





COMPOUND SUMMARY

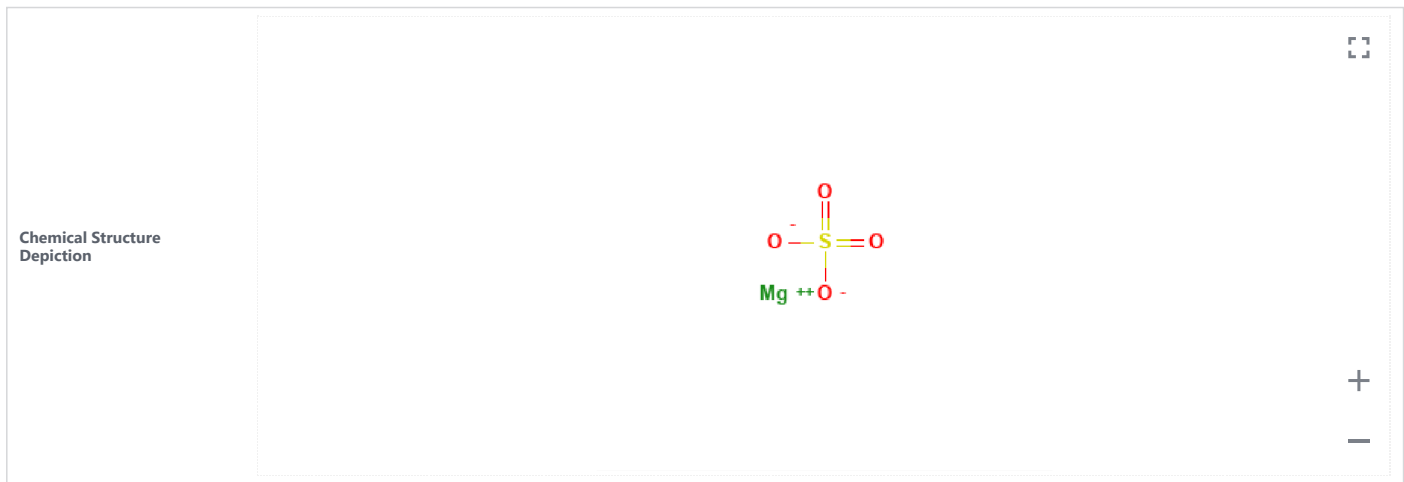
Magnesium sulfate

PubChem CID	24083				
Structure	 <p>2D</p> <p>Find Similar Structures</p>				
Chemical Safety	 <p>Irritant</p> <p>Laboratory Chemical Safety Summary (LCSS) Datasheet</p>				
Molecular Formula	MgSO ₄ or MgO ₄ S				
Synonyms	<p>MAGNESIUM SULFATE 7487-88-9 Magnesium sulphate Magnesium sulfate anhydrous Sulfuric acid magnesium salt (1:1)</p> <p>More...</p>				
Molecular Weight	120.37				
Component Compounds	<p> CID 5462224 (Magnesium)</p> <p> CID 1118 (Sulfuric acid)</p>				
Dates	<table> <tr> <td>Modify</td> <td>Create</td> </tr> <tr> <td>2022-04-09</td> <td>2004-09-16</td> </tr> </table>	Modify	Create	2022-04-09	2004-09-16
Modify	Create				
2022-04-09	2004-09-16				
<p>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.</p> <p>▶ ChEBI</p> <p>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)</p> <p>▶ DrugBank; Medical Subject Headings (MeSH)</p>					

1 Structures



1.1 2D Structure



► 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 TK 2.7.0 (PubChem release 2021.05.07)

[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 1.0.6 (PubChem release 2021.05.07)

[PubChem](#)

2.1.3 InChI Key

CSNNHWWHGAXBCP-UHFFFAOYSA-L

Computed by InChI 1.0.6 (PubChem release 2021.05.07)

[PubChem](#)

2.1.4 Canonical SMILES

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

Computed by OEChem 2.3.0 (PubChem release 2021.05.07)

[PubChem](#)

2.2 Molecular Formula

MgSO4

[ILO International Chemical Safety Cards \(ICSC\); Wikipedia](#)

MgO4S

Computed by PubChem 2.1 (PubChem release 2021.05.07)

[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](#)

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)

686-508-9

▶ 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

2.3.9 RXCUI



1311625

▶ NLM RxNorm Terminology

2.4 Synonyms



2.4.1 MeSH Entry Terms



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

▶ Medical Subject Headings (MeSH)

2.4.2 Depositor-Supplied Synonyms



MAGNESIUM SULFATE 7487-88-9	Anhydrous magnesium sulfate UNII-ML30MJ2U7I	OT-S (drying agent) OT-S	EPA Pesticide Chemical Code 050503 Magnesium Sulfate In Plastic Container
Magnesium sulphate	Magnesium sulfate, anhydrous	139939-75-6	NSC 146179
Magnesium sulfate anhydrous	Sulfato de magnesio	Caswell No. 534	Magnesium sulfate, unspecified
Sulfuric acid magnesium salt (1:1)	CHEBI:32599	Magnesium sulfate dried	SDA 15-062-07
MgSO4	MFCD00011110	Magnesii sulfas	CCRIS 8411

Magnesium sulfate (1:1)	ML30MJ2U7I	Magnesii sulfas; Magnesium sulfate; Magnesium sulphate; Mg-OK; OT-S	Sulfuric acid, mono-C10-16-alkyl esters, magr
Magnesiumsulfat	Magnesium sulfate anhydrous	Sulfuric acid magnesium salt (VAN)	SN 00
Sulfuric acid magnesium salt	Sal Angalis	Arrosalt 2327	EINECS 242-691-3
Magnesium(II) sulfate	Sal De sedlitz	HSDB 664	EINECS 268-365-0
magnesium;sulfate	Tomix OT	EINECS 231-298-2	Sulfuric acid, C10-16 alkyl ester, magnesium s

▶ PubChem

3 Chemical and Physical Properties



3.1 Computed Properties



Property Name	Property Value	Reference
Molecular Weight	120.37	Computed by PubChem 2.1 (PubChem release 2021.05.07)
Hydrogen Bond Donor Count	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
Hydrogen Bond Acceptor Count	4	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
Rotatable Bond Count	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
Exact Mass	119.9367713	Computed by PubChem 2.1 (PubChem release 2021.05.07)
Monoisotopic Mass	119.9367713	Computed by PubChem 2.1 (PubChem release 2021.05.07)
Topological Polar Surface Area	88.6 Å ²	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
Heavy Atom Count	6	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	62.2	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
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 2021.05.07)

► [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](#)

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 \(HSDB\)](#)

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 \(HSDB\)](#)

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 \(HSDB\)](#)

2.66 g/cm³

▶ [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 \(HSDB\)](#)

For more Other Experimental Properties (Complete) data for MAGNESIUM SULFATE (9 total), please visit the [HSDB record page](#).

▶ [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, 1981-2021 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, 1981-2021 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 © 2012-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

► SpectraBase

Source of Sample	Aldrich
Catalog Number	203726
Copyright	Copyright © 2018-2021 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2018-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

► SpectraBase

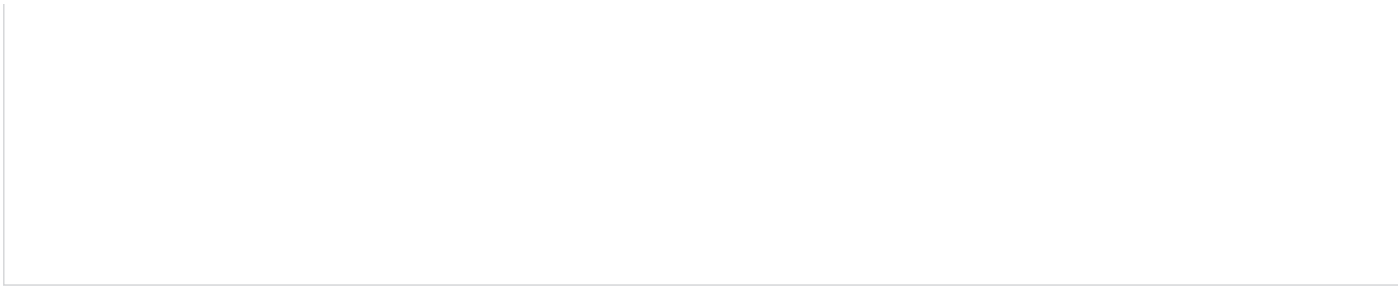
4.2 Raman Spectra



Catalog Number	203726
Copyright	Copyright © 2017-2021 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2017-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

► SpectraBase

Catalog Number	208094
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Thumbnail	



▶ SpectraBase

5 Related Records



5.1 Related Compounds with Annotation



▶ PubChem

5.2 Component Compounds



▶ PubChem

5.3 Related Compounds



Mixtures, Components, and Neutralized Forms	2 Records
Similar Compounds	6 Records

▶ PubChem

5.4 Substances



5.4.1 Related Substances



Same	164 Records
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▶ PubChem

5.4.2 Substances by Category



[▶ PubChem](#)

5.5 Entrez Crosslinks



PubMed	137 Records
Taxonomy	4 Records
OMIM	18 Records
Gene	9 Records

[▶ PubChem](#)

5.6 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 myometrial relaxant.

▶ [DrugBank](#)

Parenteral nutrition

▶ [European Medicines Agency \(EMA\)](#)

7.2 WHO Essential Medicines

Drug	Drug Classes	Formulation	Indication
Magnesium sulfate	Anticonvulsants/antiepileptics	(1) Parenteral - General injections - IV: 500 mg per mL in 2 mL ampoule (equivalent to 1 g in 2 mL; 50% weight/volume); (2) Parenteral - General injections - IM: 500 mg per mL in 10 mL ampoule (equivalent to 5 g in 10 mL; 50% weight/volume)	(1) Severe pre-eclampsia [co-prescribed with B05XA05]; (2) Eclampsia [co-prescribed with B05XA05]

▶ [WHO Model Lists of Essential Medicines](#)

7.3 FDA Orange Book

▶ [FDA Orange Book](#)

7.4 FDA National Drug Code Directory

▶ [National Drug Code \(NDC\) Directory](#)

[MAGNESIUM SULFATE ANHYDROUS](#) is an active ingredient in 3 products including: 'Mars Wellness Mg PLUS Pain Cream', '[SODIUM SULFATE, POTASSIUM SULFATE, MAGNESIUM SULFATE](#)', and SUTAB.

[▶ National Drug Code \(NDC\) Directory](#)

MAGNESIUM SULFATE, UNSPECIFIED is an active ingredient in 10 products including: 'Berberis Viscum', 'Elliotts B', and '[Epsom Salt](#)'.

[▶ National Drug Code \(NDC\) Directory](#)

7.5 Drug Labels for Ingredients



Showing 2 of 7 [View More](#)

Label Information	Total 263 labels
Drug Ingredient	MAGNESIUM SULFATE
NDC Code(s)	0220-3267-41, 0264-4204-52, 0264-4205-52, 0264-4206-54, 0264-4400-54, 0338-0190-04, 0338-1708-40, 0338-1709-40, 0338-1715-40, 0338-1719-40 ... total 443.
Packagers	1 SOURCE TRADING LLC; 21st Century Homeopathics, Inc; A-S Medication Solutions; AVADIM HOLDINGS, INC.; Advanced Beauty Systems, Inc.; Agri Laboratoies, Ltd.; Agri Laboratories, Ltd.; Amazon.Com Services LLC; AmerisourceBergen (Good Neighbor Pharmacy) 46122; Anhui Twowin Machinery Imp. & Exp. Co., Ltd. ... total 153.

[▶ DailyMed](#)

Label Information	Total 263 labels
Drug Ingredient	MAGNESIUM SULFATE; POTASSIUM CHLORIDE ; POTASSIUM PHOSPHATE , MONOBASIC; SODIUM CHLORIDE ; SODIUM PHOSPHATE
NDC Code(s)	0220-3267-41, 0264-4204-52, 0264-4205-52, 0264-4206-54, 0264-4400-54, 0338-0190-04, 0338-1708-40, 0338-1709-40, 0338-1715-40, 0338-1719-40 ... total 443.
Packagers	1 SOURCE TRADING LLC; 21st Century Homeopathics, Inc; A-S Medication Solutions; AVADIM HOLDINGS, INC.; Advanced Beauty Systems, Inc.; Agri Laboratoies, Ltd.; Agri Laboratories, Ltd.; Amazon.Com Services LLC; AmerisourceBergen (Good Neighbor Pharmacy) 46122; Anhui Twowin Machinery Imp. & Exp. Co., Ltd. ... total 153.

[▶ DailyMed](#)

7.6 Clinical Trials



7.6.1 ClinicalTrials.gov



[▶ ClinicalTrials.gov](#)

7.6.2 EU Clinical Trials Register



▶ [EU Clinical Trials Register](#)

7.7 EMA Drug Information



Active Substance	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 , Sodium sulfate , Zinc sulfate , Malic acid , arginine , glycine , serine , threonine , sodium glycerophosphate , soya bean oil, magnesium sulfate
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 \(EMA\)](#)

7.8 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 CONC N 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 \(HSDB\)](#)

For more Therapeutic Uses (Complete) data for MAGNESIUM SULFATE (32 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

7.9 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](#) CONC N 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 should 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 Classes



JECFA Functional Classes

Food Additives -> NUTRIENT_SUPPLEMENT;

- ▶ [Joint FAO/WHO Expert Committee on Food Additives \(JECFA\)](#)

8.2 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 \(CFSAN\)](#)

8.3 Evaluations of the Joint FAO/WHO Expert Committee on Food Additives - JECFA



Chemical Name	MAGNESIUM SULFATE
Evaluation Year	2007
ADI	NOT SPECIFIED
Report	TRS 947-JECFA68/
Tox Monograph	FAS 59-JECFA68/

- ▶ [Joint FAO/WHO Expert Committee on Food Additives \(JECFA\)](#)

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 dysrhythmias secondary to TCA overdose or digitalis toxicity.

▶ [DrugBank](#)

9.2 MeSH Pharmacological Classification



Anesthetics

Agents 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](#).)

▶ [Medical Subject Headings \(MeSH\)](#)

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](#).)

▶ [Medical Subject Headings \(MeSH\)](#)

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](#).)

▶ [Medical Subject Headings \(MeSH\)](#)

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](#).)

▶ [Medical Subject Headings \(MeSH\)](#)

Analgesics

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

▶ [Medical Subject Headings \(MeSH\)](#)

Anticonvulsants

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

▶ [Medical Subject Headings \(MeSH\)](#)

9.3 FDA Pharmacological Classification



Non-Proprietary Name	MAGNESIUM SULFATE
Pharmacological Classes	Increased Large Intestinal Motility [PE]; Inhibition Large Intestine Fluid/Electrolyte Absorption [PE]; Inhibition Small Intestine Fluid/Electrolyte Absorption [PE]; Magnesium Ion Exchange Activity [MoA] ; Osmotic Activity [MoA]; Osmotic Laxative [EPC]; Stimulation Large Intestine Fluid/Electrolyte Secretion [PE]; Calculi Dissolution Agent [EPC]

▶ [National Drug Code \(NDC\) Directory](#)

9.4 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](#)

9.5 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 \(HSDB\)](#)

9.6 Metabolism/Metabolites



None

▶ [DrugBank](#)

9.7 Biological Half-Life



43.2 hours (for newborns)

▶ [DrugBank](#)

9.8 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 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: <https://npirpublic.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 \(HSDB\)](#)

For more Uses (Complete) data for MAGNESIUM SULFATE (11 total), please visit the [HSDB record page](#).


- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10.1.1 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 Orange Book](#)

Food Additives -> NUTRIENT_SUPPLEMENT; -> JECFA Functional Classes

- ▶ [Joint FAO/WHO Expert Committee on Food Additives \(JECFA\)](#)

Plastics -> Polymer Type -> N.a.

547 | [ECHAPLASTICS](#) | *A list from the Plastic Additives Initiative Mapping Exercise by ECHA* | [DOI:10.5281/zenodo.2658139](#)

- ▶ [NORMAN Suspect List Exchange](#)

Plastics -> Pigments agents

547 | [ECHAPLASTICS](#) | *A list from the Plastic Additives Initiative Mapping Exercise by ECHA* | [DOI:10.5281/zenodo.2658139](#)

- ▶ [NORMAN Suspect List Exchange](#)

Cosmetics -> Bulking; Hair conditioning; Viscosity controlling

513 | [EUCOSMETICS](#) | *Combined Inventory of Ingredients Employed in Cosmetic Products (2000) and Revised Inventory (2006)* | [DOI:10.5281/zenodo.2624118](#)

- ▶ [NORMAN Suspect List Exchange](#)

10.1.2 Industry Uses



Add to Soil to increase Mg content soil. This is not a fertilizer blending, its more of Micronutrient	Processing aids, not otherwise listed
Adhesives and sealant chemicals	Viscosity adjustors
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	

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

- ▶ [EPA Chemicals under the TSCA](#)

10.1.3 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](#)

10.1.4 Household Products



Household & Commercial/Institutional Products

Information on 102 consumer products that contain Magnesium sulfate in the following categories is provided:

- Inside the Home
- Landscaping/Yard
- Personal Care

- ▶ [Consumer Product Information Database \(CPID\)](#)

10.2 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 \(HSDB\)](#)

For more Methods of Manufacturing (Complete) data for MAGNESIUM SULFATE (8 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10.3 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 \(HSDB\)](#)

10.4 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 \(HSDB\)](#)

10.5 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 \(HSDB\)](#)

10.6 U.S. Imports



(1972) 1.96X10+10 GRAMS

SRI

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

(1975) 2.99X10+10 GRAMS

SRI

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10.7 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/tsc-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 CLEANSSED & 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 \(HSDB\)](#)

INCOMPATIBILITIES: 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



Pictogram(s)	 Irritant
Signal	Warning
GHS Hazard Statements	H302 (97.68%): Harmful if swallowed [Warning] Acute toxicity, oral H312 (87.84%): Harmful in contact with skin [Warning] Acute toxicity, dermal H332 (97.4%): Harmful if inhaled [Warning] Acute toxicity, inhalation
Precautionary Statement Codes	P261, P264, P270, P271, P280, P301+P317, P302+P352, P304+P340, P317, P321, P330, P362+P364, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)
ECHA C&L Notifications Summary	<p><i>Aggregated GHS information provided by 2475 companies from 14 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.</i></p> <p><i>Reported as not meeting GHS hazard criteria by 1011 of 2475 companies. For more detailed information, please visit ECHA C&L website.</i></p> <p><i>Of the 12 notification(s) provided by 1464 of 2475 companies with hazard statement code(s).</i></p> <p><i>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.</i></p>

► [European Chemicals Agency \(ECHA\)](#)

11.1.2 Hazard Classes and Categories



Acute Tox. 4 (97.68%)

Acute Tox. 4 (87.84%)

Acute Tox. 4 (97.4%)

► [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: <https://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 ethoxyethyl 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: <https://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: <https://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: <https://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: <https://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: <https://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: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12 Toxicity

12.1 Toxicological Information

12.1.1 Toxicity Summary

LD₅₀ = 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](#)

12.1.2 Exposure Routes

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

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

12.1.3 Inhalation Symptoms

Cough.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

12.1.4 Eye Symptoms

Redness.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

12.1.5 Ingestion Symptoms

Abdominal pain. Diarrhoea. Vomiting.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

12.1.6 Acute Effects

▶ [ChemIDplus](#)

12.1.7 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 \(HSDB\)](#)

12.1.8 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 EXHIBITED 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 <https://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 <https://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 K_d 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



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► 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
US10143656
US11033498

▶ 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 Orange Book

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

▶ FDA Orange Book

Patent	11033498
Expiration	Aug 4, 2037
Applicant	BRAINTREE LABS
Drug Application	N213135 (Prescription Drug: SUTAB. Ingredients: MAGNESIUM SULFATE POTASSIUM CHLORIDE SODIUM SULFATE)

▶ FDA Orange Book

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 NCI Thesaurus Tree



▶ NCI Thesaurus (NCIt)

18.1.3 ChEBI Ontology



▶ ChEBI

18.1.4 WHO ATC Classification System



▶ WHO Anatomical Therapeutic Chemical (ATC) Classification

18.1.5 EPA Safer Choice



▶ EPA Safer Choice

18.1.6 ChemIDplus



▶ ChemIDplus

18.1.7 UN GHS Classification



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

18.1.8 EPA CPDat Classification



▶ EPA Chemical and Products Database (CPDat)

18.1.9 NORMAN Suspect List Exchange Classification



▶ NORMAN Suspect List Exchange

18.1.10 EPA DSSTox Classification



▶ EPA DSSTox

18.1.11 Consumer Product Information Database Classification



▶ Consumer Product Information Database (CPID)

18.1.12 FDA Drug Type and Pharmacologic Classification



▶ National Drug Code (NDC) Directory

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

<https://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>

Magnesium sulphate

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

magnesium sulphate

<https://echa.europa.eu/information-on-chemicals>

Magnesium sulphate

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

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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<https://www.whatsinproducts.com/contents/view/1/6>

Magnesium sulfate

<https://www.whatsinproducts.com/chemicals/view/1/136/007487-88-9>

Consumer Products Category Classification

<https://www.whatsinproducts.com/>

12. 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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Medium-chain triglycerides, Olive oil, Fish oil, Acetyl-cysteine, Alanine, Histidine, Isoleucine, Leucine, Lysine acetate, Methionine, Phenylalanine, Proline, Tryptophan, Tyrosine, Valine, glucose, calcium chloride, potassium chloride, Sodium acetate, Zinc sulfate, Malic acid, arginine, glycine, serine, threonine, sodium glycerophosphate, soya bean oil, magnesium sulfate (P/0133/2017)

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

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EPA CPDat Classification

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Magnesium sulfate, anhydrous

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

EPA Safer Chemical Ingredients Classification

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Magnesium sulfate

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<https://www.fda.gov/ForIndustry/DataStandards/SubstanceRegistrationSystem-UniqueIngredientIdentifierUNII/>22. **Wikipedia**

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<https://www.nlm.nih.gov/research/umls/rxnorm/docs/termservice.html><https://rxnav.nlm.nih.gov/id/rxnorm/1311625>25. **PubChem**<https://pubchem.ncbi.nlm.nih.gov>26. **SpectraBase**

MAGNESIUM SULFATE

<https://spectrabase.com/spectrum/JoYryPjVEq>

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

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Anesthetics

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Tocolytic Agents

<https://www.ncbi.nlm.nih.gov/mesh/68015149>

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<https://www.ncbi.nlm.nih.gov/mesh/68002121>

Analgesics

<https://www.ncbi.nlm.nih.gov/mesh/68000700>

Anticonvulsants

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GHS Classification Tree

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