

SAFETY DATA SHEET



Nitric Acid Plants (62% Solution)

ABN: 81 008 668 371

Response statement(s)

P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at a rest position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or a doctor/physician.
P321	Specific treatment is advised – see first aid instructions.
P363	Wash contaminated clothing before re-use.
P390	Absorb spillage to prevent material damage.

Storage statement(s)

P405	Store locked up.
P406	Store in corrosive resistant container with a resistant inner liner.

Disposal statement(s)

P501	Dispose of contents/container in accordance with relevant regulations.
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Other hazards

No information provided.

Section 3 – Composition/Information on Ingredients

Chemical identity of ingredients

Nitric acid
Water

Proportion of ingredients

62.0 % (wt/wt)
Remainder

CAS Number for ingredients

7697-37-2
7732-18-5

Section 4 – First Aid Measures

First Aid

NITRIC ACID 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 NITRIC ACID BURNS SHOULD RECEIVE MEDICAL ATTENTION. TRAINING ON HANDLING NITRIC ACID INCIDENTS USING THIS MSDS SHOULD BE PROVIDED BEFORE ANY NITRIC ACID HANDLING OR USE COMMENCES.

First Aid Facilities

First aid procedures, equipment, medication and training for the treatment of burns with nitric acid should be in place BEFORE the use commences. First aid personnel should be aware of the nearest hospitals which are familiar with the treatment of nitric acid 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;
- 1 % aqueous sodium bicarbonate solution;
- Oxygen;
- “Space” or thermal blankets for treating patients for shock.

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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 nitric acid 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 nitric acid with skin;
- Wear chemical goggles as a minimum level of eye protection to prevent splashes of nitric acid entering eyes;
- Avoid inhalation of nitric acid 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.

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 launder before re-use.

Seek medial assistance if irritation persists.

5. Inhalation

Rescuer should wear appropriate personal protection to avoid skin contamination skin and breathing nitric acid 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 nitric acid 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 nitric acid 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;
- Nitric acid may produce a coagulation necrosis characterised by formation of a coagulum (eschar),

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■ which is the result of the desiccating action of the acid on proteins in specific tissues. ■

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Treatment for nitric acid 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 nitric acid 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;
- 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

No data available.

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

Nitric acid is non-flammable and non-combustible. However, on contact with most metals, nitric acid will liberate hydrogen gas, which is flammable and explosive. Contact of nitric acid with cellulose based products (e.g., paper and cotton) may form nitrocellulose, which is extremely flammable.

Suitable extinguishing media

Water spray or fog, foam, dry chemical powder, or carbon dioxide.

Hazard from combustion products

Decomposes on heating producing toxic fumes of nitrogen 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 nitric acid storage containers. Avoid direct water impingement on strong acid since this creates heat increasing toxic fume evolution. Do not approach nitric acid containers suspected to be hot. If safe and practicable to do so remove nitric acid 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

2R

Section 6 – Accidental Release Measures

Emergency procedures

The hazardous nature of nitric acid, require 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.

Nitric dissolves very readily in water, giving off large quantities of heat. Avoid direct water contact with nitric acid leaks.

Methods and Materials for containment and clean up

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

Shut off nitric acid supply, if safe to do so. Shut off all possible sources of ignition. Stay upwind of vapours. Restrict access to spill site.

Small Leaks

Nitric acid fumes: Increase ventilation and allow fumes to vent to a safe area

Nitric acid 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

Nitric acid fumes: Use water fog to dampen cloud of nitric acid fumes and reduce vapours. Do not spray water directly on the leak or nitric acid container.

Nitric acid liquid: If possible contain the surface area of a spill by bunding with sand, earth or vermiculite. Do NOT use sawdust. Use protein foam blanket, at least 150 mm thick, to cover nitric acid and thus prevent evaporation into large gas cloud. Use water fog to dampen nitric acid fumes and reduce vapours.

Prevent run-off into drains and waterways.

Notify Fire and Rescue Services then CSBP Emergency Response.

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

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For the management of nitric acid 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 nitric acid 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 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. Protein foam blanket may be required for large spills.

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 nitric acid – this may generate spitting and splashing of acid. In dilution process, nitric acid should be added to plenty of water.

Do not smoke anywhere near the storage and handling of nitric acid 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 nitric acid 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.

Nitric acid is highly corrosive to most metals. Not corrosive to 304L stainless steel.

Section 8 – Exposure Controls/Personal Protection

National exposure standards

ES-TWA		ES-STEL		ES-Peak	
2 ppm	5.2 mg/m ³	4 ppm	10 mg/m ³	No data available	No data available

Biological limit values

No data available.

Engineering controls

Handle nitric acid 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
- Self contained breathing apparatus recommended where risk of exposure to nitric acid or decomposition fumes exists.
- 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.

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Section 9 – Physical and Chemical Properties

Appearance (colour, physical form, shape)

Colourless to light brown liquid.

Odour

Suffocating acrid odour

pH

10% solution < 1

Vapour pressure

Approximately 0.8 kPa at 20°C

Vapour density

2.2 at 20°C (Air =1)

Boiling point/range

118.6°C at 101.3 kPa

Freezing/melting point

Freezes at -20°C at 101.3 kPa

Solubility

Miscible in water in all proportions

Specific gravity or density

Specific gravity = 1.38 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

No data available

Section 10 – Stability and Reactivity

Chemical stability

Stable at ambient conditions of use and storage.

Conditions to avoid

Decomposes in heat or strong sunlight giving off toxic fumes of oxides of nitrogen and nitric acid vapour. Reacts vigorously with combustible and reducing agents and may cause fires.

Incompatible materials

Reducing agents, finely divided combustible materials, alcohols and glycols, aldehydes, amides, amines, cyanides (reaction liberates toxic hydrogen cyanide gas), esters, fluorides, hydrocarbons (e.g., turpentine, reaction may produce fire), sawdust, metals (e.g., mild steel, aluminium and its alloys, reaction liberates flammable hydrogen gas) and powdered metals, alkalis (e.g., sodium hydroxide, reaction is violent and produces heat, splashing and sprays), oxidizing agents (e.g., swimming pool sodium hypochlorite and calcium hypochlorite, reaction liberates toxic chlorine gas), concrete, limestone and chemicals readily decomposed by acids.

Hazardous decomposition products

When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous reactions

Nitric acid may react violently with powerful reducing agents, causing fire and explosion hazards.

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Section 11 – Toxicological Information

HEALTH EFFECTS

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

Acute:

Nitric acid is extremely corrosive, irritating and toxic leading to severe burns and rapid destruction of tissue

Inhalation:

The acid mists are very corrosive and can cause severe irritation and injury if inhaled – the irritation appears to clear up, only to return in a few hours and more severely. 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 nitric acid mists. Vapour NO₂, LD₅₀ (Inhalation, rat) = 244 ppm at 1 hour.

NO ₂ Level in ppm	Duration in minutes	Resulting Conditions on Humans
25	60	Respiratory irritation and chest pain.
50	15	
100	15	Pulmonary oedema with possible sub-acute or chronic lung lesions.
200	5	
100	60	Pulmonary oedema and death.
400	5	

Skin:

Highly corrosive to skin. Causes severe burns leading to necrosis and scarring. Nitric acid chars the tissue with a characteristic yellow colouration. The severity of injury depends on the concentration of nitric acid and the duration of exposure.

Eye:

Corrosive to eyes. Contact may cause corneal burns. Permanent eye damage including loss of sight may occur. Nitric acid 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, human) = 430 mg/kg

Chronic:

Chronic exposure to nitric acid may lead to teeth disorders (yellow discolouration and erosion of the dental enamel) which are, however, not as severe as with sulfuric, or hydrochloric acids. At low levels, chronic exposure can lead to nose bleeds and sinus problems, and changes in pulmonary function and chronic bronchitis.

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Section 12 – Ecological Information

Ecotoxicity

Nitric acid has moderate volatility. Harmful to aquatic organisms. Large discharges may contribute to the acidification of water and be fatal to fish and other aquatic life, due low pH and decomposition of nitric acid into nitrates. If discharged into an effluent treatment system, nitric acid can contribute to acidification of the system and injure sewage treatment organisms. Can cause damage to vegetation due to corrosive action.

Persistence and degradability

Expected to biodegrade and not bioaccumulate.

Mobility

Nitric acid is soluble in water and has high mobility in soil. During transport through the soil, nitric acid 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 nitric acid spillages.

Environmental fate (exposure)

In the atmosphere, nitric acid is present in very minute quantities as a gas or vapour. It reacts with ammonia in the atmosphere to form a particulate or aerosol nitrate compound that is unlikely to persist for more than 10 to 15 days. Nitric acid does not build up in plant or animal tissues largely because of its highly reactive properties.

48 hr LC₅₀ (starfish): 100 – 300 mg/L, in aerated water conditions;

48 hr LC₅₀ (shore crab): 180 mg/L, in static, aerated conditions;

48 hr LC₅₀ (cockle): 330 – 1,000 mg/L, in aerated water conditions.

Bioaccumulative potential

Nitric acid 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 Environmental Protection 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

2031

UN Proper shipping name

Nitric 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), flammable solids; substances liable to spontaneous combustion; and substances that in contact with water emit flammable gases (Class 4), 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

2R

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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).

Classifications

Safework Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.

The classifications and phrases listed below are based on Approved Criteria for Classifying Hazardous substances [NOHSC: 1008(2004)].

Hazard Codes	C	Corrosive
	N	Dangerous for the environment.
Risk Phrases	R35	Causes severe burns.
	R52/53	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Phrases	S1/2	Keep locked up and out of reach of children.
	S23	Do not breathe gas/fumes/vapours/spray (where applicable).
	S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	S36	Wear suitable protective clothing.
	S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).

Inventory listing(s)

AUSTRALIA: AICS (Australia Inventory of Chemical Substances)
All components are listed on the AICS; or are exempt.

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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.
- Code of Practice for the Preparation of Safety Data Sheets for Hazardous Chemicals, Safe Work Australia, December 2011.
- Australian Code for the Transport of Dangerous Goods by Road and Rail, 7th Edition, National Transport Commission, 2015.
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- Perry's Chemical Engineers' Handbook, R.H. Perry & D. Green, 6th Edition, McGraw-Hill, New York, 1984.
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- 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.
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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

No data available.

Important Notes

1. To the best of our knowledge this document complies with the Code of Practice for the Preparation of Safety Data Sheets for Hazardous Chemicals, Safe Work Australia, December 2011.
2. This 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 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 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 I safety data sheets without notice.