



ABN: 81 008 668 371

MATERIAL SAFETY DATA SHEET

Sulfuric Acid (98% Solution)

Section 1 – Identification of the Material and Supplier

Product Name

Sulfuric Acid (98% Solution)

Other names

Sulphuric acid, Oil of Vitriol. Company product 1010.

Recommended use

Fertiliser manufacture, battery acid, metal treatment, pH control, acid leaching.

Company name

CSBP Limited

Address

Kwinana Beach Road, KWINANA

State

Western Australia

Postcode

6167

Telephone number

(08) 9411 8777 (Australia), +61 8 9411 8777 (Overseas)

Emergency telephone number

1800 093 333 (Australia), +61 8 9411 8444

Section 2 – Hazard Identification

Hazard Classification, including a statement of overall hazardous nature

HAZARDOUS SUBSTANCE.

Sulfuric acid (98% solution) is classified as hazardous and specified in the NOHSC of Designated Hazardous Substances [NOHSC:1005(1999)].

DANGEROUS GOODS.

Sulfuric acid (98% solution) is classified for physicochemical hazards and specified as dangerous in the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code), 7th Edition, (FORS, 2007).

Risk Phrases

Sulfuric acid (98% solution) is classified as corrosive.

- | | |
|------------------|---|
| R23/25 | Toxic by inhalation and if swallowed. |
| R35 | Causes severe burns |
| R36/37/38 | Irritating to eyes, respiratory system and skin. |
| R41 | Risk of serious damage to the eyes. |
| R48 | Danger of serious damage to health by prolonged exposure. |
| R49 | May cause cancer by inhalation |

Safety Phrases

Sulfuric acid (98% solution) is a hazardous substance.

- | | |
|------------------|---|
| S1/2 | Keep locked and out of reach of children. |
| S21 | When using do not smoke. |
| S23 | Do not breathe fumes, vapour or mist |
| S24/25 | Avoid contact with skin and eyes. |
| S26 | In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. |
| S27 | Take off immediately all contaminated clothing. |
| S28 | After contact with skin, wash immediately with plenty of water. |
| S29 | Do not empty into drains. |
| S30 | Never add water to this product. |
| S36/37/39 | Wear suitable protective clothing, gloves and eye/face protection. |
| S41 | In case of fire and/or explosion do not breathe fumes. |
| S45 | In case of accident or if you feel unwell seek medical attention immediately (show the label where possible). |



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S46/62/64

If swallowed, rinse mouth with water (only if the person is conscious), do not induce vomiting; seek medical advice immediately and show this label.

S50

Do not mix with hypochlorites, cyanides, strong alkalis, or organic and combustible materials.

Poison Schedule

SUSDP Poison Schedule 6

Section 3 – Composition/Information on Ingredients

Chemical identity of ingredients

Sulfuric acid

Water

Proportion of ingredients

98 % (wt/wt)

Remainder

CAS Number for ingredients

7664-93-9

Section 4 – First Aid Measures

First Aid

SULFURIC ACID (98% SOLUTION) IS CORROSIVE ON CONTACT AND POISONOUS BY INGESTION AND INHALATION OF ITS VAPOUR. FIRST AID ATTENTION MUST BE GIVEN AS URGENTLY AS POSSIBLE AS OUTLINED BELOW. ALL SUSPECTED SULFURIC ACID (98% SOLUTION) BURNS SHOULD RECEIVE MEDICAL ATTENTION. TRAINING ON HANDLING SULFURIC ACID (98% SOLUTION) INCIDENTS USING THIS MSDS SHOULD BE PROVIDED BEFORE ANY SULFURIC ACID (98% SOLUTION) HANDLING OR USE COMMENCES.

First Aid Facilities

First aid procedures, equipment, medication and training for the treatment of burns with sulfuric acid (98% solution) should be in place BEFORE the use commences. Company physician, occupational health nurse and first aid personnel should be aware of the nearest hospitals which are familiar with the treatment of sulfuric acid (98% solution) burns.

Equipment and medication in place should be:

Safety shower and eyewash stations immediately accessible in the workplace;

Eye-wash bottle;

Personal protective equipment for use by first aid personnel;

Fresh, clean cool drinking water;

Oxygen;

“Space” or thermal blankets for treating patients for shock.

FIRST AID PROCEDURES FOR DEALING WITH THIS PRODUCT AND EXPOSURE TO IT

1. Personal Protection By First Aid Personnel

First aid personnel providing first aid treatment to a patient exposed to sulfuric acid (98% solution) should observe the following precautions for their own personal protection:

- Avoid contact with contaminated skin, clothing and equipment by wearing protective gloves to prevent contact of sulfuric acid (98% solution) with skin;
- Wear chemical goggles as a minimum level of eye protection to prevent splashes of sulfuric acid (98% solution) entering eyes;
- Avoid inhalation of sulfuric acid (98% solution) fumes or mist during rescue in contaminate areas by wearing suitable respiratory protection;
- Respiratory protection suggested is: an air supplied breathing apparatus, or positive pressure self-contained breathing apparatus.



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2. Swallowed

Do not give anything by mouth if victim is losing consciousness, or is unconscious, or convulsing. If victim is conscious, rinse mouth thoroughly with water immediately and give water or milk to drink.

DO NOT induce vomiting.

Seek urgent medical assistance.

3. Eyes

Persons with potential eye exposure should not wear contact lenses. Immediately irrigate with copious quantities of water, while holding eyelids open, for at least 15 minutes.

Seek urgent medical assistance.

4. Skin

First aid personnel must avoid contact with this chemical. Wear protective gloves when assisting patient. DO NOT USE HOT WATER. Immediately wash affected areas with copious amounts of water. Remove all contaminated clothing and laundry before re-use. DO NOT apply creams or ointments.

Seek urgent medical assistance.

5. Inhalation

Rescuer should wear appropriate personal protection to avoid skin contamination skin and breathing sulfuric acid (98% solution) fumes or mist. Remove affected persons from exposure. Allow affected person to assume most comfortable position and keep warm. Keep at rest until fully recovered. If breathing is laboured, or affected person is cyanotic (blue), ensure airways are clear and have a qualified person give oxygen through a face-mask. If breathing has stopped apply expired air resuscitation immediately. If the affected person suffers cardiac arrest commence cardio-pulmonary resuscitation immediately.

Seek urgent medical attention.

ADVICE TO DOCTOR.

Treatment for sulfuric acid (98% solution) burns to the eyes:

- Retract eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs;
- Irrigate eyes with several litres of saline for at least 20 minutes;
- DO NOT use neutralising agents or any other additives;
- Cycloplegic drops, antibiotic drops, steroid drops, vasoconstrictive agents, or artificial tears should only be administered with the approval of a consulting ophthalmologist.

Treatment for sulfuric acid (98% solution) fume, or mist, inhalation:

- Pulmonary oedema may arise – symptoms may be delayed for several hours. Affected persons should not be left unattended during this period;
- Airway problems may arise from laryngeal oedema – symptoms may be delayed for several hours;
- Treat with 100% oxygen initially;
- Respiratory distress may require cricothyroidotomy if endotracheal intubation is constrained by excessive swelling;
- Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise;
- Sulfuric acid (98% solution) may produce a coagulation necrosis characterised by formation of a coagulum (eschar), which is the result of the desiccating action of the acid on proteins in specific tissues.

Treatment for sulfuric acid (98% solution) burns to skin:

- Skin lesions require copious saline irrigation;
- Treat acid burns as thermal burns with non-adherent gauze and wrapping;
- Deep second-degree burns may benefit from topical silver sulfadiazine.

Treatment for sulfuric acid (98% solution) ingestion:

- Severe burns from acid ingestion may be associated with life-threatening acute complications of oesophageal, gastric, or intestinal perforation. Oesophageal perforation is associated with chest pain, dyspnoea, fever, subcutaneous emphysema of the chest or neck, and a pleural rub;



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- Initial management is primarily supportive. Particular attention should be directed to securing the airway, fluid resuscitation and provision of opioid analgesia;
- Immediate dilution (milk or water) within 30 minutes post ingestion is recommended;
- DO NOT attempt to neutralise the acid since exothermic reaction may extend the corrosive injury;
- A chest x-ray, upright abdominal film is recommended – this may show widening of the mediastinum, pleural effusions, pneumomediastinum, and pneumothorax. Perforation of the stomach or small intestine is associated with clinical features of chemical peritonitis: fever, abdominal tenderness, guarding and rebound, and ileus. Septic shock and multi-organ failure may complicate perforation;
- Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful;
- Limit fluids to one or two glasses in an adult;
- Charcoal has NO place in acid management as it will interfere with endoscopic evaluation;
- The use of gastric lavage within 1 hour of ingestion is suggested;
- Symptomatic patients may need the following investigations:
 - Arterial blood gas analysis;
 - Coagulation profile;
 - Complete blood count;
 - ECG;
 - Electrolytes;
 - Glucose;
 - Liver and renal function;
 - Type and cross-match;
 - Upper gastrointestinal endoscopy, ideally at 6 to 24 hours following exposure. Upper gastrointestinal endoscopy should also be strongly considered for asymptomatic patients who have intentionally ingested a strong acid and children, where the history may be unreliable. The site, extent and severity of mucosal damage can be accurately assessed by modified endoscopic classification;
 - Contrast oesophagography or thoracic CT is useful in the detection of perforation.
- Ongoing supportive care includes maintenance of adequate analgesia, fluid, electrolyte and pH balance, nutritional support, and monitoring for the development of complications. Parenteral nutrition is necessary in more severe cases;
- Subsequent management and prognosis is largely dictated by findings at upper gastrointestinal tract endoscopy;

There are two methods of treatment of oesophageal stenosis: first conservative treatment including dilatation, hydrocortisone and antibiotic therapy; and second surgical procedure.

Long Term Complications

Long term complications may include oesophageal, gastric or pyloric strictures or stenosis.

Tracheoesophageal fistulae may result from perforation of the anterior oesophageal wall. The fistula may extend to involve the aorta; both types are fatal complications.

Acid ingestions that cause deep ulceration will result in oesophageal strictures in 70% of patients. If full thickness necrosis occurs, strictures are highly likely. Strictures do not develop following superficial mucosal ulceration (the muscularis mucosa is intact).

Eighty percent of strictures will become symptomatic within two months. Strictures may also involve the stomach but only 40% become symptomatic. Strictures may rarely develop in the mouth and pharynx.

Further information about the treatment for exposure to this product can be obtained from the Poisons Information Centre on (08) 13 1126 (Australia only)



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Section 5 – Fire Fighting Measures

Product flammability

Sulfuric acid (98% solution) is non-flammable and non-combustible. However, on contact with most metals, it will liberate hydrogen gas, which is flammable and (when confined) explosive. Sulfuric acid (98% solution) is an oxyacid with a good oxidizing ability – therefore, contact with cellulose based products (e.g., paper and cotton), organic solvents and other organic materials may lead to liberation of large quantities of heat.

Suitable extinguishing media

Water fog (or if unavailable, fine water spray), foam, dry chemical powder, or carbon dioxide.

Hazard from combustion products

Decomposes on heating producing toxic fumes of sulfur oxides.

Special protective precautions and equipment for fire fighters

Wear full body protective clothing with breathing apparatus. Prevent spillage from entering drains or waterways. Consider evacuation. Use water to control fire and cool adjacent area and fire exposed sulfuric acid (98% solution) storage containers. Avoid direct water impingement on strong acid since this creates heat increasing toxic fume evolution. Do not approach sulfuric acid (98% solution) containers suspected to be hot. If safe and practicable to do so remove sulfuric acid (98% solution) containers from path of fire. Equipment should be thoroughly decontaminated after use.

Wear self-contained breathing apparatus with a full-face piece operated in pressure-demand or positive pressure mode.

Hazchem Code

2P

Section 6 – Accidental Release Measures

Emergency procedures

The hazardous nature of sulfuric acid (98% solution) requires emergency and spill procedures to be effective to avoid both human and environmental exposure. Hazardous conditions may result if material is managed improperly. Make plans in advance to handle possible emergencies, including obtaining stocks of absorbent materials.

Always wear recommended personal protective equipment and respiratory protection. Good ventilation is necessary.

Sulfuric acid (98% solution) dissolves very readily in water, giving off large quantities of heat. Avoid direct water contact with sulfuric acid (98% solution) leaks.

Methods and Materials for containment and clean up

For ALL spills, evacuate unprotected personnel upwind and out of danger.

Shut off sulfuric acid (98% solution) supply, if safe to do so. Shut off all possible sources of ignition. Stay upwind of vapours. Restrict access to spill site.

Small Leaks

Sulfuric acid (98% solution) fumes: Increase ventilation and allow fumes to vent to a safe area

Sulfuric acid (98% solution) liquid: If possible contain the surface area of a spill by bunding with sand, earth or vermiculite. Do NOT use sawdust. Dilute spill with water, then neutralise with lime or soda ash to pH 6 to 10.

Prevent run-off into drains and waterways.

Large Leaks

Sulfuric acid (98% solution) fumes: Use water fog to dampen cloud of sulfuric acid (98% solution) fumes and reduce vapours. Do not spray water directly on the leak or sulfuric acid (98% solution) container.

Sulfuric acid (98% solution) liquid: If possible contain the surface area of a spill by bunding with sand, earth or vermiculite. Do NOT use sawdust. Use water fog to dampen sulfuric acid (98% solution) fumes and reduce vapours.



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Prevent run-off into drains and waterways.

Dispose of all contained spill residues in accordance with the requirements of the Department of Environment Protection.

For the management of sulfuric acid (98% solution) emergencies during transport by road or rail, SAA/SNZ HB76: Dangerous Goods-Initial Response Guide, Guide 40 should be consulted. This Guide should be carried at all times when sulfuric acid (98% solution) is being transported.

Clean up personnel will need personal protection equipment and respiratory protection. Portable safety shower and eyewash facilities may also be needed for clean up personnel. Bags of lime or soda ash neutralising agent or chemical absorbent and substantial amounts of water will be required for large spill. A front-end loader may be required to scoop up neutralised acid/lime/soda ash residue.

Section 7 – Handling and Storage

Precautions for safe handling

Regulated dangerous goods as Class 8 Corrosive. Proper protective clothing must be worn that encapsulates the body including the face. A safety shower and eyewash should be available. Do not breathe vapour or mist. Avoid contact with skin, eyes and clothing.

Do not add water to sulfuric acid (98% solution) – this may generate spitting and splashing of acid. In dilution process, sulfuric acid (98% solution) should be added to plenty of water.

Do not smoke anywhere near the storage and handling of sulfuric acid (98% solution) or associated pipework and equipment.

Do not touch damaged containers or spilled material unless wearing appropriate personal protective equipment.

Change and wash clothing, and personal protective equipment if contaminated, or before storing and/or re-using. Wash hands and face thoroughly after handling and before work breaks, eating, drinking, smoking and using toilet facilities.

Conditions for safe storage, including any incompatibilities

Ensure sulfuric acid (98% solution) in bulk is stored and handled in accordance with Australian Standard AS 3780 *The storage and handling of corrosive substances*. Ensure adequate ventilation to keep airborne concentration below exposure standard. Where necessary, use local exhaust ventilation in conjunction with P2 canister respirator, or as appropriate, self contained breathing apparatus.

Store away from strong alkalis, hypochlorites, cyanides, organic and combustible materials.

Sulfuric acid (98% solution) is highly corrosive to most metals. Many plastics (except for Teflon - PTFE) do not resist sulfuric acid (98% solution).

Section 8 – Exposure Controls/Personal Protection

National exposure standards

ES-TWA	ES-STEL	ES-Peak
1 mg/m ³	3 mg/m ³	No data available

Biological limit values

No data available.

Engineering controls

Handle sulfuric acid (98% solution) within closed systems whenever possible. Provide adequate ventilation particularly at low level.

Personal protective equipment

Whenever the risk of exposure exists, such as tanker loading/unloading procedures, non-routine operations and emergency circumstances, the following personal protection measure are recommended:

Respiratory protection:

Supplied air or full face mask and filter respirator self contained breathing apparatus may be required if working with sulfuric acid (98% solution) or if decomposition fumes exits, for prolonged periods.



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Hand protection:

PVC or butyl rubber gauntlet-type gloves.

Eye protection:

Chemical splash goggles (gas tight type preferred) and full face shield.

Skin protection:

PVC overalls or jacket and pants and butyl rubber Wellington boots.

Section 9 – Physical and Chemical Properties

Appearance (colour, physical form, shape)

Hygroscopic, viscous clear to brownish liquid.

Odour

No appreciable odour.

pH

10% solution < 1.

Vapour pressure

Approximately 0.011 kPa at 25°C.

Vapour density

3.4 at 20°C (Air =1).

Boiling point/range

335°C at 101.3 kPa.

Freezing/melting point

Melting point, approximately 10°C at 101.3 kPa.

Solubility

Miscible in water in all proportions, soluble in most organic solvents.

Specific gravity or density

Specific gravity = 1.84 at 20°C (water = 1 at 4°C).

Flash point and method of detecting flash point

Not applicable.

Upper and lower flammable (explosive) limits in air

Not applicable.

Ignition temperature

Not applicable.

Viscosity

24 mPa.s at 20°C and 101.3 kPa.

Section 10 – Stability and Reactivity

Chemical stability

Stable at ambient conditions of use and storage.

Conditions to avoid

Sulfuric acid (98% solution) reacts violently with water, alkalis and most organic materials to liberate large quantities of heat. Dilute acid on contact with most metals, will liberate hydrogen gas, which is flammable and (when confined) explosive.

Incompatible materials

Sulfuric acid (98% solution) can react with most metals generating flammable hydrogen gas. Most plastics do not resist concentrated sulfuric acid greater than 50 to 60% strength.

Hazardous decomposition products

Releases sulfur dioxide at extremely high temperatures.



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Hazardous reactions

Sulfuric acid (98% solution) reacts vigorously, violently or explosively with many organic and inorganic chemicals including water, acrylonitrile, alkali solutions, carbides, chlorates, fulminates, nitrates, perchlorates, permanganates, picrates, metal acetylides or carbides, epichlorohydrin, aniline, ethylenediamine, alcohols with strong hydrogen peroxide, chlorosulfonic acid, cyclopentadiene, hydrofluoric acid, nitromethane, 4-nitrotoluene, phosphorus (iii) oxide, potassium, sodium, ethylene glycol, isoprene, styrene. Acetaldehyde and allyl chloride may polymerise violently in the presence of sulfuric acid (98% solution). Hazardous gases such as hydrogen cyanide, hydrogen sulfide, and acetylene, are evolved when sulfuric acid (98% solution) contacts cyanide, sulfides and carbides, respectively.

Section 11 – Toxicological Information

HEALTH EFFECTS

When handled in accordance with the guidelines in this material safety data sheet, sulfuric acid (98% solution) should not present any health effects. If this product is mishandled, symptoms that may arise are:

Acute:

Sulfuric acid (98% solution) is extremely corrosive, irritating and toxic leading to severe burns and rapid destruction of tissue.

Inhalation:

Sulfuric acid (98% solution) is not very volatile; hence workplace exposures are mainly due to mists and aerosols. The acid mists are very corrosive and can cause severe irritation and injury if inhaled. The degree and severity of respiratory effects are influenced by the size of the aerosol particulate, deposition site, concentration and humidity. Inhalation of acid mists may cause severe lung damage and life threatening pulmonary oedema (accumulation of fluid in lungs). Symptoms of pulmonary oedema include coughing and shortness of breath, and may be delayed until hours or days after exposure. Asthma can also be aggravated by exposure to sulfuric acid mists. LC₅₀ (Rat) = 510 mg/m³ 2 hour exposure.

Carcinogenicity - The International Agency for Research on Cancer (IARC) has concluded that there is sufficient evidence that occupational exposure to strong inorganic mists containing sulfuric acid is carcinogenic to humans (Group 1)*. Many studies have reported an excess of cancer of larynx, and to a lesser extent, the lungs, in a variety of processes involving the use of strong inorganic acids including sulfuric acid. Throughout these studies, sulfuric acid mists were the most common exposure, and in two studies, the number of cancers increased as exposure increased.

Mutagenicity – There was a significant higher number of sister chromatoid exchanges, micronuclei and chromosomal aberrations in cultured lymphocytes (white blood cells) from workers exposed to sulfur dioxide in a sulfuric acid factory*.

* IARC Monographs On The Evolution Of Carcinogenic Risks To Humans, Vol. 54, IARC, 1992, pp 41-130.

Skin:

Highly corrosive to skin. Causes severe burns leading to necrosis and scarring. The severity of injury depends on the concentration of sulfuric acid (98% solution) and the duration of exposure.

Eye:

Corrosive to eyes. Contact may cause corneal burns. Permanent eye damage including loss of sight may occur. Sulfuric acid (98% solution) mists and aerosols are expected to be very irritating.

Swallowed:

Can kill if swallowed. Will cause severe damage to the mucous membranes. May cause nausea, vomiting, abdominal pain and severe burns to the mouth, throat, stomach and gastrointestinal tract. LD₅₀ (Oral, rat) = 2,140 mg/kg.

Chronic:

Chronic exposure to sulfuric acid (98% solution) may lead to teeth disorders (yellow discolouration and erosion of the dental enamel), dermatitis, and respiratory irritation such as bronchial hyperactivity.



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Section 12 – Ecological Information

Ecotoxicity

Sulfuric acid (98% solution) is slightly to moderately toxic to aquatic life. Large discharges into the environment may contribute to lowering of water pH and be fatal to aquatic life and soil micro-organisms.

Persistence and degradability

Sulfuric acid (98% solution) is soluble in water and remains indefinitely in the environment as sulfate.

Mobility

Sulfuric acid (98% solution) is soluble in water and has high mobility in soil. During transport through the soil, sulfuric acid (98% solution) will dissolve some of the soil material; in particular, the carbonate based materials. The acid will be neutralised to some degree with adsorption of the proton also occurring on clay materials. However, significant amounts of acid are expected to remain for transport down towards the ground water table. Upon reaching the ground water table, the acid will continue to move, now in the direction of the ground water flow. Lime addition may be required to rectify low pH resulting from sulfuric acid (98% solution) spillages.

Environmental fate (exposure)

Large discharges may contribute to the acidification of effluent treatment systems and injure sewage treatment organisms.

96 hr LC₅₀ (Bluegill sunfish): 10-5 ppm.

Bioaccumulative potential

Sulfuric acid (98% solution) has low potential for bioaccumulation.

Section 13 – Disposal Considerations

Disposal methods and containers

Due to its inherent properties, hazardous conditions may result if material is managed improperly. Dispose of all contained and neutralised spill residue in accordance with Department of the Environment requirements. As required under the ADG Code treat empty containers as filled containers.

Special precautions for landfill or incineration

No data available.

Section 14 – Transport Information

UN Number

1830

UN Proper shipping name

Sulfuric Acid.

Class and subsidiary risk

Class 8 Corrosive. No subsidiary risk.

Packing group

II

Special precautions for user

Not to be loaded with explosives (Class 1), dangerous when wet substances (Class 4.3), oxidizing agents (Class 5.1), organic peroxides (Class 5.2), toxic and infectious substances (Class 6) – where the Class 6 substance is a cyanide, radioactive substances (class 7) and foodstuffs and foodstuff empties.

Hazchem code

2P



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Section 15 – Regulatory Information

Australian regulatory information

SUSDP POISON Schedule 6. Licensing is required for this chemical in some States and Territories.
Listed on the Australian Inventory of Chemical Substances (AICS).

Additional national and/or international regulatory information

OSHA: Hazardous by definition of Hazard Communication Standard (29CFR 1910.1200).

Section 16 – Other Information

Key / legend to abbreviations and acronyms used in the MSDS

NOHSC	National Occupational Health and Safety Commission
SUSDP	Standard for the Uniform Scheduling of Drugs and Poisons
ES-TWA	Exposure Standard – Time weighted average
ES-STEL	Exposure Standard – Short term exposure level
ES-Peak	Exposure Standard – Peak level
FORS	Federal Office of Road and Safety
LC ₅₀ :	Lethal concentration 50, median lethal concentration
LD ₅₀	Lethal dose 50. The single dose of a substance that causes the death of 50% of an animal population from exposure to the substance by any route other than inhalation
% (wt/wt)	Percent amount on a weight per weight basis
% (wt/vol)	Percent amount on a weight per volume basis
PPM	Parts per million
Zone 1 Class 1	An area in which an explosive gas atmosphere can be expected to occur periodically or occasionally during normal operation. (More than 10 hours per year but less than 1000 hours per year)

Literature references

- Occupational Safety and Health Regulations 1996, State Law Publisher, Western Australia.
- National Code of Practice for the Preparation of Material Safety Data Sheets, [NOHSC:2011(1994)], Australian Government Publishing Service, Canberra, March 1994.
- Australian Code for the Transport of Dangerous Goods by Road and Rail, 7th Edition, Australian Government Publishing Service, Canberra, October 2007.
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- International Critical Tables of Numerical Data, Physics, Chemistry and Technology, National Research Council, 1st Edition, McGraw-Hill, New York, 1928.
- Condensed Chemical Dictionary, G.G Hawley, 8th Edition, Van Nostrand Reinhold, New York, 1950.
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- Patty's Industrial Hygiene and Toxicology, F.A. Patty, 3rd Revised Edition, G.D. & F.E. Clayton (Editors), John Wiley & Sons, New York, 1981.
- Matheson Gas Data Book, W.Braker & A.L. Mossman, 6th Edition, Matheson Gas Products, Secaucus, 1980.
- Encyclopaedia of Occupational Health and Safety, International Labour Office, 4th Edition, J.M. Stellman (Editor), Geneva, 1998
- Kirk-Othmer Encyclopaedia of Chemical Technology, 4th Edition, Wiley InterScience, New York, 1997.



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Ullmann's Encyclopaedia of Industrial Chemistry, F. Ullmann, 6th Edition, Wiley Interscience, New York, 2001.

Standard for the Uniform Scheduling of Drugs and Poisons, National Health and Medical Research Council, Australian Government Publishing Service, Canberra, 1992.

Poisons Act 1964, State Law Publisher, Western Australia, Reprinted 22 January 1999.

Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NHSC:1003(1991)].

Hazardous Materials Handbook for Emergency Responders, Onguard Training for Life, J. Varela (Editor), Van Nostrand Reinhold, New York, 1996.

Chemwatch www.chemwatch.net

Guidance for the Compilation of Safety Data Sheets for Fertilizer Materials, European Fertilizer Manufacturers Association, online at www.efma.org/Publications/Guidance/Index.asp

Sources for data

Important Notes

1. To the best of our knowledge this document complies with the National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition [NOHSC:2011 (2003)].
2. This material safety data sheet summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this material safety data sheet and consider the information in the context of how the product will be handled and used in the workplace, including in conjunction with other products.
3. If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact the Safety and Emergency Services Department, CSBP Limited on (08) 9411 8777 (Australia), +61 8 9411 8777 (Overseas).
4. Our responsibility for products sold, is subject to our terms and conditions, a copy of which is sent to our customers, and is also available on request.
5. CSBP reserves the right to make change to material safety data sheets without notice.