



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	Anhydrous Ammonia, Liquified
Revision date	09-27-2011
Version #	01
CAS #	7664-41-7
MSDS Number	600
Product use	This product is intended for use as a refinery feedstock, fuel or for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.
Synonym(s)	Anhydrous Ammonia, Liquid Ammonia, Nitromite, Nitro-Sil, Ammonia (liquefied) See section 16 for complete information.
Manufacturer/Supplier	Valero Marketing & Supply Company and Affiliates P.O. Box 696000 San Antonio, TX 78269-6000 General Assistance 210-345-4593
Emergency	24 Hour Emergency 866-565-5220 1-800-424-9300 (CHEMTREC USA)

2. Hazards Identification

Physical state	Gas.
Appearance	Colorless gas or cold, mobile liquid.
Emergency overview	DANGER High pressure gas. Gas reduces oxygen available for breathing. Causes skin, eye and digestive tract burns. Harmful if inhaled or swallowed. Causes severe respiratory tract irritation. May cause allergic skin reaction. Contact with liquefied gas might cause frostbites, in some cases with tissue damage.
OSHA regulatory status	This product is hazardous according to OSHA 29 CFR 1910.1200.
Potential health effects	
Routes of exposure	Inhalation. Eyes. Skin. Ingestion.
Eyes	Causes eye burns. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").
Skin	Causes skin burns. May cause allergic skin reaction. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").
Inhalation	Harmful if inhaled. Causes severe respiratory tract irritation. Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels.
Ingestion	Harmful if swallowed. Causes digestive tract burns.
Target organs	Respiratory tract. Eyes. Central nervous system.
Chronic effects	May cause allergic skin reaction.
Potential environmental effects	Very toxic to aquatic organisms.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Ammonia, anhydrous	7664-41-7	>99.5

4. First Aid Measures

First aid procedures	
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.
Skin contact	Wash frost-bitten areas with plenty of water. Do not remove clothing. Get medical attention immediately.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Call a physician or poison control center immediately.

Ingestion Call a physician or poison control center immediately. DO NOT induce vomiting. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head lower than the hips to help prevent aspiration.

Notes to physician Treat symptomatically.

5. Fire Fighting Measures

Flammable properties Heat may cause the containers to explode.

Extinguishing media

Suitable extinguishing media Dry chemical, CO₂, water spray, fog, or foam.

Fire fighting equipment/instructions Self-contained breathing apparatus, operated in positive pressure mode and full protective clothing must be worn in case of fire.

Move container from fire area if it can be done without risk.

Hazardous combustion products Nitrogen oxides.

6. Accidental Release Measures

Personal precautions Evacuate the area promptly. No action shall be taken involving any personal risk or without suitable training. Keep unnecessary personnel away.

Ensure adequate ventilation. In case of inadequate ventilation, use respiratory protection. Wear appropriate personal protective equipment (See Section 8).

Environmental precautions Should not be released into the environment. Prevent further leakage or spillage if safe to do so. Prevent from entering into soil, ditches, sanitary sewers, waterways and/or groundwater.

Methods for cleaning up Ventilate well, stop flow of gas or liquid if possible. Immediately contact emergency personnel.

7. Handling and Storage

Handling Wear appropriate personal protective equipment (See Section 8). Eating, drinking, and smoking should be prohibited in areas where this material is handled, stored, and processed. Do not breathe gas. Do not get in eyes, on skin, on clothing. Use only with adequate ventilation.

Storage Store in accordance with local, regional, national, and international regulations. Secure cylinders in an upright position at all times, close all valves when not in use. Store in a cool, dry, well-ventilated place. Keep container tightly closed and sealed until ready for use. Protect cylinders from damage.

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value
Ammonia, anhydrous (7664-41-7)	STEL	35 ppm
	TWA	25 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Ammonia, anhydrous (7664-41-7)	PEL	35 mg/m ³
		50 ppm

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value
Ammonia, anhydrous (7664-41-7)	STEL	24 mg/m ³
		35 ppm
	TWA	17 mg/m ³ 25 ppm

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value
Ammonia, anhydrous (7664-41-7)	STEL	35 ppm
	TWA	25 ppm

Canada. Ontario OELs. (Ministry of Labor - Control of Exposure to Biological or Chemical Agents)

Components	Type	Value
Ammonia, anhydrous (7664-41-7)	STEL	24 mg/m ³
	TWA	35 ppm
		17 mg/m ³
		25 ppm

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value
Ammonia, anhydrous (7664-41-7)	STEL	24 mg/m ³
	TWA	35 ppm
		17 mg/m ³
		25 ppm

Mexico. Occupational Exposure Limit Values

Components	Type	Value
Ammonia, anhydrous (7664-41-7)	STEL	27 mg/m ³
	TWA	35 ppm
		18 mg/m ³
		25 ppm

Engineering controls Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. The engineering controls also need to keep gas, vapor, or dust concentrations below any lower explosive limits.

Personal protective equipment

- Eye / face protection** Wear approved safety glasses or goggles.
- Skin protection** Wear protective clothing appropriate for the risk of exposure.
- Respiratory protection** If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.
- General hygiene considerations** Do not eat, drink or smoke when using the product. Wash thoroughly after handling. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practices.

9. Physical & Chemical Properties

- Appearance** Colorless gas or cold, mobile liquid.
- Color** Colorless
- Odor** Penetrating odor.
- Odor threshold** Not available.
- Physical state** Gas.
- Form** Gas or liquid.
- pH** Not available.
- Melting point** Not available.
- Freezing point** -108 °F (-77.77 °C)
- Boiling point** -44 - 11.1 °F (-42.2 - -11.6 °C)
- Flash point** Not available.
- Evaporation rate** Not available.
- Flammability limits in air, upper, % by volume** 28 %
- Flammability limits in air, lower, % by volume** 15 %

Vapor pressure	Not available.
Vapor density	0.6
Specific gravity	0.682
Solubility (water)	Partially soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	1204 °F (651.11 °C)
Decomposition temperature	Not available.
Molecular weight	17.04 g/mol
Molecular formula	NH3

10. Chemical Stability & Reactivity Information

Chemical stability	Stable under normal temperature conditions and recommended use.
Conditions to avoid	In a fire or if heated, a pressure increase will occur and the container may burst or explode.
Incompatible materials	Oxidizing agents. Reducing agents. Acids.
Hazardous decomposition products	None known.
Possibility of hazardous reactions	Polymerization will not occur.

11. Toxicological Information

Toxicological information	Inhalation exposure produces upper airway, eyes, nose, and throat irritation at concentrations around 25 ppm. Inhalation of concentrations of greater than 500 ppm can result in pulmonary edema, acute congestion, bronchitis, and pneumonia; depending on the concentration and the individual. Exposure to high gas concentrations may cause temporary blindness and severe eye damage.
Acute effects	Causes severe skin, eye and digestive tract burns. Harmful if inhaled or swallowed. Causes severe respiratory tract irritation. Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").
Sensitization	May cause an allergic skin reaction.

12. Ecological Information

Ecotoxicological data	Test Results
Components	
Ammonia, anhydrous (7664-41-7)	LC50 Carp (<i>Hypophthalmichthys nobilis</i>): 0.3 mg/l 96 hours
Ecotoxicity	Very toxic to aquatic organisms.
Persistence and degradability	Not available.
Bioaccumulation / Accumulation	No data available.
Partition coefficient (n-octanol/water)	Not available.
Mobility in environmental media	No data available.

13. Disposal Considerations

Disposal instructions	Dispose in accordance with all applicable regulations. Empty containers may contain product residues. Do not puncture or incinerate even when empty. This material and/or its container must be disposed of as hazardous waste. Return the empty cylinder to the supplier.
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14. Transport Information

DOT

Basic shipping requirements:

UN number	UN1005
Proper shipping name	Ammonia, anhydrous

Hazard class 2.2
Labels required 2.2
Additional information:
Special provisions 13, T50
Packaging exceptions None
Packaging non bulk 304
Packaging bulk 314, 315
ERG number 125

DOT BULK

Basic shipping requirements:
UN number UN1005
Proper shipping name Ammonia, anhydrous
Hazard class 2.2
Labels required 2.2
Additional information:
Special provisions 13, T50
Packaging exceptions None
Packaging non bulk 304
Packaging bulk 314, 315
ERG number 125

IATA

Basic shipping requirements:
UN number 1005
Proper shipping name Ammonia, anhydrous
Hazard class 2.3
Subsidiary hazard class 8
Environmental hazards
Marine pollutant Yes
Additional information:
ERG code 2CP

IMDG

Basic shipping requirements:
UN number 1005
Proper shipping name AMMONIA, ANHYDROUS
Hazard class 2.3
Subsidiary hazard class 8
Environmental hazards
Marine pollutant Yes
EmS No. F-C, S-U

TDG

Basic shipping requirements:
Proper shipping name AMMONIA, ANHYDROUS
Hazard class 2.2
UN number UN1005

15. Regulatory Information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification(40 CFR 707, Subpt. D)

Not regulated.

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Spill: Reportable quantity

Ammonia, anhydrous (CAS 7664-41-7) 100 LBS

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold Planning Quantity

Ammonia, anhydrous (CAS 7664-41-7) 500 LBS

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Ammonia, anhydrous (CAS 7664-41-7) 1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Ammonia, anhydrous (CAS 7664-41-7) Listed.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

Ammonia, anhydrous: 100

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
 Immediate Hazard - Yes
 Delayed Hazard - No
 Fire Hazard - No
 Pressure Hazard - Yes
 Reactivity Hazard - No

Section 302 extremely hazardous substance (40 CFR 355, Appendix A) Yes

Section 311/312 (40 CFR 370) Yes

Clean Water Act (CWA) Section 112(r) (40 CFR 68.130) Hazardous substance

Drug Enforcement Administration (DEA) (21 CFR 1308.11-15) Not controlled

Canadian regulations This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS status Controlled

WHMIS classification
 A - Compressed Gas
 D2B - Other Toxic Effects-TOXIC
 E - Corrosive

WHMIS labeling**Inventory status**

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations**US - California Hazardous Substances (Director's): Listed substance**

Ammonia, anhydrous (CAS 7664-41-7) Listed.

US - Massachusetts RTK - Substance: Listed substance

Ammonia, anhydrous (CAS 7664-41-7) Listed.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

Ammonia, anhydrous (CAS 7664-41-7) 500 LBS

US - New Jersey RTK - Substances: Listed substance

Ammonia, anhydrous (CAS 7664-41-7) Listed.

US - Pennsylvania RTK - Hazardous Substances: Listed substance

Ammonia, anhydrous (CAS 7664-41-7) Listed.

16. Other Information

Further information

HMIS® is a registered trade and service mark of the NPCA.

Other information

Note: This Material Safety Data Sheet applies to the listed products and synonym descriptions for Hazard Communication purposes only. Technical Specifications vary greatly depending on the products and are not reflected in this document. Consult specification sheets for technical information.

HMIS® ratings

Health: 3
Flammability: 1
Physical hazard: 0

NFPA ratings

Health: 3
Flammability: 1
Instability: 0

Disclaimer

This Material Safety Data Sheet (MSDS) was prepared in accordance with 29 CFR 1910.1200 by Valero Marketing & Supply Co., ("VALERO"). VALERO does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this MSDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.

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