

MATERIAL SAFETY DATA SHEET (MSDS)

AMMONIA

DATE: May 2010

Version 2

Ref. No.: MS025

1 PRODUCT AND COMPANY IDENTIFICATION

Product Name	Ammonia
Chemical Formula	NH ₃
Trade name	Ammonia
Colour coding	Silver body with a Red(A.11) circle below the valve, and a yellow band immediately below the red circle
Valve	CGA240-3/8 inch – 18 NGT right hand female
Company Identification	African Oxygen Limited 23 Webber Street Johannesburg, 2001 Tel. No: (011) 490-0400 Fax No: (011) 490-0506

EMERGENCY NUMBER 0860111185 or (011) 873 4382
(24 hours)

2 COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Ammonia
Chemical family	Corrosive, caustic, reactive gas
Synonyms	Anhydrous ammonia, R717
CAS No.	7664-41-7
UN No.	1005
ERG No.	125
Hazchem	Warning Corrosive toxic gas

3 HAZARDS IDENTIFICATION

Main Hazards Irritating or corrosive to exposed tissues. Inhalation of vapours may result in pulmonary oedema and chemical pneumonitis. Contact with liquid product may cause frostbite or freeze burns, in exposed tissues. All cylinders are portable gas containers and must be regarded as pressure vessels at all times.

Adverse Health Effects. Inhalation of high concentrations produces violent coughing due to the local action on the respiratory tract. If rapid escape is not possible, severe lung irritation, pulmonary oedema and death can result. Lower concentrations cause eye irritation, laryngitis and bronchitis.

Biological Hazards. Because of its alkaline properties, long-term exposure to flora can cause damage. Aquatic fauna can also be affected should the pH of their environment change due to long-term exposure to high concentrations of ammonia.

Vapour Inhalation. Ammonia acts principally on the upper respiratory tract, where it exerts an alkaline, caustic action. It produces respiratory reflexes such as coughing and arrest of respiration. It affects the conjunctiva and cornea immediately. Inhalation causes acute inflammation of the respiratory organs, coughing, oedema of the lungs, chronic bronchial catarrh, secretion of saliva and retention of urine.

Eye Contact Exposure to high gas concentrations may cause temporary blindness and severe eye damage. Direct contact of the eyes with liquid anhydrous ammonia will produce serious eye burns.

Skin Contact Liquid anhydrous ammonia produces skin burns on contact.

Ingestion Swallowing of the liquid results in severe corrosive action of the mouth, throat, and stomach.

4 FIRST AID MEASURES

Prompt medical attention is mandatory in all cases of overexposure. Rescue personnel should be equipped with self-contained breathing apparatus. Any conscious person who has inhaled ammonia causing irritation should be assisted to an uncontaminated area and inhale fresh air. A person overcome by ammonia should immediately be carried to an uncontaminated area. If breathing has ceased, artificial respiration must be started immediately, preferably by trained personnel. If breathing is weak or has been restored by artificial respiration, oxygen may be administered. Summon a physician immediately for anyone who has been burned or overcome by ammonia. Until a physician arrives, and after having accomplished a thorough removal of ammonia as possible, keep the patient warm and quiet, and take such specific action as may be indicated.

Eye Contact Persons with potential exposure to ammonia should not wear contact lenses. Call a physician at once. Immediately begin irrigation of the eyes with copious amounts of clean water while holding the eyelids apart. Continue irrigation for 15 minutes. Repeat this procedure every 10 minutes for an hour, each time irrigating for a period of 5 minutes. If readily available, a 5% boric acid solution may be used instead of water, but irrigation must not be delayed while such a solution is sought or prepared. Prompt and thorough irrigation is of primary importance. Any standard anaesthetic solution for ophthalmic use ordered by the physician may be instilled for control of severe pain, but only after the 15 minute period of irrigation has been completed. Continuous cold boric acid compresses should be used for cases of severe injury, in addition to irrigation.

No oils or ointments should be instilled until after the eye has been examined by a qualified physician, and then only as prescribed by him. Ulcers of the cornea should be treated by an ophthalmologist.

Skin Contact If skin contact is extensive and emergency showers available, the victim should get under the emergency shower immediately. Contaminated clothing and shoes should be removed under the shower. In other cases, the affected areas should be washed thoroughly with large amounts of running water for at least 15 minutes. Do not apply salves or ointments or cover burns with dressing; however, protect the injured area with a clean cloth prior to medical care. Do not attempt to neutralise the ammonia. Subsequent medical treatment is otherwise the same as for thermal burns

Inhalation The conscious person who has inhaled a concentration of ammonia which causes irritation effects should go to an uncontaminated area and inhale fresh air or oxygen. Eye, nose and throat irritation should be treated as described below for more serious exposures. However, if the exposure has been to minor concentrations for a limited time, usually no treatment will be required. A worker overcome by ammonia must be carried to an uncontaminated atmosphere and, if breathing is laboured or has ceased, given artificial respiration (back-pressure, arm lift, or mouth-to-mouth resuscitation) immediately, preferably by trained personnel. When breathing has been restored, 100% oxygen is administered, but not for more than 1 hour of continuous treatment at one time. Oxygen therapy may be interrupted after 1 hour, and reinstated as the clinical condition indicates. Observe for laryngeal spasm and perform tracheotomy if indicated. In case of severe exposure, the patient should breathe 100% oxygen under positive exhalation pressure (4cm) for one-half hour periods every hour. Treatment may be continued in this way until symptoms subside or other clinical indications for interruption appear.

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Contact with nose & throat. Irrigate the nose and mouth continuously for 15 minutes. If the patient can swallow, encourage him to drink large quantities of 0,5% citric acid solution or lemonade. Never give anything by mouth to an unconscious person.

Ingestion If liquid anhydrous ammonia has been swallowed, call a physician immediately. If the patient is conscious and able, he should drink large amounts of water to dilute the chemical. Do not induce vomiting if the patient is in shock, extreme pain or is unconscious. If vomiting begins, place the patient face down with head lower than hips; this prevents vomit from entering the lungs and causing further injury

5 FIRE FIGHTING MEASURES

Extinguishing media. Fog-water spray. (In the absence of fog equipment, a fine spray of water may be used.) Use media suitable for surrounding fire. Although ammonia does not represent a serious flammability hazard, mixtures of air and ammonia containing from 15% to 28% ammonia vapour by volume will ignite when sparked, or exposed to temperatures exceeding 651 °C.

Specific Hazards High levels of ammonia can produce corrosive effects on tissues and can cause laryngeal and bronchial spasm and oedema so as to obstruct breathing.

Emergency Actions. Rescue personnel should be equipped with self-contained breathing apparatus. If possible, stop the flow of gas. Since ammonia is soluble in water, it is the best extinguishing media - not only in extinguishing the fire, but also absorbing the escaped ammonia gas. Evacuate the area. All cylinders should be removed from the vicinity of the fire. Cylinders that cannot be removed should be cooled with water from a safe distance. Cylinders which have been exposed to excessive heat should be clearly identified and returned to the supplier. CONTACT THE NEAREST AFROX BRANCH.

Protective Clothing. Self-contained breathing apparatus. Safety gloves, Goggles and shoes, or boots, should be worn when handling cylinders.

Environmental precautions. As the gas is lighter than air, ensure that it is not trapped in confined spaces. Knock down pockets of gas with fog-water spray, and ventilate the area using forced-draft if necessary. Prevent from entering sewers and drains.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions. Personnel working with anhydrous ammonia should be thoroughly familiar with safety precautions for handling a gas corrosive to human tissue as well as measures for handling emergencies. A gas mask must be worn when breaking and making connections, or pressuring a

system. Self-contained breathing apparatus should be available both up and down wind.

Environmental Precautions. Because of its high alkalinity and solubility in water, ammonia can alter the pH balances of surface water, soil and plants. Should they be exposed to high concentrations for any length of time, these changes in pH could be detrimental to both flora and fauna.

Small spills. Only personnel trained for, and designated to handle emergencies, should attempt to stop a leak. Respiratory equipment of a type suitable for ammonia must be worn. All persons not so equipped must leave the affected area until the leak has been stopped. If ammonia vapour is released, the irritating effect of the vapour will typically force personnel to leave the area before they have been exposed to dangerous concentrations. Knock down small amounts of ammonia using a fog-water spray. Prevent from entering sewers or drains. Ventilate the area using forced-draught ventilation if necessary.

Large spills Evacuate all unprotected personnel to upwind areas. Disperse leaks with water spray or fog to lower concentration of ammonia gas. Neutralise contaminated area with a dilute acid, and deluge with plenty of water. Rotate a leaking cylinder to allow gas instead of liquid to escape. Keep area isolated until all gas has been dispersed. Evaporation is very rapid causing ice to form on leaking cylinders

7 HANDLING AND STORAGE

Always store full cylinders in upright position. Avoid dragging, rolling or sliding cylinders. Use trolleys for handling. Cylinders should be stored in a well ventilated area on a hard dry surface. Ventilation inlets should be at ceiling and floor level. Cylinders must be used on a "first in - first out" basis. Keep cylinders away from sources of heat. Keep away from children.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Hazards. Inhalation of high concentrations produces violent coughing due to local action on the respiratory tract. If rapid escape is not possible, severe lung irritation, pulmonary oedema and death can result. Lower concentrations cause eye irritation, laryngitis and bronchitis. Exposure to high gas concentrations may cause temporary blindness and severe eye damage. Direct contact of the eyes with liquid anhydrous ammonia will produce serious eye burns. Liquid anhydrous ammonia produces skin burns on contact.

TLV 25ppm
STEL 35ppm

Engineering control measures. Engineering control measures are preferred to reduce exposures. General methods include mechanical ventilation, process or personal enclosure, and control of process conditions. Administrative controls and personal protective equipment may also be required. Use a suitable flameproof ventilation system separate from other exhaust ventilation systems. Exhaust direct to outside and supply sufficient replacement air to make up for air removed by exhaust system.

Personal protection Eyes - Chemical goggles
Hands - Rubber gloves
Skin - rubber or plastic apron

9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DATA

Chemical Symbol	NH3
Molecular Weight	17,031
Specific Volume @ 20°C & 101,325 kPa	1405,6 ml/g
Boiling point @ 101,325 kPa	-33,4 °C
Relative density (Air = 1) @ 101,325 kPa	0,599
Flammability levels in air	16 - 25% (by vol.)
Autoignition temperature	651 °C
Colour	None
Taste	Alkaline
Odour	Pungent

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10 STABILITY AND REACTIVITY

Conditions to avoid. Heating of cylinders, as the increase in pressure bears a direct relationship to increase in temperature. When the gas is exposed to temperatures in the range 449°C at 101,325kPa, dissociation will occur, with the release of nitrogen and hydrogen. The hydrogen could then form explosive gas/air mixtures. Never use cylinders as rollers or supports, or for any other purpose than the storage of ammonia.

Incompatible Materials. Most common metals are not affected by dry ammonia. However, when combined with water vapour, ammonia will attack copper, zinc, or alloys containing copper as a major alloying element. Therefore, these materials should not be used in contact with ammonia.

Hazardous Decomposition Products See above, Conditions to Avoid

11 TOXICOLOGICAL INFORMATION

Acute Toxicity Ammonia is not a systemic poison
 Skin & eye contact Severe irritant

Chronic Toxicity Chronic irritation to the eyes, nose, and upper respiratory tract may result from repeated exposure to the vapours.

Carcinogenicity: No known effect.
 Mutagenicity: Genetic mutations observed in bacterial and mammalian test systems.

Reproductive Hazards: No known effect

National Legislation: None
 (For further information see Section 3. Adverse Health Effects).

12 ECOLOGICAL INFORMATION

Ammonia gas can cause damage to the ecology due to its high alkalinity and affinity for water. pH changes can occur in the immediate environs of a spill which could affect both flora and fauna

13 DISPOSAL CONSIDERATIONS

Disposal Methods. Ammonia may be disposed of by discharge into water of sufficient volume to absorb it. Disposal of the resultant ammonium hydroxide, including and subsequent neutralisation products, must be done in an environmentally safe manner that, for example, will not be harmful to aquatic life. Large amounts should only be handled by the gas supplier.

14 TRANSPORT INFORMATION

ROAD TRANSPORTATION

UN No. 1005
 Class 2.3 Toxic gas
 Subsidiary risk Corrosive, inhalation hazard
 ERG No 125
 Hazchem warning Toxic gas

SEA TRANSPORTATION

IMDG 1005
 class 2.3
 Label Toxic gas

AIR TRANSPORTATION

ICAO/IATA Code 1005
 Class 2.3
 Subsidiary risk Toxic, corrosive gas
 Packaging group
 - Cargo 200
 - Passenger Forbidden
 Maximum quantity allowed
 - Cargo 25kg
 - Passenger Forbidden

15 REGULATORY INFORMATION

EEC Hazard class Toxic, corrosive gas

Risk phrases	R10	Flammable
	R23	Toxic By Inhalation
	R30	Can become highly flammable in use
	R50	Very toxic to aquatic organisms
Safety phrases	S(1/2)	Keep locked up and out of reach of children
	S9	Keep container in a well-ventilated place
	S16	Keep away from sources of ignition
	S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
	S(36/37/39)	Wear suitable protective clothing, gloves and eye/face protection
S45	In case of accident or if you feel unwell, seek medical advice immediately and show label where possible	

National Legislation None
 Refer to SANS 10265 for explanation of the above

16 OTHER INFORMATION

Bibliography
 Compressed Gas Association, Arlington, Virginia
 Handbook of Compressed Gases - 3rd Edition
 Matheson. Matheson Gas Data Book - 6th Edition
 SANS 10265 - Labelling of Dangerous Substances

17 EXCLUSION OF LIABILITY

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