PubChem

COMPOUND SUMMARY

Magnesium sulfate

PubChem CID	24083
Structure	 2D Find Similar Structures
Chemical Safety	 Irritant Laboratory Chemical Safety Summary (LCSS) Datasheet
Molecular Formula	$MgSO_4$ or MgO_4S
Synonyms	MAGNESIUM SULFATE 7487-88-9 Magnesium sulphate Magnesium sulfate anhydrous Sulfuric acid magnesium salt (1:1) More...
Molecular Weight	120.37 g/mol
Component Compounds	CID 5462224 (Magnesium)  CID 1118 (Sulfuric acid)
Dates	Modify 2021-01-02 Create 2004-09-16

Magnesium sulfate is a magnesium salt having sulfate as the counterion. It has a role as an anticonvulsant, a cardiovascular drug, a calcium channel blocker, an anaesthetic, a tocolytic agent, an anti-arrhythmia drug, an analgesic and a fertilizer. It is a magnesium salt and a metal sulfate.

▸ ChEBI

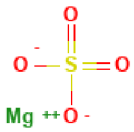
A small colorless crystal used as an anticonvulsant, a cathartic, and an electrolyte replenisher in the treatment of pre-eclampsia and eclampsia. It causes direct inhibition of action potentials in myometrial muscle cells. Excitation and contraction are uncoupled, which decreases the frequency and force of contractions. (From AMA Drug Evaluations Annual, 1992, p1083)

▸ DrugBank

1 Structures

1.1 2D Structure

Chemical Structure Depiction



PubChem

1.2 3D Status

Conformer generation is disallowed since MMFF94s unsupported element, mixture or salt

PubChem

2 Names and Identifiers

2.1 Computed Descriptors

2.1.1 IUPAC Name

magnesium;sulfate

Computed by LexiChem 2.6.6 (PubChem release 2019.06.18)

PubChem

2.1.2 InChI

InChI=1S/Mg.H2O4S/c;1-5(2,3)4/h;(H2,1,2,3,4)/q+2;/p-2

Computed by InChI 1.0.5 (PubChem release 2019.06.18)

PubChem

2.1.3 InChI Key

CSNNHWWHGAXBCP-UHFFFAOYSA-L

Computed by InChI 1.0.5 (PubChem release 2019.06.18)

PubChem

2.1.4 Canonical SMILES

[O-]S(=O)(=O)[O-].[Mg+2]

Computed by OEChem 2.1.5 (PubChem release 2019.06.18)

PubChem

2.2 Molecular Formula

MgSO4

ILO International Chemical Safety Cards (ICSC); Wikipedia

MgO4S

Computed by PubChem 2.1 (PubChem release 2019.06.18)

PubChem

2.3 Other Identifiers

2.3.1 CAS

7487-88-9

ChemIDplus; DrugBank; EPA Chemicals under the TSCA; EPA DSSTox; European Chemicals Agency (ECHA); Hazardous Substances Data Bank (HSDB); ILO International Chemical Safety Cards (ICSC)

18939-43-0

ChemIDplus; European Chemicals Agency (ECHA)

68081-97-0

ChemIDplus; EPA Chemicals under the TSCA; European Chemicals Agency (ECHA)

22189-08-8

European Chemicals Agency (ECHA)

2.3.2 Related CAS

10034-99-8 (heptahydrate)

ChemIDplus

2.3.3 Deprecated CAS

139939-75-6, 849607-35-8

- ChemIDplus

2.3.4 European Community (EC) Number

231-298-2

- European Chemicals Agency (ECHA)

242-691-3

- European Chemicals Agency (ECHA)

268-365-0

- European Chemicals Agency (ECHA)

606-949-2

- European Chemicals Agency (ECHA)

2.3.5 ICSC Number

1197

- ILO International Chemical Safety Cards (ICSC)

2.3.6 UNII

ML30MJ2U7I

- FDA/SPL Indexing Data

2.3.7 DSSTox Substance ID

DTXSID6042105

- EPA DSSTox

2.3.8 Wikipedia

Magnesium sulfate

- Wikipedia

2.4 Synonyms

2.4.1 MeSH Entry Terms

Heptahydrate Magnesium Sulfate
Magnesium Sulfate
Magnesium Sulfate, Heptahydrate
Sulfate, Magnesium

- MeSH

2.4.2 Depositor-Supplied Synonyms

MAGNESIUM SULFATE	Sulfuric acid magnesium salt	HSDB 664	Magnesium Sulfate In Plastic Container
7487-88-9	Magnesium(II) sulfate	CHEBI:32599	Magnesium sulfate, anhydrous
Magnesium sulphate	OT-S (drying agent)	EINECS 231-298-2	Magnesium sulfate, unspecified
Magnesium sulfate anhydrous	OT-S	EPA Pesticide Chemical Code 050503	SDA 15-062-07
Sulfuric acid magnesium salt (1:1)	22189-08-8	NSC 146179	CCRIS 8411
MgSO4	Caswell No. 534	ML30MJ2U7I	Sulfuric acid, mono-C10-16-alkyl esters, magnesium salts
			Magnesium sulfate, 99%, extra pure, dried, contains 3 to 4 mole

Magnesium sulfate (1:1)	Anhydrous magnesium sulfate UNII-ML30MJ2U7I	Magnesium sulfate dried	
Magnesiumsulfat		Magnesii sulfas	SN 00
Sal Angalis	Sulfuric acid magnesium salt (VAN)	Magnesium sulfate, 97%, pure, anhydrous	EINECS 242-691-3
Sal De sedlitz	Sulfato de magnesio	Arrosalt 2327	EINECS 268-365-0
Tomix OT	Sulfuric acid, magnesium salt (1:1)	Magnesium sulfate, 99%, for analysis, anhydrous	Sulfuric acid, C10-16 alkyl ester, magnesium salt

PubChem

3 Chemical and Physical Properties

3.1 Computed Properties

Property Name	Property Value	Reference
Molecular Weight	120.37 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
Hydrogen Bond Donor Count	0	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Hydrogen Bond Acceptor Count	4	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Rotatable Bond Count	0	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Exact Mass	119.936771 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
Monoisotopic Mass	119.936771 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
Topological Polar Surface Area	88.6 Å²	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Heavy Atom Count	6	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	62.2	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Isotope Atom Count	0	Computed by PubChem
Defined Atom Stereocenter Count	0	Computed by PubChem
Undefined Atom Stereocenter Count	0	Computed by PubChem
Defined Bond Stereocenter Count	0	Computed by PubChem
Undefined Bond Stereocenter Count	0	Computed by PubChem
Covalently-Bonded Unit Count	2	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2019.01.04)

PubChem

3.2 Experimental Properties

3.2.1 Physical Description

DryPowder; DryPowder, Liquid; DryPowder, PelletsLargeCrystals; GasVapor; Liquid; OtherSolid; PelletsLargeCrystals; PelletsLargeCrystals, OtherSolid

EPA Chemicals under the TSCA

HYGROSCOPIC ODOURLESS WHITE CRYSTALS OR POWDER.

ILO International Chemical Safety Cards (ICSC)

3.2.2 Color/Form

Colorless crystalline solid

Ashford, R.D. Ashford's Dictionary of Industrial Chemicals. London, England: Wavelength Publications Ltd., 1994., p. 547

Hazardous Substances Data Bank (HSDB)

Orthorhombic crystals

Lide, DR (ed.). CRC Handbook of Chemistry and Physics. 81st Edition. CRC Press LLC, Boca Raton: FL 2000, p. 4-71

Hazardous Substances Data Bank (HSDB)

Opaque powder

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 10th ed. Volumes 1-3 New York, NY: John Wiley & Sons Inc., 1999., p. V3 2268

Hazardous Substances Data Bank (HSDB)

3.2.3 Odor

Odorless

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 10th ed. Volumes 1-3 New York, NY: John Wiley & Sons Inc., 1999., p. V3 2268

Hazardous Substances Data Bank (HSDB)

3.2.4 Taste

Saline, bitter taste

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 693

▸ Hazardous Substances Data Bank (HSDB)

3.2.5 Melting Point

1124 °C (decomposition)

▸ DrugBank

Decomposes @ 1124 °C

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 693

▸ Hazardous Substances Data Bank (HSDB)

3.2.6 Solubility

710 mg/mL

▸ DrugBank

In ether, 1.16 g/100 ml at 18 °C; insoluble in acetone; soluble in alcohol and glycerin

Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. B-95

▸ Hazardous Substances Data Bank (HSDB)

Soluble in glycerol

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 693

▸ Hazardous Substances Data Bank (HSDB)

In water, 360 g/l @ 20 °C

Ashford, R.D. Ashford's Dictionary of Industrial Chemicals. London, England: Wavelength Publications Ltd., 1994., p. 547

▸ Hazardous Substances Data Bank (HSDB)

Solubility in water, 20 g/100 ml at 0 °C, 73.8 g/100 ml at 100 °C.

Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. B-95

▸ Hazardous Substances Data Bank (HSDB)

Solubility in water, g/100ml at 20 °C: 30 (good)

▸ ILO International Chemical Safety Cards (ICSC)

3.2.7 Density

2.66 g/cu cm

Gerhartz, W. (exec ed.). Ullmann's Encyclopedia of Industrial Chemistry. 5th ed.Vol A1: Deerfield Beach, FL: VCH Publishers, 1985 to Present., p. VA15 620 (1990)

▸ Hazardous Substances Data Bank (HSDB)

2.66 g/cm^3

▸ ILO International Chemical Safety Cards (ICSC)

3.2.8 LogP

-0.91

▸ DrugBank

3.2.9 Stability/Shelf Life

FOLLOWING DATE OF MFR, MGSO4 INJECTIONS HAVE EXPIRATION DATE OF 18 MO TO 5 YR, DEPENDING ON MFR & PACKAGING /HEPTAHYDRATE/

American Hospital Formulary Service. Volumes I and II. Washington, DC: American Society of Hospital Pharmacists, to 1984., p. 28:12

▸ Hazardous Substances Data Bank (HSDB)

ON EXPOSURE TO DRY AIR AT ORDINARY TEMP IT LOSES ABOUT 1 H2O; AT 70-80 °C LOSES ABOUT 4H2O; AT 100 °C LOSES 5H2O; AT 120 °C LOSES 6 H2O, RAPIDLY REABSORBING WATER WHEN EXPOSED TO MOIST AIR; LOSES THE LAST MOL OF WATER AT ABOUT 250 °C /HEPTAHYDRATE/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

▸ Hazardous Substances Data Bank (HSDB)

3.2.10 Decomposition

When heated to decomp ... emits toxic fumes of /sulfur oxides/.

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 2082

▸ Hazardous Substances Data Bank (HSDB)

1124 °C

▸ ILO International Chemical Safety Cards (ICSC)

3.2.11 pH

Neutral to litmus

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 693

▸ Hazardous Substances Data Bank (HSDB)

3.2.12 Refractive Index

Index of refraction: 1.56

Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. B-95

▸ Hazardous Substances Data Bank (HSDB)

3.2.13 Other Experimental Properties

REACTS WITH CALCIUM HYDROXIDE TO FORM MAGNESIUM HYDROXIDE

International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 810

▸ Hazardous Substances Data Bank (HSDB)

COLORLESS MONOCLINIC PRISMS; INDEX OF REFRACTION 1.523, 1.535 & 1.586; DENSITY 2.445; SOL: 68.4 G/100 CC WATER @ 100 °C /MONOHYDRATE/

Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. B-95

▸ Hazardous Substances Data Bank (HSDB)

Crystals; odorless /Trihydrate/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

▸ Hazardous Substances Data Bank (HSDB)

The drug reacts with arsenates, phosphates, and tartrates, precipitating the corresponding magnesium salts. /Magnesium sulfate injection/

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2164

▸ Hazardous Substances Data Bank (HSDB)

Lead, barium, strontium, and calcium react with magnesium sulfate resulting in precipitation of the respective sulfates.

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2164

▸ Hazardous Substances Data Bank (HSDB)

COLORLESS, RHOMBIC OR MONOCLINIC CRYSTALS /HEPTAHYDRATE/

Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. B-95

▸ Hazardous Substances Data Bank (HSDB)

SOL IN 2 PARTS H2O AT 20 °C /TRIHYDRATE/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 746

▸ Hazardous Substances Data Bank (HSDB)

White powder; odorless and has saline bitter taste; 7.5% aqueous soln is neutral to phenol red soln /Magnesium sulfate, dried BP/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 746

Hazardous Substances Data Bank (HSDB)

Efflorescent crystals or powder; bitter, saline, cooling taste; density: 1.67; pH 6-7; soluble in water (g/100 ml): 71 @ 20 °C, 91 @ 40 °C; slightly soluble in alcohol; its aqueous soln is neutral; it loses 4 H2O @ 70-80 °C, 5 H2O @ 100 °C, 6 H2O @ 120 °C; loses last molecule of H2O @ about 250 °C; rapidly reabsorbing water when exposed to moist air; on exposure to dry air at ordinary temperatures it losses approx one H2O /Heptahydrate/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

Hazardous Substances Data Bank (HSDB)

Heat of formation: -1,284.9 kJ/mol @ 25 °C; Free energy of formation: -1,170.7 kJ/mol @ 25 °C

Kirk-Othmer Encyclopedia of Chemical Technology. 4th ed. Volumes 1: New York, NY. John Wiley and Sons, 1991-Present., p. V15 (1995) 711

Hazardous Substances Data Bank (HSDB)

Specific heat: 0.800 kJ/kg-K

Gerhartz, W. (exec ed.). Ullmann's Encyclopedia of Industrial Chemistry. 5th ed.Vol A1: Deerfield Beach, FL: VCH Publishers, 1985 to Present., p. VA15 (1990) 620

Hazardous Substances Data Bank (HSDB)

Decomposes at 1124 °C

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 693

Hazardous Substances Data Bank (HSDB)

4 Spectral Information

4.1 IR Spectra

4.1.1 FTIR Spectra

Technique	KBr WAFER
Source of Sample	J. T. Baker Chemical Company
Copyright	Copyright © 1980, 1981-2020 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

Technique	4000-1350 CM^-^1=MULLED IN PERFLUORINATED HYDROCARBON; 1350-450 CM^-^1=MULLED IN MINERAL OIL
Source of Sample	Aldrich Chemical Company, Inc., Milwaukee, Wisconsin
Catalog Number	20809
Copyright	Copyright © 1980, 1981-2020 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

4.1.2 ATR-IR Spectra

Instrument Name	Bio-Rad FTS
Technique	ATR-Neat (DuraSamplIR II)
Source of Spectrum	Forensic Spectral Research
Source of Sample	Matheson, Coleman & Bell Chemical Company
Copyright	Copyright © 2012-2020 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

Source of Sample	Aldrich
Catalog Number	203726
Copyright	Copyright © 2018-2020 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2018-2020 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

4.2 Raman Spectra

Showing 2 of 3 View More

Catalog Number	203726
Copyright	Copyright © 2017-2020 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2017-2020 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

Catalog Number	208094
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Thumbnail	

SpectraBase

5 Related Records

5.1 Component Compounds

CID 5462224 (Magnesium)

CID 1118 (Sulfuric acid)

PubChem

5.2 Related Compounds

Mixtures, Components, and Neutralized Forms	2 Records

PubChem

5.3 Substances

5.3.1 Related Substances

Same	147 Records

PubChem

5.3.2 Substances by Category

PubChem

5.4 Entrez Crosslinks

PubMed	136 Records
Taxonomy	4 Records
OMIM	18 Records
Gene	9 Records

PubChem

5.5 Associated Chemicals

Magnesium sulfate trihydrate; 15320-30-6[O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018]

Hazardous Substances Data Bank (HSDB)

Magnesium sulfate heptahydrate; 10034-99-8[Lide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 83rd ed. Boca Raton, Fl: CRC Press Inc., 2002-2003., p. 4-68]

- Hazardous Substances Data Bank (HSDB)

Magnesium sulfate monohydrate; 14168-73-1[Lide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 83rd ed. Boca Raton, Fl: CRC Press Inc., 2002-2003., p. 4-68]

- Hazardous Substances Data Bank (HSDB)

Magnesium sulfate hexahydrate; 13778-97-7[Gerhartz, W. (exec ed.). Ullmann's Encyclopedia of Industrial Chemistry. 5th ed.Vol A1: Deerfield Beach, FL: VCH Publishers, 1985 to Present., p. V20 384 (2003)]

- Hazardous Substances Data Bank (HSDB)

6 Chemical Vendors

PubChem

7 Drug and Medication Information

7.1 Drug Indication

Used for immediate control of life-threatening convulsions in the treatment of severe toxemias (pre-eclampsia and eclampsia) of pregnancy and in the treatment of acute nephritis in children. Also indicated for replacement therapy in magnesium deficiency, especially in acute hypomagnesemia accompanied by signs of tetany similar to those of hypocalcemia. Also used in uterine tetany as a myometriat relaxant.

▶ DrugBank

Parenteral nutrition

▶ European Medicines Agency (EMA)

7.2 FDA Orange Book

▶ FDA Drugs

7.3 Drug Labels for Ingredients

Showing 2 of 7 View More

Label Information	Total 241 labels
Drug Ingredient	MAGNESIUM SULFATE
NDC Code(s)	0220-3267-41, 0264-4400-54, 0338-0190-04, 0338-1708-40, 0338-1709-40, 0338-1715-40, 0338-1719-40, 0363-0395-01, 0363-0395-03, 0363-0395-04 ... total 410.
Packagers	21st Century Homeopathics, Inc; Advanced Beauty Systems, Inc.; Agri Laboratoies, Ltd.; Agri Laboratories, Ltd.; AmerisourceBergen (Good Neighbor Pharmacy) 46122; Anhui Twowin Machinery Imp. & Exp. Co., Ltd.; Aspen Veterinary Resources; Aspen Veterinary Resources, Ltd.; Avadim Health, Inc.; Avadim Technologies, Inc ... total 141.

▶ DailyMed

Label Information	Total 241 labels
Drug Ingredient	MAGNESIUM SULFATE; POTASSIUM CHLORIDE; POTASSIUM PHOSPHATE, MONOBASIC; SODIUM CHLORIDE; SODIUM PHOSPHATE
NDC Code(s)	0220-3267-41, 0264-4400-54, 0338-0190-04, 0338-1708-40, 0338-1709-40, 0338-1715-40, 0338-1719-40, 0363-0395-01, 0363-0395-03, 0363-0395-04 ... total 410.
Packagers	21st Century Homeopathics, Inc; Advanced Beauty Systems, Inc.; Agri Laboratoies, Ltd.; Agri Laboratories, Ltd.; AmerisourceBergen (Good Neighbor Pharmacy) 46122; Anhui Twowin Machinery Imp. & Exp. Co., Ltd.; Aspen Veterinary Resources; Aspen Veterinary Resources, Ltd.; Avadim Health, Inc.; Avadim Technologies, Inc ... total 141.

▶ DailyMed

7.4 Clinical Trials

7.4.1 ClinicalTrials.gov

ClinicalTrials.gov

7.4.2 EU Clinical Trials Register

EU Clinical Trials Register

7.4.3 NIPH Clinical Trials Search of Japan

NIPH Clinical Trials Search of Japan

7.5 EMA Drug Information

Active Substance	Soybean oil, Medium-chain triglycerides, Olive oil, Fish oil, Acetyl-cysteine, Alanine, Histidine, Isoleucin, Leucine, Lysine acetate, Methionine, Phenylalanine, Proline, Tryptophan, Tyrosine, Valine, glucose, calcium chloride, potassium chloride, Sodium acetate, Zinc sulphate, Malic acid, arginine, glycine, serine, threonine, sodium glycerophosphate, magnesium sulphate
Therapeutic Area	Nutrition
Drug Form	Emulsion for infusion
Administration Route	Intravenous use
Decision Type	W: decision granting a waiver in all age groups for all conditions or indications
Decision Date	2017-06-07

European Medicines Agency (EMA)

7.6 Therapeutic Uses

Analgesics; Anesthetics; Anti-Arrhythmia Agents; Anticonvulsants; Calcium Channel Blockers; Cathartics; Tocolytic Agents

National Library of Medicine's Medical Subject Headings online file (MeSH, 1999)

Hazardous Substances Data Bank (HSDB)

AN EFFECTIVE & WIDELY EMPLOYED SALINE CATHARTIC. /HEPTAHYDRATE, USP/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 743

Hazardous Substances Data Bank (HSDB)

FULL DOSES OF SALINE CATHARTICS (15 G MAGNESIUM SULFATE OR ITS EQUIVALENT) PRODUCE A SEMIFLUID OR WATERY EVACUATION IN 3 HR OR LESS. LOW DOSES PRODUCE A LAXATIVE EFFECT WITH GREATER LATENCY.

Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980., p. 1005

Hazardous Substances Data Bank (HSDB)

A COLD, WET COMPRESS OF MAGNESIUM SULFATE SOLN IN WATER HAS BEEN EMPLOYED IN TREATMENT OF SUCH SKIN DISORDERS AS ERYSIPELAS. HOT CONCN AQ SOLN...(ABOUT 1 LB/PINT OF WATER) ARE SOMETIMES USED IN TREATMENT OF DEEP-SEATED INFECTIONS, CLOTHS BEING SATURATED & APPLIED WHILE HOT. ACTION MUCH LIKE THAT OF POULTICE. /HEPTAHYDRATE/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 743

Hazardous Substances Data Bank (HSDB)

Magnesium sulfate injection is mainly used as an anticonvulsant for the prevention and control of seizures in toxemia (preeclampsia or eclampsia) of pregnancy, acute nephritis (in children), and in various other conditions.

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2160

Hazardous Substances Data Bank (HSDB)

MAGNESIUM SULFATE...INHIBITS UTERINE CONTRACTIONS, PROBABLY BY DIRECT EFFECT ON MYOMETRIAL CELLS. IT IS ADMIN IV & APPEARS TO BE MORE EFFECTIVE THAN ALCOHOL; IN SOME CASES.../IT/ CAN INHIBIT PREMATURE LABOR FOR A WEEK. /MAGNESIUM SULFATE INJECTION/

American Medical Association, AMA Department of Drugs. AMA Drug Evaluations. 4th ed. Chicago: American Medical Association, 1980., p. 798

Hazardous Substances Data Bank (HSDB)

Parenterally admin magnesium sulfate may be useful in controlling seizures associated with epilepsy, glomerulonephritis, or hypothyroidism, since low plasma concns of magnesium may be a contributing cause of seizures in these conditions. /Magnesium sulfate injection/

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2160

Hazardous Substances Data Bank (HSDB)

Magnesium sulfate injection has been used to control seizures, encephalopathy, and hypertension associated with acute nephritis in children. /Magnesium sulfate injection/

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2160

Hazardous Substances Data Bank (HSDB)

Magnesium sulfate injection also is used to treat acute hypomagnesemia which may be associated with a variety of clinical conditions including malabsorption syndromes, alcoholism, cirrhosis of the liver, acute pancreatitis, or prolonged IV therapy with magnesium-free fluids. The drug is especially effective in the treatment of acute hypomagnesemia accompanied by signs of tetany similar to those observed in hypocalcemia. /Magnesium sulfate injection/

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2160

Hazardous Substances Data Bank (HSDB)

Magnesium sulfate is administered IV to counteract the intense muscle stimulating effects of barium poisoning. ... Parenteral magnesium sulfate also has been used in the management of other clinical situations including cerebral edema (as an osmotic agent) and tetanus. /Magnesium sulfate injection/

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2162

Hazardous Substances Data Bank (HSDB)

The intravenous administration of 1 to 2 g of magnesium sulfate has been reported to be effective in preventing recurrent episodes of torsades de pointes, even if serum magnesium is normal.

Hardman, J.G., L.E. Limbird, P.B., A.G. Gilman. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 10th ed. New York, NY: McGraw-Hill, 2001., p. 962

Hazardous Substances Data Bank (HSDB)

When magnesium sulfate is admin IV, the onset of action is immediate and the duration of action is about 30 min. Following IM admin of the drug, the onset of action occurs in about 1 hr and the duration of action is 3-4 hr.

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2164

Hazardous Substances Data Bank (HSDB)

MEDICATION (VET): DRENCHING WITH 25% SOLN CAUSES REFLEX CLOSURE OF ESOPHAGEAL GROOVE IN BUFFALOES & CATTLE. ... PARENTERALLY, IT IS USED AS SOURCE OF **MAGNESIUM** & **SULFATE** IONS IN PROTEIN HYDROLYSATE-ELECTROLYTE MIXT... IT IS A GENERAL ANESTHETIC...

Rossoff, I.S. Handbook of Veterinary Drugs. New York: Springer Publishing Company, 1974., p. 321

▸ **Hazardous Substances Data Bank (HSDB)**

MEDICATION (VET): MAGNESIUM SULFATE MAY HELP CONTROL **CHLORAL HYDRATE** INDUCED PREMATURE VENTRICULAR HEART BEATS IN HORSES. ... TOPICALLY SATURATED SOLN HAVE BEEN AGELESS FAVORITES FOR TREATMENT OF EDEMATOUS CONDITIONS...TENDINITIS, SWELLING, SPRAINS OF HORSES, MASTITIS & POSTPARTUM MAMMARY EDEMA OF CATTLE...

Rossoff, I.S. Handbook of Veterinary Drugs. New York: Springer Publishing Company, 1974., p. 321

▸ **Hazardous Substances Data Bank (HSDB)**

MEDICATION (VET): EXTENSIVE, AS ORAL SALINE LAXATIVE OR PURGATIVE, PARTICULARLY FOR CATTLE. ... ITS ORAL USE IN LEAD POISONING IS EFFECTIVE WHEN IT CAN STILL CONTACT UNABSORBED LEAD SALTS, PRECIPITATE THEM AS INSOL HARMLESS SULFATES, & ASSIST BY LAXATIVE ACTION IN THEIR ELIMINATION...

Rossoff, I.S. Handbook of Veterinary Drugs. New York: Springer Publishing Company, 1974., p. 321

▸ **Hazardous Substances Data Bank (HSDB)**

Hypomagnesemia without hypocalcemia may be associated with seizures, which respond to magnesium sulfate ... .

Ellenhorn, M.J., S. Schonwald, G. Ordog, J. Wasserberger. Ellenhorn's Medical Toxicology: Diagnosis and Treatment of Human Poisoning. 2nd ed. Baltimore, MD: Williams and Wilkins, 1997., p. 566

▸ **Hazardous Substances Data Bank (HSDB)**

MEDICATION (VET): PURGATIVE, IN GENERAL ANESTHESIA, IN HYPOMAGNESEMIA, EXTERNALLY (IN STRONG SOLNS) IN LOCAL INFLAMMATIONS, INFECTED WOUNDS /HEPTAHYDRATE/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

▸ **Hazardous Substances Data Bank (HSDB)**

Topically, /magnesium sulfate/ ... is used widely to relieve inflammation.

Klaassen, C.D. (ed). Casarett and Doull's Toxicology. The Basic Science of Poisons. 6th ed. New York, NY: McGraw-Hill, 2001., p. 843

▸ **Hazardous Substances Data Bank (HSDB)**

VET: IT HAS OFTEN BEEN USED IN AN AQUEOUS-**GLYCERIN** PASTE, OCCASIONALLY WITH ATTAPULGITE CLAYS & OTHER ADDITIVES SUCH AS **METHYL SALICYLATE** IN POULTICES, OR AS SOLN UNDER IMPERVIOUS BANDAGES.

Rossoff, I.S. Handbook of Veterinary Drugs. New York: Springer Publishing Company, 1974., p. 321

▸ **Hazardous Substances Data Bank (HSDB)**

...17 patients with angiographically normal coronary arteries /were infused with/ ...magnesium sulfate (MgSO(4)) (0.02 mmol/min and 0.2 mmol/min) ...for 2 min into the left coronary ostium before and after intracoronary infusion of /the **nitric oxide** synthase inhibitor **N(G)-monomethyl-L-arginine**/ (**L-NMMA**). ...At a dose of 0.02 mmol/min, MgSO(4) did not affect the /diameter of the proximal and distal segments of the epicardial/ coronary arteries. At a dose of 0.2 mmol/min, MgSO(4) caused coronary artery dilation (mean (SEM) proximal diameter 3.00 (0.09) to 3.11 (0.09) mm; distal 1.64 (0.06) to 1.77 (0.07) mm) and increased coronary blood flow (79.3 (7.5) to 101.4 (9.9) ml/min, p<0.001 v baseline for all). MgSO(4) increased the changes in these parameters after the infusion of L-NMMA (p<0.001 v baseline). ...

PMID:11454846
*Full text: **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1729866***
Teragawa H, et al; Heart 86 (2): 212-216 (2001)

▸ **Hazardous Substances Data Bank (HSDB)**

/Exptl Ther/ ...The effects of MgSO4 on **kainate**-induced seizures in rats /were examined/. 40 female Long-Evans rats were stereotaxically implanted with a chronic bipolar recording electrode in the hippocampus and an injection cannula in the lateral cerebral ventricle. ...To study peripheral effects of MgSO4 /one wk post-surgery/, rats received 270 mg/kg, MgSO4 ip followed every 20 minutes for 2 hours by 27 mg/kg MgSO4. Control rats received an equal volume of saline. At 2 hours, rats received 0.3 g/l **kainate** through their indwelling cannulae and seizure activity was assessed. To study direct central actions of MgSO4, rats received 50 g/l MgSO4 or an equal volume of saline along with either 0.3 or 1.0 g/l **kainate** through their cannulae. Seizure activity was assessed for 45 minutes thereafter. Rats were euthanized 4 days later and brains processed for histology. In the rats treated with peripheral MgSO4, onset to status was shortened (MgSO4 103 +/- 34.1 vs saline 532.8 +/- 13.5 sec; p<0.01). There was no difference in the duration of status between the two groups. In the rats treated with central MgSO4, 100% of rats receiving 1.0 g kainate died, whereas only 50% died in the 1.0 g kainate in MgSO4. MgSO4 appeared not to effect the onset on status-like seizure activity but reduced the EEG frequency. In both the peripheral and central experiments, kainic acid destroyed much of the pyramidal cell layer in the hippocampus, especially in the CA3 region. 70% of the rats receiving kainate in saline exhibited neuronal necrosis while only 30% of those receiving MgSO4 had any neuronal damage. MgSO4 does not reduce kainate-induced seizures, but it does have a protective action against mortality and neuronal death. ...This action /may be/ due to magnesium's antagonistic effect on calcium, thus reducing calcium-mediated neurotoxicity.

Standley, CA et al; Journal of the society for Gynecologic Investigation 3(2): 306a (1996)

▸ **Hazardous Substances Data Bank (HSDB)**

/Exptl Ther/ ...Eligibility criteria included admission or transport to University Hospital between 25 and 34 weeks gestation with an initial episode of spontaneous premature labor. Patients were ...given an initial mental status exam prior to magnesium sulfate infusion. Those patients ...already on **magnesium** were ...given an initial mental status exam at the time of arrival. Once a therapeutic level of **magnesium** was documented a repeat mental status exam was performed, with a third exam performed 24 hours after the **magnesium** infusion has been discontinued. As a control group pregnant women hospitalized for premature rupture of the membranes not in labor had the exams performed initially, after 24 hours of hospitalization, and again after 72 hours of hospitalization. Exclusion criteria included underlying mental illness, administration of other medications that might affect mental status, cervical dilation >4 cm, clinical evidence of chorioamnionitis, or the presence of any significant abnormalities in the fetal heart

rate tracing. The mental status exam consisted of the mini mental state exam, the comprehension portion of the Wechsler Adult Intelligence Scale, and the Bender-Gestalt Indicator. The results of these exams were scored in a blinded fashion by a psychiatrist. There were 22 patients in the study group and 9 patients in the control group. There were no differences in the age, gravidity, parity, or gestational age of the two groups. Out of a possible 102 points, the mean mental status scores were as follows: MgSO4: Initial, 76.3 +/- 11.2; Therapy, 74.7 +/- 12.2; Final, 79.3 +/- 14.6; P Value, 0.66. Control: Initial, 78.7 +/- 13.1; Therapy, 77.9 +/- 11.9; Final, 76.3 +/- 12.7; P Value, 0.64. The mean serum **magnesium** level at the time of therapy was 5.1 mg/dL. The time required for response to the Wechsler test was significantly different although the scoring of the comprehension was unchanged (15.2 +/- 3.6 min vs 22.3 +/- 4.7 min, P<0.05). This prospective blinded study reveals no differences in maternal mental status during magnesium sulfate infusion at the levels recorded in our study. There was an increase in the length of time required to answer the comprehension and judgment portion of the examination. These findings have significant clinical implications suggesting that patients on magnesium sulfate can make appropriate judgments and can, therefore, participate in clinical discussions and trials.

Zinnante M et al; Primary Care Update for OB/GYNS 5 (4): 180 (1998)

▸ **Hazardous Substances Data Bank (HSDB)**

/Exptl Ther/ /The purpose of this study was/ to investigate whether in utero exposure to magnesium sulfate (MgSO4) was associated with a lower prevalence of cerebral palsy (CP) in infants born weighing <1,500 g. Singleton infants weighing <1,500 g at birth (very low birthweight, VLBW) and surviving to 3 years with moderate or severe congenital CP were identified among 155,636 children born 1983-1985 in four California counties. VLBW children with CP were compared with randomly selected VLBW control survivors with respect to whether their mothers received MgSO4 to prevent convulsions in preeclampsia or as a tocolytic agent, and other information abstracted from labor and delivery records. During the admission for delivery, 7.1% of the 42 VLBW infants with later CP and 36% of the 75 VLBW controls were exposed to MgSO4 (odds ratio (OR) 0.14, 95% confidence interval (CI) 0.05, 0.51). The overall association of MgSO4 with reduced risk of CP was also observed in the subgroup of infants born to women who were not preeclamptic (OR 0.25, CI 0.08, 0.97). Infants with CP were less often exposed antenatally to MgSO4 whether or not there was cotreatment with non-MgSO4 tocolytics (other tocolytics administered, OR for MgSO4 exposure 0.23, CI 0.06, 1.2; other tocolytics not administered, OR for MgSO4 0.08, CI 0.02, 0.68), or antenatal corticosteroids (steroids given, OR for MgSO4 exposure 0.24, CI 0.06, 1.3; steroids not given, OR for MgSO4, 0.08, CI 0.02, 0.72). Apparent benefit of magnesium was observed in the presence or absence of a variety of characteristics of pregnancies, births, and infants. In this observational study, in utero exposure to MgSO4 was more frequent in controls than in children with CP, suggesting a protective effect of MgSO4 against CP in these VLBW infants.

Nelson KB, Grether JK; Pediatrics 94(2): 263-269 (1995)

▸ **Hazardous Substances Data Bank (HSDB)**

/Exptl Ther/ The bronchodilating effect of magnesium sulfate (MgSO4) was studied in 2 patients with status asthmaticus, who were intubated and mechanically ventilated by a respirator. Airway resistance was continuously monitored by the respiration-controlled interruption technique. After administration of 0.5 mmol/min MgSO4 iv, airway resistance decreased from 17 to 9, and from 13 to 8 mmHg/L/s in the 2 patients, respectively, and piping rales diminished or disappeared. ...While corticosteroid therapy requires several hours to demonstrate significant effects in status asthmaticus, MgSO4 is of great benefit in the rapid improvement of airflow obstruction.

Okayama H, et al; Asthma 28(1): 11-17 (1991)

▸ **Hazardous Substances Data Bank (HSDB)**

/Exptl Ther/ ...In a multicenter cohort, this study tests the hypothesis that administration of magnesium sulfate improves pulmonary function in patients with acute severe asthma. ...Patients aged 18-60 yr presenting with acute asthma and FEV1 < or = 30% predicted on arrival to the /emergency departemnt (ED) of 8 hospitals/ received nebulized albuterol at regular intervals and IV methylprednisolone. Two grams of IV magnesium sulfate or placebo were administered 30 min after ED arrival. The primary efficacy end point was FEV1 at 240 min, and the data analysis was intent to treat. 248 patients were included, and the mean FEV1 on ED arrival was 22.9% predicted. At 240 min, patients receiving magnesium had a mean FEV1 of 48.2% predicted, compared to 43.5% predicted in the placebo-treated group (mean difference, 4.7%; 95% confidence interval [CI], 0.29 to 9.3%; p=0.045). A regression model confirmed the effect of magnesium compared to placebo was greater in patients with a lower initial FEV1 (p<0.05). If the initial FEV1 was <25% predicted, the final FEV1 was 45.3% predicted in the magnesium-treated group and 35.6% predicted in the placebo-treated group (mean difference, 9.7%; 95% CI, 4.0 to 15.3%; p=0.001). If the initial FEV was > or = 25% predicted, **magnesium** administration was not beneficial; the final FEV1 was 51.1% predicted in the **magnesium**-treated group and 53.9% predicted in the placebo-treated group (mean difference, -2.9%, 95% CI, - 9.4 to 3.7; p= not significant). Overall, the use of magnesium sulfate did not improve hospital admission rates.

PMID:12171821

Silverman RA, et al; Chest 122(2): 489-497 (2002)

▸ **Hazardous Substances Data Bank (HSDB)**

/Exptl Ther/ ...The aim of this study was to investigate the effect of **magnesium** (Mg) treatment on P-wave duration and dispersion in patients undergoing CABG. The study included 148 consecutive patients (33 women, 115 men; mean age 62.1 +/- 7.0 years) undergoing CABG who were randomly allocated to 2 groups. Group A consisted of 93 patients to whom 1.5 g daily MgSO(4) infusion was applied the day before surgery, just after operation, and 4 days following surgery, and group B consisted of 55 control patients. From the preoperative and postoperative fourth day, 12-lead ECG recordings, duration of the P waves, and P-wave dispersions were calculated. There were no differences between the two groups with regard to age, sex, and blood Mg level. Comparison of the baseline and day 4 ECG measurements showed no difference as far as heart rates, duration of PQ, and QRS intervals were concerned. AF developed in 2 (2%) cases in group A and in 20 (36%) cases in group B (P<0.001). There was no difference between the two groups when average basal P max, P min, P dispersion, and day 4 P min values were compared. In group A, fourth day P max (94.3 +/- 11.8 vs 101.0 +/- 13.2 ms; P=0.0025) and P dispersion (38.2 +/- 9.2 vs 44.9 +/- 10.9 ms; P=0.0002) were significantly lower as compared to group B. Comparing the patients who developed AF, and who did not, no difference was detected with regard to baseline P max, P min, P dispersion, and day 4 P min. Day 4 P max (95.1 +/- 11.8 vs 106.4 +/- 14.0 ms, P=0.0015) and P dispersion (38.9 +/- 8.8 vs 50.7 +/- 13.0 ms, P=0.001) of patients who developed AF were significantly higher. Baseline Mg levels were similar in patients who developed AF, and who did not, but the day 4 Mg level was significantly lower in AF group (2.0 +/- 0.23 vs 2.15 +/- 0.26 mg/dL, P<0.001). Perioperative Mg treatment reduces P dispersion and the risk of developing AF in patients undergoing CABG.

PMID:12167181

Dagdelen S, et al; Ann Noninvasive Electrocardiol 7(3): 211-218 (2002)

▸ **Hazardous Substances Data Bank (HSDB)**

/Exptl Ther/ Numerous clinical reports suggest the beneficial effects of chelation therapy for the treatment of atherosclerosis. However, the results of these studies are inconclusive and controversial. The purpose of this present study was to examine the prophylactic and therapeutic effects of chelation liquid (CHL) in experimental atherosclerosis. Twenty New Zealand white rabbits were fed a 1% **cholesterol**-supplemented diet for 45 days. In the prophylactic phase of the study subcutaneous 300 mg **EDTA** + 500 mg magnesium sulfate (MgSO4) injections (five rabbits) and isotonic saline (five rabbits) were given to test and control groups, respectively, along with **cholesterol** rich diet. The CHL treatment ameliorated the rise of serum **cholesterol** and serum triglyceride concentrations, lowered serum **calcium** concentrations and reduced

the aortic atheroma. In the therapeutic phase of the experiment the cholesterol diet was stopped and the remaining 10 animals were returned to normal diet. Five of these rabbits were given CHL injections and other five animals were given isotonic saline injections for 121 days. Although the level of cholesterol and triglyceride were not significantly different in the two groups, the serum calcium concentration and the percentage of the area of flate aortic specimen occupied by atheroma were significantly lower in the CHL treated rabbits as compared to controls. It is concluded that CHL injections have a definite prophylactic effect on atherogenesis in the cholesterol-fed rabbit, and may have some therapeutic value in the regression phase.

PMID:11903413

Evans DA, et al; Diabetes Obes Metab 3 (6): 417-422 (2001)

Hazardous Substances Data Bank (HSDB)

/Exptl Ther/ ... /The/ objectives /of the study were/ to examine the effect of magnesium sulfate infusion on cardiac sympathetic efferent postganglionic neuronal liberation of noradrenaline. Twenty-two patients who underwent cardiac catheterization were randomly allocated to the control group or the magnesium group. Plasma noradrenaline and adrenaline concentrations in the aorta and the coronary sinus were measured. Noradrenaline or adrenaline release from the heart was calculated by dividing the difference in noradrenaline or adrenaline concentration between the aorta and the coronary sinus by that of the aorta. After baseline blood sampling, the control patients and the patients in the magnesium group received intravenous infusion of saline or magnesium sulfate (10 mmol). All patients were then subjected to 3 min of handgrip exercise stress test to augment sympathetic efferent neuronal activity, and the blood sampling was repeated. Although blood pressure was increased by the handgrip stress test, there were no differences in heart rate and blood pressure between the two groups, both at baseline and during the handgrip stress test. The plasma noradrenaline and adrenaline concentrations and noradrenaline or adrenaline release from the heart did not differ between the two groups in the baseline condition. However, the handgrip stress increased plasma noradrenaline concentrations and the cardiac noradrenaline release was increased in the control group, whereas the cardiac noradrenaline release was not increased by the handgrip stress in the magnesium group (P<0.02). These data indicate that magnesium sulfate infusion suppresses the release of catecholamines by the heart, which is an indirect index of sympathetic efferent neuronal activity.

PMID:11875582

Ohtsuka S, et al; Can J Cardiol 18(2): 133-140 (2002)

Hazardous Substances Data Bank (HSDB)

/Exptl Ther/ Previous studies with magnesium have shown beneficial effects in pain syndromes and in vascular disorders (hypertension, migraines, Raynaud's phenomenon). However, results have been variable, possibly because of the limited oral doses achievable due to frequent diarrhea. ...A 53-yr-old white man ...with disabling erythromelalgia (EM) ...achieved modest improvement limited by adverse effects with calcium antagonists and then obtained remission with the use of magnesium. Intolerant of several standard magnesium products, he attained high doses of magnesium by taking iv-grade magnesium sulfate diluted in water orally (up to 24 mL/d of MgSO4 50% = 1,166 mg/day of magnesium). After 12 months of continued improvement, ...The Erythromelalgia Association /was/ notified ...of the success of this therapy .../and/ those interested in high-dose magnesium therapy /were encouraged/ ...to report their results to the Association. Twelve patients responded to this request, describing several standard oral magnesium products. Overall, 8 of 13 patients (61.5%) reported improvement (1, remission; 3, major improvement; 2, moderate improvement; 2, mild improvement). Four patients (30.8%) reported no response to magnesium therapy, and 1 patient's symptoms worsened. Two patients' magnesium dose was limited because of diarrhea. Despite recent progress in understanding and treating EM, this vascular disorder remains painful and life-altering for many patients. In this informal survey, the use of high oral doses of magnesium produced good and sometimes dramatic results in 8 of 13 patients who had been unresponsive to many other treatments. These results suggest a possible role for high-dose oral magnesium in the treatment of EM and, perhaps, other vascular disorders.

PMID:11847944

Choen JS, et al; Ann Pharmacother 36 (2): 255-260 (2002)

Hazardous Substances Data Bank (HSDB)

/Exptl Ther/ The aims of this study were to evaluate the safety and efficacy of magnesium replacement therapy and to determine its effect on potassium retention in hypokalemic, critically ill patients. ...A total of 32 adult surgical ICU patients were admitted to the study on the basis of documented hypokalemia (potassium of <3.5 mmol/L) within the 24-hr period before entering the study. Patients were randomized to receive either placebo (n=15) or magnesium sulfate (n=17). One patient from each group was excluded from the study due to failure to complete the full series of doses. Patients received a "test dose" of either magnesium sulfate (2 g, 8 mmol) or placebo (5% dextrose in water) infused over 30 mins every 6 hrs for eight doses. The next schedule test dose was held if hypermagnesemia (magnesium of >2.8 mg/dL (>1.15 mmol/L)) was documented at any time during the study. Routine replacements of potassium and magnesium continued during the duration of the study, when clinically indicated, for serum potassium concentrations of 3.5 mmol/L or serum magnesium concentrations of <1.8 mg/dL (<0.74 mmol/L). ...Age, weight, and Acute Physiology and Chronic Health Evaluation II scores were recorded on entry into the study. Just before administration of each test dose, blood was drawn for magnesium and potassium, bicarbonate, pH, and glucose determinations, and an aliquot of the preceding 6 hrs urine collection was sent for magnesium and potassium determinations. Serum calcium, phosphate, urea nitrogen, and creatinine concentrations were measured daily. The amounts of magnesium and potassium administered via parenteral nutrition, tube feeding, and replacement infusions were calculated for each 6-hr interval. The amounts of magnesium and potassium excreted in the urine were similarly assessed. The groups showed no differences with regard to age, weight, Acute Physiology and Chronic Health Evaluation II scores, or initial serum magnesium concentration. Initial potassium, bicarbonate, pH, calcium, phosphate, glucose, blood urea nitrogen, and creatinine values were not different between groups. Patients receiving magnesium sulfate showed a statistically significant increase in serum magnesium concentration at 6 hrs when compared with placebo, as well as with itself at time 0 (p<0.0001), a difference maintained throughout the study. Compared with the placebo group, the total amount of elemental magnesium administered was significantly greater in the treatment group (1603 +/- 124 vs. 752 +/- 215 mg (65.7 +/- 5.8 vs. 30.8 +/- 8.8 mmol), p<0.0001), as was urine magnesium excretion (1000 +/- 156 vs. 541 +/- 68 mg (41.0 +/- 6.4 vs. 22.2 +/- 2.8 mmol) p<0.0001). However, the net magnesium balance (total magnesium in - total urine magnesium) was significantly more positive in the treatment group (612 +/- 180 vs. 216 +/- 217 mg (25.1 +/- 7.4 vs. 8.9 +/- 8.9 mmol), p<0.005). The treatment and control groups had the same serum potassium concentrations and did not receive different amounts of potassium (245 +/- 39 vs. 344 +/- 45 mmol, respectively, p=0.06), although the treatment group required less potassium replacement/6 hrs by 30 hrs compared with itself at time 0 (p=0.05). Despite the same serum potassium values, the net potassium balance for 48 hrs was positive in the treatment group (+ 72 +/- 32 mmol) and negative in the control group (-74 +/- 95 mmol, p<0.05). There were no complications associated with the magnesium sulfate administration. /The authors concluded that/ magnesium sulfate administered according to the above regimen safety and significantly increases the circulating magnesium concentration. Despite greater urine magnesium losses in the treatment group, this group exhibited significantly better magnesium retention.

PMID:8565536

Hamill-Ruth RJ, et al; Crit Care Med 24(1): 38-45 (1996)

Hazardous Substances Data Bank (HSDB)

/Exptl Ther/ Intravenous magnesium sulfate also has been used in the management of /paroxysomal/ atrial tachycardia when other measures have failed and when there is no evidence of myocardial damage.

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2161

Hazardous Substances Data Bank (HSDB)

Parenteral magnesium chloride and magnesium sulfate are used in conditions that require an increase in magnesium ions for electrolyte adjustment. /Included in US product labeling/

MICROMEDEX Thomson Health Care. USPDI - Drug Information for the Health Care Professional. 22nd ed. Volume 1. MICROMEDEX Thomson Health Care, Greenwood Village, CO. 2002. Content Reviewed and Approved by the U.S. Pharmacopeial Convention, Inc., p. 1942

Hazardous Substances Data Bank (HSDB)

7.7 Drug Warnings

SOME ABSORPTION OF COMPONENT IONS OF SALINE CATHARTICS DOES OCCUR, & IN CERTAIN INSTANCES THEY MAY PRODUCE SYSTEMIC TOXICITY. IN AN INDIVIDUAL WITH IMPAIRED RENAL FUNCTION, ACCUM OF MAGNESIUM IONS IN BODY FLUIDS MAY BE SUFFICIENT TO CAUSE INTOXICATION. MAGNESIUM CATHARTICS SHOULD BE ADMIN ONLY IF RENAL FUNCTION IS ADEQUATE.

Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980., p. 1005

Hazardous Substances Data Bank (HSDB)

THE DRUG IS GENERALLY SAFE BUT CAN CAUSE TEMPORARY LOSS OF DEEP TENDON REFLEXES IN MOTHER & MAY SUPPRESS SKELETAL MUSCLE ACTIVITY IN NEONATE. IT SHOULD NOT BE USED IN PT WITH HEART DISEASE...

American Medical Association, AMA Department of Drugs. AMA Drug Evaluations. 4th ed. Chicago: American Medical Association, 1980., p. 798

Hazardous Substances Data Bank (HSDB)

NEONATE MAY BE DROWSY & EXHIBIT RESP DIFFICULTIES & DIMINISHED MUSCLE TONE. HOWEVER...NO RELATIONSHIP BETWEEN PLASMA MAGNESIUM CONCN OF BLOOD COLLECTED FROM UMBILICAL CORD & THE APGAR SCORE /HAS BEEN FOUND/.

Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980., p. 882

Hazardous Substances Data Bank (HSDB)

Patients receiving parenteral magnesium sulfate shold be observed carefully, and serum magnesium concn should be monitored to avoid overdosage. ... An IV preparation of a calcium salt (e.g., calcium gluconate) should be readily available for use when magnesium sulfate is given IV. /Magnesium sulfate injection/

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2163

Hazardous Substances Data Bank (HSDB)

For more Drug Warnings (Complete) data for MAGNESIUM SULFATE (14 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

8 Food Additives and Ingredients

8.1 Food Additive Status

FDA Food Additive Status

Magnesium sulfate - NUTR/DS, GRAS, GMP - 182.5443, 184.1443

- FDA Center for Food Safety and Applied Nutrition (CFSAN)

9 Pharmacology and Biochemistry

9.1 Pharmacology

Magnesium sulfate is a small colorless crystal used as an anticonvulsant, a cathartic, and an electrolyte replenisher in the treatment of pre-eclampsia and eclampsia. It causes direct inhibition of action potentials in myometrial muscle cells. Excitation and contraction are uncoupled, which decreases the frequency and force of contractions. Magnesium sulfate is gaining popularity as an initial treatment in the management of various dysrhythmias, particularly torsades de pointes, and dyrhythmias secondary to TCA overdose or digitalis toxicity.

▸ DrugBank

9.2 MeSH Pharmacological Classification

Anti-Arrhythmia Agents

Agents used for the treatment or prevention of cardiac arrhythmias. They may affect the polarization-repolarization phase of the action potential, its excitability or refractoriness, or impulse conduction or membrane responsiveness within cardiac fibers. Anti-arrhythmia agents are often classed into four main groups according to their mechanism of action: sodium channel blockade, beta-adrenergic blockade, repolarization prolongation, or calcium channel blockade. (See all compounds classified as Anti-Arrhythmia Agents.)

▸ MeSH

Tocolytic Agents

Drugs that prevent preterm labor and immature birth by suppressing uterine contractions (TOCOLYSIS). Agents used to delay premature uterine activity include magnesium sulfate, beta-mimetics, oxytocin antagonists, calcium channel inhibitors, and adrenergic beta-receptor agonists. The use of intravenous alcohol as a tocolytic is now obsolete. (See all compounds classified as Tocolytic Agents.)

▸ MeSH

Analgesics

Compounds capable of relieving pain without the loss of CONSCIOUSNESS. (See all compounds classified as Analgesics.)

▸ MeSH

Anticonvulsants

Drugs used to prevent SEIZURES or reduce their severity. (See all compounds classified as Anticonvulsants.)

▸ MeSH

Calcium Channel Blockers

A class of drugs that act by selective inhibition of calcium influx through cellular membranes. (See all compounds classified as Calcium Channel Blockers.)

▸ MeSH

Anesthetics

Agents that are capable of inducing a total or partial loss of sensation, especially tactile sensation and pain. They may act to induce general ANESTHESIA, in which an unconscious state is achieved, or may act locally to induce numbness or lack of sensation at a targeted site. (See all compounds classified as Anesthetics.)

▸ MeSH

9.3 ATC Code

A - Alimentary tract and metabolism

A06 - Drugs for constipation

A06A - Drugs for constipation

A06AD - Osmotically acting laxatives

A06AD04 - Magnesium sulfate

▸ WHO Anatomical Therapeutic Chemical (ATC) Classification

A - Alimentary tract and metabolism

A12 - Mineral supplements

A12C - Other mineral supplements

A12CC - Magnesium

A12CC02 - Magnesium sulfate

▸ WHO Anatomical Therapeutic Chemical (ATC) Classification

B - Blood and blood forming organs

B05 - Blood substitutes and perfusion solutions

B05X - I.v. solution additives

B05XA - Electrolyte solutions

B05XA05 - Magnesium sulfate

▸ WHO Anatomical Therapeutic Chemical (ATC) Classification

D - Dermatologicals

D11 - Other dermatological preparations

D11A - Other dermatological preparations

D11AX - Other dermatologicals

D11AX05 - Magnesium sulfate

▸ WHO Anatomical Therapeutic Chemical (ATC) Classification

V - Various

V04 - Diagnostic agents

V04C - Other diagnostic agents

V04CC - Tests for bile duct patency

V04CC02 - Magnesium sulfate

▸ WHO Anatomical Therapeutic Chemical (ATC) Classification

9.4 Absorption, Distribution and Excretion

Route of Elimination

Magnesium is excreted solely by the kidney at a rate proportional to the serum concentration and glomerular filtration.

▸ DrugBank

Magnesium sulfate is excreted by the kidneys at a rate that varies from one patient to another but that is directly proportional to the serum concn and glomerular filtration.

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2164

▸ Hazardous Substances Data Bank (HSDB)

PLASMA CONCN OF MAGNESIUM INCR IN FETUS & APPROACH MATERNAL BLOOD VALUES AFTER MAGNESIUM SULFATE ADMIN IN ECLAMPSIA & PREECLAMPSIA.

Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980., p. 882

▸ Hazardous Substances Data Bank (HSDB)

9.5 Metabolism/Metabolites

None

▸ DrugBank

9.6 Biological Half-Life

43.2 hours (for newborns)

▸ DrugBank

9.7 Mechanism of Action

Magnesium is the second most plentiful cation of the intracellular fluids. It is essential for the activity of many enzyme systems and plays an important role with regard to neurochemical transmission and muscular excitability. Magnesium sulfate reduces striated muscle contractions and blocks peripheral neuromuscular transmission by reducing acetylcholine release at the myoneural junction. Additionally, Magnesium inhibits Ca^{2+} influx through dihydropyridine-sensitive, voltage-dependent channels. This accounts for much of its relaxant action on vascular smooth muscle.

▸ DrugBank

CATHARTIC ACTION RESULTS FROM FACT THAT MGSO4 IS NOT ABSORBED FROM INTESTINAL TRACT, & THUS RETAINS SUFFICIENT WATER WITHIN LUMEN OF BOWEL TO MAKE AN ISOTONIC SOLN. IN EVENT...SALT IS GIVEN IN HYPERTONIC SOLN, SOURCE OF WATER WOULD BE BODY FLUIDS, &...DEHYDRATING ACTION IS EXERTED. /HEPTAHYDRATE, USP/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 743

Hazardous Substances Data Bank (HSDB)

EXACT MECHANISM OF.../CNS/ DEPRESSANT ACTIVITY IS NOT FULLY KNOWN; HOWEVER, EXCESS **MAGNESIUM** APPEARS TO DECR AMT OF **ACETYLCHOLINE** LIBERATED BY MOTOR NERVE IMPULSE. /HEPTAHYDRATE INJECTION USP/

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2163

Hazardous Substances Data Bank (HSDB)

Isolated myometrial strips were obtained from humans undergoing elective cesarean section at term pregnancy and Wistar albino rats on gestational days 19-21. These strips were mounted in organ baths for recording of isometric tensions. The effect of magnesium sulfate, **isradipine**, and **ritodrine** on the amplitude and frequency of spontaneous contractions was compared. ... **Ritodrine** (10-8-10-5 M) concentration-dependently inhibited the frequency and amplitude of spontaneous contractions of myometrial strips. At 10-4 M, tachyphylaxis of **ritodrine** occurred and contractions started again. Magnesium sulfate (10-7-10-4 M) inhibited the frequency but did not change the amplitude of the spontaneous contractions. **Isradipine** (10-7-10-4 M) had a concentration-related inhibitor effect on both the frequency and amplitude of the spontaneous contractions. The effects of magnesium sulfate, **isradipine**, and **ritodrine** were considerably similar in myometrium strips obtained from pregnant rats and humans. ...

PMID:12225296

Kantas E, et al; Acta Obstet Gynecol Scand 81(9): 825-830 (2002)

Hazardous Substances Data Bank (HSDB)

10 Use and Manufacturing

10.1 Use Classification

EPA Safer Chemical Functional Use Classes -> Processing Aids and Additives

- EPA Safer Choice

Safer Chemical Classes -> Green circle - The chemical has been verified to be of low concern

- EPA Safer Choice

Human Drugs -> EU pediatric investigation plans

- European Medicines Agency (EMA)

Human Drugs -> FDA Approved Drug Products with Therapeutic Equivalence Evaluations (Orange Book) -> Active Ingredients

- FDA Drugs

Cosmetics -> Bulking; Hair conditioning; Viscosity controlling

S13 | EUCOSMETICS | Combined Inventory of Ingredients Employed in Cosmetic Products (2000) and Revised Inventory (2006) | DOI:10.5281/zenodo.2624118

- NORMAN Suspect List Exchange

10.2 Uses

EPA CPDat Chemical and Product Categories

The Chemical and Products Database, a resource for exposure-relevant data on chemicals in consumer products, Scientific Data, volume 5, Article number: 180125 (2018), DOI:10.1038/sdata.2018.125

- EPA Chemical and Products Database (CPDat)

For magnesium sulfate (USEPA/OPP Pesticide Code: 050503) there are 0 labels match. /SRP: Not registered for current use in the U.S., but approved pesticide uses may change periodically and so federal, state and local authorities must be consulted for currently approved uses./

U.S. Environmental Protection Agency/Office of Pesticide Program's Chemical Ingredients Database on Magnesium Sulfate (7487-88-9). Available from, as of October 23, 2002: http://npirspublic.ceris.purdue.edu/ppis/

- Hazardous Substances Data Bank (HSDB)

WEIGHTING COTTON AND SILK; INCR BLEACHING ACTION OF CHLORINATED LIME; MFR OF MOTHER-OF-PEARL AND FROSTED PAPERS; FIRE-PROOFING FABRICS; DYEING & PRINTING CALICOS; IN FERTILIZERS; EXPLOSIVES, MATCHES; MINERAL WATER; TANNING LEATHER.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

- Hazardous Substances Data Bank (HSDB)

CATALYST CARRIER; CERAMICS; COSMETIC LOTIONS; DIETARY SUPPLEMENT; FERTILIZERS AND TEXTILES.

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 693

- Hazardous Substances Data Bank (HSDB)

AS ANTICONVULSANT; CATHARTIC /HEPTAHYDRATE/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

- Hazardous Substances Data Bank (HSDB)

IN PREPN OF EFFERVESCENT & NONEFFERVESCENT, APERIENT POWDERS OR GRANULES /TRIHYDRATE/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 746

Hazardous Substances Data Bank (HSDB)

IN PREPN OF MORISON'S PASTE WHICH IS EMPLOYED AS APPLICATION TO CARBUNCLES & BOILS /MAGNESIUM SULFATE, DRIED BRITISH PHARMACOPEIA/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 746

Hazardous Substances Data Bank (HSDB)

AS A CATHARTIC & ANALGESIC IN MEDICINE; FINISHING AGENT FOR TEXTILES; AS WATER-CORRECTING AGENT IN BREWING INDUST; COMPONENT OF FIREPROOFING COMPOSITIONS, PRESERVATIVES, TANNING & COAGULATING AGENTS; INT FOR MAGNESIUM TRISILICATE; COMPONENT OF NICKEL BATHS FOR PLATING OTHER METALS; CATALYST SUPPORT FOR PLATINUM IN SULFURIC ACID PRODUCTION

SRI

Hazardous Substances Data Bank (HSDB)

MEDICATION (VET)

Hazardous Substances Data Bank (HSDB)

MEDICATION

Hazardous Substances Data Bank (HSDB)

PRODUCTION OF HIGH FRUCTOSE CORN SYRUP; PLASTICS; IN DETERGENTS

CHEMICAL PRODUCTS SYNOPSIS: MAGNESIUM SULFATE, 1981

Hazardous Substances Data Bank (HSDB)

Weighting cotton and silk, fireproofing fabrics, fertilizers, explosives, matches, ceramics, cosmetic lotions.

International Labour Office. Encyclopaedia of Occupational Health and Safety. 4th edition, Volumes 1-4 1998. Geneva, Switzerland: International Labour Office, 1998., p. 63.24

Hazardous Substances Data Bank (HSDB)

10.2.1 Industry Uses

Add to Soil to increase Mg content soil. This is not a fertilizer blending, its more of Micronutrient
Adhesives and sealant chemicals
Agricultural chemicals (non-pesticidal)
Bleaching agents
CHEMICAL DISTRIBUTION
Chemical manufacturing
Fillers
Laboratory chemicals
Material is repackaged into drums / totes and sold for various applications.
Personal Care
Pharmaceutical
Pigments
Plating agents and surface treating agents
Processing aids, not otherwise listed
Viscosity adjustors

https://www.epa.gov/chemical-data-reporting

EPA Chemicals under the TSCA

10.2.2 Consumer Uses

Agricultural products (non-pesticidal)
Building/construction materials - wood and engineered wood products
Building/construction materials not covered elsewhere
CHEMICAL DISTRIBUTION
General spill clean up, neutralization, and sorbent
LAB CHEMICALS
Laundry and dishwashing products
Lawn and garden care products
Non-TSCA use
Paper products
Personal care products
Photographic supplies, film, and photo chemicals

https://www.epa.gov/chemical-data-reporting

EPA Chemicals under the TSCA

10.3 Methods of Manufacturing

RECOVERY OF THE MINERAL KIESERITE (MAGNESIUM SULFATE MONOHYDRATE) OR EPSOMITE (MAGNESIUM SULFATE HEPTAHYDRATE) FOLLOWED BY DEHYDRATION

SRI

Hazardous Substances Data Bank (HSDB)

Action of sulfuric acid on magnesium oxide, hydroxide or carbonate; mined in a high degree of purity

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 693

Hazardous Substances Data Bank (HSDB)

DRIED MAGNESIUM SULFATE IS PREPARED BY HEATING THE HEPTAHYDRATE UNTIL APPROX 25% OF ITS WEIGHT IS LOST. /DRIED MAGNESIUM SULFATE/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

Hazardous Substances Data Bank (HSDB)

PREPN: BENNETT, US PATENT 3,297,413 (1967 TO DOW). /TRIHYDRATE/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

Hazardous Substances Data Bank (HSDB)

...CAN BE PREPD BY NEUTRALIZING SULFURIC ACID WITH MAGNESIUM CARBONATE OR OXIDE, BUT IT IS USUALLY OBTAINED DIRECTLY FROM NATURAL SOURCES. MGSO4 IN FORM OF DOUBLE SALT WITH ALKALI METALS OCCURS ABUNDANTLY IN SEVERAL MINES, AND THESE FORM THE LARGEST SOURCE OF THE SALT. /HEPTAHYDRATE/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 742

Hazardous Substances Data Bank (HSDB)

...IN LARGE QUANTITIES FROM MAGNESIUM SALTS OCCURRING IN BRINES USED FOR EXTRACTION OF BROMINE. "LIQUORS" AFTER REMOVAL OF BROMINE...TREATED WITH CALCIUM HYDROXIDE...PRECIPATING MAGNESIUM AS HYDROXIDE. SULFUR DIOXIDE & AIR... PASSED INTO AQ SUSPENSION OF MAGNESIUM HYDROXIDE YIELDING MAGNESIUM SULFATE. /HEPTAHYDRATE/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 739

Hazardous Substances Data Bank (HSDB)

Anhydrous MgSO4 can be prepared only by dehydration of a hydrate.

Kirk-Othmer Encyclopedia of Chemical Technology. 4th ed. Volumes 1: New York, NY. John Wiley and Sons, 1991-Present., p. V15 710 (1995)

Hazardous Substances Data Bank (HSDB)

PURER GRADES OF EPSOM SALT CAN BE MANUFACTURED BY NEUTRALIZATION OF MgO OR Mg(OH)2 WITH SULFUFIC ACID

CHEMICAL PRODUCTS SYNOPSIS: MAGNESIUM SULFATE, 1981

Hazardous Substances Data Bank (HSDB)

10.4 Formulations/Preparations

.../MAGNESIUM SULFATE/ MOST COMMON FORMS ARE THE CRYSTALLIZED SALT MGSO4.7H2O (EPSOM SALT) & KIESERITE (MGSO4.H2O). WHEN EITHER OF THESE SALTS IS CALCINED TO REMOVE COMBINED WATER, THE ANHYDROUS SALT, MGSO4, IS OBTAINED.

Farm Chemicals Handbook 1980. Willoughby, Ohio: Meister, 1980., p. B-44

Hazardous Substances Data Bank (HSDB)

MAGNESIUM SULFATE INJECTION, USP, IS AVAIL IN CONCN OF 10, 12.5, 25 & 50%. /MGSO4 INJECTION/

Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980., p. 882

Hazardous Substances Data Bank (HSDB)

GRADES: TECHNICAL, CP, USP, FCC

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 693

Hazardous Substances Data Bank (HSDB)

PURITY: 62-70%. /MAGNESIUM SULFATE, DRIED BRITISH PHARMACOPEIA/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 746

Hazardous Substances Data Bank (HSDB)

For more Formulations/Preparations (Complete) data for MAGNESIUM SULFATE (6 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

10.5 Consumption Patterns

DERIVATIVE: CONSUMER, DRUG STORE & PHARMACEUTICAL, 25%; CHEMICALS, 20%; PLASTICS, 15%; FERTILIZER, 15%; ANIMAL FEED, 5%; BUILDING PRODUCTS, 5%; DETERGENTS, 5%; PAPER, 3%; MISC, 7% (1981)

CHEMICAL PRODUCTS SYNOPSIS: MAGNESIUM SULFATE, 1981

Hazardous Substances Data Bank (HSDB)

10.6 U.S. Production

Aggregated Product Volume (EPA CDR 2016)

100,000,000 - 250,000,000 lb

https://www.epa.gov/chemical-data-reporting

EPA Chemicals under the TSCA

(1973) 5.9X10+10 GRAMS (ANHYDROUS & HYDROUS)

SRI

Hazardous Substances Data Bank (HSDB)

(1975) 4.31X10+10 G (ANHYDROUS & HYDROUS)

SRI

Hazardous Substances Data Bank (HSDB)

10.7 U.S. Imports

(1972) 1.96X10+10 GRAMS

SRI

Hazardous Substances Data Bank (HSDB)

(1975) 2.99X10+10 GRAMS

SRI

Hazardous Substances Data Bank (HSDB)

10.8 General Manufacturing Information

Industry Processing Sectors

Agriculture, forestry, fishing and hunting
All other basic inorganic chemical manufacturing
All other chemical product and preparation manufacturing
Carbon black manufacturing
Miscellaneous manufacturing
Paper manufacturing
Pesticide, fertilizer, and other agricultural chemical manufacturing
Pharmaceutical and medicine manufacturing
Services
Soap, cleaning compound, and toilet preparation manufacturing
Synthetic dye and pigment manufacturing
Wholesale and retail trade
Wood product manufacturing

EPA Chemicals under the TSCA

EPA TSCA Commercial Activity Status

Sulfuric acid magnesium salt (1:1): ACTIVE

https://www.epa.gov/tsca-inventory

EPA Chemicals under the TSCA

EPA TSCA Commercial Activity Status

Sulfuric acid, mono-C10-16-alkyl esters, magnesium salts: ACTIVE

https://www.epa.gov/tsca-inventory

EPA Chemicals under the TSCA

MAGNESIUM SULFATE IS DISSOLVED IN **WATER** FOR INJECTION, & SOLN, SUITABLY FILTERED UNTIL FREE FROM SUSPENDED MATTER, IS PLACED IN CLEANSED & STERILE AMPULS. THESE ARE SEALED & SUITABLY STERILIZED. /MAGNESIUM SULFATE INJECTION, USP/

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 1015

Hazardous Substances Data Bank (HSDB)

INCOMPATIBALITIES: ADDITION OF ALCOHOL MAY CAUSE PPTN OF MAGNESIUM SULFATE FROM AQ SOLN. ALKALI HYDROXIDES FORM INSOL **MAGNESIUM HYDROXIDE**, ALKALI CARBONATES FORM BASIC **CARBONATE**, & SALICYLATES FORM BASIC **SALICYLATE**.

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 742

Hazardous Substances Data Bank (HSDB)

Magnesium sulfate does not occur in nature in anhydrous form. It is found in the form of hydrates and double salts in salt and potash deposits ... .

Gerhartz, W. (exec ed.). Ullmann's Encyclopedia of Industrial Chemistry. 5th ed.Vol A1: Deerfield Beach, FL: VCH Publishers, 1985 to Present., p. VA15 619 (1990)

Hazardous Substances Data Bank (HSDB)

11 Safety and Hazards

11.1 Hazards Identification

11.1.1 GHS Classification

Showing 1 of 2 View More

Pictogram(s)	 Irritant
Signal	Warning
GHS Hazard Statements	H302 (97.74%): Harmful if swallowed [**Warning** Acute toxicity, oral] H312 (87.9%): Harmful in contact with skin [**Warning** Acute toxicity, dermal] H332 (97.47%): Harmful if inhaled [**Warning** Acute toxicity, inhalation]
Precautionary Statement Codes	P261, P264, P270, P271, P280, P301+P312, P302+P352, P304+P312, P304+P340, P312, P322, P330, P363, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)
ECHA C&L Notifications Summary	*Aggregated GHS information provided by 2470 companies from 13 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.* *Reported as not meeting GHS hazard criteria by 1007 of 2470 companies. For more detailed information, please visit **ECHA C&L website.*** *Of the 11 notification(s) provided by 1463 of 2470 companies with hazard statement code(s).* *Information may vary between notifications depending on impurities, additives, and other factors. The percentage value in parenthesis indicates the notified classification ratio from companies that provide hazard codes. Only hazard codes with percentage values above 10% are shown.*

▸ European Chemicals Agency (ECHA)

11.1.2 Hazard Classes and Categories

Acute Tox. 4 (97.74%)

Acute Tox. 4 (87.9%)

Acute Tox. 4 (97.47%)

▸ European Chemicals Agency (ECHA)

Acute Tox. 4 (99.77%)

Skin Irrit. 2 (100%)

Eye Irrit. 2 (99.55%)

▸ European Chemicals Agency (ECHA)

11.1.3 EPA Safer Chemical

Chemical: Magnesium sulfate, anhydrous

Green circle - The chemical has been verified to be of low concern based on experimental and modeled data.

▸ EPA Safer Choice

11.1.4 Fire Hazards

Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.

▸ ILO International Chemical Safety Cards (ICSC)

11.2 First Aid Measures

11.2.1 Inhalation First Aid

Fresh air, rest.

▸ ILO International Chemical Safety Cards (ICSC)

11.2.2 Skin First Aid

Rinse skin with plenty of water or shower.

- ILO International Chemical Safety Cards (ICSC)

11.2.3 Eye First Aid

Rinse with plenty of water (remove contact lenses if easily possible).

- ILO International Chemical Safety Cards (ICSC)

11.2.4 Ingestion First Aid

Rinse mouth. Give one or two glasses of water to drink.

- ILO International Chemical Safety Cards (ICSC)

11.3 Fire Fighting

In case of fire in the surroundings, use appropriate extinguishing media.

- ILO International Chemical Safety Cards (ICSC)

11.4 Accidental Release Measures

11.4.1 Spillage Disposal

Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Store and dispose of according to local regulations. Wash away remainder with plenty of water.

- ILO International Chemical Safety Cards (ICSC)

11.4.2 Disposal Methods

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices.

- Hazardous Substances Data Bank (HSDB)

11.5 Handling and Storage

11.5.1 Safe Storage

Dry.

- ILO International Chemical Safety Cards (ICSC)

11.5.2 Storage Conditions

KEEP WELL CLOSED. /HEPTAHYDRATE/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

- Hazardous Substances Data Bank (HSDB)

11.6 Exposure Control and Personal Protection

11.6.1 Inhalation Risk

A harmful concentration of airborne particles can be reached quickly , especially if powdered.

- ILO International Chemical Safety Cards (ICSC)

11.6.2 Effects of Short Term Exposure

The substance is mildly irritating to the eyes and respiratory tract.

ILO International Chemical Safety Cards (ICSC)

11.6.3 Allowable Tolerances

Residues of magnesium sulfate are exempted from the requirement of a tolerance when used as a solid diluent, carrier or safener in accordance with good agricultural practices as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest.

*40 CFR 180.1001(c); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 22, 2002: **http://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

11.6.4 Inhalation Prevention

Avoid inhalation of dust.

ILO International Chemical Safety Cards (ICSC)

11.6.5 Eye Prevention

Wear safety spectacles.

ILO International Chemical Safety Cards (ICSC)

11.6.6 Ingestion Prevention

Do not eat, drink, or smoke during work.

ILO International Chemical Safety Cards (ICSC)

11.7 Stability and Reactivity

11.7.1 Hazardous Reactivities and Incompatibilities

Potentially explosive reaction when heated with ethoxyethynyl alcohols (e.g., 1-ethoxy-3-methyl-1-butyn-3-ol).

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 2082

Hazardous Substances Data Bank (HSDB)

11.8 Regulatory Information

11.8.1 FIFRA Requirements

As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their future use. Under this pesticide reregistration program, EPA examines health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether they are eligible for reregistration. In addition, all pesticides must meet the new safety standard of the Food Quality Protection Act of 1996. Pesticides for which EPA had not issued Registration Standards prior to the effective date of FIFRA '88 were divided into three lists based upon their potential for human exposure and other factors, with List B containing pesticides of greater concern and List D pesticides of less concern. Magnesium sulfate is found on List D. Case No: 4055; Pesticide type: insecticide, herbicide; Case Status: No products containing the pesticide are actively registered. Therefore, we are characterizing the case as "cancelled." Under FIFRA, pesticide producers may voluntarily cancel their registered products. EPA also may cancel pesticide registrations if registrants fail to pay required fees or make/meet certain reregistration commitments, or if EPA reaches findings of unreasonable adverse effects.; Active ingredient (AI): magnesium sulfate; AI Status: The active ingredient is no longer contained in any registered products. Thus, we characterize it as "cancelled."

United States Environmental Protection Agency/ Prevention, Pesticides and Toxic Substances; Status of Pesticides in Registration, Reregistration, and Special Review. (1998) EPA 738-R-98-002, p. 320

Hazardous Substances Data Bank (HSDB)

Residues of magnesium sulfate are exempted from the requirement of a tolerance when used as a solid diluent, carrier or safener in accordance with good agricultural practices as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest.

*40 CFR 180.1001(c); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 22, 2002: **http://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

11.8.2 FDA Requirements

This substance is generally recognized as safe when used in accordance with good manufacturing or feeding practice.

*21 CFR 582.5443; U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 22, 2002: **http://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

Substance added directly to human food affirmed as generally recognized as safe (GRAS).

21 CFR 184.1443; U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 22, 2002: ***http://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

The Approved Drug Products with Therapeutic Equivalence Evaluations List identifies currently marketed prescription drug products, incl magnesium sulfate, approved on the basis of safety and effectiveness by FDA under sections 505 of the Federal Food, Drug, and Cosmetic Act.

DHHS/FDA; Electronic Orange Book-Approved Drug Products with Therapeutic Equivalence Evaluations. Available from, as of April 16, 2003: ***http://www.fda.gov/cder/ob/***

Hazardous Substances Data Bank (HSDB)

Drug products containing certain active ingredients offered over-the-counter (OTC) for certain uses. Magnesium sulfate is included as a topical acne drug product and an orally administered menstrual drug product.

21 CFR 310.545; U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of April 16, 2003: ***http://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

Drug products containing active ingredients offered over-the-counter (OTC) for the treatment of boils. Magnesium sulfate is included in this section.

21 CFR 310.531; U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of April 16, 2003: ***http://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

12 Toxicity

12.1 Toxicological Information

12.1.1 Exposure Routes

The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

- ILO International Chemical Safety Cards (ICSC)

12.1.2 Inhalation Symptoms

Cough.

- ILO International Chemical Safety Cards (ICSC)

12.1.3 Eye Symptoms

Redness.

- ILO International Chemical Safety Cards (ICSC)

12.1.4 Ingestion Symptoms

Abdominal pain. Diarrhoea. Vomiting.

- ILO International Chemical Safety Cards (ICSC)

12.1.5 Acute Effects

- ChemIDplus

12.1.6 Interactions

ADMIN OF MAGNESIUM SULFATE IN PREECLAMPSIA & ECLAMPSIA POTENTIATES NEUROMUSCULAR BLOCKADE PRODUCED BY D-TUBOCURARINE, DECAMETHONIUM, & SUCCINYLCHOLINE.

Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980., p. 880

- Hazardous Substances Data Bank (HSDB)

When barbiturates, opiates, general anesthetics, or other CNS depressants are administered concomitantly with magnesium sulfate, dosage of these agents must be carefully adjusted because of the additive central depressant effects.

McEvoy, G.K. (ed.). American Hospital Formulary Service- Drug Information 2002. Bethesda, MD: American Society of Health-System Pharmacists, Inc. 2002 (Plus Supplements)., p. 2163

- Hazardous Substances Data Bank (HSDB)

...Magnesium inhibited extracellular calcium entry, intracellular calcium release, cytosolic calcium oscillations, and phasic contractions of myometrial smooth muscle /induced by oxytocin and other uterotonic agonists/.

PMID:9826560
Phillippe, M; Biochemical and Biophysical Research Communications 252 (2): 502-507 (1998)

Hazardous Substances Data Bank (HSDB)

...The present in vivo rat study examined the effect of magnesium sulfate to alter the pressor response to norepinephrine (NE) and angiotensin II (A II). Magnesium doses were chosen to approximate those used in treating preeclampsia. NE resulted in a significant rise in mean arterial pressure (delta MAP, 46 +/- 3.7 mmHg; p<0.001). A II also resulted in a significant rise in MAP (delta MAP, 23 +/- 3.6 mmHg, p<0.02). Magnesium sulfate alone had no significant effect on MAP but attenuated the pressor response to both NE (delta MAP, 16 +/- 1.5 mmHg) and A II (delta MAP, 12 +/- 2.5 mmHg). After discontinuation of the magnesium sulfate infusion, the control pressor responses to NE and A II were again seen (delta MAP, 39 +/- 3.5 mmHg and delta MAP, 28 +/- 4.2 mmHg, respectively). Although magnesium sulfate is not a primary antihypertensive agent, it may have effects on blood pressure by attenuating the actions of circulating vasoconstrictors.

PMID:1418160

Aisenbrey GA, et al; Am J Perinatol 9 (5-6): 477-480 (1992)

Hazardous Substances Data Bank (HSDB)

For more Interactions (Complete) data for MAGNESIUM SULFATE (6 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

12.1.7 Toxicity Summary

LD_{50} = 1200 mg/kg (rat, subcutaneous). May be harmful if swallowed. May act as an irritant. Adverse reactions include hypotension, ECG changes, diarrhea, urinary retention, CNS depression and respiratory depression.

DrugBank

12.1.8 Human Toxicity Excerpts

/HUMAN EXPOSURE STUDIES/ Human systemic effects: heart changes, cyanosis, flaccid paralysis with appropriate anesthesia.

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 2082

Hazardous Substances Data Bank (HSDB)

12.1.9 Non-Human Toxicity Excerpts

/LABORATORY ANIMALS: Acute Exposure/ INJECTION OF 0.08 MOLAR MAGNESIUM SULFATE INTO RABBITS CORNEA...CAUSED NO REACTION. OLD REPORTS ALLEGING CORNEAL OPACIFICATION FROM MAGNESIUM...SULFATE WERE CONCERNED PRIMARILY WITH AN ARTIFICIAL FERTILIZER NAMED KAINIT, WHICH CONTAINED VARIOUS MAGNESIUM & POTASSIUM SALTS.

Grant, W. M. Toxicology of the Eye. 2nd ed. Springfield, Illinois: Charles C. Thomas, 1974., p. 639

Hazardous Substances Data Bank (HSDB)

/LABORATORY ANIMALS: Developmental or Reproductive Toxicity/ ...The cardiac index (Q), pulmonary arterial pressure (PAP), systemic arterial pressure (SAP), and pulmonary (PVRI) and systemic (SVRI) vascular resistance indices were measured in 9 newborn piglets (including 3 controls). Pulmonary hypertension was induced by .../hypoxia/, after which there was a significant increase in PAP and PVRI (37% and 142%, respectively; p<0.01) and a significant fall in SAP and Q (30% and 33%, respectively; p<0.01). ...Magnesium sulfate was infused iv as 4 doses of 25 mg/kg, 15 minutes apart, which resulted in a significant mean (SD) incr in serum magnesium (0.83 (0.07) mmol/l to 1.82 (0.19) mmol/l; p<0.01). After the initial dose SAP, SVRI, PAP and PVRI decreased, but not significantly. Each subsequent dose of (50, 75, 100 mg/kg) was accompanied by further significant reductions in these variables from control baseline (p<0.05). The PVRI:SVRI ratio remained unchanged throughout. Inhaled nitric oxide (NO) 40 ppm was administered after the last dose of magnesium sulfate. The PVRI:SVRI significantly decreased (p<0.05), indicating that reversible pulmonary hypertension remained after a maximum dose of magnesium sulfate. ...Unlike NO, magnesium sulfate is not a selective pulmonary vasodilator and may lead to deleterious effects on systemic pressures in critically ill newborns.

Ryan CA, et al; Arch Dis Child Fetal Neonatal Ed 71 (3): F151-155 (1994)

Hazardous Substances Data Bank (HSDB)

/LABORATORY ANIMALS: Developmental or Reproductive Toxicity/ WEANLING RATS EXHIBITIED DIARRHEA, DEPRESSED GROWTH RATE, & INTESTINAL DISTENSION WHEN FED 1% MAGNESIUM SULFATE.

Venugopal, B. and T.D. Luckey. Metal Toxicity in Mammals, 2. New York: Plenum Press, 1978., p. 53

Hazardous Substances Data Bank (HSDB)

12.1.10 Non-Human Toxicity Values

LD50 Mouse subcutaneous 645 mg/kg

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 2082

Hazardous Substances Data Bank (HSDB)

LD50 Rat subcutaneous 1200 mg/kg

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 2082

Hazardous Substances Data Bank (HSDB)

12.1.11 Protein Binding

25-30%

- DrugBank

12.2 Ecological Information

12.2.1 Natural Pollution Sources

OCCURS IN NATURE AS THE MINERAL EPSOMITE. /HEPTAHYDRATE/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

- Hazardous Substances Data Bank (HSDB)

MONOHYDRATE OCCURS IN NATURE AS MINERAL KIESERITE. /MONOHYDRATE/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 1018

- Hazardous Substances Data Bank (HSDB)

12.2.2 Artificial Pollution Sources

The production and use of **magnesium** compounds as refractories, as chemical intermediates, and in construction materials(1,2) result in their release to the environment through various waste streams(SRC). The production and use of **magnesium** compounds in environmental applications and in agriculture(1,2) results in their direct release to the environment(SRC). About 69% of the **magnesium** compounds used in the United States were used for refractories (e.g., olivine)(1). The remaining 31% of **magnesium** compounds were used in agriculture as fertilizer or animal feed (e.g, **magnesium oxide**, magnesium sulfate), as chemical intermediates (e.g., **magnesium chloride**, **magnesium hydroxide**, **magnesium carbonate**, **magnesium oxide**) , construction materials (e.g., **magnesium oxide**), environmental (e.g., **magnesium oxide**, **magnesium hydroxide**), and industrial applications (e.g., **magnesium oxide**)(1,2). Other uses include road dust and **ice** control (e.g., **magnesium chloride**), pulp and paper applications (e.g.,magnesium sulfate), pharmaceuticals (e.g., magnesium sulfate, **magnesium carbonate**, **magnesium oxide**), and cosmetics (e.g., **magnesium carbonate**)(1,2).

*(1) Kramer DA; USGS Minerals Yearbook for Magnesium Compounds (2001). Available from **http://minerals.usgs.gov/minerals/pubs/commodity/magnesium/401302.pdf** as of Oct 21, 2002. (2) Kramer DA; USGS Mineral Commodity Summary for Magnesium Compounds (2002). Available from **http://minerals.usgs.gov/minerals/pubs/commodity/magnesium/401302.pdf** as of Oct 21, 2002.*

- Hazardous Substances Data Bank (HSDB)

12.2.3 Environmental Fate

AQUATIC FATE: Natural **water** systems acquire **magnesium** through weathering reactions, which involve the interaction of **water** and atmosphere with the earth's crust and subsequent leaching of **magnesium** compounds into **water**. The Mg2+ ion is the predominant form of dissolved **magnesium**. However, some **magnesium** complexes do form. The magnesium sulfate ion pair complex (MgSO4) is the most significant complex present, representing 2.6% and 11% of the total **magnesium** content in fresh and sea **water**, respectively. The concentrations of **bicarbonate** and **carbonate** complexes are significant but considerably less than **sulfate** complexes. Incorporation of **magnesium** compounds into sediment is an important removal process. For example, a small amount of **magnesium** is ion exchanged for **calcium** on clay minerals in ocean sediment. Also small amounts of **magnesium carbonate** (about 6% of the **magnesium** supplied by rivers) are deposited with calcite (CaCO3) in seawater. There is significant uptake of **magnesium** (about 24% of the river input of **magnesium**) by sediment in which **sulfate** reduction is taking place(1). The avg Kd value for **magnesium** sorption on Po River sediments is 1.3 cu m/kg, which suggests that **magnesium** ions are weakly sorbed on sediments(2). High-temperature alteration of basalts at hydrothermal vents apparently constitute the most important sink for **magnesium** in seawater(1).

(1) Bodek I et al, eds; Environmental Inorganic Chemistry. Elmsford, NY: Pergamon Press pp. 6.5-1 to 6.5-10 (1988) (2) Pettine M et al; Sci Tot Environ 145: 243-265 (1994)

- Hazardous Substances Data Bank (HSDB)

13 Associated Disorders and Diseases

- Comparative Toxicogenomics Database (CTD)

14 Literature

14.1 Coronavirus Studies

PubChem

14.2 NLM Curated PubMed Citations

PubChem

14.3 Springer Nature References

Springer Nature

14.4 Thieme References

Thieme Chemistry

14.5 Wiley References

Wiley

14.6 Depositor Provided PubMed Citations

PubChem

14.7 Synthesis References

Shinichi Yamamoto, Akifumi Sekitani, "BASIC MAGNESIUM SULFATE GRANULE, AND PROCESS FOR PRODUCTION THEREOF." U.S. Patent US20110042297, issued February 24, 2011.

DrugBank

14.8 General References

1. Blitz M, Blitz S, Hughes R, Diner B, Beasley R, Knopp J, Rowe BH: Aerosolized magnesium sulfate for acute asthma: a systematic review. Chest. 2005 Jul;128(1):337-44. [PMID:16002955]
2. Yokoyama K, Takahashi N, Yada Y, Koike Y, Kawamata R, Uehara R, Kono Y, Honma Y, Momoi MY: Prolonged maternal magnesium administration and bone metabolism in neonates. Early Hum Dev. 2010 Mar;86(3):187-91. doi: 10.1016/j.earlhumdev.2010.02.007. Epub 2010 Mar 12. [PMID:20226604]
3. Wedig KE, Kogan J, Schorry EK, Whitsett JA: Skeletal demineralization and fractures caused by fetal magnesium toxicity. J Perinatol. 2006 Jun;26(6):371-4. [PMID:16724078]
4. Nassar AH, Sakhel K, Maarouf H, Naassan GR, Usta IM: Adverse maternal and neonatal outcome of prolonged course of magnesium sulfate tocolysis. Acta Obstet Gynecol Scand. 2006;85(9):1099-103. [PMID:16929415]
5. Malaeb SN, Rassi AI, Haddad MC, Seoud MA, Yunis KA: Bone mineralization in newborns whose mothers received magnesium sulphate for tocolysis of premature labour. Pediatr Radiol. 2004 May;34(5):384-6. Epub 2004 Feb 18. [PMID:14985884]
6. Matsuda Y, Maeda Y, Ito M, Sakamoto H, Masaoka N, Takada M, Sato K: Effect of magnesium sulfate treatment on neonatal bone abnormalities. Gynecol Obstet Invest. 1997;44(2):82-8. [PMID:9286718]
7. Schanler RJ, Smith LG Jr, Burns PA: Effects of long-term maternal intravenous magnesium sulfate therapy on neonatal calcium metabolism and bone mineral content. Gynecol Obstet Invest. 1997;43(4):236-41. [PMID:9194621]
8. Santi MD, Henry GW, Douglas GL: Magnesium sulfate treatment of preterm labor as a cause of abnormal neonatal bone mineralization. J Pediatr Orthop. 1994 Mar-Apr;14(2):249-53. [PMID:8188843]
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10. Cumming WA, Thomas VJ: Hypermagnesemia: a cause of abnormal metaphyses in the neonate. AJR Am J Roentgenol. 1989 May;152(5):1071-2. [PMID:2705341]
11. Lamm CI, Norton KI, Murphy RJ, Wilkins IA, Rabinowitz JG: Congenital rickets associated with magnesium sulfate infusion for tocolysis. J Pediatr. 1988 Dec;113(6):1078-82. [PMID:3193315]
12. McGuinness GA, Weinstein MM, Cruikshank DP, Pitkin RM: Effects of magnesium sulfate treatment on perinatal calcium metabolism. II. Neonatal responses. Obstet Gynecol. 1980 Nov;56(5):595-600. [PMID:7432730]
13. Riaz M, Porat R, Brodsky NL, Hurt H: The effects of maternal magnesium sulfate treatment on newborns: a prospective controlled study. J Perinatol. 1998 Nov-Dec;18(6 Pt 1):449-54. [PMID:9848759]

▸ DrugBank

14.9 Chemical Co-Occurrences in Literature

▸ PubChem

14.10 Chemical-Gene Co-Occurrences in Literature

▸ PubChem

14.11 Chemical-Disease Co-Occurrences in Literature

PubChem

15 Patents

US6946149

DrugBank

15.1 Depositor-Supplied Patent Identifiers

PubChem

Link to all deposited patent identifiers

PubChem

15.2 WIPO PATENTSCOPE

Patents are available for this chemical structure:

https://patentscope.wipo.int/search/en/result.jsf?inchikey=CSNNHWWHGAXBCP-UHFFFAOYSA-L

PATENTSCOPE (WIPO)

15.3 FDA Orange Book Patents

Patent	6946149
Expiration	Mar 7, 2023
Applicant	BRAINTREE LABS
Drug Application	N022372 (Prescription Drug: SUPREP BOWEL PREP KIT. Ingredients: MAGNESIUM SULFATE | POTASSIUM SULFATE | SODIUM SULFATE)

FDA Drugs

Patent	10143656
Expiration	Aug 4, 2037
Applicant	BRAINTREE LABS
Drug Application	N213135 (Prescription Drug: SUTAB (COPACKAGED). Ingredients: MAGNESIUM SULFATE | POTASSIUM CHLORIDE | SODIUM SULFATE)

FDA Drugs

16 Biomolecular Interactions and Pathways

16.1 Chemical-Gene Interactions

16.1.1 CTD Chemical-Gene Interactions

Comparative Toxicogenomics Database (CTD)

16.2 DrugBank Interactions

DrugBank

16.3 Drug-Drug Interactions

DrugBank

17 Biological Test Results

17.1 BioAssay Results

PubChem

18 Classification

18.1 Ontologies

18.1.1 MeSH Tree

Medical Subject Headings (MeSH)

18.1.2 ChEBI Ontology

ChEBI

18.1.3 WHO ATC Classification System

WHO Anatomical Therapeutic Chemical (ATC) Classification

18.1.4 EPA Safer Choice

EPA Safer Choice

18.1.5 ChemIDplus

ChemIDplus

18.1.6 UN GHS Classification

UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

18.1.7 EPA CPDat Classification

EPA Chemical and Products Database (CPDat)

18.1.8 NORMAN Suspect List Exchange Classification

NORMAN Suspect List Exchange

18.1.9 EPA DSSTox Classification

EPA DSSTox

19 Information Sources

FILTER BY SOURCE ALL SOURCES

1. ### ChEBI

Magnesium sulfate
http://www.ebi.ac.uk/chebi/searchId.do?chebiId=CHEBI:32599

ChEBI Ontology
http://www.ebi.ac.uk/chebi/userManualForward.do#ChEBI%20Ontology

2. ### DrugBank

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https://www.drugbank.ca/legal/terms_of_use

Magnesium sulfate
http://www.drugbank.ca/drugs/DB00653

3. ### ChemIDplus

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https://www.nlm.nih.gov/copyright.html

Magnesium sulfate anhydrous
https://chem.nlm.nih.gov/chemidplus/sid/0007487889

Magnesium sulfate
https://chem.nlm.nih.gov/chemidplus/sid/0018939430

Sulfuric acid, mono-C10-16-alkyl esters, magnesium salts
https://chem.nlm.nih.gov/chemidplus/sid/0068081970

ChemIDplus Chemical Information Classification
https://chem.nlm.nih.gov/chemidplus/

4. ### EPA Chemicals under the TSCA

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

Sulfuric acid magnesium salt (1:1)
https://www.epa.gov/chemicals-under-tsca

5. ### EPA DSSTox

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

Magnesium sulfate
https://comptox.epa.gov/dashboard/DTXSID6042105

CompTox Chemicals Dashboard Chemical Lists
https://comptox.epa.gov/dashboard/chemical_lists/

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https://echa.europa.eu/web/guest/legal-notice

Magnesium sulphate
https://echa.europa.eu/substance-information/-/substanceinfo/100.028.453

100.038.795
https://echa.europa.eu/substance-information/-/substanceinfo/100.038.795

100.062.132
https://echa.europa.eu/substance-information/-/substanceinfo/100.062.132

Sulfuric acid magnesium salt (1:1), hydrate
https://echa.europa.eu/substance-information/-/substanceinfo/100.133.687

Magnesium sulphate
https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/12302

Sulfuric acid, mono-C10-16-alkyl esters, magnesium salts
https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/90071

7. ### Hazardous Substances Data Bank (HSDB)

MAGNESIUM SULFATE
https://pubchem.ncbi.nlm.nih.gov/source/hsdb/664

8. ### ILO International Chemical Safety Cards (ICSC)

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MAGNESIUM SULFATE
https://www.ilo.org/dyn/icsc/showcard.display?p_version=2&p_card_id=1197

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10. ## Comparative Toxicogenomics Database (CTD)

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11. ## DailyMed

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MAGNESIUM SULFATE

https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=MAGNESIUM+SULFATE

MAGNESIUM SULFATE; POTASSIUM CHLORIDE; POTASSIUM PHOSPHATE, MONOBASIC; SODIUM CHLORIDE; SODIUM PHOSPHATE

https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=MAGNESIUM+SULFATE;+POTASSIUM+CHLORIDE;+POTASSIUM+PHOSPHATE,+MONOBASIC;+SODIUM+CHLORIDE;+SODIUM+PHOSPHATE

MAGNESIUM SULFATE; POTASSIUM SULFATE; SODIUM SULFATE

https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=MAGNESIUM+SULFATE;+POTASSIUM+SULFATE;+SODIUM+SULFATE

AMINO ACIDS; CALCIUM CHLORIDE; DEXTROSE; MAGNESIUM SULFATE; POTASSIUM CHLORIDE; SODIUM ACETATE; SODIUM GLYCEROPHOSPHATE; SOYBEAN OIL

https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=AMINO+ACIDS;+CALCIUM+CHLORIDE;+DEXTROSE;+MAGNESIUM+SULFATE;+POTASSIUM+CHLORIDE;+SODIUM+ACETATE;+SODIUM+GLYCEROPHOSPHATE;+SOYBEAN+OIL

CALCIUM CHLORIDE; DEXTROSE; MAGNESIUM SULFATE; POTASSIUM CHLORIDE; SODIUM BICARBONATE; SODIUM CHLORIDE; SODIUM PHOSPHATE, DIBASIC, HEPTAHYDRATE

https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=CALCIUM+CHLORIDE;+DEXTROSE;+MAGNESIUM+SULFATE;+POTASSIUM+CHLORIDE;+SODIUM+BICARBONATE;+SODIUM+CHLORIDE;+SODIUM+PHOSPHATE,+DIBASIC,+HEPTAHYDRATE

MAGNESIUM SULFATE; POLYETHYLENE GLYCOL 3350; POTASSIUM CHLORIDE; POTASSIUM SULFATE; SODIUM BICARBONATE; SODIUM CHLORIDE; SODIUM SULFATE

https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=MAGNESIUM+SULFATE;+POLYETHYLENE+GLYCOL+3350;+POTASSIUM+CHLORIDE;+POTASSIUM+SULFATE;+SODIUM+BICARBONATE;+SODIUM+CHLORIDE;+SODIUM+SULFATE

MAGNESIUM SULFATE; POTASSIUM CHLORIDE; SODIUM SULFATE

https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=MAGNESIUM+SULFATE;+POTASSIUM+CHLORIDE;+SODIUM+SULFATE

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https://www.ema.europa.eu/en/medicines/human/paediatric-investigation-plans/emea-002067-pip02-17

13. ## EPA Chemical and Products Database (CPDat)

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

magnesium sulfate

https://comptox.epa.gov/dashboard/DTXSID6042105#exposure

EPA CPDat Classification

https://www.epa.gov/chemical-research/chemical-and-products-database-cpdat

14. ## EPA Safer Choice

LICENSE

https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

Magnesium sulfate, anhydrous

https://www.epa.gov/saferchoice/safer-ingredients

EPA Safer Chemical Ingredients Classification

https://www.epa.gov/saferchoice

15. ## FDA Drugs

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https://www.fda.gov/about-fda/about-website/website-policies#linking

https://www.fda.gov/Drugs/InformationOnDrugs/ucm129662.htm

16. ## NORMAN Suspect List Exchange

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NORMAN Suspect List Exchange Classification

https://www.norman-network.com/nds/SLE/

17. ## EU Clinical Trials Register

https://www.clinicaltrialsregister.eu/

18. ## FDA Center for Food Safety and Applied Nutrition (CFSAN)

LICENSE

Magnesium sulfate
https://www.fda.gov/food/food-additives-petitions/food-additive-status-list

19. ## FDA/SPL Indexing Data

ML30MJ2U7I
https://www.fda.gov/ForIndustry/DataStandards/SubstanceRegistrationSystem-UniqueIngredientIdentifierUNII/

20. ## Wikipedia

magnesium sulfate
https://en.wikipedia.org/wiki/Magnesium_sulfate

21. ## NIPH Clinical Trials Search of Japan

https://rctportal.niph.go.jp/en/

22. ## PubChem

https://pubchem.ncbi.nlm.nih.gov

23. ## SpectraBase

MAGNESIUM SULFATE
https://spectrabase.com/spectrum/JolYryPjVEq

SULFURIC ACID, MAGNESIUM SALT (1:1)
https://spectrabase.com/spectrum/FVe9iKKIz7O

Magnesium sulfate anhydrous
https://spectrabase.com/spectrum/C1d7OLT3uDw

Magnesium sulfate
https://spectrabase.com/spectrum/JaXa1xWT3VI

Magnesium sulfate
https://spectrabase.com/spectrum/GkCfO5yrCNr

Magnesium sulfate
https://spectrabase.com/spectrum/I5EMZUMJzUu

Magnesium sulfate
https://spectrabase.com/spectrum/DO3k9rR1woG

24. ## Springer Nature

https://pubchem.ncbi.nlm.nih.gov/substance/341138904

25. ## Thieme Chemistry

26. ## WHO Anatomical Therapeutic Chemical (ATC) Classification

https://www.whocc.no/atc/

ATC Code
https://www.whocc.no/atc_ddd_index/

27. ## Wiley

https://pubchem.ncbi.nlm.nih.gov/substance/?source=wiley&sourceid=11447

28. ## MeSH

Magnesium Sulfate
https://www.ncbi.nlm.nih.gov/mesh/68008278

Anti-Arrhythmia Agents
https://www.ncbi.nlm.nih.gov/mesh/68000889

Tocolytic Agents
https://www.ncbi.nlm.nih.gov/mesh/68015149

Analgesics
https://www.ncbi.nlm.nih.gov/mesh/68000700

Anticonvulsants
https://www.ncbi.nlm.nih.gov/mesh/68000927

Calcium Channel Blockers
https://www.ncbi.nlm.nih.gov/mesh/68002121

Anesthetics
https://www.ncbi.nlm.nih.gov/mesh/68000777

29. ## Medical Subject Headings (MeSH)

MeSH Tree
http://www.nlm.nih.gov/mesh/meshhome.html

30. ## UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

GHS Classification Tree

http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

31. **PATENTSCOPE (WIPO)**

SID 403029308
https://pubchem.ncbi.nlm.nih.gov/substance/403029308