however, when combined with boric acid (30w%), they became self-extinguishing. Most remarkably, bicomponent films comprising CNF and chitosan, displayed better fire retardancy than that of neat CS films. Moreover, boric acid improved the thermal stability of the bicomponent films. The tensile strength and Young's modulus of CS, CNF and CS-CNF films improved at intermediate boric acid addition, although a negative effect on elongation was observed. Copyright Â© 2017 Elsevier Ltd. All rights reserved.

129. Decay resistance of wood treated with boric acid and tall oil derivates.

PubMed

Temiz, Ali; Alfredsen, Gry; Eikenes, Morten; Terziev, Nasko

2008-05-01

In this study, the effect of two boric acid concentrations (1% and 2%) and four derivates of tall oil with varying chemical composition were tested separately and in combination. The tall oil derivates were chosen in a way that they consist of different amounts of free fatty, resin acids and neutral compounds. Decay tests using two brown rot fungi (Postia placenta and Coniophora puteana) were performed on both unleached and leached test samples. Boric acid showed a low weight loss in test samples when exposed to fungal decay before leaching, but no effect after leaching. The tall oil derivates gave better efficacy against decay fungi compared to control, but are not within the range of the efficacy needed for a wood preservative. Double impregnation with boric acid and tall oil derivates gave synergistic effects for several of the double treatments both in unleached and leached samples. In the unleached samples the double treatment gave a better efficacy against decay fungi than tall oil alone. In leached samples a better efficacy against brown rot fungi were achieved than in samples with boron alone and a nearly similar or better efficacy than for tall oil alone. Boric acid at 2% concentration combined with the tall oil derivate consisting of 90% free resin acids (TO-III) showed the best performance against the two decay fungi with a weight loss less than 3% after a modified pure culture test.

130. In vivo percutaneous absorption of boron as boric acid, borax, and disodium octaborate tetrahydrate in humans: a summary.

     PubMed

     Wester, R C; Hui, X; Maibach, H I; Bell, K; Schell, M J; Northington, D J; Strong, P; Culver, B D

     1998-01-01

     Literature from the first half of this century reports concern for toxicity from topical use of boric acid, but assessment of percutaneous absorption has been impaired by lack of analytical sensitivity. Analytical methods in this study included inductively coupled plasma-mass spectrometry, which now allows quantitation of percutaneous absorption of 10B in 10B-enriched boric acid, borax, and disodium octaborate tetrahydrate (DOT) in biological matrices. This made it possible, in the presence of comparatively large natural dietary boron intakes for the in vivo segment of this study, to quantify the boron passing through skin. Human volunteers were dosed with 10B-enriched boric acid, 5.0%, borax, 5.0%, or disodium octaborate tetrahydrate, 10% in aqueous solutions. Urinalysis, for boron and changes in boron isotope ratios, was used to measure absorption. Boric acid in vivo percutaneous absorption was 0.226 (SD = 0.125) mean percent dose, with flux and permeability constant (Kp) calculated at 0.009 microg/cm2/h and 1.9 x 10(-7) cm/h, respectively. Borax absorption was 0.210 (SD = 0.194) mean percent dose, with flux and Kp calculated at 0.009 microg/cm2/h and 1.8 x 10(-7) cm/h, respectively. DOT absorption was 0.122 (SD = 0.108) mean percent, with flux and Kp calculated at 0.01 microg/cm2/h and 1.0 x 10(-7) cm/h, respectively. Pretreatment with the potential skin irritant 2% sodium lauryl sulfate had no effect on boron skin absorption. These in vivo results show that percutaneous absorption of boron, as boric acid, borax, and disodium octaborate tetrahydrate, through intact human skin is low and is significantly less than the average daily dietary intake. This very low boron skin absorption makes it apparent that, for the borates tested, the use of gloves to prevent systemic uptake is unnecessary. These findings do not apply to abraded or otherwise damaged skin.

131. Increased sensitivity and variability of phytotoxicity responses in Arctic soils to a reference toxicant, boric acid.

     PubMed

     Anaka, Alison; Wickstrom, Mark; Siciliano, Steven Douglas

     2008-03-01

     Industrial and human activities in the Arctic regions may pose a risk to terrestrial Arctic ecosystem functions. One of the most common terrestrial toxicological end points, primary productivity, typically is assessed using a plant phytotoxicity test. Because of cryoturbation, a soil mixing process common in polar regions, we hypothesized that phytotoxicity test results in Arctic soils would be highly variable compared to other terrestrial ecosystems. The variability associated with phytotoxicity tests was evaluated using Environment Canada's standardized plant toxicity test in three cryoturbated soils from Canada's Arctic exposed to a reference toxicant, boric acid. Northern wheatgrass (Elymus lanceolatus) not only was more sensitive to toxicants in Arctic soils, its response to toxicants was more variable compared to that in temperate soils. The phytotoxicity of boric acid in cryosols was much greater than commonly reported in other soils, with a boric acid concentration of less than 150 microg/g soil needed to inhibit root and shoot growth by 20%. Large variability also was found in the phytotoxicity test results, with coefficients of variation for 10 samples ranging from 160 to 79%. The increased toxicity of boric acid in cryosols and variability in test response was not explained by soil properties. Based on our admittedly limited data set of three different Arctic soils, we recommend that more than 30 samples be taken from each control and potentially impacted area to accurately assess contaminant effects at sites in northern Canada. Such intensive sampling will insure that false-negative results for toxicant impacts in Arctic soils are minimized.

132. Mitochondrial dysfunction is involved in the toxic activity of boric acid against Saprolegnia.

PubMed

Ali, Shimaa E; Thoen, Even; Evensen, Ã˜ystein; Wiik-Nielsen, Jannicke; Gamil, Amr A A; Skaar, Ida

2014-01-01

There has been a significant increase in the incidence of Saprolegnia infections over the past decades, especially after the banning of malachite green. Very often these infections are associated with high economic losses in salmonid farms and hatcheries. The use of boric acid to control the disease has been investigated recently both under in vitro and in vivo conditions, however its possible mode of action against fish pathogenic Saprolegnia is not known. In this study, we have explored the transformation in Saprolegnia spores/hyphae after exposure to boric acid (1 g/L) over a period 4-24 h post treatment. Using transmission electron microscopy (TEM), early changes in Saprolegnia spores were detected. Mitochondrial degeneration was the most obvious sign observed following 4 h treatment in about 20% of randomly selected spores. We also investigated the effect of the treatment on nuclear division, mitochondrial activity and function using confocal laser scanning microscopy (CLSM). Fluorescence microscopy was also used to test the effect of treatment on mitochondrial membrane potential and formation of reactive oxygen species. Additionally, the viability and proliferation of treated spores that correlated to mitochondrial enzymatic activity were tested using an MTS assay. All obtained data pointed towards changes in the mitochondrial structure, membrane potential and enzymatic activity following treatment. We have found that boric acid has no effect on the integrity of membranes of Saprolegnia spores at concentrations tested. It is therefore likely that mitochondrial dysfunction is involved in the toxic activity of boric acid against Saprolegnia spp.

133. Mitochondrial Dysfunction Is Involved in the Toxic Activity of Boric Acid against Saprolegnia

PubMed Central

Ali, Shimaa E.; Thoen, Even; Evensen, Ã˜ystein; Wiik-Nielsen, Jannicke; Gamil, Amr A. A.; Skaar, Ida

2014-01-01

There has been a significant increase in the incidence of Saprolegnia infections over the past decades, especially after the banning of malachite green. Very often these infections are associated with high economic losses in salmonid farms and hatcheries. The use of boric acid to control the disease has been investigated recently both under in vitro and in vivo conditions, however its possible mode of action against fish pathogenic Saprolegnia is not known. In this study, we have explored the transformation in

Saprolegnia spores/hyphae after exposure to boric acid (1 g/L) over a period 4â€“24 h post treatment. Using transmission electron microscopy (TEM), early changes in Saprolegnia spores were detected. Mitochondrial degeneration was the most obvious sign observed following 4 h treatment in about 20% of randomly selected spores. We also investigated the effect of the treatment on nuclear division, mitochondrial activity and function using confocal laser scanning microscopy (CLSM). Fluorescence microscopy was also used to test the effect of treatment on mitochondrial membrane potential and formation of reactive oxygen species. Additionally, the viability and proliferation of treated spores that correlated to mitochondrial enzymatic activity were tested using an MTS assay. All obtained data pointed towards changes in the mitochondrial structure, membrane potential and enzymatic activity following treatment. We have found that boric acid has no effect on the integrity of membranes of Saprolegnia spores at concentrations tested. It is therefore likely that mitochondrial dysfunction is involved in the toxic activity of boric acid against Saprolegnia spp. PMID:25354209

134. Effect of boric acid on oxidative stress in rats with fetal alcohol syndrome

PubMed Central

SOGUT, IBRAHIM; OGLAKCI, AYSEGUL; KARTKAYA, KAZIM; OL, KEVSER KUSAT; SOGUT, MELIS SAVASAN; KANBAK, GUNGOR; INAL, MINE ERDEN

2015-01-01

To the best of our knowledge, this is the first study concerning the effect of boric acid (BA) administration on fetal alcohol syndrome (FAS). In this study, the aim was to investigate prenatal alcohol-induced oxidative stress on the cerebral cortex of newborn rat pups and assess the protective and beneficial effects of BA supplementation on rats with FAS. Pregnant rats were divided into three groups, namely the control, alcohol and alcohol + boric acid groups. As markers of alcohol-induced oxidative stress in the cerebral cortex of the newborn pups, malondialdehyde (MDA), superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) levels were measured. Although the MDA levels in the alcohol group were significantly increased compared with those in the control group ($P<0.05$), the MDA level in the alcohol + boric acid group was shown to be significantly decreased compared with that in the alcohol group ($P<0.01$). The CAT activity of the alcohol + boric acid group was significantly higher than that in the alcohol group ($P<0.05$). The GPx activity in the alcohol group was decreased compared with that in the control group ($P<0.05$). These results demonstrate that alcohol is capable of triggering damage to membranes of the cerebral cortex of rat pups and BA could be influential in antioxidant mechanisms against oxidative stress resulting from prenatal alcohol exposure. PMID:25667671

135. Toxicological and histopathological effects of boric acid on Atta sexdens rubropilosa (Hymenoptera: Formicidae) workers.

PubMed

Sumida, Simone; Silva-Zacarin, Elaine C M; Decio, PÃ¢mela; Malaspina, Osmar; Bueno, Fabiana C; Bueno, Odair C

2010-06-01

The current study compared the toxicity of different concentrations of boric acid in adult workers of Atta sexdens rubropilosa Forel (Hymenoptera: Formicidae), with toxicological bioassays, and examining the dose-dependent and time-dependent histopathological changes, of the midgut, Malpighian tubules, and postpharyngeal glands. Our results revealed the importance of conducting toxicological bioassays combined with morphological analyses of the organs of ants chronically exposed to insecticides used in commercial ant baits. In vitro bioassays showed that boric acid significantly decreases the survivorship of workers regardless of concentration, whereas the morphological data suggested progressive dose-dependent and time-dependent changes in the organs examined, which were evident in the midgut. The midgut is the first organ to be affected, followed by the postpharyngeal gland and Malpighian tubules. This sequence is in agreement with the absorption pathway of this chemical compound in the midgut, its transference to the hemolymph, possibly reaching the postpharyngeal glands, and excretion by the Malpighian tubules. These progressive changes might be due to the cumulative and delayed effect of boric acid. Our findings provide important information for the understanding of the action of boric acid in ant baits in direct and indirect target organs.

136. Effect of boric acid on oxidative stress in rats with fetal alcohol syndrome.

PubMed

Sogut, Ibrahim; Oglakci, Aysegul; Kartkaya, Kazim; Ol, Kevser Kusat; Sogut, Melis Savasan; Kanbak, Gungor; Inal, Mine Erden

2015-03-01

To the best of our knowledge, this is the first study concerning the effect of boric acid (BA) administration on fetal alcohol syndrome (FAS). In this study, the aim was to investigate prenatal alcohol-induced oxidative stress on the cerebral cortex of newborn rat pups and assess the protective and beneficial effects of BA supplementation on rats with FAS. Pregnant rats were divided into three groups, namely the control, alcohol and alcohol + boric acid groups. As markers of alcohol-induced oxidative stress in the cerebral cortex of the newborn pups, malondialdehyde (MDA), superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) levels were measured. Although the MDA levels in the alcohol group were significantly increased compared with those in the control group ($P<0.05$), the MDA level in the alcohol + boric acid group was shown to be significantly decreased compared with that in the alcohol group ($P<0.01$). The CAT activity of the alcohol + boric acid group was significantly higher than that in the alcohol group ($P<0.05$). The GPx activity in the alcohol group was decreased compared with that in the control group ($P<0.05$). These results demonstrate that alcohol is capable of triggering damage to membranes of the cerebral cortex of rat pups and BA could be influential in antioxidant mechanisms against oxidative stress resulting from prenatal alcohol exposure.

137. Boric Acid Reduces the Formation of DNA Double Strand Breaks and Accelerates Wound Healing Process.

PubMed

Tepedelen, Burcu Erbaykent; Soya, Elif; Korkmaz, Mehmet

2016-12-01

Boron is absorbed by the digestive and respiratory system, and it was considered that it is converted to boric acid (BA), which was distributed to all tissues above 90Â %. The biochemical essentiality of boron element is caused by boric acid because it affects the activity of several enzymes involved in the metabolism. DNA damage repair mechanisms and oxidative stress regulation is quite important in the transition stage from normal to cancerous cells; thus, this study was conducted to investigate the protective effect of boric acid on DNA damage and wound healing in human epithelial cell line. For this purpose, the amount of DNA damage occurred with irinotecan (CPT-11), etoposide (ETP), doxorubicin (Doxo), and H 2 O 2 was determined by immunofluorescence through phosphorylation of H2AX (Ser139) and pATM (Ser1981) in the absence and presence of BA. Moreover, the effect of BA on wound healing has been investigated in epithelial cells treated with these agents. Our results demonstrated that H2AX (Ser139) foci numbers were significantly decreased in the presence of BA while wound healing was accelerated by BA compared to that in the control and only drug-treated cells. Eventually, the results indicate that BA reduced the formation of DNA double strand breaks caused by agents as well as improving the wound healing process. Therefore, we suggest that boric acid has important therapeutical effectiveness and may be used in the treatment of inflammatory diseases where oxidative stress and wound healing process plays an important role.

138. EFFECTS OF HYPERTHERMIA AND BORIC ACID ON SKELETAL DEVELOPMENT IN RAT EMBRYOS

     EPA Science Inventory

     BACKGROUND: The individual effects of boric acid (BA) and hyperthermia on the development of the axial skeleton have previously been reported. Both cause an increased incidence of axial skeletal defects including a decrease in the total number of ribs and vertebrae. Because of th...

139. Evaluation of boric acid sugar baits against Aedes albopictus (Diptera: Culicidae) in tropical environments.

     PubMed

     Naranjo, Diana P; Qualls, Whitney A; MÃ¼ller, Gunter C; Samson, Dayana M; Roque, Deborah; Alimi, Temitope; Arheart, Kristopher; Beier, John C; Xue, Rui-De

     2013-04-01

     Attractive toxic sugar bait (active ingredient, 1% boric acid) was evaluated against Aedes albopictus Skuse populations in the laboratory, semi-field trials, and field trials in residential communities in St. Augustine, Florida. Laboratory evaluations of boric acid sugar baits applied to the plant Pentas lanceolata (Rubiaceae) demonstrated 100 and 92% mortality of A. albopictus at day 7 and 14, respectively. A semi-field study evaluating the bait application to the upperside or topside of leaves resulted in no significant difference on mortality ($P>0.05$). Overall combined top and bottom boric acid sugar bait application mortality at day 7 was 95% based on leaf bioassays. Field application of the boric acid sugar baits significantly ($P<0.05$) decreased adult A. albopictus populations up to day 21 post-treatment compared to the pre-treatment population numbers. A significant reduction in oviposition was demonstrated both at day 7 and 14 post-application ($P=0.001$) as monitored by ovitraps. Attractive toxic sugar bait application in tropical environments demonstrated efficacy, persistence, and feasibility in controlling A. albopictus populations.

140. The reaction of boric acid with wood in a polystyrene matrix

     Treesearch

     Yanxin Wang; John Simonsen; Carlos Pascoal Neto; Joao Rocha; Timothy G. Rials; Eric Hart

     1996-01-01

     The reaction of boric acid with wood fibers in a polymer melt was examined using 13C-nuclear magnetic resonance (NMR), 11B-NMR. differential scanning calorimetry, dynamic mechanical analysis, and component extraction and by the determination of material properties. Samples were blended at 350 and 380Ã‚Â°F in a roll mill. The...

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141. Effects of Boric Acid on Hox Gene Expression and the Axial Skeleton in the Developing Rat

     EPA Science Inventory

     Gestational exposure to boric acid (BA) causes reduced incidences of supernumerary ribs and shortening/absence of the 13th rib in the progeny of multiple laboratory species. To further explore this, Sprague-Dawley rats received 500 mg/kg b.i.d. on gestation days (GD) 6, 7, 8, 9,...

142. BASIC study: is intravaginal boric acid non-inferior to metronidazole in symptomatic bacterial vaginosis? Study protocol for a randomized controlled trial.

     PubMed

     Zeron Mullins, Melinda; Trouton, Konia M

     2015-07-26

     Bacterial vaginosis is associated with increased transmission of sexually transmitted infections, preterm labor, post-surgical infections, and endometritis. Current treatment for symptomatic bacterial vaginosis includes antibiotics, such as metronidazole, which are 70-80 % effective at one month after treatment and result in high recurrence rates and secondary candida infections. Intravaginal boric acid has been used for over a hundred years to treat vaginal infections, such as bacterial vaginosis. Boric acid is inexpensive, accessible, and has shown to be an effective treatment for other infections, such as vaginal candidiasis. To date, there has been no clinical trial evaluation of boric acid effectiveness to treat bacterial vaginosis. The BASIC (Boric Acid, Alternate Solution for Intravaginal Colonization) trial is a randomized, double-blinded, multicenter study. The study will enroll a minimum of 240 women of 16-50 years of age who are symptomatic with bacterial vaginosis. Eligible participants will have Amsel and Nugent scores confirming bacterial vaginosis. Women who are pregnant or menopausal or have other active co-infections will be excluded. Consenting participants who meet exclusion and inclusion criteria will be randomly assigned to one of three treatment groups: boric acid, metronidazole, or an inert placebo. Self-administration of treatment intravaginally for 10 days will be followed by clinical assessment at 7 and 30 days (days 17 and 40, respectively) after the end of the treatment phase. Primary outcome is a non-inferiority, per-protocol comparison of the effectiveness of boric acid with that of metronidazole at day 17, as measured by the Nugent score in 16-50 year olds. Secondary outcomes include: non-inferiority, intention-to-treat comparison of effectiveness of boric acid with that of metronidazole at day 17, analysis for both per-protocol and intention-to-treat at day 40, and safety considerations, including adverse effects requiring patient

143. 40 CFR 721.1730 - Poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric acid (H3BO3).

     Code of Federal Regulations, 2013 CFR

     2013-07-01

     ...-hydroxy, ester with boric acid (H3BO3). 721.1730 Section 721.1730 Protection of Environment ENVIRONMENTAL..., ester with boric acid (H3BO3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric...

144. 40 CFR 721.1730 - Poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric acid (H3BO3).

     Code of Federal Regulations, 2014 CFR

     2014-07-01

     ...-hydroxy, ester with boric acid (H3BO3). 721.1730 Section 721.1730 Protection of Environment ENVIRONMENTAL..., ester with boric acid (H3BO3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric...

145. 40 CFR 721.1731 - Poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric acid (H3BO3).

     Code of Federal Regulations, 2012 CFR

     2012-07-01

     ...-hydroxy, ester with boric acid (H3BO3). 721.1731 Section 721.1731 Protection of Environment ENVIRONMENTAL..., ester with boric acid (H3BO3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric...

146. 40 CFR 721.1731 - Poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric acid (H3BO3).

     Code of Federal Regulations, 2010 CFR

     2010-07-01

     ...-hydroxy, ester with boric acid (H3BO3). 721.1731 Section 721.1731 Protection of Environment ENVIRONMENTAL..., ester with boric acid (H3BO3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric...

147. 40 CFR 721.1731 - Poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric acid (H3BO3).

     Code of Federal Regulations, 2011 CFR

     2011-07-01

     ...-hydroxy, ester with boric acid (H3BO3). 721.1731 Section 721.1731 Protection of Environment ENVIRONMENTAL..., ester with boric acid (H3BO3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric...

148. 40 CFR 721.1731 - Poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric acid (H3BO3).

     Code of Federal Regulations, 2013 CFR

     2013-07-01

     ...-hydroxy, ester with boric acid (H3BO3). 721.1731 Section 721.1731 Protection of Environment ENVIRONMENTAL..., ester with boric acid (H3BO3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric...

149. [40 CFR 721.1730 - Poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric acid (H3BO3).]

    [Code of Federal Regulations, 2012 CFR]

    2012-07-01

    ...-hydroxy, ester with boric acid (H3BO3). 721.1730 Section 721.1730 Protection of Environment ENVIRONMENTAL..., ester with boric acid (H3BO3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric...

150. [40 CFR 721.1731 - Poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric acid (H3BO3).]

    [Code of Federal Regulations, 2014 CFR]

    2014-07-01

    ...-hydroxy, ester with boric acid (H3BO3). 721.1731 Section 721.1731 Protection of Environment ENVIRONMENTAL..., ester with boric acid (H3BO3). (a) Chemical substance and significant new uses subject to reporting. (1) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-methyl-Ï‰-hydroxy, ester with boric...

151. [The effect of pregnancy on renal clearance of boron in rats given boric acid orally.]

    [PubMed]

    Vaziri, N D; Oveisi, F; Culver, B D; Pahl, M V; Andersen, M E; Strong, P L; Murray, F J

    2001-04-01

    Boric acid (H(3)BO(3)) has been shown to cause developmental abnormalities in the offspring of pregnant rats. Comparative data on the renal clearance of boron (B) in rats and humans, both pregnant and nonpregnant, exposed to boric acid (BA) would reduce uncertainty in interspecies extrapolation from rats to humans. The purpose of this study was to evaluate the effect of pregnancy on the plasma half-life and renal clearance of boron in Sprague-Dawley rats given a single oral dose of boric acid. For the half-life study, nonpregnant and pregnant (gestation day 16) rats were given a single dose of 30 mg/kg of boric acid by gavage, and plasma samples were collected at 2-3 h intervals. The plasma half-life of boron was determined to be 2.9 +/- 0.2 and 3.2 +/- 0.3 h in nonpregnant and pregnant rats, respectively. In the clearance study, nonpregnant and pregnant (GD 16) rats were given a single gavage dose of 0.3, 3, or 30 mg/kg of boric acid. Boron clearance was slightly higher in pregnant rats (3.3 +/- 0.6, 3.2 +/- 0.5, and 3.4 +/- 0.5 ml/min/kg, respectively) compared to nonpregnant rats (3.1 +/- 0.8, 3.0 +/- 0.6, and 3.2 +/- 0.5 ml/min/kg, respectively), but the difference was not statistically significant and not dose-related. Boron clearance was less than creatinine clearance, suggesting tubular reabsorption in both groups. In conclusion, pregnancy did not appear to significantly alter the renal clearance or the plasma half-life of boron in Sprague-Dawley rats under the conditions of this study.

152. [Boric acid reduces axonal and myelin damage in experimental sciatic nerve injury]

    [PubMed Central]

    KÄ±zÄ±lay, Zahir; Erken, Haydar Ali; Ã‡etin, Nesibe Kahraman; AktaÅŸ, Serdar; Abas, BurÃ§in Ä°rem; YÄ±lmaz, Ali

2016-01-01

The aim of this study was to investigate the effects of boric acid in experimental acute sciatic nerve injury. Twenty-eight adult male rats were randomly divided into four equal groups (n = 7): control (C), boric acid (BA), sciatic nerve injury (I), and sciatic nerve injury + boric acid treatment (BAI). Sciatic nerve injury was generated using a Yasargil aneurysm clip in the groups I and BAI. Boric acid was given four times at 100 mg/kg to rats in the groups BA and BAI after injury (by gavage at 0, 24, 48 and 72 hours) but no injury was made in the group BA. In vivo electrophysiological tests were performed at the end of the day 4 and sciatic nerve tissue samples were taken for histopathological examination. The amplitude of compound action potential, the nerve conduction velocity and the number of axons were significantly lower and the myelin structure was found to be broken in group I compared with those in groups C and BA. However, the amplitude of the compound action potential, the nerve conduction velocity and the number of axons were significantly greater in group BAI than in group I. Moreover, myelin injury was significantly milder and the intensity of nuclear factor kappa B immunostaining was significantly weaker in group BAI than in group I. The results of this study show that administration of boric acid at 100 mg/kg after sciatic nerve injury in rats markedly reduces myelin and axonal injury and improves the electrophysiological function of injured sciatic nerve possibly through alleviating oxidative stress reactions. PMID:27904499

153. Loci Contributing to Boric Acid Toxicity in Two Reference Populations of Drosophila melanogaster

PubMed Central

Najarro, Michael A.; Hackett, Jennifer L.; Macdonald, Stuart J.

2017-01-01

Populations maintain considerable segregating variation in the response to toxic, xenobiotic compounds. To identify variants associated with resistance to boric acid, a commonly-used household insecticide with a poorly understood mechanism of action, we assayed thousands of individuals from hundreds of strains. Using the Drosophila Synthetic Population Resource (DSPR), a multi-parental population (MPP) of inbred genotypes, we mapped six QTL to short genomic regions containing few protein-coding genes (3â€“188), allowing us to identify plausible candidate genes underlying resistance to boric acid toxicity. One interval contains multiple genes from the cytochrome P450 family, and we show that ubiquitous RNAi of one of these genes, Cyp9b2, markedly reduces resistance to the toxin. Resistance to boric acid is positively correlated with caffeine resistance. The two phenotypes additionally share a pair of QTL, potentially suggesting a degree of pleiotropy in the genetic control of resistance to these two distinct xenobiotics. Finally, we screened the Drosophila Genetic Reference Panel (DGRP) in an attempt to identify sequence variants within mapped QTL that are associated with boric acid resistance. The approach was largely unsuccessful, with only one QTL showing any associations at QTL-specific 20% False Discovery Rate (FDR) thresholds. Nonetheless, these associations point to a potential candidate gene that can be targeted in future validation efforts. Although the mapping data resulting from the two reference populations do not clearly overlap, our work provides a starting point for further genetic dissection of the processes underlying boric acid toxicity in insects. PMID:28592646

154. Boric acid reduces axonal and myelin damage in experimental sciatic nerve injury.

PubMed

KÄ±zÄ±lay, Zahir; Erken, Haydar Ali; Ã‡etin, Nesibe Kahraman; AktaÅŸ, Serdar; Abas, BurÃ§in Ä°rem; YÄ±lmaz, Ali

2016-10-01

The aim of this study was to investigate the effects of boric acid in experimental acute sciatic nerve injury. Twenty-eight adult male rats were randomly divided into four equal groups (n = 7): control (C), boric acid (BA), sciatic nerve injury (I), and sciatic nerve injury + boric acid treatment (BAI). Sciatic nerve injury was generated using a Yasargil aneurysm clip in the groups I and BAI. Boric acid was given four times at 100 mg/kg to rats in the groups BA and BAI after injury (by gavage at 0, 24, 48 and 72 hours) but no injury was made in the group BA. In vivo electrophysiological tests were performed at the end of the day 4 and sciatic nerve tissue samples were taken for histopathological examination. The amplitude of compound action potential, the nerve conduction velocity and the number of axons were significantly lower and the myelin structure was found to be broken in group I compared with those in groups C and BA. However, the amplitude of the compound action potential, the nerve conduction velocity and the number of axons were significantly greater in group BAI than in group I. Moreover, myelin injury was significantly milder and the intensity of nuclear factor kappa B immunostaining was significantly weaker in group BAI than in group I. The results of this study show that administration of boric acid at 100 mg/kg after sciatic nerve injury in rats markedly reduces myelin and axonal injury and improves the electrophysiological function of injured sciatic nerve possibly through alleviating oxidative stress reactions.

155. Loci Contributing to Boric Acid Toxicity in Two Reference Populations of Drosophila melanogaster.

PubMed

Najarro, Michael A; Hackett, Jennifer L; Macdonald, Stuart J

2017-06-07

Populations maintain considerable segregating variation in the response to toxic, xenobiotic compounds. To identify variants associated with resistance to boric acid, a commonly-used household insecticide with a poorly understood mechanism of action, we assayed thousands of individuals from hundreds of strains. Using the Drosophila Synthetic Population Resource (DSPR), a multi-parental population (MPP) of inbred genotypes, we mapped six QTL to short genomic regions containing few protein-coding genes (3-188), allowing us to identify plausible candidate genes underlying resistance to boric acid toxicity. One interval contains multiple genes from the cytochrome P450 family, and we show that ubiquitous RNAi of one of these genes, Cyp9b2 , markedly reduces resistance to the toxin. Resistance to boric acid is positively correlated with caffeine resistance. The two phenotypes additionally share a pair of QTL, potentially suggesting a degree of pleiotropy in the genetic control of resistance to these two distinct xenobiotics. Finally, we screened the Drosophila Genetic Reference Panel (DGRP) in an attempt to identify sequence variants within mapped QTL that are associated with boric acid resistance. The approach was largely unsuccessful, with only one QTL showing any associations at QTL-specific 20% False Discovery Rate (FDR) thresholds. Nonetheless, these associations point to a potential candidate gene that can be targeted in future validation efforts. Although the mapping data resulting from the two reference populations do not clearly overlap, our work provides a starting point for further genetic dissection of the processes underlying boric acid toxicity in insects. Copyright Â© 2017 Najarro et al.

156. FLUCONAZOLE AND BORIC ACID FOR TREATMENT OF VAGINAL CANDIDIASIS--NEW WORDS ABOUT OLD ISSUE.

PubMed

Khameneie, K M; Arianpour, N; Roozegar, R; Aklamli, M; Amiri, M M

2013-04-01

To compare boric acid as an effective treatment for VVC compared to fluconazole. We also studied the efficiency of these drugs in preventing recurrence of VVC. A cross sectional, randomized, double-blind study. Gynaecology clinic of Imam Reza hospital, Tehran - Iran Women with signs and symptoms related to Vulvo Vaginal Candidiasis. Seventy five patients out of total 150 patients with signs and symptoms related to Vulvo Vaginal Candidiasis were treatedwith boric acidpowder everynight for a week and the remaining 75 patients received Fluconazole. The cure rate in first group was 46.7% but the cure rate in second group was 37.3%. The difference was not statistically significant (P>0.3). Difference between the efficacy of the two drugs was not significant either (P=0.47). The recurrence rate among patients in first group was 35% while it was 32% in second group. Their difference was not statistically significant (P=0.54). According to our findings, treatment of vaginal candidiasis with boric acid is as effective as fluconazole. The availability of boric acid and its relatively low cost suggests it as a safe and effective drug for treatment of candidiasis.

157. Identification of boric acid as a novel chemoattractant and elucidation of its chemoreceptor in Ralstonia pseudosolanacearum Ps29.

    PubMed

    Hida, Akiko; Oku, Shota; Nakashimada, Yutaka; Tajima, Takahisa; Kato, Junichi

    2017-08-17

    Chemotaxis enables bacteria to move toward more favorable environmental conditions. We observed chemotaxis toward boric acid by Ralstonia pseudosolanacearum Ps29. At higher concentrations, the chemotactic response of R. pseudosolanacearum toward boric acid was comparable to or higher than that toward L-malate, indicating that boric acid is a strong attractant for R. pseudosolanacearum. Chemotaxis assays under different pH conditions suggested that R. pseudosolanacearum recognizes B(OH) 3 (or B(OH 3)â€‰+â€‰B(OH) 4 -) but not B(OH) 4 - alone. Our previous study revealed that R. pseudosolanacearum Ps29 harbors homologs of all 22R. pseudosolanacearum GMI1000 mcp genes. Screening of 22 mcp single-deletion mutants identified the RS_RS17100 homolog as the boric acid chemoreceptor, which was designated McpB. The McpB ligand-binding domain (LBD) was purified in order to characterize its binding to boric acid. Using isothermal titration calorimetry, we demonstrated that boric acid binds directly to the McpB LBD with a K D (dissociation constant) of 5.4â€‰ÂµM. Analytical ultracentrifugation studies revealed that the McpB LBD is present as a dimer that recognizes one boric acid molecule.

158. Voltammetric study of the boric acid-salicylaldehyde-H-acid ternary system and its application to the voltammetric determination of boron.

    PubMed

    Kajiwara, Mari; Ito, Yoshio N; Miyazaki, Yoshinobu; Fujimori, Takao; Takehara, KÃ´; Yoshimura, Kazuhisa

    2015-02-14

    The ternary system of boric acid, salicylaldehyde (SA) and H-acid (HA) was voltammetrically studied from kinetic and equilibrium points of view. The effect of the SA substituents was also studied by using two analogs, 5-fluorosalicylaldehyde (F-SA) and 5-methylsalicylaldehyde (Me-SA). The three cathodic peaks of Azomethine H (AzH), Azomethine H-boric acid complex (AzB), and free SA were observed in the solution containing boric acid, SA and HA. The peak potentials of AzH and SA were shifted to negative potentials with increasing pH, while the peak potential of AzB was pH-independent. This difference indicates that a proton participates in the charge-transfer steps of the AzH and SA reductions, but not in that of the AzB reduction. The formation constants for the AzB complexation were similar among all the examined analogs. In the kinetic study, the reaction rate was higher in an acidic condition for the AzH formation, but in a neutral condition for the AzB formation. The rate constants for the AzB complexes were in the order of F-SA > SA â‰ˆ Me-SA, indicating that the fluoro group accelerates the F-AzB complexation. The AzB complexation mechanism is considered to consist of more than three steps, i.e., the pre-equilibrium of the salicylaldehyde-boric acid complex (SA-B) formation, the nucleophilic attack of HA on SA-B, and the remaining some steps to form AzB. Based on these results, the voltammetric determination method of boron using F-SA was optimized, which allowed the boron concentration to be determined within only 5 min with a 0.03 mg B dm(-3) detection limit.

159. Extreme Activity of Drug Nanocrystals Coated with A Layer of Non-Covalent Polymers from Self-Assembled Boric Acid

     NASA Astrophysics Data System (ADS)

     Zhan, Honglei; Liang, Jun F.

     2016-12-01

     Non-covalent polymers have remarkable advantages over synthetic polymers for wide biomedical applications. In this study, non-covalent polymers from self-assembled boric acid were used as the capping reagent to replace synthetic polymers in drug crystallization. Under acidic pH, boric acid self-assembled on the surface of drug nanocrystals to form polymers with network-like structures held together by hydrogen bonds. Coating driven by boric acid self-assembly had negligible effects on drug crystallinity and structure but resulted in drug nanocrystals with excellent dispersion properties that aided in the formation of a more stable suspension. Boric acid coating improved drug stability dramatically by preventing drug molecules from undergoing water hydrolysis in a neutral environment. More importantly, the specific reactivity of orthoboric groups to diols in cell glycocalyx facilitated a rapid cross-membrane translocation of drug nanocrystals, leading to efficient intracellular drug delivery, especially on cancer cells with highly expressed sialic acids. Boric acid coated nanocrystals of camptothecin, an anticancer drug with poor aqueous solubility and stability, demonstrated extreme cytotoxic activity (IC50â€‰<â€‰5.0â€‰Î¼g/mL) to cancer cells compared to synthetic polymer coated CPT nanocrystals and free CPT. Surface coating using non-covalent polymers from self-assembled boric acid will have wide biomedical applications especially in biomaterials and drug delivery field.

160. Extreme Activity of Drug Nanocrystals Coated with A Layer of Non-Covalent Polymers from Self-Assembled Boric Acid.

     PubMed

     Zhan, Honglei; Liang, Jun F

     2016-12-09

     Non-covalent polymers have remarkable advantages over synthetic polymers for wide biomedical applications. In this study, non-covalent polymers from self-assembled boric acid were used as the capping reagent to replace synthetic polymers in drug crystallization. Under acidic pH, boric acid self-assembled on the surface of drug nanocrystals to form polymers with network-like structures held together by hydrogen bonds. Coating driven by boric acid self-assembly had negligible effects on drug crystallinity and structure but resulted in drug nanocrystals with excellent dispersion properties that aided in the formation of a more stable suspension. Boric acid coating improved drug stability dramatically by preventing drug molecules from undergoing water hydrolysis in a neutral environment. More importantly, the specific reactivity of orthoboric groups to diols in cell glycocalyx facilitated a rapid cross-membrane translocation of drug nanocrystals, leading to efficient intracellular drug delivery, especially on cancer cells with highly expressed sialic acids. Boric acid coated nanocrystals of camptothecin, an anticancer drug with poor aqueous solubility and stability, demonstrated extreme cytotoxic activity (IC 50 â€‰<â€‰5.0â€‰Î¼g/mL) to cancer cells compared to synthetic polymer coated CPT nanocrystals and free CPT. Surface coating using non-covalent polymers from self-assembled boric acid will have wide biomedical applications especially in biomaterials and drug delivery field.

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161. Extreme Activity of Drug Nanocrystals Coated with A Layer of Non-Covalent Polymers from Self-Assembled Boric Acid

     PubMed Central

     Zhan, Honglei; Liang, Jun F.

     2016-01-01

     Non-covalent polymers have remarkable advantages over synthetic polymers for wide biomedical applications. In this study, non-covalent polymers from self-assembled boric acid were used as the capping reagent to replace synthetic polymers in drug crystallization. Under acidic pH, boric acid self-assembled on the surface of drug nanocrystals to form polymers with network-like structures held together by hydrogen bonds. Coating driven by boric acid self-assembly had negligible effects on drug crystallinity and structure but resulted in drug nanocrystals with excellent dispersion properties that aided in the formation of a more stable suspension. Boric acid coating improved drug stability dramatically by preventing drug molecules from undergoing water hydrolysis in a neutral environment. More importantly, the specific reactivity of orthoboric groups to diols in cell glycocalyx facilitated a rapid cross-membrane translocation of drug nanocrystals, leading to efficient intracellular drug delivery, especially on cancer cells with highly expressed sialic acids. Boric acid coated nanocrystals of camptothecin, an anticancer drug with poor aqueous solubility and stability, demonstrated extreme cytotoxic activity (IC50â€‰<â€‰5.0â€‰Î¼g/mL) to cancer cells compared to synthetic polymer coated CPT nanocrystals and free CPT. Surface coating using non-covalent polymers from self-assembled boric acid will have wide biomedical applications especially in biomaterials and drug delivery field. PMID:27934922

162. Selective Extraction and Purification of Azaspiracids from Blue Mussels (Mytilus edulis) Using Boric Acid Gel.

     PubMed

     Miles, Christopher O; Kilcoyne, Jane; McCarron, Pearse; Giddings, Sabrina D; Waaler, Thor; Rundberget, Thomas; Samdal, Ingunn A; LÃ¸vberg, Kjersti E

     2018-03-21

     Azaspiracids belong to a family of more than 50 polyether toxins originating from marine dinoflagellates such as Azadinium spinosum. All of the azaspiracids reported thus far contain a 21,22-dihydroxy group. Boric acid gel can bind selectively to compounds containing vic-diols or Î±-hydroxycarboxylic acids via formation of reversible boronate complexes. Here we report use of the gel to selectively capture and release azaspiracids from extracts of blue mussels. Analysis of the extracts and fractions by liquid chromatography-tandem mass spectrometry (LC-MS) showed that this procedure resulted in an excellent cleanup of the azaspiracids in the extract. Analysis by enzyme-linked immunoasorbent assay (ELISA) and LC-MS indicated that most azaspiracid analogues were recovered in good yield by this procedure. The capacity of boric acid gel for azaspiracids was at least 50 Î¼g/g, making this procedure suitable for use in the early stages of preparative purification of azaspiracids. In addition to its potential for concentration of dilute samples, the extensive cleanup provided by boric acid gel fractionation of azaspiracids in mussel samples almost eliminated matrix effects during subsequent LC-MS and could be expected to reduce matrix effects during ELISA analysis. The method may therefore prove useful for quantitative analysis of azaspiracids as part of monitoring programs. Although LC-MS data showed that okadaic acid analogues also bound to the gel, this was much less efficient than for azaspiracids under the conditions used. The boric acid gel methodology is potentially applicable to other important groups of natural toxins containing diols including ciguatoxins, palytoxins, pectenotoxins, tetrodotoxin, trichothecenes, and toxin glycosides.

163. Permeability of boric acid across lipid bilayers and factors affecting it.

PubMed

Dordas, C; Brown, P H

2000-05-15

Boron enters plant roots as undissociated boric acid (H(3)BO(3)). Significant differences in B uptake are frequently observed even when plants are grown under identical conditions. It has been theorized that these differences reflect species differences in permeability coefficient of H(3)BO(3) across plasma membrane. The permeability coefficient of boric acid however, has not been experimentally determined across any artificial or plant membrane. In the experiments described here the permeability coefficient of boric acid in liposomes made of phosphatidylcholine was 4.9x10(-6) cm sec(-1), which is in good agreement with the theoretical value. The permeability coefficient varied from 7x10(-6) to 9.5x10(-9) cm sec(-1) with changes in sterols (cholesterol), the type of phospholipid head group, the length of the fatty acyl chain, and the pH of the medium. In this study we also used Arabidopsis thaliana mutants which differ in lipid composition to study the effect of lipid composition on B uptake. The chs1-1 mutant which has lower proportion of sterols shows 30% higher B uptake compared with the wild type, while the act1-1 mutant which has an increased percentage of longer fatty acids, exhibited 35% lower uptake than the wild type. Lipid composition changes in each of the remaining mutants influenced B uptake to various extents. These data suggest that lipid composition of the plasma membrane can affect total B uptake.

164. Effect of pressure on the dissociation constant of boric acid in water and seawater

NASA Astrophysics Data System (ADS)

Millero, Frank J.; Ward, Gary K.; Surdo, Antonio Lo; Huang, Fen

2012-01-01

The sound speeds of boric acid and sodium borate in water and 0.725 m NaCl have been measured from 0 to 50 Â°C and to near 1 molal. These results have been used to determine the partial molal adiabatic compressibilities of B(OH) 3 and NaB(OH) 4. The partial molal volumes, vÂ¯(i), and compressibilities, Î°Â¯(i), have been used to estimate the changes in the volume (Î” V) and compressibility (Î” Î°) for the dissociation of boric acid in water and average seawater (0.725 m NaCl, SA Ëœ 35 g/kg) B(OH)3+H2O=H++B(OH)4- where

165. Permeability and Channel-Mediated Transport of Boric Acid across Membrane Vesicles Isolated from Squash Roots1

PubMed Central

Dordas, Christos; Chrispeels, Maarten J.; Brown, Patrick H.

2000-01-01

Boron is an essential micronutrient for plant growth and the boron content of plants differs greatly, but the mechanism(s) of its uptake into cells is not known. Boron is present in the soil solution as boric acid and it is in this form that it enters the roots. We determined the boron permeability coefficient of purified plasma membrane vesicles obtained from squash (Cucurbita pepo) roots and found it to be 3 Ã— 10âˆ'7 Â±1.4 Ã— 10âˆ'8 cm sâˆ'1, six times higher than the permeability of microsomal vesicles. Boric acid permeation of the plasma membrane vesicles was partially inhibited (30%â€"39%) by mercuric chloride and phloretin, a non-specific channel blocker. The inhibition by mercuric chloride was readily reversible by 2-mercaptoethanol. The energy of activation for boron transport into the plasma membrane vesicles was 10.2 kcal molâˆ'1. Together these data indicate that boron enters plant cells in part by passive diffusion through the lipid bilayer of the plasma membrane and in part through proteinaceous channels. Expression of the major intrinsic protein (MIP) PIP1 in Xenopus laevis oocytes resulted in a 30% increase in the boron permeability of the oocytes. Other MIPs tested (PIP3, MLM1, and GlpF) did not have this effect. We postulate that certain MIPs, like those that have recently been shown to transport small neutral solutes, may also be the channels through which boron enters plant cells. PMID:11080310

166. Enantiomeric separation of seven Î²-agonists by NACE-Study of chiral selectivity with diacetone-d-mannitol-boric acid complex.

PubMed

Lv, Lili; Wang, Lijuan; Li, Jun; Jiao, Yajun; Gao, Shengnan; Wang, Jiachang; Yan, Hongyuan

2017-10-25

A rapid and effective nonaqueous capillary electrophoresis (NACE)-ultraviolet (UV) method was developed for the enantiomeric separation of seven Î²-agonists. Diacetone-d-mannitol-boric acid complex was used as a new chiral selector. It was in situ synthesized by the reaction of diacetone-d-mannitol and boric acid in methanol medium containing triethylamine. The effects of diacetone-d-mannitol, boric acid, and triethylamine concentrations on the enantioseparation were carefully investigated. Under the optimized conditions, baseline enantioseparation could be obtained for six of the tested Î²-agonists within 12min. These results were better than that obtained with d-mannitol-boric acid complex in previous work. 11 B nuclear magnetic resonance (11 B NMR) was applied to determine the fraction of boron species and confirm the formation of diacetone-d-mannitol-boric acid complex. Validation of the established NACE method was also carried out according to ICH guidelines. Calibration curves showed good linearity with correlation coefficients (r)â‰¥0.9992 over a certain concentration range for each enantiomer of the tested five Î²-agonists. The relative standard deviations (RSDs) of intra-day precisions and inter-day precisions of migration times were â‰¤1.4% (n=6), and â‰¤6.3% (n=10), respectively. That of peak areas were â‰¤3.7% (n=6), and â‰¤5.6% (n=10), respectively. The limits of detection (LODs) and the limits of quantitation (LOQs) based on the signal-to-noise ratios of 3 and 10 were found below 1.25Î¼gmL -1 and 5.00Î¼gmL -1 , respectively. The proposed method was successfully applied to the determination of clenbuterol enantiomers in a multi-component pharmaceutical dosage form called "Ambroxol Hydrochloride and Clenbuterol Hydrochloride Oral Solution". Copyright Â© 2017 Elsevier B.V. All rights reserved.

167. Establishment of Genetically Encoded Biosensors for Cytosolic Boric Acid in Plant Cells.

PubMed

Fukuda, Makiha; Wakuta, Shinji; Kamiyo, Jio; Fujiwara, Toru; Takano, Junpei

2018-06-08

Boron (B) is an essential micronutrient for plants. To maintain B concentration in tissues at appropriate levels, plants use boric acid channels belonging to the NIP subfamily of aquaporins and BOR borate exporters. To regulate B transport, these transporters exhibit different cell-type specific expression, polar localization, and B-dependent post-transcriptional regulation. Here, we describe the development of genetically encoded biosensors for cytosolic boric acid to visualize the spatial distribution and temporal dynamics of B in plant tissues. The biosensors were designed based on the function of the NIP5;1 5'-untranslated region (UTR), which promotes mRNA degradation in response to an elevated cytosolic boric acid concentration. The signal intensities of the biosensor coupled with Venus fluorescent protein and a nuclear localization signal (uNIP5;1-Venus) showed a negative correlation with intracellular B concentrations in cultured tobacco BY-2 cells. When expressed in Arabidopsis thaliana, uNIP5;1-Venus enabled quantification of the B distribution in roots at single-cell resolution. In mature roots, cytosolic B levels in stele were maintained under low-B supply, while those in epidermal, cortical, and endodermal cells were influenced by external B concentrations. Another biosensor coupled with a luciferase protein fused to a destabilization PEST sequence (uNIP5;1-Luc) was used to visualize changes in cytosolic boric acid concentrations. Thus, uNIP5;1-Venus/Luc enables visualization of B transport in various plant cells/tissues. This article is protected by copyright. All rights reserved. This article is protected by copyright. All rights reserved.

168. Autoinducer-2 detection among commensal oral streptococci is dependent on pH and boric acid.

PubMed

Cuadra, Giancarlo A; Frantellizzi, Ashley J; Gaesser, Kimberly M; Tammariello, Steven P; Ahmed, Anika

2016-07-01

Autoinducer-2, considered a universal signaling molecule, is produced by many species of bacteria; including oral strains. Structurally, autoinducer-2 can exist bound to boron (borated autoinducer-2). Functionally, autoinducer-2 has been linked to important bacterial processes such as virulence and biofilm formation. In order to test production of autoinducer-2 by a given bacterial strain, a bioassay using marine bioluminescent bacteria Vibrio harveyi as a reporter for autoinducer-2 has been designed. We hypothesize that pH adjustment and addition of boron are required for optimal bioluminescence and accurate autoinducer-2 detection. Using this reporter strain we tested autoinducer-2 activity from two oral commensal species, Streptococcus gordonii DL1 and Streptococcus oralis 34. Spent broth was collected and adjusted to pH 7.5 and supplemented with boric acid prior to measuring autoinducer- 2 activity. Results show that low pH inhibits bioluminescence of the reporter strain, but pH 7.5 allows for bioluminescence induction and proper readings of autoinducer-2 activity. Addition of boric acid also has a positive effect on bioluminescence allowing for a more sensitive detection of autoinducer-2 activity. Our data suggests that although autoinducer-2 is present in spent broth, low pH and/or low levels of boric acid become an obstacle for proper autoinducer-2 detection. For proper autoinducer-2 detection, we propose a protocol using this bioassay to include pH adjustment and boric acid addition to spent broth. Studies on autoinducer-2 activity in several bacteria species represent an important area of study as this universal signaling molecule is involved in critical bacterial phenotypes such as virulence and biofilm formation.

169. The effect of boric acid on bacterial culture of canine and feline urine.

PubMed

Rowlands, M; Blackwood, L; Mas, A; Cripps, P; Crompton, C; Burrow, R

2011-10-01

To identify the optimal method of submission of canine and feline urine for bacterial culture. Cystocentesis samples from 250 animals (200 dogs, 50 cats) suspected of having urinary tract infections were collected. The reference aliquot, without preservative, was processed on site within 2 hours. Two further aliquots (one without preservative, one with boric acid) were stored at room temperature for up to 7 hours and then posted by guaranteed next day delivery to a commercial laboratory for analysis. Forty-seven of the samples were positive on culture in the reference test. There was no significant difference between reference test results and those of samples posted without preservative (P=0Â·39), but samples posted in boric acid were significantly less likely to give a positive result (P=0Â·01). Samples posted without preservative had a sensitivity of 82% and a specificity of 98%; for boric acid, sensitivity was 73% and specificity 99%. Postal urine samples should be submitted to the laboratory in a plain sterile tube. Â© 2011 British Small Animal Veterinary Association.

170. Genotoxic effects of boric acid and borax in zebrafish, Danio rerio using alkaline comet assay.

    PubMed

    GÃ¼lsoy, Nagihan; Yavas, CÃ¼neyd; Mutlu, Ã–zal

    2015-01-01

    The present study is conducted to determine the potential mechanisms of Boron compounds, boric acid (BA) and borax (BX), on genotoxicity of zebrafish Danio rerio for 24, 48, 72 and 96-hours acute exposure (level:1, 4, 16, 64 mg/l BA and BX) in semi-static bioassay experiment. For that purpose, peripheral erythrocytes were drawn from caudal vein and Comet assay was applied to assess genotoxicity. Acute (96 hours) exposure and high concentrations of boric acid and borax increases % tail DNA and Olive tail moment. Genotoxicity was found for BA as concentration-dependent and BX as concentration and time dependent manner. In general, significant effects (P < 0,05) on both concentrations and exposure times were observed in experimental groups. DNA damage was highest at 96 h and 24 h for all BX and BA concentrations, respectively in peripheral blood of D. rerio. For the first time, our study demonstrates the effect of waterborne BA and BX exposure on genotoxicity at the molecular level, which may contribute to understanding the mechanism of boric acid and borax-induced genotoxicity in fish.

171. Genotoxic effects of boric acid and borax in zebrafish, Danio rerio using alkaline comet assay

    PubMed Central

    GÃ¼lsoy, Nagihan; Yavas, CÃ¼neyd; Mutlu, Ã–zal

    2015-01-01

    The present study is conducted to determine the potential mechanisms of Boron compounds, boric acid (BA) and borax (BX), on genotoxicity of zebrafish Danio rerio for 24, 48, 72 and 96-hours acute exposure (level:1, 4, 16, 64 mg/l BA and BX) in semi-static bioassay experiment. For that purpose, peripheral erythrocytes were drawn from caudal vein and Comet assay was applied to assess genotoxicity. Acute (96 hours) exposure and high concentrations of boric acid and borax increases % tail DNA and Olive tail moment. Genotoxicity was found for BA as concentration-dependent and BX as concentration and time dependent manner. In general, significant effects (P < 0,05) on both concentrations and exposure times were observed in experimental groups. DNA damage was highest at 96 h and 24 h for all BX and BA concentrations, respectively in peripheral blood of D. rerio. For the first time, our study demonstrates the effect of waterborne BA and BX exposure on genotoxicity at the molecular level, which may contribute to understanding the mechanism of boric acid and borax-induced genotoxicity in fish. PMID:26862320

172. Breaking Bad Delirium: Methamphetamine and Boric Acid Toxicity with Hallucinations and Pseudosepsis.

PubMed

Johnson, Kayla; Stollings, Joanna L; Ely, E Wesley

2017-02-01

A 30-year-old patient presented with hallucinations and profound shock. He was initially misdiagnosed as having severe sepsis; once ingestions were considered, he was diagnosed as potentially having arsenic toxicity. The clinical story reveals many instructional lessons that could aid in the evaluation and management of future patients. This man presented with large amounts of blue crystals around his nose and lips from inhaling and eating boric acid (an ant poison) so he could, as he put it, kill the ants "pouring into my mouth and nose and up into my brain." His profound pseudosepsis and sustained delirium were induced by co-ingestion of methamphetamine and a large quantity of boric acid. Delirium is a form of acute brain dysfunction that often is multifactorial in critical illness and, when seen in septic shock, is associated with prolonged mechanical ventilation, increased length of hospital stay, medical costs, higher mortality, and long-term cognitive impairment resembling dementia. Pseudosepsis is a noninfectious condition most commonly seen with ingestions such as salicylate (aspirin) toxicity. This report emphasizes the need to recognize agents that contain boric acid as an etiology of unexplained delirium and profound shock.

173. Effects of boric acid on experimental periodontitis and alveolar bone loss in rats.

PubMed

Demirer, Serhat; Kara, M Isa; Erciyas, Kamile; Ozdemir, Hakan; Ozer, Hatice; Ay, Sinan

2012-01-01

The goal of the present study was to evaluate the histopathologic and morphometric effects of systemic boric acid in a rat periodontitis model. Twenty-four Wistar rats were divided into three groups of eight animals each: non-ligated (NL), ligature only (LO), and ligature and treated with boric acid (BA) (3mg/kg per day for 11 days). A 4/0 silk suture was placed in a subgingival position around the mandibular first molars; after 11 days the rats were sacrificed, and changes in alveolar bone levels were measured clinically and tissues were histopathologically examined to assess the differences amongst the study groups. The ratio of presence of inflammatory cell infiltration (ICI) and osteoclast number in the LO group was significantly higher than that of the NL and BA groups ($p<0.05$). The ratio of presence of osteoblastic activity in the LO group was significantly lower than that of the NL and BA groups ($p<0.05$). Alveolar bone loss was also significantly higher in the LO group compared to the BA and NL groups ($p<005$). This study has demonstrated that systemic administration of boric acid reduced periodontal inflammation and alveolar bone loss in periodontal disease in rats. Copyright Â© 2011 Elsevier Ltd. All rights reserved.

174. Breaking Bad Delirium: Methamphetamine and Boric Acid Toxicity with Hallucinations and Pseudosepsis

PubMed Central

Johnson, Kayla; Stollings, Joanna L.; Ely, E. Wesley

2016-01-01

Objectives A 30-year-old patient presented with hallucinations and profound shock. He was initially misdiagnosed as having severe sepsis; once ingestions were considered, he was diagnosed as potentially having arsenic toxicity. Summary The clinical story reveals many instructional lessons that could aid in the evaluation and management of future patients. This man presented with large amounts of blue crystals around his nose and lips from inhaling and eating boric acid (an ant poison) so he could, as he put it, kill the ants â€œpouring into my mouth and nose and up into my brain.â€ His profound pseudosepsis and sustained delirium were induced by co-ingestion of methamphetamine and a large quantity of boric acid. Delirium is a form of acute brain dysfunction that often is multifactorial in critical illness and, when seen in septic shock, is associated with prolonged mechanical ventilation, increased length of hospital stay, medical costs, higher mortality, and long-term cognitive impairment resembling dementia. Pseudosepsis is a noninfectious condition most commonly seen with ingestions such as salicylate (aspirin) toxicity. Conclusions This report emphasizes the need to recognize agents that contain boric acid as an etiology of unexplained delirium and profound shock. PMID:28158885

175. Inhibition studies of soybean (Glycine max) urease with heavy metals, sodium salts of mineral acids, boric acid, and boronic acids.

 PubMed

 Kumar, Sandeep; Kayastha, Arvind M

 2010-10-01

 Various inhibitors were tested for their inhibitory effects on soybean urease. The K(i) values for boric acid, 4-bromophenylboronic acid, butylboronic acid, and phenylboronic acid were 0.20 +/- 0.05 mM, 0.22 +/- 0.04 mM, 1.50 +/- 0.10 mM, and 2.00 +/- 0.11 mM, respectively. The inhibition was competitive type with boric acid and boronic acids. Heavy metal ions including Ag(+), Hg(2+), and Cu(2+) showed strong inhibition on soybean urease, with the silver ion being a potent inhibitor (IC(50) = 2.3 x 10(-8) mM). Time-dependent inhibition studies exhibited biphasic kinetics with all heavy metal ions. Furthermore, inhibition studies with sodium salts of mineral acids (NaF, NaCl, NaNO(3), and Na(2)SO(4)) showed that only F(-) inhibited soybean urease significantly (IC(50) = 2.9 mM). Competitive type of inhibition was observed for this anion with a K(i) value of 1.30 mM.

176. In situ synthesis of twelve dialkyltartrate-boric acid complexes and two polyols-boric acid complexes and their applications as chiral ion-pair selectors in nonaqueous capillary electrophoresis.

 PubMed

 Wang, Li-Juan; Yang, Juan; Yang, Geng-Liang; Chen, Xing-Guo

 2012-07-27

 In this paper, twelve dialkyltartrate-boric acid complexes and two polyols-boric acid complexes were in situ synthesized by the reaction of different dialkyltartrates or polyols with boric acid in methanol containing triethylamine. All of the twelve dialkyltartrate-boric acid complexes were found to have relatively good chiral separation performance in nonaqueous capillary electrophoresis (NACE). Their chiral recognition effects in terms of both enantioselectivity (Î±) and resolution (R(s)) were similar when the number of carbon atoms was below six in the alkyl group of alcohol moiety. The dialkyltartrates containing alkyl groups of different structures but the same number of carbon atoms, i.e. one of straight chain and one of branched chain, also provided similar chiral recognition effects. Furthermore, it was demonstrated for the first time that two methanol insoluble polyols, D-mannitol and D-sorbitol, could react with boric acid to prepare chiral ion-pair selectors using methanol as the solvent medium. Copyright Â© 2012 Elsevier B.V. All rights reserved.

177. 40 CFR 721.1729 - Boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...

 Code of Federal Regulations, 2011 CFR

 2011-07-01

... 40 Protection of Environment 31 2011-07-01 2011-07-01 false Boric acid (H3BO3), mixed esters with... acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol mono Me ether... identified as boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...

178. 40 CFR 721.1729 - Boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...

     Code of Federal Regulations, 2014 CFR

     2014-07-01

     ... 40 Protection of Environment 31 2014-07-01 2014-07-01 false Boric acid (H3BO3), mixed esters with... acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol mono Me ether... identified as boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...

179. 40 CFR 721.1729 - Boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...

     Code of Federal Regulations, 2010 CFR

     2010-07-01

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180. 40 CFR 721.1729 - Boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...

     Code of Federal Regulations, 2013 CFR

     2013-07-01

     ... 40 Protection of Environment 32 2013-07-01 2013-07-01 false Boric acid (H3BO3), mixed esters with... acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol mono Me ether... identified as boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...

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181. [40 CFR 721.1729 - Boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...]

     [Code of Federal Regulations, 2012 CFR]

     2012-07-01

     ... 40 Protection of Environment 32 2012-07-01 2012-07-01 false Boric acid (H3BO3), mixed esters with... acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol mono Me ether... identified as boric acid (H3BO3), mixed esters with polyethylene glycol mono-Bu ether and polyethylene glycol...

182. [Boric acid increases the expression levels of human anion exchanger genes SLC4A2 and SLC4A3.]

     [PubMed]

     Akbas, F; Aydin, Z

     2012-04-03

     Boron is an important micronutrient in plants and animals. The role of boron in living systems includes coordinated regulation of gene expression, growth and proliferation of higher plants and animals. There are several well-defined genes associated with boron transportation and tolerance in plants and these genes show close homology with human anion exchanger genes. Mutation of these genes also characterizes some genetic disorders. We investigated the toxic effects of boric acid on HEK293 cells and mRNA expression of anion exchanger (SLC4A1, SLC4A2 and SLC4A3) genes. Cytotoxicity of boric acid at different concentrations was tested by using the methylthiazolyldiphenyl-tetrazolium bromide assay. Gene expression profiles were examined using quantitative real-time PCR. In the HEK293 cells, the nontoxic upper concentration of boric acid was 250 Î¼M; more than 500 Î¼M caused cytotoxicity. The 250 Î¼M boric acid concentration increased gene expression level of SLC4A2 up to 8.6-fold and SLC4A3 up to 2.6-fold, after 36-h incubation. There was no significant effect of boric acid on SLC4A1 mRNA expression levels.

183. [Evaluation of commercial boric acid containing vials for urine culture: low risk of contamination and cost effectiveness considerations.]

     [PubMed]

     Appannanavar, Suma B; Biswal, Manisha; Rajkumari, Nonika; Mohan, Balvinder; Taneja, Neelam

     2013-01-01

     Urine culture is a gold standard in the diagnosis of urinary tract infection. Clean catch midstream urine collection and prompt transportation is essential for appropriate diagnosis. Improper collection and delay in transportation leads to diagnostic dilemma. In developing countries, higher ambient temperatures further complicate the scenario. Here, we have evaluated the role of boric acid as a preservative for urine samples prior to culture in female patients attending outpatient department at our center. Consecutive 104 urine samples were cultured simultaneously in plain uricol (Control-C) and boric acid containing tubes from Becton Dickinson urine culture kit (Boric acid group-BA). In the real-time evaluation, we found that in almost 57% (59/104) of the urine samples tested, it was more effective in maintaining the number of the organisms as compared to samples in the container without any preservative. Our in vitro study of simulated urine cultures revealed that urine samples could be kept up to 12 h before culture in the preservative without any inhibitory effect of boric acid. Though the use of boric acid kit may marginally increase the initial cost but has indirect effects like preventing delays in treatment and avoidance of false prescription of antibiotics. If the man-hours spent on repeat investigations are also taken into consideration, then the economic cost borne by the laboratory would also decrease manifold with the use of these containers.

184. Exposure assessment of boron in BandÄ±rma boric acid production plant.

PubMed

Duydu, YalÃ§in; BaÅŸaran, NurÅŸen; Bolt, Hermann M

2012-06-01

Boric acid and sodium borates have been considered as being "toxic to reproduction and development", following results of animal studies with high doses. Experimentally, a NOAEL of 17.5mg B/kg-bw/day (corresponds to âˆ¼2020 ng boron/g blood) has been identified for the (male) reproductive effects of boron in a multigenerational study of rats, and a NOAEL for the developmental effects in rats was identified at 9.6 mg B/kg-bw/day (corresponds to 1270 ng boron/g blood). These values are being taken as the basis of current EU safety assessments. The present study was conducted to assess the boron exposure under extreme exposure conditions in a boric acid production plant located in BandÄ±rma, Turkey. The mean blood boron concentrations of low and high exposure groups were 72.94 Â± 15.43 (48.46-99.91) and 223.89 Â± 60.49 (152.82-454.02)ng/g respectively. The mean blood boron concentration of the high exposure group is still â‰ˆ 6 times lower than the highest no effect level of boron in blood with regard to the developmental effects in rats and â‰ˆ 9 times lower than the highest no effect level of boron in blood with regard to the reprotoxic effects in male rats. In this context, boric acid and sodium borates should not be considered as toxic to reproduction for humans in daily life. Copyright Â© 2012 Elsevier GmbH. All rights reserved.

185. Boric acid inhibits alveolar bone loss in rats by affecting RANKL and osteoprotegerin expression.

PubMed

SaÄŸlam, M; HatipoÄŸlu, M; KÃ¶seoÄŸlu, S; Esen, H H; Kelebek, S

2014-08-01

The goal of the present study was to evaluate the effects of systemic boric acid on the levels of expression of RANKL and osteoprotegerin (OPG) and on histopathologic and histometric changes in a rat periodontitis model. Twenty-four Wistar rats were divided into three groups of eight animals each: nonligated (NL); ligature only (LO); and ligature plus treatment with boric acid (BA) (3 mg/kg per day for 11 d). A 4/0 silk suture was placed in a subgingival position around the mandibular right first molars; after 11 d the rats were killed, and alveolar bone loss in the first molars was histometrically determined. Periodontal tissues were examined histopathologically to assess the differences among the study groups. RANKL and OPG were detected immunohistochemically. Alveolar bone loss was significantly higher in the LO group than in the BA and NL groups ($p < 0.05$). The number of inflammatory infiltrate and osteoclasts in the LO group was significantly higher than that in the NL and BA groups ($p < 0.05$). The numbers of osteoblasts in LO and BA groups were significantly higher compared with NL group ($p < 0.05$). There were significantly more RANKL-positive cells in the LO group than in the BA and NL groups ($p < 0.05$). There was a higher number of OPG-positive cells in the BA group than in the LO and NL groups ($p < 0.05$). The present study shows that systemic administration of boric acid may reduce alveolar bone loss by affecting the RANKL/OPG balance in periodontal disease in rats. Â© 2013 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd.

186. Partitioning of Alkali Metal Salts and Boric Acid from Aqueous Phase into the Polyamide Active Layers of Reverse Osmosis Membranes.

PubMed

Wang, Jingbo; Kingsbury, Ryan S; Perry, Lamar A; Coronell, Orlando

2017-02-21

The partition coefficient of solutes into the polyamide active layer of reverse osmosis (RO) membranes is one of the three membrane properties (together with solute diffusion coefficient and active layer thickness) that determine solute permeation. However, no well-established method exists to measure solute partition coefficients into polyamide active layers. Further, the few studies that measured partition coefficients for inorganic salts report values significantly higher than one (âˆ¼3-8), which is contrary to expectations from Donnan theory and the observed high rejection of salts. As such, we developed a benchtop method to determine solute partition coefficients into the polyamide active layers of RO membranes. The method uses a quartz crystal microbalance (QCM) to measure the change in the mass of the active layer caused by the uptake of the partitioned solutes. The method was evaluated using several inorganic salts (alkali metal salts of chloride) and a weak acid of common concern in water desalination (boric acid). All partition coefficients were found to be lower than 1, in general agreement with expectations from Donnan theory. Results reported in this study advance the fundamental understanding of contaminant transport through RO membranes, and can be used in future studies to decouple the contributions of contaminant partitioning and diffusion to contaminant permeation.

187. Diffusion of neutral and ionic species in charged membranes: boric acid, arsenite, and water.

PubMed

Goli, Esmaiel; Hiemstra, Tjisse; Van Riemsdijk, Willem H; Rahnemaie, Rasoul; Malakouti, Mohammad Jafar

2010-10-15

Dynamic ion speciation using DMT (Donnan membrane technique) requires insight into the physicochemical characteristics of diffusion in charged membranes (tortuosity, local diffusion coefficients) as well as ion accumulation. The latter can be precluded by studying the diffusion of neutral species, such as boric acid, B(OH)â‚ƒâ□°(aq), arsenite, As(OH)â‚ƒâ□°(aq), or water. In this study, the diffusion rate of B(OH)â‚ƒâ□° has been evaluated as a function of the concentration, pH, and ionic strength. The rate is linearly dependent on the concentration of solely the neutral species, without a significant contribution of negatively charged species such as B(OH)â‚„â□», present at high pH. A striking finding is the very strong effect (factor of ~10) of the type of cation (K(+), Na(+), Ca(2+), Mg(2+), Al(3+), and H(+)) on the diffusion coefficient of B(OH)â‚ƒâ□° and also As(OH)â‚ƒâ□°. The decrease of the diffusion coefficient can be rationalized as an enhancement of the mean viscosity of the confined solution in the membrane. The diffusion coefficients can be described by a semiempirical relationship, linking the mean viscosity of the confined solute of the membrane to the viscosity of the free solution. In proton-saturated membranes, as used in fuel cells, viscosity is relatively more enhanced; i.e., a stronger water network is formed. Extraordinarily, our B(OH)â‚ƒ-calibrated model (in HNOâ‚ƒ) correctly predicts the reported diffusion coefficient of water (D(Hâ‚‚O)), measured with Â¹H NMR and quasi-elastic neutron scattering in H(+)-Nafion membranes. Upon drying these membranes, the local hydronium, H(Hâ‚‚O)(n)(+), concentration and corresponding viscosity increase, resulting in a severe reduction of the diffusion coefficient (D(Hâ‚‚O) â‰ˆ 5-50 times), in agreement with the model. The present study has a second goal, i.e., development of the methodology for measuring the free concentration of neutral species in solution. Our data suggest that the free concentration can be

188. Effect of boric acid on antioxidant enzyme activity, lipid peroxidation, and ultrastructure of midgut and fat body of Galleria mellonella.

PubMed

BÃ¼yÃ¼kgÃ¼zel, Ender; BÃ¼yÃ¼kgÃ¼zel, Kemal; Snela, Milena; Erdem, Meltem; Radtke, Katarzyna; Ziemnicki, Kazimierz; Adamski, Zbigniew

2013-04-01

Boric acid is widely used as an insecticide, acaricide, herbicide, and fungicide and also during various industrial processings. Hence, numerous populations are subjects to this toxic compound. Its action on animals is still not fully known and understood. We examined the effect of boric acid on larvae of greater wax moth (Galleria mellonella). The chemical appeared to be toxic for larvae, usually in a concentration-dependent manner. Exposed groups revealed increased lipid peroxidation and altered activity of catalase, superoxide dismutase, glutathione S-transferase, and glutathione peroxidase. We also observed changes of ultrastructure, which were in tune with biochemical assays. We suggest that boric acid has a broad mode of action, which may affect exposed larvae, and even if sublethal, they may lead to disturbances within exposed populations.

189. Is Boric Acid Toxic to Reproduction in Humans? Assessment of the Animal Reproductive Toxicity Data and Epidemiological Study Results.

PubMed

Duydu, YalÃ§Ä±n; BaÅŸaran, NurÅŸen; UstÃ¼ndaÄŸ, Aylin; AydÄ±n, Sevtap; UndeÄŸer, UlkÃ¼; Ataman, Osman Yavuz; Aydos, Kaan; DÃ¼ker, YalÃ§Ä±n; Ickstadt, Katja; Waltrup, Brita Schulze; Golka, Klaus; Bolt, Hermann Maximilian

2016-01-01

Boric acid and sodium borates are classified as toxic to reproduction in the CLP Regulation under "Category 1B" with the hazard statement of "H360FD". This classification is based on the reprotoxic effects of boric acid and sodium borates in animal experiments at high doses. However, boron mediated reprotoxic effects have not been proven in epidemiological studies so far. The epidemiological study performed in BandÄ±rma boric acid production plant is the most comprehensive published study in this field with 204 voluntarily participated male workers. Sperm quality parameters (sperm morphology, concentration and motility parameters), FSH, LH and testosterone levels were determined in all participated employees as the reproductive toxicity biomarkers of males. However, boron mediated unfavorable effects on reproduction in male workers have not been determined even in the workers under very high daily boron exposure (0.21 mg B/kg-bw/day) conditions. The NOAEL for rat reproductive toxicity is equivalent to a blood boron level of 2020 ng/g. This level is higher than the mean blood boron concentration (223.89 Â± 69.49 ng/g) of the high exposure group workers in BandÄ±rma boric acid production plant (Turkey) by a factor of 9. Accordingly, classifying boric acid and sodium borates under "Category 1B" as "presumed reproductive human toxicant in the CLP regulation seems scientifically not reasonable. The results of the epidemiological studies (including the study performed in China) support for a down-classification of boric acid from the category 1B, H360FD to category 2, H361d, (suspected of damaging the unborn child).

190. Chronic suppurative otitis media due to nontuberculous mycobacteria: A case of successful treatment with topical boric acid.

PubMed

Lefebvre, Marie-Astrid; Quach, Caroline; Daniel, Sam J

2015-07-01

Nontuberculous mycobacteria (NTM) are an increasingly recognized cause of chronic suppurative otitis media in children with tympanostomy tubes. Treatment of this condition is difficult and typically requires a combination of systemic antibiotics and surgical debridement. We present the first case of a 2-year-old male with chronic suppurative otitis media due to NTM who failed systemic antibiotic therapy and was successfully managed with topical boric acid powder. This report highlights the challenges involved in treating this infection, and introduces boric acid as a potentially valuable component of therapy. Copyright Â© 2015 Elsevier Ireland Ltd. All rights reserved.

191. Ecotoxicity of boric acid in standard laboratory tests with plants and soil organisms.

PubMed

Princz, Juliska; Becker, Leonie; Scheffczyk, Adam; Stephenson, Gladys; Scroggins, Rick; Moser, Thomas; RÃ¶mbke, JÃ¶rg

2017-05-01

To verify the continuous sensitivity of ecotoxicological tests (mainly the test organisms), reference substances with known toxicity are regularly tested. Ideally, this substance(s) would lack specificity in its mode action, be bioavailable and readily attainable with cost-effective means of chemical characterization. Boric acid has satisfied these criteria, but has most recently been characterized as a substance of very high concern, due to reproductive effects in humans, thus limiting its recommendation as an ideal reference toxicant. However, there is probably no other chemical for which ecotoxicity in soil has been so intensively studied; an extensive literature review yielded lethal (including avoidance) and sublethal data for 38 taxa. The ecotoxicity data were evaluated using species sensitivity distributions, collectively across all taxa, and separately according to species type, endpoints, soil type and duration. The lack of specificity in the mode of action yielded broad toxicity among soil taxa and soil types, and provided a collective approach to assessing species sensitivity, while taking into consideration differences in test methodologies and exposure durations. Toxicity was species-specific with Folsomia candida and enchytraied species demonstrating the most sensitivity; among plants, the following trend occurred: dicotyledonous (more sensitive) â‰« monocotyledonous â‰« gymnosperm species. Sensitivity was also time and endpoint specific, with endpoints such as lethality and avoidance being less sensitive than reproduction effects. Furthermore, given the breadth of data and toxicity demonstrated by boric acid, lessons learned from its evaluation are discussed to recommend the properties required by an ideal reference substance for the soil compartment.

192. Molecular complexes of alprazolam with carboxylic acids, boric acid, boronic acids, and phenols. Evaluation of supramolecular heterosynthons mediated by a triazole ring.

PubMed

Varughese, Sunil; Azim, Yasser; Desiraju, Gautam R

2010-09-01

A series of molecular complexes, both co-crystals and salts, of a triazole drug-alprazolam-with carboxylic acids, boric acid, boronic acids, and phenols have been analyzed with respect to heterosynthons present in the crystal structures. In all cases, the triazole ring behaves as an efficient hydrogen bond acceptor with the acidic coformers. The hydrogen bond patterns exhibited with aromatic carboxylic acids were found to depend on the nature and position of the substituents. Being a strong acid, 2,6-dihydroxybenzoic acid forms a salt with alprazolam. With aliphatic dicarboxylic acids alprazolam forms hydrates and the water molecules play a central role in synthon formation and crystal packing. The triazole ring makes two distinct heterosynthons in the molecular complex with boric acid. Boronic acids and phenols form consistent hydrogen bond patterns, and these are seemingly independent of the substitutional effects. Boronic acids form noncentrosymmetric cyclic synthons, while phenols form O--H...N hydrogen bonds with the triazole ring.

193. Theoretical isotopic fractionation between structural boron in carbonates and aqueous boric acid and borate ion

NASA Astrophysics Data System (ADS)

Balan, Etienne; Noireaux, Johanna; Mavromatis, Vasileios; Saldi, Giuseppe D.; Montouillout, ValÃ©rie; Blanchard, Marc; Pietrucci, Fabio; Gervais, Christel; Rustad, James R.; Schott, Jacques; Gaillardet, JÃ©rÃ´me

2018-02-01

The 11B/10B ratio in calcite and aragonite is an important proxy of oceanic water pH. However, the physico-chemical mechanisms underpinning this approach are still poorly known. In the present study, we theoretically determine the equilibrium isotopic fractionation properties of structural boron species in calcium carbonates, BO33-, BO2(OH)2- and B(OH)4- anions substituted for carbonate groups, as well as those of B(OH)4- and B(OH)3 species in vacuum. Significant variability of equilibrium isotopic fractionation properties is observed among these structural species which is related to their contrasted coordination state, Bsbnd O bond lengths and atomic-scale environment. The isotopic composition of structural boron does not only depend on its coordination number but also on its medium range environment, i.e. farther than its first coordination shell. The isotopic fractionation between aqueous species and their counterparts in vacuum are assessed using previous investigations based on similar quantum-mechanical modeling approaches. At 300 K, the equilibrium isotope composition of structural trigonal species is 7-15â€° lighter than that of aqueous boric acid molecules, whereas substituted tetrahedral borate ions are heavier than their aqueous counterparts by 10-13â€°. Although significant uncertainties are known to affect the theoretical prediction of fractionation factors between solids and solutions, the usually assumed lack of isotopic fractionation during borate incorporation in carbonates is challenged by these theoretical results. The present theoretical equilibrium fractionation factors between structural boron and aqueous species differ from those inferred from experiments which may indicate that isotopic equilibrium, unlike chemical equilibrium, was not reached in most experiments. Further research into the isotopic fractionation processes at the interface between calcium carbonates and aqueous solution as well as long duration experiments aimed at

194. Improvement of the performance of the positive electrode in the lead/acid battery by addition of boric acid

NASA Astrophysics Data System (ADS)

Badawy, W. A.; El-Egamy, S. S.

A major disadvantage of the lead/acid battery is the decrease in voltage during operation which makes it unsuitable for systems sensitive to voltage fluctuations. Additives like BaSO 4 or SrSO 4, which are isomorphous to PbSO 4, have been used to overcome this problem. Phosphoric acid and the various phosphates have long been used to improve the performance of the positive electrode of the battery. A beneficial effect of phosphoric acid is to inhibit the rate of the self-discharge reaction of the positive electrode in the lead/acid battery. However, adverse effects of phosphoric acid include capacity loss in the initial cycles, excessive mossing, especially at high H 3PO 4 concentrations, and poor low-temperature performance (decrease in the rate of PbSO 4 oxidation). The effect of boric acid as an additive substituting for H 3PO 4 has been investigated using linear sweep voltammetry, constant potential and impedance measurements. The results show that boric acid markedly improves the kinetics of the {PbO 2}/{PbSO 4} couple and removes the problems encountered during the usage of H 3PO 4.

195. ASSESSMENT OF BORIC ACID AND BORAX USING THE IEHR EVALUATIVE PROCESS FOR ASSESSING HUMAN DEVELOPMENT AND REPRODUCTIVE TOXICITY OF AGENTS

EPA Science Inventory

This document presents an evaluation of the reproductive and developmental effects of boric acid, H3803 (CAS Registry No. 10043-35-3) and disodium tetraborate decehydrate or borax, Na2B4O2O(CAS Registry No. 1303-96-4). he element, boron, does not exist naturally. oron always exis...

196. Sub-lethal exposure of cockroaches to boric acid pesticide contributes to increased Bla g 2 excretion.

 PubMed

 Zhang, Y C; Perzanowski, M S; Chew, G L

 2005-07-01

 Several epidemiology studies have found an increase in the major cockroach allergen Bla g 2 with reported pesticide use. Our aim was to investigate the effect on the excretion of Bla g 1 and Bla g 2 allergens by cockroaches exposed to sub-lethal doses of the pesticides, boric acid and hydramethylnon gel. German cockroaches in separate colonies were fed either boric acid or hydramethylnon gel at concentrations of 0.2, 0.1 and 0.01% in their water supply over a 2 week period. Ten colonies were exposed to each treatment concentration. Bla g 1 and Bla g 2 in fecal pellets were measured by ELISA. Cockroaches exposed to boric acid excreted fecal pellets with significantly higher concentrations of Bla g 2 (35,400 U/g) than did controls (12,700 U/g) ($P = 0.001$). Bla g 1 concentrations were not significantly different. There was no difference in either Bla g 1 or Bla g 2 concentrations between cockroaches that ingested hydramethylnon gel and those in the controls colonies. The application of boric acid, a common pesticide, appears to paradoxically increase the production of Bla g 2, a major allergen, by the surviving cockroaches. This may have important implications in avoidance strategies.

197. Open-framework gallium borate with boric and metaboric acid molecules inside structural channels showing photocatalysis to water splitting.

 PubMed

 Gao, Wenliang; Jing, Yan; Yang, Jia; Zhou, Zhengyang; Yang, Dingfeng; Sun, Junliang; Lin, Jianhua; Cong, Rihong; Yang, Tao

 2014-03-03

 An open-framework gallium borate with intrinsic photocatalytic activities to water splitting has been discovered. Small inorganic molecules, H3BO3 and H3B3O6, are confined inside structural channels by multiple hydrogen bonds. It is the first example to experimentally show the structural template effect of boric acid in flux synthesis.

198. Synthesis of boron suboxide from boron and boric acid under mild pressure and temperature conditions

 SciTech Connect

 Jiao, Xiaopeng; Jin, Hua; Ding, Zhanhui

 2011-05-15

 Graphical abstract: Well-crystallized and icosahedral B{sub 6}O crystals were prepared by reacting boron and boric acid at milder reaction conditions (1 GPa and 1300 {sup o}C for 2 h) as compared to previous work.. Research highlights: {yields} Well-crystallized icosahedral B{sub 6}O was synthesized by reacting boric acid and boron. {yields} The synthesis conditions (1 GPa and 1300 {sup o}C for 2 h) are milder in comparison with previous work. {yields} The more practical synthesis method may make B{sub 6}O as a potential substitute for diamond in industry. -- Abstract: Boron suboxide (B{sub 6}O) was synthesized by reacting boron and boricmoreÂ Â» acid (H{sub 3}BO{sub 3}) at pressures between 1 and 10 GPa, and at temperatures between 1300 and 1400 {sup o}C. The B{sub 6}O samples prepared were icosahedral with diameters ranging from 20 to 300 nm. Well-crystallized and icosahedral crystals with an average size of {approx}100 nm can be obtained at milder reaction conditions (1 GPa and 1300 {sup o}C for 2 h) as compared to previous work. The bulk B{sub 6}O sample was stable in air at 600 {sup o}C and then slowly oxidized up to 1000 {sup o}C. The relatively mild synthetic conditions developed in this study provide a more practical synthesis of B{sub 6}O, which may potentially be used as a substitute for diamond in industry as a new superhard material.Â«Â less

199. Boric acid reversibly inhibits the second step of pre-mRNA splicing.

    PubMed

    Shomron, Noam; Ast, Gil

    2003-09-25

    Several approaches have been used to identify the factors involved in mRNA splicing. None of them, however, comprises a straightforward reversible method for inhibiting the second step of splicing using an external reagent other than a chelator. This investigation demonstrates that the addition of boric acid to an in vitro pre-mRNA splicing reaction causes a dose-dependent reversible inhibition effect on the second step of splicing. The mechanism of action does not involve chelation of several metal ions; hindrance of 3' splice-site; or binding to hSlu7. This study presents a novel method for specific reversible inhibition of the second step of pre-mRNA splicing.

200. Fast isotopic separation of 10 B and 11 B boric acid by capillary zone electrophoresis.

    PubMed

    Kamencev, Mikhail; Yakimova, Nina; Moskvin, Leonid; Kuchumova, Irina; Tkach, Kirill; Malinina, Yulia

    2016-11-01

    Fast isotopic separation of 10 B and 11 B boric acid by CZE was demonstrated. The BGE contained 25 mM phenylalanine and 5 mM putrescine (Ñ€Ð□ 8.95). The running conditions were +25 kV at 20Â°C with indirect photometric detection at 210 nm. Baseline separation was achieved in less than 9 min. RSD of migration times and corrected peak areas were less than 0.5 and 3%, respectively (n = 5). Linearity was demonstrated in the range 0.2-2 mM for 11 B and 0.2-0.5 mM for 10 B. Â© 2016 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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201. Boric acid irrigation as an adjunct to mechanical periodontal therapy in patients with chronic periodontitis: a randomized clinical trial.

PubMed

SaÄŸlam, Mehmet; Arslan, UÄŸur; Buket Bozkurt, Åžerife; Hakki, Sema S

2013-09-01

The purpose of this single-masked, randomized, controlled clinical trial was to evaluate the effects of boric acid irrigation as an adjunct to scaling and root planing (SRP) on clinical and microbiologic parameters and compare this method with chlorhexidine irrigation and SRP alone in patients with chronic periodontitis (CP). Forty-five systemically healthy patients with CP are included in this study. They were divided into three groups: 1) SRP + saline irrigation (C); 2) SRP + chlorhexidine irrigation (CHX); and 3) SRP + boric acid irrigation (B). To determine an ideal concentration of boric acid, a preclinical analysis was conducted. At baseline, 1 month, and 3 months after treatment, clinical measurements, including plaque index (PI), gingival index (GI), probing depth (PD), clinical attachment level (CAL), and bleeding on probing (BOP), were performed, and subgingival plaque samples were taken. Quantitative analysis of Porphyromonas gingivalis (Pg), Tannerella forsythia (Tf), and Treponema denticola (Td) was performed using real-time polymerase chain reaction (PCR) procedures. The concentration of boric acid is 0.75% in this study. All clinical parameters showed statistically significant reduction at all time points compared to baseline in all groups (P <0.001). Whole-mouth PD and CAL reduction was similar in all groups at all time points after treatment (P >0.05). The PD and CAL reductions for moderately deep pockets (PD â‰¥5 and <7) were greater in the B group compared to other groups between baseline and 1 month (P <0.05). For deep pockets (PD â‰¥7), reductions were similar in the B and CHX groups (P >0.05). BOP (percentage) was significantly lower in the B group compared with the CHX and C groups in the first month after treatment (P <0.001). GI and PI scores were significantly lower in the B and CHX groups compared with the C group at all time points after treatment (P <0.05). The amounts of Pg, Tf, and Td were significantly reduced in all treatment groups

202. Boric-Acid-Functional Lanthanide Metal-Organic Frameworks for Selective Ratiometric Fluorescence Detection of Fluoride Ions.

PubMed

Yang, Zhong-Rui; Wang, Man-Man; Wang, Xue-Sheng; Yin, Xue-Bo

2017-02-07

Here, we report that boric acid is used to tune the optical properties of lanthanide metal-organic frameworks (LMOFs) for dual-fluorescence emission and improves the selectivity of LMOFs for the determination of F - ions. The LMOFs are prepared with 5-boronoisophthalic acid (5-bop) and Eu 3+ ions as the precursors. Emission mechanism study indicates that 5-bop is excited with UV photons to produce its triplet state, which then excites Eu 3+ ions for their red emission. This is the general story of the antenna effect, but electron-deficient boric acid decreases the energy transfer efficiency from the triplet state of 5-bop to Eu 3+ ions, so dual emission from both 5-bop and Eu 3+ ions is efficiently excited at the single excitation of 275 nm. Moreover, boric acid is used to identify fluoride specifically as a free accessible site. The ratiometric fluorescent detection of F - ions is validated with the dual emission at single excitation. The LMOFs are very monodisperse, so the determination of aqueous F - ions is easily achieved with high selectivity and a low detection limit (2 Î¼M). For the first time, we reveal that rational selection of functional ligands can improve the sensing efficiency of LMOFs through tuning their optical property and enhancing the selectivity toward targets.

203. Fabrication of Li2TiO3 pebbles using PVA-boric acid reaction for solid breeding materials

NASA Astrophysics Data System (ADS)

Park, Yi-Hyun; Cho, Seungyon; Ahn, Mu-Young

2014-12-01

Lithium metatitanate (Li2TiO3) is a candidate breeding material of the Helium Cooled Ceramic Reflector (HCCR) Test Blanket Module (TBM). The breeding material is used in pebble-bed form to reduce the uncertainty of the interface thermal conductance. In this study, Li2TiO3 pebbles were successfully fabricated by the slurry droplet wetting method using the cross-linking reaction between polyvinyl alcohol (PVA) and boric acid. The effects of fabrication parameters on the shaping of Li2TiO3 green body were investigated. In addition, the basic characteristics of the sintered pebble were also evaluated. The shape of Li2TiO3 green bodies was affected by slurry viscosity, PVA content and boric acid content. The grain size and average crush load of sintered Li2TiO3 pebble were controlled by the sintering time. The boron was completely removed during the final sintering process.

204. A new dual-channel optical signal probe for Cu2+ detection based on morin and boric acid.

PubMed

Wang, Peng; Yuan, Bin Fang; Li, Nian Bing; Luo, Hong Qun

2014-01-01

In this work we utilized the common analytical reagent morin to develop a new a dual-channel, cost-effective, and sensitive method for determination of Cu(2+). It is found that morin is only weakly fluorescent by itself, but forms highly fluorescent complexes with boric acid. Moreover, the fluorescence of complexes of morin with boric acid is quenched linearly by Cu(2+) in a certain concentration range. Under optimum conditions, the fluorescence quenching efficiency was linearly proportional to the concentration of cupric ions in the range of 0.5-25 Î¼M with high sensitivity, and the detection limit for Cu(2+) was 0.38 Î¼M. The linear range was 1-25 Î¼M determined by spectrophotometry, and the detection limit for cupric ions was 0.8 Î¼M. Furthermore, the mechanism of sensitive fluorescence quenching response of morin to Cu(2+) is discussed.

205. Non-avoidance behaviour in enchytraeids to boric acid is related to the GABAergic mechanism.

PubMed

Bicho, Rita C; Gomes, Susana I L; Soares, Amadeu M V M; Amorim, MÃ³nica J B

2015-05-01

Soil invertebrates, e.g. enchytraeids, are known to be able to avoid unfavourable conditions, which gives them an important ecological advantage. These organisms possess chemoreceptors that can detect stressors, which in turn activate responses such as avoidance behaviour. We studied the avoidance behaviour in response to boric acid (BA) using enchytraeids. Results showed not only no avoidance, but that increasing concentrations seemed to have an "attraction" effect. To study the underlying mechanism, a selection of genes targeting for neurotransmission pathways (acetylcholinesterase (AChE) and gamma-aminobutyric acid receptor (GABAr)) were quantified via quantitative real-time polymerase chain reaction (qPCR). Evidences were that BA is neurotoxic via the GABAergic system mechanism where it acts as a GABA-associated protein receptor (GABAAR) antagonist possibly causing anaesthetic effects. This is the first time that (non)avoidance behaviour in invertebrates was studied in relation with the GABAergic system. We strongly recommend the combination of such gene and/or functional assay studies with the avoidance behaviour test as it can bring many advantages and important interpretation lines for ecotoxicity with minor effort.

206. Fast quantitative analysis of boric acid by gas chromatography-mass spectrometry coupled with a simple and selective derivatization reaction using triethanolamine.

PubMed

Zeng, Li-Min; Wang, Hao-Yang; Guo, Yin-Long

2010-03-01

A fast, selective, and sensitive GC-MS method has been developed and validated for the determination of boric acid in the drinking water by derivatization with triethanolamine. This analytic strategy successfully converts the inorganic, nonvolatile boric acid B(OH)(3) present in the drinking water to a volatile triethanolamine borate B(OCH(2)CH(2))(3)N in a quantitative manner, which facilitates the GC measurement. The SIM mode was applied in the analysis and showed high accuracy, specificity, and reproducibility, as well as reducing the matrix effect effectively. The calibration curve was obtained from 0.01 microg/mL to 10.0 microg/mL with a satisfactory correlation coefficient of 0.9988. The limit of detection for boric acid was 0.04 microg/L. Then the method was applied for detection of the amount of boric acid in bottled drinking water and the results are in accordance with the reported concentration value of boric acid. This study offers a perspective into the utility of GC-MS as an alternate quantitative tool for detection of B(OH)(3), even for detection of boron in various other samples by digesting the boron compounds to boric acid. Copyright 2010 American Society for Mass Spectrometry. Published by Elsevier Inc. All rights reserved.

207. Fiberboards treated with Nâ€™-N-(1, 8-Naphthalyl) hydroxylamine (NHA-Na), borax, and boric acid

Treesearch

Turgay Akbulut; S. Nami Kartal; Frederick Green

2004-01-01

This paper reports on the physical and mechanical properties and decay and termite resistance of fiberboard panels made from pine and beech treated with NÃ¢Â€Â™-N-(1, 8-Naphthalyl) hydroxylamine sodium salt(NHA-Na), borax, and boric acid at varying loadings. The panels were manufactured using 10 percent urea-formaldehyde resin and 1 percent NH4Cl. Mechanical and physical...

208. Synthesis and evaluation of aminoborates derived from boric acid and diols for protecting wood against fungal and thermal degradation

Treesearch

George C. Chen

2008-01-01

N-methyl amino catechol borate (1), N-methyl amino-4-methyl catechol borate (2), N-methyl amino-4-t-butyl catechol borate (3), and N-methyl amino-2, 3-naphthyl borate (4) were synthesized by reflux of boric acid with a diol in solvent N,N-dimethyl formamide. The aminoborates were characterized by proton nuclear magnetic resonance spectroscopy, FTIR spectroscopy and...

209. Inhibition of boric acid and sodium borate on the biological activity of microorganisms in an aerobic biofilter.

PubMed

GÃ¼neÅŸ, Y

2013-01-01

The aim of this work was to study the inhibition effect of boric acid and sodium borate on the treatment of boron containing synthetic wastewater by a down flow aerobic fixed bed biofilm reactor at various chemical oxygen demand (COD)/boron ratios (0.47-20.54). The inhibitory effect of boron on activated sludge was evaluated on the basis of COD removal during the experimental period. The biofilter (effective volume = 2.5 L) was filled with a ring of plastic material inoculated with acclimated activated sludge. The synthetic wastewater composed of glucose, urea, KH2PO4, MgSO4, Fe2 SO4, ZnSO4 x 7H20, KCl, CaCl2, and di-sodium tetraborate decahydrate or boric acid (B = 100-2000 mg L(-1)). The biological treatment of boron containing wastewater resulted in a low treatment removal rate due to the reduced microbial activity as a result of toxic effects of high boron concentrations. The decrease in the COD removal rate by the presence of either boric acid or sodium borate was practically indistinguishable. It was observed from the experiments that about 90-95% of COD removal was possible at high COD/boron ratios.

210. Porous carbon-coated silica macroparticles as anode materials for lithium ion batteries: Effect of boric acid

     NASA Astrophysics Data System (ADS)

     Kim, Young-Kuk; Moon, Jong-Woo; Lee, Jung-Goo; Baek, Youn-Kyung; Hong, Seong-Hyun

     2014-12-01

     We report carbon-coated porous silica macroparticles (SiO2@C) prepared using polymeric templates and subsequent carbonization with sucrose for improved electrochemical energy storage in lithium-ion batteries (LIBs). In addition, boron is introduced to improve the stability of electrochemical cells by pyrolyzing mixtures of sucrose and boric acid (SiO2@C + B) under inert atmosphere. The initially large surface area of porous SiO2 (SBET âˆ¼ 658 m2 g-1) is reduced to 102 m2 g-1 after carbonization and introduction of boric acid. Surface of both SiO2@C and SiO2@C + B are covered with amorphous carbon. In particular, SiO2@C + B particles containing borosilicate (Si-O-B) phase and B-O bondings and Si-C-O bondings are also detected from the X-ray photoelectron spectra. The SiO2@C + B macroparticles shows high reversible charge capacity up to 503 mAh g-1 after 103 cycles of Li intercalation/de-intercalation although initial capacity was 200 mAh g-1. The improved charge capacity of SiO2@C + B is attributed to formation of advantageous microstructures induced from boric acid.

211. Corrosion resistance of inconel 690 to borax, boric acid, and boron nitride at 1100{degrees}C

     SciTech Connect

     Imrich, K.J.

     1996-12-12

     Significant general and localized corrosion was observed on Inconel 690 coupons following exposure to borax, boric acid and boron nitride at 1100{degrees}C. Severe localized attack at and below the melt line was observed on coupons exposed to borax. An intergranular attack at and below the melt line was observed on coupons exposed to borax. An intergranular attack (IGA) of the Inconel 690 was also observed. Severe internal void formation and IGA (30 mils penetration after 3 days) was observed in the coupon exposed to boric acid. Both borax and boric acid remove the protective chromium oxide; however, this layer canmoreÂ Â» be reestablished by heating the Inconel 690 to 975 {degrees}C in air for several hours. Inconel 690 in direct contact with boron nitride resulted in the formation of a thick chromium borate layer, a general corrosion rate of 50 to 90 mils per year, and internal void formation of 1 mil per day.Â«Â less

212. Human environmental and occupational exposures to boric acid: reconciliation with experimental reproductive toxicity data.

PubMed

Bolt, Hermann M; BaÅŸaran, NurÅŸen; Duydu, YalÃ§Ä±n

2012-01-01

The reproductive toxicity of boric acid and borates is a matter of current regulatory concern. Based on experimental studies in rats, no-observed-adverse-effect levels (NOAELs) were found to be 17.5 mg boron (B)/kg body weight (b.w.) for male fertility and 9.6 mg B/kg b.w. for developmental toxicity. Recently, occupational human field studies in highly exposed cohorts were reported from China and Turkey, with both studies showing negative results regarding male reproduction. A comparison of the conditions of these studies with the experimental NOAEL conditions are based on reported B blood levels, which is clearly superior to a scaling according to estimated B exposures. A comparison of estimated daily B exposure levels and measured B blood levels confirms the preference of biomonitoring data for a comparison of human field studies. In general, it appears that high environmental exposures to B are lower than possible high occupational exposures. The comparison reveals no contradiction between human and experimental reproductive toxicity data. It clearly appears that human B exposures, even in the highest exposed cohorts, are too low to reach the blood (and target tissue) concentrations that would be required to exert adverse effects on reproductive functions.

213. Periods of vertebral column sensitivity to boric acid treatment in CD-1 mice in utero.

PubMed

Cherrington, Jana W; Chernoff, Neil

2002-01-01

Boric acid (BA) has many uses as an industrial compound and is widely distributed in the environment. BA has been shown to produce rib agenesis, a rare effect in laboratory animals. This study was conducted to determine if there is a period of sensitivity to this unusual effect. BA (500 or 750 mg/kg) was administered p.o. to pregnant CD-1 mice once daily on gestational days (GDs) 6-10. A reduction of 13th rib length occurred at both dose levels. BA 400mg/kg was also administered twice daily on GD 6, 7, 8, 9, or 10 or on GDs 6-8. A significant decrease in average fetal weight was observed in all treatment groups. Significant increases in the incidence of cervical ribs/ossifications resulted from treatments on GD 7 and GDs 6-8. Rib agenesis occurred with treatment on GD 8 and GDs 6-8. Reduced rib length, a decreased incidence of supernumerary ribs (SNR), and an increased incidence of fused and/or branched ribs occurred when dams were treated GDs 6-8. Doses of 750 mg/kg given twice on day 8 produced significant increases in several thoracic skeletal anomalies. Further studies of pathogenesis are necessary to determine the earliest perturbations and the processes that are affected. The sensitivity of embryos to treatment on GD 8 to rib agenesis suggests that BA is affecting early processes such as gastrulation and presomitic mesoderm formation and patterning in this area.

214. The neuroprotective role of boric acid on aluminum chloride-induced neurotoxicity.

PubMed

Colak, Suat; Geyikoglu, Fatime; Keles, Osman Nuri; TÃ¼rkez, Hasan; Topal, Ahmet; Unal, BÃ¼nyami

2011-09-01

This study was designed to investigate the qualitative and quantitative changes in brain tissue following aluminum chloride (AlCl(3)) administration and to determine whether boric acid (BA) has a protective effect against brain damage induced by AlCl(3). For this aim, Sprague-Dawley rats were randomly separated into eight groups: (1) control, (2) AlCl(3) (5 mg/kg/day), (3, 4 and 5) BA (3.25, 36 and 58.5 mg/kg/day), (6, 7 and 8) AlCl(3) (5 mg/kg/day) plus BA (3.25, 36 and 58.5 mg/kg/day). After the animals were killed, the total numbers of neuron in the brain of all groups were determined using an unbiased stereological analysis. In addition to the stereological analysis, all brains were examined histopathologically by using light and electron microscopy. The stereological and histopathological results indicated a high damage of the rat brain tissues in the AlCl(3) and AlCl(3) + high dose BA (36 and 58.5) treatment groups. However, protective effects on neuron were observed in the AlCl(3) + low dose BA (3.25) group when compared other AlCl(3) groups. Our stereological and histopathological findings show that low-dose BA, as a proteasome inhibitor, can decrease the adverse effects of AlCl(3) on the cerebral cortex.

215. The effects of boric acid on sister chromatid exchanges and chromosome aberrations in cultured human lymphocytes.

     PubMed

     Arslan, Mehmet; Topaktas, Mehmet; Rencuzogullari, EyyÃ¼p

     2008-02-01

     The aim of this study was to determine the possible genotoxic effects of boric acid (BA) (E284), which is used as an antimicrobial agent in food, by using sister chromatid exchange (SCEs) and chromosome aberration (CAs) tests in human peripheral lymphocytes. The human lymphocytes were treated with 400, 600, 800, and 1000 mug/mL concentrations of BA dissolved in dimethyl sulfoxide (DMSO), for 24 h and 48 h treatment periods. BA did not increase the SCEs for all the concentrations and treatment periods when compared to control and solvent control (DMSO). BA induced structural and total CAs at all the tested concentrations for 24 and 48 h treatment periods. The induction of the total CAs was dose dependent for the 24 h treatment period. However, BA did not cause numerical CAs. BA showed a cytotoxic effect by decreasing the replication index (RI) and mitotic index (MI). BA decreased the MI in a dose-dependent manner for the 24 h treatment period.

216. Boric acid destabilizes the hyphal cytoskeleton and inhibits invasive growth of Candida albicans.

     PubMed

     Pointer, Benjamin R; Boyer, Michael P; Schmidt, Martin

     2015-04-01

     Exposure of Candida albicans to sub-lethal concentrations of boric acid (BA) restricts the dimorphic fungus to its yeast morphology and prevents the formation of invasive hyphae on solid substrates. Exposure to BA causes a rapid and reversible disappearance of polarisome and SpitzenkÃ¶rper in growing hyphae. In BA-treated hyphae of C. albicans, actin quickly reorganizes from cytoplasmic cables to cortical patches and cell wall growth switches from an apical to an isotropic pattern. As a result of the cytoskeletal changes, the hyphal tips broaden and directional growth of hyphae ceases in the presence of BA. An analysis of homozygous deletion strains showed that mutants with constitutive or enhanced hyphal growth (tup1, nrg1, ssn6, rbf1) are BA-sensitive, demonstrating that cellular morphology is a major determinant of BA tolerance. The screening of deletion mutants also showed that deficiencies of the main activator of hyphal gene expression, Efg1, and the Rim101-signalling cascade, leading to Efg1 activation, cause BA resistance. Taken together, the data presented show that the selective inhibitory effect on BA on C. albicans hyphae is rooted in a disruption of apical cytoskeletal elements of growing hyphae. Copyright Â© 2015 John Wiley & Sons, Ltd.

217. Boric acid-dependent decrease in regulatory histone H3 acetylation is not mutagenic in yeast.

PubMed

Pointer, Benjamin R; Schmidt, Martin

2016-07-01

Candida albicans is a dimorphic yeast commonly found on human mucosal membranes that switches from yeast to hyphal morphology in response to environmental factors. The change to hyphal growth requires histone H3 modifications by the yeast-specific histone acetyltransferase Rtt109. In addition to its role in morphogenesis, Rtt109-dependent acetylation of histone H3 lysine residues 9 and 56 has regulatory functions during DNA replication and repair. Boric acid (BA) is a broad-spectrum agent that specifically inhibits C. albicans hyphal growth, locking the fungus in its harmless commensal yeast state. The present study characterizes the effect of BA on C. albicans histone acetylation in respect to specificity, time-course and significance. We demonstrate that sublethal concentrations of BA reduce H3K9/H3K56 acetylation, both on a basal level and in response to genotoxic stress. Acetylation at other selected histone sites were not affected by BA. qRT-PCR expression analysis of the DNA repair gene Rad51 indicated no elevated level of genotoxic stress during BA exposure. A forward-mutation analysis demonstrated the BA does not increase spontaneous or induced mutations. The findings suggest that DNA repair remains effective even when histone H3 acetylation decreases and dispels the notion that BA treatment impairs genome integrity in yeast. Â© FEMS 2016. All rights reserved. For permissions, please e-mail: journals.permissions@oup.com.

218. Hierarchical porous photoanode based on acid boric catalyzed sol for dye sensitized solar cells

NASA Astrophysics Data System (ADS)

Maleki, Khatereh; Abdizadeh, Hossein; Golobostanfard, Mohammad Reza; Adelfar, Razieh

2017-02-01

The hierarchical porous photoanode of the dye sensitized solar cell (DSSC) is synthesized through non-aqueous sol-gel method based on H3BO3 as an acid catalyst and the efficiencies of the fabricated DSSC based on these photoanodes are compared. The sol parameters of 0.17 M, water mole ratio of 4.5, acid mole ratio of 0.45, and solvent type of ethanol are introduced as optimum parameters for photoanode formation without any detectable cracks. The optimized hierarchical photoanode mainly contains anatase phase with slight shift toward higher angles, confirming the doping of boron into titania structure. Moreover, the porous structure involves two ranges of average pore sizes of 20 and 635 nm. The diffuse reflectance spectroscopy (DRS) shows the proper scattering and blueshift in band gap. The paste parameters of solid:liquid, TiO2:ethyl cellulose, and terpineol:ethanol equal to 11:89, 3.5:7.5, and 25:64, respectively, are assigned as optimized parameters for this novel paste. The photovoltaic properties of short circuit current density, open circuit voltage, fill factor, and efficiency of 5.89 mA/cm2, 703 mV, 0.7, and 2.91% are obtained for the optimized sample, respectively. The relatively higher short circuit current of the main sample compared to other samples is mainly due to higher dye adsorption in this sample corresponding to its higher surface area and presumably higher charge transfer confirmed by low RS and Rct in electrochemical impedance spectroscopy data. Boric acid as a catalyst in titania sol not only forms hierarchical porous structure, but also dopes the titania lattice, which results in appreciated performance in this device.

219. Intravaginal boric acid: is it an alternative therapeutic option for vaginal trichomoniasis?

PubMed

Thorley, Nicola; Ross, Jonathan

2017-12-09

Trichomoniasis, caused by Trichomonas vaginalis (TV), is the most common curable sexually transmitted infection worldwide. Current guidance in the UK is to treat TV with a nitroimidazole antibiotic. The high prevalence of TV, high rate of antibiotic resistance and limited tolerability to nitroimidazoles suggest that alternative treatment regimens are needed. Intravaginal boric acid (BA) has been used safely for the treatment of candida vulvovaginitis and bacterial vaginosis, and in vitro studies suggest BA is active against TV. We review the evidence for the efficacy of BA in patients with TV. MEDLINE, EMBASE, CINAHL, AMED, HMIC and BNI and Grey literature databases, The Cochrane Library, Trial Registers, conference abstracts and proceedings were searched. Inclusion criteria were women aged 16 years or over with microbiological confirmation of TV infection and using BA as treatment. There were no restrictions on language, publication date or study design. The in vitro evidence for BA activity against TV was also reviewed. No randomised controlled trials or case series were found. Four case reports demonstrated TV clearance with BA using a variety of dose regimens (dose 600â€‰mg alternate nights to 600â€‰mg two times per day; duration 1-5 months). In vitro studies suggest that BA has activity against TV which is independent of its effect on pH. Further evaluation of BA for the treatment of uncomplicated TV is required, but it may be useful when therapeutic options are limited. If shown to be safe and effective, intravaginal BA might provide a well-tolerated alternative anti-infective treatment which reduces community exposure to systemic antibiotics. Â© Article author(s) (or their employer(s) unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

220. Protective effect of boric acid on lead- and cadmium-induced genotoxicity in V79 cells.

PubMed

UstÃ¼ndaÄŸ, Aylin; Behm, Claudia; FÃ¶llmann, Wolfram; Duydu, YalÃ§in; Degen, Gisela H

2014-06-01

The toxic heavy metals cadmium (Cd) and lead (Pb) are important environmental pollutants which can cause serious damage to human health. As the metal ions (Cd(2+) and Pb(2+)) accumulate in the organism, there is special concern regarding chronic toxicity and damage to the genetic material. Metal-induced genotoxicity has been attributed to indirect mechanisms, such as induction of oxidative stress and interference with DNA repair. Boron is a naturally occurring element and considered to be an essential micronutrient, although the cellular activities of boron compounds remain largely unexplored. The present study has been conducted to evaluate potential protective effects of boric acid (BA) against genotoxicity induced by cadmium chloride (CdCl2) and lead chloride (PbCl2) in V79 cell cultures. Cytotoxicity assays (neutral red uptake and cell titer blue assay) served to determine suitable concentrations for subsequent genotoxicity assays. Chromosomal damage and DNA strand breaks were assessed by micronucleus tests and comet assays. Both PbCl2 and CdCl2 (at 3, 5 and 10 ÂµM) were shown to induce concentration-dependent increases in micronucleus frequencies and DNA strand breaks in V79 cells. BA itself was not cytotoxic (up to 300 ÂµM) and showed no genotoxic effects. Pretreatment of cells with low levels of BA (2.5 and 10 ÂµM) was found to strongly reduce the genotoxic effects of the tested metals. Based on the findings of this in vitro study, it can be suggested that boron provides an efficient protection against the induction of DNA strand breaks and micronuclei by lead and cadmium. Further studies on the underlying mechanisms for the protective effect of boron are needed.

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221. Effects of boric acid and 2-aminoethoxydiphenyl borate on necrotizing enterocolitis.

PubMed

YazÄ±cÄ±, SelÃ§uk; AkÅŸit, Hasan; Korkut, OÄŸuzhan; Sunay, Bahar; Ã‡elik, Tanju

2014-01-01

The aim was to study the effects of boric acid (BA) and 2-aminoethoxydiphenyl borate (2-APB) on oxidative stress and inflammation in an experimental necrotizing enterocolitis (NEC) rat model. Experimental NEC was induced in 40 newborn Sprague-Dawley rats by asphyxia and hypothermia applied in 3 consecutive days. Rats were subdivided into 4 subgroups as NEC, NEC+BA, NEC+2-APB, and controls. BA and 2-APB were applied daily before the procedure. Serum total antioxidant status, superoxide dismutase (SOD), tumor necrosis factor (TNF)-Î±, interleukin (IL)-6, and erythrocyte glutathione (GSH) levels were measured. Pathological changes for NEC in intestinal architecture were evaluated by a grading system. Pretreatment with BA and 2-APB resulted in a decrease in NEC incidence. In all of the NEC groups, decreased serum levels of GSH and SOD were measured. Boron limited GSH consumption but had no effect on SOD levels. Total antioxidant status levels were not statistically different among groups. In our experimental NEC model, BA, but not 2-APB, prevented the increase of TNF-Î±. Pretreatment with BA and 2-APB downregulated the activity levels of IL-6 in NEC. In the experimental NEC model, BA and 2-APB partly prevent NEC formation, modulate the oxidative stress parameters, bring a significant decrease in GSH consumption, and enhance the antioxidant defense mechanism, but have no effect on total antioxidant status. BA inhibits the hypoxia and hypothermia-induced increase in both IL-6 and TNF-a, but 2-APB only in IL-6. Boron may be beneficial in preventing NEC.

222. Boric Acid Is Reproductively Toxic to Adult Xenopus laevis, but Not Endocrine Active.

PubMed

Fort, Douglas J; Fort, Troy D; Mathis, Michael B; Ball, R Wayne

2016-11-01

The potential reproductive and endocrine toxicity of boric acid (BA) in the African clawed frog, Xenopus laevis, was evaluated using a 30-day exposure of adult frogs. Adult female and male frogs established as breeders were exposed to a culture water control and 4 target (nominal) test concentrations [5.0, 7.5, 10.0, and 15â€‰mg boron (B)/L, equivalent to 28.5, 42.8, 57.0, and 85.5â€‰mg BA/L] using flow-through diluter exposure system. The primary endpoints measured were adult survival, growth (weight and snout-vent length [SVL]), necropsy data, reproductive fecundity, and development of progeny (F1) from the exposed frogs. Necropsy endpoints included gonad weight, gonado-somatic index (GSI), ovary profile (oocyte normalcy and stage distribution), sperm count, and dysmorphology. Endocrine endpoints included plasma estradiol (E2), testosterone (T), dihydrotestosteone (DHT), gonadal CYP 19 (aromatase), and gonadal 5Î±-reductase (5-AR). BA exposure to adult female X. laevis increased the proportion of immature oocytes (<â€‰stage II) in the ovaries of females, reduced sperm counts and increased sperm cell dysmorphology frequency in male frogs exposed to 15â€‰mg B/L. No effects on the other general, developmental (F1), or endocrine endpoints were observed. Based on the results of the present study, the no observed adverse effects concentration (NOAEC) for the reproductive endpoints was 10â€‰mg B/L;

and 15â€‰mg B/L for reproductive fecundity, F1 embryo larval development, and endocrine function. These results confirmed that although BA is capable of inducing reproductive toxicity at high concentrations, it is not an endocrine disrupting agent. Â© The Author 2016. Published by Oxford University Press on behalf of the Society of Toxicology. All rights reserved. For Permissions, please e-mail: journals.permissions@oup.com.

223. Crystal Chemistry of the Potassium and Rubidium Uranyl Borate Families Derived from Boric Acid Fluxes

SciTech Connect

Wang, Shuao; Alekseev, Evgeny V.; Stritzinger, Jared T.

2010-07-19

The reaction of uranyl nitrate with a large excess of molten boric acid in the presence of potassium or rubidium nitrate results in the formation of three new potassium uranyl borates, K{sub 2}[(UO{sub 2}){sub 2}B{sub 12}O{sub 19}(OH){sub 4}]Â·0.3H{sub 2}O (KUBO-1), K[(UO{sub 2}){sub 2}B{sub 10}O{sub 15}(OH){sub 5}] (KUBO-2), and K[(UO{sub 2}){sub 2}B{sub 10}O{sub 16}(OH){sub 3}]Â·0.7H{sub 2}O (KUBO-3) and two new rubidium uranyl borates Rb{sub 2}[(UO{sub 2}){sub 2}B{sub 13}O{sub 20}(OH){sub 5}] (RbUBO-1) and Rb[(UO{sub 2}){sub 2}B{sub 10}O{sub 16}(OH){sub 3}]Â·0.7H{sub 2}O (RbUBO-2). The latter is isotypic with KUBO-3. These compounds share a common structural motif consisting of a linear uranyl, UO{sub 2}{sup 2+},moreÂ Â» cation surrounded by BO{sub 3} triangles and BO{sub 4} tetrahedra to create an UO{sub 8} hexagonal bipyramidal environment around uranium. The borate anions bridge between uranyl units to create sheets. Additional BO{sub 3} triangles extend from the polyborate layers and are directed approximately perpendicular to the sheets. All of these compounds adopt layered structures. With the exception of KUBO-1, the structures are all centrosymmetric. All of these compounds fluoresce when irradiated with long-wavelength UV light. The fluorescence spectrum yields well-defined vibronically coupled charge-transfer features.Â«Â less

224. Investigation of the vaporization of boric acid by transpiration thermogravimetry and knudsen effusion mass spectrometry.

PubMed

Balasubramanian, R; Lakshmi Narasimhan, T S; Viswanathan, R; Nalini, S

2008-11-06

The vaporization of H3BO3(s) was studied by using a commercial thermogravimetric apparatus and a Knudsen effusion mass spectrometer. The thermogravimetric measurements involved use of argon as the carrier gas for vapor transport and derivation of vapor pressures of H3BO3(g) in the temperature range 315-352 K through many flow dependence and temperature dependence runs. The vapor pressures as well as the enthalpy of sublimation obtained in this study represent the first results from measurements at low temperatures that are in accord with the previously reported near-classical transpiration measurements (by Stackelberg et al. 70 years ago) at higher temperatures (382-413 K with steam as the carrier gas). The KEMS measurements performed for the first time on boric acid showed H3BO3(g) as the principal vapor species with no meaningful information discernible on H2O(g) though. The thermodynamic parameters, both p(H3BO3) and Delta sub H degrees m(H3BO3,g), deduced from KEMS results in the temperature range 295-342 K are in excellent agreement with the transpiration results lending further credibility to the latter. All this information points toward congruent vaporization at the H3BO3 composition in the H2O-B2O3 binary system. The vapor pressures obtained from transpiration (this study and that of Stackelberg et al.) as well as from KEMS measurements are combined to recommend the following: log [p(H3BO3)/Pa]=-(5199+/-74)/(T/K)+(15.65+/-0.23), valid for T=295-413 K; and Delta sub H degrees m=98.3+/-9.5 kJ mol (-1) at T=298 K for H3BO3(s)=H3BO3(g).

225. Arabidopsis thaliana NIP7;1: An Anther-Specific Boric Acid Transporter of the Aquaporin Superfamily Regulated by an Unusual Tyrosine in Helix 2 of the Transport Pore

SciTech Connect

Li, Tian; Choi, Won-Gyu; Baudry, Jerome Y

Plant nodulin-26 intrinsic proteins (NIPs) are members of the aquaporin superfamily that serve as multifunctional transporters of uncharged metabolites. In Arabidopsis thaliana, a specific NIP pore subclass, known as the NIP II proteins, is represented by AtNIP5;1 and AtNIP6;1, which encode channel proteins expressed in roots and leaf nodes, respectively, that participate in the transport of the critical cell wall nutrient boric acid. Modeling of the protein encoded by the AtNIP7;1 gene shows that it is a third member of the NIP II pore subclass in Arabidopsis. However, unlike AtNIP5;1 and AtNIP6;1 proteins, which form constitutive boric acid channels, AtNIP7;1moreÂ Â» forms a channel with an extremely low intrinsic boric acid transport activity. Molecular modeling and molecular dynamics simulations of AtNIP7;1 suggest that a conserved tyrosine residue (Tyr81) located in transmembrane helix 2 adjacent to the aromatic arginine (ar/R) pore selectivity region stabilizes a closed pore conformation through interaction with the canonical Arg220 in ar/R region. Substitution of Tyr81 with a Cys residue, characteristic of established NIP boric acid channels, results in opening of the AtNIP7;1 pore that acquires a robust, transport activity for boric acid as well as other NIP II test solutes (glycerol and urea). Substitution of a Phe for Tyr81 also opens the channel, supporting the prediction from MD simulations that hydrogen bond interaction between the Tyr81 phenol group and the ar/R Arg may contribute to the stabilization of a closed pore state. Expression analyses show that AtNIP7;1 is selectively expressed in developing anther tissues of young floral buds of A. thaliana, principally in developing pollen grains of stage 9 11 anthers. Because boric acid is both an essential nutrient as well as a toxic compound at high concentrations, it is proposed that Tyr81 modulates transport and may provide an additional level of regulation for this transporter in male gametophyte

226. Arabidopsis thaliana NIP7;1: an anther-specific boric acid transporter of the aquaporin superfamily regulated by an unusual tyrosine in helix 2 of the transport pore.

PubMed

Li, Tian; Choi, Won-Gyu; Wallace, Ian S; Baudry, Jerome; Roberts, Daniel M

2011-08-09

Plant nodulin-26 intrinsic proteins (NIPs) are members of the aquaporin superfamily that serve as multifunctional transporters of uncharged metabolites. In Arabidopsis thaliana, a specific NIP pore subclass, known as the NIP II proteins, is represented by AtNIP5;1 and AtNIP6;1, which encode channel proteins expressed in roots and leaf nodes, respectively, that participate in the transport of the critical cell wall nutrient boric acid. Modeling of the protein encoded by the AtNIP7;1 gene shows that it is a third member of the NIP II pore subclass in Arabidopsis. However, unlike AtNIP5;1 and AtNIP6;1 proteins, which form constitutive boric acid channels, AtNIP7;1 forms a channel with an extremely low intrinsic boric acid transport activity. Molecular modeling and molecular dynamics simulations of AtNIP7;1 suggest that a conserved tyrosine residue (Tyr81) located in transmembrane helix 2 adjacent to the aromatic arginine (ar/R) pore selectivity region stabilizes a closed pore conformation through interaction with the canonical Arg220 in ar/R region. Substitution of Tyr81 with a Cys residue, characteristic of established NIP boric acid channels, results in opening of the AtNIP7;1 pore that acquires a robust, transport activity for boric acid as well as other NIP II test solutes (glycerol and urea). Substitution of a Phe for Tyr81 also opens the channel, supporting the prediction from MD simulations that hydrogen bond interaction between the Tyr81 phenol group and the ar/R Arg may contribute to the stabilization of a closed pore state. Expression analyses show that AtNIP7;1 is selectively expressed in developing anther tissues of young floral buds of A. thaliana, principally in developing pollen grains of stage 9-11 anthers. Because boric acid is both an essential nutrient as well as a toxic compound at high concentrations, it is proposed that Tyr81 modulates transport and may provide an additional level of regulation for this transporter in male gametophyte development

227. Toxicity and carcinogenicity studies of boric acid in male and female B6C3F1 mice.

PubMed Central

Dieter, M P

1994-01-01

Toxicity and potential carcinogenicity studies of boric acid were investigated in mice to verify in a second rodent species that this was a noncarcinogenic chemical. Earlier chronic studies in rats indicated boric acid was not a carcinogen. The chemical is nominated for testing because over 200 tons are produced annually, there are multiple uses for the product, and there is potential for widespread human exposure, both orally and dermally. Both sexes of B6C3F1 mice were offered diets mixed with boric acid for 14 days, 13 weeks, or 2 years. Dietary doses used in the acute, 14-day study were 0, 0.62, 1.25, 2.5, 5, and 10%; those in the subchronic, 13-week study were 0, 0.12, 0.25, 0.50, 1, and 2%; and doses in the 2-year, chronic study were 0, 0.25, and 0.50% in the diet. Mortality, clinical signs of toxicity, estimates of food consumption, body weight gain, and histopathologic examination of selected tissues constituted the variables measured. In the 14-day study mortality was proportional to dose and time of exposure in both sexes, occurring in dose groups as low as 2.5% and as early as 7 days of exposure. Body weights were depressed more than 10% below controls in the higher dose groups of both sexes. Mortality in the 13-week study was confined to the two highest dose groups in male mice and to the 2%-dose group in females. Body weight depression from 8 to 23% below those of controls occurred in the 0.50% and higher dose groups of both sexes. (ABSTRACT TRUNCATED AT 250 WORDS) PMID:7889889

228. Effects of Local Administration of Boric Acid on Posterolateral Spinal Fusion with Autogenous Bone Grafting in a Rodent Model.

PubMed

KÃ¶mÃ¼rcÃ¼, Erkam; Ã–zyalvaÃ§lÄ±, GÃ¼lzade; Kaymaz, Burak; GÃ¶lge, Umut Hatay; GÃ¶ksel, Ferdi; Cevizci, Sibel; Adam, GÃ¼rhan; Ozden, Raif

2015-09-01

Spinal fusion is among the most frequently applied spinal surgical procedures. The goal of the present study was to evaluate whether the local administration of boric acid (BA) improves spinal fusion in an experimental spinal fusion model in rats. Currently, there is no published data that evaluates the possible positive effects if the local administration of BA on posterolateral spinal fusion. Thirty-two rats were randomly divided into four independent groups: no material was added at the fusion area for group 1; an autogenous morselized corticocancellous bone graft was used for group 2; an autogenous morselized corticocancellous bone graft with boric acid (8.7Â mg/kg) for group 3; and only boric acid was placed into the fusion area for group 4. The L4-L6 spinal segments were collected at week 6, and the assessments included radiography, manual palpation, and histomorphometry. A statistically significant difference was determined between the groups with regard to the mean histopathological scores (pâ€‰=â€‰0.002), and a paired comparison was made with the Mann-Whitney U test to detect the group/groups from which the difference originated. It was determined that only the graftâ€‰+â€‰BA practice increased the histopathological score significantly with regard to the control group (pâ€‰=â€‰0.002). Whereas, there was no statistically significant difference between the groups in terms of the manual assessment of fusion and radiographic analysis (respectively pâ€‰=â€‰0.328 and pâ€‰=â€‰0.196). This preliminary study suggests that BA may clearly be useful as a therapeutic agent in spinal fusion. However, further research is required to show the most effective dosage of BA on spinal fusion, and should indicate whether BA effects spinal fusion in the human body.

229. The Aquaporin Splice Variant NbXIP1;1Î± Is Permeable to Boric Acid and Is Phosphorylated in the N-terminal Domain

PubMed Central

Ampah-Korsah, Henry; Anderberg, Hanna I.; Engfors, Angelica; Kirscht, Andreas; Norden, Kristina; Kjellstrom, Sven; Kjellbom, Per; Johanson, Urban

2016-01-01

Aquaporins (AQPs) are membrane channel proteins that transport water and uncharged solutes across different membranes in organisms in all kingdoms of life. In plants, the AQPs can be divided into seven different subfamilies and five of these are present in higher plants. The most recently characterized of these subfamilies is the XIP subfamily, which is found in most dicots but not in monocots. In this article, we present data on two different splice variants (Î± and Î²) of NbXIP1;1 from Nicotiana benthamiana. We describe the heterologous expression of NbXIP1;1Î± and Î² in the yeast Pichia pastoris, the subcellular localization of the protein in this system and the purification of the NbXIP1;1Î± protein. Furthermore, we investigated the functionality and the substrate specificity of the protein by stopped-flow spectrometry in P. pastoris spheroplasts and with the protein reconstituted in proteoliposomes. The phosphorylation status of the protein and localization of the phosphorylated amino acids were verified by mass spectrometry. Our results show that NbXIP1;1Î± is located in the plasma membrane when expressed in P. pastoris, that it is not permeable to water but to boric acid and that the protein is phosphorylated at several amino acids in the N-terminal cytoplasmic domain of the protein. A growth assay showed that the yeast cells expressing the N-terminally His-tagged NbXIP1;1Î± were more sensitive to boric acid as compared to the cells expressing the C-terminally His-tagged isoform. This might suggest that the N-terminal His-tag functionally mimics the phosphorylation of the N-terminal domain and that the N-terminal domain is involved in gating of the channel. PMID:27379142

230. Gypsum crystal size distribution in four continuous flow stirred slurry boric acid reactors in series compared with the batch

NASA Astrophysics Data System (ADS)

Ã‡akal, G. Ã–.; EroÄŸlu, Ä°.; Ã–zkar, S.

2006-04-01

Colemanite, one of the important boron minerals, is dissolved in aqueous sulfuric acid to produce boric acid. In this reaction, gypsum is obtained as a by-product. Gypsum crystals are in the shape of thin needles. These crystals should be grown to an easily filterable size in order to increase the production yield and purity of boric acid. In this paper, the particle size distributions and the volume-weighted mean diameters of the gypsum crystals obtained in batch and continuous flow systems were compared. Experiments in both batch and continuous reactors were performed at a temperature of 85 Â°C, a stirring rate of 400 rpm, and the inlet CaO to SO42- molar ratio of 1.0 using colemanite mineral in particle size smaller than 150 Î¼m. The average diameter of the gypsum crystals obtained at 3.5 h from the batch reactor was found to be 37-41 Î¼m. This value for the continuous system at steady state was observed to change between 44-163 Î¼m. The particle size of the gypsum crystals was found to increase with the residence time of the solid in the continuous system.

231. In vivo percutaneous absorption of boric acid, borax, and disodium octaborate tetrahydrate in humans compared to in vitro absorption in human skin from infinite and finite doses.

PubMed

Wester, R C; Hui, X; Hartway, T; Maibach, H I; Bell, K; Schell, M J; Northington, D J; Strong, P; Culver, B D

1998-09-01

Literature from the first half of this century report concern for toxicity from topical use of boric acid, but assessment of percutaneous absorption has been impaired by lack of analytical sensitivity. Analytical methods in this study included inductively coupled plasma-mass spectrometry which now allows quantitation of percutaneous absorption of 10B in 10B-enriched boric acid, borax, and disodium octaborate tetrahydrate (DOT) in biological matrices. This made it possible, in the presence of comparatively large natural dietary boron intakes for the in vivo segment of this study, to quantify the boron passing through skin. Human volunteers were dosed with 10B-enriched boric acid, 5.0%, borax, 5.0%, or disodium octaborate tetrahydrate, 10%, in aqueous solutions. Urinalysis, for boron and changes in boron isotope ratios, was used to measure absorption. Boric acid in vivo percutaneous absorption was 0.226 (SD = 0.125) mean percentage dose, with flux and permeability constant (Kp) calculated at 0.009 microgram/cm2/h and 1.9 x 10(-7) cm/h, respectively. Borax absorption was 0.210 (SD = 0.194) mean percentage of dose, with flux and Kp calculated at 0.009 microgram/cm2/h and 1.8 x 10(-7) cm/h, respectively. DOT absorption was 0.122 (SD = 0.108) mean percentage, with flux and Kp calculated at 0.01 microgram/cm2/h and 1.0 x 10(-7) cm/h, respectively. Pretreatment with the potential skin irritant 2% sodium lauryl sulfate had no effect on boron skin absorption. In vitro human skin percentage of doses of boric acid absorbed were 1.2 for a 0.05% solution, 0.28 for a 0.5% solution, and 0.70 for a 5.0% solution. These absorption amounts translated into flux values of, respectively, 0.25, 0.58, and 14.58 micrograms/cm2/h and permeability constants (Kp) of 5.0 x 10(-4), 1.2 x 10(-4), and 2.9 x 10(-4) cm/h for the 0.05, 0.5, and 5.0% solutions. The above in vitro doses were at infinite, 1000 microliters/cm2 volume. At 2 microliters/cm2 (the in vivo dosing volume), flux decreased some

232. A comparative review of the pharmacokinetics of boric acid in rodents and humans.

PubMed

Murray, F J

1998-01-01

The pharmacokinetics of boric acid (BA) have been studied in animals and humans. Orally administered BA is readily and completely absorbed in rats, rabbits, and humans, as well as other animal species. In animals and humans, absorbed BA appears to be rapidly distributed throughout the body water via passive diffusion. Following administration of BA, the ratio of blood: soft tissue concentrations of boron (B) is approx 1.0 in rats and humans; in contrast, concentrations of B in bone exceed those in blood by a factor of approx 4 in both rats and humans. In rats, adipose tissue concentrations of B are only 20% of the levels found in blood and soft tissues; however, human data on adipose tissue levels are not available. BA does not appear to be metabolized in either animals or humans owing to the excessive energy required to break the B-O bond. BA has an affinity for cis-hydroxy groups, and it has been hypothesized to elicit its biological activity through this mechanism. The elimination kinetics of BA also appear to be similar for rodents and humans. BA is eliminated unchanged in the urine. The kinetics of elimination were evaluated in human volunteers given BA orally or intravenously; the half-life for elimination was essentially the same (approx 21 h) by either route of exposure. In rats, blood and tissue levels of B reached steady-state after 3-4 d of oral administration of BA; assuming first-order kinetics, a half-life of 14-19 h may be calculated. The lack of metabolism of BA eliminates metabolic clearance as a potential source of interspecies variation. Accordingly, in the absence of differences in metabolic clearance, renal clearance is expected to be the major determinant of interspecies variation in pharmacokinetics. Because glomerular filtration rates are slightly higher in rats than in humans, the slight difference in half-lives may be readily explained. The most sensitive toxicity end point for BA appears to be developmental toxicity in rats, with a No

233. Morphological alterations induced by boric acid and fipronil in the midgut of worker honeybee (Apis mellifera L.) larvae : Morphological alterations in the midgut of A. mellifera.

    PubMed

    da Silva Cruz, Aline; da Silva-Zacarin, Elaine C M; Bueno, Odair C; Malaspina, Osmar

    2010-04-01

    Morphological alterations, by means of histological and ultrastructural analysis, have been used to determine the effects of boric acid and fipronil on midgut tissues of honeybee worker, Apis mellifera L. larvae. In order to observe possible morphological alterations in the midgut, two groups of bioassays were performed. In the first one, the larvae were chronically treated with different concentrations of boric acid added to the food (1.0, 2.5 and 7.5 mg/g). In the second group, the larvae were fed with diets containing different concentrations of fipronil (0.1 and 1 microg/g) and compared with control groups without these chemical compounds. In the first bioassay, the larvae were collected on day 3 and in the second bioassay on day 4, when the mortality rate obtained in the toxicological bioassay was not very high. The larval midguts were removed and processed for morphological analyses using a light and transmission electron microscopy. We observed cytoplasmic vacuolizations, with the absence of autophagic vacuoles, and chromatinic compacting in most of the cells in the groups treated with pesticides. The morphological alterations were far greater in the larvae treated with boric acid than in the larvae treated with fipronil. Our data suggest that the midgut cell death observed was in response to boric acid and fipronil action. This study significantly improves the understanding of the toxicological effect of these insecticides from the ecotoxicological perspective.

234. Some features of the effect the pH value and the physicochemical properties of boric acid have on mass transfer in a VVER reactor's core

    NASA Astrophysics Data System (ADS)

    Gavrilov, A. V.; Kritskii, V. G.; Rodionov, Yu. A.; Berezina, I. G.

    2013-07-01

    Certain features of the effect of boric acid in the reactor coolant of nuclear power installations equipped with a VVER-440 reactor on mass transfer in the reactor core are considered. It is determined that formation of boric acid polyborate complexes begins under field conditions at a temperature of 300Â°C when the boric acid concentration is equal to around 0.065 mol/L (4 g/L). Operations for decontaminating the reactor coolant system entail a growth of corrosion product concentration in the coolant, which gives rise to formation of iron borates in the zones where subcooled boiling of coolant takes place and to the effect of axial offset anomalies. A model for simulating variation of pressure drop in a VVER-440 reactor's core that has invariable parameters during the entire fuel campaign is developed by additionally taking into account the concentrations of boric acid polyborate complexes and the quantity of corrosion products (Fe, Ni) represented by the ratio of their solubilities.

235. The Usability of Boric Acid as an Alternative Foaming Agent on the Fabrication of Al/Al2O3 Composite Foams

    NASA Astrophysics Data System (ADS)

    Yaman, Bilge; Onuklu, Eren; Korpe, Nese O.

    2017-09-01

Pure Al and alumina (2, 5, 10 wt.% Al2O3)-added Al composite foams were fabricated through powder metallurgy technique, where boric acid (H3BO3) is employed as a new alternative foaming agent. It is aimed to determine the effects of boric acid on the foaming behavior and cellular structure and also purposed to develop the mechanical properties of Al foams by addition of Al2O3. Al and Al composite foams with porosity fraction in the range of 46-53% were achieved by sintering at 620 Â°C for 2 h. Cell morphology was characterized using a combination of stereomicroscope equipped with image analyzer and scanning electron microscopy. Microhardness values were measured via using Vickers indentation technique. Quasi-static compression tests were performed at strain rate of 10-3 s-1. Compressive strength and energy absorption of the composite foams enhanced not only by the increasing weight fraction of alumina, but also by the usage of boric acid which leads to formation of boron oxide (B2O3) acting as a binder in obtaining dense cell walls. The results revealed that the boric acid has outstanding potential as foaming agent in the fabrication of Al and Al composite foams by providing improved mechanical properties.

236. DEFECTS IN CERVICAL VERTEBRAE IN BORIC ACID-EXPOSED RAT EMBRYOS ARE ASSOCIATED WITH ANTERIOR SHIFTS OF HOX GENE EXPRESSION DOMAINS

EPA Science Inventory

Defects in cervical vertebrae in boric acid-exposed rat embryos are associated with anterior shifts of hox gene expression domains

Nathalie Wery,1 Michael G. Narotsky,2 Nathalie Pacico,1 Robert J. Kavlock,2 Jacques J. Picard,1 AND Francoise Gofflot,1*
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237. The Effect of Boric Acid and Borax on Oxidative Stress, Inflammation, ER Stress and Apoptosis in Cisplatin Toxication and Nephrotoxicity Developing as a Result of Toxication.

PubMed

Hazman, Ã–mer; Bozkurt, Mehmet Fatih; Fidan, Abdurrahman Fatih; Uysal, Fadime Erkan; Ã‡elik, Sefa

2018-06-01

The development of treatment protocols that can reduce side effects in chemotherapy applications is extremely important in terms of cancer treatment. In this context, it was aimed to investigate the effects of boric acid and borax on cisplatin toxicity (nephrotoxicity) in rats. In the experimental phase, eight groups were formed from rats. Boric acid and borax were given to the treatment groups with three different doses using gavage. On the fifth day of the study, cisplatin (10Â mg/kg) was administered to all rats except the control group. At the end of the study, oxidative stress-related (GSH, MDA, PCO, GPx, 8-OHdG), inflammation-related (TNF-Î±, IL-1Î², IL-18, MCP-1, ICAM, TGF-Î²), apoptosis-related (p53, caspase 1, 3, 8, 12, bcl-2, bcl-xL, NFkB), and ER stress-related (GRP78, ATF-6, PERK) basic parameters were analyzed in serum, erythrocyte, and kidney tissues. Kidney tissues were also examined by histopathological and immunohistochemical methods. Borax and boric acid at different doses decreased inflammation and oxidative stress caused by cisplatin toxicity and increased ER stress. As a result of the treatments applied to experimental animals, it was determined that boric acid and borax reduced apoptotic damage in kidney tissue, but the decrease was statistically significant only in 200Â mg/kg boric acid-administered group. In the study, low anti-apoptotic effects of borate doses with the anti-inflammatory and antioxidant effect may be due to increased ER stress at the relevant doses. Further studies on the effects of boron compounds on ER stress and apoptotic mechanisms may clarify this issue. Thus, possible side effects or if there are new usage areas of borone compounds which have many usage areas in clinics can be detected.

238. Vibrational Properties of Bulk Boric Acid 2A and 3T Polymorphs and Their Two-Dimensional Layers: Measurements and Density Functional Theory Calculations.

PubMed

Bezerra da Silva, M; Santos, R C R; Freire, P T C; Caetano, E W S; Freire, V N

2018-02-08

Boric acid (H 3 BO 3) is being used effectively nowadays in traps/baits for the management of Aedes aegypti L. and Aedes albopictus Skuse species of mosquitoes, which are the main spreading vectors worldwide for diseases such as malaria, dengue, and zika. Previously, we published results on the structural, electronic, and optical properties of its molecular triclinic H 3 BO 3 -2A and trigonal H 3 BO 3 -3T polymorphs within the framework of density functional theory (DFT). Because of the renewed importance of these materials, the focus of this work is on the vibrational properties of the bulk boric acid 2A and 3T polymorphs. We measured the infrared and Raman spectra of the former, which was accompanied and interpreted through state-of-the-art DFT calculations, supplemented by computations regarding the H 3 BO 3 molecule and two-dimensional layers based on the bulk structures. We identify/assign their normal modes and find vibrational signatures for each polymorph as well as in- and out-of-plane motions and molecular vibrations, unveiling a nice agreement between the DFT level of theory employed and our improved spectroscopic measurements in the wavenumber ranges of 400-2000 cm -1 (infrared) and 0-1500 cm -1 (Raman). We show that a dispersion-corrected DFT functional within the generalized gradient approximation (GGA) can be very accurate in describing the vibrational properties of the boric acid polymorphs. Besides, several issues left open/not clearly resolved in previously published works on the vibrational mode assignments of the bulk and 2D sheets of boric acid are explained satisfactorily. Finally, phonon dispersions and associated densities of states were also evaluated for each polymorph along with their temperature-dependent DFT-calculated entropy, enthalpy, free energy, heat capacity, and Debye temperature. In particular, our DFT calculations suggest a possible way to differentiate the 2A and 3T boric acid polymorphs through Raman spectroscopy and heat

239. Microwave-Assisted Condensation Reactions of Acetophenone Derivatives and Activated Methylene Compounds with Aldehydes Catalyzed by Boric Acid under Solvent-Free Conditions.

PubMed

Brun, Elodie; Safer, Abdelmounaim; Carreaux, FranÃ§ois; Bourahla, Khadidja; L'helgoua'ch, Jean-Martial; Bazureau, Jean-Pierre; Villalgordo, Jose Manuel

2015-06-23

We here disclosed a new protocol for the condensation of acetophenone derivatives and active methylene compounds with aldehydes in the presence of boric acid under microwave conditions. Implementation of the reaction is simple, healthy and environmentally friendly owing to the use of a non-toxic catalyst coupled to a solvent-free procedure. A large variety of known or novel compounds have thus been prepared, including with substrates bearing acid or base-sensitive functional groups.

240. The histopathological and morphometric investigation of the effects of systemically administered boric acid on alveolar bone loss in ligature-induced periodontitis in diabetic rats.

PubMed

Balci Yuce, Hatice; Toker, Hulya; Goze, Fahrettin

2014-11-01

The purpose of this study was to evaluate the effects of systemically administered boric acid on alveolar bone loss, histopathological changes and oxidant/antioxidant status in ligature-induced periodontitis in diabetic rats. Forty-four Wistar rats were divided into six experimental groups: (1) non-ligated (NL, n = 6) group, (2) ligature only (LO, n = 6) group, (3) Streptozotocin only (STZ, n = 8) group, (4) STZ and ligature (STZ+LO, n = 8) group, (5) STZ, ligature and systemic administration of 15 mg/kg/day boric acid for 15 days (BA15, n = 8) group and (6) STZ, ligature and systemic administration of 30 mg/kg/day boric acid for 15 days (BA30, n = 8) group. Diabetes mellitus was induced by 60 mg/kg streptozotocin. Silk ligatures were placed at the gingival margin of lower first molars of the mandibular quadrant. The study duration was 15 days after diabetes induction and the animals were sacrificed at the end of this period. Changes in alveolar bone levels were clinically measured and tissues were histopathologically examined. Serum total antioxidant status (TAS), total oxidant status (TOS), calcium (Ca) and magnesium (Mg) levels and oxidative stress index (OSI) were evaluated. Primary outcome was alveolar bone loss. Seconder outcome (osteoblast number) was also measured. At the end of 15 days, the alveolar bone loss was significantly higher in the STZ+LO group compared to the other groups ($p < 0.05$). There was no significant difference in alveolar bone loss between the STZ+LO 15 mg/kg boric acid and STZ+LO 30 mg/kg boric acid groups ($p > 0.05$). Systemically administered boric acid significantly decreased alveolar bone loss compared to the STZ+LO group ($p < 0.05$). The osteoblast number in the BA30 group was significantly higher than those of the NL, STZ and STZ+LO groups ($p < 0.05$). Inflammatory cell infiltration was significantly higher in the STZ+LO group the other groups ($p < 0.05$). Serum TAS levels were significantly higher in the NL and LO groups than the

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241. Assessment of the chemical changes induced in human melanoma cells by boric acid treatment using infrared imaging.

PubMed

Acerbo, Alvin S; Miller, Lisa M

2009-08-01

Boron is found in everyday foods and drinking water in trace quantities. Boron exists as boric acid (BA) within plants and animals, where low levels have been linked to cancer incidence. However, this correlation is not well characterized. In this study, we examined the chemical and morphological effects of BA on human skin melanoma cells (SK-MEL28) using Fourier Transform InfraRed Imaging (FTIRI) with a Focal Plane Array (FPA) detector. Cells were grown under concentrations of BA ranging from 0 to 50 mM. Cell viability was determined after 1, 2, 3, 5, 7 and 10 days using trypan blue staining. With FTIRI, images of approximately twenty cells per time point per condition were collected. Principal components analysis (PCA) was used to evaluate changes in cell composition, with particular focus on the lipid, protein, and nucleic acid spectral components. Results from trypan blue staining revealed decreased cell viability as BA concentration increased. FTIRI data indicated that the protein and lipid contents (as indicated by the lipid/protein ratio) did not undergo substantial changes due to BA treatment. In contrast, the nucleic acid/protein ratio significantly decreased with BA treatment. PCA results showed an increase in beta-sheet protein at higher concentrations of BA (12.5, 25, and 50 mM). Together, these results suggest that high concentrations of BA have an anti-proliferative effect and show signs consistent with apoptosis.

242. THE KINETICS OF SAPONIFICATION OF IODOACETIC ACID BY SODIUM HYDROXIDE AND BY CERTAIN ALKALINE BUFFER SOLUTIONS

PubMed Central

BrdiÄ□ka, R.

1936-01-01

1. The rate of the saponification of iodoacetic acid in sodium hydroxide and alkaline buffer solutions yielding glycollic acid was measured by means of HeyrovskÃ½'s polarographic method. 2. From the bimolecular velocity constants, increasing with the ionic strength of the solution, the BrÃ¶nsted factor, F, which characterizes the primary salt effect, was calculated. 3. In the borate buffer solutions the monomolecular constants of the saponification were determined which, at values above the pH of neutralization of boric acid, show a proportionality to the concentration of hydroxyl anions. Below the pH of neutralization of boric acid, they are proportional to the concentration of borate anions. PMID:19872968

243. THE KINETICS OF SAPONIFICATION OF IODOACETIC ACID BY SODIUM HYDROXIDE AND BY CERTAIN ALKALINE BUFFER SOLUTIONS.

PubMed

Brdicka, R

1936-07-20

1. The rate of the saponification of iodoacetic acid in sodium hydroxide and alkaline buffer solutions yielding glycollic acid was measured by means of HeyrovskÃ½'s polarographic method. 2. From the bimolecular velocity constants, increasing with the ionic strength of the solution, the BrÃ¶nsted factor, F, which characterizes the primary salt effect, was calculated. 3. In the borate buffer solutions the monomolecular constants of the saponification were determined which, at values above the pH of neutralization of boric acid, show a proportionality to the concentration of hydroxyl anions. Below the pH of neutralization of boric acid, they are proportional to the concentration of borate anions.

244. Effects of sublethal exposure to boric acid sugar bait on adult survival, host-seeking, bloodfeeding behavior, and reproduction of Stegomyia albopicta.

PubMed

Ali, Arshad; Xue, Rui-De; Barnard, Donald R

2006-09-01

Effects of sublethal exposure to 0.1% boric acid sugar bait on adult survival, host-seeking, bloodfeeding behavior, and reproduction of Stegomyia albopicta were studied in the laboratory. Survival of males as well as females was significantly reduced when exposed to the bait, compared to control adults. The host-seeking and bloodfeeding activities in the baited females decreased, but the mean duration of blood engorgement (probing to voluntary withdrawal of proboscis) was not significantly different between the baited and control females. The landing and biting rates (human forearm) were significantly reduced in the baited females compared to nonbaited controls. Fecundity and fertility (based on number of laid eggs per female and percentage egg hatch, respectively) in the baited females were significantly reduced, and ovarian development was retarded. Sublethal exposure to sugar-based boric acid bait has the potential to reduce adult populations of St. albopicta.

245. Synthesis and evaluation of borates derived from boric acid and diols for the protection of wood against fungal decay and thermal degradation

     Treesearch

     George C. Chen

     2004-01-01

     N,N-dimethyl amino carbinol catechol borate(1). N,N-dimethyl amino carbinol-4-methyl catechol borate(2), N,N-dimethyl amino carbinol-4-t- butyl catechol borate(3). N,N-dimethyl amino carbinol-2,3-naphthyl borate 4) were synthesized by refluxing boric acid and diol in DMF(N,N-dimethyl formamide). The borates were characterized by NMR. Wood impregnated with borate 1,2 or...

246. [Chiral separation of five beta-blockers using di-n-hexyl L-tartrate-boric acid complex as mobile phase additive by reversed-phase liquid chromatography].

     PubMed

     Yang, Juan; Wang, Lijuan; Guo, Qiaoling; Yang, Gengliang

     2012-03-01

     A reversed-phase high performance liquid chromatographic (HPLC) method using the di-n-hexyl L-tartrate-boric acid complex as a chiral mobile phase additive was developed for the enantioseparation of five beta-blockers including propranolol, esmolol, metoprolol, bisoprolol and sotalol. In order to obtain a better enantioseparation, the influences of concentrations of di-n-butyl L-tartrate and boric acid, the type, concentration and pH of the buffer, methanol content as well as the molecular structure of analytes were extensively investigated. The separation of the analytes was performed on a Venusil MP-C18 column (250 mm x 4.6 mm, 5 microm). The mobile phase was 15 mmol/L ammonium acetate-methanol containing 60 mmol/L boric acid, 70 mmol/L di-n-hexyl L-tartrate (pH 6.00). The volume ratios of 15 mmol/L ammonium acetate to methanol were 20: 80 for propranolol, esmolol, metoprolol, bisoprolol and 30: 70 for sotalol. The flow rate was 0.5 mL/min and the detection wavelength was set at 214 nm. Under the optimized conditions, baseline enantioseparation was obtained separately for the five pairs of analytes.

247. Mechanism of permeability-enhancing effect of EDTA and boric acid on the corneal penetration of 4-[1-hydroxy-1-methylethyl]-2-propyl-1-[4-[2-[tetrazole-5-yl]phenyl]phenyl] methylimidazole-5-carboxylic acid monohydrate (CS-088).

     PubMed

     Kikuchi, Takayuki; Suzuki, Masahiko; Kusai, Akira; Iseki, Ken; Sasaki, Hitoshi; Nakashima, Kenichiro

     2005-08-11

     This study was conducted to clarify the penetration properties of 4-[1-hydroxy-1-methylethyl]-2-propyl-1-[4-[2-[tetrazole-5-yl]phenyl]phenyl]methylimidazole-5-carboxylic acid monohydrate (CS-088), an ophthalmic agent, and the mechanism of the permeability-enhancing effect of EDTA and boric acid (EDTA/boric acid) on the corneal penetration of CS-088. In the absence of additives, corneal permeability decreased with increasing concentration of CS-088 as CS-088 monomers self-associate to form dimers. Presence of EDTA/boric acid caused no significant changes in the physicochemical properties of CS-088, the apparent partition coefficient or the mean particle size of CS-088. EDTA/boric acid induced only a slight change in the zeta potential of liposomes used as a model of the biological membrane. On the other hand, EDTA/boric acid significantly increased membrane fluidity of liposomes, whereas other buffering agents tested did not. This effect was synergistic and concentration-dependent for both EDTA and boric acid as was observed in in vitro corneal penetration of CS-088. In accordance with the result, the rate of CS-088 permeation into the liposomes significantly increased by the addition of EDTA/boric acid. Therefore, it was demonstrated that EDTA/boric acid promotes corneal penetration of CS-088 through the transcellular pathway by increasing membrane fluidity. Conversely, other buffering agents decreased corneal permeability of CS-088 by inducing further self-association of CS-088 aggregates.

248. Therapeutic efficacy for hepatocellular carcinoma by boric acid-mediated boron neutron capture therapy in a rat model.

     PubMed

     Lin, Sy-Yu; Lin, Chen-Jou; Liao, Jiunn-Wang; Peir, Jinn-Jer; Chen, Wei-Lin; Chi, Chin-Wen; Lin, Yung-Chang; Liu, Yu-Ming; Chou, Fong-In

     2013-11-01

     Hepatocellular carcinoma (HCC) is a common malignant tumor with poor prognosis. Boron neutron capture therapy (BNCT) may provide an alternative therapy for HCC. This study investigated the therapeutic efficacy of boric acid (BA)-mediated BNCT for HCC in a rat model. The pharmacokinetic and biodistribution of BA in N1S1 tumor-bearing rats were analyzed. Rats were injected with 25 mg B/kg body weight via tail veins before neutron irradiation at the Tsing Hua Open-pool Reactor, and the efficacy of BNCT was evaluated from the tumor size, tumor blood flow, and biochemical analyses. HCC-bearing rats administered BNCT showed reductions in tumor size on ultrasound imaging, as well as an obvious reduction in the distribution of tumor blood flow. The lesion located in livers had disappeared on the 80th day after BNCT; a recovery of values to normal levels was also recorded. BA-mediated BNCT is a promising alternative for liver cancer therapy since the present study demonstrated the feasibility of curing a liver tumor and restoring liver function in rats. Efforts are underway to investigate the histopathological features and the detailed mechanisms of BA-mediated BNCT.

249. Dose-dependent Effect of Boric Acid on Myogenic Differentiation of Human Adipose-derived Stem Cells (hADSCs).

     PubMed

     Apdik, HÃ¼seyin; DoÄŸan, AyÅŸegÃ¼l; Demirci, Selami; AydÄ±n, Safa; Åžahin, Fikrettin

     2015-06-01

     Boron, a vital micronutrient for plant metabolism, is not fully elucidated for embryonic and adult body development, and tissue regeneration. Although optimized amount of boron supplement has been shown to be essential for normal gestational development in zebrafish and frog and beneficial for bone regeneration in higher animals, effects of boron on myogenesis and myo-regeneration remains to be solved. In the current study, we investigated dose-dependent activity of boric acid on myogenic differentiation of human adipose-derived stem cells (hADSCs) using immunocytochemical, gene, and protein expression analysis. The results revealed that while low- (81.9Â Î¼M) and high-dose (819.6Â Î¼M) boron treatment increased myogenic gene expression levels such as myosin heavy chain (MYH), MyoD, myogenin, and desmin at day 4 of differentiation, high-dose treatment decreased myogenic-related gene and protein levels at day 21 of differentiation, confirmed by immunocytochemical analysis. The findings of the study present not only an understanding of boron's effect on myogenic differentiation but also an opportunity for the development of scaffolds to be used in skeletal tissue engineering and supplements for embryonic muscle growth. However, fine dose tuning and treatment period arranging are highly warranted as boron treatment over required concentrations and time might result in detrimental outcomes to myogenesis and myo-regeneration.

250. Boric acid inhibits LPS-induced TNF-alpha formation through a thiol-dependent mechanism in THP-1 cells.

PubMed

Cao, Jun; Jiang, Liping; Zhang, Xiaomei; Yao, Xiaofeng; Geng, Chengyan; Xue, Xiangxin; Zhong, Laifu

2008-01-01

Oxidative stress plays an important role during inflammatory diseases and antioxidant administration to diminish oxidative stress may arrest inflammatory processes. Boron has been implicated to modulate certain inflammatory mediators and regulate inflammatory processes. Here we investigated the role of the tripeptide glutathione (GSH) in modulating the effects of boric acid (BA) on lipopolysaccharide (LPS)-induced tumor necrosis factor alpha (TNF-alpha) formation in THP-1 monocytes. Interestingly, we found that BA had no significant effects on both TNF-alpha production and intracellular GSH contents, whereas it could inhibit LPS-induced TNF-alpha formation and ameliorated the d,l-buthionine-S,R-sulfoximine (BSO)-induced GSH depletion. Twenty-four hour incubation with BSO induced a decrease of the intracellular GSH and an increase of TNF-alpha. Treatment with N-acetyl-l-cysteine (NAC) did not significantly increase intracellular content of GSH but significantly reduced the secretion of TNF-alpha. BSO-pretreatment for 24h enhanced the LPS-induced secretion and mRNA expression of TNF-alpha further. BA inhibited LPS-stimulated TNF-alpha formation was also seen after GSH depletion by BSO. These results indicate that BA may have anti-inflammatory effect in the LPS-stimulated inflammation and the effect of BA on TNF-alpha secretion may be induced via a thiol-dependent mechanism.

251. Effect of Tumor Microenvironment on Selective Uptake of Boric Acid in HepG2 Human Hepatoma Cells.

PubMed

Bai, Yu-Chi; Hsia, Yu-Chun; Lin, Yu-Ting; Chen, Kuan-Hao; Chou, Fong-In; Yang, Chia-Min; Chuang, Yung-Jen

2017-11-01

Feasibility and efficacy of boric acid (BA)-mediated boron neutron capture therapy (BNCT) was first demonstrated by eliminating hepatocellular carcinoma (HCC) in a rat model. Furthermore, selective uptake of BA by liver tumor cells was shown in a rabbit model. To gain further insight, this study aimed to investigate the mechanisms of transportation and selective uptake of BA in HepG2 liver tumor cells. Transportation of BA in HepG2 cells was analyzed by time-course assays and by analyzing the rate of diffusion versus the concentration of BA. The effect of different tumor conditions on BA uptake was studied by treating HepG2 cells with 25 Î¼g 10 B/ml BA under different concentrations of glucose, at different pH and in the presence of water-soluble cholesterol. HepG2 cells mainly uptake BA by simple diffusion. Cell membrane permeability may also contribute to tumor-specific uptake of BA. The selective uptake of BA was achieved primarily by diffusion, while other factors, such as low pH and increased membrane fluidity, which are hallmarks of HCC, might further enhance BA uptake. CopyrightÂ© 2017, International Institute of Anticancer Research (Dr. George J. Delinasios), All rights reserved.

252. Controlling the optical properties of polyaniline doped by boric acid particles by changing their doping agent and initiator concentration

NASA Astrophysics Data System (ADS)

Cabuk, Mehmet; GÃ¼ndÃ¼z, Bayram

2017-12-01

In this study, polyaniline doped by boric acid (PAni:BA) conducting polymers were chemically synthesized by oxidative polymerization method using (NH4)2S208 (APS) as initiator. Pani:BA conducting polymers were synthesized by using two different APS/aniline molar ratios as 1:1 and 2:1. Their results were compared with PAni doped by HCl (PAni) conducting polymer. Structural properties of the PAni, PAni:BA (1:1) and PAni:BA (2:1) conducting polymers were characterized by using FTIR, SEM, TGA, particle size and apparent density measurements. Effects of doping agents and initiator concentrations on optical properties were investigated in detail. The optoelectronic parameters such as absorption band edge, molar extinction coefficient, direct allowed band gap, refractive index, optical conductance and electrical conductance of the PAni, PAni:BA (1:1) and PAni:BA (2:1) were determined. The absorption band edge and direct allowed band gap of PAni were decreased with doping BA and increasing APS ratio. Also, the refractive index values of the materials were calculated from experimental results and compared with obtained results from Moss, Ravindra, Herve-Vandamme, Reddy and Kumar-Singh relations.

253. Comparison of Boric Acid and Combination Drug of Polymyxin, Neomycin and Hydrocortisone (polymyxin NH) in the Treatment of Acute Otitis Externa.

PubMed

Amani, Soroush; Moeini, Mohammad

2016-07-01

Acute otitis externa is an inflammation of the external auditory canal known as "swimmer's ear". Direct costs including medical treatment, painkillers, antibiotics, steroids or both and indirect costs are also remarkable. The aim of this study was to compare the effect of boric acid and polymyxin, neomycin and hydrocortisone composition in the treatment of acute otitis externa. This randomized clinical trial was carried out on 80 patients aged more than 17-year-old who were referred to Kashani hospital clinic with a diagnosis of acute otitis externa by otolaryngologist. The patients were randomly allocated to two groups (A: Boric acid and B: polymyxin NH ear drops) and Painkiller was prescribed and administered orally for all patients and in the presence of fever, cellulitis around the ears and neck adenopathy, broad-spectrum systemic antibiotics were used besides topical treatment. Symptoms of patients who were evaluated by a physician includes pain, discharge from the ear, swelling of the ear canal, auricle swelling, tenderness, and ear itching. In addition, pain was evaluated in patients and was recorded by Macgill Pain Questionnaire, in the first, third, seventh and tenth days. Results showed that itching on third day (p=0.007) and swelling of the ear canal in the examination of the third day (p=0.006) and the seventh day (p=0.001) in the polymyxin NH group was more than those of boric acid group. Overall mean pain based on McGill questionnaire was 11.10Â±1.49 in boric acid group in the examination on the first day and was 4.05Â±0.22 in the examination on the tenth day and in the polymyxin NH group, it was 10.9Â±0.99 on the first day and 4.20Â±0.40 on the tenth day. In both groups, pain relief was the same and there was no significant difference between two groups (p=0.075). The findings of this study showed slight differences in the effectiveness of the boric acid drug and combination of polymyxin, neomycin and hydrocortisone in the treatment of patients with

254. Comparison of Boric Acid and Combination Drug of Polymyxin, Neomycin and Hydrocortisone (polymyxin NH) in the Treatment of Acute Otitis Externa

PubMed Central

Moeini, Mohammad

2016-01-01

Introduction Acute otitis externa is an inflammation of the external auditory canal known as "swimmerâ€™s ear". Direct costs including medical treatment, painkillers, antibiotics, steroids or both and indirect costs are also remarkable. Aim The aim of this study was to compare the effect of boric acid and polymyxin, neomycin and hydrocortisone composition in the treatment of acute otitis externa. Materials and Methods This randomized clinical trial was carried out on 80 patients aged more than 17-year-old who were referred to Kashani hospital clinic with a diagnosis of acute otitis externa by otolaryngologist. The patients were randomly allocated to two groups (A: Boric acid and B: polymyxin NH ear drops) and Painkiller was prescribed and administered orally for all patients and in the presence of fever, cellulitis around the ears and neck adenopathy, broad-spectrum systemic antibiotics were used besides topical treatment. Symptoms of patients who were evaluated by a physician includes pain, discharge from the ear, swelling of the ear canal, auricle swelling, tenderness, and ear itching. In addition, pain was evaluated in patients and was recorded by Macgill Pain Questionnaire, in the first, third, seventh and tenth days. Results Results showed that itching on third day (p=0.007) and swelling of the ear canal in the examination of the third day (p=0.006) and the seventh day (p=0.001) in the polymyxin NH group was more than those of boric acid group. Overall mean pain based on McGill questionnaire was 11.10Â±1.49 in boric acid group in the examination on the first day and was 4.05Â±0.22 in the examination on the tenth day and in the polymyxin NH group, it was 10.9Â±0.99 on the first day and 4.20Â±0.40 on the tenth day. In both groups, pain relief was the same and there was no significant difference between two groups (p=0.075). Conclusion The findings of this study showed slight differences in the effectiveness of the boric acid drug and combination of polymyxin

255. Evaluating 10B-enriched Boric Acid, Bromide, and Heat as Tracers of Recycled Groundwater Flow near MAR Operations

NASA Astrophysics Data System (ADS)

Becker, T.; Clark, J. F.

2012-12-01

County, CA, USA) has been in progress since September 6, 2011, following injection of boric acid enriched in boron-10 (10B) and bromide (Br-) tracers. Tracer concentrations are collected at 9 monitoring wells that have pre-experiment estimated travel times between 0.5 to 180 days. Results indicate that 10B-enriched boric acid is an effective deliberate tracer at MAR sites; however, the ion's movement is slightly retarded relative to bromide by the substrate. 10B/Br- travel time ratios range from 1 to 1.4. In addition to the two deliberate geochemical tracers, heat is being evaluated as a possible intrinsic tracer at MAR sites. At the time of the experiment (late summer), reclaimed water was significantly warmer (~20Â°F) than the native groundwater as it entered the system. Time series are developed from loggers outfitted at each monitoring well, with measurements recorded hourly accurate to one thousandth of a degree. Results are similar to 10B & Br- travel times and validate the potential of heat as an intrinsic tracer.

256. Boric acid permeation in forward osmosis membrane processes: modeling, experiments, and implications.

PubMed

Jin, Xue; Tang, Chuyang Y; Gu, Yangshuo; She, Qianhong; Qi, Saren

2011-03-15

Forward osmosis (FO) is attracting increasing interest for its potential applications in desalination. In FO, permeation of contaminants from feed solution into draw solution through the semipermeable membrane can take place simultaneously with water diffusion. Understanding the contaminants transport through and rejection by FO membrane has significant technical implications in the way to separate clean water from the diluted draw solution. In this study, a model was developed to predict boron flux in FO operation. A strong agreement between modeling results and experimental data indicates that the model developed in this study can accurately predict the boron transport through FO membranes. Furthermore, the model can guide the fabrication of improved FO membranes with decreased boron permeability and structural parameter to minimize boron flux. Both theoretical model and experimental results demonstrated that when membrane active layer was facing draw solution, boron flux was substantially greater compared to the other membrane orientation due to more severe internal concentration polarization. In this investigation, for the first time, rejection of contaminants was defined in FO processes. This is critical to compare the membrane performance between different membranes and experimental conditions.

257. Comparison of PrestoBlueÂ® and plating method to evaluate antimicrobial activity of ascorbic acid, boric acid and curcumin in an inÂ vitro gastrointestinal model.

     PubMed

     Hernandez-Patlan, D; Solis-Cruz, B; MÃ©ndez-Albores, A; Latorre, J D; Hernandez-Velasco, X; Tellez, G; LÃ³pez-Arellano, R

     2018-02-01

     To compare the conventional plating method vs a fluorometric method using PrestoBlue Â® as a dye by determining the antimicrobial activity of two organic acids and curcumin (CUR) against Salmonella Enteritidis in an avian inÂ vitro digestion model that simulates the crop, proventriculus and intestine. A concentration of 10 8 Â CFU per ml of S. Enteritidis was exposed to groups with different rates of ascorbic acid (AA), boric acid (BA) and CUR. Significant differences were observed when the means of the treatments were compared with the controls in the compartments that simulate the crop and intestine (PÂ <Â 0Â·05). Ascorbic acid alone and high rates of AA in the mixtures were the most efficient treatments in the crop compartment. However, in the intestinal compartment BA alone and at different rates in the mixture BA-CUR (1Â :Â 1) were the best treatments to decrease the concentration of S. Enteritidis. The results of this study suggest that there could be an antagonistic bactericidal effect between AA and CUR and AA and BA as well as a synergistic bactericidal effect between BA and CUR. These findings may contribute to the development of a formulation with microencapsulated compounds to liberate them in different compartments to combat S. Enteritidis infections in broiler chickens. Â© 2017 The Society for Applied Microbiology.

258. OsNIP3;1, a rice boric acid channel, regulates boron distribution and is essential for growth under boron-deficient conditions.

     PubMed

     Hanaoka, Hideki; Uraguchi, Shimpei; Takano, Junpei; Tanaka, Mayuki; Fujiwara, Toru

     2014-06-01

     Boron is an essential micronutrient for higher plants. Boron deficiency is an important agricultural issue because it results in loss of yield quality and/or quantity in cereals and other crops. To understand boron transport mechanisms in cereals, we characterized OsNIP3;1, a member of the major intrinsic protein family in rice (Oryza sativa L.), because OsNIP3;1 is the most similar rice gene to the Arabidopsis thaliana boric acid channel genes AtNIP5;1 and AtNIP6;1. Yeast cells expressing OsNIP3;1 imported more boric acid than control cells. GFP-tagged OsNIP3;1 expressed in tobacco BY2 cells was localized to the plasma membrane. The accumulation of OsNIP3;1 transcript increased fivefold in roots within 6Â h of the onset of boron starvation, but not in shoots. Promoter-GUS analysis suggested that OsNIP3;1 is expressed mainly in exodermal cells and steles in roots, as well as in cells around the vascular bundles in leaf sheaths and pericycle cells around the xylem in leaf blades. The growth of OsNIP3;1 RNAi plants was impaired under boron limitation. These results indicate that OsNIP3;1 functions as a boric acid channel, and is required for acclimation to boron limitation. Boron distribution among shoot tissues was altered in OsNIP3;1 knockdown plants, especially under boron-deficient conditions. This result demonstrates that OsNIP3;1 regulates boron distribution among shoot tissues, and that the correct boron distribution is crucial for plant growth. Â© 2014 The Authors The Plant Journal Â© 2014 John Wiley & Sons Ltd.

259. [In vitro activity of bergamot natural essence and furocoumarin-free and distilled extracts, and their associations with boric acid, against clinical yeast isolates.]

     [PubMed]

     Romano, L; Battaglia, F; Masucci, L; Sanguinetti, M; Posteraro, B; Plotti, G; Zanetti, S; Fadda, G

     2005-01-01

     There is very little information, to date, on the antifungal activity of bergamot oil. In this study, we investigated the in vitro activity of three bergamot oils (natural essence, furocoumarin-free extract and distilled extract) against clinically relevant Candida species. We studied the two derivatives, components of Italian pharmaceutical products, that are supposed to be less toxic than the essential oil. In vitro susceptibility of 40 clinical isolates of Candida spp. (Candida albicans, n=20; Candida glabrata, n=13; Candida krusei, n=4; Candida tropicalis, n=2; Candida parapsilosis, n=1), associated with symptomatic and asymptomatic vulvovaginal candidiasis, was determined using a modification of the NCCLS M27-A2 broth microdilution method. MICs were evaluated for each of the oils alone and combined with sub-inhibitory concentrations of the well-known antiseptic, boric acid. To boric acid, all isolates had MIC values ranging from 0.094% to 0.187% (w/v). At 24 h readings, the MIC(90)s (for all isolates) were (v/v): 5% for natural essence of bergamot, 2.5% for the furocoumarin-free extract, and 1.25% for the distilled extract. At the 48 h reading, these values increased to >10%, 5% and 2.5%, respectively. At both readings, MIC(90)s for all oil+boric acid combinations were significantly lower than corresponding values for the oils alone (P <0.05). These data indicate that bergamot oils are active in vitro against Candida spp., suggesting their potential role for the topical treatment of Candida infections.

260. [Collaborative study of the determination of boric acid in caviar by emission spectroscopy.]

     [PubMed]

     Franco, V; Holak, W

     1975-03-01

     Caviar samples were spiked at the 0.1 and 0.2% levels and digested with nitric acid in a closed Teflon-lined digestion vessel to prevent volatility losses. The boron was complexed with 2-ethyl-1,3-hexanediol and extracted into methylisobulty ketone. The emission of the boron oxide band was measured in a nitrous oxidehydrogen flame. The mean recoveries at the 0.1 and 0.2% levels for 6 collaborators were 95.7 and 97.1%, respectively.

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261. Assay of calcium borogluconate veterinary medicines for calcium gluconate, boric acid, phosphorus, and magnesium by using inductively coupled plasma emission spectrometry

    SciTech Connect

    Lyons, D.J.; Spann, K.P.

    1985-03-01

    An inductively coupled plasma spectrometric method is described for the determination of 4 elements (Ca, B, P, and Mg) in calcium borogluconate veterinary medicines. Samples are diluted, acidified, and sprayed directly into the plasma. Reproducibility relative confidence intervals for a single sample assay are +/- 1.4% (calcium), +/- 1.8% (boron), +/- 2.6% (phosphorus), and +/- 1.4% (magnesium). The total element concentrations for each of 4 elements compared favorably with concentrations determined by alternative methods. Formulation estimates of levels of calcium gluconate, boric acid, phosphorus, and magnesium salts can be made from the analytical data.

262. Protective Effect of Boric Acid on Oxidative DNA Damage In Chinese Hamster Lung Fibroblast V79 Cell Lines

    PubMed Central

    YÄ±lmaz, Sezen; Ustundag, Aylin; Cemiloglu Ulker, Ozge; Duydu, YalcÄ±n

    2016-01-01

    Objective Many studies have been published on the antioxidative effects of boric acid (BA) and sodium borates in in vitro studies. However, the boron (B) concentrations tested in these in vitro studies have not been selected by taking into account the realistic blood B concentrations in humans due to the lack of comprehensive epidemiological studies. The recently published epidemiological studies on B exposure conducted in China and Turkey provided blood B concentrations for both humans in daily life and workers under extreme exposure conditions in occupational setting. The results of these studies have made it possible to test antioxidative effects of BA in in vitro studies within the concentra- tion range relevant to humans. The aim of this study was to investigate the protective ef- fects of BA against oxidative DNA damage in V79 (Chinese hamster lung fibroblast) cells. The concentrations of BA tested for its protective effect was selected by taking the blood B concentrations into account reported in previously published epidemiological studies. Therefore, the concentrations of BA tested in this study represent the exposure levels for humans in both daily life and occupational settings. Materials and Methods In this experimental study, comet assay and neutral red uptake (NRU) assay methods were used to determinacy to toxicity and genotoxicity of BA and hydrogen peroxide (H2O2). Results The results of the NRU assay showed that BA was not cytotoxic within the tested concentrations (3, 10, 30, 100 and 200 ÂµM). These non-cytotoxic concentrations were used for comet assay. BA pre-treatment significantly reduced ($P<0.05$, one-way ANOVA) the DNA damaging capacity of H2O2 at each tested BA concentrations in V79 cells. Conclusion Consequently, pre-incubation of V79 cells with BA has significantly reduced the H2O2-induced oxidative DNA damage in V79 cells. The protective effect of BA against oxidative DNA damage in V79 cells at 5, 10, 50, 100 and 200 Î¼M (54, 108, 540

263. Protective Effect of Boric Acid on Oxidative DNA Damage In Chinese Hamster Lung Fibroblast V79 Cell Lines.

    PubMed

YÄ±lmaz, Sezen; Ustundag, Aylin; Cemiloglu Ulker, Ozge; Duydu, YalcÄ±n

2016-01-01

Many studies have been published on the antioxidative effects of boric acid (BA) and sodium borates in in vitro studies. However, the boron (B) concentrations tested in these in vitro studies have not been selected by taking into account the realistic blood B concentrations in humans due to the lack of comprehensive epidemiological studies. The recently published epidemiological studies on B exposure conducted in China and Turkey provided blood B concentrations for both humans in daily life and workers under extreme exposure conditions in occupational setting. The results of these studies have made it possible to test antioxidative effects of BA in in vitro studies within the concentra- tion range relevant to humans. The aim of this study was to investigate the protective ef- fects of BA against oxidative DNA damage in V79 (Chinese hamster lung fibroblast) cells. The concentrations of BA tested for its protective effect was selected by taking the blood B concentrations into account reported in previously published epidemiological studies. Therefore, the concentrations of BA tested in this study represent the exposure levels for humans in both daily life and occupational settings. In this experimental study, comet assay and neutral red uptake (NRU) assay methods were used to determinacy to toxicity and genotoxicity of BA and hydrogen peroxide (H2O2). The results of the NRU assay showed that BA was not cytotoxic within the tested concentrations (3, 10, 30, 100 and 200 ÂµM). These non-cytotoxic concentrations were used for comet assay. BA pre-treatment significantly reduced ($P<0.05$, one-way ANOVA) the DNA damaging capacity of H2O2 at each tested BA concentrations in V79 cells. Consequently, pre-incubation of V79 cells with BA has significantly reduced the H2O2-induced oxidative DNA damage in V79 cells. The protective effect of BA against oxidative DNA damage in V79 cells at 5, 10, 50, 100 and 200 Î¼M (54, 108, 540, 1080, and 2161 ng/ml B equivalents) concentrations

264. [Effect of boric acid on the properties of Li{sub 2}MnO{sub 3}Â·LiNi{sub 0.5}Mn{sub 0.5}O{sub 2} composite cathode powders prepared by large-scale spray pyrolysis with droplet classifier]

[SciTech Connect]

Hong, Young Jun; Choi, Seung Ho; Sim, Chul Min

2012-12-15

Graphical abstract: Display Omitted Highlights: â–º Spherical shape Li{sub 2}MnO{sub 3}Â·LiNi{sub 0.5}Mn{sub 0.5}O{sub 2} composite cathode powders are prepared by large-scale spray pyrolysis with droplet classifier. â–º Boric acid improves the morphological and electrochemical properties of the composite cathode powders. â–º The discharge capacity of the composite cathode powders decreases from 217 to 196 mAh g{sup âˆ'1} by the 30th cycle. -- Abstract: Spherically shaped 0.3Li{sub 2}MnO{sub 3}Â·0.7LiNi{sub 0.5}Mn{sub 0.5}O{sub 2} composite cathode powders with filled morphology and narrow size distribution are prepared by large-scale spray pyrolysis. A droplet classification reduces the standard deviation of the size distribution of themoreÂ Â» composite cathode powders. Addition of boric acid improves the morphological properties of the product powders by forming a lithium borate glass material with low melting temperature. The optimum amount of boric acid dissolved in the spray solution is 0.8 wt% of the composite powders. The powders prepared from the spray solution with 0.8 wt% boric acid have a mixed layered crystal structure comprising Li{sub 2}MnO{sub 3} and LiNi{sub 0.5}Mn{sub 0.5}O{sub 2} phases, thus forming a composite compound. The initial charge and discharge capacities of the composite cathode powders prepared from the 0.8 wt% boric acid spray solution are 297 and 217 mAh g{sup âˆ'1}, respectively. The discharge capacity of the powders decreases from 217 to 196 mAh g{sup âˆ'1} by the 30th cycle, in which the capacity retention is 90%.Â«Â less

265. [In situ synthesis of di-n-butyl l-tartrate-boric acid complex chiral selector and its application in chiral microemulsion electrokinetic chromatography.]

[PubMed]

Hu, Shaoqiang; Chen, Yonglei; Zhu, Huadong; Zhu, Jinhua; Yan, Na; Chen, Xingguo

2009-11-06

A novel procedure for in situ assembling a complex chiral selector, di-n-butyl l-tartrate-boric acid complex, by the reaction of di-n-butyl l-tartrate with boric acid in a running buffer was reported and its application in the enantioseparation of beta-blockers and structural related compounds by chiral microemulsion electrokinetic chromatography (MEEKC) has been demonstrated. In order to achieve a good enantioseparation, the effect of dibutyl l-tartrate and sodium tetraborate concentration, surfactant identity and concentration, cosurfactant, buffer pH and composition, organic modifiers, as well as applied voltage and capillary length were investigated. Ten pairs of enantiomers that could not be separated with only dibutyl l-tartrate, obtained good chiral separation using the complex chiral selector; among them, seven pairs could be baseline resolved under optimized experimental conditions. The fixation of chiral centers by the formation of five-membered rings, and being oppositely charged with basic analytes were thought to be the key factors giving the complex chiral selector a superior chiral recognition capability. The effect of the molecular structure of analytes on enantioseparation was discussed in terms of molecular interaction.

266. Resource recycling through artificial lightweight aggregates from sewage sludge and derived ash using boric acid flux to lower co-melting temperature.

PubMed

Hu, Shao-Hua; Hu, Shen-Chih; Fu, Yen-Pei

2012-02-01

This study focuses on artificial lightweight aggregates (ALWAs) formed from sewage sludge and ash at lowered co-melting temperatures using boric acid as the fluxing agent. The weight percentages of boric acid in the conditioned mixtures of sludge and ash were 13% and 22%, respectively. The ALWA derived from sewage sludge was synthesized under the following conditions: preheating at 400 degrees C 0.5 hr and a sintering temperature of 850 degrees C 1 hr. The analytical results of water adsorption, bulk density, apparent porosity, and compressive strength were 3.88%, 1.05 g/cm3, 3.93%, and 29.7 MPa, respectively. Scanning electron microscope (SEM) images of the ALWA show that the trends in water adsorption and apparent porosity were opposite to those of bulk density. This was due to the inner pores being sealed off by lower-melting-point material at the aggregates'surface. In the case of ash-derived aggregates, water adsorption, bulk density, apparent porosity, and compressive strength were 0.82%, 0.91 g/cm3, 0.82%, and 28.0 MPa, respectively. Both the sludge- and ash-derived aggregates meet the legal standards for ignition loss and soundness in Taiwan for construction or heat insulation materials.

267. Preparative enantioseparation of propafenone by counter-current chromatography using di-n-butyl L-tartrate combined with boric acid as the chiral selector.

PubMed

Tong, Shengqiang; Shen, Mangmang; Zheng, Ye; Chu, Chu; Li, Xing-Nuo; Yan, Jizhong

2013-09-01

This paper extends the research of the utilization of borate coordination complexes in chiral separation by counter-current chromatography (CCC). Racemic propafenone was successfully enantioseparated by CCC with di-n-butyl l-tartrate combined with boric acid as the chiral selector. The two-phase solvent system was composed of chloroform/ 0.05 mol/L acetate buffer pH 3.4 containing 0.10 mol/L boric acid (1:1, v/v), in which 0.10 mol/L di-n-butyl l-tartrate was added in the organic phase. The influence of factors in the enantioseparation of propafenone were investigated and optimized. A total of 92 mg of racemic propafenone was completely enantioseparated using high-speed CCC in a single run, yielding 40-42 mg of (R)- and (S)-propafenone enantiomers with an HPLC purity over 90-95%. The recovery for propafenone enantiomers from fractions of CCC was in the range of 85-90%. Â© 2013 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

268. Boric acid induces cytoplasmic stress granule formation, eIF2Î± phosphorylation, and ATF4 in prostate DU-145 cells.

PubMed

Henderson, Kimberly A; Kobylewski, Sarah E; Yamada, Kristin E; Eckhert, Curtis D

2015-02-01

Dietary boron intake is associated with reduced prostate and lung cancer risk and increased bone mass. Boron is absorbed and circulated as boric acid (BA) and at physiological concentrations is a reversible competitive inhibitor of cyclic ADP ribose, the endogenous agonist of the ryanodine receptor calcium (Ca(+2)) channel, and lowers endoplasmic reticulum (ER) [Ca(2+)]. Low ER [Ca(2+)] has been reported to induce ER stress and activate the eIF2Î±/ATF4 pathway. Here we report that treatment of DU-145 prostate cells with physiological levels of BA induces ER stress with the formation of stress granules and mild activation of eIF2Î±, GRP78/BiP, and ATF4. Mild activation of eIF2Î± and its downstream transcription factor, ATF4, enables cells to reconfigure gene expression to manage stress conditions and mild activation of ATF4 is also required for the differentiation of osteoblast cells. Our results using physiological levels of boric acid identify the eIF2Î±/ATF pathway as a plausible mode of action that underpins the reported health effects of dietary boron.

269. BN Bonded BN fiber article from boric oxide fiber

DOEpatents

Hamilton, Robert S.

1978-12-19

A boron nitride bonded boron nitride fiber article and the method for its manufacture which comprises forming a shaped article with a composition comprising boron oxide fibers and boric acid, heating the composition in an anhydrous gas to a temperature above the melting point of the boric acid and nitriding the resulting article in ammonia gas.

270. Boric acid and salinity effects on maize roots. Response of aquaporins ZmPIP1 and ZmPIP2, and plasma membrane H+-ATPase, in relation to water and nutrient uptake.

PubMed

Martinez-Ballesta, Maria del Carmen; BastÃas, Elizabeth; Zhu, Chuanfeng; SchÃ¤ffner, Anton R; GonzÃ¡lez-Moro, BegoÃ±a; GonzÃ¡lez-Murua, Carmen; Carvajal, Micaela

2008-04-01

Under saline conditions, an optimal cell water balance, possibly mediated by aquaporins, is important to maintain the whole-plant water status. Furthermore, excessive accumulation of boric acid in the soil solution can be observed in saline soils. In this work, the interaction between salinity and excess boron with respect to the root hydraulic conductance (L(0)), abundance of aquaporins (ZmPIP1 and ZmPIP2), ATPase activity and root sap nutrient content, in the highly boron- and salt-tolerant Zea mays L. cv. amylacea, was evaluated. A downregulation of root ZmPIP1 and ZmPIP2 aquaporin contents were observed in NaCl-treated plants in agreement with the L(0) measurements. However, in the H3BO3-

treated plants differences in the ZmPIP1 and ZmPIP2 abundance were observed. The ATPase activity was related directly to the amount of ATPase protein and Na+ concentration in the roots, for which an increase in NaCl- and H3BO3+ NaCl-treated plants was observed with respect to untreated and H3BO3-treated plants. Although nutrient imbalance may result from the effect of salinity or H3BO3 alone, an ameliorative effect was observed when both treatments were applied together. In conclusion, our results suggest that under salt stress, the activity of specific membrane components can be influenced directly by boric acid, regulating the functions of certain aquaporin isoforms and ATPase as possible components of the salinity tolerance mechanism.

271. Effect of single flame retardant aluminum tri-hydroxide and boric acid against inflammability and biodegradability of recycled PP/KF composites

NASA Astrophysics Data System (ADS)

Suharty, Neng Sri; Dihardjo, Kuncoro; Handayani, Desi Suci; Firdaus, Maulidan

2016-03-01

Composites rPP/DVB/AA/KF had been reactively synthesized in melt using starting material: recycled polypropylene (rPP), kenaf fiber (KF), multifunctional compound acrylic acid (AA), compatibilizer divinyl benzene (DVB). To improve the inflammability of composites, single flame retardant aluminum tri-hydroxide (ATH) and boric acid (BA) as an additive was added. The inflammability of the composites was tested according to ASTM D635. By using 20% ATH and 5% BA additive in the composites it is effectively inhibiting its time to ignition (TTI). Its burning rate (BR) can be reduced and its heat realease (%HR) decreases. The biodegradability of composites was quantified by its losing weight (LW) of composites after buried for 4 months in the media with rich cellulolytic bacteria. The result shows that the LW of composites in the presence 20% ATH and 5% BA is 6.3%.

272. The toxic effect of gallic acid on biochemical factors, viability and proliferation of rat bone marrow mesenchymal stem cells was compensated by boric acid.

PubMed

Abnosi, Mohammad Hussein; Yari, Somayeh

2018-07-01

Gallic acid (GA) and boron are found in many plants. Our previous studies showed 6â€¯ng/ml boric acid (BA) had positive effect on biochemistry of rat bone marrow mesenchymal stem cells (MSCs) and their osteogenic differentiation. Therefore, we investigate the effect of different doses of GA alone and in the presence of BA on MSCs. the viability of MSCs was assayed using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) and trypan blue at 12, 24 and 36â€¯h in presence of different concentration of GA. Then 30 and 120â€¯Î¼M of GA as well as 6â€¯ng/ml of BA in 36â€¯h were selected for further study. The proliferation, Morphology, sodium and potassium level, concentration of calcium, activity of alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP) and lactate dehydrogenase (LDH) as well as malondialdehyde (MDA) concentration, total antioxidant capacity (FRAP) and activity of superoxide dismutase (SOD) and catalase (CAT) were estimated. Results showed GA alone reduced viability, proliferation, nuclear diameter and cytoplasm area. In addition, GA showed anaerobic metabolic shift but no change in MDA and scavenging enzymes. Both concentration of GA caused elevation of FRAP, whereas only at 120â€¯Î¼M increased the sodium-potassium and reduced calcium. The co-treatment of GA and BA improves the viability, proliferation and morphology of the cells. In addition, co-treatment compensated the metabolic shift caused by GA and could balance the potassium level and FRAP as it was raised by GA. Although GA content of tea is harmful to the cells but simultaneous consumption of fruits and vegetables as a rich source of boron might compensate the damaging effect of GA.

273. Impact of boron rich layer on performance degradation in boric acid diffused emitters for n-type crystalline Si solar cells

     NASA Astrophysics Data System (ADS)

     Singha, Bandana; Singh Solanki, Chetan

     2018-01-01

     Boron rich layer (BRL) formed beneath the borosilicate glass layer during p-type emitter formation is an undesirable phenomenon. It influences different cell parameters and can degrade the device performance. In this work, the device degradation study is done for different BRL thicknesses produced with different concentrations of the boric acid dopant source. The bulk carrier lifetime reduces to more than 75% and emitter saturation current density becomes more than 10-12 mA cm-2 for 60 nm of BRL thickness. The observed J sc and V oc values become zero for BRL thicknesses higher than 40 nm as seen in this work and the device properties could not be enhanced. So, higher thicknesses of BRL should be avoided.

274. Autoradiographic and histopathological studies of boric acid-mediated BNCT in hepatic VX2 tumor-bearing rabbits: Specific boron retention and damage in tumor and tumor vessels.

     PubMed

     Yang, C H; Lin, Y T; Hung, Y H; Liao, J W; Peir, J J; Liu, H M; Lin, Y L; Liu, Y M; Chen, Y W; Chuang, K S; Chou, F I

     2015-12-01

     Hepatoma is a malignant tumor that responds poorly to conventional therapies. Boron neutron capture therapy (BNCT) may provide a better way for hepatoma therapy. In this research, (10)B-enriched boric acid (BA, 99% (10)B) was used as the boron drug. A multifocal hepatic VX2 tumor-bearing rabbit model was used to study the mechanisms of BA-mediated BNCT. Autoradiography demonstrated that BA was selectively targeted to tumors and tumor vessels. Histopathological examination revealed the radiation damage to tumor-bearing liver was concentrated in the tumor regions during BNCT treatment. The selective killing of tumor cells and the destruction of the blood vessels in tumor masses may be responsible for the success of BA-mediated BNCT for liver tumors. Copyright Â© 2015 Elsevier Ltd. All rights reserved.

275. The Efficacy of Boric Acid Used to Treat Experimental Osteomyelitis Caused by Methicillin-Resistant Staphylococcus aureus: an In Vivo Study.

     PubMed

     GÃ¼zel, Yunus; Golge, Umut H; Goksel, Ferdi; Vural, Ahmet; Akcay, Muruvvet; Elmas, Sait; Turkon, Hakan; Unver, Ahmet

     2016-10-01

     We explored the ability of local and systemic applications of boric acid (BA) to reduce the numbers of methicillin-resistant Staphylococcus aureus (MRSA) in a rat model of tibial osteomyelitis (OM), and compared boric acid with vancomycin (V). Implant-associated osteomyelitis was established in 35 rats. After 4Â weeks, at which time OM was evident both radiologically and serologically in all animals, the rats were divided into five groups of equal number: group 1, control group (no local application of BA or other medication); group 2, V group; group 3, local BAâ€‰+â€‰V group; group 4, local BA group; and group 5, localâ€‰+â€‰systemic BA group. Serum total antioxidant status, and the levels of tumor necrosis factor (TNF)-Î± and interleukin (IL)-6, were measured. Pathological changes attributable to bone OM were evaluated using a grading system. Bacterial colony-forming units (CFUs) per gram of bone were counted. The lowest bacterial numbers were evident in group 3, and the bacterial numbers were significantly lower than that of the control group in all four test groups (pâ€‰<â€‰0.001). Group 3 also had the least severe bone infection (OM score 1.7â€‰Â±â€‰1.1, pâ€‰<â€‰0.05). Upon histological and microbiological evaluation, no significant difference was evident between groups 2 and 3. Total antioxidant levels were significantly different in all treatment groups compared to the control group. Microbiological and histopathological evaluation showed that systemic or local application of BA was effective to treat OM, although supplementary V increased the effectiveness of BA.

276. Experimental Investigations to Enhance the Tribological Performance of Engine Oil by Using Nano-Boric Acid and Functionalized Multiwalled Carbon Nanotubes: A Comparative Study to Assess Wear in Bronze Alloy

NASA Astrophysics Data System (ADS)

Ajay Vardhaman, B. S.; Amarnath, M.; Ramkumar, J.; Rai, Prabhat K.

2018-04-01

In various mechanical systems, lubricants are generally used to reduce friction and wear; thus, the total energy loss in the mechanical systems can be minimized by the proper enhancement of lubrication properties. In general, friction modifiers and antiwear additives are used to improve the tribological properties of the lubricant. However, the use of these additives has to be phased out due to their fast chemical degradation in their applications and other environmental issues. In recent years, the use of nanoparticles as a potential lubricant additive has received considerable attention because of its excellent mechanical and tribological characteristics. The present work describes the tribological behavior of nano-boric acid, multiwalled carbon nanotubes (MWCNTs), and functionalized multiwalled carbon nanotubes (FMWCNTs) modified with carboxylic acid. These nanoparticles were used to enhance the tribological properties of engine oil (SAE20W40) used to lubricate bronze alloy samples. The performance of these nano-coolants was assessed on a linear reciprocating ball-on-flat tribometer. Results highlight the friction and wear behavior of the nano-boric acid, MWCNTs, and FMWCNTs under three varying parameters such as the effect of nanoparticles concentration, load-carrying capacity, and sliding speed. The addition of nano-boric acid, MWCNTs, and FMWCNTs has significantly improved the tribological properties of the base lubricant. The addition of 0.5 wt.% of nano-boric acid, MWCNTs, and FMWCNTs to the base lubricant has decreased the coefficient of friction by 19.76, 30.55, and 35.65%, respectively, and a significant reduction in wear volume by 55.17, 71.42, and 88.97% was obtained in comparison with base lubricant.

277. An ion-pair principle for enantioseparations of basic analytes by nonaqueous capillary electrophoresis using the di-n-butyl L-tartrate-boric acid complex as chiral selector.

PubMed

Wang, Li-Juan; Liu, Xiu-Feng; Lu, Qie-Nan; Yang, Geng-Liang; Chen, Xing-Guo

2013-04-05

A chiral recognition mechanism of ion-pair principle has been proposed in this study. It rationalized the enantioseparations of some basic analytes using the complex of di-n-butyl l-tartrate and boric acid as the chiral selector in methanolic background electrolytes (BGEs) by nonaqueous capillary electrophoresis (NACE). An approach of mass spectrometer (MS) directly confirmed that triethylamine promoted the formation of negatively charged di-n-butyl l-tartrate-boric acid complex chiral counter ion with a complex ratio of 2:1. And the negatively charged counter ion was the real chiral selector in the ion-pair principle enantioseparations. It was assumed that triethylamine should play its role by adjusting the apparent acidity (pH*) of the running buffer to a higher value. Consequently, the effects of various basic electrolytes including inorganic and organic ones on the enantioseparations in NACE were investigated. The results showed that most of the basic electrolytes tested were favorable for the enantioseparations of basic analytes using di-n-butyl l-tartrate-boric acid complex as the chiral ion-pair selector. Copyright Â© 2013 Elsevier B.V. All rights reserved.

278. Boric acid flux synthesis, structure and magnetic property of MBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ (M=Mn, Fe, Zn)

SciTech Connect

Yang, Dingfeng; Cong, Rihong; Gao, Wenliang, E-mail: gaowl@cqu.edu.cn

2013-05-01

Three new borates MBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ (M=Mn, Fe, Zn) have been synthesized by boric acid flux methods, which are isotypic to NiBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€. Single-crystal XRD was performed to determine the crystal structures in detail. They all crystallize in the monoclinic space group P2â‚□/c. The size of MO{sub 6} (M=Mg, Mn, Fe, Co, Ni, Zn) octahedron shows a good agreement with the Shannon effective ionic radii of MÂ²â□º. Magnetic measurements indicate MnBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ is antiferromagnetic without a long-range ordering down to 2 K. The values of its magnetic superexchange constants were evaluated by DFT calculations, which explain the observed magnetic behavior. The UVâ€“vis diffuse reflectancemoreÂ Â» spectrum of ZnBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ suggests a band gap ~4.6 eV. DFT calculations indicate it has a direct band gap 4.9 eV. The optical band gap is contributed by charge transfers from the occupied O 2p to the unoccupied Zn 4s states. - Graphical abstract: Experimental and theoretical studies indicate MnBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ is antiferromagnetic without a long-range ordering. DFT calculations show ZnBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ has a direct band gap of 4.9 eV. Highlights: â€¢ MBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ (M=Mn, Fe, Zn) are synthesized by two-step boric acid flux method. â€¢ Single-crystal XRD was performed to determine the crystal structures in detail. â€¢ Size of MOâ‚† (M=Mg, Mn, Fe, Co, Ni, Zn) agrees with the effective ionic radii. â€¢ MnBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ is antiferromagnetic without a long-range ordering down to 2 K. â€¢ DFT calculations indicate ZnBâ‚□â‚‚Oâ‚□â‚„(OH)â‚□â‚€ has a direct band gap 4.9 eV.Â«Â less

279. Quantitative extraction and concentration of synthetic water-soluble acid dyes from aqueous media using a quinine-chloroform solution

SciTech Connect

Kobayashi, F.; Ozawa, N.; Hanai, J.

Twenty-one water-soluble acid dyes, including eleven azo, five triphenylmethane four xanthene, one naphthol derivatives, used at practical concentrations for food coloration, were quantitatively extracted from water and various carbonated beverages into a 0.1 M quinine-chloroform solution in the presence of 0.5 M boric acid by brief shaking. Quantitative extraction of these dyes was also accomplished by the 0.1 M quinine-chloroform solution made conveniently from chloroform, quinine hydrochloride, and sodium hydroxide added successively to water or beverages containing boric acid. Quinine acted as a countercation on the dyes having sulfonic and/or carboxylic acid group(s) to form chloroform-soluble ion-pair complexes. The diacidicmoreÂ Â» base alkaloid interacted with each acid group of mono-, di-, tri-, and tetrasulfonic acid dyes approximately in the ratio 0.8-0.9 to 1. The dyes in the chloroform solution were quantitatively concentrated into a small volume of sodium hydroxide solution also by brief shaking. The convenient quinine-chloroform method was applicable to the quantitative extraction of a mixture of 12 dyes from carbonated beverages, which are all currently used for food coloration. A high-pressure liquid chromatographic method is also presented for the systematic separation and determination of these 12 dyes following their concentration into the aqueous alkaline solution. The chromatogram was monitored by double-wavelength absorptiometry in the visible and ultraviolet ray regions.Â«Â less

280. Efficient boron abstraction using honeycomb-like porous magnetic hybrids: Assessment of techno-economic recovery of boric acid.

     PubMed

     Oladipo, Akeem Adeyemi; Gazi, Mustafa

     2016-12-01

     Porous magnetic hybrids were synthesized and functionalized with glycidol to produce boron-selective adsorbent. The magnetic hybrid (MH) comparatively out-performed the existing expensive adsorbents. MH had a saturation magnetisation of 63.48 emu/g and average pore diameter ranging from meso to macropores. The magnetic hybrids showed excellent selectivity towards boron and resulted in 79-93% boron removal even in the presence of competing metal ions (Na + and Cr 2+). Experiments were performed in a column system, and breakthrough time was observed to increase with bed depths and decreased with flow rates. The batch experiments revealed that 60Â min was enough to achieve equilibrium, and the level of boron sorption was 108.5Â mg/g from a synthetic solution. Several adsorption-desorption cycles were performed using a simple acid-water treatment and evaluated using various kinetic models. The spent adsorbents could be separated easily from the mixture by an external magnetic field. The cost-benefit analysis was performed for the treatment of 72Â m 3 /year boron effluent, including five years straight line depreciation charges of equipment. The net profit and standard percentage confirmed that the recovery process is economically feasible. Copyright Â© 2016 Elsevier Ltd. All rights reserved.

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281. Polar Localization of the NIP5;1 Boric Acid Channel Is Maintained by Endocytosis and Facilitates Boron Transport in Arabidopsis Roots

     PubMed Central

     Yoshinari, Akira; Shimada, Tomoo; Mitani-Ueno, Namiki

     2017-01-01

     Boron uptake in Arabidopsis thaliana is mediated by nodulin 26-like intrinsic protein 5;1 (NIP5;1), a boric acid channel that is located preferentially on the soil side of the plasma membrane in root cells. However, the mechanism underlying this polar localization is poorly understood. Here, we show that the polar localization of NIP5;1 in epidermal and endodermal root cells is mediated by the phosphorylation of Thr residues in the conserved TPG (ThrProGly) repeat in the N-terminal region of NIP5;1. Although substitutions of Ala for three Thr residues in the TPG repeat did not affect lateral diffusion in the plasma membrane, these substitutions inhibited endocytosis and strongly compromised the polar localization of GFP-NIP5;1. Consistent with this, the polar localization was compromised in Âμ subunit mutants of the clathrin adaptor AP2. The Thr-to-Ala substitutions did not affect the boron transport activity of GFP-NIP5;1 in Xenopus laevis oocytes but did inhibit the ability to complement boron translocation to shoots and rescue growth defects in nip5;1-1 mutant plants under boron-limited conditions. These results demonstrate that the polar localization of NIP5;1 is maintained by clathrin-mediated endocytosis, is dependent on phosphorylation in the TPG repeat, and is necessary for the efficient transport of boron in roots. PMID:28341806

282. Polar Localization of the NIP5;1 Boric Acid Channel Is Maintained by Endocytosis and Facilitates Boron Transport in Arabidopsis Roots.

PubMed

Wang, Sheliang; Yoshinari, Akira; Shimada, Tomoo; Hara-Nishimura, Ikuko; Mitani-Ueno, Namiki; Feng Ma, Jian; Naito, Satoshi; Takano, Junpei

2017-04-01

Boron uptake in Arabidopsis thaliana is mediated by nodulin 26-like intrinsic protein 5;1 (NIP5;1), a boric acid channel that is located preferentially on the soil side of the plasma membrane in root cells. However, the mechanism underlying this polar localization is poorly understood. Here, we show that the polar localization of NIP5;1 in epidermal and endodermal root cells is mediated by the phosphorylation of Thr residues in the conserved TPG (ThrProGly) repeat in the N-terminal region of NIP5;1. Although substitutions of Ala for three Thr residues in the TPG repeat did not affect lateral diffusion in the plasma membrane, these substitutions inhibited endocytosis and strongly compromised the polar localization of GFP-NIP5;1. Consistent with this, the polar localization was compromised in Âμ subunit mutants of the clathrin adaptor AP2. The Thr-to-Ala substitutions did not affect the boron transport activity of GFP-NIP5;1 in Xenopus laevis oocytes but did inhibit the ability to complement boron translocation to shoots and rescue growth defects in nip5;1-1 mutant plants under boron-limited conditions. These results demonstrate that the polar localization of NIP5;1 is maintained by clathrin-mediated endocytosis, is dependent on phosphorylation in the TPG repeat, and is necessary for the efficient transport of boron in roots. Â© 2017 American Society of Plant Biologists. All rights reserved.

283. Design and optimization of production parameters for boric acid crystals with the crystallization process in an MSMPR crystallizer using FBRMÂ® and PVMÂ® technologies

NASA Astrophysics Data System (ADS)

Kutluay, Sinan; Åžahin, Ã–mer; Ceyhan, A. Abdullah; Ä°zgi, M. Sait

2017-06-01

In crystallization studies, newly developed technologies, such as Focused Beam Reflectance Measurement (FBRM) and Particle Vision and Measurement (PVM) are applied for determining on-line monitoring of a representation of the Chord Length Distribution (CLD) and observe the photographs of crystals respectively; moreover recently they are widely used. Properly installed, the FBRM ensures on-line determination of the CLD, which is statistically associated to the Crystal Size Distribution (CSD). In industrial crystallization, CSD and mean crystal size as well as external habit and internal structure are important characteristics for further use of the crystals. In this paper, the effect of residence time, stirring speed, feeding rate, supersaturation level and the polyelectrolytes such as anionic polyacrylamide (APAM) and non-ionic polyacrylamide (NPAM) on the CLD as well as the shape of boric acid crystals were investigated by using the FBRM G600 and the PVM V819 probes respectively in an MSMPR (Mixed Suspension Mixed Product Removal) crystallizer. The CSD and kinetic data were determined experimentally using continuous MSMPR crystallizer running at steady state. The population density of nuclei, the nucleation rate and the growth rate were determined from the experimental population balance distribution when the steady state was reached.

284. Small amount of water induced preparation of several morphologies for InBO3:Eu3+ phosphor via a facile boric acid flux method and their luminescent properties

     NASA Astrophysics Data System (ADS)

     Ding, Wen; Liang, Pan; Liu, Zhi-Hong

     2017-05-01

     Four kinds of morphologies for InBO3:Eu3+ phosphor have been prepared via a facile boric acid flux method only by adjusting the small amount of added water. The prepared samples have been characterized by XRD, FT-IR, and SEM. It was found that the size and morphology of the samples could be effectively controlled by adjusting reaction temperature, reaction time, especially the small amount of added water, which plays an extremely critical role in the controlling morphology. The possible growth mechanisms for microsphere and flower-like morphologies were further discussed on the basis of time-dependent experiments. Furthermore, the luminescence properties of prepared InBO3:Eu3+ samples have been investigated by photoluminescence (PL) spectra. The results show that the InBO3:Eu3+ phosphors show strong orange emissions under ultraviolet excitation at 237 nm. The monodisperse microsphere sample possesses the highest PL intensity among above four morphologies, which can be used as a potential orange luminescent material.

285. Laser ablation molecular isotopic spectroscopy (LAMIS) towards the determination of multivariate LODs via PLS calibration model of 10B and 11B Boric acid mixtures

     NASA Astrophysics Data System (ADS)

     Harris, C. D.; Profeta, Luisa T. M.; Akpovo, Codjo A.; Johnson, Lewis; Stowe, Ashley C.

     2017-05-01

     A calibration model was created to illustrate the detection capabilities of laser ablation molecular isotopic spectroscopy (LAMIS) discrimination in isotopic analysis. The sample set contained boric acid pellets that varied in isotopic concentrations of 10B and 11B. Each sample set was interrogated with a Q-switched Nd:YAG ablation laser operating at 532 nm. A minimum of four band heads of the Î² system B2âˆ‘ -> Î§2âˆ‘transitions were identified and verified with previous literature on BO molecular emission lines. Isotopic shifts were observed in the spectra for each transition and used as the predictors in the calibration model. The spectra along with their respective 10/11B isotopic ratios were analyzed using Partial Least Squares Regression (PLSR). An IUPAC novel approach for determining a multivariate Limit of Detection (LOD) interval was used to predict the detection of the desired isotopic ratios. The predicted multivariate LOD is dependent on the variation of the instrumental signal and other composites in the calibration model space.

286. Avidin self-associates with boric acid gel suspensions: an affinity boron carrier that might be developed for boron neutron-capture therapy.

     PubMed

     Bench, Bennie J; Johnson, Rebecca; Hamilton, Craig; Gooch, Joey; Wright, John R

     2004-02-15

     It has been shown in preliminary studies that the antibacterial protein avidin self-associates with the boric acid gel polymer, and avidin-coated gel particles in the micrometer and submicrometer size ranges are of interest for boron neutron-capture therapy (BNCT), which is neutron-induced fission of boron-10 to produce intense alpha radiation for tumor destruction. The gel particles carry large amounts of boron-10 and are theoretically able effect a meaningful tissue dosing through BNCT. A gross precipitation of gel particles occurs within 46 min of mixing when the avidin/colloid ratio is about 0.34 g avidin/g colloid. This is a minimum time if gel and avidin concentrations are in the low microgram/milliliter range, but at higher proportions of avidin the time delay to precipitation increases significantly; i.e., the colloid surface becomes blocked, inhibiting lattice formation. The avidin-coated gel particles eventually cross-link, forming a solid matrix and precipitating on a timescale measured on the order of an hour. At shorter exposure times rapid agglutination-like reactions were observed with biotinylated bovine albumin, suggesting that two-stage pretargeting of specific tissues should be possible with biotinylated antitumor antibodies. However, for BNCT to be practical, avidin's interaction with the gel needs to be strengthened, and all aryl-B(OH)(2) groups on the particle surfaces must be blocked, or else the particles will interact strongly and nonspecifically with each other and with the carbohydrate groups present on most cell surfaces. Glyceric acid delays the precipitation of the particle suspensions while most simple and complex carbohydrates accelerate it.

287. Spectroscopic quantification of 5-hydroxymethylcytosine in genomic DNA using boric acid-functionalized nano-microsphere fluorescent probes.

PubMed

Chen, Hua-Yan; Wei, Jing-Ru; Pan, Jiong-Xiu; Zhang, Wei; Dang, Fu-Quan; Zhang, Zhi-Qi; Zhang, Jing

2017-05-15

5-hydroxymethylcytosine (5hmC) is the sixth base of DNA. It is involved in active DNA demethylation and can be a marker of diseases such as cancer. In this study, we developed a simple and sensitive 2-(4-boronophenyl)quinoline-4-carboxylic acid modified poly (glycidyl methacrylate (PBAQA-PGMA) fluorescent probe to detect the 5hmC content of genomic DNA based on T4 Î²-glucosyltransferase-catalyzed glucosylation of 5hmC. The fluorescence-enhanced intensity recorded from the DNA sample was proportional to its 5-hydroxymethylcytosine content and could be quantified by fluorescence spectrophotometry. The developed probe showed good detection sensitivity and selectivity and a good linear relationship between the fluorescence intensity and the concentration of 5 hmC within a 0-100nM range. Compared with other fluorescence detection methods, this method not only could determine trace amounts of 5 hmC from genomic DNA but also could eliminate the interference of fluorescent dyes and the need for purification. It also could avoid multiple labeling. Because the PBAQA-PGMA probe could enrich the content of glycosyl-5-hydroxymethyl-2-deoxycytidine from a complex ground substance, it will broaden the linear detection range and improve sensitivity. The limit of detection was calculated to be 0.167nM after enrichment. Furthermore, the method was successfully used to detect 5-hydroxymethylcytosine from mouse tissues. Copyright Â© 2016 Elsevier B.V. All rights reserved.

288. 40 CFR 721.1730 - Poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric acid (H3BO3).

Code of Federal Regulations, 2010 CFR

2010-07-01

... 40 Protection of Environment 30 2010-07-01 2010-07-01 false Poly(oxy-1,2-ethanediyl), ÃŽÂ±-butyl-Ã□... Significant New Uses for Specific Chemical Substances Â§ 721.1730 Poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy...) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric...

289. 40 CFR 721.1730 - Poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric acid (H3BO3).

Code of Federal Regulations, 2011 CFR

2011-07-01

... 40 Protection of Environment 31 2011-07-01 2011-07-01 false Poly(oxy-1,2-ethanediyl), ÃŽÂ±-butyl-Ã□... Significant New Uses for Specific Chemical Substances Â§ 721.1730 Poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy...) The chemical substance identified as poly(oxy-1,2-ethanediyl), Î±-butyl-Ï‰-hydroxy, ester with boric...

290. Nitric acid recovery from waste solutions

DOEpatents

Wilson, A. S.

1959-04-14

The recovery of nitric acid from aqueous nitrate solutions containing fission products as impurities is described. It is desirable to subject such solutions to concentration by evaporation since nitric acid is regenerated thereby. A difficulty, however, is that the highly radioactive fission product ruthenium is volatilized together with the nitric acid. It has been found that by adding nitrous acid, ruthenium volatilization is suppressed and reduced to a negligible degree so that the distillate obtained is practically free of ruthenium.

291. ELECTROLYTIC REDUCTION OF NITRIC ACID SOLUTIONS

DOEpatents

Alter, H.W.; Barney, D.L.

1958-09-30

A process is presented for the treatment of radioactivc waste nitric acid solutions. The nitric acid solution is neutralized with an alkali metal hydroxide in an amount sufficient to precipitate insoluble hydroxides, and after separation of the precipitate the solution is electrolyzed to convert the alkali nitrate formed, to alkali hydroxide, gaseous ammonla and oxygen. The solution is then reusable after reducing the volume by evaporating the water and dissolved ammonia.

292. Superlubricity of a Mixed Aqueous Solution

NASA Astrophysics Data System (ADS)

Ma, Zhi-Zuo; Zhang, Chen-Hui; Luo, Jian-Bin; Lu, Xin-Chun; Wen, Shi-Zhu

2011-05-01

A super-low friction coefficient of 0.0028 is measured under a pressure of 300 MPa when the friction pair (the silicon nitride ball sliding on the silicate glass) is lubricated by the mixed aqueous solution of glycerol and boric acid. The morphorlogies of the hydroxylated glass plate are observed by an atomic force microscope (AFM) in deionized water, glycerol, boric acid and their mixed aqueous solution. Bonding peaks of the retained liquids adhered on the surface of the sliding track are detected by an infrared spectrum apparatus and a Raman spectrum apparatus. The mechanism of the superlubricity of the glycerol and boric acid mixed aqueous solution is discussed. It is deduced that the formation of the lubricant film has enough strength to support higher loads, the hydration effect offering the super lower shear resistance. Key words: superlubricity, water based lubricant, ultra-low friction

293. Reference electrode for strong oxidizing acid solutions

DOEpatents

Rigdon, Lester P.; Harrar, Jackson E.; Bullock, Sr., Jack C.; McGuire, Raymond R.

1990-01-01

A reference electrode for the measurement of the oxidation-reduction potentials of solutions is especially suitable for oxidizing solutions such as highly concentrated and fuming nitric acids, the solutions of nitrogen oxides, N.sub.2 O.sub.4 and N.sub.2 O.sub.5, in nitric acids. The reference electrode is fabricated of entirely inert materials, has a half cell of Pt/Ce(IV)/Ce(III)/70 wt. % HNO.sub.3, and includes a double-junction design with an intermediate solution of 70 wt. % HNO.sub.3. The liquid junctions are made from Corning No. 7930 glass for low resistance and negligible solution leakage.

294. Performance Characteristics of Borate Fatty Acid Formulations as Mold Inhibitors

Treesearch

Robert D. Coleman; Vina Yang; Carol A. Clausen

2013-01-01

The combination of boric acid (BA) or disodium octaborate tetrahydrate (DOT) and a fatty acid (FA) such as heptanoic, octanoic, and nonanoic acids (C7Ã¢Â€Â“C9) is an effective treatment solution for protecting wood structures against mold. BA or DOT alone have substantial potency against insects and decay fungi, but have negligible or no mold inhibitor activity. However,...

295. Effects of fly ash and boric acid on Y2O3-stabilized tetragonal ZrO2 dispersed with MgAl2O4: An experimental study on rat subcutaneous tissue.

PubMed

Ergun, Gulfem; Guru, Metin; Egilmez, Ferhan; Cekic-Nagas, Isil; Yilmaz, Dervis

2015-05-01

The aim of this study was to evaluate the subcutaneous tissue reaction around zirconia-based materials. Forty-eight male Wistar Albino rats were used in this study. Disk-shaped (1mm height and 5mm diameter) samples composed of 67% spinel (MgAl2O4), 27% tetragonal zirconia polycrystal, 4% (m/m) fly ash and 2% (m/m) boric acid were inserted into dorsal muscles of rats. After 1, 4, 8 and 16 weeks, the animals were sacrificed and zirconia materials were removed with the surrounding tissue. Tissue sections were made with a microtome and then stained with hematoxylin and eosin. Sections were evaluated for the intensity of inflammation. Additionally, the somatic and visceral lymph nodes were evaluated. Data were submitted to one-way analysis of variance (ANOVA) and Tukey HSD tests at a significant level of $p < 0.05$. There were statistically significant differences between mean inflammatory scores in different experimental periods ($p < 0.05$). In addition, the inflammatory reaction decreased over time. The tested materials had no damaging effect on the rat lymph nodes and did not have a toxic action on the internal organs. Therefore, zirconia polycrystal tested in the present study may offer a promising treatment alternative after further mechanical and biological studies are performed. Copyright Â© 2014 Elsevier GmbH. All rights reserved.

296. Alkaline earth cation extraction from acid solution

DOEpatents

Dietz, Mark; Horwitz, E. Philip

2003-01-01

An extractant medium for extracting alkaline earth cations from an aqueous acidic sample solution is described as are a method and apparatus for using the same. The separation medium is free of diluent, free-flowing and particulate, and comprises a Crown ether that is a 4,4'(5')[C.sub.4 -C.sub.8 -alkylcyclohexano]18-Crown-6 dispersed on an inert substrate material.

297. Acidities of Water and Methanol in Aqueous Solution and DMSO

ERIC Educational Resources Information Center

Gao, Daqing

2009-01-01

The relative acidities of water and methanol have been a nagging issue. In gas phase, methanol is more acidic than water by 36.0 kJ/mol; however, in aqueous solution, the acidities of methanol and water are almost identical. The acidity of an acid in solution is determined by both the intrinsic gas-phase ionization Gibbs energy and the solventâ€¦

298. Reactive solute transport in acidic streams

USGS Publications Warehouse

Broshears, R.E.

1996-01-01

Spatial and temporal profiles of Ph and concentrations of toxic metals in streams affected by acid mine drainage are the result of the interplay of physical and biogeochemical processes. This paper describes a reactive solute transport model that provides a physically and thermodynamically quantitative interpretation of these profiles. The model combines a transport module that includes advection-dispersion and transient storage with a geochemical speciation module based on MINTEQA2. Input to the model includes stream hydrologic properties derived from tracer-dilution experiments, headwater and lateral inflow concentrations analyzed in field samples, and a thermodynamic database. Simulations reproduced the general features of steady-state patterns of observed pH and concentrations of aluminum and sulfate in St. Kevin Gulch, an acid mine drainage stream near Leadville, Colorado. These patterns were altered temporarily by injection of sodium carbonate into the stream. A transient simulation reproduced the observed effects of the base injection.

299. Process for the extraction of strontium from acidic solutions

DOEpatents

Horwitz, E. Philip; Dietz, Mark L.

1994-01-01

The invention is a process for selectively extracting strontium values from aqueous nitric acid waste solutions containing these and other fission product values. The extractant solution is a macrocyclic polyether in an aliphatic hydrocarbon diluent containing a phase modifier. The process will selectively extract strontium values from nitric acid solutions which are up to 6 molar in nitric acid.

300. Process for the extraction of strontium from acidic solutions

DOEpatents

Horwitz, E.P.; Dietz, M.L.

1994-09-06

The invention is a process for selectively extracting strontium values from aqueous nitric acid waste solutions containing these and other fission product values. The extractant solution is a macrocyclic polyether in an aliphatic hydrocarbon diluent containing a phase modifier. The process will selectively extract strontium values from nitric acid solutions which are up to 6 molar in nitric acid. 4 figs.

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301. Process for the extraction of strontium from acidic solutions

DOEpatents

Horwitz, E.P.; Dietz, M.L.

1993-01-01

The invention is a process for selectively extracting strontium values from aqueous nitric acid waste solutions containing these and other fission product values. The extractant solution is a macrocyclic polyether in an aliphatic hydrocarbon diluent containing a phase modifier. The process will selectively extract strontium values from nitric acid solutions which are up to 6 molar in nitric acid.

302. Lugol's solution eradicates Staphylococcus aureus biofilm inÂ vitro.

PubMed

GrÃ¸nseth, Torstein; Vestby, Lene K; Nesse, Live L; Thoen, Even; Habimana, Olivier; von Unge, Magnus; Silvola, Juha T

2017-12-01

The aim of the study was to evaluate the antibacterial efficacy of Lugol's solution, acetic acid, and boric acid against Staphylococcus aureus biofilm. The efficacy of Lugol's solution 1%, 0.1%, and 0.05%, acetic acid 5% or boric acid 4.7% for treatment of Staphylococcus aureus biofilm inÂ vitro was tested using 30 clinical strains. Susceptibility in the planktonic state was assessed by disk diffusion test. Antiseptic effect on bacteria in biofilm was evaluated by using a Biofilm-oriented antiseptic test (BOAT) based on metabolic activity, a biofilm bactericidal test based on culturing of surviving bacteria and confocal laser scanning microscopy combined with LIVE/DEAD staining. In the planktonic state, all tested S.Â aureus strains were susceptible to Lugol's solution and acetic acid, while 27 out of 30 tested strains were susceptible to boric acid. In biofilm the metabolic activity was significantly reduced following exposure to

Lugol's solution and 5% acetic acid, while boric acid exposure led to no significant changes in metabolic activities. In biofilm, biocidal activity was observed for Lugol's solution 1% (30/30), 0.1% (30/30), and 0.05% (26/30). Acetic acid and boric acid showed no bactericidal activity in this test. Confocal laser scanning microscopy, assessed in 4/30 strains, revealed significantly fewer viable biofilm bacteria with Lugol's solution (1% pÂ <Â 0.001, 0.1% pÂ =Â 0.001 or 0.05% pÂ =Â 0.001), acetic acid 5% for 10Â min (pÂ =Â 0.001) or 30Â min (pÂ =Â 0.015), but not for acetic acid for 1Â min or boric acid. Lugol's solution 1.0% and 0.1% effectively eradicated S.Â aureus in biofilm and could be an alternative to conventional topical antibiotics where S.Â aureus biofilm is suspected such as external otitis, pharyngitis and wounds. Copyright Â© 2017 Elsevier B.V. All rights reserved.

303. Nitric acid uptake by sulfuric acid solutions under stratospheric conditions - Determination of Henry's Law solubility

NASA Technical Reports Server (NTRS)

Reihs, Christa M.; Golden, David M.; Tolbert, Margaret A.

1990-01-01

The uptake of nitric acid by sulfuric acid solutions representative of stratospheric particulate at low temperatures was measured to determine the solubility of nitric acid in sulfuric acid solutions as a function of H2SO4 concentration and solution temperature. Solubilities are reported for sulfuric acid solutions ranging from 58 to 87 wt pct H2SO4 over a temperature range from 188 to 240 K, showing that, in general, the solubility of nitric acid increases with decreasing sulfuric acid concentration and with decreasing temperature. The measured solubilities indicate that nitric acid in the global stratosphere will be found predominantly in the gas phase.

304. Activation of the EIF2Î±/ATF4 and ATF6 Pathways in DU-145 Cells by Boric Acid at the Concentration Reported in Men at the US Mean Boron Intake.

PubMed

Kobylewski, Sarah E; Henderson, Kimberly A; Yamada, Kristin E; Eckhert, Curtis D

2017-04-01

Fruits, nuts, legumes, and vegetables are rich sources of boron (B), an essential plant nutrient with chemopreventive properties. Blood boric acid (BA) levels reflect recent B intake, and men at the US mean intake have a reported non-fasting level of 10Â Î¼M. Treatment of DU-145 prostate cancer cells with physiological concentrations of BA inhibits cell proliferation without causing apoptosis and activates eukaryotic initiation factor 2 (eIF2Î±). EIF2Î± induces cell differentiation and protects cells by redirecting gene expression to manage endoplasmic reticulum stress. Our objective was to determine the temporal expression of endoplasmic reticulum (ER) stress-activated genes in DU-145 prostate cells treated with 10Â Î¼M BA. Immunoblots showed post-treatment increases in eIF2Î± protein at 30Â min and ATF4 and ATF6 proteins at 1Â h and 30Â min, respectively. The increase in ATF4 was accompanied by an increase in the expression of its downstream genes growth arrest and DNA damage-induced protein 34 (GADD34) and homocysteine-induced ER protein (Herp), but a decrease in GADD153/CCAAT/enhancer-binding protein homologous protein (CHOP), a pro-apoptotic gene. The increase in ATF6 was accompanied by an increase in expression of its downstream genes GRP78/BiP, calreticulin, Grp94, and EDEM. BA did not activate IRE1 or induce cleavage of XBP1 mRNA, a target of IRE1. Low boron status has been associated with increased cancer risk, low bone mineralization, and retinal degeneration. ATF4 and BiP/GRP78 function in osteogenesis and bone remodeling, calreticulin is required for tumor suppressor p53 function and mineralization of teeth, and BiP/GRP78 and EDEM prevent the aggregation of misfolded opsins which leads to retinal degeneration. The identification of BA-activated genes that regulate its phenotypic effects provides a molecular underpinning for boron nutrition and biology.

305. Process for the recovery of strontium from acid solutions

     DOEpatents

     Horwitz, E.P.; Dietz, M.L.

     1992-03-31

     The invention is a process for selectively extracting strontium and technetium values from aqueous nitric acid waste solutions containing these and other fission product values. The extractant is a macrocyclic polyether in a diluent which is insoluble in water, but which will itself dissolve a small amount of water. The process will extract strontium and technetium values from nitric acid solutions which are up to 6 molar in nitric acid. 5 figs.

306. Process for the recovery of strontium from acid solutions

     DOEpatents

     Horwitz, E. Philip; Dietz, Mark L.

     1992-01-01

     The invention is a process for selectively extracting strontium and technetium values from aqueous nitric acid waste solutions containing these and other fission product values. The extractant is a macrocyclic polyether in a diluent which is insoluble in water, but which will itself dissolve a small amount of water. The process will extract strontium and technetium values from nitric acid solutions which are up to 6 molar in nitric acid.

307. REDUCTION OF ACIDITY OF NITRIC ACID SOLUTIONS BY USE OF FORMALDEHYDE

     DOEpatents

     Healy, T.V.

     1958-05-20

     A continuous method is described of concentrating by evaporation and reducing the nitrate ion content of an aqueous solution of metallic salts containing nitric acid not in excess of 8N. It consists of heating the solution and then passing formaldehyde into the heated solution to bring about decomposition of the nitric acid. The evolved gases containing NO are contacted countercurrently with an aqueous metal salt solution containing nitric acid in excess of 8N so as to bring about decomposition of the nitric acid and lower the normality to at least 8N, whereupon it is passed into the body of heated solution.

308. Method for liquid chromatographic extraction of strontium from acid solutions

     DOEpatents

     Horwitz, E. Philip; Dietz, Mark L.

     1992-01-01

     A method and apparatus for extracting strontium and technetium values from biological, industrial and environmental sample solutions using a chromatographic column is described. An extractant medium for the column is prepared by generating a solution of a diluent containing a Crown ether and dispersing the solution on a resin substrate material. The sample solution is highly acidic and is introduced directed to the chromatographic column and strontium or technetium is eluted using deionized water.

309. Raman spectra of amino acids and their aqueous solutions

     NASA Astrophysics Data System (ADS)

     Zhu, Guangyong; Zhu, Xian; Fan, Qi; Wan, Xueliang

     2011-03-01

     Amino acids are the basic "building blocks" that combine to form proteins and play an important physiological role in all life-forms. Amino acids can be used as models for the examination of the importance of intermolecular bonding in life processes. Raman spectra serve to obtain information regarding molecular conformation, giving valuable insights into the topology of more complex molecules (peptides and proteins). In this paper, amino acids and their aqueous solution have been studied by Raman spectroscopy. Comparisons of certain values for these frequencies in amino acids and their aqueous solutions are given. Spectra of solids when compared to those of the solute in solution are invariably much more complex and almost always sharper. We present a collection of Raman spectra of 18 kinds of amino acids (L-alanine, L-arginine, L-aspartic acid, cystine, L-glutamic acid, L-glycine, L-histidine, L-isoluecine, L-leucine, L-lysine, L-phenylalanine, L-methionone, L-proline, L-serine, L-threonine, L-tryptophan, L-tyrosine, L-valine) and their aqueous solutions that can serve as references for the interpretation of Raman spectra of proteins and biological materials.

310. Polymerization of beta-amino acids in aqueous solution

     NASA Technical Reports Server (NTRS)

     Liu, R.; Orgel, L. E.; Bada, J. L. (Principal Investigator)

     1998-01-01

     We have compared carbonyl diimidazole (CDI) and 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDAC) as activating agents for the oligomerization of negatively-charged alpha- and beta-amino acids in homogeneous aqueous solution. alpha-Amino acids can be oligomerized efficiently using CDI, but not by EDAC. beta-Amino acids can be oligomerized efficiently using EDAC, but not by CDI. Aspartic acid, an alpha- and beta-dicarboxylic acid is oligomerized efficiently by both reagents. These results are explained in terms of the mechanisms of the reactions, and their relevance to prebiotic chemistry is discussed.

311. Method for incorporating radioactive phosphoric acid solutions in concrete

     DOEpatents

     Wolf, G.A.; Smith, J.W.; Ihle, N.C.

     1982-07-08

     A method for incorporating radioactive phosphoric acid solutions in concrete is described wherein the phosphoric acid is reacted with Ca(OH)/sub 2/ to form a precipitate of hydroxyapatite and the hydroxyapatite is mixed with Portland cement to form concrete.

312. Method for incorporating radioactive phosphoric acid solutions in concrete

     DOEpatents

     Wolf, Gary A [Kennewick, WA; Smith, Jeffrey W [Lancaster, OH; Ihle, Nathan C [Walla Walla, WA

     1984-01-01

A method for incorporating radioactive phosphoric acid solutions in concrete is described wherein the phosphoric acid is reacted with Ca(OH).sub.2 to form a precipitate of hydroxyapatite and the hydroxyapatite is mixed with portland cement to form concrete.

313. Thermal Stability of Acetohydroxamic Acid/Nitric Acid Solutions

SciTech Connect

Rudisill, T.S.

2002-03-13

The transmutation of transuranic actinides and long-lived fission products in spent commercial nuclear reactor fuel has been proposed as one element of the Advanced Accelerator Applications Program. Preparation of targets for irradiation in an accelerator-driven subcritical reactor would involve dissolution of the fuel and separation of uranium, technetium, and iodine from the transuranic actinides and other fission products. The UREX solvent extraction process is being developed to reject and isolate the transuranic actinides in the acid waste stream by scrubbing with acetohydroxamic acid (AHA). To ensure that a runaway reaction will not occur between nitric acid and AHA, an analoguemoreÂ Â» of hydroxyl amine, thermal stability tests were performed to identify if any processing conditions could lead to a runaway reaction.Â«Â less

314. Improved method for extracting lanthanides and actinides from acid solutions

DOEpatents

Horwitz, E.P.; Kalina, D.G.; Kaplan, L.; Mason, G.W.

1983-07-26

A process for the recovery of actinide and lanthanide values from aqueous acidic solutions uses a new series of neutral bi-functional extractants, the alkyl(phenyl)-N,N-dialkylcarbamoylmethylphosphine oxides. The process is suitable for the separation of actinide and lanthanide values from fission product values found together in high-level nuclear reprocessing waste solutions.

315. RECOVERY OF ACTINIDES FROM AQUEOUS NITRIC ACID SOLUTIONS

DOEpatents

Ader, M.

1963-11-19

A process of recovering actinides is presented. Tetravalent actinides are extracted from rare earths in an aqueous nitric acid solution with a ketone and back-extracted from the ketone into an aqueous medium. The aqueous actinide solution thus obtained, prior to concentration by boiling, is sparged with steam to reduce its ketone to a maximum content of 3 grams per liter. (AEC)

316. Phosphorylation of Glyceric Acid in Aqueous Solution Using Trimetaphosphate

NASA Technical Reports Server (NTRS)

Kolb, Vera; Orgel, Leslie E.

1996-01-01

The phosphorylation of glyceric acid is an interesting prebiotic reaction because it converts a simple, potentially prebiotic organic molecule into phosphate derivatives that are central to carbohydrate metabolism. We find that 0.05 M glyceric acid in the presence of 0.5 M trimetaphosphate in alkaline solution gives a mixture of 2- and 3-phosphoglyceric acids in combined yields of up to 40%.

317. Reduction of Plutonium in Acidic Solutions by Mesoporous Carbons

DOE PAGES

Parsons-Moss, Tashi; Jones, Stephen; Wang, Jinxiu; ...

2015-12-19

Batch contact experiments with several porous carbon materials showed that carbon solids spontaneously reduce the oxidation state of plutonium in 1-1.5 M acid solutions, without significant adsorption. The final oxidation state and rate of Pu reduction varies with the solution matrix, and also depends on the surface chemistry and surface area of the carbon. It was demonstrated that acidic Pu(VI) solutions can be reduced to Pu(III) by passing through a column of porous carbon particles, offering an easy alternative to electrolysis with a potentiostat.

318. Calcium leaching behavior of cementitious materials in hydrochloric acid solution.

PubMed

Yang, Huashan; Che, Yujun; Leng, Faguang

2018-06-11

The calcium leaching behavior of cement paste and silica fume modified calcium hydroxide paste, exposed to hydrochloric acid solution, is reported in this paper. The kinetic of degradation was assessed by the changes of pH of hydrochloric acid solution with time. The changes of compressive strength of specimens in hydrochloric acid with time were tested. Hydration products of leached specimens were also analyzed by X-ray diffraction (XRD), differential scanning calorimetry (DSC), thermogravimetric (TG), and atomic force microscope (AFM). Tests results show that there is a dynamic equilibrium in the supply and consumption of calcium hydroxide in hydrochloric acid solution, which govern the stability of hydration products such as calcium silicate hydrate (C-S-H). The decrease of compressive strength indicates that C-S-H are decomposed due to the lower concentration of calcium hydroxide in the pore solution than the equilibrium concentration of the hydration products. Furthermore, the hydration of unhydrated clinker delayed the decomposition of C-S-H in hydrochloric acid solution due to the increase of calcium hydroxide in pore solution of cementitious materials.

319. Investigation on solubility of hydroxy dibasic acids in alkanolamine solutions

NASA Astrophysics Data System (ADS)

Du, M.

2017-12-01

Solubilities of three hydroxy dibasic (adipic, suberic, and sebacic) acids in alkanolamine solutions were measured within the 30-90â„ƒ temperature range. It is found that solubility of these acids sharply grows with temperature and concentration of alkanolamine solvent. In addition, the study substantiates the adjustment of pH to optimize the CO2 absorption and desorption processes. The precipitation of added acids from alkanolamine solvents by cooling is found to be quite problematic, which makes the recovery of residual acids from lean alkanolamine solvents non-feasible and requires the application of alternative methods.

320. Contact lens care solutions downregulate membrane-associated mucins 1 and 16 in cultured human corneal epithelial cells and at the rat corneal surface in vivo.

    PubMed

    Tchedre, Kissaou; Imayasu, Masaki; Hori, Yuichi; Cavanagh, H Dwight

    2013-11-01

    The purpose of this study was first to evaluate the effect of multipurpose contact lens care solutions (MPSs) on the expression of membrane-associated mucins (MUC1 and MUC16) in SV40-transformed human corneal epithelial (HCE-T) cells and in vivo rat cornea. The second aim of this study was to determine the role of the common MPS additive boric acid in reducing mucin expression and release. The HCE-T cells were exposed to different concentrations of MPS-F, MPS-G, MPS-H, MPS-I, and MPS-J with 100% treatment for 30 minutes and 10% treatment for 24 hours. MUC1 and MUC16 expressions were subsequently analyzed by Western blotting. Wister rats were also subjected to MPS-A, MPS-B, MPS-C, MPS-D, and MPS-E and received phosphate-buffered saline exposure (1 drop in the right eye every 10 minutes for 1 hour). The left eye was used as control. Cornea sections and lysates were used for the immunohistochemical assay of MUC1 and MUC16 expressions. Conditioned media from treated HCE-T cells were also analyzed using Western blotting. The MPSs containing boric acid downregulated MUC1 and MUC16 in the rat cornea, whereas MPSs without boric acid had no effect as demonstrated by the Western blotting and immunohistochemical analysis. Conditioned media from MPS-containing boric acid revealed some trace of MUC16. The clinical use of MPSs containing boric acid that reduce MUC1 and MUC16 availability should be avoided. Additionally, the presence of MUC16 in the conditioned media suggests that boric acid may have enhanced cleavage of MUC16 at the cell membrane surface.

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321. Vibrational studies in aqueous solutions. Part II. The acid oxalate ion and oxalic acid

    NASA Astrophysics Data System (ADS)

    Shippey, T. A.

    1980-08-01

    Assignments for oxalic acid in solution are re-examined. A detailed assignment of the IR and Raman spectra of the acid oxalate ion is presented for the first time. Raman spectroscopy is used to study the first ionization of oxalic acid.

322. Population and size distribution of solute-rich mesospecies within mesostructured aqueous amino acid solutions.

PubMed

Jawor-Baczynska, Anna; Moore, Barry D; Lee, Han Seung; McCormick, Alon V; Sefcik, Jan

2013-01-01

Aqueous solutions of highly soluble substances such as small amino acids are usually assumed to be essentially homogenous systems with some degree of short range local structuring due to specific interactions on the sub-nanometre scale (e.g. molecular clusters, hydration shells), usually not exceeding several solute molecules. However, recent theoretical and experimental studies have indicated the presence of much larger supramolecular assemblies or mesospecies in solutions of small organic and inorganic molecules as well as proteins. We investigated both supersaturated and undersaturated aqueous solutions of two simple amino acids (glycine and DL-alanine) using Dynamic Light Scattering (DLS), Brownian Microscopy/Nanoparticles Tracking Analysis (NTA) and Cryogenic Transmission Electron Microscopy (Cryo-TEM). Colloidal scale mesospecies (nanodroplets) were previously reported in supersaturated solutions of these amino acids and were implicated as intermediate species on non-classical crystallization pathways. Surprisingly, we have found that the mesospecies are also present in significant numbers in undersaturated solutions even when the solute concentration is well below the solid-liquid equilibrium concentration (saturation limit). Thus, mesopecies can be observed with mean diameters ranging from 100 to 300 nm and a size distribution that broadens towards larger size with increasing solute concentration. We note that the mesospecies are not a separate phase and the system is better described as a thermodynamically stable mesostructured liquid containing solute-rich domains dispersed within bulk solute solution. At a given temperature, solute molecules in such a mesostructured liquid phase are subject to equilibrium distribution between solute-rich mesospecies and the surrounding bulk solution.

323. Effect of three ophthalmic solutions on chemical conjunctivitis in the neonate.

PubMed

Yasunaga, S

1977-02-01

In an attempt to reduce chemical conjunctivitis after silver nitrate prophylaxis, three different ophthalmic solutions (sodium chloride, sterile water, and a boric acid-sodium borate solution) were used to irrigate the eyes immediately after prophylaxis in 450 neonates. Sterile water significantly reduced (P less than .02) the prevalence of chemical conjunctivitis when compared to the conventional sodium chloride rinse. A significantly greater prevalence of chemical irritation in low-birth-weight infants was also noted (P less than .02).

324. Ionizing radiation induced degradation of salicylic acid in aqueous solution

NASA Astrophysics Data System (ADS)

AlbarrÃ¡n, Guadalupe; Mendoza, Edith

2018-06-01

The radiation-induced degradation of salicylic acid (SA-) in aqueous solutions (1.0 and 0.1 mmol dm-3) saturated with N2O or air or without oxygen were studied. Irradiation was carried out using a cobalt-60 source. With a 1 mmol dm-3 solution saturated with N2O a seemingly total degradation occurred at about 18 kGy, although small quantities of 2,3-dihydroxybenzoic acid, catechol and 2,5-dihydroxybenzoic acid were present at that dose at concentrations of 67, 22 and 6 Î¼mol dm-3 respectively. Under air and when free oxygen, the three radiolytic products were present at 18.54 kGy while SA- was destroyed only to 90% and 62%, respectively. In the case of 0.1 mmol dm-3 SA- solutions, the acid was degraded at 3.5 kGy if the solution contained N2O, at 5.8 kGy in air and at 7 kGy without oxygen. The concentration of the radiolytic products increased with increasing dose and after a maximum they decreased. The oxidation was followed by measuring the chemical oxygen demand; the slopes were 0.48 and 0.11, 0.21 and 0.07, 0.15 and 0.03 mmol dm-3 kGy-1 for 1.0 and 0.10 mmol dm-3 solutions saturated with N2O or air or without oxygen, respectively.

325. Methanol Uptake by Low Temperature Aqueous Sulfuric Acid Solutions

     NASA Technical Reports Server (NTRS)

     Iraci, L. T.; Essin, A. M.; Golden, D. M.; Hipskind, R. Stephen (Technical Monitor)

     2001-01-01

     The global methanol budget is currently unbalanced, with source terms significantly larger than the sinks terms. To evaluate possible losses of gaseous methanol to sulfate aerosols, the solubility and reactivity of methanol in aqueous sulfuric acid solutions representative of upper tropospheric and lower stratospheric aerosols is under investigation. Methanol will partition into sulfate aerosols according to its Henry's law solubility. Using standard uptake techniques in a Knudsen cell reactor, we have measured the effective Henry's law coefficient, H*, for cold (196 - 220 K) solutions ranging between 45 and 70 wt % H2SO4. We have found that methanol solubility ranges from approx. 10(exp 5) - 10(exp 7) M/atm for UT/LS conditions. Solubility increases with decreasing temperature and with increasing sulfuric acid content. Although methanol is slightly more soluble than are acetone and formaldehyde, current data indicate that uptake by clean aqueous sulfuric acid particles will not be a significant sink for methanol in the UT/LS. These solubility measurements include uptake due to physical solvation and any rapid equilibria which are established in solution. Reaction between primary alcohols and sulfuric acid does occur, leading to the production of alkyl sulfates. Literature values for the rate of this reaction suggest that formation of CH3OSO3H is not significant over our experimental time scale for solutions below 80 wt % H2SO4. To confirm this directly, results obtained using a complementary equilibrium measurement technique will also be presented.

326. Mechanisms of neptunium redox reactions in nitric acid solutions

     SciTech Connect

     Chatterjee, Sayandev; Bryan, Samuel A.; Casella, Amanda J.

     First transuranium element neptunium (Np) exhibits complicated behavior in acidic solutions because it can adopt wide range of oxidation states typically from +3 to +6 and coordinate large variety of ligands. In particular, accurate determination of Np redox potentials in nitric acid solutions is challenging due to overlapping chemical and electrochemical reactions leading to significant experimental uncertainties. Furthermore, over past decades spectrophotometry has been extensively applied to identify and characterize Np solution species in different oxidation states. However, relevant spectral database of Np in nitric acid solutions that can serve for the reference purposes has yet to be established duemoreÂ Â» to the experimental difficulty to isolate and stabilize Np species in pure oxidation states without compromising solution optical properties. This work demonstrates that combination of voltammetry and controlled-potential in situ thin-layer spectropotentiometry overcomes these challenges so that Np species in pure +3, +4, +5, or +6 oxidation states were electrochemically generated in the systematically varied 0.1 â€“ 5 M nitric acid solutions, and corresponding vis-NIR spectral signatures were obtained. In situ optical monitoring of the interconversion between adjacent Np oxidation states resulted in elucidation of the mechanisms of the involved redox reactions, in-depth understanding of the relative stability of the Np oxidation states, and allowed benchmarking of the redox potentials of the NpO22+/NpO2+, NpO2+/Np4+

and Np4+/Np3+ couples. Notably, the NpO2+/Np4+ couple was distinguished from the proximal Np4+/Np3+ process overcoming previous concerns and challenges encountered in accurate determination of the respective potentials.Â«Â less

327. Solution Preserves Nucleic Acids in Body-Fluid Specimens

NASA Technical Reports Server (NTRS)

Pierson, Duane L.; Stowe, Raymond P.

2004-01-01

A solution has been formulated to preserve deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) in specimens of blood, saliva, and other bodily fluids. Specimens of this type are collected for diagnostic molecular pathology, which is becoming the method of choice for diagnosis of many diseases. The solution makes it possible to store such specimens at room temperature, without risk of decomposition, for subsequent analysis in a laboratory that could be remote from the sampling location. Thus, the solution could be a means to bring the benefits of diagnostic molecular pathology to geographic regions where refrigeration equipment and diagnostic laboratories are not available. The table lists the ingredients of the solution. The functions of the ingredients are the following: EDTA chelates divalent cations that are necessary cofactors for nuclease activity. In so doing, it functionally removes these cations and thereby retards the action of nucleases. EDTA also stabilizes the DNA helix. Tris serves as a buffering agent, which is needed because minor contaminants in an unbuffered solution can exert pronounced effects on pH and thereby cause spontaneous degradation of DNA. SDS is an ionic detergent that inhibits ribonuclease activity. SDS has been used in some lysis buffers and as a storage buffer for RNA after purification. The use of the solution is straightforward. For example, a sample of saliva is collected by placing a cotton roll around in the subject's mouth until it becomes saturated, then the cotton is placed in a collection tube. Next, 1.5 mL of the solution are injected directly into the cotton and the tube is capped for storage at room temperature. The effectiveness of the solution has been demonstrated in tests on specimens of saliva containing herpes simplex virus. In the tests, the viral DNA, as amplified by polymerase chain reaction, was detected even after storage for 120 days.

328. Solution influence on biomolecular equilibria - Nucleic acid base associations

NASA Technical Reports Server (NTRS)

Pohorille, A.; Pratt, L. R.; Burt, S. K.; Macelroy, R. D.

1984-01-01

Various attempts to construct an understanding of the influence of solution environment on biomolecular equilibria at the molecular level using computer simulation are discussed. First, the application of the formal statistical thermodynamic program for investigating biomolecular equilibria in solution is presented, addressing modeling and conceptual simplications such as perturbative methods, long-range interaction approximations, surface thermodynamics, and hydration shell. Then, Monte Carlo calculations on the associations of nucleic acid bases in both polar and nonpolar solvents such as water and carbon tetrachloride are carried out. The solvent contribution to the enthalpy of base association is positive (destabilizing) in both polar and nonpolar solvents while negative enthalpies for stacked complexes are obtained only when the solute-solute in vacuo energy is added to the total energy. The release upon association of solvent molecules from the first hydration layer around a solute to the bulk is accompanied by an increase in solute-solvent energy and decrease in solvent-solvent energy. The techniques presented are expectd to displace less molecular and more heuristic modeling of biomolecular equilibria in solution.

329. Method for extracting lanthanides and actinides from acid solutions

DOEpatents

Horwitz, E. Philip; Kalina, Dale G.; Kaplan, Louis; Mason, George W.

1985-01-01

A process for the recovery of actinide and lanthanide values from aqueous acidic solutions with an organic extractant having the formula: ##STR1## where .phi. is phenyl, R.sup.1 is a straight or branched alkyl or alkoxyalkyl containing from 6 to 12 carbon atoms and R.sup.2 is an alkyl containing from 3 to 6 carbon atoms. The process is suitable for the separation of actinide and lanthanide values from fission product values found together in high level nuclear reprocessing waste solutions.

330. Decomposition mechanism of chromite in sulfuric acid-dichromic acid solution

NASA Astrophysics Data System (ADS)

Zhao, Qing; Liu, Cheng-jun; Li, Bao-kuan; Jiang, Mao-fa

2017-12-01

The sulfuric acid leaching process is regarded as a promising, cleaner method to prepare trivalent chromium products from chromite; however, the decomposition mechanism of the ore is poorly understood. In this work, binary spinels of Mg-Al, Mg-Fe, and Mg-Cr in the powdered and lump states were synthesized and used as raw materials to investigate the decomposition mechanism of chromite in sulfuric acid-dichromic acid solution. The leaching yields of metallic elements and the changes in morphology of the spinel were studied. The experimental results showed that the three spinels were stable in sulfuric acid solution and that dichromic acid had little influence on the decomposition behavior of the Mg-Al spinel and Mg-Fe spinel because Mg2+, Al3+, and Fe3+ in spinels cannot be oxidized by Cr6+. However, in the case of the Mg-Cr spinel, dichromic acid substantially promoted the decomposition efficiency and functioned as a catalyst. The decomposition mechanism of chromite in sulfuric acid-dichromic acid solution was illustrated on the basis of the findings of this study.

331. Interaction of Ethyl Alcohol Vapor with Sulfuric Acid Solutions

NASA Technical Reports Server (NTRS)

Leu, Ming-Taun

2006-01-01

We investigated the uptake of ethyl alcohol (ethanol) vapor by sulfuric acid solutions over the range approx.40 to approx.80 wt % H2SO4 and temperatures of 193-273 K. Laboratory studies used a fast flow-tube reactor coupled to an electron-impact ionization mass spectrometer for detection of ethanol and reaction products. The uptake coefficients ((gamma)) were measured and found to vary from 0.019 to 0.072, depending upon the acid composition and temperature. At concentrations greater than approx.70 wt % and in dilute solutions colder than 220 K, the values approached approx.0.07. We also determined the effective solubility constant of ethanol in approx.40 wt % H2SO4 in the temperature range 203-223 K. The potential implications to the budget of ethanol in the global troposphere are briefly discussed.

332. Surface tensions of solutions containing dicarboxylic acid mixtures

NASA Astrophysics Data System (ADS)

Lee, Jae Young; Hildemann, Lynn M.

2014-06-01

Organic solutes tend to lower the surface tension of cloud condensation nuclei, allowing them to more readily activate. The surface tension of various dicarboxylic acid aerosol mixtures was measured at 20 Â°C using the Wilhelmy plate method. At lower concentrations, the surface tension of a solution with equi-molar mixtures of dicarboxylic acids closely followed that of a solution with the most surface-active organic component alone. Measurements of surface tension for these mixtures were lower than predictions using Henning's model and the modified Szyszkowski equation, by Ëœ1-2%. The calculated maximum surface excess (Î“max) and inverse Langmuir adsorption coefficient (Î²) from the modified Szyszkowski equation were both larger than measured values for 6 of the 7 mixtures tested. Accounting for the reduction in surface tension in the KÃ¶hler equation reduced the critical saturation ratio for these multi-component mixtures - changes were negligible for dry diameters of 0.1 and 0.5 Î¼m, but a reduction from 1.0068 to 1.0063 was seen for the 4-dicarboxylic acid mixture with a dry diameter of 0.05 Î¼m.

333. Methanol Uptake By Low Temperature Aqueous Sulfuric Acid Solutions

NASA Technical Reports Server (NTRS)

Iraci, Laura T.; Essin, Andrew M.; Golden, David M.; Hipskind, R. Stephen (Technical Monitor)

2001-01-01

To evaluate the role of upper tropospheric and lower stratospheric aerosols in the global budget of methanol, the solubility and reactivity of CH3OH in aqueous sulfuric acid solutions are under investigation. Using standard uptake techniques in a Knudsen cell reactor, we have measured the effective Henry's law coefficient, H(*), for methanol dissolution into 45 to 70 percent by weight H2SO4. We find that methanol solubility ranges from 10(exp 5) to 10(exp 8) M/atm and increases with decreasing temperature and with increasing sulfuric acid content. These solubility measurements include uptake due to physical solvation and all rapid equilibria which are established in solution. Our data indicate that simple uptake by aqueous sulfuric acid particles will not be a significant sink for methanol in the UT/LS. These results differ from those recently reported in the literature, and an explanation of this disparity will be presented. In addition to solvation, reaction between primary alcohols and sulfuric acid does occur, leading to the production of alkyl sulfates. Literature values for the rate of this reaction suggest that formation of CH3OSO3H may proceed in the atmosphere but is not significant under our experimental conditions. Results obtained using a complementary equilibrium measurement technique confirm this directly. In addition, the extent of methanol sequestration via formation of mono- and dimethylsulfate will be evaluated under several atmospheric conditions.

334. Micro-organization of humic acids in aqueous solutions

NASA Astrophysics Data System (ADS)

KluÄ□Ã¡kovÃ¡, Martina; VÄ›Å¾nÃkovÃ¡, KateÅ™ina

2017-09-01

The methods of dynamic light scattering and micro-rheology were used to investigate the molecular organization of humic acids in solutions. The obtained results were supplemented by ultraviolet/visible spectrometry and measurement of the zeta potential. Particle tracking micro-rheology was used for the first time as a novel method in humic research. Solutions of humic acids were prepared in three different mediums: NaOH, NaCl, and NaOH neutralized by HCl after dissolution of the humic sample. The molecular organization of humic acids was studied over a wide concentration range (0.01-10 g dm-3). Two breaks were detected in the obtained concentration dependencies. The rearrangements were observed at concentrations around 0.02 g dm-3 and 1 g dm-3. Changes in the measured values observed at around 0.02 g dm-3 were less noticeable and were related to the formation of particles between 100 and 1000 nm in size and the strong bimodal character of humic systems diluted by NaCl. The ;switch-over point; at around 1 g dm-3 indicated changes in the secondary structure of humic acids connected with the increase in colloidal stability (decrease of zeta potential), the decrease in polydispersity, and minimal values of viscosity.

335. Solubility limits of dibutyl phosphoric acid in uranium-nitric acid solutions

SciTech Connect

Pierce, R.A.

2000-01-04

The Savannah River Site has enriched uranium (EU) solution that has been stored since being purified in its solvent extraction processes. The concentrations in solution are approximately 6 g/L U and 0.1 M nitric acid. Residual tributylphosphate in solution has slowly hydrolyzed to form dibutyl phosphoric acid (HDBP) at concentrations averaging 30--50 mg/L. Dibutyl phosphoric acid, in turn, is in equilibrium with (HDBP){sub 2} and DBP{sup {minus}}. Uranium can form compounds with the dibutylphosphate ion (DBP{sup {minus}}) which have limited solubility, thereby creating a nuclear criticality safety issue. Literature reports and earlier SRTC tests have shown that it is feasiblemoreÂ Â» to precipitate U-DBP solid during the storage and processing of EU solutions. As a result, a series of solubility experiments were run at nitric acid concentrations from 0--4.0 M HNO{sub 3}, uranium at 0--90 g/L, and temperatures from 0--30 C. The data shows temperature and nitric acid concentration dependence consistent with what would be expected. With respect to uranium concentration, U-DBP solubility passes through a minimum between 6 and 12 g/L U at the acid concentrations and temperatures studied. However, the minimum shows a slight shift toward lower uranium concentrations at lower nitric acid concentrations. The shifts in solubility are strongly dependent upon the overall ionic strength of the solution. The data also reveal a shift to higher DBP solubility above 0.5 M HNO{sub 3} for both 6 g/L and 12 g/L uranium solutions. Analysis of U-DBP solids from the tests identified distinct differences between precipitates from less than 0.5 M solutions and those from greater than 4 M acid. Analyses identified UO{sub 2}(DBP){sub 2} as the dominant compound present at low acid concentrations in accordance with literature reports. As the acid concentration increases, the crystalline UO{sub 2}(DBP){sub 2} shows molecular substitutions and an increase in amorphous content.Â«Â less

336. Speciation of platinum(IV) in nitric acid solutions.

PubMed

Vasilchenko, Danila; Tkachev, Sergey; Baidina, Iraida; Korenev, Sergey

2013-09-16

The speciation of platinum(IV) ions in nitric acid (6-15.8 M) solutions of H2[Pt(OH)6] has been studied by (195)Pt NMR and Raman spectroscopy. Series of aqua-hydroxo-nitrato complexes [Pt(L)(x)(NO3)(6-x)] (L = H2O or OH(-); x = 0,â€‰..., 6) were found to exist in such solutions. The pair additivity model of chemical shifts and statistical theory were used to assign signals in NMR spectra to particular [Pt(L)(x)(NO3)(6-x)] species. Mononuclear hexanitratoplatinates(IV) have been isolated in solid state in substantial yield as pyridinium salt (PyH)2[Pt(NO3)6] and characterized by single-crystal X-ray diffraction. Aging of the platinum nitric acid solutions for more than 5-6 h results in oligomerization of [Pt(L)(x)(NO3)(6-x)] species and the formation of oligonuclear aqua-hydroxo-nitrato complexes with OH(-) and NO3(-) bridging ligands. Oligomeric platinum(IV) complexes with two and four nuclei were unambiguously detected by NMR on (195)Pt -enriched samples. Oligomers with even higher nuclearity were also detected. Dimeric anions [Pt2(Î¼-OH)2(NO3)8](2-) have been isolated as single crystals of tetramethylammonium salt and characterized by X-ray diffraction.

337. Structure of polyacrylic acid and polymethacrylic acid solutions : a small angle neutron scattering study

NASA Astrophysics Data System (ADS)

Moussaid, A.; Schosseler, F.; Munch, J. P.; Candau, S. J.

1993-04-01

The intensity scattered from polyacrylic acid and polymethacrylic acid solutions has been measured by small angle neutron scattering experiemnts. The influence of polymer concentration, ionization degree, temperature and salt content has been investigated. Results are in qualitative agreement with a model which predicts the existence of microphases in the unstable region of the phase diagram. Quantitative comparison with the theory is performed by fitting the theoretical structure factor to the experimental data. For a narrow range of ionizaiton degrees nearly quantitative agreement with the theory is found for the polyacrylic acide system.

338. Quenching characteristics of bathocuproinedisulfonic acid, disodium salt in aqueous solution and copper sulfate plating solution

NASA Astrophysics Data System (ADS)

Koga, Toshiaki; Hirakawa, Chieko; Takeshita, Michinori; Terasaki, Nao

2018-04-01

Bathocuproinedisulfonic acid, disodium salt (BCS) is generally used to detect Cu(I) through a color reaction. We newly found BCS fluorescence in the visible blue region in an aqueous solution. However, the fluorescence mechanism of BCS is not well known, so we should investigate its fundamental information. We confirmed that the characteristics of fluorescence are highly dependent on the molecular concentration and solvent properties. In particular, owing to the presence of the copper compound, the fluorescence intensity extremely decreases. By fluorescence quenching, we observed that a copper compound concentration of 10-6 mol/L or less could easily be measured in an aqueous solution. We also observed BCS fluorescence in copper sulfate plating solution and the possibility of detecting monovalent copper by fluorescence reabsorption.

339. Systems solutions by lactic acid bacteria: from paradigms to practice

PubMed Central

2011-01-01

Lactic acid bacteria are among the powerhouses of the food industry, colonize the surfaces of plants and animals, and contribute to our health and well-being. The genomic characterization of LAB has rocketed and presently over 100 complete or nearly complete genomes are available, many of which serve as scientific paradigms. Moreover, functional and comparative metagenomic studies are taking off and provide a wealth of insight in the activity of lactic acid bacteria used in a variety of applications, ranging from starters in complex fermentations to their marketing as probiotics. In this new era of high throughput analysis, biology has become big science. Hence, there is a need to systematically store the generated information, apply this in an intelligent way, and provide modalities for constructing self-learning systems that can be used for future improvements. This review addresses these systems solutions with a state of the art overview of the present paradigms that relate to the use of lactic acid bacteria in industrial applications. Moreover, an outlook is presented of the future developments that include the transition into practice as well as the use of lactic acid bacteria in synthetic biology and other next generation applications. PMID:21995776

340. Non-catalytic hydrogenation of VO2 in acid solution.

PubMed

Chen, Yuliang; Wang, Zhaowu; Chen, Shi; Ren, Hui; Wang, Liangxin; Zhang, Guobin; Lu, Yalin; Jiang, Jun; Zou, Chongwen; Luo, Yi

2018-02-26

Hydrogenation is an effective way to tune the property of metal oxides. It can conventionally be performed by doping hydrogen into solid materials with noble-metal catalysis, high-temperature/pressure annealing treatment, or high-energy proton implantation in vacuum condition. Acid solution naturally provides a rich proton source, but it should cause corrosion rather than hydrogenation to metal oxides. Here we report a facile approach to hydrogenate monoclinic vanadium dioxide (VO 2) in acid solution at ambient condition by placing a small piece of low workfunction metal (Al, Cu, Ag, Zn, or Fe) on VO 2 surface. It is found that the attachment of a tiny metal particle (~1.0â€‰mm) can lead to the complete hydrogenation of an entire wafer-size VO 2 (>2 inch). Moreover, with the right choice of the metal a two-step insulator-metal-insulator phase modulation can even be achieved. An electron-proton co-doping mechanism has been proposed and verified by the first-principles calculations.

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341. Toluene nitration in irradiated nitric acid and nitrite solutions

NASA Astrophysics Data System (ADS)

Elias, Gracy; Mincher, Bruce J.; Mezyk, Stephen P.; Muller, Jim; Martin, Leigh R.

2011-04-01

The kinetics, mechanisms, and stable products produced for the nitration of aryl alkyl mild ortho-para director toluene in irradiated nitric acid and neutral nitrite solutions were investigated using Î³ and pulse radiolysis. Electron pulse radiolysis was used to determine the bimolecular rate constants for the reaction of toluene with different transient species produced by irradiation. HPLC with UV detection, GC-MS and LC-MS, were used to assess the stable reaction products. Free-radical based nitration reaction products were found in irradiated acidic and neutral media. In 6.0 M HNO3, ring substitution, side chain substitution, and oxidation, produced different nitrated toluene products. For ring substitution, nitrogen oxide radicals were added mainly to cyclohexadienyl radicals, whereas for side chain substitution, these radicals were added to the carbon-centered benzyl radical produced by H-atom abstraction. In neutral nitrite solutions, radiolytically-induced ring nitration products approached a statistically random distribution, suggesting a direct free-radical reaction involving addition of the rad NO2 radical.

342. Arsenic removal from acidic solutions with biogenic ferric precipitates.

PubMed

Ahoranta, Sarita H; Kokko, Marika E; Papirio, Stefano; Ã–zkaya, Bestamin; Puhakka, Jaakko A

2016-04-05

Treatment of acidic solution containing 5g/L of Fe(II) and 10mg/L of As(III) was studied in a system consisting of a biological fluidized-bed reactor (FBR) for iron oxidation, and a gravity settler for iron precipitation and separation of the ferric precipitates. At pH 3.0 and FBR retention time of 5.7h, 96-98% of the added Fe(II) precipitated (99.1% of which was jarosite). The highest iron oxidation and precipitation rates were 1070 and 28mg/L/h, respectively, and were achieved at pH 3.0. Subsequently, the effect of pH on arsenic removal through sorption and/or co-precipitation was examined by gradually decreasing solution pH from 3.0 to 1.6 (feed pH). At pH 3.0, 2.4 and 1.6, the highest arsenic removal efficiencies obtained were 99.5%, 80.1% and 7.1%, respectively. As the system had ferric precipitates in excess, decreased arsenic removal was likely due to reduced co-precipitation at pH<2.4. As(III) was partially oxidized to As(V) in the system. In shake flask experiments, As(V) sorbed onto jarosite better than As(III). Moreover, the sorption capacity of biogenic jarosite was significantly higher than that of synthetic jarosite. The developed bioprocess simultaneously and efficiently removes iron and arsenic from acidic solutions, indicating potential for mining wastewater treatment. Copyright Â© 2015 Elsevier B.V. All rights reserved.

343. Conformation of poly(Î³-glutamic acid) in aqueous solution.

PubMed

Muroga, Yoshio; Nakaya, Asami; Inoue, Atsuki; Itoh, Daiki; Abiru, Masaya; Wada, Kaori; Takada, Masako; Ikake, Hiroki; Shimizu, Shigeru

2016-04-01

Local conformation and overall conformation of poly(Î³-DL-glutamic acid) (PÎ³DLGA) and poly(Î³-L-glutamic acid) (PÎ³LGA) in aqueous solution was studied as a function of degree of ionization Îµ by (1) H-NMR, circular dichroism, and potentiometric titration. It was clarified that their local conformation is represented by random coil over an entire Îµ range and their overall conformation is represented by expanded random-coil in a range of Îµâ€‰>â€‰Îµ(*) , where Îµ(*) is about 0.3, 0.35, 0.45, and 0.5 for added-salt concentration of 0.02M, 0.05M, 0.1M, and 0.2M, respectively. In a range of Îµâ€‰<â€‰Îµ(*) , however, Îµ dependence of their overall conformation is significantly differentiated from each other. PÎ³DLGA tends to aggregate intramolecularly and/or intermolecularly with decreasing Îµ, but PÎ³LGA still behaves as expanded random-coil. It is speculated that spatial arrangement of adjacent carboxyl groups along the backbone chain essentially affects the overall conformation of PÎ³GA in acidic media. Â© 2015 Wiley Periodicals, Inc.

344. Infrared optical constants of H2O ice, amorphous nitric acid solutions, and nitric acid hydrates

NASA Technical Reports Server (NTRS)

Toon, Owen B.; Koehler, Birgit G.; Middlebrook, Ann M.; Tolbert, Margaret A.; Jordon, Joseph

1994-01-01

We determined the infrared optical constants of nitric acid trihydrate, nitric acid dihydrate, nitric acid monohydrate, and solid amorphous nitric acid solutions which crystallize to form these hydrates. We have also found the infrared optical constants of H2O ice. We measured the transmission of infrared light throught thin films of varying thickness over the frequency range from about 7000 to 500/cm at temperatures below 200 K. We developed a theory for the transmission of light through a substrate that has thin films on both sides. We used an iterative Kramers-Kronig technique to determine the optical constants which gave the best match between measured transmission spectra and those calculated for a variety of films of different thickness. These optical constants should be useful for calculations of the infrared spectrum of polar stratospheric clouds.

345. INTERACTION OF AQUEOUS SOLUTIONS OF CHLORINE WITH MALIC ACID, TARTARIC ACID, AND VARIOUS FRUIT JUICES, A SOURCE OF MUTAGENS

EPA Science Inventory

The interactions of aqueous solutions of chlorine with some fruit acids (citric acid, DL-malic acid, and L-tartaric acid) at different pH values were studied. iethyl ether extraction followed by GC/MS analysis indicated that a number of mutagens (certain chlorinated propanones an...

346. GADOLINIUM OXALATE SOLUBILITY MEASUREMENTS IN NITRIC ACID SOLUTIONS

SciTech Connect

Pierce, R. A.

2012-03-12

HB-Line will begin processing Pu solutions during FY2012 that will involve the recovery of Pu using oxalate precipitation and filtration. After the precipitation and filtration processes, the filtrate solution will be transferred from HB-Line to H-Canyon. The presence of excess oxalate and unfiltered Pu oxalate solids in these solutions create a criticality safety issue if they are sent to H-Canyon without controls in H-Canyon. One approach involves H-Canyon receiving the filtrate solution into a tank that is poisoned with soluble gadolinium (Gd). Decomposition of the oxalate will occur within a subsequent H-Canyon vessel. The receipt of excess oxalate into themoreÂ Â» H-Canyon receipt tanks has the potential to precipitate a portion of the Gd poison in the receipt tanks. Because the amount of Gd in solution determines the maximum amount of Pu solids that H-Canyon can receive, H-Canyon Engineering requested that SRNL determine the solubility of Gd in aqueous solutions of 4-10 M nitric acid (HNO{sub 3}), 4-12 g/L Gd, and 0.15-0.25 M oxalic acid (H{sub 2}C{sub 2}O{sub 4}) at 25 Â°C. The target soluble Gd concentration is 6 g/L. The data indicate that the target can be achieved above 6 M HNO{sub 3} and below 0.25 M H{sub 2}C{sub 2}O{sub 4}. At 25 Â°C, for 6 M HNO{sub 3}, 11 g/L and 7 g/L Gd are soluble in 0.15 M and 0.25 M H{sub 2}C{sub 2}O{sub 4}, respectively. In 4 M HNO{sub 3}, the Gd solubility drops significantly to 2.5 g/L and 0.8 g/L in 0.15 M and 0.25 M H{sub 2}C{sub 2}O{sub 4}, respectively. The solubility of Gd at 8-10 M HNO{sub 3} exceeds the solubility at 6 M HNO{sub 3}. The data for 4 M HNO{sub 3} showed good agreement with data in the literature. To achieve a target of 6 g/L soluble Gd in solution in the presence of 0.15-0.25 M oxalate, the HNO{sub 3} concentration must be maintained at or above 6 M HNO{sub 3}. The solubility of Gd in 4 M HNO{sub 3} with 0.15 M oxalate at 10 Â°C is about 1.5 g/L. For 6 M HNO{sub 3} with 0.15 M oxalate, the solubility of

347. Boric ester-type molten salt via dehydrocoupling reaction.

PubMed

Matsumi, Noriyoshi; Toyota, Yoshiyuki; Joshi, Prerna; Puneet, Puhup; Vedarajan, Raman; Takekawa, Toshihiro

2014-11-14

Novel boric ester-type molten salt was prepared using 1-(2-hydroxyethyl)-3-methylimidazolium chloride as a key starting material. After an ion exchange reaction of 1-(2-hydroxyethyl)-3-methylimidazolium chloride with lithium (bis-(trifluoromethanesulfonyl) imide) (LiNTf2), the resulting 1-(2-hydroxyethyl)-3-methylimidazolium NTf2 was reacted with 9-borabicyclo[3.3.1]nonane (9-BBN) to give the desired boric ester-type molten salt in a moderate yield. The structure of the boric ester-type molten salt was supported by 1H-, 13C-, 11B- and 19F-NMR spectra. In the presence of two different kinds of lithium salts, the matrices showed an ionic conductivity in the range of 1.1 Ã— 10â□»â□´-1.6 Ã— 10â□»â□µ S cmâ□»Â¹ at 51 Â°C. This was higher than other organoboron molten salts ever reported.

348. Boric Ester-Type Molten Salt via Dehydrocoupling Reaction

PubMed Central

Matsumi, Noriyoshi; Toyota, Yoshiyuki; Joshi, Prerna; Puneet, Puhup; Vedarajan, Raman; Takekawa, Toshihiro

2014-01-01

Novel boric ester-type molten salt was prepared using 1-(2-hydroxyethyl)-3-methylimidazolium chloride as a key starting material. After an ion exchange reaction of 1-(2-hydroxyethyl)-3-methylimidazolium chloride with lithium (bis-(trifluoromethanesulfonyl) imide) (LiNTf2), the resulting 1-(2-hydroxyethyl)-3-methylimidazolium NTf2 was reacted with 9-borabicyclo[3.3.1]nonane (9-BBN) to give the desired boric ester-type molten salt in a moderate yield. The structure of the boric ester-type molten salt was supported by 1H-, 13C-, 11B- and 19F-NMR spectra. In the presence of two different kinds of lithium salts, the matrices showed an ionic conductivity in the range of 1.1 Ã— 10âˆ’4â€“1.6 Ã— 10âˆ’5 S cmâˆ’1 at 51 Â°C. This was higher than other organoboron molten salts ever reported. PMID:25405738

349. Solubility of xenon in amino-acid solutions. II. Nine less-soluble amino acids

NASA Astrophysics Data System (ADS)

Kennan, Richard P.; Himm, Jeffrey F.; Pollack, Gerald L.

1988-05-01

Ostwald solubility (L) of xenon gas, as the radioisotope 133Xe, has been measured as a function of solute concentration, at 25.0 Â°C, in aqueous solutions of nine amino acids. The amino-acid concentrations investigated covered much of their solubility ranges in water, viz., asparagine monohydrate (0-0.19 M), cysteine (0-1.16 M), glutamine (0-0.22 M), histidine (0-0.26 M), isoleucine (0-0.19 M), methionine (0-0.22 M), serine (0-0.38 M), threonine (0-1.4 M), and valine (0-0.34 M). We have previously reported solubility results for aqueous solutions of six other, generally more soluble, amino acids (alanine, arginine, glycine, hydroxyproline, lysine, and proline), of sucrose and sodium chloride. In general, L decreases approximately linearly with increasing solute concentration in these solutions. If we postulate that the observed decreases in gas solubility are due to hydration, the results under some assumptions can be used to calculate hydration numbers (H), i.e., the number of H2O molecules associated with each amino-acid solute molecule. The average values of hydration number (HÂ¯) obtained at 25.0 Â°C are 15.3Â±1.5 for asparagine, 6.8Â±0.3 for cysteine, 11.5Â±1.1 for glutamine, 7.3Â±0.7 for histidine, 5.9Â±0.4 for isoleucine, 10.6Â±0.8 for methionine, 11.2Â±1.3 for serine, 7.7Â± 1.0 for threonine, and 6.6Â±0.6 for valine. We have also measured the temperature dependence of solubility L(T) from 5-40 Â°C for arginine, glycine, and proline, and obtained hydration numbers HÂ¯(T) in this range. Between 25-40 Â°C, arginine has an HÂ¯ near zero. This may be evidence for an attractive interaction between xenon and arginine molecules in aqueous solution.

350. Dibutyl Phosphoric Acid Solubility in High-Acid, Uranium-Bearing Solutions at SRS

SciTech Connect

Pierce, R.A.

1998-10-02

The Savannah River Site has enriched uranium (EU) solution which has been stored for almost 10 years since being purified in the second uranium cycle of the H area solvent extraction process. The concentrations in solution are approximately 6 g/L U and about 0.1 M nitric acid. Residual tributylphosphate in the solutions has slowly hydrolyzed to form dibutyl phosphoric acid (HDBP) at concentrations averaging 50 mg/L. Uranium is known to form compounds with the dibutylphosphate ion (DBP) which have limited solubility. The potential to form uranium-DBP solids raises a nuclear criticality safety issue. Prior SRTC tests (WSRC-TR-98-00188) showed that U-DBPmoreÂ Â» solids precipitate at concentrations potentially attainable during the storage of enriched uranium solutions. Furthermore, evaporation of the existing EUS solution without additional acidification could result in the precipitation of U-DBP solids if the DBP concentration in the resulting solution exceeds 110 mg/L at ambient temperature. The same potential exists for evaporation of unwashed 1CU solutions. As a follow-up to the earlier studies, SRTC studied the solubility limits for solutions containing acid concentrations above 0.5M HNO3. The data obtained in these tests reveals a shift to higher levels of DBP solubility above 0.5M HNO3 for both 6 g/L and 12 g/L uranium solutions. Analysis of U-DBP solids from the tests identified a mixture of different molecular structures for the solids created. The analysis distinguished UO2(DBP)2 as the dominant compound present at low acid concentrations. As the acid concentration increases, the crystalline UO2(DBP)2 shows molecular substitutions and an increase in amorphous content. Further analysis by methods not available at SRS will be needed to better identify the specific compounds present. This data indicates that acidification prior to evaporation can be used to increase the margin of safety for the storage of the EUS solutions. Subsequent experimentation evaluated

351. High-Yield Production of Levulinic Acid from Pretreated Cow Dung in Dilute Acid Aqueous Solution.

PubMed

Su, Jialei; Shen, Feng; Qiu, Mo; Qi, Xinhua

2017-02-14

Agricultural waste cow dung was used as feedstock for the production of a high value-added chemical levulinic acid (LA) in dilute acid aqueous solutions. A high LA yield of 338.9 g/kg was obtained from the pretreated cow dung, which was much higher than that obtained from the crude cow dung (135 g/kg), mainly attributed to the breakage of the lignin fraction in the lignocellulose structure of the cow dung by potassium hydroxide (KOH) pretreatment, and thus enhanced the accessibility of cow dung to the acid sites in the catalytic reaction. Meanwhile, another value-added chemical formic acid could be obtained with a yield of ca. 160 g/kg in the process, implying a total production of ca. 500 g/kg yield for LA and formic acid from the pretreated cow dung with the proposed process. The developed process was shown to be tolerant to high initial substrate loading with a satisfied LA yield. This work provides a promising strategy for the value-increment utilization of liglocellulosic agricultural residues.

352. Compatible solute influence on nucleic acids: Many questions but few answers

PubMed Central

Kurz, Matthias

2008-01-01

Compatible solutes are small organic osmolytes including but not limited to sugars, polyols, amino acids, and their derivatives. They are compatible with cell metabolism even at molar concentrations. A variety of organisms synthesize or take up compatible solutes for adaptation to extreme environments. In addition to their protective action on whole cells, compatible solutes display significant effects on biomolecules in vitro. These include stabilization of native protein and nucleic acid structures. They are used as additives in polymerase chain reactions to increase product yield and specificity, but also in other nucleic acid and protein applications. Interactions of compatible solutes with nucleic acids and protein-nucleic acid complexes are much less understood than the corresponding interactions of compatible solutes with proteins. Although we may begin to understand solute/nucleic acid interactions there are only few answers to the many questions we have. I summarize here the current state of knowledge and discuss possible molecular mechanisms and thermodynamics. PMID:18522725

353. Interaction between Al3+ and acrylic acid and polyacrylic acid in acidic aqueous solution: a model experiment for the behavior of Al3+ in acidified soil solution.

     PubMed

     Etou, Mayumi; Masaki, Yuka; Tsuji, Yutaka; Saito, Tomoyuki; Bai, Shuqin; Nishida, Ikuko; Okaue, Yoshihiro; Yokoyama, Takushi

     2011-01-01

     From the viewpoint of the phytotoxicity and mobility of Al(3+) released from soil minerals due to soil acidification, the interaction between Al(3+) and acrylic acid (AA) and polyacrylic acid (PAA) as a model compound of fulvic acid was investigated. The interaction was examined at pH 3 so as to avoid the hydrolysis of Al(3+). The interaction between Al(3+) and AA was weak. However, the interaction between Al(3+) and PAA was strong and depended on the initial (COOH in PAA)/Al molar ratio (R(P)) of the solution. For the range of 1/R(P), the interaction between Al(3+) and PAA can be divided into three categories: (1) 1:1 Al-PAA-complex (an Al(3+) combines to a carboxyl group), (2) intermolecular Al-PAA-complex (an Al(3+) combines to more than 2 carboxyl groups of other Al-PAA-complexes) in addition to the 1:1 Al-PAA-complex and (3) precipitation of intermolecular complexes. In conclusion, R(P) is an important factor affecting the behavior of Al(3+) in acidic soil solution.

354. SFG study of platinum electrodes in perchloric acid solutions

     NASA Astrophysics Data System (ADS)

     Zheng, W. Q.; Pluchery, O.; Tadjeddine, A.

     2002-04-01

     Infrared-visible sum-frequency generation (SFG) spectroscopy has been used to study the structure of water molecules (and/or its derivatives OH -, H 3O + etc.) at aqueous electrolyte/electrode interfaces. For Pt(1 1 0) and Pt(1 0 0) electrodes in 0.1 M perchloric acid solution, we did not observe any significant O-H stretching resonance. In striking contrast to the resonant SFG signal, the nonresonant SFG (NRSFG) signal varies sensitively with the applied electrochemical potential, indicating that the interaction of water molecules with platinum electrodes is relatively weak as compared to that of H + and ClO 4- ions. From changes in the NRSFG signal and on the basis of an ionic adsorption model, we can also deduce that the potential of zero charge of Pt(1 1 0) in 0.1 M HClO 4 should be located at about 0.22 V (vs. NHE). This value is in good agreement with that measured recently by electrochemical method.

355. Large-scale production of anhydrous nitric acid and nitric acid solutions of dinitrogen pentoxide

     DOEpatents

     Harrar, Jackson E.; Quong, Roland; Rigdon, Lester P.; McGuire, Raymond R.

     2001-01-01

     A method and apparatus are disclosed for a large scale, electrochemical production of anhydrous nitric acid and N.sub.2 O.sub.5. The method includes oxidizing a solution of N.sub.2 O.sub.4 /aqueous-HNO.sub.3 at the anode, while reducing aqueous HNO.sub.3 at the cathode, in a flow electrolyzer constructed of special materials. N.sub.2 O.sub.4 is produced at the cathode and may be separated and recycled as a feedstock for use in the anolyte. The process is controlled by regulating the electrolysis current until the desired products are obtained. The chemical compositions of the anolyte and catholyte are monitored by measurement of the solution density and the concentrations of N.sub.2 O.sub.4.

356. Uptake of Hypobromous Acid (HOBr) by Aqueous Sulfuric Acid Solutions: Low-Temperature Solubility and Reaction

   NASA Technical Reports Server (NTRS)

   Iraci, Laura T.; Michelsen, Rebecca R.; Ashbourn, Samatha F. M.; Rammer, Thomas A.; Golden, David M.

   2005-01-01

   Hypobromous acid (HOBr) is a key species linking inorganic bromine to the chlorine and odd hydrogen chemical families. We have measured the solubility of HOBr in 45 - 70 wt% sulfuric acid solutions representative of upper tropospheric and lower stratospheric aerosol composition. Over the temperature range 201 - 252 K, HOBr is quite soluble in sulfuric acid, with an effective Henry's law coefficient, H* = 10(exp 4) - 10(exp 7) mol/L/atm. H* is inversely dependent on temperature, with Delta H = -46.2 kJ/mol and Delta S = -106.2 J/mol/K for 55 - 70 wt% H2SO4 solutions. Our study includes temperatures which overlap both previous measurements of HOBr solubility. For uptake into aqueous 45 wt% H2SO4, the solubility can be described by log H* = 3665/T - 10.63. For 55 - 70 wt% H2SO4, log H* = 2412/T - 5.55. At temperatures colder than approx. 213 K, the solubility of HOBr in 45 wt% H2SO4 is noticeably larger than in 70 wt% H2SO4. The solubility of HOBr is comparable to that of HBr, indicating that upper tropospheric and lower stratospheric aerosols should contain equilibrium concentrations of HOBr which equal or exceed those of HBr. Our measurements indicate chemical reaction of HOBr upon uptake into aqueous sulfuric acid in the presence of other brominated gases followed by evolution of gaseous products including Br2O and Br2, particularly at 70 wt% H2SO4.

357. Extraction equilibrium of indium(III) from nitric acid solutions by di(2-ethylhexyl)phosphoric acid dissolved in kerosene.

   PubMed

   Tsai, Hung-Sheng; Tsai, Teh-Hua

   2012-01-04

   The extraction equilibrium of indium(III) from a nitric acid solution using di(2-ethylhexyl) phosphoric acid (D2EHPA) as an acidic extractant of organophosphorus compounds dissolved in kerosene was studied. By graphical and numerical analysis, the compositions of indium-D2EHPA complexes in organic phase and stoichiometry of the extraction reaction were examined. Nitric acid solutions with various indium concentrations at 25 Â°C were used to obtain the equilibrium constant of InRâ‚ƒ in the organic phase. The experimental results showed that the extraction distribution ratios of indium(III) between the organic phase and the aqueous solution increased when either the pH value of the aqueous solution and/or the concentration of the organic phase extractant increased. Finally, the recovery efficiency of indium(III) in nitric acid was measured.

358. Raman spectroscopic study of the conformation of dicarboxylic acid salts in aqueous solutions

   NASA Astrophysics Data System (ADS)

   Fukushima, Kunio; Watanabe, Toshiaki; Umemura, Matome

   1986-08-01

It is already known that the molecules of long chain monocarboxylic acid salts have a tendency to form micelles in aqueous solutions, the molecular chain taking the all- trans zigzag structure. However it is considered difficult for dicarboxylic acid salts to adopt the same structure as the monocarboxylic acid salts as they have two carboxyl groups, one on each end of the molecular chain. Therefore, a special structure is expected to exist for dicarboxylic acid salts in aqueous solution. In order to examine this, Raman spectra of suberic acid salt and azelaic acid salt in aqueous solution were measured and the normal vibrational calculation carried out, showing that dicarboxylic acid salts have a helical structure in aqueous solution.

359. Acid Solutions for Etching Corrosion-Resistant Metals

NASA Technical Reports Server (NTRS)

Simmons, J. R.

1982-01-01

New study characterized solutions for etching austenitic stainless steels, nickel-base alloys, and titanium alloys (annealed). Solutions recommended for use remove at least 0.4 mil of metal from surface in less than an hour. Solutions do not cause intergranular attack on metals for which they are effective, when used under specified conditions.

360. 49 CFR 173.229 - Chloric acid solution or chlorine dioxide hydrate, frozen.

Code of Federal Regulations, 2012 CFR

2012-10-01

... 49 Transportation 2 2012-10-01 2012-10-01 false Chloric acid solution or chlorine dioxide hydrate... Than Class 1 and Class 7 Â§ 173.229 Chloric acid solution or chlorine dioxide hydrate, frozen. When the.... Fiberboard boxes must be reinforced and insulated and sufficient dry ice must be used to maintain the hydrate...

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361. 49 CFR 173.229 - Chloric acid solution or chlorine dioxide hydrate, frozen.

Code of Federal Regulations, 2013 CFR

2013-10-01

... 49 Transportation 2 2013-10-01 2013-10-01 false Chloric acid solution or chlorine dioxide hydrate... Than Class 1 and Class 7 Â§ 173.229 Chloric acid solution or chlorine dioxide hydrate, frozen. When the.... Fiberboard boxes must be reinforced and insulated and sufficient dry ice must be used to maintain the hydrate...

362. 49 CFR 173.229 - Chloric acid solution or chlorine dioxide hydrate, frozen.

     Code of Federal Regulations, 2010 CFR

     2010-10-01

     ... 49 Transportation 2 2010-10-01 2010-10-01 false Chloric acid solution or chlorine dioxide hydrate... Than Class 1 and Class 7 Â§ 173.229 Chloric acid solution or chlorine dioxide hydrate, frozen. When the.... Fiberboard boxes must be reinforced and insulated and sufficient dry ice must be used to maintain the hydrate...

363. 49 CFR 173.229 - Chloric acid solution or chlorine dioxide hydrate, frozen.

     Code of Federal Regulations, 2011 CFR

     2011-10-01

     ... 49 Transportation 2 2011-10-01 2011-10-01 false Chloric acid solution or chlorine dioxide hydrate... Than Class 1 and Class 7 Â§ 173.229 Chloric acid solution or chlorine dioxide hydrate, frozen. When the.... Fiberboard boxes must be reinforced and insulated and sufficient dry ice must be used to maintain the hydrate...

364. 49 CFR 173.229 - Chloric acid solution or chlorine dioxide hydrate, frozen.

     Code of Federal Regulations, 2014 CFR

     2014-10-01

     ... 49 Transportation 2 2014-10-01 2014-10-01 false Chloric acid solution or chlorine dioxide hydrate... Than Class 1 and Class 7 Â§ 173.229 Chloric acid solution or chlorine dioxide hydrate, frozen. When the.... Fiberboard boxes must be reinforced and insulated and sufficient dry ice must be used to maintain the hydrate...

365. Chemical evaluation of soil-solution in acid forest soils

     USGS Publications Warehouse

     Lawrence, G.B.; David, M.B.

     1996-01-01

     Soil-solution chemistry is commonly studied in forests through the use of soil lysimeters.This approach is impractical for regional survey studies, however, because lysimeter installation and operation is expensive and time consuming. To address these problems, a new technique was developed to compare soil-solution chemistry among red spruce stands in New York, Vermont, New Hampshire, Maine. Soil solutions were expelled by positive air pressure from soil that had been placed in a sealed cylinder. Before the air pressure was applied, a solution chemically similar to throughfall was added to the soil to bring it to approximate field capacity. After the solution sample was expelled, the soil was removed from the cylinder and chemically analyzed. The method was tested with homogenized Oa and Bs horizon soils collected from a red spruce stand in the Adirondack Mountains of New York, a red spruce stand in east-central Vermont, and a mixed hardwood stand in the Catskill Mountains of New York. Reproducibility, effects of varying the reaction time between adding throughfall and expelling soil solution (5-65 minutes) and effects of varying the chemical composition of added throughfall, were evaluated. In general, results showed that (i) the method was reproducible (coefficients of variation were generally < 15%), (ii) variations in the length of reaction-time did not affect expelled solution concentrations, and (iii) adding and expelling solution did not cause detectable changes in soil exchange chemistry. Concentrations of expelled solutions varied with the concentrations of added throughfall; the lower the CEC, the more sensitive expelled solution concentrations were to the chemical concentrations of added throughfall. Addition of a tracer (NaBr) showed that the expelled solution was a mixture of added solution and solution that preexisted in the soil. Comparisons of expelled solution concentrations with concentrations of soil solutions collected by zero-tension and

366. Sonolytic degradation of butyric acid in aqueous solutions.

    PubMed

    DÃ¼kkancÄ±, Meral; GÃ¼ndÃ¼z, GÃ¶nÃ¼l

    2013-11-15

    The sonolytic degradation of butyric acid was investigated in an ultrasonic reactor emitting waves at 850Â kHz. The effects of the ultrasonic power, the initial concentration of butyric acid, and the addition of H_2O_2 were studied on the degradation of butyric acid. In the sonication of butyric acid, degradation degrees as high as 31.5% could be achieved at a power of 31Â W, at an initial concentration of 2.8Â mM butyric acid with the addition of 0.34Â M H_2O_2 for a sonication time of 5Â h. The degradation of butyric acid increased with irradiation time, indicating first order kinetics. Copyright Â© 2013 Elsevier Ltd. All rights reserved.

367. A 25% tannic acid solution as a root canal irrigant cleanser: a scanning electron microscope study.

    PubMed

    Bitter, N C

    1989-03-01

    A scanning electron microscope was used to evaluate the cleansing properties of a 25% tannic acid solution on the dentinal surface in the pulp chamber of endodontically prepared teeth. This was compared with the amorphous smear layer of the canal with the use of hydrogen peroxide and sodium hypochlorite solution as an irrigant. The tannic acid solution removed the smear layer more effectively than the regular cleansing agent.

368. Isolation of nonvolatile, organic solutes from natural waters by zeotrophic distillation of water from N,N-dimethylformamide

    USGS Publications Warehouse

    Leenheer, J.A.; Brown, P.A.; Stiles, E.A.

    1987-01-01

    Nonvolatile, organic solutes that comprise the dissolved organic carbon (DOC) in saline waters were isolated by removal of the water by distillation from a N,N-dimethylformamideformic acid-acetonitrile mixture. Salts isolated with the DOC were removed by crystallization of sodium chloride and sodium sulfate from the solvent mixture, removal of silicic acid by acidification and precipitation, removal of boric acid by methylation and volatilization, and removal of phosphate by zinc acetate precipitation. Chemical alteration of the organic solutes was minimized during evaporative concentration steps by careful control of acid concentrations in the solvent mixture and was minimized during drying by conversion of the samples to pyridinium and sodium salts. Recoveries of various hydrophilic organic standards from aqueous salt solutions and recoveries of natural organic solutes from various water samples varied from 60 to 100%. Losses of organic solutes during the isolation procedure were nonselective and related to the number of salt- and precipitate-washing cycles in the procedure.

369. Direct sensing of fluoride in aqueous solutions using a boronic acid based sensor.

PubMed

Wu, Xin; Chen, Xuan-Xuan; Song, Bing-Nan; Huang, Yan-Jun; Ouyang, Wen-Juan; Li, Zhao; James, Tony D; Jiang, Yun-Bao

2014-11-21

Binding of the fluoride ion triggers aggregation of a pyreneboronic acid-catechol ensemble in acidic aqueous solutions, giving rise to intense excimer emission, allowing for sensitive fluoride ion sensing at ppm levels, with an apparent fluoride binding constant higher than 10(3) M(-1) which is unprecedented for boronic acid sensors in water.

370. Solution properties and taste behavior of lactose monohydrate in aqueous ascorbic acid solutions at different temperatures: Volumetric and rheological approach.

PubMed

Sarkar, Abhijit; Sinha, Biswajit

2016-11-15

The densities and viscosities of lactose monohydrate in aqueous ascorbic acid solutions with several molal concentrations m=(0.00-0.08)molkg(-1) of ascorbic acid were determined at T=(298.15-318.15)K and pressure p=101kPa. Using experimental data apparent molar volume (Ï•V), standard partial molar volume (Ï•V(0)), the slope (SV(âˆ—)), apparent specific volumes (Ï•Vsp), standard isobaric partial molar expansibility (Ï•E(0)) and its temperature dependence [Formula: see text] the viscosity B-coefficient and solvation number (Sn) were determined. Viscosity B-coefficients were further employed to obtain the free energies of activation of viscous flow per mole of the solvents (Î”Î¼1(0â‰)) and of the solute (Î”Î¼2(0â‰)). Effects of molality, solute structure and temperature and taste behavior were analyzed in terms of solute-solute and solute-solvent interactions; results revealed that the solutions are characterized predominantly by solute-solvent interactions and lactose monohydrate behaves as a long-range structure maker. Copyright Â© 2016 Elsevier Ltd. All rights reserved.

371. Removal of radium from acidic solutions containing same by adsorption on coal fly ash

DOEpatents

Scheitlin, Frank M.

1984-01-01

The invention is a process for the removal of radium from acidic aqueous solutions. In one aspect, the invention is a process for removing radium from an inorganic-acid solution. The process comprises contacting the solution with coal fly ash to effect adsorption of the radium on the ash. The radium-containing ash then is separated from the solution. The process is simple, comparatively inexpensive, and efficient. High radium-distribution coefficients are obtained even at room temperature. Coal fly ash is an inexpensive, acid-resistant, high-surface-area material which is available in large quantities throughout the United States. The invention is applicable, for example, to the recovery of .sup.226 Ra from nitric acid solutions which have been used to leach radium from uranium-mill tailings.

372. Process for the removal of radium from acidic solutions containing same

DOEpatents

Scheitlin, F.M.

The invention is a process for the removal of radium from acidic aqueous solutions. In one aspect, the invention is a process for removing radium from an inorganic-acid solution. The process comprises contacting the solution with coal fly ash to effect adsorption of the radium on the ash. The radium-containing ash then is separated from the solution. The process is simple, comparatively inexpensive, and efficient. High radium-distribution coefficients are obtained even at room temperature. Coal fly ash is an inexpensive, acid-resistant, high-surface-area material which is available in large quantities throughout the United States. The invention is applicable, for example, to the recovery of /sup 226/Ra from nitric acid solutions which have been used to leach radium from uranium-mill tailings.

373. Acid-base equilibrium in aqueous solutions of 1,3-dimethylbarbituric acid as studied by 13C NMR spectroscopy

NASA Astrophysics Data System (ADS)

Gryff-Keller, A.; Kraska-Dziadecka, A.

2011-12-01

13C NMR spectra of 1,3-dimethylbarbituric acid in aqueous solutions of various acidities and for various solute concentrations have been recorded and interpreted. The spectra recorded at pH = 2 and below contain the signals of the neutral solute molecule exclusively, while the ones recorded at pH = 7 and above only the signals of the appropriate anion, which has been confirmed by theoretical GIAO-DFT calculations. The signals in the spectra recorded for solutions of pH < 7 show dynamic broadenings. The lineshape analysis of these signals has provided information on the kinetics of the processes running in the dynamic acid-base equilibrium. The kinetic data determined this way have been used to clarify the mechanisms of these processes. The numerical analysis has shown that under the investigated conditions deprotonation of the neutral solute molecules undergoes not only via a simple transfer of the C-H proton to water molecules but also through a process with participation of the barbiturate anions. Moreover, the importance of tautomerism, or association, or both these phenomena for the kinetics of the acid-base transformations in the investigated system has been shown. Qualitatively similar changes of 13C NMR spectra with the solution pH variation have been observed for the parent barbituric acid.

374. Discoloration of titanium alloy in acidic saline solutions with peroxide.

PubMed

Takemoto, Shinji; Hattori, Masayuki; Yoshinari, Masao; Kawada, Eiji; Oda, Yutaka

2013-01-01

The objective of this study was to compare corrosion behavior in several titanium alloys with immersion in acidulated saline solutions containing hydrogen peroxide. Seven types of titanium alloy were immersed in saline solutions with varying levels of pH and hydrogen peroxide content, and resulting differences in color and release of metallic elements determined in each alloy. Some alloys were characterized using Auger electron spectroscopy. Ti-55Ni alloy showed a high level of dissolution and difference in color. With immersion in solution containing hydrogen peroxide at pH 4, the other alloys showed a marked difference in color but a low level of dissolution. The formation of a thick oxide film was observed in commercially pure titanium showing discoloration. The results suggest that discoloration in titanium alloys immersed in hydrogen peroxide-containing acidulated solutions is caused by an increase in the thickness of this oxide film, whereas discoloration of Ti-55Ni is caused by corrosion.

375. Hydrophobic interactions between polymethacrylic acid and sodium laureth sulfate in aqueous solutions

     NASA Astrophysics Data System (ADS)

     Yaremko, Z. M.; Fedushinskaya, L. B.; Burka, O. A.; Soltys, M. N.

     2014-09-01

     The role of hydrophobic interaction in the development of associative processes is demonstrated, based on the concentration dependences of the viscosity and pH of binary solutions of polymethacrylic acid as an anionic polyelectrolyte and sodium laureth sulfate as an anionic surfactant. It is found that the inflection point on the dependence of the difference between the pH values of binary solutions of polymethacrylic acid and sodium laureth sulfate on the polyelectrolyte concentration is a criterion for determining the predominant contribution from hydrophobic interaction, as is the inflection point on the dependence of pH of individual solutions of polymethacrylic acid on the polyelectrolyte concentration.

376. Reprocessing system with nuclide separation based on chromatography in hydrochloric acid solution

     SciTech Connect

     Suzuki, Tatsuya; Tachibana, Yu; Koyama, Shi-ichi

     2013-07-01

     We have proposed the reprocessing system with nuclide separation processes based on the chromatographic technique in the hydrochloric acid solution system. Our proposed system consists of the dissolution process, the reprocessing process, the minor actinide separation process, and nuclide separation processes. In the reprocessing and separation processes, the pyridine resin is used as a main separation media. It was confirmed that the dissolution in the hydrochloric acid solution is easily achieved by the plasma voloxidation and by the addition of oxygen peroxide into the hydrochloric acid solution.

377. PROCESS OF SECURING PLUTONIUM IN NITRIC ACID SOLUTIONS IN ITS TRIVALENT OXIDATION STATE

     DOEpatents

     Thomas, J.R.

     1958-08-26

     >Various processes for the recovery of plutonium require that the plutonium be obtalned and maintained in the reduced or trivalent state in solution. Ferrous ions are commonly used as the reducing agent for this purpose, but it is difficult to maintain the plutonium in a reduced state in nitric acid solutions due to the oxidizing effects of the acid. It has been found that the addition of a stabilizing or holding reductant to such solution prevents reoxidation of the plutonium. Sulfamate ions have been found to be ideally suitable as such a stabilizer even in the presence of nitric acid.

378. Effects of the pH and Concentration on the Stability of Standard Solutions of Proteinogenic Amino Acid Mixtures.

     PubMed

     Kato, Megumi; Yamazaki, Taichi; Kato, Hisashi; Yamanaka, Noriko; Takatsu, Akiko; Ihara, Toshihide

2017-01-01

To prepare metrologically traceable amino acid mixed standard solutions, it is necessary to determine the stability of each amino acid present in the mixed solutions. In the present study, we prepared amino acid mixed solutions using certified reference standards of 17 proteinogenic amino acids, and examined the stability of each of these amino acids in 0.1 N HCl. We found that the concentration of glutamic acid decreased significantly during storage. LC/MS analysis indicated that the instability of glutamic acid was due to the partial degradation of glutamic acid to pyroglutamic acid in 0.1 N HCl. Using accelerated degradation tests, we investigated several solvent compositions to improve the stability of glutamic acid in amino acid mixed solution, and determined that the change of the pH by diluting the mixed solution improved the stability of glutamic acid.

379. Reactivity of the cadmium ion in concentrated phosphoric acid solutions.

PubMed

De Gyves, J; Gonzales, J; Louis, C; Bessiere, J

1989-07-01

The solvation transfer coefficients which characterize the changes of ion reactivity with phosphoric acid concentration have been calculated for cadmium from the constants of the successive chloride complexes, and for silver and diethyldithiophosphate from potentiometric measurements. They evidence the strong desolvation of the cadmium species in concentrated phosphoric acid media, causing a remarkable increase of its reactivity. They allow the results of liquid-liquid extraction, precipitation and flotation reactions to be correctly interpreted and their changes to be foreseen when the reagents are modified.

380. Molecular dynamics study on glycolic acid in the physiological salt solution

NASA Astrophysics Data System (ADS)

Matsunaga, S.

2018-05-01

Molecular dynamics (MD) study on glycolic acid in the physiological salt solution has been performed, which is a model of a biofuel cell. The structure and charge distribution of glycolic acid in aqueous solution used in MD is beforehand optimized by Gaussian09 utilizing the density functional theory. MD is performed in the NTV constant condition, i.e. the number of particles, temperature, and volume of MD cell are definite. The structure difference of the glycolic acid and oxalic acid is detected by the water distribution around the molecules using the pair distribution functions, gij(r), and the frequency dependent diffusion coefficients, Di(Î½). The anomalous dielectric constant of the solution, i.e. about 12 times larger than that of water, has been obtained, which may be attributed to the ion pair formation in the solution.

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381. Effect of citric acid on the acidification of artificial pepsin solution for metacercariae isolation from fish.

PubMed

Kim, Min-Ki; Pyo, Kyoung-Ho; Hwang, Young-Sang; Chun, Hyang Sook; Park, Ki Hwan; Ko, Seong-Hee; Chai, Jong-Yil; Shin, Eun-Hee

2013-11-15

Artificial digestive solution based on pepsin is essential for collecting metacercariae from fish. To promote the enzymatic reactivity of pepsin, the pH of the solution has to be adjusted to pH 1.0-2.0. Hydrochloride (HCl) is usually used for this purpose, but the use of HCl raises safety concerns. The aim of this work was to address the usefulness of citric acid as an alternative for HCl for the acidification of pepsin solution, and to examine its potential to damage metacercariae during in vitro digestion as compared with HCl. Changes in pH after adding 1-9% of citric acid (m/v) to pepsin solution were compared to a 1% HCl (v/v) addition. Digestion of fish muscle was evaluated by measuring released protein concentrations by spectrophotometry. In addition, survival rates of metacercariae in pepsin solution were determined at different citric acid concentrations and were compared that of with 1% HCl. The present study shows that addition of citric acid reduced the pH of pepsin solutions to the required level. Addition of more than 5% of citric acid resulted in the effective digestion of fish muscle over 3h in vitro, and 5% citric acid was less lethal to metacercariae than 1% HCl in pepsin solution. Pepsin solution containing 5% citric acid had digestive capacity superior to pepsin solution containing 1% HCl after 3h incubation with released protein concentrations of 12.0 ng/ml for 5% citric acid and 9.6 ng/ml for 1% HCl. Accordingly, the present study suggests that the addition of 5% citric acid to pepsin solution is a good alternative to 1% HCl in infection studies because citric acid is a stable at room temperature and has a good safety profile. In addition, we suggest that the use of citric acid enables the preparation of commercial digestive solutions for the detection of microorganisms in fish and other vertebrate muscle tissue. Copyright Â© 2013 The Authors. Published by Elsevier B.V. All rights reserved.

382. An investigation into the stability and sterility of citric acid solutions used for cough reflex testing.

PubMed

Falconer, James R; Wu, Zimei; Lau, Hugo; Suen, Joanna; Wang, Lucy; Pottinger, Sarah; Lee, Elaine; Alazawi, Nawar; Kallesen, Molly; Gargiulo, Derryn A; Swift, Simon; Svirskis, Darren

2014-10-01

Citric acid is used in cough reflex testing in clinical and research settings to assess reflexive cough in patients at risk of swallowing disorders. To address a lack of knowledge in this area, this study investigated the stability and sterility of citric acid solutions. Triplicate solutions of citric acid (0.8Â M) in isotonic saline were stored at 4Â Â±Â 2Â Â°C for up to 28Â days and analysed by high-performance liquid chromatography. Microbiological sterility of freshly prepared samples and bulk samples previously used for 2Â weeks within the hospital was determined using a pour plate technique. Microbial survival in citric acid was determined by inoculating Staphylococcus aureus, Escherichia coli, or Candida albicans into citric acid solution and monitoring the number of colony-forming units/mL over 40Â min. Citric acid solutions remained stable at 4Â Â°C for 28Â days (98.4Â Â±Â 1.8Â % remained). The freshly prepared and clinical samples tested were sterile. However, viability studies revealed that citric acid solution allows for the survival of C. albicans but not for S. aureus or E. coli. The microbial survival study showed that citric acid kills S. aureus and E. coli but has no marked effect on C. albicans after 40Â min. Citric acid samples at 0.8Â M remained stable over the 4-week testing period, with viable microbial cells absent from samples tested. However, C. albicans has the ability to survive in citric acid solution if inadvertently introduced in practice. For this reason, in clinical and research practice it is suggested to use single-use aliquots prepared aseptically which can be stored for up to 28Â days at 4Â Â°C.

383. Salicylic acid peels versus Jessner's solution for acne vulgaris: a comparative study.

PubMed

Bae, Byung Gi; Park, Chang Ook; Shin, Hyoseung; Lee, Soo Hyun; Lee, Yun Sun; Lee, Sang Ju; Chung, Kee Yang; Lee, Kwang Hoon; Lee, Ju Hee

2013-02-01

Salicylic acid was recently formulated in a hydroethanolic vehicle at a concentration of 20% to 30%. Salicylic acid has strong comedolytic effects because of its lipophilic nature. To compare the therapeutic efficacy and tolerability of salicylic acid peels with those of Jessner's solution peels in patients with acne vulgaris. Thirteen patients (13 men; mean age 22.6, range 20-28) with facial acne were enrolled. Jessner's solution was applied to one side of each patient's face and 30% salicylic acid to the other in three sessions at 2-week intervals. A blinded investigator counted noninflammatory and inflammatory lesions before treatment and 2Â weeks after each treatment. Inflammatory and noninflammatory acne lesion counts decreased in proportion to the duration of treatment. Inflammatory acne lesion counts did not differ significantly between salicylic acid and Jessner's solution peels, although in terms of noninflammatory acne lesion counts, sites treated with salicylic acid showed significant improvement (pÂ =Â .04), whereas those treated with Jessner's solution did not. We found that 30% salicylic acid peels were effective for inflammatory acne and more effective than Jessner's solution peels for treating noninflammatory acne. Â© 2012 by the American Society for Dermatologic Surgery, Inc. Published by Wiley Periodicals, Inc.

384. Treatment of infectious skin defects or ulcers with electrolyzed strong acid aqueous solution.

PubMed

Sekiya, S; Ohmori, K; Harii, K

1997-01-01

A chronic ulcer with an infection such as methicillin-resistant Staphylococcus aureus is hard to heal. Plastic and reconstructive surgeons often encounter such chronic ulcers that are resistant to surgical or various conservative treatments. We applied conservative treatment using an electrolyzed strong acid aqueous solution and obtained satisfactory results. The lesion was washed with the solution or soaked in a bowl of the solution for approximately 20 min twice a day. Fresh electrolyzed strong acid aqueous solution is unstable and should be stored in a cool, dark site in a sealed bottle. It should be used within a week after it has been produced. Here we report on 15 cases of infectious ulcers that were treated by electrolyzed strong acid aqueous solution. Of these cases, 7 patients were healed, 3 were granulated, and in 5, infection subsided. In most cases the lesion became less reddish and less edematous. Discharge or foul odor from the lesion was decreased. Electrolyzed strong acid aqueous solution was especially effective for treating a chronic refractory ulcer combined with diabetes melitus or peripheral circulatory insufficiency. This clinically applied therapy of electrolyzed strong acid aqueous solution was found to be effective so that this new therapeutic technique for ulcer treatment can now be conveniently utilized.

385. The dissolution of quartz in dilute aqueous solutions of organic acids at 25Â°C

USGS Publications Warehouse

Bennett, P.C.; Melcer, M.E.; Siegel, D.I.; Hassett, J.P.

1988-01-01

The dissolution of quartz in dilute aqueous solutions of organic acids at 25Â° and standard pressure was investigated by the batch dissolution method. The bulk dissolution rate of quartz in 20 mmole/Kg citrate solutions at pH 7 was 8 to 10 times faster than that in pure water. After 1750 hours the concentration of dissolved silica in the citrate solution was 167 Î¼mole/Kg compared to 50 Î¼mole/Kg in water and a 20 mmole/Kg solution of acetate at pH 7. Solutions of salicylic, oxalic, and humic acids also accelerated the dissolution of quartz in aqueous solution at pH 7. The rate of dissolution in organic acids decreased sharply with decreasing pH.The possibility of a silica-organic acid complex was investigated using UV-difference spectroscopy. Results suggest that dissolved silica is complexed by citrate, oxalate and pyruvate at pH 7 by an electron-donor acceptor complex, whereas no complexation occurs between silica and acetate, lactate, malonate, or succinate. Three models are proposed for the solution and surface complexation of silica by organic acid anions which result in the accelerated dissolution and increased solubility of quartz in organic rich water.

386. Kinetics of reactions of aquacobalamin with aspartic and glutamic acids and their amides in water solutions

NASA Astrophysics Data System (ADS)

Bui, T. T. T.; Sal'nikov, D. S.; Dereven'kov, I. A.; Makarov, S. V.

2017-04-01

The kinetics of aquacobalamin reaction with aspartic and glutamic acids, and with their amides in water solutions, is studied via spectrophotometry. The kinetic and activation parameters of the process are determined. It is shown that the reaction product is cobalamin-amino acid complex. The data are compared to results on the reaction between aquacobalamin and primary amines.

387. DYNAMIC CONDUCTIVITY MEASUREMENTS IN HUMIC AND FULVIC ACID SOLUTIONS. (R828158)

EPA Science Inventory

Conductivity changes of dilute aqueous humic and fulvic acids solutions were monitored after the addition of small quantities of Cu, Cd, Pb, and Zn. The solutions were stirred at a constant and reproducible rate, and measurements proceeded until stable conductivities were atta...

388. Effect of amino acids on the eutectic behavior of NaCl solutions studied by DSC.

PubMed

Chen, N J; Morikawa, J; Hashimoto, T

2005-06-01

The effect of a series of amino acids on the eutectic behavior of NaCl solutions at isotonic concentration has been studied by differential scanning calorimetry. The inclusion of different amino acids had different effects on eutectic formation. The amino acids were grouped into four categories based on their effect on eutectic formation: category C were amino acids that had no effect on eutectic formation; category D amino acids inhibited eutectic formation; category T amino acids shifted the melting of the eutectic to a lower temperature; category E amino acids caused the formation of a new eutectic with a melting temperature approximately -5 degrees C. The mechanism of these different effects on eutectic behavior is discussed, based on the chemical structure of the amino acids.

389. Extraction of steroidal glucosiduronic acids from aqueous solutions by anionic liquid ion-exchangers

PubMed Central

Mattox, Vernon R.; Litwiller, Robert D.; Goodrich, June E.

1972-01-01

A pilot study on the extraction of three steroidal glucosiduronic acids from water into organic solutions of liquid ion-exchangers is reported. A single extraction of a 0.5mm aqueous solution of either 11-deoxycorticosterone 21-glucosiduronic acid or cortisone 21-glucosiduronic acid with 0.1m-tetraheptylammonium chloride in chloroform took more than 99% of the conjugate into the organic phase; under the same conditions, the very polar conjugate, Î²-cortol 3-glucosiduronic acid, was extracted to the extent of 43%. The presence of a small amount of chloride, acetate, or sulphate ion in the aqueous phase inhibited extraction, but making the aqueous phase 4.0m with ammonium sulphate promoted extraction strongly. An increase in the concentration of ion-exchanger in the organic phase also promoted extraction. The amount of cortisone 21-glucosiduronic acid extracted by tetraheptylammonium chloride over the pH range of 3.9 to 10.7 was essentially constant. Chloroform solutions of a tertiary, a secondary, or a primary amine hydrochloride also will extract cortisone 21-glucosiduronic acid from water. The various liquid ion exchangers will extract steroidal glucosiduronic acid methyl esters from water into chloroform, although less completely than the corresponding free acids. The extraction of the glucosiduronic acids from water by tetraheptylammonium chloride occurs by an ion-exchange process; extraction of the esters does not involve ion exchange. PMID:5075264

390. Method for extracting lanthanides and actinides from acid solutions by modification of Purex solvent

DOEpatents

Horwitz, E.P.; Kalina, D.G.

1984-05-21

A process has been developed for the extraction of multivalent lanthanide and actinide values from acidic waste solutions, and for the separation of these values from fission product and other values, which utilizes a new series of neutral bi-functional extractants, the alkyl(phenyl)-N, N-dialkylcarbamoylmethylphosphine oxides, in combination with a phase modifier to form an extraction solution. The addition of the extractant to the Purex process extractant, tri-n-butylphosphate in normal paraffin hydrocarbon diluent, will permit the extraction of multivalent lanthanide and actinide values from 0.1 to 12.0 molar acid solutions.

391. The amino acid's backup bone - storage solutions for proteomics facilities.

PubMed

Meckel, Hagen; Stephan, Christian; Bunse, Christian; Krafzik, Michael; Reher, Christopher; Kohl, Michael; Meyer, Helmut Erich; Eisenacher, Martin

2014-01-01

Proteomics methods, especially high-throughput mass spectrometry analysis have been continually developed and improved over the years. The analysis of complex biological samples produces large volumes of raw data. Data storage and recovery management pose substantial challenges to biomedical or proteomic facilities regarding backup and archiving concepts as well as hardware requirements. In this article we describe differences between the terms backup and archive with regard to manual and automatic approaches. We also introduce different storage concepts and technologies from transportable media to professional solutions such as redundant array of independent disks (RAID) systems, network attached storages (NAS) and storage area network (SAN). Moreover, we present a software solution, which we developed for the purpose of long-term preservation of large mass spectrometry raw data files on an object storage device (OSD) archiving system. Finally, advantages, disadvantages, and experiences from routine operations of the presented concepts and technologies are evaluated and discussed. This article is part of a Special Issue entitled: Computational Proteomics in the Post-Identification Era. Guest Editors: Martin Eisenacher and Christian Stephan. Copyright Â© 2013. Published by Elsevier B.V.

392. Solute-enhanced production of gamma-valerolactone (GVL) from aqueous solutions of levulinic acid

 DOEpatents

 Dumesic, James A.; Wettstein, Stephanie G.; Alonso, David Martin; Gurbuz, Elif Ispir

 2016-06-28

 A method to produce levulinic acid (LA) and gamma-valerolactone (GVL) from biomass-derived cellulose or lignocellulose by selective extraction of LA using GVL and optionally converting the LA so isolated into GVL, with no purifications steps required to yield the GVL.

393. Solute-enhanced production of gamma-valerolactone (GVL) from aqueous solutions of levulinic acid

 DOEpatents

 Dumesic, James A; Wettstein, Stephanie G; Alonso, David Martin; Gurbuz, Elif Ispir

 2015-02-24

 A method to produce levulinic acid (LA) and gamma-valerolactone (GVL) from biomass-derived cellulose or lignocellulose by selective extraction of LA using GVL and optionally converting the LA so isolated into GVL, with no purifications steps required to yield the GVL.

394. Comparative study of buffered 50% glycolic acid (pH 3.0) + 0.5% salicylic acid solution vs Jessner's solution in patients with acne vulgaris.

 PubMed

 In Jae, Jeong; Dong Ju, Hyun; Dong Hyun, Kim; Yoon, Moon Soo; Lee, Hee Jung

 2017-11-21

 Superficial chemical peels are frequently used in acne vulgaris treatment. Although glycolic acid (GA) has been widely used in clinical practice, its pH ranges from 0.08-2.75 and thus should be neutralized after application to avoid burns. To evaluate treatment efficacy and safety of chemical peeling using buffered 50% GA (pH 3.0)Â +Â 0.5% salicylic acid (SA) solution that does not need to be neutralized in the treatment of acne vulgaris compared to the conventional peeling using Jessner's solution. We performed a prospective, randomized, evaluator-blind, split-face clinical trial. Twenty patients were randomized by assigning one side of each patient's face to receive a 50% GA (pH 3.0)Â +Â 0.5% SA peel (GA side) and the other side to receive the Jessner's solution (Jessner's solution side). All patients underwent 2 sessions of treatment spaced 2Â weeks apart. Lesion count, acne severity, subjective efficacy assessment, and side effects were evaluated. The total lesion count was significantly reduced for the GA and Jessner's solution sides (PÂ <Â .001). However, there was no significant difference in the total lesion count, acne severity, or subjective efficacy assessment between the 2 sides (PÂ >Â .05). The GA side had fewer side effects than the Jessner's solution side. The results of this study suggest that chemical peeling using the 50% GA (pH 3.0)Â +Â 0.5% SA solution can be as effective and convenient as the conventional peeling using Jessner's solution in the treatment of acne vulgaris and may show fewer adverse events than the conventional peeling. Â© 2017 Wiley Periodicals, Inc.

395. [Dissolution of Simulated and Radioactive Savannah River Site High-Level Waste Sludges with Oxalic Acid & Citric Acid Solutions]

     [SciTech Connect]

     STALLINGS, MARY

     This report presents findings from tests investigating the dissolution of simulated and radioactive Savannah River Site sludges with 4 per cent oxalic acid and mixtures of oxalic and citric acid previously recommended by a Russian team from the Khlopin Radium Institute and the Mining and Chemical Combine (MCC). Testing also included characterization of the simulated and radioactive waste sludges. Testing results showed the following: Dissolution of simulated HM and PUREX sludges with oxalic and citric acid mixtures at SRTC confirmed general trends reported previously by Russian testing. Unlike the previous Russian testing six sequential contacts of a mixture of oxalicmoreÂ Â» acid citric acids at a 2:1 ratio (v/w) of acid to sludge did not produce complete dissolution of simulated HM and PUREX sludges. We observed that increased sludge dissolution occurred at a higher acid to sludge ratio, 50:1 (v/w), compared to the recommended ratio of 2:1 (v/w). We observed much lower dissolution of aluminum in a simulated HM sludge by sodium hydroxide leaching. We attribute the low aluminum dissolution in caustic to the high fraction of boehmite present in the simulated sludge. Dissolution of HLW sludges with 4 per cent oxalic acid and oxalic/citric acid followed general trends observed with simulated sludges. The limited testing suggests that a mixture of oxalic and citric acids is more efficient for dissolving HM and PUREX sludges and provides a more homogeneous dissolution of HM sludge than oxalic acid alone. Dissolution of HLW sludges in oxalic and oxalic/citric acid mixtures produced residual sludge solids that measured at higher neutron poison to equivalent 235U weight ratios than that in the untreated sludge solids. This finding suggests that residual solids do not present an increased nuclear criticality safety risk. Generally the neutron poison to equivalent 235U weight ratios of the acid solutions containing dissolved sludge components are lower than those in the

396. [Growth behavior of anodic porous alumina formed in malic acid solution]

     [NASA Astrophysics Data System (ADS)]

     Kikuchi, Tatsuya; Yamamoto, Tsuyoshi; Suzuki, Ryosuke O.

     2013-11-01

     The growth behavior of anodic porous alumina formed on aluminum by anodizing in malic acid solutions was investigated. High-purity aluminum plates were electropolished in $CH_3COOH/HClO_4$ solutions and then anodized in 0.5 M malic acid solutions at 293 K and constant cell voltages of 200-350 V. The anodic porous alumina grew on the aluminum substrate at voltages of 200-250 V, and a black, burned oxide film was formed at higher voltages. The nanopores of the anodic oxide were only formed at grain boundaries of the aluminum substrate during the initial stage of anodizing, and then the growth region extended to the entire aluminum surface as the anodizing time increased. The anodic porous alumina with several defects was formed by anodizing in malic acid solution at 250 V, and oxide cells were approximately 300-800 nm in diameter.

397. [Time dependent inhibition of xanthine oxidase in irradiated solutions of folic acid, aminopterin and methotrexate]

     [SciTech Connect]

     Robinson, K.; Pilot, T.F.; Meany, J.E.

     1990-01-01

The xanthine oxidase catalyzed oxidation of hypoxanthine was followed by monitoring the formation of uric acid at 290 nm. Inhibition of xanthine oxidase occurs in aqueous solutions of folic acid methotrexate and aminopterin. These compounds are known to dissociate upon exposure to ultraviolet light resulting in the formation of their respective 6-formylpteridine derivatives. The relative rates of dissociation were monitored spectrophotometrically by determining the absorbance of their 2,4-dinitrophenylhydrazine derivatives at 500 nm. When aqueous solutions of folic acid, aminopterin and methotrexate were exposed to uv light, a direct correlation was observed between the concentrations of the 6-formylpteridine derivatives existing inmoreÂ Â» solution and the ability of these solutions to inhibit xanthine oxidase. The relative potency of the respective photolysis products were estimated.Â«Â less

398. Trapping proton transfer intermediates in the disordered hydrogen-bonded network of cryogenic hydrofluoric acid solutions.

PubMed

Ayotte, Patrick; Plessis, Sylvain; Marchand, Patrick

2008-08-28

A molecular-level description of the structural and dynamical aspects that are responsible for the weak acid behaviour of dilute hydrofluoric acid solutions and their unusual increased acidity at near equimolar concentrations continues to elude us. We address this problem by reporting reflection-absorption infrared spectra (RAIRS) of cryogenic HF-H(2)O binary mixtures at various compositions prepared as nanoscopic films using molecular beam techniques. Optical constants for these cryogenic solutions [n(omega) and k(omega)] are obtained by iteratively solving Fresnel equations for stratified media. Modeling of the experimental RAIRS spectra allow for a quantitative interpretation of the complex interplay between multiple reflections, optical interference and absorption effects. The evolution of the strong absorption features in the intermediate 1000-3000 cm(-1) range with increasing HF concentration reveals the presence of various ionic dissociation intermediates that are trapped in the disordered H-bonded network of cryogenic hydrofluoric acid solutions. Our findings are discussed in light of the conventional interpretation of why hydrofluoric acid is a weak acid revealing molecular-level details of the mechanism for HF ionization that may be relevant to analogous elementary processes involved in the ionization of weak acids in aqueous solutions.

399. Acidic and basic solutions dissolve protein plugs made of lithostathine complicating choledochal cyst/pancreaticobiliary maljunction.

PubMed

Kaneko, Kenitiro; Ono, Yasuyuki; Tainaka, Takahisa; Sumida, Wataru; Ando, Hisami

2009-07-01

Symptoms of choledochal cysts are caused by protein plugs made of lithostathine, which block the long common channel and increase pancreaticobiliary ductal pressure. Agents that dissolve protein plugs can provide relief from or prevent symptoms. In the present study, drugs reportedly effective for pancreatic and biliary stones were used in dissolution tests. Protein plugs were obtained from choledochal cysts during surgery in two children (5- and 6-year-old girls). Plugs approximately 2 mm in diameter were immersed in citric acid, tartaric acid, dimethadione, bromhexine, dehydrocholic acid, sodium citrate, hydrochloric acid, and sodium hydroxide solutions under observation with a digital microscope. The pH of each solution was measured using a pH meter. Plugs dissolved in citric acid (5.2 mM; pH 2.64), tartaric acid (6.7 mM; pH 2.51), dimethadione (75 mM; pH 3.70), hydrochloric acid (0.5 mM; pH 3.13), and sodium hydroxide (75 mM; pH 12.75) solutions. Plugs did not dissolve in dimethadione (7.5 mM; pH 4.31), bromhexine (0.1%; pH 4.68), dehydrocholic acid (5%; pH 7.45), and sodium citrate (75 mM; pH

7.23) solutions. Protein plugs in choledochal cysts are dissolved in acidic and basic solutions, which may eliminate longitudinal electrostatic interactions of the lithostathine protofibrils.

400. Partitioning of Lysolipids, Fatty Acids and Their Mixtures in Aqueous Lipid Bilayers: Solute Concentration / Composition Effects

     PubMed Central

     Singh, Jasmeet; Lai, Amy Jo; Alaee, Yasmin; Ranganathan, Radha

     2013-01-01

     Distribution of lysopalmitoylphosphatidylcholine (LPPC), Palmitic acid (PA) and their 1:1 mixtures between water and dipalmitoylphosphatidylcholine (DPPC) bilayer were determined using a fluorescence probe that selectively detects only the solutes in water. Water solute concentrations were obtained at each of several lipid concentrations. Dynamic Light Scattering experiments confirmed that the lipid/solute aggregates were vesicles in the concentration range investigated. Lipid concentration dependence of the solute component in water was fit to a thermodynamic model of solute distribution between two coexisting solvents. Water/bilayer partition coefficient and the free energy of transfer, for each of these solutes were determined from the fit. Main findings are: (1) Water/bilayer partition coefficient of solute is greater for 2 to 10 % solute mole fraction than for 0 to 2 %, signaling solute induced bilayer perturbation that increases bilayer solubility, beginning at 2 % solute mole fraction. (2) Partition coefficients are in the order LPPCsolute solubility in the bilayer-gel phase and lack of it in the bilayer-liquid phase when LPPC and PA are present together. Implications of the solute concentration / composition and bilayer phase dependences of the partition coefficients to the reported solute induced enhancements in transmembrane permeability are discussed. PMID:24099742

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401. Changes in properties of polyacid-modified composite resins (compomers) following storage in acidic solutions.

     PubMed

     Nicholson, J W; Gjorgievska, E; Bajraktarova, B; McKenzie, M A

     2003-06-01

     The interaction of three polyacid-modified composite resins (compomers) with various acidic storage solutions, and also water, over periods of time up to 6 months has been studied and compared with those of a glass-ionomer and a composite resin. This interaction has been shown to vary in a complex way with length of storage and nature of the acid, and citric acid was found to be the most aggressive storage medium for glass-ionomer cement, and also for the compomers. The pure composite resin, by contrast, was relatively unaffected by all of the acid solutions examined. In all acids, the compomers showed a distinct buffering effect, i.e. they increased the pH towards neutral, as did the glass-ionomer. The extent of this also varied with duration of storage and nature of the acid. The biaxial flexure strength was determined and found to be essentially unaffected by the complex chemical interactions with acidic storage solutions. Values obtained for the compomers were lower than those of the composite resin, but above those of the glass-ionomer. Fourier-transform infrared (FT-IR) spectroscopy was employed to study the changes in the compomers following storage in the aqueous media, but bands were broad and no detailed assignments could be made. There were changes in the region of the spectra associated with metal carboxylates however, and this indicates that the secondary acid-base reaction had occurred following water uptake.

402. Radiolysis of poly(acrylic acid) in aqueous solution

NASA Astrophysics Data System (ADS)

Ulanski, Piotr; Bothe, Eberhard; Hildenbrand, Knut; Rosiak, Janusz M.; von Sonntag, Clemens

1995-02-01

Poly(acrylic acid), PAA, reacts with OH-radicals yielding -CHî—¸CH(CO 2H)- (Î²-radicals) and -CH 2î—¸C(CO 2H)- (Î±-radicals) in a ratio of approximately 2:1. This estimate is based on pulse radiolysis data where the absorption spectrum of the PAA-radicals was compared with the spectra of Î±-radicals from model systems. The Î²-radicals convert slowly into Î±-radicals (k = 0.7 s -1 at pH 10). This process has also been observed by ESR. At PAA-concentrations of 10 -2 mol dm -3 chain scission dominates over other competing reactions except at low pH. The rate of chain scission was followed by pulse conductometry and in the pH range 7-9 k = 4 Ã— 10 -2s -1 was observed. Oxygen reacts with PAA-radicals with k = 3.1 Ã— 10 8 dm 3 mol -1 s -1 at pH 3.5 and k = 1.0 Ã— 10 8 dm 3 mol -1 s -1 at pH 10. The corresponding peroxyl radicals undergo slow intramolecular H-transfer yielding a UV-absorbing product whose properties are that of 1,3-diketones.

403. Acid-Base Properties of Azo Dyes in Solution Studied Using Spectrophotometry and Colorimetry

NASA Astrophysics Data System (ADS)

Snigur, D. V.; Chebotarev, A. N.; Bevziuk, K. V.

2018-03-01

Colorimetry and spectrophotometry with chemometric data processing were used to study the acid-base properties of azo dyes in aqueous solution. The capabilities of both methods were compared. Ionization constants of all the functional groups of the azo compounds studied could be determined relative to the change in the specific color difference depending on the acidity of the medium. The colorimetric functions of ion-molecular forms of azo compounds used as an analytical signal allow us to obtain complete information on the acid-base equilibrium in a wide acidity range.

404. The kinetics of oxidation of bilirubin and ascorbic acid in solution

NASA Astrophysics Data System (ADS)

Solomonov, A. V.; Rumyantsev, E. V.; Kochergin, B. A.; Antina, E. V.

2012-07-01

The results of a comparative study of the oxidation of bilirubin, ascorbic acid, and their mixture in aqueous solutions under the action of air oxygen and hydrogen peroxide are presented. The observed and true rate constants for the oxidation reactions were determined. It was shown that the oxidation of tetrapyrrole pigment occurred under these conditions bypassing the stage of biliverdin formation to monopyrrole products. Simultaneous oxidation of bilirubin and ascorbic acid was shown to be accompanied by the inhibition of ascorbic acid oxidation by bilirubin, whereas ascorbic acid itself activated the oxidation of bilirubin.

405. Separation of thorium and uranium in nitric acid solution using silica based anion exchange resin.

PubMed

Chen, Yanliang; Wei, Yuezhou; He, Linfeng; Tang, Fangdong

2016-09-30

To separate thorium and uranium in nitric acid solution using anion exchange process, a strong base silica-based anion exchange resin (SiPyR-N4) was synthesized. Batch experiments were conducted and the separation factor of thorium and uranium in 9M nitric acid was about 10. Ion exchange chromatography was applied to separate thorium and uranium in different ratios. Uranium could be eluted by 9M nitric acid and thorium was eluted by 0.1M nitric acid. It was proved that thorium and uranium can be separated and recovered successfully by this method. Copyright Â© 2016 Elsevier B.V. All rights reserved.

406. Precipitation pathways for ferrihydrite formation in acidic solutions

DOE PAGES

Zhu, Mengqiang; Khalid, Syed; Frandsen, Cathrine; ...

2015-10-03

In this study, iron oxides and oxyhydroxides form via Fe 3+ hydrolysis and polymerization in many aqueous environments, but the pathway from Fe 3+ monomers to oligomers and then to solid phase nuclei is unknown. In this work, using combined X-ray, UVâ€“vis, and MÃ¶ssbauer spectroscopic approaches, we were able to identify and quantify the long-time sought ferric speciation over time during ferric oxyhydroxide formation in partially-neutralized ferric nitrate solutions ([Fe 3+] = 0.2 M, 1.8 < pH < 3). Results demonstrate that Fe exists mainly as Fe(H 2O) 6 3+, Î¼-oxo aquo dimers and ferrihydrite, and that with time, themoreÂ Â» Î¼-oxo dimer decreases while the other two species increase in their concentrations. No larger Fe oligomers were detected. Given that the structure of the Î¼-oxo dimer is incompatible with those of all Fe oxides and oxyhydroxides, our results suggest that reconfiguration of the Î¼-oxo dimer structure occurs prior to further condensation leading up to the nucleation of ferrihydrite. The structural reconfiguration is likely the rate-limiting step involved in the nucleation process.Â«Â less

407. THE ACCURATE DETERMINATION OF MICROGRAM AMOUNTS OF BORON IN ALUMINUM AND ALUMINUM-URANIUM ALLOYS BY THE METHYL BORATE-CURCUMIN-OXALIC ACID METHOD

SciTech Connect

Crocker, I.H.

1958-10-01

A method was developed for the deternninntion of boron in aluminum and aluminum--uranium alloys in which the boron concentration is 30 ppm or more. Boron is separated by distillation as methyl borate from a hydrochloric acid solution of the alloy and is determined spectrophotometrically by the boric acid--

curcumin-oxalic acid color reaction. A precision of plus or minus 2% is attain able when the determination is penformed with the utmost care. The accuracy is such that no bias need be given when a calibration curve is used. (auth)

408. Isotherm-Based Thermodynamic Models for Solute Activities of Organic Acids with Consideration of Partial Dissociation.

PubMed

Nandy, Lucy; Ohm, Peter B; Dutcher, Cari S

2016-06-23

Organic acids make up a significant fraction of the organic mass in atmospheric aerosol particles. The calculation of gas-liquid-solid equilibrium partitioning of the organic acid is therefore critical for accurate determination of atmospheric aerosol physicochemical properties and processes such as new particle formation and activation to cloud condensation nuclei. Previously, an adsorption isotherm-based statistical thermodynamic model was developed for capturing solute concentration-activity relationships for multicomponent aqueous solutions over the entire concentration range (Dutcher et al. J. Phys. Chem. C/A 2011, 2012, 2013), with model parameters for energies of adsorption successfully related to dipole-dipole electrostatic forces in solute-solvent and solvent-solvent interactions for both electrolytes and organics (Ohm et al. J. Phys. Chem. A 2015). However, careful attention is needed for weakly dissociating semivolatile organic acids. Dicarboxylic acids, such as malonic acid and glutaric acid are treated here as a mixture of nondissociated organic solute (HA) and dissociated solute (H(+) + A(-)). It was found that the apparent dissociation was greater than that predicted by known dissociation constants alone, emphasizing the effect of dissociation on osmotic and activity coefficient predictions. To avoid additional parametrization from the mixture approach, an expression was used to relate the Debye-HÃ¼ckel hard-core collision diameter to the adjustable solute-solvent intermolecular distance. An improved reference state treatment for electrolyte-organic aqueous mixtures, such as that observed here with partial dissociation, has also been proposed. This work results in predictive correlations for estimation of organic acid and water activities for which there is little or no activity data.

409. Hydrogen peroxide generation in a model paediatric parenteral amino acid solution.

PubMed

Brawley, V; Bhatia, J; Karp, W B

1993-12-01

1. Parenteral amino acid solutions undergo photooxidation, which may be an important factor in total parenteral nutrition-associated hepatic dysfunction. Light-exposed parenteral solutions containing amino acids, in addition to vitamins and trace minerals, generate free radicals, which, in turn, may contribute to this type of injury. This study examined the characteristics of H_2O_2 production in a parenteral amino acid solution modelled on a commercially available paediatric parenteral amino acid solution. 2. The solution was exposed to light in the presence of riboflavin-5'-monophosphate (riboflavin), and peroxide formation in the presence and absence of catalase (H_2O_2 formation) was assayed using potassium iodide/molybdate. 3. Peak H_2O_2 production occurred at a light intensity of 8 microW cm-2 nm-1 in the 425-475 nm waveband and was linear to 2 h of light exposure. H_2O_2 production reached 500 mumol/l at 24 h. 4. H_2O_2 was directly related to a riboflavin concentration of up to 20 mumol/l and was maximal at 30 mumol/l. 5. H_2O_2 production was greatest in the amino acid/riboflavin solution at a pH of between 5 and 6. 6. Under the conditions of light exposure intensity, light exposure time, riboflavin concentration and pH found during the administration of parenteral nutrition in neonatal intensive care units, net H_2O_2 production occurs in solutions modelled on a paediatric parenteral amino acid preparation.

410. Electrothermal vaporization of mineral acid solutions in inductively coupled plasma mass spectrometry: comparison with sample nebulization

     NASA Astrophysics Data System (ADS)

     Mora, Juan; Gras, Luis; van Veen, Eric H.; de Loos-Vollebregt, Margaretha T. C.

     1999-06-01

     The analytical behaviour of an electrothermal vaporization (ETV) device for the introduction of mineral acid solutions in inductively coupled plasma mass spectrometry (ICP-MS) was evaluated. Water, nitric acid, hydrochloric acid, perchloric acid and sulphuric acid in concentrations within the 0.05-1.0 mol l-1 range were studied. For all the acids tested, increasing the acid concentration increases the ion signal and deteriorates the precision. The magnitude of the signal enhancement depends on the analyte and on the acid considered. Acid solutions give rise to ion signals that are between 2 and 10 times higher than those with water. Among the acids tested, sulphuric acid provides the highest signals. The addition of palladium reduces matrix effects due to the acids and increases the signal in ETV ICP-MS. In comparison with conventional sample nebulization (CS), the ETV sample introduction system provides higher sensitivities (between 2 and 20 times higher) at the same acid concentration. The magnitude of this improvement is similar to that obtained with a microwave desolvation system (MWDS). The ETV sample introduction system gives rise to the lowest background signals from matrix-induced species. Due to this fact, the limits of detection (LODs) obtained for the isotopes affected by any interference are lower for ETV sample introduction than those obtained with the CS and the MWDS. For the isotopes that do not suffer from matrix-induced spectral interferences, the ETV gives rise to LODs higher than those obtained with the CS. For these isotopes the lowest LODs are obtained with MWDS.

411. Gamma-irradiation of malic acid in aqueous solutions. [prebiotic significance

     NASA Technical Reports Server (NTRS)

     Negron-Mendoza, A.; Graff, R. L.; Ponnamperuma, C.

     1980-01-01

     The gamma-irradiation of malic acid in aqueous solutions was studied under initially oxygenated and oxygen-free conditions in an attempt to determine the possible interconversion of malic acid into other carboxylic acids, specifically those associated with Krebs cycle. The effect of dose on product formation of the system was investigated. Gas-liquid chromatography combined with mass spectrometry was used as the principal means of identification of the nonvolatile products. Thin layer chromatography and direct probe mass spectroscopy were also employed. The findings show that a variety of carboxylic acids are formed, with malonic and succinic acids in greatest abundance. These products have all been identified as being formed in the gamma-irradiation of acetic acid, suggesting a common intermediary. Since these molecules fit into a metabolic cycle, it is strongly suggestive that prebiotic pathways provided the basis for biological systems.

412. Formation of amino acids by cobalt-60 irradiation of hydrogen cyanide solutions

     NASA Technical Reports Server (NTRS)

     Sweeney, M. A.; Toste, A. P.; Ponnamperuma, C.

     1976-01-01

     Experiments were conducted to study the pathway for the prebiotic origin of amino acids from hydrogen cyanide (HCN) under the action of ionizing radiation considered as an effective source of energy on the primitive earth. The irradiations were performed in a cobalt-60 source with a dose rate of 200,000 rad/hr.

Seven naturally occurring amino acids are identified among the products formed by the hydrolysis of gamma-irradiated solutions of HCN: glycine, alanine, valine, serine, threonine, aspartic acid, and glutamic acid. The identity of these amino acids is established by gas chromatography and mass spectrometry. Control experiments provided evidence that the amino acids are not the result of contamination.

413. Radiation-induced degradation of cyclohexanebutyric acid in aqueous solutions by gamma ray irradiation

NASA Astrophysics Data System (ADS)

Jia, Wenbao; He, Yanquan; Ling, Yongsheng; Hei, Daqian; Shan, Qing; Zhang, Yan; Li, Jiatong

2015-04-01

The radiation-induced degradation of cyclohexanebutyric acid under gamma ray irradiation was investigated. Degradation experiments were performed with 100 mL sealed Pyrex glass vessels loaded with 80 mL of cyclohexanebutyric acid solutions at various initial concentrations of 10, 20, and 40 mg L-1. The absorbed doses were controlled at 0, 0.65, 1.95, 3.25, 6.5, 9.75, and 13 kGy. The results showed that gamma ray irradiation could effectively degrade cyclohexanebutyric acid in aqueous solutions. The removal rate of cyclohexanebutyric acid increased significantly with the increase of absorbed dose and the decrease of its initial concentration. At the same time, the removal of chemical oxygen demand (COD) was as effective as that of cyclohexanebutyric acid. The kinetic studies showed that the degradation of cyclohexanebutyric acid followed pseudo first-order reaction. Above all, the proposed mechanism obtained when NaNO2, NaNO3 and tert-butanol were added showed that the â€¢OH radical played a major role in the gamma degradation process of cyclohexanebutyric acid, while â€¢H and eaq- played a minor role in the gamma degradation process. The degradation products were identified by Fourier transform infrared spectroscopy (FTIR) and gas chromatography/mass spectrometry (GC/MS) during cyclohexanebutyric acid degradation.

414. Phase equilibria in a system of aqueous arginine with an octane solution of sulfonic acid

NASA Astrophysics Data System (ADS)

Kuvaeva, Z. I.; Koval'chuk, I. V.; Vodop'yanova, L. A.; Soldatov, V. S.

2013-05-01

The extraction of arginine (Arg) from aqueous salt (0.1 M NaCl) solutions with a sulfo extractant in a wide range of pH values and amino acid concentrations was studied. The 0.1 M solution of dinonylnaphthalenesulfonic acid (HD) in octane was used as an extractant. The degree of extraction was found to be high at pH 0.8-9.0. This can be explained by the effect of additional intermolecular interactions in the extractant phase involving the guanidine group of Arg.

415. Efficiency of cardioplegic solutions containing L-arginine and L-aspartic acid.

PubMed

Pisarenko, O I; Shul'zhenko, V S; Studneva, I M

2006-04-01

In experiments on rats we studied the effects of cardioplegic solutions with L-aspartic acid or L-arginine on functional recovery and metabolism of isolated working heart after 40-min normothermal global ischemia and 30-min reperfusion. After reperfusion of the hearts preventively protected with cardioplegic solution containing L-aspartic acid or L-arginine, coronary flow decreased in comparison with the initial values. As a component of cardioplegic solution, L-arginine was less efficient in recovery of contractility and cardiac output of the hearts in comparison with L-aspartic acid. In hearts protected with L-aspartic acid, the postischemic levels of ATP and phosphocreatine were significantly higher, and the level of lactate was significantly lower than in hearts protected with L-arginine. In comparison with L-arginine, L-aspartic acid is a more efficient component of cardioplegic solution in protection of the heart from metabolic and functional damages caused by global ischemia and reperfusion.

416. Biocompatibility of a bicarbonate-buffered amino-acid-based solution for peritoneal dialysis.

PubMed

Bender, Thorsten O; Witowski, Janusz; Aufricht, Christoph; Endemann, Michaela; Frei, Ulrich; Passlick-Deetjen, Jutta; JÃ¶rres, Achim

2008-09-01

Amino-acid-based peritoneal dialysis (PD) fluids have been developed to improve the nutritional status of PD patients. As they may potentially exacerbate acidosis, an amino-acid-containing solution buffered with bicarbonate (Aminobic) has been proposed to effectively maintain acid-base balance. The aim of this study was to evaluate the mesothelial biocompatibility profile of this solution in comparison with a conventional low-glucose-based fluid. Omentum-derived human peritoneal mesothelial cells (HPMC) were preexposed to test PD solutions for up to 120 min, then allowed to recover in control medium for 24 h, and assessed for heat-shock response, viability, and basal and stimulated cytokine [interleukin (IL)-6] and prostaglandin (PGE(2)) release. Acute exposure of HPMC to conventional low-glucose-based PD solution resulted in a time-dependent increase in heat-shock protein (HSP-72) expression, impaired viability, and reduced ability to release IL-6 in response to stimulation. In contrast, in cells treated with Aminobic, the expression of HSP-72 was significantly lower, and viability and cytokine-producing capacity were preserved and did not differ from those seen in control cells. In addition, exposure to Aminobic increased basal release of IL-6 and PGE(2). These data point to a favorable biocompatibility profile of the amino-acid-based bicarbonate-buffered PD solution toward HPMC.

417. Stability of antimicrobial activity of peracetic acid solutions used in the final disinfection process.

PubMed

Costa, Solange Alves da Silva; Paula, OlÃvia Ferreira Pereira de; Silva, CÃ©lia Regina GonÃ§alves E; LeÃ£o, Mariella Vieira Pereira; Santos, Silvana SolÃ©o Ferreira dos

2015-01-01

The instruments and materials used in health establishments are frequently exposed to microorganism contamination, and chemical products are used before sterilization to reduce occupational infection. We evaluated the antimicrobial effectiveness, physical stability, and corrosiveness of two commercial formulations of peracetic acid on experimentally contaminated specimens. Stainless steel specimens were contaminated with Staphylococcus aureus, Escherichia coli, Candida albicans, blood, and saliva and then immersed in a ready peracetic acid solution: 2% Sekusept Aktiv (SA) or 0.25% Proxitane Alpha (PA), for different times. Then, washes of these instruments were plated in culture medium and colony-forming units counted. This procedure was repeated six times per day over 24 non-consecutive days. The corrosion capacity was assessed with the mass loss test, and the concentration of peracetic acid and pH of the solutions were measured with indicator tapes. Both SA and PA significantly eliminated microorganisms; however, the SA solution was stable for only 4 days, whereas PA remained stable throughout the experiment. The concentration of peracetic acid in the SA solutions decreased over time until the chemical was undetectable, although the pH remained at 5. The PA solution had a concentration of 500-400 mg/L and a pH of 2-3. Neither formulation induced corrosion and both reduced the number of microorganisms ($p = 0.0001$). However, the differences observed in the performance of each product highlight the necessity of establishing a protocol for optimizing the use of each one.

418. A new approach to study cadmium complexes with oxalic acid in soil solution.

PubMed

DytrtovÃ¡, Jana JaklovÃ¡; Jakl, Michal; SestÃ¡kovÃ¡, Ivana; Zins, Emilie-Laure; SchrÃ¶der, Detlef; NavrÃ¡til, TomÃ¡Å¡

2011-05-05

This study presents a new analytical approach for the determination of heavy metals complexed to low-molecular-weight-organic acids in soil solutions, which combines the sensitivity of differential pulse anodic stripping voltammetry (DPASV) with the molecular insight gained by electrospray ionization mass spectrometry (ESI-MS). The combination of these analytical methods allows the investigation of such complexes in complex matrixes. On the voltammograms of the soil solutions, in addition to the expected complexes of oxalic acid with cadmium and lead, respectively, also peaks belonging to mixed complexes of cadmium, lead, and oxalic acid (OAH(2)) were observed. In order to verify the possible formation of complexes with OAH(2), aqueous solutions of OAH(2) with traces of Cd(II) were investigated as model systems. Signals corresponding to several distinct molecular complexes between cadmium and oxalic acid were detected in the model solutions using negative-ion ESI-MS, which follow the general formula [Cd(n)(X,Y)((2n+1))](-), where n is the number of cadmium atoms, X=Cl(-), and Y=OAH(-). Some of these complexes were also identified in the ESI mass spectra taken from the soil solutions. Copyright Â© 2011 Elsevier B.V. All rights reserved.

419. Oxidation of ascorbic acid by a (salen)ruthenium(VI) nitrido complex in aqueous solution.

PubMed

Wang, Qian; Man, Wai-Lun; Lam, William W Y; Lau, Tai-Chu

2014-12-25

The oxidation of ascorbic acid (H2A) by [Ru(VI)(N)(L)(MeOH)](+) in aqueous acidic solutions has the following stoichiometry: 2[Ru(VI)(N)] + 3H2A â†' 2[Ru(III)(NH2-HA)](+) + A. Mechanisms involving HAT/N-rebound at low pH (â‰¤2) and nucleophilic attack at the nitride at high pH (â‰¥5) are proposed.

420. Adsorption of Cu(II) from aqueous solution on sulfuric acid treated palygorskite

NASA Astrophysics Data System (ADS)

Niu, Yan-Ning; Yuan, Yuan; Gao, Wei-Xin; Qian, Sheng; Sun, Wen

2018-03-01

The absorption behavior of Cu2+ from aqueous solution on sulfuric acid treated palygorskite were investigated, the results showed that palygorskite had high absorption ability for Cu2+ from aqueous solution. Effects of the shaking time, pH and the copper ion concentration on the removal rate were discussed. The absorption behavior of Cu2+ could be well imitated by the Langmuir isothermal equation.

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421. Molecular dynamics simulation studies of the interactions between ionic liquids and amino acids in aqueous solution.

PubMed

TomÃ©, Luciana I N; Jorge, Miguel; Gomes, JosÃ© R B; Coutinho, JoÃ£o A P

2012-02-16

Although the understanding of the influence of ionic liquids (ILs) on the solubility behavior of biomolecules in aqueous solutions is relevant for the design and optimization of novel biotechnological processes, the underlying molecular-level mechanisms are not yet consensual or clearly elucidated. In order to contribute to the understanding of the molecular interactions established between amino acids and ILs in aqueous media, classical molecular dynamics (MD) simulations were performed for aqueous solutions of five amino acids with different structural characteristics (glycine, alanine, valine, isoleucine, and glutamic acid) in the presence of 1-butyl-3-methylimidazolium bis(trifluoromethyl)sulfonyl imide. The results from MD simulations enable to relate the properties of the amino acids, namely their hydrophobicity, to the type and strength of their interactions with ILs in aqueous solutions and provide an explanation for the direction and magnitude of the solubility phenomena observed in [IL + amino acid + water] systems by a mechanism governed by a balance between competitive interactions of the IL cation, IL anion, and water with the amino acids.

422. Effects Sprayed Solution of Salicylic Acid to Prevent of Wilt Disease Caused by Fussarium oxysporium

NASA Astrophysics Data System (ADS)

Yousif, Dina. Y. M.

2018-05-01

The current search aimed to detective the effect of sprayed solution of salicylic acid on plant and leaves of sweet green pepper (Capsicum annuum) for control the pathogen Fussarium oxysporium compering with control plant and leaves. Results indicated that, the spray of salicylic acid at concentration 0.5 g/L is effecting the fungal infection through prevent transport fungus F. oxysporum to the neighboring green pepper plant. The number of dead green pepper plant after sprayed with solution of salicylic acid and only water they were (4, 6, and 3) (8, 9, and 10) respectively. While the experimental infection of green pepper leaves after inoculated the fungus as local spot by scorching small spots of these leaves with the aid of hot nail. These spots were then exposed to the 0.5 g/L aqueous solution salicylic acid before and after the inoculation of the fungus. The spray of salicylic acid before 24 and 48 hour prevent the development of disease and make a good protection of the mention leaves from infection with this fungus, the diameter of leaves lesion (1,1.5 cm) respectively. while the ability of fungus to grow after 24 and 48 hour from salicylic acid treatment was markedly reduce as compared with control, such treatment show slow growth of pathogen infect.

423. Electrochemical formation of hydroxide for enhancing carbon dioxide and acid gas uptake by a solution

DOEpatents

Rau, Gregory Hudson [Castro Valley, CA

2012-05-15

A system is described for forming metal hydroxide from a metal carbonate utilizing a water electrolysis cell having an acid-producing anode and a hydroxyl-producing cathode immersed in a water solution of sufficient ionic content to allow an electric current to pass between the hydroxyl-producing cathode and the acid-producing anode. A metal carbonate, in particular water-insoluble calcium carbonate or magnesium carbonate, is placed in close proximity to the acid-producing anode. A direct current electrical voltage is provided across the acid-producing anode and the hydroxyl-producing cathode sufficient to generate acid at the acid-producing anode and hydroxyl ions at the hydroxyl-producing cathode. The acid dissolves at least part of the metal carbonate into metal and carbonate ions allowing the metal ions to travel toward the hydroxyl-producing cathode and to combine with the hydroxyl ions to form the metal hydroxide. The carbonate ions travel toward the acid-producing anode and form carbonic acid and/or water and carbon dioxide. Among other uses, the metal hydroxide formed can be employed to absorb acid gases such as carbon dioxide from a gas mixture. The invention can also generate hydrogen and oxidative gases such as oxygen or chlorine.

424. Understanding the dissolution of Î±-zein in aqueous ethanol and acetic acid solutions.

PubMed

Li, Yunqi; Li, Ji; Xia, Qiuyang; Zhang, Boce; Wang, Qin; Huang, Qingrong

2012-10-04

Zein is a corn prolamin that has broad industrial applications because of its unique physical properties. Currently, the high cost of extraction and purification, which is directly related to the dispersion of zein in different solvents, is the major bottleneck of the zein industry. Solution behaviors of zein have been studied for a long time. However, the physical nature of zein in different solvents remains unclear. In this study, small-angle X-ray scattering (SAXS), static light scattering (SLS), and rheology were combined to study the structure and protein-solvent interaction of Î±-zein in both acetic acid and aqueous ethanol solutions. We found that the like-dissolve-like rule, the partial unfolding, and the protonation of zein are all critical to understanding the solution behaviors. Zein holds an elongated conformation (i.e., prolate ellipsoid) in all solutions, as revealed from SAXS data. There is an "aging effect" for zein in aqueous ethanol solutions, as evidenced by the transition of Newtonian rheological profiles for fresh zein solutions to the non-Newtonian shear thinning behavior for zein solutions after storage at room temperature for 24 h. Such shear thinning behavior becomes more pronounced for zein solutions at higher concentrations. The SLS results clearly show that acetic acid is a better solvent to dissolve zein than aqueous ethanol solution, as supported by a more negative second virial coefficient. This is majorly caused by the protonation of the protein, which was further verified by the dissolution of zein in water (a nonsolvent for zein) with the addition of acids.

425. IN VITRO INTERACTIONS BETWEEN LACTIC ACID SOLUTION AND ART GLASS-IONOMER CEMENTS

PubMed Central

Wang, Linda; Cefaly, Daniela Francisca Gigo; dos Santos, JanaÃna Lima; dos Santos, Jean Rodrigo; Lauris, JosÃ© Roberto Pereira; Mondelli, Rafael Francisco Lia; Atta, Maria Teresa

2009-01-01

Objectives: Production of acids such as lactic acid contributes to establish a cariogenic environment that leads to dental substrate demineralization. Fluoride plays an important role in this case and, as fluoridereleasing materials, glass-ionomer cements are expected to contribute to minimize deleterious reactions. This study evaluated interactions of glass-ionomer cements used in atraumatic restorative treatment (ART-GICs) with an aqueous lactic acid solution, testing the null hypotheses that no changes occur in the pH of the solution or on the surface roughness and mass of the ART-GICs when exposed to lactic acid solution over a 6-week period. Material and Methods: Ketac Molar, Fuji IX, Vitro Molar and Magic Glass were tested, and compared to Filtek Z250 and Ketac Fil Plus as control groups. Six specimens of each material were made according to manufacturers' instructions. The pH of the solution and roughness and mass changes of each specimen were determined over 6 weeks. Each specimen was individually stored in 2 mL of 0.02 M lactic acid solution for 1 week, renewing the solution every week. pH of solution and mass of the specimens were monitored weekly, and surface roughness of the specimens was assessed before and at the end of the 6-week acid challenge. pH and mass data were analyzed statistically by repeated measures using one-way ANOVA and Tukey's post-hoc tests for each material. Paired t-tests were used for roughness analysis. Tukey's post-hoc tests were applied to verify differences of final roughness among the materials. Significance level was set at 5%. Results: The null hypotheses were partially rejected. All materials were able to increase the pH of the lactic acid solution and presented rougher surfaces after immersion, while mass change was minimal and generally not statistically significant. Conclusions: These findings can be helpful to predict the performance of these materials under clinical conditions. A protective action against the carious

426. [Effects of choledochal perfusion with biliary acid solutions on activity of the sphincter of Oddi (author's transl)].

PubMed

Bevilacqua, R G; Margarido, N F; Soares, L A; Mansur, R; Koch, V; GonÃ§alves, E L

1979-06-01

The changes of sphincter of Oddi's resistance, induced by choledochal perfusion of conjugated (taurocolic) and non-conjugated (colic) biliary acid solutions, in anesthetized dogs, were studied. The perfusions were made at a constant flow and intracholedochal pressures were registered. The mean number of contractions per minute, the mean maximal pressures and the mean minimal pressures in each study periods were analysed. The choledochal perfusion with the biliary acids solutions induced a slight but significative increase in sphincteric resistance. After 15 minutes, the perfusion with colic acid solution induced maximal pressures significantly more elevated than the ones observed with taurocolic acid solution. The non-conjugated solution induced a pressure tracing significantly distinct from the tracing observed with the conjugated acid solution. No changes in resistance were observed with a 2% NaCl solution. This implies that the observed changes in resistance were not related to osmotic stimulation of the sphincter of Oddi.

427. Length scale dependence of the dynamic properties of hyaluronic acid solutions in the presence of salt.

PubMed

Horkay, Ferenc; Falus, Peter; Hecht, Anne-Marie; Geissler, Erik

2010-12-02

In solutions of the charged semirigid biopolymer hyaluronic acid in salt-free conditions, the diffusion coefficient D(NSE) measured at high transfer momentum q by neutron spin echo is more than an order of magnitude smaller than that determined by dynamic light scattering, D(DLS). This behavior contrasts with neutral polymer solutions. With increasing salt content, D(DLS) approaches D(NSE), which is independent of ionic strength. Contrary to theoretical expectation, the ion-polymer coupling, which dominates the low q dynamics of polyelectrolyte solutions, already breaks down at distance scales greater than the Debye-HÃ¼ckel length.

428. REDUCTION OF PLUTONIUM VALUES IN AN ACIDIC AQUEOUS SOLUTION WITH FORMALDEHYDE

DOEpatents

Olson, C.M.

1959-06-01

A method is given for reducing Pu to the tetravalent state and lowering the high acidity of dissolver solutions containing U and Pu. Formaldehyde is added to the HNO/sub 3/ solution of U and Pu to effect a formaldehyde to HNO/sub 3/ molar ratio of 0.375:1 to 1.5:1. The Pu can then be removed from the solution by carrier precipitation using BiPO/sub 4/ or by ion exchange. (T.R.H.)

429. Experimental Shock Chemistry of Aqueous Amino Acid Solutions and the Cometary Delivery of Prebiotic Compounds

NASA Astrophysics Data System (ADS)

Blank, Jennifer G.; Miller, Gregory H.; Ahrens, Michael J.; Winans, Randall E.

2001-02-01

A series of shock experiments were conducted to assess the feasibility of the delivery of organic compounds to the Earth via cometary impacts. Aqueous solutions containing near-saturation levels of amino acids (lysine, norvaline, aminobutyric acid, proline, and phenylalanine) were sealed inside stainless steel capsules and shocked by ballistic impact with a steel projectile plate accelerated along a 12-m-long gun barrel to velocities of 0.5-1.9 km sec^-1. Pressure-temperature-time histories of the shocked fluids were calculated using 1D hydrodynamical simulations. Maximum conditions experienced by the solutions lasted 0.85-2.7 Î¼s and ranged from 5.1-21 GPa and 412-870 K. Recovered sample capsules were milled open and liquid was extracted. Samples were analyzed using high performance liquid chromatography (HPLC) and mass spectrometry (MS). In all experiments, a large fraction of the amino acids survived. We observed differences in kinetic behavior and the degree of survivability among the amino acids. Aminobutyric acid appeared to be the least reactive, and phenylalanine appeared to be the most reactive of the amino acids. The impact process resulted in the formation of peptide bonds; new compounds included amino acid dimers and cyclic diketopiperazines. In our experiments, and in certain naturally occurring impacts, pressure has a greater influence than temperature in determining reaction pathways. Our results support the hypothesis that significant concentrations of organic material could survive a natural impact process.

430. Experimental shock chemistry of aqueous amino acid solutions and the cometary delivery of prebiotic compounds.

PubMed

Blank, J G; Miller, G H; Ahrens, M J; Winans, R E

2001-01-01

A series of shock experiments were conducted to assess the feasibility of the delivery of organic compounds to the Earth via cometary impacts. Aqueous solutions containing near-saturation levels of amino acids (lysine, norvaline, aminobutyric acid, proline, and phenylalanine) were sealed inside stainless steel capsules and shocked by ballistic impact with a steel projectile plate accelerated along a 12-m-long gun barrel to velocities of 0.5-1.9 km sec-1. Pressure-temperature-time histories of the shocked fluids were calculated using 1D hydrodynamical simulations. Maximum conditions experienced by the solutions lasted 0.85-2.7 microseconds and ranged from 5.1-21 GPa and 412-870 K. Recovered sample capsules were milled open and liquid was extracted. Samples were analyzed using high performance liquid chromatography (HPLC) and mass spectrometry (MS). In all experiments, a large fraction of the amino acids survived. We observed differences in kinetic behavior and the degree of survivability among the amino acids. Aminobutyric acid appeared to be the least reactive, and phenylalanine appeared to be the most reactive of the amino acids. The impact process resulted in the formation of peptide bonds; new compounds included amino acid dimers and cyclic diketopiperazines. In our experiments, and in certain naturally occurring impacts, pressure has a greater influence than temperature in determining reaction pathways. Our results support the hypothesis that significant concentrations of organic material could survive a natural impact process.

431. The thermochemical characteristics of solution of phenol and benzoic acid in water-dimethylsulfoxide and water-acetonitrile mixtures

     NASA Astrophysics Data System (ADS)

     Zakharov, A. G.; Voronova, M. I.; Batov, D. V.; Smirnova, K. V.

     2011-03-01

     The solution of phenol and benzoic acid in water-dimethylsulfoxide (DMSO) and water-acetonitrile (AN) mixtures was studied. As distinct from benzoic acid, the thermodynamic characteristics of solution of phenol sharply change at concentrations corresponding to a change in the character of cluster formation in water-DMSO and water-AN mixtures. Differences in the solvation of phenol and benzoic acid are explained by different mechanisms of the interaction of the solutes with clusters existing in binary mixtures.

432. Electrochemical formation of hydroxide for enhancing carbon dioxide and acid gas uptake by a solution

     DOEpatents

     Rau, Gregory Hudson

     2014-07-01

     A system for forming metal hydroxide from a metal carbonate utilizes a water electrolysis cell having an acid-producing anode and a hydroxyl-producing cathode immersed in a water solution of sufficient ionic content to allow an electric current to pass between the hydroxyl-producing cathode and the acid-producing anode. A metal carbonate is placed in close proximity to the acid-producing anode. A direct current electrical voltage is provided across the acid-producing anode and the hydroxyl-producing cathode sufficient to generate acid at the acid-producing anode and hydroxyl ions at the hydroxyl-producing cathode. The acid dissolves at least part of the metal carbonate into metal and carbonate ions allowing the metal ions to travel toward the hydroxyl-producing cathode and to combine with the hydroxyl ions to form the metal hydroxide. The carbonate ions travel toward the acid-producing anode and form carbonic acid and/or water and carbon dioxide.

433. Citric acid-modified Fenton's reaction for the oxidation of chlorinated ethylenes in soil solution systems.

     PubMed

     Seol, Yongkoo; Javandel, Iraj

     2008-06-01

     Fenton's reagent, a solution of hydrogen peroxide and ferrous iron catalyst, is used for an in situ chemical oxidation of organic contaminants. Sulfuric acid is commonly used to create an acidic condition needed for catalytic oxidation. Fenton's reaction often involves pressure buildup and precipitation of reaction products, which can cause safety hazards and diminish efficiency. We selected citric acid, a food-grade substance, as an acidifying agent to evaluate its efficiencies for organic contaminant removal in Fenton's reaction, and examined the impacts of using citric acid on the unwanted reaction products. A series of batch and column experiments were performed with varying H2O2 concentrations to decompose selected chlorinated ethylenes. Either dissolved iron from soil or iron sulfate salt was added to provide the iron catalyst in the batch tests. Batch experiments revealed that both citric and sulfuric acid systems achieved over 90% contaminant removal rates, and the presence of iron catalyst was essential for effective decontamination. Batch tests with citric acid showed no signs of pressure accumulation and solid precipitations, however the results suggested that an excessive usage of H2O2 relative to iron catalysts (Fe2+/H2O2<1/330) would result in lowering the efficiency of contaminant removal by iron chelation in the citric acid system. Column tests confirmed that citric acid could provide suitable acidic conditions to achieve higher than 55% contaminant removal rates.

434. 49 CFR 173.195 - Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution).

    Code of Federal Regulations, 2013 CFR

    2013-10-01

    ... 49 Transportation 2 2013-10-01 2013-10-01 false Hydrogen cyanide, anhydrous, stabilized... Hazardous Materials Other Than Class 1 and Class 7 Â§ 173.195 Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution). (a) Hydrogen cyanide, anhydrous, stabilized, must be packed in...

435. 49 CFR 173.195 - Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution).

    Code of Federal Regulations, 2011 CFR

    2011-10-01

    ... 49 Transportation 2 2011-10-01 2011-10-01 false Hydrogen cyanide, anhydrous, stabilized... Hazardous Materials Other Than Class 1 and Class 7 Â§ 173.195 Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution). (a) Hydrogen cyanide, anhydrous, stabilized, must be packed in...

436. 49 CFR 173.195 - Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution).

    Code of Federal Regulations, 2010 CFR

    2010-10-01

    ... 49 Transportation 2 2010-10-01 2010-10-01 false Hydrogen cyanide, anhydrous, stabilized... Hazardous Materials Other Than Class 1 and Class 7 Â§ 173.195 Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution). (a) Hydrogen cyanide, anhydrous, stabilized, must be packed in...

437. 49 CFR 173.195 - Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution).

    Code of Federal Regulations, 2012 CFR

    2012-10-01

    ... 49 Transportation 2 2012-10-01 2012-10-01 false Hydrogen cyanide, anhydrous, stabilized... Hazardous Materials Other Than Class 1 and Class 7 Â§ 173.195 Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution). (a) Hydrogen cyanide, anhydrous, stabilized, must be packed in...

438. 49 CFR 173.195 - Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution).

    Code of Federal Regulations, 2014 CFR

2014-10-01

... 49 Transportation 2 2014-10-01 2014-10-01 false Hydrogen cyanide, anhydrous, stabilized... Hazardous Materials Other Than Class 1 and Class 7 Â§ 173.195 Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution). (a) Hydrogen cyanide, anhydrous, stabilized, must be packed in...

439. Regularities in the association of polymethacrylic acid with benzethonium chloride in aqueous solutions

NASA Astrophysics Data System (ADS)

Tugay, A. V.; Zakordonskiy, V. P.

2006-06-01

The association of cationogenic benzethonium chloride with polymethacrylic acid in aqueous solutions was studied by nephelometry, conductometry, tensiometry, viscometry, and pH-metry. The critical concentrations of aggregation and polymer saturation with the surface-active substance were determined. A model describing processes in such systems step by step was suggested.

440. SOLVENT EXTRACTION PROCESS FOR SEPARATING URANIUM AND PLUTONIUM FROM AQUEOUS ACIDIC SOLUTIONS OF NEUTRON IRRADIATED URANIUM

DOEpatents

Bruce, F.R.

1962-07-24

A solvent extraction process was developed for separating actinide elements including plutonium and uranium from fission products. By this method the ion content of the acidic aqueous solution is adjusted so that it contains more equivalents of total metal ions than equivalents of nitrate ions. Under these conditions the extractability of fission products is greatly decreased. (AEC)

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441. Solution blow spun Poly(lactic acid)/Hydroxypropyl methylcellulose nanofibers with antimicrobial properties

USDA-ARS?s Scientific Manuscript database

Poly(lactic acid) (PLA) nanofibers containing hydroxypropyl methylcellulose (HPMC) and tetracycline hydrochloride (THC) were solution blow spun from two different solvents, chloroform/acetone (CA, 80:20 v/v) and 2,2,2-triflouroethanol (TFE). The diameter distribution, chemical, thermal, thermal stab...

442. Assessment of the Effects Exerted by Acid and Alkaline Solutions on Bone: Is Chemistry the Answer?

    PubMed

    Amadasi, Alberto; Camici, Arianna; Porta, Davide; Cucca, Lucia; Merli, Daniele; Milanese, Chiara; Profumo, Antonella; Rassifi, Nabila; Cattaneo, Cristina

    2017-09-01

    The treatment of corpses with extremely acid or basic liquids is sometimes performed in criminal contexts. A thorough characterization by chemical analysis may provide further help to macroscopic and microscopic analysis; 63 porcine bone samples were treated with solutions at different pH (1-14) for immersion periods up to 70 days, as well as in extremely acidic sulfuric acid solutions (9 M/18 M) and extremely basic sodium hydroxide. Inductively coupled optical emission spectrometry (ICP-OES)/plasma mass spectrometry (ICP-MS), Fourier transform infrared spectroscopy (FT-IR), energy dispersive X-ray analysis (EDX), X-ray powder diffraction (XRPD), and scanning electron microscopy (SEM) showed that only the sulfuric acid solution 18 M was able to completely dissolve the sample. In addition, chemical analysis allowed to recognize the contact between bone and substances. Hydrated calcium sulfate arose from extreme pH. The possibility of detecting the presence of human material within the residual solution was demonstrated, especially with FT-IR, ICP-OES, and EDX. Â© 2017 American Academy of Forensic Sciences.

443. Modification of vital wheat gluten with phosphoric acid to produce high free-solution capacity

    USDA-ARS?s Scientific Manuscript database

    Wheat gluten reacts with phosphoric acid to produce natural superabsorbent gels. The gel properties are defined by Fourier Transform Infra-red (FTIR) spectroscopy, 2-dimensional gel electrophoresis (2DE), and uptake of water, salt solutions, and aqueous ethanol. Temperatures above 120'C and dry cond...

444. PHYSICAL SOLUTIONS FOR ACID ROCK DRAINAGE AT REMOTE SITES DEMONSTRATION PROJECT

    EPA Science Inventory

    This report summarizes the results of Mine Waste Technology Program, Activity III, Project 42, Physical Solutions for Acid Rock Drainage at Remote Sites, funded by the U.S. Environmental Protection Agency (EPA) and jointly administered by EPA and the U.S. Department of Energy. A...

445. IMPROVEMENT UPON THE CARRIER PRECIPITATION OF PLUTONIUM IONS FROM NITRIC ACID SOLUTIONS

    DOEpatents

    James, R.A.; Thompson, S.G.

    1958-12-23

    A process is reported for improving the removal of plutonlum by carrier precipitation by the addition of nitrite ions to a nitrlc acid solutlon of neutronirradiated unanium so as to destroy any hydrazine that may be present in the solution since the hydrazine tends to complex the tetravalent plutonium and prevents removal by the carrier precipltate, such as bismuth phospbate.

446. Ginger extract as green corrosion inhibitor of mild steel in hydrochloric acid solution

NASA Astrophysics Data System (ADS)

Fidrusli, A.; Suryanto; Mahmood, M.

2018-01-01

Ginger extract as corrosion inhibitor from natural resources was studied to prevent corrosion of mild steel in acid media. Ginger rhizome was extracted to produce green corrosion inhibitor (G-1) while ginger powder bought at supermarket was also extract to form green corrosion inhibitor (G-2). Effectiveness of inhibitor in preventing corrosion process of mild steel was studied in 1.0 M of hydrochloric acid. The experiment of weight loss method and polarization technique were conducted to measure corrosion rate and inhibition efficiency of mild steel in solution containing 1.0 M of hydrochloric acid with various concentration of inhibitor at room temperature. The results showed that, the rate of corrosion dropped from 8.09 mmpy in solution containing no inhibitor to 0.72 mmpy in solution containing 150g/l inhibitor while inhibition efficiency up to 91% was obtained. The polarization curve in polarization experiments shows that the inhibition efficiency is 86% with high concentration of inhibitor. The adsorption of ginger extract on the surface of mild steel was observed by using optical microscope and the characterization analysis was done by using pH measurement method. When high concentration of green inhibitor in the acid solution is used, the pH at the surface of steel is increasing.

447. An overview of the recovery of acid from spent acidic solutions from steel and electroplating industries.

PubMed

Agrawal, Archana; Sahu, K K

2009-11-15

Every metal and metallurgical industry is associated with the generation of waste, which may be a solid, liquid or gaseous in nature. Their impacts on the ecological bodies are noticeable due to their complex and hazardous nature affecting the living and non-living environment which is an alarming issue to the environmentalist. The increasingly stringent regulations regarding the discharge of acid and metal into the environment, and the increasing stress upon the recycling/reuse of these effluents after proper treatment have focused the interest of the research community on the development of new approaches for the recovery of acid and metals from industrial wastes. This paper is a critical review on the acidic waste streams generated from steel and electroplating industries particularly from waste pickle liquor and spent bleed streams. Various aspects on the generation of these streams and the methods used for their treatment either for the recovery of acid for reuse or disposal are being dealt with. Major stress is laid upon the hydrometallurgical methods such as solvent extraction.

448. Solution Structure and Backbone Dynamics of Human Liver Fatty Acid Binding Protein: Fatty Acid Binding Revisited

PubMed Central

Cai, Jun; LÃ¼cke, Christian; Chen, Zhongjing; Qiao, Ye; Klimtchuk, Elena; Hamilton, JamesÂ A.

2012-01-01

Liver fatty acid binding protein (L-FABP), a cytosolic protein most abundant in liver, is associated with intracellular transport of fatty acids, nuclear signaling, and regulation of intracellular lipolysis. Among the members of the intracellular lipid binding protein family, L-FABP is of particular interest as it can i), bind two fatty acid molecules simultaneously and ii), accommodate a variety of bulkier physiological ligands such as bilirubin and fatty acyl CoA. To better understand the promiscuous binding and transport properties of L-FABP, we investigated structure and dynamics of human L-FABP with and without bound ligands by means of heteronuclear NMR. The overall conformation of human L-FABP shows the typical Î²-clam motif. Binding of two oleic acid (OA) molecules does not alter the protein conformation substantially, but perturbs the chemical shift of certain backbone and side-chain protons that are involved in OA binding according to the structure of the human L-FABP/OA complex. Comparison of the human apo and holo L-FABP structures revealed no evidence for an â€œopen-capâ€ conformation or a â€œswivel-backâ€ mechanism of the K90 side chain upon ligand binding, as proposed for rat L-FABP. Instead, we postulate that the lipid binding process in L-FABP is associated with backbone dynamics. PMID:22713574

449. Recovery of fission product palladium from acidic high level waste solutions

SciTech Connect

Rizvi, G.H.; Mathur, J.N.; Murali, M.S.

1996-07-01

The recovery of palladium from a synthetic pressurized heavy water reactor high level waste (PHWR-HLW) solution has been carried out, and the best reagents to use for the actual HLW solutions are discussed. The extraction of palladium from nitric acid solutions has been carried out using Cyanex-471X (triisobutylphosphine sulfide, TIPS) as the extractant. The metal ion could be quantitatively extracted from solutions with nitric acid concentrations between 2.0 and 6.0 M. The species extracted into the organic phase was found to be Pd(NO{sub 3}){sub 2}{center_dot}TIPS. Nitric acid in the range of 2.0 to 5.0 M had no effect on TIPSmoreÂ Â» for at least 71 hours. A systematic study of gamma irradiation on loading and stripping of palladium from loaded organic phases using several potential extractants, TIPS, alpha benzoin oxime, dioctylsulfide, and dioctylsulfoxide has been made. A flow sheet for the recovery of palladium from actual HLW solutions using TIPS is proposed.Â«Â less

450. Synthesis of highly ordered TiO2 nanotube in malonic acid solution by anodization.

PubMed

Ryu, Won Hee; Park, Chan Jin; Kwon, Hyuk Sang

2008-10-01

We synthesized TiO2 nanotube array by anodizing in a solution of malonic acid (HOOCCH2COOH) and NH4F, and analyzed the morphology of the nanotube using scanning electron microscopy (SEM). The morphology of TiO2 nanotube was largely affected by anodizing time, anodizing voltage, and malonic acid concentration. With increasing the anodizing voltage from 5 V to 20 V, the diameter of TiO2 nanotube was increased from about 20 nm to 110 nm and its length from about 10 nm to 700 nm. In addition, the length of TiO2 nanotube was increased with increasing anodizing time up to 6 h at 20 V. We obtained the longest and the most highly ordered nanotube structure when anodizing Ti in a solution of 0.5 wt% NH4F and 1 M malonic acid at 20 V for 6 h.

451. Homogeneous freezing of single sulfuric and nitric acid solution drops levitated in an acoustic trap

NASA Astrophysics Data System (ADS)

Diehl, Karoline; Ettner-Mahl, Matthias; Hannemann, Anke; Mitra, Subir K.

2009-10-01

The freezing temperatures of single supercooled drops of binary and ternary sulfuric and nitric acid solutions were measured while varying the acid concentration. An acoustic levitator was used which allows to freely suspend single solution drops in air without electrical charges thereby avoiding any electrical influences which may affect the freezing process. The drops of typically 500 Âµm in radius were monitored by a video camera during cooling cycles down to - 85 Â°C to simulate the upper tropospheric and stratospheric temperature range. The present data confirm that liquid solution droplets can be supercooled far below the equilibrium melting point by approximately 35 Â°C. They follow the general trend of the expected freezing temperatures for homogeneous ice nucleation.

452. Impact of fluorescent lighting on the browning potential of model wine solutions containing organic acids and iron.

     PubMed

     Grant-Preece, Paris; Barril, Celia; Schmidtke, Leigh M; Clark, Andrew C

     2018-03-15

     Model wine solutions containing organic acids, individually or combined, and iron(III), were exposed to light from fluorescent lamps or stored in darkness for four hours. (-)-Epicatechin was then added, and the solutions incubated in darkness for 10days. Browning was monitored by UV-visible absorption spectrophotometry and UHPLC-DAD. The pre-irradiated solutions containing tartaric acid exhibited increased yellow/brown coloration compared to the dark controls mainly due to reaction of the tartaric acid photodegradation product glyoxylic acid with (-)-epicatechin to form xanthylium cation pigments. In these solutions, browning decreased as the concentrations of organic acids other than tartaric acid increased. Xanthylium cations were also detected in the pre-irradiated malic acid solution. However, in the malic acid, succinic acid, citric acid and lactic acid solutions, any coloration was mainly due to the production of dehydrodiepicatechin A, which was largely independent of prior light exposure, but strongly affected by the organic acid present. Copyright Â© 2017 Elsevier Ltd. All rights reserved.

453. Electrolyte diodes with weak acids and bases. I. Theory and an approximate analytical solution.

     PubMed

     IvÃ¡n, KristÃ³f; Simon, PÃ©ter L; Wittmann, MÃ¡ria; Noszticzius, ZoltÃ¡n

     2005-10-22

     Until now acid-base diodes and transistors applied strong mineral acids and bases exclusively. In this work properties of electrolyte diodes with weak electrolytes are studied and compared with those of diodes with strong ones to show the advantages of weak acids and bases in these applications. The theoretical model is a one dimensional piece of gel containing fixed ionizable groups and connecting reservoirs of an acid and a base. The electric current flowing through the gel is measured as a function of the applied voltage. The steady-state current-voltage characteristic (CVC) of such a gel looks like that of a diode under these conditions. Results of our theoretical, numerical, and experimental investigations are reported in two parts. In this first, theoretical part governing equations necessary to calculate the steady-state CVC of a reverse-biased electrolyte diode are presented together with an approximate analytical solution of this reaction-diffusion-ionic migration problem. The applied approximations are quasielectroneutrality and quasiequilibrium. It is shown that the gel can be divided into an alkaline and an acidic zone separated by a middle weakly acidic region. As a further approximation it is assumed that the ionization of the fixed acidic groups is complete in the alkaline zone and that it is completely suppressed in the acidic one. The general solution given here describes the CVC and the potential and ionic concentration profiles of diodes applying either strong or weak electrolytes. It is proven that previous formulas valid for a strong acid-strong base diode can be regarded as a special case of the more general formulas presented here.

454. Effective Removal of Tetracycline from Aqueous Solution by Organic Acid-Coated Magnetic Nanoparticles.

PubMed

Guo, Liang; Liang, Yuyan; Chen, Xuelan; Xu, Wei; Wu, Kesheng; Wei, Hua; Xiong, Yonghua

2016-03-01

Self-assembled iron oxide nanocomposites are good magnetic nano-adsorbents that can be prepared using simple methods. Four types of organic acid-functionalised (oleic acid, undecenoic acid, caprylic acid or hexanoic acid) magnetic nanoparticles (MNPs) were synthesised through a one-pot chemisorption method for the removal of tetracycline (TC) from aqueous solution. The undecenoic acid-coated MNPs (UA-MNPs) exhibited the highest adsorption efficiency and can be easily retrieved with a low-gradient magnetic separator (0.4 Tesla) at pH 5.0 aqueous solution. The TC adsorption process on the UA-MNPs followed the Langmuir isotherm and the maximum adsorption capacities increased from 86.96 mg g(-1) to 222.2 mg g(-1) with the increase in temperature from 288 K to 318 K. The kinetics of adsorption fits pseudo-second-order model perfectly with a rate constant, 5.946 g mg(-1) min(-1) at 298 K. The positive values of the enthalpy (AH) and the negative value of the free energy (AG) indicated an endothermic and spontaneous adsorption process of TC on the UA-MNPs. Moreover, the UA-MNPs possessed excellent ability to adsorb the other three major types of TC antibiotics, including chlortetracycline, oxytetracycline and doxycycline.

455. Solution of Azelaic Acid (20%), Resorcinol (10%) and Phytic Acid (6%) Versus Glycolic Acid (50%) Peeling Agent in the Treatment of Female Patients with Facial Melasma

PubMed Central

Faghihi, Gita; Taheri, Azam; Shahmoradi, Zabihollah; Nilforoushzadeh, Mohammad Ali

2017-01-01

Background: Melasma, a common acquired disorder of hyperpigmentation, especially in women, is often resistant to therapy. This study was aimed to evaluate the efficacy and safety of azelaic acid, resorcinol and phytic acid solution in chemical peeling of melasma in comparison to 50% glycolic acid. Materials and Methods: This clinical trial was performed, on 42 female patients with bilateral melasma. Severity of melasma was assessed by melasma area and severity index (MASI). Combination of (20% azelaic acid + 10% resorcinol + 6% phytic acid) was used as a new peeling agent on the right side of the face and 50% glycolic acid on the left side every 2 weeks for 6 times. Follow-up was carried out for 3 months after the last session. Any decrease in MASI score and unwanted complications following peeling were evaluated and compared during the trial. Results: Patients showed marked improvement as calculated with MASI score before and after treatment in both sides of the face. The efficacy of combination formula (azelaic acid, resorcinol and phytic acid) was similar to glycolic acid, but with fewer complications. There was no statistically difference in improvement between two groups ($P > 0.05$). However, the patient's discomfort following procedures was significantly lower with azelaic acid, resorcinol and phytic compared with the glycolic acid peels ($P < 0.05$) and there was the same duration in the beginning of the therapeutic response in both groups. Conclusion: Results showed that triple-combination was found to be an effective and safe peeling agent in the treatment of melasma and it was as effective as 50% glycolic acid peel. PMID:28299301

456. Solution of Azelaic Acid (20%), Resorcinol (10%) and Phytic Acid (6%) Versus Glycolic Acid (50%) Peeling Agent in the Treatment of Female Patients with Facial Melasma.

PubMed

Faghihi, Gita; Taheri, Azam; Shahmoradi, Zabihollah; Nilforoushzadeh, Mohammad Ali

2017-01-01

Melasma, a common acquired disorder of hyperpigmentation, especially in women, is often resistant to therapy. This study was aimed to evaluate the efficacy and safety of azelaic acid, resorcinol and phytic acid solution in chemical peeling of melasma in comparison to 50% glycolic acid. This clinical trial was performed, on 42 female patients with bilateral melasma. Severity of melasma was assessed by melasma area and severity index (MASI). Combination of (20% azelaic acid + 10% resorcinol + 6% phytic acid) was used as a new peeling agent on the right side of the face and 50% glycolic acid on the left side every 2 weeks for 6 times. Follow-up was carried out for 3 months after the last session. Any decrease in MASI score and unwanted complications following peeling were evaluated and compared during the trial. Patients showed marked improvement as calculated with MASI score before and after treatment in both sides of the face. The efficacy of combination formula (azelaic acid, resorcinol and phytic acid) was similar to glycolic acid, but with fewer complications. There was no statistically difference in improvement between two groups ($P > 0.05$). However, the patient's discomfort following procedures was significantly lower with azelaic acid, resorcinol and phytic compared with the glycolic acid peels ($P < 0.05$) and there was the same duration in the beginning of the therapeutic response in both groups. Results showed that triple-combination was found to be an effective and safe peeling agent in the treatment of melasma and it was as effective as 50% glycolic acid peel.

457. Influence of Concentration and Agitation of Sodium Hypochlorite and Peracetic Acid Solutions on Tissue Dissolution.

PubMed

Tanomaru-Filho, MÃ¡rio; Silveira, Bruna Ramos Franco; Martelo, Roberta Bosso; Guerreiro-Tanomaru, Juliane Maria

2015-11-01

To evaluated the tissue dissolution of sodium hypochlorite (NaOCl) and peracetic acid (PA) solutions at different concentrations, with or without ultrasonic agitation. The following solutions were analyzed: 2.5% NaOCl, 0.5, 1 and 2% PA, 1% PA associated with 6.5% hydrogen peroxide (HP) and saline. Fragments of bovine pulp tissue with 25 Â± 2g mg were immersed into test tubes containing 4 mL of the solutions for 10 minutes. In the groups with agitation, pulp tissues were submitted to 2 cycles of 1 minute of ultrasonic agitation. The specimens were weighed after the removal from the solutions. The percentage of mass loss was calculated according to the difference of mass before and after exposure to solutions. Data were submitted to ANOVA and Tukey tests ($p < 0.05$). A total of 2.5% NaOCl with or without agitation showed the higher tissue dissolution (between 64.5 and 67% of mass reduction) ($p < 0.005$). By comparing the PA solutions, the concentrations of 1 and 2% with or without agitation and the concentration of 0.5% with agitation showed similar dissolution activity (between 35.4 and 44% of mass reduction). The use of the ultrasonic agitation promoted an increase of the dissolution ability only for 0.5% PA. Peracetic acid solution has pulp tissue dissolution. However, this ability is lower than 2.5% NaOCl solution. The sodium hypochlorite solution shows higher ability to dissolve tissue than PA.

458. Interaction of Atmospheric-Pressure Air Microplasmas with Amino Acids as Fundamental Processes in Aqueous Solution

PubMed Central

Zhou, Renwu; Zhou, Rusen; Zhuang, Jinxing; Zong, Zichao; Zhang, Xianhui; Liu, Dongping; Bazaka, Kateryna; Ostrikov, Kostya

2016-01-01

Plasma medicine is a relatively new field that investigates potential applications of cold atmospheric-pressure plasmas in bioengineering, such as for bacterial inactivation and degradation of organic molecules in water. In order to enunciate mechanisms of bacterial inactivation at molecular or atomic levels, we investigated the interaction of atmospheric-pressure air microplasmas with amino acids in aqueous solution by using high-resolution mass spectrometry (HRMS). Results show that the oxidation effect of plasma-induced species on the side chains of the amino acids can be categorized into four types, namely hydroxylation, nitration, dehydrogenation and dimerization. In addition, relative activities of amino acids resulting from plasma treatment come in descending order as follows: sulfur-containing carbon-chain amino acids > aromatic amino acids > five-membered ring amino acids > basic carbon-chain amino acids. Since amino acids are building blocks of proteins vital to the growth and reproduction of bacteria, these results provide an insight into the mechanism of bacterial inactivation by plasma. PMID:27183129

459. Aquatic photolysis: photolytic redox reactions between goethite and adsorbed organic acids in aqueous solutions

USGS Publications Warehouse

Goldberg, M.C.; Cunningham, K.M.; Weiner, Eugene R.

1993-01-01

Photolysis of mono and di-carboxylic acids that are adsorbed onto the surface of the iron oxyhydroxide (goethite) results in an oxidation of the organic material and a reduction from Fe(III) to Fe(II) in the iron complex. There is a subsequent release of Fe2+ ions into solution. At constant light flux and constant solution light absorption, the factors responsible for the degree of photolytic reaction include: the number of lattice sites that are bonded by the organic acid; the rate of acid readsorption to the surface during photolysis; the conformation and structure of the organic acid; the degree of oxidation of the organic acid; the presence or absence of an ??-hydroxy group on the acid, the number of carbons in the di-acid chain and the conformation of the di-acid. The ability to liberate Fe(III) at pH 6.5 from the geothite lattice is described by the lyotropic series: tartrate>citrate> oxalate > glycolate > maleate > succinate > formate > fumarate > malonate > glutarate > benzoate = butanoate = control. Although a larger amount of iron is liberated, the series is almost the same at pH 5.5 except that oxalate > citrate and succinate > maleate. A set of rate equations are given that describe the release of iron from the goethite lattice. It was observed that the pH of the solution increases during photolysis if the solutions are not buffered. There is evidence to suggest the primary mechanism for all these reactions is an electron transfer from the organic ligand to the Fe(III) in the complex. Of all the iron-oxyhydroxide materials, crystalline goethite is the least soluble in water; yet, this study indicates that in an aqueous suspension, iron can be liberated from the goethite lattice. Further, it has been shown that photolysis can occur in a multiphase system at the sediment- water interface which results in an oxidation of the organic species and release of Fe2+ to solution where it becomes available for further reaction. ?? 1993.

460. Radiolysis of aqueous solutions of acetic acid in the presence of Na-montmorillonite

NASA Technical Reports Server (NTRS)

Navarro-Gonzalez, R.; Negron-Mendoza, A.; Ramos, S.; Ponnamperuma, C.

1990-01-01

The gamma-irradiation of 0.8 mol dm-3 aqueous, oxygen-free acetic acid solutions was investigated in the presence or absence of Na-montmorillonite. H2, CH4, CO, CO2, and several polycarboxylic acids were formed in all systems. The primary characteristics observed in the latter system were: (1) Higher yield of the decomposition of acetic acid; (2) Lower yield of the formation of polycarboxylic acids; (3) No effect on the formation of methane; (4) Higher yield of the formation of carbon dioxide; and (5) The reduction of Fe3+ in the octahedral sites of Na-montmorillonite. A possible reaction scheme was proposed to account for the observed changes. The results are important in understanding heterogeneous processes in radiation catalysis and might be significant to prebiotic chemistry.

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461. Kinetics of nonoxidative leaching of galena in perchloric, hydrobromic, and hydrochloric acid solutions

NASA Astrophysics Data System (ADS)

NÃºÃ±ez, C.; Espiell, F.; GarcÃa-Zayas, J.

1988-08-01

Several kinetic studies are presented on the nonoxidative leaching of galena with solutions of hydrocloric, hydrobromic, and perchloric acid. The kinetic parameters were set up in terms of the mean ionic activities of the electrolytes. The apparent order of reaction for the mean ionic activity of perchloric acid is one. For hydrochloric acid the order of reaction over a wide range of concentrations is 3/2 with respect to its mean activity. For hydrobromic acid, whose anion has greater complex-forming power for lead than HC1, the order of reaction is 2. Activation energies are 64.4 kJ/mole for HC1, 71.5 kJ/mole for HC104, and 66.5 kJ mole for HBr. The complete kinetic equations are given for the three reactions.

462. Evaluation of ethylenediaminetetraacetic acid (EDTA) solution and gel for smear layer removal.

PubMed

Dotto, Sidney Ricardo; Travassos, Rosana Maria Coelho; de Oliveira, Elias Pandonor Motcy; Machado, Manoel Eduardo de Lima; Martins, JosÃ© Luiz

2007-08-01

The purpose of this in vitro study was to compare the efficacy of 24% ethylenediaminetetraacetic acid (EDTA) gel and 17% EDTA solution in cleaning dentine walls after root canal instrumentation. Thirty human canine teeth were divided into three groups of 10 teeth each. In Group 1, 1% sodium hypochlorite was used as the irrigating solution; in Group 2, 1% sodium hypochlorite was used with 17% EDTA solution; and in Group 3, 1% sodium hypochlorite was used with 24% EDTA gel. The presence of a smear layer was analysed after instrumentation using scanning electron microscopy. The Kruskal-Wallis test revealed a statistical difference ($P < 0.05$) between Groups 1 and 2, and also between Groups 1 and 3. No difference was observed between Groups 2 and 3 ($P > 0.05$). The results indicate that 1% sodium hypochlorite alone does not remove the smear layer and that there was no statistical difference between EDTA gel and EDTA solution in smear layer removal.

463. Effect of tritium on corrosion behavior of chromium in 0.01 N sulfuric acid solution

SciTech Connect

Oyaidzu, M.; Isobe, K.; Hayashi, T.

The effects of tritium on the corrosion behavior of chromium in 0.01 N sulfuric solution have been investigated in the present study. Electrochemical experiments have been carried our for pure chromium. At first, the concentration dependence of sulfuric acid solution on anodic polarization behavior of chromium was experimented, resulting in that 0.01 N one was found appropriate. The dependence of both dissolved oxygen and tritium concentration on anodic behavior of chromium were performed. It was found from that the self-passivation of chromium induced by dissolved oxygen was inhibited in tritiated solution resulting in the enhancement of the corrosion. As amoreÂ Â» consequence it is highly likely that the elution of chromium by highly oxidative radiolysis products would explain the passivation inhibitory effect of SUS304 stainless steel observed in tritiated solutions.Â«Â less

464. Degradation of hydroxycinnamic acid mixtures in aqueous sucrose solutions by the Fenton process.

PubMed

Nguyen, Danny M T; Zhang, Zhanying; Doherty, William O S

2015-02-11

The degradation efficiencies and behaviors of caffeic acid (CaA), p-coumaric acid (pCoA), and ferulic acid (FeA) in aqueous sucrose solutions containing the mixture of these hydroxycinnamic acids (HCAs) were studied by the Fenton oxidation process. Central composite design and multiresponse surface methodology were used to evaluate and optimize the interactive effects of process parameters. Four quadratic polynomial models were developed for the degradation of each individual acid in the mixture and the total HCAs degraded. Sucrose was the most influential parameter that significantly affected the total amount of HCA degraded. Under the conditions studied there was a <0.01% loss of sucrose in all reactions. The optimal values of the process parameters for a 200 mg/L HCA mixture in water (pH 4.73, 25.15 Â°C) and sucrose solution (13 mass %, pH 5.39, 35.98 Â°C) were 77% and 57%, respectively. Regression analysis showed goodness of fit between the experimental results and the predicted values. The degradation behavior of CaA differed from those of pCoA and FeA, where further CaA degradation is observed at increasing sucrose and decreasing solution pH. The differences (established using UV/vis and ATR-FTIR spectroscopy) were because, unlike the other acids, CaA formed a complex with Fe(III) or with Fe(III) hydrogen-bonded to sucrose and coprecipitated with lepidocrocite, an iron oxyhydroxide.

465. PROCESS FOR EXTRACTING NEPTUNIUM AND PLUTONIUM FROM NITRIC ACID SOLUTIONS OF SAME CONTAINING URANYL NITRATE WITH A TERTIARY AMINE

DOEpatents

Sheppard, J.C.

1962-07-31

A process of selectively extracting plutonium nitrate and neptunium nitrate with an organic solution of a tertiary amine, away from uranyl nitrate present in an aqueous solution in a maximum concentration of 1M is described. The nitric acid concentration is adjusted to about 4M and nitrous acid is added prior to extraction. (AEC)

466. Unified molecular picture of the surfaces of aqueous acid, base, and salt solutions.

PubMed

Mucha, Martin; Frigato, Tomaso; Levering, Lori M; Allen, Heather C; Tobias, Douglas J; Dang, Liem X; Jungwirth, Pavel

2005-04-28

The molecular structure of the interfacial regions of aqueous electrolytes is poorly understood, despite its crucial importance in many biological, technological, and atmospheric processes. A long-term controversy pertains between the standard picture of an ion-free surface layer and the strongly ion specific behavior indicating in many cases significant propensities of simple inorganic ions for the interface. Here, we present a unified and consistent view of the structure of the air/solution interface of aqueous electrolytes containing monovalent inorganic ions. Molecular dynamics calculations show that in salt solutions and bases the positively charged ions, such as alkali cations, are repelled from the interface, whereas the anions, such as halides or hydroxide, exhibit a varying surface propensity, correlated primarily with the ion polarizability and size. The behavior of acids is different due to a significant propensity of hydronium cations for the air/solution interface. Therefore, both cations and anions exhibit enhanced concentrations at the surface and, consequently, these acids (unlike bases and salts) reduce the surface tension of water. The results of the simulations are supported by surface selective nonlinear vibrational spectroscopy, which reveals among other things that the hydronium cations are present at the air/solution interface. The ion specific propensities for the air/solution interface have important implications for a whole range of heterogeneous physical and chemical processes, including atmospheric chemistry of aerosols, corrosion processes, and bubble coalescence.

467. Copper-Sulfate Pentahydrate as a Product of the Waste Sulfuric Acid Solution Treatment

NASA Astrophysics Data System (ADS)

MarkoviÄ‡, Radmila; StevanoviÄ‡, Jasmina; AvramoviÄ‡, Ljiljana; NedeljkoviÄ‡, Dragutin; JugoviÄ‡, Branimir; StajiÄ‡-TroÅ¡iÄ‡, Jasna; GvozdenoviÄ‡, Milica

2012-12-01

The aim of this study is synthesis of copper-sulfate pentahydrate from the waste sulfuric acid solution-mother liquor generated during the regeneration process of copper bleed solution. Copper is removed from the mother liquor solution in the process of the electrolytic treatment using the insoluble lead anodes alloyed with 6 mass pct of antimony on the industrial-scale equipment. As the result of the decopperization process, copper is removed in the form of the cathode sludge and is precipitated at the bottom of the electrolytic cell. By this procedure, the content of copper could be reduced to the 20 mass pct of the initial value. Chemical characterization of the sludge has shown that it contains about 90 mass pct of copper. During the decopperization process, the very strong poison, arsine, can be formed, and the process is in that case terminated. The copper leaching degree of 82 mass pct is obtained using H2SO4 aqueous solution with the oxygen addition during the cathode sludge chemical treatment at 80 Â°C Â± 5 Â°C. Obtained copper salt satisfies the requirements of the Serbian Standard for Pesticide, SRPS H.P1. 058. Therefore, the treatment of waste sulfuric acid solutions is of great economic and environmental interest.

468. Superhydrophobic copper surfaces fabricated by fatty acid soaps in aqueous solution for excellent corrosion resistance

NASA Astrophysics Data System (ADS)

Xu, Wenlong; Hu, Yuanyuan; Bao, Wenda; Xie, Xiaoyu; Liu, Yiran; Song, Aixin; Hao, Jingcheng

2017-03-01

A simple and safe one-step immersion method was developed to obtain the stable superhydrophobic copper surfaces with excellent corrosion resistance ability using fatty acids in water-medium instead of ethanol. An organic alkali, N,N-dimethylcyclohexylamine (DMCHA), was chosen to solve the poor solubility of fatty acids in water and the high Krafft point of carboxylate salts with inorganic counterions.

The superhydrophobic property can be realized in a much quicker process (7.5 min) in aqueous solution than in ethanol (more than 2 d), which is universally feasible for the fabrication of superhydrophobic metal surfaces in industry scale, thereby greatly increasing the safety in industrial manufacture.

469. Composition and process for separating cesium ions from an acidic aqueous solution also containing other ions

     DOEpatents

     Dietz, Mark L.; Horwitz, E. Philip; Bartsch, Richard A.; Barrans, Jr., Richard E.; Rausch, David

     1999-01-01

     A crown ether cesium ion extractant is disclosed as is its synthesis. The crown ether cesium ion extractant is useful for the selective purification of cesium ions from aqueous acidic media, and more particularly useful for the isolation of radioactive cesium-137 from nuclear waste streams. Processes for isolating cesium ions from aqueous acidic media using the crown ether cesium extractant are disclosed as are processes for recycling the crown ether cesium extractant and processes for recovering cesium from a crown ether cesium extractant solution.

470. Composition and process for separating cesium ions from an acidic aqueous solution also containing other ions

     DOEpatents

     Dietz, M.L.; Horwitz, E.P.; Bartsch, R.A.; Barrans, R.E. Jr.; Rausch, D.

     1999-03-30

     A crown ether cesium ion extractant is disclosed as is its synthesis. The crown ether cesium ion extractant is useful for the selective purification of cesium ions from aqueous acidic media, and more particularly useful for the isolation of radioactive cesium-137 from nuclear waste streams. Processes for isolating cesium ions from aqueous acidic media using the crown ether cesium extractant are disclosed as are processes for recycling the crown ether cesium extractant and processes for recovering cesium from a crown ether cesium extractant solution. 4 figs.

471. Dissolution profile of dolomite in chloric acid solution: The effect of chloric acid concentration and pulp density

     NASA Astrophysics Data System (ADS)

     Solihin, Indriani, Mubarok, M. Zaki

     2018-05-01

     Dolomite is one of carbonate minerals that contain magnesium. Magnesium is important element used in many aspects of life such as cofactor of many enzymes in human body, nutrient for plants, and raw material in automotive industry. Dolomite can be processed through low temperature process to obtain magnesium and calcium oxide that is needed in important applications such as base material for making drugs, raw material in the synthesize slow release fertilizer, materials for fire retardant, component for catalyst, etc. One of the important step of this low temperature process is dissolution of dolomite. Optimizing the dissolution process determines the % extraction of magnesium and calcium oxide from dolomite. The dissolution of dolomite from Gresik, East Java Provence Indonesia, in chloric acid solution has been conducted. Chloric acid concentration and pulp density are the variables that were observed. The dissolution of magnesium and calcium from Gresik dolomite was found to be very fast. The stable stage of dissolution can be reached for 5-10 seconds. The % extraction is mainly determined by the molar ratio of chloric acid / dolomite. At molar ratio of chloric acid / dolomite equal or above stoichiometric of dolomite dissolution, % extraction of magnesium is almost 100 %.

472. Acid-catalyzed oxidation of 2,4-dichlorophenoxyacetic acid by ammonium nitrate in aqueous solution

SciTech Connect

Leavitt, D.D.; Abraham, M.A.

1990-04-01

2,4-Dichlorophenoxyacetic acid (2,4-D) was oxidized to CO{sub 2} and water by homogeneous, liquid-phase reaction with ammonium nitrate at temperatures between 250 and 450{degree}F and pressures below 100 psi. N{sub 2} and N{sub 2}O were produced from the thermal decomposition of the ammonium nitrate oxidant. An unexpected maximum in conversion was observed at an intermediate reaction temperature, which was consistent with rapid thermal decomposition of the NH{sub 4}NO{sub 3} oxidant. Postulated reaction pathways consisting of simultaneous oxidation of 2,4-D and decomposition of the oxidant allowed estimation of kinetic constants from best-fit analysis of the data. The proposed reaction model provided amoreÂ Â» mathematical description of 2,4-D conversion, which allowed extrapolation of the results to reaction conditions and reactor configurations that were not experimentally investigated.Â«Â less

473. Thermodynamic characteristics of the interaction between nicotinic acid and phenylalanine in an aqueous buffer solution at 298 K

NASA Astrophysics Data System (ADS)

Badelin, V. G.; Tyunina, E. Yu.; Mezhevoi, I. N.; Tarasova, G. N.

2013-08-01

The interaction between L-phenylalanine and nicotinic acid is studied by solution calorimetry in an aqueous buffer solution (pH 7.35) at different ratios of the reagents. Experimental data on the enthalpy of dissolution of amino acid in the buffer solution of nicotinic acid at 298.15 K are calculated. The values of thermodynamic parameters for the complexation of L-phenylalanine with nicotinic acid are calculated. It is shown that the formation of a 1: 2 molecular complex is stabilized by the entropy factor due to the dominant role of the dehydration effect of initial reagents.

474. Color removal from acid and reactive dye solutions by electrocoagulation and electrocoagulation/adsorption processes.

PubMed

Bellebia, S; Kacha, S; Bouberka, Z; Bouyakoub, A Z; Derriche, Z

2009-04-01

In this study, electrocoagulation of Marine Blue Erionyl MR (acid dye) and electrocoagulation followed by adsorption of Brilliant Blue Levafix E-BRA (reactive dye) from aqueous solutions were investigated, using aluminum electrodes and granular activated carbon (GAC). In the electrocoagulation and adsorption of dyestuff solutions, the effects of current density, loading charge, pH, conductivity, stirring velocity, contact time, and GAC concentration were examined. The optimum conditions for the electrocoagulation process were identified as loading charges 7.46 and 1.49 F/m3, for a maximum abatement of 200 mg/L reactive and acid dye, respectively. The residual reactive dye concentration was completely removed with 700 mg/L GAC. The results of this investigation provide important data for the development of a combined process to remove significant concentrations of recalcitrant dyes from water, using moderate activated carbon energy and aluminum consumption, and thereby lowering the cost of treatment.

475. Evaluation of the Magnesium Hydroxide Treatment Process for Stabilizing PFP Plutonium/Nitric Acid Solutions

SciTech Connect

Gerber, Mark A.; Schmidt, Andrew J.; Delegard, Calvin H.

2000-09-28

This document summarizes an evaluation of the magnesium hydroxide [Mg(OH)2] process to be used at the Hanford Plutonium Finishing Plant (PFP) for stabilizing plutonium/nitric acid solutions to meet the goal of stabilizing the plutonium in an oxide form suitable for storage under DOE-STD-3013-99. During the treatment process, nitric acid solutions bearing plutonium nitrate are neutralized with Mg(OH)2 in an air sparge reactor. The resulting slurry, containing plutonium hydroxide, is filtered and calcined. The process evaluation included a literature review and extensive laboratory- and bench-scale testing. The testing was conducted using cerium as a surrogate for plutonium to identify and quantifymoreÂ Â» the effects of key processing variables on processing time (primarily neutralization and filtration time) and calcined product properties.Â«Â less

476. Kinetics of Ni3S2 sulfide dissolution in solutions of sulfuric and hydrochloric acids

NASA Astrophysics Data System (ADS)

Palant, A. A.; Bryukvin, V. A.; Vinetskaya, T. N.; Makarenkova, T. A.

2008-02-01

The kinetics of Ni3S2 sulfide (heazlewoodite) dissolution in solutions of hydrochloric and sulfuric acids is studied. The process under study in the temperature range of 30 90Â°C is found to occur in a kinetic regime and is controlled by the corresponding chemical reactions of the Ni3S2 decomposition by solutions of inorganic acids (E a = 67 92 kJ/mol, or 16 22 kcal/mol). The only exception is the Ni3S2-HCl system at elevated temperatures (60 90Â°C). In this case, the apparent activation energy decreases sharply to 8.8 kJ/mol (2.1 kcal/mol), which is explained by the catalytic effect of gaseous chlorine formed under these conditions. The studies performed are related to the physicochemical substantiation of the hydrometallurgical processing of the copper-nickel converter mattes produced in the industrial cycle of the Norilsk Mining Company.

477. Mechanistic study of fulvic acid assisted propranolol photodegradation in aqueous solution.

PubMed

Makunina, Maria P; Pozdnyakov, Ivan P; Chen, Yong; Grivin, Vyacheslav P; Bazhin, Nikolay M; Plyusnin, Victor F

2015-01-01

Laser flash (355 nm) and stationary (365 nm) photolysis were used to study the mechanisms of propranolol photolysis in the presence of fulvic acid in aqueous solutions. The FA-assisted photodegradation of propranolol was observed using UV-A irradiation (where propranolol is stable). Direct evidence indicated that the photodegradation resulted from the static quenching of the FA triplet state by propranolol via the electron transfer mechanism. The triplet state yield (Ï•Tâ‰ˆ0.6%) and the T-T absorption coefficient (É›T(620 nm)â‰ˆ5Ã—10(4) M(-1) cm(-1)) were estimated for the first time by modeling the yields of the FA triplet state in the presence of propranolol. Thus, fulvic acid is a promising agent for accelerating propranolol photodegradation in aqueous solutions under UV-A light irradiation. Copyright Â© 2014 Elsevier Ltd. All rights reserved.

478. Citric Acid-Modified Fenton's Reaction for the Oxidation of Chlorinated Ethylenes in Soil Solution Systems

    SciTech Connect

    Seol, Yongkoo; Javandel, Iraj

    Fenton's reagent, a solution of hydrogen peroxide and ferrous iron catalyst, is used for an in-situ chemical oxidation of organic contaminants. Sulfuric acid is commonly used to create an acidic condition needed for catalytic oxidation. Fenton's reaction often involves pressure buildup and precipitation of reaction products, which can cause safety hazards and diminish efficiency. We selected citric acid, a food-grade substance, as an acidifying agent to evaluate its efficiencies for organic contaminant removal in Fenton's reaction, and examined the impacts of using citric acid on the unwanted reaction products. A series of batch and column experiments were performed with varyingmoreÂ Â» H{sub 2}O{sub 2} concentrations to decompose selected chlorinated ethylenes. Either dissolved iron from soil or iron sulfate salt was added to provide the iron catalyst in the batch tests. Batch experiments revealed that both citric and sulfuric acid systems achieved over 90% contaminant removal rates, and the presence of iron catalyst was essential for effective decontamination. Batch tests with citric acid showed no signs of pressure accumulation and solid precipitations, however the results suggested that an excessive usage of H{sub 2}O{sub 2} relative to iron catalysts (Fe{sup 2+}/H{sub 2}O{sub 2} < 1/330) would result in lowering the efficiency of contaminant removal by iron chelations in the citric acid system. Column tests confirmed that citric acid could provide suitable acidic conditions to achieve higher than 55% contaminant removal rates.Â«Â less

479. FURFURAL YIELD AND DECOMPOSITION IN SODIUM 2,4DIMETHYLBENZENESULFONATE--SULFURIC ACID--WATER SOLUTIONS.

    DTIC Science & Technology

    Batch-type microreactors (about 1/40 milliliter of reactants) were used to measure furfural yields from acidified xylose solutions containing sodium...It was found that presence of the salt did not affect the quantity of furfural produced, but greatly increased the rate of formation. The regular...increase in rate of furfural formation was directly related to the increase in the rate xylose decomposition, and furfural yields for all salt and acid

480. The response of soil solution chemistry in European forests to decreasing acid deposition.

    PubMed

    Johnson, James; Graf Pannatier, Elisabeth; Carnicelli, Stefano; Cecchini, Guia; Clarke, Nicholas; Cools, Nathalie; Hansen, Karin; Meesenburg, Henning; Nieminen, Tiina M; Pihl-Karlsson, Gunilla; Titeux, Hugues; Vanguelova, Elena; Verstraeten, Arne; Vesterdal, Lars; Waldner, Peter; Jonard, Mathieu

    2018-03-31

    Acid deposition arising from sulphur (S) and nitrogen (N) emissions from fossil fuel combustion and agriculture has contributed to the acidification of terrestrial ecosystems in many regions globally. However, in Europe and North America, S deposition has greatly decreased in recent decades due to emissions controls. In this study, we assessed the response of soil solution chemistry in mineral horizons of European forests to these changes. Trends in pH, acid neutralizing capacity (ANC), major ions, total aluminium (Al tot) and dissolved organic carbon were determined for the period 1995-2012. Plots with at least 10Â years of observations from the ICP Forests monitoring network were used. Trends were assessed for the upper mineral soil (10-20Â cm, 104 plots) and subsoil (40-80Â cm, 162 plots). There was a large decrease in the concentration of sulphate (SO42-) in soil solution; over a 10-year period (2000-2010), SO42- decreased by 52% at 10-20Â cm and 40% at 40-80Â cm. Nitrate was unchanged at 10-20Â cm but decreased at 40-80Â cm. The decrease in acid anions was accompanied by a large and significant decrease in the concentration of the nutrient base cations: calcium, magnesium and potassium (BcÂ =Â Ca 2+ Â +Â Mg 2+ Â +Â K +) and Al tot over the entire dataset. The response of soil solution acidity was nonuniform. At 10-20Â cm, ANC increased in acid-sensitive soils (base saturation â‰¤10%) indicating a recovery, but ANC decreased in soils with base saturation >10%. At 40-80Â cm, ANC remained unchanged in acid-sensitive soils (base saturation â‰¤20%, pHCaCl2Â â‰¤Â 4.5) and decreased in better-buffered soils (base saturation >20%, pHCaCl2Â >Â 4.5). In addition, the molar ratio of Bc to Al tot either did not change or decreased. The results suggest a long-time lag between emission abatement and changes in soil solution acidity and underline the importance of long-term monitoring in evaluating ecosystem response to decreases in deposition. Â© 2018 John Wiley & Sons

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481. Forward osmosis for oily wastewater reclamation: Multi-charged oxalic acid complexes as draw solutes.

PubMed

Ge, Qingchun; Amy, Gary Lee; Chung, Tai-Shung

2017-10-01

Forward osmosis (FO) has demonstrated its merits in hybrid FO seawater desalination. However, FO may have a potential for other applications if suitable draw solutes are available. In this study, a series of novel draw solutes based on oxalic acid (OA)-transitional metal complexes are presented. Influential factors of FO performance have been systematically investigated by varying the transitional metals, cations of the complex draw solutes as well as the experimental conditions. Compared to NaCl and other recently synthesized draw solutes, the OA complexes show superior FO performance in terms of high water fluxes up to 27.5 and 89.1 LMH under the respective FO and PRO (pressure retarded osmosis) modes, both with negligible reverse solute fluxes. The features of octahedral geometry, abundant hydrophilic groups and ionic species are crucial for the OA complexes as appropriate draw solutes with satisfactory FO performance. Among the synthesized OA complexes, the ammonium salt of chromic complex (NH 4 -Cr-OA) outperforms others due to the presence of more ionic species in its complex system. NH 4 -Cr-OA also performs better than the typical NaCl draw solute in FO oily wastewater treatment with higher water recovery and negligible reverse fluxes. Dilute solutions of OA complexes have been reconcentrated through membrane distillation (MD) and reused to new round of FO processes. The OA complexes have demonstrated their suitability and superiority as a novel class of draw solutes for the FO process in this study. Copyright Â© 2017 Elsevier Ltd. All rights reserved.

482. Chemical durability of glaze on Zsolnay architectural ceramics (Budapest, Hungary) in acid solutions

NASA Astrophysics Data System (ADS)

Baricza, Ã□gnes; BajnÃ³czi, Bernadett; May, ZoltÃ¡n; TÃ³th, MÃ¡ria; SzabÃ³, Csaba

2015-04-01

Zsolnay glazed architectural ceramics are among the most famous Hungarian ceramics, however, there is no profound knowledge about the deterioration of these building materials. The present study aims to reveal the influence of acidic solutions in the deterioration of Zsolnay ceramics. The studied ceramics are glazed roof tiles, which originate from two buildings in Budapest: one is located in the densely built-up city centre with high traffic rate and another one is in a city quarter with moderate traffic and more open space. The roof tiles represent the construction and the renovation periods of the buildings. The ceramics were mainly covered by lead glazes in the construction period and mainly alkali glazes in the renovation periods. The glaze of the tiles were coloured with iron (for yellow glaze) or chromium/copper/iron (for green glazes) in the case of the building located in the city centre, whereas cobalt was used as colorant and tin oxide as opacifier for the blue glaze of the ceramics of the other building. Six tiles were selected from each building. Sulphuric acid (H2SO4) solutions of pH2 and pH4 were used to measure the durability of the glazes up to 14 days at room temperature. The surfaces of the glazed ceramics after the treatment were measured by X-ray diffraction, Raman spectroscopy and SEM-EDS techniques to determine the precipitated phases on the surface of the glaze. Electron microprobe analysis was used to quantitatively characterise phases found and to determine the chemical composition of the treated glaze. The recovered sulphuric acid solutions were measured with ICP-OES technique in order to quantify the extent of the ion exchange between the glaze and the solutions. There is a significant difference in the dissolution rates in the treatments with sulphuric acid solutions of pH2 and pH4, respectively. The solution of pH2 induced greater ion exchange (approx. 7-10 times) from the glaze compared to the solution of pH4. Alkali and alkali earth

483. Surface characterisation of ethylene propylene diene rubber upon exposure to aqueous acidic solution

NASA Astrophysics Data System (ADS)

Mitra, Susanta; Ghanbari-Siahkali, Afshin; Kingshott, Peter; Hvilsted, SÃ¸ren; Almdal, Kristoffer

2006-07-01

Two types of pure ethylene propylene diene rubbers were exposed to two different acids for varying period of time. Surface characterisation was carried out using X-ray photoelectron spectroscopy (XPS). Two EPDM rubbers selected for this study were comparable in co-monomer compositions but significantly different with respect to molar mass and the presence of long chain branching. Both rubbers contained 5-ethylidene-2-norbornene (ENB) as diene. Solution cast films of pure EPDM samples were exposed in two different acidic solutions, viz. chromosulphuric (Cr (VI)/H 2SO 4) and sulphuric acid (H 2SO 4) (20%, v/v) at ambient temperature from 1 to 12 weeks. XPS analysis indicated that several oxygenated species were formed on the surface of both rubbers after exposure. It was postulated from the XPS analyses that both aqueous acidic solutions attacked the olefinic double bonds (C dbnd C) of ENB. Furthermore, 20% Cr (VI)/H 2SO 4 also attacked the allylic carbon-hydrogen (C sbnd H) bonds of ENB resulting in more oxygenated species on the surface compared to 20% H 2SO 4 under identical conditions. Cr (VI) in the 20% Cr (VI)/H 2SO 4 was found to play an important role in alteration of surface chemistry. Studies using a model system consisting of EPDM mixed with Cr (VI) and Cr (III) salts revealed that the change of oxidation state from Cr (VI) to Cr (III) as a consequence of direct involvement of Cr (VI) in the chemical alteration of EPDM surfaces. Interestingly, the presence of long chain branching and molar mass did not significantly influence the chemical processes owing to the acid treatment.

484. Exceptionally crystalline and conducting acid doped polyaniline films by level surface assisted solution casting approach

NASA Astrophysics Data System (ADS)

Puthirath, Anand B.; Methattel Raman, Shijeesh; Varma, Sreekanth J.; Jayalekshmi, S.

2016-04-01

Emeraldine salt form of polyaniline (PANI) was synthesized by chemical oxidative polymerisation method using ammonium persulfate as oxidant. Resultant emeraldine salt form of PANI was dedoped using ammonia solution and then re-doped with camphor sulphonic acid (CSA), naphthaline sulphonic acid (NSA), hydrochloric acid (HCl), and m-cresol. Thin films of these doped PANI samples were deposited on glass substrates using solution casting method with m-cresol as solvent. A level surface was employed to get homogeneous thin films of uniform thickness. Detailed X-ray diffraction studies have shown that the films are exceptionally crystalline. The crystalline peaks observed in the XRD spectra can be indexed to simple monoclinic structure. FTIR and Raman spectroscopy studies provide convincing explanation for the exceptional crystallinity observed in these polymer films. FESEM and AFM images give better details of surface morphology of doped PANI films. The DC electrical conductivity of the samples was measured using four point probe technique. It is seen that the samples also exhibit quite high DC electrical conductivity, about 287 S/cm for CSA doped PANI, 67 S/cm for NSA doped PANI 65 S/cm for HCl doped PANI, and just below 1 S/cm for m-cresol doped PANI. Effect of using the level surface for solution casting is studied and correlated with the observed crystallinity.

485. Exceptionally crystalline and conducting acid doped polyaniline films by level surface assisted solution casting approach

SciTech Connect

Puthirath, Anand B.; Varma, Sreekanth J.; Jayalekshmi, S., E-mail: jayalekshmi@cusat.ac.in

2016-04-18

Emeraldine salt form of polyaniline (PANI) was synthesized by chemical oxidative polymerisation method using ammonium persulfate as oxidant. Resultant emeraldine salt form of PANI was dedoped using ammonia solution and then re-doped with camphor sulphonic acid (CSA), naphthaline sulphonic acid (NSA), hydrochloric acid (HCl), and m-cresol. Thin films of these doped PANI samples were deposited on glass substrates using solution casting method with m-cresol as solvent. A level surface was employed to get homogeneous thin films of uniform thickness. Detailed X-ray diffraction studies have shown that the films are exceptionally crystalline. The crystalline peaks observed in the XRD spectra canmoreÂ Â» be indexed to simple monoclinic structure. FTIR and Raman spectroscopy studies provide convincing explanation for the exceptional crystallinity observed in these polymer films. FESEM and AFM images give better details of surface morphology of doped PANI films. The DC electrical conductivity of the samples was measured using four point probe technique. It is seen that the samples also exhibit quite high DC electrical conductivity, about 287â€‰S/cm for CSA doped PANI, 67â€‰S/cm for NSA doped PANI 65â€‰S/cm for HCl doped PANI, and just below 1â€‰S/cm for m-cresol doped PANI. Effect of using the level surface for solution casting is studied and correlated with the observed crystallinity.Â«Â less

486. Nanostructural characterization of large-scale porous alumina fabricated via anodizing in arsenic acid solution

NASA Astrophysics Data System (ADS)

Akiya, Shunta; Kikuchi, Tatsuya; Natsui, Shungo; Suzuki, Ryosuke O.

2017-05-01

Anodizing of aluminum in an arsenic acid solution is reported for the fabrication of anodic porous alumina. The highest potential difference (voltage) without oxide burning increased as the temperature and the concentration of the arsenic acid solution decreased, and a high anodizing potential difference of 340 V was achieved. An ordered porous alumina with several tens of cells was formed in 0.1-0.5 M arsenic acid solutions at 310-340 V for 20 h. However, the regularity of the porous alumina was not improved via anodizing for 72 h. No pore sealing behavior of the porous alumina was observed upon immersion in boiling distilled water, and it may be due to the formation of an insoluble complex on the oxide surface. The porous alumina consisted of two different layers: a hexagonal alumina layer that contained arsenic from the electrolyte and a pure alumina honeycomb skeleton. The porous alumina exhibited a white photoluminescence emission at approximately 515 nm under UV irradiation at 254 nm.

487. Assorted interactions of amino acids prevailing in aqueous vitamin C solutions probed by physicochemical and ab-initio contrivances

NASA Astrophysics Data System (ADS)

Das, Koyeli; Roy, Milan Chandra; Rajbanshi, Biplab; Roy, Mahendra Nath

2017-11-01

Qualitative and quantitative analysis of molecular interaction prevailing in tyrosine and tryptophan in aqueous solution of vitamin C have been probed by thermophysical properties. The apparent molar volume (Ï•V), viscosity B-coefficient, molal refraction (RM) of tyrosine and tryptophan have been studied in aqueous vitamin C solutions at diverse temperatures via Masson equation which deduced solute-solvent and solute-solute interactions, respectively. Spectroscopic study along with physicochemical and computational techniques provides lots of interesting and highly significant insights of the model biological systems. The overall results established strong solute-solvent interactions between studied amino acids and vitamin C mixture in the ternary solutions.

488. Kinetic Aspects of Leaching Zinc from Waste Galvanizing Zinc by Using Hydrochloric Acid Solutions

NASA Astrophysics Data System (ADS)

SminÄ□Ã¡kovÃ¡, EmÃlia; TrpÄ□evskÃ¡, Jarmila; PiroÅ¡kovÃ¡, Jana

2017-10-01

In this work, the results of acid leaching of flux skimmings coming from two plants are presented. Sample A contained two phases, Zn(OH)Cl and NH4Cl. In sample B, the presence of three phases, Zn5(OH)8Cl2Â·H2O, (NH4)2(ZnCl4) and ZnCl2(NH3)2, was proved. The aqueous solution of hydrochloric acid and distilled water was used as the leaching medium. The effects of the leaching time, temperature and concentration of the leaching medium on the zinc extraction were investigated. The apparent activation energy, E a = 4.61 kJ mol-1, and apparent reaction order n = 0.18 for sample A, and the values E a = 6.28 kJ mol-1 and n = 0.33 for sample B were experimentally determined. Zinc leaching in acid medium is a diffusion-controlled process.

489. A kinetic study of the enhancement of solution chemiluminescence of glyoxylic acid oxidation by manganese species.

PubMed

Otamonga, Jean-Paul; Abdel-Mageed, Amal; Agater, Irena B; Jewsbury, Roger A

2015-08-01

In order to study the mechanism of the enhancement of solution chemiluminescence, the kinetics of the decay of the oxidant and the chemiluminescence emission were followed for oxidations by permanganate, manganese dioxide sol and Mn(3+) (aq) of glyoxylic acid, using stopped-flow spectrophotometry. Results are reported for the glyoxylic acid oxidized under pseudo first-order conditions and in an acidic medium at 25â€‰Â°C. For permanganate under these conditions, the decay is sigmoidal, consistent with autocatalysis, and for manganese dioxide sol and Mn(3+) it is pseudo first order. The effects of the presence of aqueous formaldehyde and Mn(2+) were observed and a fit to a simple mechanism is discussed. It is concluded that chemiluminescent enhancement in these systems is best explained by reaction kinetics. Copyright Â© 2014 John Wiley & Sons, Ltd.

490. Corrosion Behaviour of Sn-based Lead-Free Solders in Acidic Solution

     NASA Astrophysics Data System (ADS)

     Nordarina, J.; Mohd, H. Z.; Ahmad, A. M.; Muhammad, F. M. N.

     2018-03-01

     The corrosion properties of Sn-9(5Al-Zn), Sn-Cu and SAC305 were studied via potentiodynamic polarization method in an acidic solution of 1 M hydrochloric acid (HCl). Sn-9(5Al-Zn) produced different polarization profile compared with Sn-Cu and SAC305. The morphological analysis showed that small, deep grooves shaped of corrosion product formed on top of Sn-9(5Al-Zn) solder while two distinctive structures of closely packed and loosely packed corrosion product formed on top of Sn-Cu and SAC305 solder alloys. Phase analysis revealed the formations of various corrosion products such as SnO and SnO2 mainly dominant on surface of solder alloys after potentiodynamic polarization in 1 M hydrochloric acid (HCl).

491. Removal of humic acid from aqueous solution using dual PMMA/PVDF composite nanofiber: kinetics study

     NASA Astrophysics Data System (ADS)

     Zulfikar, M. A.; Afrianingsih, I.; Bahri, A.; Nasir, M.; Alni, A.; Setiyanto, H.

     2018-05-01

     The removal of humic acid from aqueous solution using dual poly(methyl methacrylate)/polyvinyl difluoride composite nanofiber under the influence of concentration has been studied. The experiments were performed using humic acid (HA) as an adsorbate at concentration in the range of 50-200 mg/L. Pseudo-first-order, pseudo-second-order, and intra-particle diffusion models were used to describe the kinetic data and the rate constants were evaluated. It was observed that the amount of humic acid removed decrease with increasing concentration. The kinetic study revealed that pseudo-second order model fitted well the kinetic data, while the external diffusion or boundary layer diffusion was the main rate determining step in the removal process.

492. Corrosion behavior of ODS steels with several chromium contents in hot nitric acid solutions

     NASA Astrophysics Data System (ADS)

     Tanno, Takashi; Takeuchi, Masayuki; Ohtsuka, Satoshi; Kaito, Takeji

     2017-10-01

     Oxide dispersion strengthened (ODS) steel cladding tubes have been developed for fast reactors. Tempered martensitic ODS steels with 9 and 11 wt% of chromium (9Cr-, 11Cr-ODS steel) are the candidate material in research being carried out at JAEA. In this work, fundamental immersion tests and electrochemical tests of 9 to 12Cr-ODS steels were systematically conducted in various nitric acid solutions at 95 Â°C. The corrosion rate decreased exponentially with effective solute chromium concentration (Creff) and nitric acid concentration. Addition of vanadium (V) and ruthenium (Ru) also decreased the corrosion rate. The combination of low Creff and dilute nitric acid could not avoid the active mass dissolution during active domain at the beginning of immersion, and the corrosion rate was high. Higher Creff decreased the partial anodic current during the active domain and assisted the passivation of the surface of the steel. Concentrated nitric acid and addition of Ru and V increased partial cathodic current and shifted the corrosion potential to noble side. These effects should have prevented the active mass dissolution and decreased the corrosion rate.

493. Conformation of kainic acid in solution from molecular modelling and NMR spectra.

PubMed

Falk, M; Sidhu, P; Walter, J A

1998-01-01

Conformational behaviour of kainic acid in aqueous solution was elucidated by molecular mechanics and dynamics. The pucker of the five-membered ring in kainic acid was examined and compared with that of model compounds. In cyclopentane there is no barrier to pseudorotation, so that all puckered states coexist. In pyrrolidinium, the presence of a hetero-atom in the ring introduces a small barrier (about 0.6 kcal mol(-1)) to pseudorotation, separating two stable regions, A and B, which are equivalent by symmetry. In proline, the presence of the carboxylate group on C2 removes the symmetry but two stable conformational minima, A and B, remain. In kainic acid, the presence of side-chains on C3 and C4 introduces complications resulting in additional sub-minima in both regions, A and B. In solution, kainic acid is a complex mixture of conformers with comparable energies, because of the combination of several stable states of the pyrrolidinium ring with the torsional degrees of freedom arising from the two side-chains. The individual geometries, energies, and estimates of relative populations of these conformers were obtained from molecular dynamics simulations. The calculations were validated by a comparison of predicted inter-proton distances and vicinal proton coupling constants with the experimental quantities derived from NMR spectra.

494. White Paper on Potential Hazards Associated with Contaminated Cheesecloth Exposed to Nitric Acid Solutions

SciTech Connect

Hypes, Philip A.

This white paper addresses the potential hazards associated with waste cheesecloth that has been exposed to nitric acid solutions. This issue was highlighted by the cleanup of a 100 ml leak of aqueous nitric acid solution containing Heat Source (HS) plutonium on 21 June 2016. Nitration of cellulosic material is a well-understood process due to industrial/military applications of the resulting material. Within the Department of Energy complex, nitric acids have been used extensively, as have cellulosic wipes. If cellulosic materials are nitrated, the cellulosic material can become ignitable and in extreme cases, reactive. We have chemistry knowledge and operating experiencemoreÂ Â» to support the conclusion that all current wastes are safe and compliant. There are technical questions worthy of further experimental evaluation. An extent of condition evaluation has been conducted back to 2004. During this time period there have been interruptions in the authorization to use cellulosic wipes in PF-4. Limited use has been authorized since 2007 (for purposes other than spill cleanup), so our extent of condition includes the entire current span of use. Our evaluation shows that there is no indication that process spills involving high molarity nitric acid were cleaned up with cheesecloth since 2007. The materials generated in the 21 June leak will be managed in a safe manner compliant with all applicable requirements.Â«Â less

495. The anodizing behavior of aluminum in malonic acid solution and morphology of the anodic films

    NASA Astrophysics Data System (ADS)

    Ren, Jianjun; Zuo, Yu

    2012-11-01

    The anodizing behavior of aluminum in malonic acid solution and morphology of the anodic films were studied. The voltage-time response for galvanostatic anodization of aluminum in malonic acid solution exhibits a conventional three-stage feature but the formation voltage is much higher. With the increase of electrolyte concentration, the electrolyte viscosity increases simultaneously and the high viscosity decreases the film growth rate. With the concentration increase of the malonic acid electrolyte, the critical current density that initiates local "burning" on the sample surface decreases. For malonic acid anodization, the field-assisted dissolution on the oxide surface is relatively weak and the nucleation of pores is more difficult, which results in greater barrier layer thickness and larger cell dimension. The embryo of the porous structure of anodic film has been created within the linear region of the first transient stage, and the definite porous structure has been established before the end of the first transient stage. The self-ordering behavior of the porous film is influenced by the electrolyte concentration, film thickness and the applied current density. Great current density not only improves the cell arrangement order but also brings about larger cell dimension.

496. Solubility Limits of Dibutyl Phosphoric Acid in Uranium Solutions at SRS

    SciTech Connect

    Thompson, M.C.; Pierce, R.A.; Ray, R.J.

    1998-06-01

    The Savannah River Site has enriched uranium (EU) solution which has been stored for almost 10 years since being purified in the second uranium cycle of the H area solvent extraction process. The concentrations in solution are {tilde 6} g/L U and about 0.1 M nitric acid. Residual tributylphosphate in the solutions has slowly hydrolyzed to form dibutyl phosphoric acid (HDBP) at concentrations averaging 50 mg/L. Uranium is known to form compounds with DBP which have limited solubility. The potential to form uranium-DBP solids raises a nuclear criticality safety issue. SRTC tests have shown that U-DBP solids will precipitate atmoreÂ Â» concentrations potentially attainable during storage of enriched uranium solutions. Evaporation of the existing EUS solution without additional acidification could result in the precipitation of U-DBP solids if DBP concentration in the resulting solution exceeds 110 ppm at ambient temperature. The same potential exists for evaporation of unwashed 1CU solutions. The most important variables of interest for present plant operations are HNO{sub 3} and DBP concentrations. Temperature is also an important variable controlling precipitation. The data obtained in these tests can be used to set operating and safety limits for the plant. It is recommended that the data for 0 degrees C with 0.5 M HNO{sub 3} be used for setting the limits. The limit would be 80 mg/L which is 3 standard deviations below the average of 86 observed in the tests. The data shows that super-saturation can occur when the DBP concentration is as much as 50 percent above the solubility limit. However, super-saturation cannot be relied on for maintaining nuclear criticality safety. The analytical method for determining DBP concentration in U solutions was improved so that analyses for a solution are accurate to within 10 percent. However, the overall uncertainty of results for periodic samples of the existing EUS solutions was only reduced slightly. Thus, sampling appears

497. Flash photolysis and pulse radiolysis studies on collagen Type I in acetic acid solution.

    PubMed

Sionkowska, Alina

2006-07-03

An investigation of the photochemical properties of collagen Type I in acetic acid solution was carried out using nanosecond laser irradiation. The transient spectra of collagen solution excited at 266 nm show two bands. One of them with maximum at 295 nm and the second one with maximum at 400 nm. The peak at 400 nm is assigned to tyrosyl radicals. The first peak of the transient absorption spectra at 295 nm is probably due to photoionisation producing collagen radical cation. The transient for collagen solution in acetic acid at 640 nm was not observed. It is evidence that there is no hydrated electron in the irradiated collagen solution. The reactions of hydrated electrons and (*)OH radicals with collagen have been studied by pulse radiolysis. In the absorption spectra of products resulting from the reaction of collagen with e(aq)(-) no characteristic maximum absorption in UV and visible light region has been observed. In the absorption spectra of products resulting from the reaction of the hydroxyl radicals with collagen two bands have been observed. The first one at 320 nm and the second one at 405 nm. Reaction of (*)OH radicals with tyrosine residues in collagen chains gives rise to Tyr phenoxyl radicals (absorption at 400 nm).

498. Influence of D-Penicillamine on the Viscosity of Hyaluronic Acid Solutions

NASA Astrophysics Data System (ADS)

Liang, Jing; Krause, Wendy E.; Colby, Ralph H.

2006-03-01

Polyelectrolyte hyaluronic acid (HA, hyaluronan) is an important component in synovial fluid. Its presence results in highly viscoelastic solutions with excellent lubricating and shock-absorbing properties. In comparison to healthy synovial fluid, diseased fluid has a reduced viscosity. In osteoarthritis this reduction in viscosity results from a decline in both the molecular weight and concentration of hyaluronic acid HA. Initial results indicate that D-penicillamine affects the rheology of bovine synovial fluid, a model synovial fluid solution, and its components, including HA. In order to understand how D-penicillamine modifies the viscosity of these solutions, the rheological properties of sodium hyaluronate (NaHA) in phosphate-buffered saline (PBS) with D-penicillamine were studied as function of time, D-penicillamine concentration (0 -- 0.01 M), and storage conditions. Penicillamine has a complex, time dependent effect on the viscosity of NaHA solutions---reducing the zero shear rate viscosity of a 3 mg/mL NaHA in PBS by ca. 40% after 44 days.

499. Method for extracting lanthanides and actinides from acid solutions by modification of Purex solvent

DOEpatents

Horwitz, E.P.; Kalina, D.G.

1986-03-04

A process is described for the recovery of actinide and lanthanide values from aqueous solutions with an extraction solution containing an organic extractant having the formula as shown in a diagram where [phi] is phenyl, R[sup 1] is a straight or branched alkyl or alkoxyalkyl containing from 6 to 12 carbon atoms and R[sup 2] is an alkyl containing from 3 to 6 carbon atoms and phase modifiers in a water-immiscible hydrocarbon diluent. The addition of the extractant to the Purex process extractant, tri-n-butylphosphate in normal paraffin hydrocarbon diluent, will permit the extraction of multivalent lanthanide and actinide values from 0.1 to 12.0 molar acid solutions. 6 figs.

500. Method for extracting lanthanides and actinides from acid solutions by modification of purex solvent

DOEpatents

Horwitz, E. Philip; Kalina, Dale G.

1986-01-01

A process for the recovery of actinide and lanthanide values from aqueous solutions with an extraction solution containing an organic extractant having the formula: ##STR1## where .phi. is phenyl, R.sup.1 is a straight or branched alkyl or alkoxyalkyl containing from 6 to 12 carbon atoms and R.sup.2 is an alkyl containing from 3 to 6 carbon atoms and phase modifiers in a water-immiscible hydrocarbon diluent. The addition of the extractant to the Purex process extractant, tri-n-butylphosphate in normal paraffin hydrocarbon diluent, will permit the extraction of multivalent lanthanide and actinide values from 0.1 to 12.0 molar acid solutions.

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