

Safety Data Sheet



1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name: **AMMONIA - ANHYDROUS**

Other name(s): Ammonia anhydrous; Ammonia gas; Anhydrous ammonia; Ammonia liquid; Big N; Ammonia cylinder (used).

Recommended Use of the Chemical and Restrictions on Use Fertilizer; preparation of fertilizers; chemical synthesis; condensation catalyst; latex preservative; manufacture of explosives; rocket fuel.

Supplier: Ixom Operations Pty Ltd
ABN: 51 600 546 512
Street Address: Level 8, 1 Nicholson Street
East Melbourne Victoria 3002
Australia

Telephone Number: +61 3 9906 3000
Emergency Telephone: **1 800 033 111 (ALL HOURS)**

Please ensure you refer to the limitations of this Safety Data Sheet as set out in the "Other Information" section at the end of this Data Sheet.

2. HAZARDS IDENTIFICATION

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.

This material is hazardous according to Safe Work Australia; HAZARDOUS CHEMICAL.

Classification of the chemical:

Flammable Gases - Category 2
Gases under pressure - Liquefied Gas
Acute Inhalation Toxicity - Category 3
Skin Corrosion - Sub-category 1B
Eye Damage - Category 1
Specific target organ toxicity (single exposure) - Category 3

The following health/environmental hazard categories fall outside the scope of the Workplace Health and Safety Regulations:
Acute Aquatic Toxicity - Category 1

SIGNAL WORD: DANGER



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.
H335 May cause respiratory irritation.

Safety Data Sheet



Precautionary Statement(s):

Prevention:

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

Response:

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P321 Specific treatment (see First Aid Measures on Safety Data Sheet).
P363 Wash contaminated clothing before re-use.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P311 Call a POISON CENTER or doctor/physician.
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.
P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 Eliminate all ignition sources if safe to do so.
P391 Collect spillage.

Storage:

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

Disposal:

P501 Dispose of contents and container in accordance with local, regional, national, international regulations.

Poisons Schedule (SUSMP): S6 Poison.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Hazard Codes
Ammonia	7664-41-7	>99.5%	H221 H331 H314 H335 H400

4. FIRST AID MEASURES

For advice, contact a Poisons Information Centre (e.g. phone Australia 131 126; New Zealand 0800 764 766) or a doctor. Urgent hospital treatment is likely to be needed.

Inhalation:

Remove victim from area of exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. If patient finds breathing difficult and develops a bluish discolouration of the skin (which suggests a lack of oxygen in the blood - cyanosis), ensure airways are clear of any obstruction and have a qualified person give oxygen through a face mask. Apply artificial respiration if patient is not breathing. Seek immediate medical advice.

Skin Contact:

If spilt on large areas of skin or hair, immediately drench with running water and remove clothing. Continue to wash skin and hair with plenty of water (and soap if material is insoluble) until advised to stop by the Poisons Information Centre or a doctor. For freeze burns, immediately flood burnt area with large amounts of luke-warm water and cover with a clean, dry dressing. Do not use hot water. Seek immediate medical assistance.

Product Name: AMMONIA - ANHYDROUS
Substance No: 000031098301

Issued: 10/10/2017
Version: 5

Safety Data Sheet



Eye Contact:

Immediately wash in and around the eye area with large amounts of water for at least 15 minutes. Eyelids to be held apart. Remove clothing if contaminated and wash skin. Urgently seek medical assistance. Transport promptly to hospital or medical centre.

Ingestion:

Immediately rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water. Get to a doctor or hospital quickly.

Indication of immediate medical attention and special treatment needed:

Treat symptomatically. Delayed pulmonary oedema may result. Following severe exposure, the patient should be kept under medical supervision for at least 48 hours. Can cause corneal burns.

5. FIRE FIGHTING MEASURES

Suitable Extinguishing Media:

Fine water spray, normal foam, dry agent (carbon dioxide, dry chemical powder). Water spray can be used to bring down the vapour but should not be sprayed on pools of liquid ammonia. If water is used, a minimum of 100 volumes of water must be available for each volume of ammonia.

Hazchem or Emergency Action Code: 2RE

Specific hazards arising from the chemical:

Flammable gas. May form flammable vapour mixtures with air. Avoid all ignition sources. All potential sources of ignition (open flames, pilot lights, furnaces, spark producing switches and electrical equipment etc) must be eliminated both in and near the work area. Do NOT smoke. Flammable concentrations of ammonia gas can accumulate in the vapour space of storage containers/vessels. Caution should be exercised when opening.

Special protective equipment and precautions for fire-fighters:

Ammonia: The main products of combustion in air, at or above 780 °C, are nitrogen and water with small amounts of nitrogen dioxide and ammonium nitrate. Ammonia decomposes into flammable hydrogen gas at approximately 450 °C. May form flammable mixtures in air. The presence of oil or other combustible material will increase the fire hazard. Fatalities have occurred as a result of the explosive nature of the ammonia gas. If involved in a fire, keep containers cool with water spray. If safe to do so, remove containers from path of fire. Fire-fighters to wear full body protective clothing and self-contained breathing apparatus. Consider evacuation.

6. ACCIDENTAL RELEASE MEASURES

Emergency procedures/Environmental precautions:

Shut off all possible sources of ignition. Clear area of all unprotected personnel. Do not allow container or product to get into drains, sewers, streams or ponds. If contamination of sewers or waterways has occurred advise emergency services or State Department of Agriculture.

Safety Data Sheet



Personal precautions/Protective equipment/Methods and materials for containment and cleaning up:

Avoid breathing in vapours. Work up wind or increase ventilation. Wear protective equipment to prevent skin and eye contamination and the inhalation of vapours. Stop leak if safe to do so.

Additional information:

GAS: For a small gas leak, increase ventilation and allow gas to vent to a safe area. For larger gas leaks, use fire hoses equipped with fog nozzles to disperse gas down-wind. Do NOT spray water directly on the leak or ammonia container.

LIQUID: Large volumes of gas will evaporate from a liquid spill. For small liquid spills, increase ventilation and allow the liquid to volatilise to safe area. For large spills, cover liquid with protein foam 150 mm thick. **DO NOT HOSE LIQUID AMMONIA TO DRAIN;** contact with water will accelerate vaporisation due to liberation of heat upon mixing with water.

7. HANDLING AND STORAGE

This material is a Scheduled Poison S6 and must be stored, maintained and used in accordance with the relevant regulations.

Precautions for safe handling:

Avoid skin and eye contact and breathing in vapour. Keep out of reach of children.

Conditions for safe storage, including any incompatibilities:

Store ammonia in a cool, well ventilated area, away from sources of heat or ignition and foodstuffs. Store away from oxidising agents, boron halides, acids, acid anhydrides, acid chlorides, halogens (eg. chlorine), interhalogens, heavy metals and their salts, ethylene oxide, hypochlorous acid, acetaldehyde (etc., refer to section 10). Check cylinders regularly for leaks.

The transport of liquefied ammonia in a tank or bulk container made of quenched and tempered steel is prohibited unless the liquefied ammonia contains not less than 0.2% water mass. May be an explosion hazard, especially in confined spaces.

Ensure pressure gauges and fittings are not made of copper, zinc or alloys (eg. brass).

Refer to AS/NZS 2022 Anhydrous ammonia - Storage and handling.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ammonia: 8hr TWA = 17 mg/m³ (25 ppm), 15 min STEL = 24 mg/m³ (35 ppm)

As published by Safe Work Australia Workplace Exposure Standards for Airborne Contaminants.

TWA - The time-weighted average airborne concentration of a particular substance when calculated over an eight-hour working day, for a five-day working week.

STEL (Short Term Exposure Limit) - the airborne concentration of a particular substance calculated as a time-weighted average over 15 minutes, which should not be exceeded at any time during a normal eight hour work day. According to current knowledge this concentration should neither impair the health of, nor cause undue discomfort to, nearly all workers.

These Workplace Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These workplace exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Safety Data Sheet



Appropriate engineering controls:

Ensure ventilation is adequate to maintain air concentrations below Workplace Exposure Standards. Ammonia gas is generally lighter than air and will disperse under normal conditions. However, when ammonia liquid contacts air, the gas produced may be heavier than air. Prevent concentration in hollows or sumps. Do NOT enter confined spaces where vapour may have collected. An asphyxiant gas which can lead to the reduction of the oxygen concentration by displacement or dilution. The minimum oxygen content in air should be 18% by volume under normal atmospheric pressure.

If in the handling and application of this material, safe exposure levels could be exceeded, the use of engineering controls such as local exhaust ventilation must be considered and the results documented. If achieving safe exposure levels does not require engineering controls, then a detailed and documented risk assessment using the relevant Personal Protective Equipment (PPE) (refer to PPE section below) as a basis must be carried out to determine the minimum PPE requirements.

Individual protection measures, such as Personal Protective Equipment (PPE):

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors.

OVERALLS, CHEMICAL GOGGLES, RUBBER BOOTS, AIR MASK , GLOVES (Long), APRON.

* Not required if wearing air supplied mask.



GENERAL: Avoid all contact. Ensure safety shower and eyewash station is close at hand. Persons who could be subject to ammonia exposure must not wear contact lenses. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storage or re-use.

EYE PROTECTION: Wear gas tight goggles which have a seal between the face and the frame. A full face shield shall only be worn to supplement the protection provided by the gas tight goggles.

SKIN PROTECTION: Wear coveralls, or full length trousers with a long sleeved shirt, with gloves and boots. Available information suggests that gloves made from chlorobutyl-proofed fabric or butyl rubber should be suitable for intermittent contact. However, due to variations in glove construction and local conditions, a final assessment should be made by the user. A complete encapsulating suit is recommended for heavy exposures.

RESPIRATORY PROTECTION: Use with adequate ventilation. Up to 250 ppm - wear vapour respirator with type K cartridge or air supplied mask meeting the requirements of AS/NZS 1715 and AS/NZS 1716. Greater than 250 ppm - wear air supplied full face mask meeting the requirements of AS/NZS 1715 and AS/NZS 1716.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Gas . Liquid under pressure.
Colour:	Colourless
Odour:	Intensely irritating ammoniacal odour.
Odour Threshold:	5-53 ppm.
Molecular Formula:	NH ₃
Solubility:	Soluble in water. Soluble in alcohol and ether.
Specific Gravity:	0.682 (-33 °C, liquid)
Relative Vapour Density (air=1):	0.6
Vapour Pressure (20 °C):	882 kPa
Flash Point (°C):	Not applicable

Product Name: AMMONIA - ANHYDROUS
Substance No: 000031098301

Issued: 10/10/2017
Version: 5

Safety Data Sheet



Flammability Limits (%):	15.5 - 25
Autoignition Temperature (°C):	669
% Volatile by Volume:	100
Boiling Point/Range (°C):	-33.4
pH:	11.6 (1m solution)
Viscosity:	0.266 cP @ -34°C
Freezing Point/Range (°C):	-34.9 (20% solution)

10. STABILITY AND REACTIVITY

Reactivity:	Reacts violently with acids. Hygroscopic: absorbs moisture or water from surrounding air.
Chemical stability:	Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Ammonia dissolves exothermically in water. Can react explosively with chlorine and hypochlorites or other strong oxidising agents. Critical pressure = 11.4 MPa.
Possibility of hazardous reactions:	Corrosive to copper, zinc, and their alloys.
Conditions to avoid:	Avoid exposure to heat, sources of ignition, and open flame.
Incompatible materials:	Incompatible with oxidising agents, boron halides, acids, acid anhydrides, acid chlorides, halogens, interhalogens, heavy metals and their salts, ethylene oxide, acetaldehyde, calcium, hypochlorous acid, silver, acrolein, boron, perchlorates, chlorites, nitrogen tetroxide, sulfur.
Hazardous decomposition products:	Hydrogen. Oxides of nitrogen.

11. TOXICOLOGICAL INFORMATION

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

Ingestion:	Not a likely route of exposure, however, swallowing liquid will result in freeze burns of the mouth, throat and stomach.
Eye contact:	A severe eye irritant. Corrosive to eyes; contact can cause corneal burns. Contamination of eyes can result in permanent injury. Liquid splashes or spray may cause freeze burns to the eye.
Skin contact:	Liquid splashes or spray may cause freeze burns. Contact with skin will result in severe irritation. Corrosive to skin - may cause skin burns.
Inhalation:	Material is irritant to the mucous membranes of the respiratory tract (airways). Exposure to concentrations above the Exposure Standard of 25 ppm may cause irritation to the eyes, nose and throat. Higher concentrations may cause breathing difficulty, chest pain, bronchospasm, pink frothy sputum and pulmonary oedema. This may further predispose the patient to the development of acute bronchitis and pneumonia. Overexposure may result in death.

Acute toxicity:
Oral LD50 (rat): 350 mg/kg

Product Name: AMMONIA - ANHYDROUS
Substance No: 000031098301

Issued: 10/10/2017
Version: 5

Safety Data Sheet



Inhalation LC50 (rat): 2000 ppm/4hr

Skin corrosion/irritation: Irritant (human).
Serious eye damage/irritation: Severe irritant (human).
Chronic effects: Chronic exposure to ammonia may cause chemical pneumonitis and kidney damage.

Ammonia: Lowest Published Lethal Concentration (human) = 5,000 ppm/5 min.

Irritation of the respiratory tract and conjunctivae was found in workers inhaling 100 ppm ammonia and 20 ppm caused complaints and discomfort to unacclimatized workers.

Studies on the effect on man of exposures in the 5-50 ppm range are few, however general field experience in a large number of workers exposed to ammonia from blueprinting and copying machines indicates a maximum acceptable concentration without severe complaints of 20-25 ppm.

12. ECOLOGICAL INFORMATION

Ecotoxicity Avoid contaminating waterways.

Persistence/degradability: The material is biodegradable. Ammonia is strongly adsorbed to soil and sediment particles and colloids in water.

Aquatic toxicity: Very toxic to aquatic organisms. Ammonia is readily oxidised to nitrite which is also very toxic to fish.
24hr LC50 (rainbow trout - fertilized egg) = >3.58 mg/L.
24hr LC50 (rainbow trout - alevins 0-50 days old) = >3.58 mg/L.
24hr LC50 (rainbow trout - fry 85 days old) = 0.068 mg/L.
24hr LC50 (rainbow trout - adult): 0.097 mg/L.

48hr LC50 (Daphnia magna): 24 - 189 mg/L.
96hr LC50 (rainbow trout): 0.53 mg/L.

Terrestrial toxicity: Expected to be harmful to terrestrial species.

13. DISPOSAL CONSIDERATIONS

Disposal methods:
Refer to Waste Management Authority. Close valves of empty containers. Return empty containers to supplier using the same precautions as with filled containers.

14. TRANSPORT INFORMATION

Road and Rail Transport

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.



UN No: 1005
Transport Hazard Class: 2.3 Toxic Gas
Subrisk 1: 8 Corrosive

Safety Data Sheet



Proper Shipping Name or Technical Name: AMMONIA, ANHYDROUS
Hazchem or Emergency Action Code: 2RE

Marine Transport

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS.

UN No: 1005
Transport Hazard Class: 2.3 Toxic Gas
Subrisk 1: 8 Corrosive
Proper Shipping Name or Technical Name: AMMONIA, ANHYDROUS

IMDG EMS Fire: F-C
IMDG EMS Spill: S-U

Marine Pollutant Yes

Air Transport

Classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air; DANGEROUS GOODS.

TRANSPORT PROHIBITED under the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air in Passenger and Cargo Aircraft, and Cargo Aircraft Only.

UN No: 1005
Transport Hazard Class: 2.3 Toxic Gas
Subrisk 1: 8 Corrosive
Proper Shipping Name or Technical Name: AMMONIA, ANHYDROUS

15. REGULATORY INFORMATION

Classification:

This material is hazardous according to Safe Work Australia; HAZARDOUS CHEMICAL.

Classification of the chemical:

Flammable Gases - Category 2
Gases under pressure - Liquefied Gas
Acute Inhalation Toxicity - Category 3
Skin Corrosion - Sub-category 1B
Eye Damage - Category 1
Specific target organ toxicity (single exposure) - Category 3

The following health/environmental hazard categories fall outside the scope of the Workplace Health and Safety Regulations:

Acute Aquatic Toxicity - Category 1

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.
H335 May cause respiratory irritation.

Safety Data Sheet



Poisons Schedule (SUSMP): S6 Poison.

This material is listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

BIBRA Toxicity Profile - Ammonia 1986. Orica Chemicals Handbook Ammonia. Orica Australia Operations Pty. Ltd. 1993. In: 'Quick Selection Guide to Chemical Protective Clothing'. 3rd Edition. Eds. Forsberg, K. and Mansdon, S.Z. Van Nostrand Reinhold, New York, 1997.

Canadian Centre for Occupational Health and Safety - Web Info Service. 2001.

In: 'The Dictionary of Substances and their Effects'. Ed. Gangolli S. Royal Society of Chemistry, 1999.

In: 'Handbook of Environmental Data on Organic Chemicals'. 3rd Edition. Ed. Verschueren. Van Nostrand Reinhold Company, New York 1996.

Supplier Safety Data Sheet; 03/ 2014.

This safety data sheet has been prepared by Ixom Operations Pty Ltd Toxicology & SDS Services.

Reason(s) for Issue:

5 Yearly Revised Primary SDS

Change in Stability and Reactivity

This SDS summarises to our best knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material in the workplace. Since Ixom Operations Pty Ltd cannot anticipate or control the conditions under which the product may be used, each user must, prior to usage, assess and control the risks arising from its use of the material.

If clarification or further information is needed, the user should contact their Ixom representative or Ixom Operations Pty Ltd at the contact details on page 1.

Ixom Operations Pty Ltd's responsibility for the material as sold is subject to the terms and conditions of sale, a copy of which is available upon request.