

Section 1 – Identification of the Material and Supplier

Product Name

Ammonia (Anhydrous)

Other names

Anhydrous ammonia, ammonia, and ammonia gas. Company product code 1670.

Recommended use

Manufacture of fertilisers, sodium cyanide and explosives. Nickel refinement. Refrigerant.

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 only), +61 8 9411 8444

Section 2 – Hazard Identification

Hazard Classification, including a statement of overall hazardous nature

HAZARDOUS SUBSTANCE

Anhydrous ammonia is classified as hazardous according to Australian WHS Regulations.

DANGEROUS GOODS

Anhydrous ammonia 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.

GHS Classification(s)

Flammable Gases: Category 2

Gases Under Pressure: Liquefied gas

Skin Corrosion/Irritation: Category 1B

Acute Toxicity: Inhalation: Category 3

Aquatic Hazard (Acute): Category 1

Aquatic Hazard (Chronic): Category 3

Label Elements

Signal word **DANGER**

Pictogram(s)



Hazard Statement(s)

- H221** Flammable gas.
- H280** Contains gas under pressure; may explode if heated.
- H314** Causes severe skin burns and eye damage.
- H331** Toxic if inhaled.
- H400** Very toxic to aquatic life.
- H412** Harmful to aquatic life with long lasting effects.

Prevention statement(s)

- P210** Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- P260** Do not breathe dust/fume/gas/mist/vapours/spray.
- P264** Wash thoroughly after handling.
- P271** Use only outdoors or in well-ventilated area.
- P273** Avoid release to the environment.
- P280** Wear protective gloves/protective clothing/eye protection/face protection.

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 to fresh air and keep at rest in a 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 doctor/physician.
- P321** Specific treatment is advised – see first aid instructions.
- P363** Wash contaminated clothing before reuse.
- P377** Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
- P381** Eliminate all ignition sources is safe to do so.
- P391** Collect spillage.

Storage statement(s)

- P403 + P233** Store in a well-ventilated place. Keep container tightly closed.
- P405** Store locked up.
- P410 + P403** Protect from sunlight. Store in a well-ventilated place.

Disposal statement(s)

- P501** Dispose of contents/container in accordance with relevant regulations.

Other hazards

In high concentrations may cause asphyxiation. Contact with liquid may cause cold burns/frostbite.

Section 3 – Composition/Information on Ingredients

Chemical identity of ingredients	Proportion of ingredients	CAS Number for ingredients
Ammonia	> 99.5 % (wt/wt)	7664-41-7
Water	Remainder	7732-18-5

Section 4 – First Aid Measures

First Aid

ANHYDROUS AMMONIA IS POISONOUS BY INHALATION AND INGESTION, AND CORROSIVE TO THE BODY ON CONTACT. FIRST AID ATTENTION MUST BE GIVEN AS URGENTLY AS POSSIBLE AS OUTLINED BELOW.

ALL SUSPECTED ANHYDROUS AMMONIA BURNS SHOULD RECEIVE MEDICAL ATTENTION.

TRAINING ON HANDLING AMMONIA INCIDENTS USING THIS MSDS SHOULD BE PROVIDED BEFORE ANY AMMONIA HANDLING OR USE COMMENCES.

First Aid Facilities

First aid procedures, equipment, medication and training for the treatment of burns with anhydrous ammonia 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 anhydrous ammonia 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;
- 5 % aqueous boric acid solution;
- 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 anhydrous ammonia 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 anhydrous ammonia with skin;
- Wear chemical goggles as a minimum level of eye protection to prevent splashes of ammonia-containing liquids entering eyes;
- Avoid inhalation of anhydrous ammonia fumes or mist during rescue in contaminated 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 clean fresh water immediately and spit out rinse water. Give water or milk to drink.

DO NOT INDUCE VOMITING.

Obtain medical attention immediately.

3. Eyes

Persons with potential eye exposure should NOT wear contact lenses.

Immediately flush the contaminated eye(s) with gently flowing copious amounts of clean fresh water for at least 15 minutes, holding the eyelid(s) open. Take care not to rinse contaminated water into a non-affected eye.

Continue irrigation with normal water until the severe pain of the burn is relieved.

Obtain medical attention immediately.

NOTE: Do not use anything other than clean fresh water, or sterile saline on the eye.

4. Skin

First aid personnel must avoid contact with this chemical. Wear protective gloves when assisting patient.

DO NOT USE HOT WATER.

Immediately flush contaminated skin area thoroughly with gently running copious amounts of clean fresh water (if cryogenic “burns” are experienced use lukewarm water) for at least 15 minutes. While washing with water remove contaminated clothing, jewellery, footwear and leather goods, e.g., watchbands and belts. Launder these thoroughly before re-use.

Apply 5 % aqueous boric acid solution to affected areas to neutralise ammoniacal alkalinity.

Obtain medical attention immediately.

5. Inhalation

Rescuer should wear appropriate personal protection to avoid skin contamination and breathing ammonia fumes or mist.

Move patient from area to a well ventilated position, resuscitate if necessary. **DO NOT CARRY OUT EXPIRED AIR RESUSCITATION IF RESCUER MAY BECOME CONTAMINATED.** Keep warm and at rest.

If breathing is difficult give oxygen. If the patient suffers cardiac arrest, commence cardio-pulmonary resuscitation immediately, ensuring that the rescuer does not become contaminated.

Seek medical attention immediately.

ADVICE TO DOCTOR.

Ammonia is an alkali, which on contact with flesh causes a liquefaction necrosis on proteins, and is potentially much more dangerous than acid burns. Alkali agents liquefy tissue by denaturation of proteins and saponification of fats. In contrast to acids, whose tissue penetration is limited by the formation of a coagulum, alkalis can continue to penetrate very deeply into tissue.

1. Treatment for ammonia burns to eyes:

- Retract eyelids to ensure thorough irrigation of conjunctival cul-de-sacs;
- Irrigate eyes with several litres of saline for at least 20 minutes;
- Perform pH tests, if available, before and after each set of eye irrigations, and continue this monitoring until the pH returns to the normal range (pH 7 to 8);
- DO NOT use neutralising agents or any other additives;
- Evaluate completely general appearance of the globe, conjunctiva, anterior chamber and cornea, with attention to redness, pallor, or opacification, and presence of foreign bodies;
- Stain with fluorescein to look for areas of increased uptake signifying corneal abrasion. A slit lamp examination may be useful - it allows for a more detailed examination of the cornea and anterior chamber, including presence of hyphema or hypopyon;
- Verify pupillary and extraocular muscle function;
- Document the visual acuity of patients with ocular exposure or complaints. Documentation should include right eye and left eye individually, then vision with both eyes;
- Before administering, or prescribing cycloplegic drops, steroid drops, or vasoconstrictive agents, consider consulting an ophthalmologist.

2. Treatment for ammonia fumes, or mist inhalation

- Pulmonary oedema may arise. Symptoms may be delayed for several hours. Affected persons should not be left unattended during this period;
- If the larynx is involved, local oedema may produce respiratory distress, stridor and a hoarse voice.

3. Treatment for ammonia burns to skin

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

4. Treatment for ammonia ingestion

- Severe burns from alkali ingestion may lead to the life-threatening complications of oesophageal perforation and mediastinitis. These are associated with chest pain, dyspnoea, fever, subcutaneous emphysema of the chest or neck, and a pleural rub. Symptoms and signs associated with significant alkali-induced tissue injury include pain in the mouth and throat, drooling, pain on swallowing, vomiting, abdominal pain and haematemesis. Extensive tissue injury may be associated with fever, tachycardia, hypotension and tachypnoea;
- Initial management is primarily supportive. Particular attention should be directed towards securing the airway, fluid resuscitation and provision of analgesia;
- DO rinse any visible material from the mouth with water or saline;
- DO NOT induce vomiting as re-exposure of the mucosa to the alkali is harmful;
- DO NOT attempt to neutralise the ingested alkali since exothermic reaction may extend the corrosive injury;

- Consider passing a naso-gastric tube;
- A chest X-ray, upright abdominal film, is recommended – this may show widening of the mediastinum, pleural effusions, pneumomediastinum and/or 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 complicate perforation;
- DO NOT give oral fluids as these may interfere with endoscopic evaluation;
- DO NOT give oral activated charcoal as it will interfere with endoscopic evaluation;

ADVICE TO DOCTOR (cont..)

4. Treatment for ammonia ingestion (cont..)

- Inspection of the oropharynx may reveal areas of mucosal burn, which appear as white patches with erythematous borders. The absence of visible burns to the lips, mouth or throat does not necessarily imply an absence of significant burns to the oesophagus;
- Tracheoesophageal fistulae may result from perforation of the anterior oesophageal wall. The fistula may extend to involve the aorta and, in this case, is fatal;
- Symptomatic patients may need the following investigations:
 - Arterial blood gas analysis;
 - Coagulation profile;
 - Complete blood count;
 - Contrast oesophagography or thoracic CT (to detect oesophageal perforation);
 - ECG;
 - Electrolytes;
 - Glucose;
 - Liver and renal function;
 - Chest X-ray, upright abdominal film;
 - Type and cross-match;
- Upper gastrointestinal endoscopy should be performed as soon as practicable and within 24 hours of ingestion. This investigation is essential to assess the severity of mucosal damage and plan treatment. Upper gastrointestinal endoscopy should also be considered for asymptomatic patients who have intentionally ingested a strong alkali and children, where the history may be unreliable;
 - Early esophagogastrosopy, by direct visualisation of the lesion with fibre optic endoscopes is the most effective investigation for the classification of alkali burns and in planning management follow-up.
- Ongoing supportive care includes maintenance of adequate analgesia, fluid electrolyte and pH balance, nutritional support, and monitoring for the development of complications. Subsequent management and prognosis is largely dictated by findings at upper gastrointestinal tract endoscopy. These may be graded as follows:
 - Grade I: Simple inflammation;
 - Grade II: Few ulcerations and focal necrosis limited to part of the oesophagus;
 - Grade III: Multiple ulcerations, extensive necrosis involving the entire oesophagus and massive haemorrhage.

Grade I and II lesions heal completely with supportive care alone and can be adequately managed on a generic medical ward.

Patients with Grade I lesions will usually tolerate oral fluids, but those with Grade II lesions may require a period of total parenteral nutrition or feeding jejunostomy.

Patients with Grade II endoscopic findings require intensive care management, total parenteral nutrition or feeding jejunostomy until healing is documented, and are likely to develop oesophageal strictures.

Urgent laparotomy (without associated thoracotomy) with surgical resection of necrotic tissue and surgical repair is indicated in the presence of symptoms or sign of gastrointestinal perforation or where

full thickness necrosis is found at endoscopy.

There is no clinical evidence that corticosteroids prevent the development of strictures following alkali ingestion.

Prophylactic broad-spectrum antibiotics are not indicated unless there is evidence of gastrointestinal tract perforation or full thickness necrosis.

ADVICE TO DOCTOR (cont..)

Long Term Complications

Those patients with Grade II burns are at risk of developing an oesophageal stricture. For this reason, these patients require follow-up evaluations that include endoscopic examinations and/or contrast radiography until complete healing or stricture formation is documented. Eighty percent of strictures produce symptoms within two months. Oesophageal stricture formation requires long term-dilation or surgical repair. Survivors of alkali ingestion are at an increased risk of developing carcinoma of the oesophagus. The average interval between the original injury and diagnosis of carcinoma is greater than 40 years.

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

Section 5 – Fire Fighting Measures

Product flammability

Ammonia gas is flammable, but requires significant heat to initiate combustion.

Suitable extinguishing media

For small flames, use dry chemical, carbon dioxide or water spray. For large fires, use water fog or spray. Note that ammonia is readily absorbed by water and the resultant ammonia solution is alkaline. Prevent contamination of drains or waterways, absorb runoff with sand or similar.

Hazard from combustion products

Ammonia produces nitrogen and water vapour on normal combustion in air but at high temperature some ammonia could decompose to form hydrogen gas.

Special protective precautions and equipment for fire fighters

Wear full protective clothing, including respiratory protection.

Anhydrous ammonia vapour is lighter than air, and pockets of ammonia are likely to be trapped in ceilings or under roof. Use water fog to dampen an ammonia cloud and reduce vapours.

Chemical absorbent and substantial amounts of water will be required for large spill.

Portable shower and eyewash facility may also be needed.

Prevent run-off into drains and waterways.

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Section 6 – Accidental Release Measures

Emergency procedures

The hazardous nature of anhydrous ammonia, 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.

One volume of liquid anhydrous ammonia released from a container at 15 °C will dissipate into approximately 850 volumes of gaseous ammonia. However, liquid anhydrous ammonia may take considerable time to evaporate due to its latent heat of evaporation. Anhydrous ammonia vapours are lighter than air, and pockets of ammonia are likely to be trapped in ceilings or under roof.

Anhydrous ammonia dissolves very readily in water, giving off large quantities of heat. Avoid direct water

contact with ammonia leaks.

Methods and Materials for containment and clean up

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

Shut off anhydrous ammonia supply, if safe to do so. If anhydrous ammonia container is leaking, and if possible, try to position it so that gaseous ammonia rather than liquid ammonia leaks out. Shut off all possible sources of ignition. Stay upwind of vapours. Restrict access to spill site.

Small Leaks

Gas: Increase ventilation and allow gas to vent to a safe area

Liquid: If possible contain the surface area of a spill by bunding with earth or vermiculite. Allow vaporisation to a safe area. Prevent run-off into drains and waterways.

Large Leaks

Gas: Use water fog to dampen an ammonia cloud and reduce vapours. Do not spray water directly on the leak or ammonia container.

Liquid: If possible contain the surface area of a spill by bunding with earth or vermiculite. Use protein foam blanket, at least 150 mm thick, to cover liquid anhydrous ammonia and thus prevent evaporation into large gas cloud. Use water fog to dampen an ammonia cloud and reduce vapours.

Prevent run-off into drains and waterways.

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

For the management of anhydrous ammonia emergencies during transport by road or rail, SAA/SNZ HB76: Dangerous Goods-Initial Response Guide, Guide 07 should be consulted. This Guide should be carried at all times when anhydrous ammonia 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.

Protein foam blanket may be required for large spills. Chemical absorbent and substantial amounts of water will also be required for large spills.

Section 7 – Handling and Storage

Precautions for safe handling

Regulated dangerous goods as Toxic Gas Class 2; with a subsidiary risk listing in Class 8, as 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 touch with bare skin any surface that has been iced by the storage of anhydrous ammonia. If skin sticks to the surface of iced anhydrous ammonia storage and carrying equipment, thaw out with lukewarm water before removing – failure to do so will result in serious injury and frostbite.

Do not add water to anhydrous ammonia. In dilution process anhydrous ammonia should be added to plenty of water, preferably under the surface of the water, in order to minimise the generation of ammonia vapour and splashes.

Do not smoke anywhere near the storage and handling of anhydrous ammonia 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

Store in accordance with Australian Standard AS 2022 *Anhydrous ammonia storage and handling* (SAA Anhydrous Ammonia Code).

Always store cylinders upright, in a cool, dry well ventilated area, protected from weather, sunlight and direct heat. Bulk storage anhydrous ammonia containers should be painted white to reflect direct sunlight. Intense localised heat may cause ammonia containers to explode. Periodically check anhydrous ammonia storage

containers for leaks, using a sulfur dioxide test bottle.

The location and surrounding areas of equipment used for storing anhydrous ammonia should be assessed and classified according to the relevant Australian Standards for hazardous areas. The equipment should be rated for use in that classification.

Store away from halogens, mineral acids and oxidizing agents (such as hypochlorites, chlorinating and brominating agents).

Anhydrous ammonia is highly corrosive to aluminium, copper, tin, zinc and their alloys. Without at least 0.5 % moisture, anhydrous ammonia will cause stress cracking in carbon steel. Not corrosive to 304L or 316 SS.

Section 8 – Exposure Controls/Personal Protection

National exposure standards

ES-TWA		ES-STEL		ES-Peak	
25 ppm	17 mg/m ³	35 ppm	24 mg/m ³	No data available	No data available

Biological limit values

No data available

Engineering controls

Use in open, or well ventilated areas.

Use local and /or general exhaust ventilation to keep inhalation exposures below the exposure standard and as low as possible.

Personal protective equipment

Personal protective equipment (PPE) should be used where other control measures are not practicable or adequate to control exposure. It should be chosen to prevent routine exposure and to protect workers in the case of accidental splashes, spillage or release.

Eye/face protection: Wear chemical goggles and face shield to prevent eye and facial contact.

Skin protection: Wear PVC gauntlet gloves to prevent skin contact. Wear PVC jacket and trousers to prevent contact. A complete encapsulating suit is recommended for heavy exposures.

Respiratory protection: When opening anhydrous ammonia container valves and connecting and disconnecting ammonia lines wear self contained breathing apparatus (or ensure it is readily available for immediate use) with type ABEK1 cartridge, or air supplied full face mask complying with AS/NZ 1715 and AS/NZ 1716.

Thermal hazard: Wear thermal chemical resistant gloves if handling iced lines.

Section 9 – Physical and Chemical Properties

Appearance (colour, physical form, shape)

Colourless gas or liquid.

Odour

Sharp, irritating and penetrating odour.

pH

pH of a 10% solution: >12.

Vapour pressure

756 kPa at 20 °C.

Vapour density

Relative vapour density (air = 1): 0.77

Boiling point/range

Boiling point: -33.3 °C at 1 atmosphere

Freezing/melting point

Melting point: -77.7 °C

Solubility

Solubility in water: 89.9 g/100 g water at 20 °C; very soluble in diethyl ether and acetone; partially soluble in methanol.

Specific gravity or density

Specific gravity liquid: 0.682 (water = 1);

Specific gravity gas: 0.770 (air = 1).

Flash point and method of detecting flash point

No data available.

Upper and lower flammable (explosive) limits in air

Flammability limits: 16 – 25 % (^{vol}/_{vol}).

Ignition temperature

Auto ignition temperature: 651 °C.

Viscosity

Dynamic viscosity liquid: 0.255 mPa.s at 0 °C and 1 atmosphere;

Dynamic viscosity gas: 0.00982 mPa.s at 0 °C and 1 atmosphere.

Section 10 – Stability and Reactivity

Chemical stability

In accordance with the SAA Anhydrous Ammonia Code, anhydrous ammonia, with at least 0.5 % moisture, stored in dedicated carbon steel containers in a electrical zone 1 class 1 area, remains stable.

Conditions to avoid

Anhydrous ammonia is extremely soluble in water giving off large quantities of heat. It can react explosively with oxidizing agents (which include swimming pool chemicals such as chlorine and sodium/calcium hypochlorite). It is corrosive to copper, tin, zinc and their alloys such as bronze and brass.

Incompatible materials

Anhydrous ammonia is highly corrosive to aluminium, copper, tin, zinc and their alloys. Can form explosive compounds with mercury and silver oxide. Not corrosive to 304L or 316 stainless steel. Will attack some forms of plastics, rubber and coatings.

Hazardous decomposition products

Ammonia produces nitrogen and water vapour on normal combustion in air but at high temperature some ammonia could decompose to form hydrogen gas.

Hazardous reactions

Anhydrous ammonia can react explosively with oxidizing agents (which include swimming pool chemicals such as chlorine and sodium/calcium hypochlorite).

Section 11 – Toxicological Information

HEALTH EFFECTS

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

Acute:

Anhydrous ammonia, liquid and vapour, is highly irritant and corrosive to exposed tissues and to mucous membranes of the eyes and respiratory tract. May be fatal if inhaled in large quantities. Cryogenic, or frostbite “burns” may be experienced when incorrectly handling ammonia liquid. Toxic doses of ammonia acutely affect cerebral energy metabolism, localized at the base of the brain.

Inhalation:

Inhalation of ammonia liquid and vapour will result in burns and irritation to the nose and upper respiratory tract, resulting in lesions of the nasal septum, pulmonary oedema and pneumonitis. Symptoms may include coughing, sore throat and shortness of breath. Severe scarring of tissue and death may result. Damage may appear days after exposure. 5,000-6,000 ppm for 30-120 min administered to guinea pigs has been reported to cause blindness. LD₅₀ (Inhalation, rat) = 7,338 – 11,590 ppm at 1 hour.

Ammonia Level in ppm	Resulting Conditions on Humans
5 – 25	Minor irritation of the eye and respiratory tract, odour threshold by most persons.
25	National exposure standard (ES-TWA).
100	No adverse effect for average worker. Deliberate exposure for long periods not permitted.
400	Immediate nose and throat irritation. No serious effects after 30 minutes to 1 hour.
700	Immediate eye irritation. No serious effect after 30 minutes to 1 hour.
1,700	Convulsive coughing. Severe eye, nose and throat irritation. Could be fatal after 30 minutes.
2,000 – 5,000	Convulsive coughing. Severe eye, nose and throat irritation. Could be fatal after 15 minutes.
5,000	Lowest concentration known to be lethal to humans exposed for 5 minutes via inhalation.
5,000 – 10,000	Respiratory spasm. Rapid Asphyxia.

Skin:

Ammonia liquid will cause severe burns and necrosis. Ammonia vapour will cause irritation, including redness and itching, and at high concentrations burns and blistering. Cryogenic “burn” may result as a result of contacting ammonia liquid.

Eye:

Ammonia liquid will cause severe eye burns and permanent eye damage. Ammonia vapour will cause severe irritations and burns, at high concentrations leading to redness and pain following contact.

Swallowed:

Ammonia liquid will cause severe irritation and burns to the mouth, oesophagus and stomach, accompanied by severe burning sensation. Severe scarring of tissue and death may result. Ammonia vapour will cause severe irritation and burns. Symptoms include bleeding, vomiting, abdominal pain, diarrhoea and fall in blood pressure. Damage may appear days after exposure. LD₅₀ (Oral, rat) = 350 mg/kg.

Chronic:

Prolonged, or repeated exposure to ammonia vapour may result in pulmonary function effects, and will cause drying of the skin with cracking, irritation and blistering that may lead to dermatitis and necrosis.

Ammonia toxicity is a major factor in the pathogenesis of hepatic encephalopathy associated with chronic liver disease. Populations at special risk of exposure to ammonia include individuals with reduced liver function, corneal disease, glaucoma, or chronic respiratory diseases.

Section 12 – Ecological Information

Ecotoxicity

Very toxic to aquatic organisms. In low concentrations in water and soil, ammonia acts as a fertiliser to promote plant growth. Free ammonia concentrations of 2.5 mg per litre at pH 7.4 to 8.5 are considered harmful to marine life. In water ammonia (NH₃) is considered to be the primary toxic form while the more prevalent ammonium hydroxide (NH₄OH) form is much less harmful. Increases in pH above 7.5 will lead to an increased level of non-ionised ammonia (NH₃). Ammonia is readily oxidized to nitrite which is also toxic to marine life.

Vegetation contacted with anhydrous ammonia or exposed to significant vapour concentrations may suffer leaf scorching

Persistence and degradability

In soil, ammonia may either volatilize to the atmosphere, adsorb to particulate matter, or undergo microbial transformation to nitrate or nitrite anions.

In water, ammonia volatilizes to the atmosphere, is transformed to other nitrogenous compounds, or may be bound to materials in the water.

Mobility

Ammonia is strongly adsorbed on soil, and on sediment particles and colloids in water. This adsorption results in high concentrations of sorbed ammonia in oxidized sediments. Under anoxic conditions, the adsorptive capacity of sediments is less, resulting in the release of ammonia to either the water column or an oxidized sediment layer above.

Environmental fate (exposure)

48 hr LC₅₀ (daphnia magna): 24 mg/L;
48 hr LC₅₀, S (daphnia magna) :189 mg/L;
24 hr LC₅₀ (rainbow trout): fertilised egg:> 3.58 mg/L;
alevins (0-50 days old): 3.58 mg/L;
fry (85 days old): 0.068 mg/L;
adults: 0.097 mg/L.

Bioaccumulative potential

Under aerobic conditions ammonia will oxidize to nitrate and 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 in accordance with Department of Environmental requirements. Shut all valves in empty containers. 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

1005

UN Proper shipping name

Ammonia, Anhydrous

Class and subsidiary risk

Class 2.3 Toxic Gas; Subsidiary Risk Class 8 Corrosive.

Packing group

None allocated

Special precautions for user

Not to be loaded with explosives (Class 1), flammable liquids (Class 3), spontaneously combustible substances (Class 4.2), dangerous when wet substances (Class 4.3), oxidizing agents (Class 5.1), organic peroxides (Class 5.2), radioactive substances (class 7) and food and food packaging in any quantity.

Hazchem code

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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](#)

NA

[Classifications](#)

[Inventory listing\(s\)](#)

AUSTRALIA: AICS (Australia Inventory of Chemical Substances)

All components are listed on the AICS; or are exempt.

Section 16 – Other Information

[Key / legend to abbreviations and acronyms used in the SDS](#)

AICS	Australian Inventory of Chemical Substances
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.
Chemical Rubber Handbook, D.R. Lide, CRC Press, 65th Edition, Boca Ratón, 1987.
Perry's Chemical Engineers' Handbook, R.H. Perry & D. Green, 6th Edition, McGraw-Hill, New York, 1984.
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.
Dangerous Properties of Industrial Chemicals, N.I.Sax & R.J. Lewis (Sr), 7th Edition, Van Nostrand Reinhold, New York, 1984.
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



ABN: 81 008 668 371

SAFETY DATA SHEET

Ammonia (Anhydrous)



Kirk-Othmer Encyclopaedia of Chemical Technology, 4th Edition, Wiley InterScience, New York, 1997.
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, Ongoing 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

No data available

Important Notes

1. To the best of our knowledge this document complies with the Preparation of Safety Data Sheets for Hazardous Chemicals Code of Practice February 2016.
2. This 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 this safety data sheets without notice.