










Material Safety Data Sheet

NFPA Classification	DOT / TDG Pictograms	WHMIS Classification	PROTECTIVE CLOTHING
Health 3 Flammability 0 Reactivity Q> Specific Hazard V		  	    
<i>Section I. Chemical Product</i>			
PRODUCT NAME/ TRADE NAME	Anhydrous Ammonia, Agricultural Grade, 82-0-0		
SYNONYM	This Material Safety Data Sheet applies to the following Fertiglobe products: Synonyms: 82-0-0 Anhydrous Ammonia Liquefied ammonia Ammonia, Anhydrous, Standard Grade	MSDS prepared by the Environment, Health and Safety Department on: Fertiglobe	
CHEMICAL NAME	Ammonia		
CHEMICAL FAMILY	Alkali		
CHEMICAL FORMULA	NH ₃		
MATERIAL USES	Agricultural industry: Fertilizer. Industrial applications: Manufacture of chemicals. Manufacture of synthetic fibers. Refrigerant. Cleaning solutions. Manufacture of specialty fertilizers.		

Section II. Hazards Ingredients.

NAME	CAS#	Exposure Limits (ACGIH)						%by Weight
		TLV-TWA mg/m ³	TLV-TWA ppm	STEL mg/m ³	STEL ppm	CEIL mg/m ³	CEIL ppm	
Ammonia anhydrous Water	7664-41-7 7732-18-5	17	25	24	35	99.8	2	
TOXICOLOGICAL DATA ON Anhydrous Ammonia 82-0-0:								

Section III. Hazards Identification.

POTENTIAL ACUTE HEALTH EFFECTS

Anhydrous ammonia gas or liquid is very corrosive to body tissues, reacting with body moisture on contact.

The odour threshold for ammonia is on average 17 PPM although the range of sensitivity ranges from 0.7 PPM to 50 PPM for acclimatized individuals. Generally, concentrations of up to 25 PPM are tolerated although unpleasant and pungent. Above this concentration, irritation of the eyes, nose and throat may begin. The extent of irritation increases with increasing ammonia concentration.

Eye and throat irritation is more pronounced between 100 and 400 PPM. Above 400 PPM, skin irritation is noticeable and immediate throat irritation and coughing will result. NIOSH has established 300 PPM as the concentration immediately dangerous to life and health (IDLH), which is defined as the concentration above which self-rescue may be difficult or impossible due to physiological effects. At concentrations between 1000 PPM and 2500 PPM increasing chest tightness, bronchospasm and severe eye and skin irritation will result. Delayed effects such as chemical pneumonitis and pulmonary edema may develop several hours after exposure. At concentrations above 2500 PPM, laryngeal spasm may occur resulting in rapid asphyxia. Effects may be more pronounced at lower concentrations in children, the elderly, and persons with impaired lung function.

Eyes:

Eye irritant. May cause severe eye irritation with corneal injury and permanent vision impairment.

Skin:

Skin irritant. Contact may cause severe skin irritation, chemical burns, and blistering. Contact with vaporizing liquid may cause frostbite due to rapid evaporative cooling. Cooling effect may mask the extent of corrosive injury received.

Inhalation:

Irritating to entire respiratory tract. Excessive overexposure may cause severe irritation to the upper respiratory tract and potential lung damage.

Ingestion:

Ingestion is not a likely route of exposure due to the physical state of the substance (a compressed, liquefied gas).

POTENTIAL ACUTE HEALTH EFFECTS

CARCINOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, OSHA.

MUTAGENIC EFFECTS: NONE by ACGIH, EPA, IARC, OSHA.

TERATOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, OSHA. The substance is harmful to the lungs and mucous membranes, Repeated or prolonged exposure to the substance can produce target organ damage. Sub-acute and chronic exposures to concentrations of 100-200 ppm may result in eye irritation while concentrations of 200-1000 ppm may produce eye damage.

Section IV. First Aid Measures

EYE CONTACT

IMMEDIATELY FLUSH EYES WITH WATER for at least 30 minutes, keeping eyelids open. OBTAIN MEDICAL ATTENTION IMMEDIATELY.

MINOR SKIN CONTACT

Flush skin with large amounts of water for at least 30 minutes while removing contaminated clothing and shoes. Obtain immediate medical attention.

EXTENSIVE SKIN CONTACT

No additional information.

MINOR INHALATION

Loosen tight clothing. Allow to rest in a well ventilated area. Give artificial respiration if breathing has stopped. Obtain immediate medical attention.

SEVERE INHALATION

If gases or vapors are present, rescuers must wear self-contained breathing apparatus and an impervious (Level A) encapsulating suit if subject to US OSHA requirements. (29CFR 1910.120 has been deemed to overrule the lesser protection requirements given in 1910.111) In other jurisdictions or if responding under D.O.T. rules (49CFR) full bunker gear or Level B clothing may suffice.

Evacuate affected persons to a safe area as soon as possible. Loosen tight clothing around the neck and waist. If the person is not breathing, perform artificial respiration. If breathing is difficult, administer oxygen. Maintain an open airway. Obtain immediate medical attention. Observation may be warranted. Pulmonary edema may occur several hours after exposure.

SLIGHT INGESTION

If anhydrous ammonia has entered the mouth or throat, begin resuscitation or artificial respiration and continue until victim is breathing. Administer oxygen if available. Obtain immediate medical attention. Do not induce vomiting. Careful removal of the substance from the stomach by medical personnel is required. Call a physician or poison control center immediately. Get immediate medical attention. If tolerated, give no more than 1 cup of milk or water to rinse the mouth and throat and dilute the stomach contents. No more than 8 ounces (1 cup) in adults and 4 ounces (1/2 cup) in children is recommended to minimize the risk of vomiting.

EXTENSIVE INGESTION

No additional information.

Section V. Fire and Explosion Data

THE PRODUCT IS	Flammable.
AUTO-IGNITION TEMPERATURE	651.1°C(1204°F)
FLASH POINT	Not applicable. Material exists as a gas unless confined under pressure.
FLAMMABILITY LIMITS	LOWER: 16% UPPER: 25%
PRODUCTS OF COMBUSTION	Nitrogen oxides (N ₂ , H ₂ O, NO, NO ₂ ...).
FIRE HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES	Slightly flammable in the presence of open flames and sparks. Narrow lower to upper flammability limits (16-25%) makes ignition difficult.
EXPLOSION HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES	Slightly explosive in the presence of reducing materials (hypochlorites or other halogenated compounds). Non-explosive in the presence of open flames and sparks, shocks, heat, oxidizing materials, combustible materials, organic materials, metals, acids, alkalis, or moisture.
FIRE FIGHTING MEDIA AND INSTRUCTIONS	Corrosive. Fire fighters should wear a self contained breathing apparatus and full bunker gear or encapsulated suits. Approach from upwind. If anhydrous ammonia catches fire, stop flow of gas or liquid if it may be done safely. Cool containing vessels with water in order to prevent pressure build-up, autoignition or explosion. Move containing vessels from fire if without risk. Use water fog to suppress vapors. Do not direct water into spilled ammonia. Ammonia is a cryogenic liquid which will cool with evaporation thereby limiting vapor release. Fire water at supply temperature will increase liquid ammonia's temperature resulting in greater evaporation. Contain run-off water for treatment.
SPECIAL REMARKS ON FIRE HAZARDS	When heated to decomposition it emits toxic fumes. Hazardous Combustion Products: Nitrogen oxides
SPECIAL REMARKS ON EXPLOSION HAZARDS	Explosive when mixed with chlorinated materials such as hypochlorites. Forms nitrogen dichloride which explodes spontaneously in air. Reacts similarly with other halogenated materials

Section VI. Accidental Release Measures

SMALL SPILL

Warn personnel to move away. Keep unprotected personnel upwind of spill area. DO NOT APPROACH LIQUID OR VAPOR CLOUD WITHOUT ENCAPSULATING SUIT AND SCBA. If possible to do so without hazard, isolate leak by shutting off supply of ammonia from containing vessel. Use water fog to suppress airborne vapors from leak or spill. DO NOT DIRECT WATER INTO SPILLED LIQUID! ANHYDROUS AMMONIA WILL AUTOREFRIGERATE REDUCING VAPOR RELEASE. ADDITION OF WATER WILL WARM CRYOGENIC LIQUID RESULTING IN GREATER GASIFICATION. Contain run-off water for later recovery and treatment. Call emergency number on this MSDS sheet for assistance.

LARGE SPILL

Corrosive gas. Materials will autorefrigerate under accidental release presenting a cold dense heavier than air vapor cloud or fog. Warn personnel to move away. Keep unprotected personnel upwind of spill area. Evacuate any unprotected personnel who are downwind of spills. Consider an exclusion zone of 1500 metres or 5000 feet around the incident area. Incident Commander may adjust size of exclusion zone based on the circumstances of the emergency and analysis of the threat presented by the release. See Exposure Limits Section for Evacuation Guidelines.

Community Emergency Response Instructions:

- * Stay indoors (unless evacuation has been called)
- * Close all windows and doors
- * Shut off furnace, exhaust fans, and air conditioners
- * Wait for and follow advice from local police or authorities
- * If smell is very strong, breath through a wet cloth

Eliminate all sources of ignition. DO NOT APPROACH LIQUID OR VAPOR CLOUD WITHOUT ENCAPSULATING SUIT AND SCBA. If possible, and personnel are protected by appropriate personal protective equipment, turn leaking container so that gas escapes rather than liquid, or isolate leak by shutting off supply of ammonia from containing vessel. If possible, apply patch or otherwise restrict size of leak. Use water fog to suppress airborne vapors from leak or spill. DO NOT DIRECT WATER INTO SPILLED LIQUID! ANHYDROUS AMMONIA WILL AUTOREFRIGERATE REDUCING VAPOR RELEASE. ADDITION OF WATER WILL WARM CRYOGENIC LIQUID RESULTING IN GREATER GASIFICATION. Contain run-off water for later recovery and treatment. Call Emergency Number on this MSDS sheet for assistance.

Section VII. Handling and Storage

PRECAUTIONS

Keep ammonia handling facilities locked. Keep storage vessels away from direct heat. Ground all equipment. Keep away from incompatible materials such as oxidizing agents, reducing agents, metals, and acids. Keep children away from ammonia storage and handling equipment.

STORAGE

Keep away from combustible materials, heat, and incompatible materials, especially dry or liquid bleach. Ensure facilities are well maintained and emergency response and first aid equipment is readily available. Always ensure there is a nearby source of water for first aid purposes and spill response. Facilities storing or handling ammonia should be equipped with an eyewash and safety shower, or other equipment for emergency decontamination. See requirements under 29 CFR 1910.111.

Section VIII. Exposure Controls/Personal Protection

ENGINEERING CONTROLS

Workers must be trained in the safe handling and use of ammonia. Adequate, well engineered systems must be provided for storage, transfer and use. Process block valves, equipment enclosures and other isolation facilities may be necessary. Provide adequate general or local exhaust systems to maintain concentrations within exposure guidelines.

PERSONAL PROTECTION

The selection of personal protective equipment varies, depending upon conditions of use.

Respiratory Protection:

Use a NIOSH approved chemical cartridge respirator with full face piece for ammonia concentrations up to 300 PPM. Use a positive pressure (pressure demand) SCBA for concentrations above 300 PPM, for emergency response, or for entry into unknown concentrations.

Eye Protection:

Contact lenses should not be worn when handling anhydrous ammonia. Use chemical goggles and a face shield or full face piece air purifying or air supplied respirator.

Skin Protection:

Where chemical contact is unlikely, wear butyl rubber, nitrile, or polyvinyl chloride boots, gloves, rain jacket and pants.

PERSONAL PROTECTION IN CASE OF LARGE RELEASE

Under emergency conditions, where contact with liquid anhydrous ammonia or high concentration gas is probable, chemically resistant, gastight totally encapsulating suits with 60 minute positive pressure SCBA are required.

Ensure that a respiratory protection meeting 29 CFR 1910.134 is in place.

EXPOSURE LIMITS

Consult local authorities for acceptable exposure limits in your jurisdiction.

ACGIH TLV-TWA: 25 ppm, TLV-STEL: 35 ppm.
MSHA STANDARD-air:TWA 25 ppm (18 mg/m3)

U.S. OSHA:

OSHA PEL (Gen Industry):8H TWA 50 ppm (35 mg/m3) REFERENCE:

Code of Federal Regulations 29:1910.1000 OSHA PEL

(Construction):8H TWA 50 ppm (35 mg/m3) REFERENCE:

Code of Federal Regulations 29:1926.55 OSHA PEL (Shipyard):8H

TWA 50 ppm (35 mg/m3) REFERENCE:

Code of Federal Regulations 29:1915.1000

NIOSH REL, AMMONIA in air:10H TWA 25 ppm; STEL 35 ppm; IDLH 300 ppm

AIHA Emergency Response Planning Guidelines:

*ERPG-1: <25 PPM for 1 hour. Objectionable odor.

* ERPG-2: 25-200 PPM for 1 hour. Strong objectionable odor, some eye, nose and throat irritation.

* ERPG-3: 200-1000 PPM for 1 hour. Severe eye and respiratory irritation, without development of life threatening health effects.

National Academy of Sciences 1987 Emergency Exposure Guidance Levels: Up to 24 hour continuous exposure: 100 PPM

Section IX. Physical and Chemical Properties

PHYSICAL STATE AND APPEARANCE	Colorless cryogenic liquid or gas.		
MOLECULAR WEIGHT	17.03	COLOR	Colorless.
pH (10% SOLN/WATER)	12	ODOR	Ammoniacal. (Strong.)
BOILING POINT	-33.35°C (-28°F)	ODOR THRESHOLD	17ppm
MELTING POINT	-77.7°C (-107.9°F)	TASTE	Burning. (Strong.)
CRITICAL TEMPERATURE	Not available.	VOLATILITY	100% (w/w).
SPECIFIC GRAVITY g/cc	0.62 (Water = 1)	SOLUBILITY	Easily soluble in cold or hot water. Soluble in hot water.
BULK DENSITY kg/m³; lbs/ft³ kg/m³; lbs/ft³	620 kg/m ³ ; 38.7 lbs/ft ³ 5.2 lbs/gal (US)	DISPERSION PROPERTIES	See solubility in water, methanol.
VAPOR PRESSURE	6610 mm of Hg (@ 20° C) 93 psi @ 60°F	WATER/OIL DIST. COEFF.	The product is more soluble in water.
VAPOR DENSITY	0.6 (Air = 1)		

Section X. Stability and Reactivity Data

STABILITY	The product is stable.
INSTABILITY TEMPERATURE	Not available.
CONDITIONS OF INSTABILITY	No additional information.
INCOMPATIBILITY WITH VARIOUS SUBSTANCES	Extremely reactive or incompatible with acids. Highly reactive with oxidizing agents and reducing agents. Do not use copper, brass, bronze, or galvanized steel in contact with ammonia. Do not use brazed joints in ammonia service. Forms explosive compounds with many heavy metals such as mercury or silver. Reacts explosively with chlorine, hypochlorites (such as bleach or dry chlorinating chemicals) and other halogens (bromine, iodine, fluorine).
CORROSIVITY	Highly corrosive to copper and its alloys. Slightly corrosive to aluminum and zinc. Very slightly corrosive to mild steel. Non-corrosive to glass or stainless steel (304 or 316).
SPECIAL REMARKS ON REACTIVITY	Incompatible with halogens, aluminum, copper, brass, and zinc. Incompatible with strong acids. Corrosive to brass. Incompatible with copper alloys (stress cracking). Will corrode a wide variety of metals. Contact your sales representative or a metallurgical specialist to ensure compatibility with system equipment.

Section XI. Toxicological Information

SIGNIFICANT ROUTES OF EXPOSURE	Inhalation. Eye contact. Skin contact. Eye contact. Ingestion. Inhalation.
TOXICITY TO ANIMALS	See Section II.
SPECIAL REMARKS ON TOXICITY TO ANIMALS	Hazardous for humans or animal life. Corrosive to skin and eyes on contact. Severe over- exposure can produce lung damage, choking, unconsciousness or death. May cause severe eye irritation.
OTHER EFFECTS ON HUMANS	Slightly to very dangerous in case of skin contact, eye contact, or inhalation. Material may be irritating or corrosive.
SPECIAL REMARKS ON CHRONIC EFFECTS ON HUMANS	Exposure can cause coughing, chest pains, difficulty in breathing. Repeated significant overexposure can cause permanent lung function damage, edema and chemical pneumonitis. May cause serious damage to the eyes.
SPECIAL REMARKS ON OTHER EFFECTS ON HUMANS	No additional remark.

Section XII. Ecological Information

ECOTOXICITY	Hazardous for humans or animal life. Ammonia is a toxic hazard to fish. In low concentrations in water and soil, ammonia acts as a fertilizer to promote plant growth. Under aerobic conditions ammonia will oxidize to nitrate and does not accumulate in the environment. Sub-lethal concentrations in water can have adverse physiological effects on marine species. Free ammonia concentrations of 2.5 mg per litre at pH 7.4 to 8.5 are considered harmful to marine life. In water, free NH ₃ is considered to be the primary toxic form while the much more prevalent NH ₄ OH form is much less harmful.
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Section XIII. Disposal Considerations

WASTE DISPOSAL OR RECYCLING	Call for assistance on treatment and disposal.
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Section XIV. Transport Information

DOT / TDG CLASSIFICATION	<p>U.S. DOT Classification under §172.101 for shipments originating in the United States for U.S. domestic destinations: DOT Class 2.2: Non-flammable compressed gas.</p>
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Shipping documents must have the words "Inhalation Hazard" entered in association with the shipping description, and each bulk package shall have the words "Inhalation Hazard" marked on two opposite sides of the package. Size of the markings must conform to the requirements of §172.302(b).

PIN	UN 1005 PGX
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SPECIAL PROVISIONS FOR TRANSPORT	<p>Not acceptable for transport as a consumer commodity, or as a limited quantity. Not acceptable for transport in public passenger rail vehicles. Transport by passenger aircraft must comply with ICAO Special Provision A1. Not acceptable for transport by passenger ship.</p>
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DOT (U.S.A) (Pictograms)	
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Section XV. Other Regulatory Information and Pictograms

OTHER REGULATIONS

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
 TSCA (Toxic Substance Control Act): This product is listed on the TSCA Inventory.
 CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): This product is on the Domestic Substances List (DSL), and acceptable for use under the provisions of CEPA.
 CERCLA: If the reportable quantity of this product is accidentally spilled, the incident is subject to the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and must be reported to the National Response Centre by calling (800) 424-8802. The reportable spill quantity of this product is 100 lbs.
 SARA HAZARD CATEGORY: This product has been revised according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following category(ies):
 Immediate Health, Delayed Health, Fire, Sudden Release of Pressure, Reactive
 This product also contains the following Section 313 reportable ingredient:

Ammonia Cas # 7664-41-7 Maximum %: 100.0

Subject to the provisions of 40 CFR Part 68 Subpart G - Risk Management Plan if stored in quantities in excess of 10,000 lbs.

CALIFORNIA PROPOSITION 65: The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986 (CA Health and Safety Code Sec 25249.5):

This product contains no chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

OTHER CLASSIFICATIONS

HCS (U.S.A.) HCS CLASS: Toxic.

DSCL (EEC) R10- Flammable.
R23- Toxic by inhalation.

National Fire Protection Association (U.S.A.)

Hazards presented under acute emergency conditions only:

Fire Hazard
Reactivity

Health



Specific Hazard

TDG (Pictograms - Canada)



DSCL (Europe) (Pictograms)



ADR (Europe) (Pictograms)



Section XVI. Other Information

-29 CFR Part 1910
-40 CFR Parts 1-799
-49 CFR Parts 1-199

REFERENCES

- Gazette Part II, Vol. 122, No. 2 Registration SOR/88-64 31 December, 1987 Hazardous Products Act "Ingredient Disclosure List".
- American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances, 2002.
- Corrosion Data Survey, Sixth Edition, 1985, National Association of Corrosion Engineers.
- Fire Protection Guide to Hazardous Materials, (NFPA49, 325M, 491M, and 704), National Fire Protection Association, 10th Ed, 1991.
 - The Transportation of Dangerous Goods Act (1992) and Clear Language Transportation of Dangerous Goods Regulations, 2002, Transport Canada.
- TOMES Plus®, 2002 Micromedex Inc.
- Environment Canada, Environmental Protection Service, Ammonia: Environmental and Technical Information for Problem Spills, July 1984, Beauregard Press Limited, Ottawa
- The Fertilizer Institute Product Testing Plan Results, October 2001

OTHER SPECIAL CONSIDERATIONS

No additional information.