

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

1.1 Product identifier

Product name AMMONIA
Synonym(s) 003 - SDS NUMBER • AMMONIA ANHYDROUS • ANHYDROUS AMMONIA • PRODUCT CODES: 160, 175, 178, 230, 300 • R717

1.2 Uses and uses advised against

Use(s) AQUEOUS AMMONIA • CHEMICAL REAGENT • HEAT TREATMENT • NITRIDING AGENT • REFRIGERANT

1.3 Details of the supplier of the product

Supplier name BOC LIMITED (AUSTRALIA)
Address 10 Julius Avenue, North Ryde, NSW, 2113, AUSTRALIA
Telephone 131 262, (02) 8874 4400
Fax 132 427 (24 hours)
Website <http://www.boc.com.au>

1.4 Emergency telephone number(s)

Emergency 1800 653 572 (24/7) (Australia only)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

GHS classification(s) Flammable Gases: Category 2
Acute Toxicity: Inhalation: Category 3
Gases Under Pressure: Liquefied gas
Skin Corrosion/Irritation: Category 1B
Aquatic Toxicity (Acute): Category 1

2.2 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.

PRODUCT NAME AMMONIA**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 a 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 if 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.

2.3 Other hazards

Asphyxiant. Effects are proportional to oxygen displacement.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Substances / Mixtures

| Ingredient | CAS Number | EC Number | Content (v/v) |
|------------|------------|-----------|---------------|
| AMMONIA | 7664-41-7 | 231-635-3 | >99.5% |

4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye Hold eyelids apart and flush the eye continuously with water. Continue flushing until advised to stop by the PIC or a doctor, or for at least 15 minutes.

Inhalation If inhaled, remove from contaminated area. Remove contaminated clothing and check there is no obstruction to the airway. If breathing is weak or has ceased, give artificial respiration. Further treatment should be symptomatic and supportive. Consult doctor and recommend admission to hospital for observation. For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor.

Skin Cold burns: Remove contaminated clothing and gently flush affected areas with warm water (30°C) for 15 minutes. Apply sterile dressing and treat as for a thermal burn. For large burns, immerse in warm water for 15 minutes. DO NOT apply any form of direct heat. Seek immediate medical attention.

Ingestion No information provided.

First aid facilities Eye wash facilities and safety shower are recommended.

4.2 Most important symptoms and effects, both acute and delayed

Corrosive. Over exposure to low levels may result in irritation with coughing and bronchospasm. Acute exposure to high levels may result in pulmonary oedema and asphyxiation.

4.3 Immediate medical attention and special treatment needed

Obtain medical assistance. Treat with a corticosteroid spray as soon as possible after inhalation.

5. FIRE FIGHTING MEASURES

5.1 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.

5.2 Special hazards arising from the substance or mixture

Gas is flammable within certain vapour concentration limits and can form explosive mixtures with air. Gas is lighter than air and will generally disperse, however may concentrate in hollows or sumps. Dissolves exothermically in water. Corrosive to metals evolving flammable hydrogen. Eliminate all ignition sources including cigarettes, open flames, spark producing switches/tools, heaters, naked lights, pilot lights, mobile phones, etc when handling.

5.3 Advice for firefighters

Temperatures in a fire may cause cylinders to rupture and internal pressure relief devices to be activated. Cool cylinders or containers exposed to fire by applying water from a protected location. Do not approach cylinders or containers suspected of being hot. Remove cool cylinders from the path of the fire. Evacuate the area if unable to keep cylinders cool. If a flame from the cylinder is impinging on flammable materials or other cylinders then evacuate the area. If the cylinder is standing alone and the flame is not impinging on flammable materials or other cylinders then let the flame continue until all gas has been consumed. Ensure working area is well ventilated before re-entry. Products of combustion include oxides of nitrogen which are hazardous.

5.4 Hazchem code

2RE

2 Fine Water Spray.

R Wear liquid-tight chemical protective clothing and breathing apparatus. Dilute spill and run-off.

E Evacuation of people in and around the immediate vicinity of the incident should be considered.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

If the cylinder is leaking, evacuate area of personnel. Inform manufacturer/supplier of leak. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ensure adequate air ventilation. Eliminate all sources of ignition. Consider the risk of potentially explosive atmospheres.

6.2 Environmental precautions

Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.3 Methods of cleaning up

Carefully move material to a well ventilated remote area, then allow to discharge if safe to do so. Do not attempt to repair leaking valve or cylinder safety devices.

6.4 Reference to other sections

See Sections 8 and 13 for exposure controls and disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Do not drag, drop, slide or roll cylinders. The uncontrolled release of a gas under pressure may cause physical harm. Use a suitable hand truck for cylinder movement. Use only in well-ventilated areas. When handling cylinders, use appropriate trolley. Do not drag or roll cylinders.

7.2 Conditions for safe storage, including any incompatibilities

Do not store near sources of ignition or incompatible materials. Cylinders should be stored below 45°C in a secure area, upright and restrained to prevent cylinders from falling. Cylinders should also be stored in a dry, well ventilated area constructed of non-combustible material with firm level floor (preferably concrete), away from areas of heavy traffic and emergency exits. Outside or detached storage preferred. Keep out of direct sunlight. Refer to AS/NZ 2022: Anhydrous Ammonia - Storage and Handling and AS 4332: The Storage and Handling of Gases in Cylinders.

7.3 Specific end use(s)

No information provided.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Exposure standards

| Ingredient | Reference | TWA | | STEL | |
|------------|-----------|-----|-------------------|------|-------------------|
| | | ppm | mg/m ³ | ppm | mg/m ³ |
| Ammonia | SWA (AUS) | 25 | 17 | 35 | 24 |

Biological limits

No biological limit values have been entered for this product.

8.2 Exposure controls

Engineering controls Avoid inhalation. Use in well ventilated areas. Maintain vapour levels below the recommended exposure standard. In poorly ventilated areas, mechanical flameproof extraction ventilation is recommended.

PPE

- Eye / Face** Wear safety glasses.
- Hands** Wear leather gloves.
- Body** Wear coveralls and safety boots.
- Respiratory** Wear a Type K (Ammonia) respirator. Where an inhalation risk exists, wear Self Contained Breathing Apparatus (SCBA) or an Air-line respirator. At high vapour levels, wear Self Contained Breathing Apparatus (SCBA) or an Air-line respirator.



9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

| | |
|---------------------------|---------------------------|
| Appearance | COLOURLESS GAS OR LIQUID |
| Odour | PUNGENT SUFFOCATING ODOUR |
| Flammability | FLAMMABLE GAS CATEGORY 2 |
| Flash point | NOT APPLICABLE |
| Boiling point | -33.4°C |
| Melting point | -78°C |
| Evaporation rate | NOT APPLICABLE |
| pH | NOT APPLICABLE |
| Vapour density | 0.597 (Air = 1) |
| Specific gravity | NOT APPLICABLE |
| Solubility (water) | 0.576 kg/kg @ 20°C |
| Vapour pressure | 960 kPa @ 25°C |
| Upper explosion limit | 28 % |
| Lower explosion limit | 15 % |
| Partition coefficient | NOT AVAILABLE |
| Autoignition temperature | 651°C |
| Decomposition temperature | NOT AVAILABLE |
| Viscosity | NOT AVAILABLE |
| Explosive properties | NOT AVAILABLE |
| Oxidising properties | NOT AVAILABLE |
| Odour threshold | NOT AVAILABLE |

9.2 Other information

| | |
|----------------------|------------------------------|
| Critical pressure | 11,277 kPa |
| Critical temperature | 132.4°C (Liquefiable gas) |
| Liquid density | 602 kg/m ³ @ 25°C |
| % Volatiles | 100 % |

10. STABILITY AND REACTIVITY

10.1 Reactivity

Carefully review all information provided in sections 10.2 to 10.6.

10.2 Chemical stability

Stable under recommended conditions of storage.

10.3 Possibility of hazardous reactions

Polymerization will not occur.

10.4 Conditions to avoid

Avoid shock, friction, heavy impact, heat, sparks, open flames and other ignition sources.

10.5 Incompatible materials

Ammonia is stable. Ammonia has potentially explosive or violent reactions with strong oxidisers, nitric acid, fluorine and nitrogen oxide. Ammonia forms explosive products with silver chloride, silver oxide, bromine, iodine and mercury. Ammonia is incompatible or has potentially hazardous reactions with silver, acetaldehyde, acrolein, boron, perchlorates, chlorine monoxide, chlorites, nitrogen tetroxide and sulphur. Ammonia is hygroscopic and will absorb moisture from the air to form an alkaline aqueous solution. Commercial anhydrous ammonia contains some moisture and readily attacks copper, cadmium, zinc (galvanised), tin and their alloys such as brass and bronze. These materials must not be used in ammonia systems). Iron and steel, aluminium, and their alloys (when free from copper) are normally resistant to corrosion by ammonia. Piping should be rigid steel except where connections are required such as between cylinders. For industrial ammonia applications steel-reinforced flexible neoprene line is recommended for pig-tails. When handling higher purities either stainless steel or PTFE (Teflon) is used. Other suitable materials of construction include glass, ceramic, Peek, tantalum and titanium. Stress-corrosion Cracking - Though carbon steel is widely used for ammonia storage and transport, carbon steel can be subject to stress corrosion cracking and there have been dozens of instances of this occurring. To combat this phenomenon, appropriate measures must be taken when using carbon steel as a pressure vessel.

10.6 Hazardous decomposition products

This material will not decompose to form hazardous products other than that already present.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

| | |
|---------------------------------|---|
| Acute toxicity | Toxic if inhaled. Extremely irritating and corrosive. Characteristic smell from 5 ppm and irritant effects usually provides good warning properties. Over exposure to low levels may result in irritation with coughing and bronchospasm. Acute exposure to high levels may result in pulmonary oedema and asphyxia. Delayed reaction including pulmonary oedema may occur up to 24 hours after exposure. |
| | AMMONIA LC50 (Inhalation): 2000 ppm / 4 hours (rat) |
| Skin | Causes severe burns. Contact may result in irritation, redness, pain, rash, dermatitis and possible burns. |
| Eye | Causes severe burns. Contact may result in irritation, lacrimation, pain, redness and corneal burns with possible permanent eye damage. |
| Sensitization | Not classified as causing skin or respiratory sensitisation. However, over exposure may cause respiratory sensitisation with asthma-like effects. |
| Mutagenicity | Not classified as a mutagen. However, some animal studies have shown possible evidence for mutagenic effects. |
| Carcinogenicity | Not classified as a carcinogen. |
| Reproductive | Not classified as a reproductive toxin. |
| STOT – single exposure | Over exposure may result in irritation to nose and throat. High level exposure may result in significant toxicity effects to the respiratory system. Symptoms include shortness of breath (dyspnoea), cyanosis, dizziness, headache, nausea, and a build up of fluids in the lungs (pulmonary oedema). |
| STOT – repeated exposure | Chronic exposure damages the respiratory system resulting in long-term shortness in breath (dyspnoea), persistent cough and obliterative bronchuolitis. |
| Aspiration | Not classified as causing aspiration. |

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Very toxic to aquatic organisms.

PRODUCT NAME AMMONIA**12.2 Persistence and degradability**

No information provided.

12.3 Bioaccumulative potential

No information provided.

12.4 Mobility in soil

No information provided.

12.5 Other adverse effects

May cause pH changes in aqueous ecological systems.

13. DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods****Waste disposal** Cylinders should be returned to the manufacturer or supplier for disposal of contents.**Legislation** Dispose of in accordance with relevant local legislation.**14. TRANSPORT INFORMATION****CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE**

| | LAND TRANSPORT (ADG) | SEA TRANSPORT (IMDG / IMO) | AIR TRANSPORT (IATA / ICAO) |
|--------------------------------------|-------------------------|-------------------------------|--------------------------------|
| 14.1 UN Number | 1005 | 1005 | 1005 |
| 14.2 Proper Shipping Name | AMMONIA, ANHYDROUS | AMMONIA, ANHYDROUS | AMMONIA, ANHYDROUS |
| 14.3 Transport hazard classes | 2.3, 8 | 2.3, 8 | 2.3, 8 |
| 14.4 Packing Group | None Allocated | None Allocated | None Allocated |

14.5 Environmental hazards No information provided**14.6 Special precautions for user****Hazchem code** 2RE**GTEPG** 2B3**EMS** F-C, S-U**Other information** Ensure cylinder is separated from driver. Refer to the ADG Code for regulations on transport of dangerous goods.**15. REGULATORY INFORMATION****15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****Poison schedule** Classified as a Schedule 6 (S6) Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).**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 the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)].

| | | |
|---------------------|---|-------------------------------|
| Hazard codes | C | Corrosive |
| | F | Flammable |
| | N | Dangerous for the environment |
| | T | Toxic |

PRODUCT NAME AMMONIA

| | | |
|-----------------------------|---|--|
| Risk phrases | R10 | Flammable. |
| | R23 | Toxic by inhalation. |
| | R34 | Causes burns. |
| | R50 | Very toxic to aquatic organisms. |
| Safety phrases | 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 where possible). |
| | S61 | Avoid release to the environment. Refer to special instructions/safety data sheets. |
| Inventory listing(s) | AUSTRALIA: AICS (Australian Inventory of Chemical Substances) All components are listed on AICS, or are exempt. | |

16. OTHER INFORMATION

Additional information The storage of significant quantities of gas cylinders must comply with AS4332 The storage and handling of gases in cylinders.

Application method: Gas withdrawal: regulator of suitable pressure and flow rating fitted to cylinder or manifold with low pressure gas distribution to equipment. Liquid withdrawal: appropriate refrigeration equipment or appropriate heat exchanger to vaporise the liquid.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:

The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

HEALTH EFFECTS FROM EXPOSURE:

It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

| | | |
|----------------------|-----------------------|---|
| Abbreviations | ACGIH | American Conference of Governmental Industrial Hygienists |
| | CAS # | Chemical Abstract Service number - used to uniquely identify chemical compounds |
| | CNS | Central Nervous System |
| | EC No. | EC No - European Community Number |
| | EMS | Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods) |
| | GHS | Globally Harmonized System |
| | GTEPG | Group Text Emergency Procedure Guide |
| | IARC | International Agency for Research on Cancer |
| | LC50 | Lethal Concentration, 50% / Median Lethal Concentration |
| | LD50 | Lethal Dose, 50% / Median Lethal Dose |
| | mg/m ³ | Milligrams per Cubic Metre |
| | OEL | Occupational Exposure Limit |
| | pH | relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline). |
| | ppm | Parts Per Million |
| | STEL | Short-Term Exposure Limit |
| | STOT-RE | Specific target organ toxicity (repeated exposure) |
| | STOT-SE | Specific target organ toxicity (single exposure) |
| | SUSMP | Standard for the Uniform Scheduling of Medicines and Poisons |
| | SWA | Safe Work Australia |
| TLV | Threshold Limit Value | |
| TWA | Time Weighted Average | |

PRODUCT NAME AMMONIA**Revision history**

| Revision | Description |
|----------|----------------------|
| 2.4 | Standard SDS Review |
| 2.3 | Standard SDS Review |
| 2.2 | Standard SDS Review |
| 2.1 | Standard SDS Review |
| 2.0 | Standard SDS Review. |
| 1.0 | Initial SDS creation |

Report status

This document has been compiled by RMT on behalf of the manufacturer, importer or supplier of the product and serves as their Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer, importer or supplier or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer, importer or supplier.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

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Revision: 2.4
SDS date: 16 March 2015

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