

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:	Fertilizer; preparation of fertilizers; chemical synthesis; refrigerant, condensation catalyst; latex preservative; manufacture of explosives; rocket fuel
Supplier:	PSE Refrigeration & Air Conditioning
ABN:	48 005 815 770
Street Address:	4/5 Kearney St, Bayswater Victoria, Australia, 3153
Telephone Number:	+61 3 9729 8224
Facsimile:	+61 3 9729 3228

2. HAZARDS IDENTIFICATION

This material is hazardous according to criteria of ASCC; HAZARDOUS SUBSTANCE.	
Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.	
Risk Phrases:	Flammable. Toxic by inhalation. Causes burns. Risk of serious damage to eyes. Very toxic to aquatic organisms.
Safety Phrases	Keep locked up and out of the reach of children. Keep container in a well ventilated place. Keep away from sources of ignition - No Smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible).
Poisons Schedule:	S6 Poison

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Risk Phrases
Ammonia	7664-41-7	>99.5%	R10 R23 R34 R37 R41 R50
Impurities	N/A	<0.5%	N/A

4. FIRST AID MEASURES

For advice, contact a Poisons Information Centre (Phone eg. Australia 131 126; New Zealand 0 800 764766) 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.
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 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.

5. FIRE FIGHTING MEASURES

Hazards from Combustion products	Combustible 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.
Precautions for fire fighters and special protective equipment:	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.
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.
Hazchem Code:	2RE

6. ACCIDENTAL RELEASE MEASURES

<p>Emergency procedures:</p>	<p>If contamination of sewers or waterways has occurred advise emergency services or State Department of Agriculture.</p>
<p>Methods and materials for containment and clean up:</p>	<p>Shut off all possible sources of ignition. Avoid breathing in vapours. Work up wind or increase ventilation. Clear area of all unprotected personnel. Wear protective equipment to prevent skin and eye contamination and the inhalation of vapours. Stop leak if safe to do so.</p>
<p>Additional information:</p>	<p>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 vapourisation due to liberation of heat upon mixing with water.</p>

7. HANDLING AND STORAGE

<p>Conditions for safe storage:</p>	<p>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 and acetaldehyde. 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).</p>
<p>Precautions for safe handling:</p>	<p>Avoid skin and eye contact and breathing in vapour. Keep out of reach of children.</p>

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

<p>National Exposure Standards</p> <p>TWA (Time Weighted Average)</p> <p>STEL (Short Term Exposure Limit)</p>	<p>8 hr TWA = 17 mg/m³ (25 ppm) 15 min STEL = 24 mg/m³ (35 ppm)</p> <p><i>*As published by the National Occupational Health and Safety Commission.</i></p> <p>The time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.</p> <p>The average airborne concentration over a 15 minute period 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.</p>
<p>These 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 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.</p>	
<p>Engineering controls:</p> <p>Personal Protective Equipment</p> <p>GENERAL</p> <p>EYE</p> <p>SKIN</p> <p>RESPIRATORY</p>	<p>Ensure ventilation is adequate to maintain air concentrations below Exposure Standards. Use with local exhaust ventilation or while wearing air supplied mask. 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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

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:	0.68 (-33 °C)
Relative Vapour Density (air=1):	0.6
Vapour Pressure (20 °C):	882 kPa
Flash Point (°C):	Not available
Flammability Limits (%):	15.5 - 25
Autoignition Temperature (°C):	669
% Volatile by Volume:	100
Boiling Point/Range (°C):	-33.4
pH:	11.6 (1M @ 25 °C)
Freezing Point/Range (°C):	-77.7

10. STABILITY AND REACTIVITY

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.
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 hypochlorous acid , calcium , acetaldehyde .
Hazardous decomposition products:	Hydrogen.
Hazardous reactions:	Corrosive to copper , zinc and their alloys .

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.
Long Term Effects:	Chronic exposure to ammonia may cause chemical pneumonitis and kidney damage.
Toxicological Data:	Inhalation LC50 (rat): 2000 ppm/4hr. SKIN: Irritant (human). EYES: Severe irritant (human). 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 unacclimatitised 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 and mobility	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.
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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.
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14. TRANSPORT INFORMATION

<u>Road and Rail Transport:</u>	
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
Class-primary:	2.3 Toxic Gas
Subrisk 1:	8 Corrosive
Proper Shipping Name:	AMMONIA, ANHYDROUS
Hazchem Code:	2RE
<u>Marine Transport:</u>	
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
Class-primary:	2.3 Toxic Gas
Subrisk 1:	8 Corrosive
Proper Shipping Name:	AMMONIA, ANHYDROUS
IMDG EMS Fire:	F-C
IMDG EMS Spill:	S-C
<u>Air Transport:</u>	
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 aircraft and cargo aircraft.	
UN No:	1005
Class-primary:	2.3 Toxic Gas
Subrisk 1:	8 Corrosive
Proper Shipping Name:	AMMONIA, ANHYDROUS

15. REGULATORY INFORMATION

Classification:	This material is hazardous according to criteria of ASCC; HAZARDOUS
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	SUBSTANCE.
Hazard Category:	T : Toxic C: Corrosive
Risk Phrase(s):	R10: Flammable. R23: Toxic by inhalation. R34: Causes burns. R41: Risk of serious damage to eyes.
Safety Phrase(s):	S1/2: Keep locked up and out of the reach of children. S9: Keep container in a well ventilated place. S16: Keep away from sources of ignition - No smoking. S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36/37/39: Wear suitable protective clothing, gloves and eye/face protection. S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible).
Poisons Schedule:	S6 Poison.
This material is listed on the Australian Inventory of Chemical Substances (AICS).	

16. OTHER INFORMATION

<p>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.</p> <p>This MSDS 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 PSE Refrigeration 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.</p> <p>If clarification or further information is needed, the user should contact PSE Refrigeration & Air Conditioning at the contact details on page 1.</p> <p>PSE Refrigeration & Air Conditioning's responsibility for the material as sold is subject to the terms and conditions of sale, a copy of which is available upon request.</p>	
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