

Section 1. Chemical product and company identification

Product name	: Ammonia
Supplier	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Product use	: Synthetic/Analytical chemistry.
Synonym	: Ammonia
MSDS #	: 001003
Date of Preparation/Revision	: 8/20/2009.
In case of emergency	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Gas. [COLORLESS GAS OR COLD, MOBILE LIQUID WITH A STRONG, PENETRATING ODOR]
Emergency overview	: DANGER! CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS. HARMFUL IF INHALED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CONTENTS UNDER PRESSURE. Do not puncture or incinerate container. Do not breathe gas. Do not get on skin or clothing. May cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container closed. Do not get in eyes, on skin or on clothing. Avoid breathing gas. Wash thoroughly after handling. Contact with rapidly expanding gases can cause frostbite.
Target organs	: May cause damage to the following organs: lungs, upper respiratory tract, skin, eyes.
Routes of entry	: Inhalation, Skin Contact, Eye Contact, Ingestion.
Potential acute health effects	
Eyes	: Severely corrosive to the eyes. Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.
Skin	: Severely corrosive to the skin. Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation	: Toxic by inhalation. Severely corrosive to the respiratory system.
Ingestion	: Ingestion is not a normal route of exposure for gases
Potential chronic health effects	: CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available.
Medical conditions aggravated by over-exposure	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Ammonia	7664-41-7	100	<p>ACGIH TLV (United States, 1/2008). STEL: 24 mg/m³ 15 minute(s). STEL: 35 ppm 15 minute(s). TWA: 17 mg/m³ 8 hour(s). TWA: 25 ppm 8 hour(s).</p> <p>NIOSH REL (United States, 6/2008). STEL: 27 mg/m³ 15 minute(s). STEL: 35 ppm 15 minute(s). TWA: 18 mg/m³ 10 hour(s). TWA: 25 ppm 10 hour(s).</p> <p>OSHA PEL (United States, 11/2006). TWA: 35 mg/m³ 8 hour(s). TWA: 50 ppm 8 hour(s).</p> <p>OSHA PEL 1989 (United States, 3/1989). STEL: 27 mg/m³ 15 minute(s). STEL: 35 ppm 15 minute(s).</p>

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : Respiratory protection approved by NIOSH / MSHA for ammonia must be used when exposure limits are exceeded. Whether chemical canister respirator or self-contained breathing apparatus is sufficient for effective respiratory protection depends on the type and magnitude of exposure.
- Ingestion** : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

- Flammability of the product** : Non-flammable.
- Auto-ignition temperature** : 651.11°C (1204°F)
- Flammable limits** : Lower: 15% Upper: 28%
- Products of combustion** : Decomposition products may include the following materials:
nitrogen oxides
- Fire hazards in the presence of various substances** : Extremely flammable in the presence of the following materials or conditions: oxidizing materials.
- Fire-fighting media and instructions** : Use an extinguishing agent suitable for the surrounding fire.
- Move containers from fire zone if possible; if not, use water to cool fire-exposed containers. Use water spray to control vapors. Do not put water directly on liquid ammonia. Personnel must be equipped with appropriate protective clothing and respiratory protection.
- Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : In US, federal regulations require that a release of 100 lb. or more of ammonia must be reported immediately to the National Response Center at (800) 424-8802, the SERC and the LEPC. In California, ALL releases must be reported to CUPA, state and local agencies. Additional state and local regulations may apply. SUGGESTED LOCAL ACTION: Stop leak if feasible. Avoid breathing ammonia. Evacuate personnel not equipped with protective clothing and equipment. Use copious amounts of water spray or fog to absorb ammonia vapor. DO NOT put water on liquid ammonia. Contain run-off to prevent ammonia from entering a stream, lake, sewer, or ditch. Any release of this material, during the course of loading, transporting, unloading or temporary storage, must be reported to U.S. DOT as required by 49 CFR 171.15 and 171.16.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up** : Immediately contact emergency personnel. Stop leak if without risk. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

- Handling** : Refer to the ANSI K61.1 standard for storage and handling information. Protect containers from physical damage and temperatures exceeding 120°F. Use only approved storage systems. Zinc, copper, silver, cadmium, and their alloys must not be used in ammonia systems since they can be rapidly corroded by it. Avoid hydrostatic pressure, which can cause equipment rupture, by adhering to proper filling procedures and the use of hydrostatic pressure relief valves where appropriate.
- Storage** : Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

- Engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Personal protection**
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Full chemical-resistant suit and self-contained breathing apparatus should be worn only by trained and authorized persons.

Product name

Ammonia

ammonia, anhydrous

ACGIH TLV (United States, 1/2008).

STEL: 24 mg/m³ 15 minute(s).

STEL: 35 ppm 15 minute(s).

TWA: 17 mg/m³ 8 hour(s).

TWA: 25 ppm 8 hour(s).

NIOSH REL (United States, 6/2008).

STEL: 27 mg/m³ 15 minute(s).

STEL: 35 ppm 15 minute(s).

TWA: 18 mg/m³ 10 hour(s).

TWA: 25 ppm 10 hour(s).

OSHA PEL (United States, 11/2006).

TWA: 35 mg/m³ 8 hour(s).

TWA: 50 ppm 8 hour(s).

OSHA PEL 1989 (United States, 3/1989).

STEL: 27 mg/m³ 15 minute(s).

STEL: 35 ppm 15 minute(s).

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight	: 17.04 g/mole
Molecular formula	: H ₃ -N
Boiling/condensation point	: -33.3°C (-27.9°F)
Melting/freezing point	: -77.8°C (-108°F)
Critical temperature	: 132.4°C (270.3°F)
Vapor pressure	: 114.1 (psig)
Vapor density	: 0.60 @ 32°F (Air=1)
Specific Volume (ft³/lb)	: 22.7273
Gas Density (lb/ft³)	: 0.044
Physical/chemical properties comments	: SPECIFIC GRAVITY (AIR=1): @ 70°F (21.1°C) = 0.59 PH: Approx. 11.6 for 1 N Sol'n. in water

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Incompatible with oxygen and peroxides. Incompatible with some strong acids.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
ammonia, anhydrous	LC50 Inhalation Vapor	Rat	7040 mg/m ³	30 minutes
	LC50 Inhalation Vapor	Rat	18600 mg/m ³	5 minutes
	LC50 Inhalation Gas.	Rat	9500 ppm	1 hours
	LC50 Inhalation Gas.	Mouse	4230 ppm	1 hours
	LC50 Inhalation Gas.	Rat	2000 ppm	1 hours
	LC50 Inhalation Gas.	Rat	2000 ppm	4 hours
	LC50 Inhalation Gas.	Rat	17401 ppm	15 minutes

Ammonia

- IDLH** : 300 ppm
- Chronic effects on humans** : May cause damage to the following organs: lungs, upper respiratory tract, skin, eyes.
- Other toxic effects on humans** : No specific information is available in our database regarding the other toxic effects of this material to humans.
- Specific effects**
- Carcinogenic effects** : No known significant effects or critical hazards.
- Mutagenic effects** : No known significant effects or critical hazards.
- Reproduction toxicity** : No known significant effects or critical hazards.

Section 12. Ecological information




Ecotoxicity data

Aquatic ecotoxicity


Product/ingredient name	Test	Result	Species	Exposure
ammonia, anhydrous	-	Acute LC50 1.17 mg/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	-	Acute LC50 0.88 mg/L Fresh water	Fish - Orangethroat darter - Etheostoma spectabile	96 hours
	-	Acute LC50 0.74 mg/L Fresh water	Fish - Orangethroat darter - Etheostoma spectabile	96 hours
	-	Acute LC50 16010 to 21460 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Mysis	48 hours
	-	Acute LC50 14860 to 19140 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - Zoea	48 hours
	-	Acute LC50 14530 to 20600 ug/L Marine water	Crustaceans - San paulo shrimp - Penaeus paulensis - Zoea	48 hours
	-	Acute LC50 11310 to 15480 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Zoea	48 hours
	-	Acute LC50 8590 to 9640 ug/L Marine water	Crustaceans - San paulo shrimp - Penaeus paulensis - Post- larvae	48 hours
	-	Acute LC50 5210 to 6040 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - Zoea	48 hours
	-	Acute LC50 4980 to 9070 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Nauplii	48 hours
	-	Acute LC50 4180 to 6030 ug/L Fresh water	Daphnia - Water flea - Daphnia	48 hours

		magna - <24 hours	
-	Acute LC50 4130 to 5100 ug/L Fresh water	Daphnia - Water flea - Daphnia pulex - <24 hours	48 hours
-	Acute LC50 2710 to 3670 ug/L Fresh water	Daphnia - Water flea - Ceriodaphnia reticulata - <4 hours	48 hours
-	Acute LC50 2500 ug/L Fresh water	Crustaceans - Aquatic sowbug - Asellus aquaticus - 8 to 10 mm	48 hours
-	Acute LC50 1600 to 1730 ug/L Fresh water	Fish - Common jollytail - Galaxias maculatus - Juvenile (Fledgling, Hatchling, Weanling) - 42 to 62 mm - 0.4 to 1.3 g	96 hours
-	Acute LC50 1550 ug/L Fresh water	Fish - Common jollytail - Galaxias maculatus - Juvenile (Fledgling, Hatchling, Weanling) - 42 to 62 mm - 0.4 to 1.3 g	96 hours
-	Acute LC50 660 ug/L Fresh water	Fish - Cyprinus carpio	96 hours
-	Acute LC50 450 to 470 ug/L Fresh water	Fish - Chinook salmon - Oncorhynchus tshawytscha - Underyearling - 1 to 7 g	96 hours
-	Acute LC50 440 ug/L Fresh water	Fish - Cyprinus carpio	96 hours
-	Acute LC50 380 ug/L Fresh water	Fish - Silver carp - Hypophthalmichthys molitrix - Fingerling	96 hours
-	Acute LC50 300 ug/L Fresh water	Fish - Carp - Hypophthalmichthys nobilis	96 hours
-	Acute LC50 31260 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - 3.58 to 4.75 cm - 0.4 to 0.69 g	48 hours
-	Acute LC50 25400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
-	Acute LC50 22790 to 32200 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Post-larvae	48 hours

Ammonia**Products of degradation** : Products of degradation: nitrogen oxides (NO, NO₂ etc.).**Environmental fate** : Not available.**Environmental hazards** : No known significant effects or critical hazards.**Toxicity to the environment** : Not available.**Section 13. Disposal considerations****Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.****Section 14. Transport information**

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1005	AMMONIA, ANHYDROUS	2.2	Not applicable (gas).		<p>Reportable quantity 100 lbs. (45.4 kg)</p> <p>Limited quantity Yes.</p> <p>Packaging instruction Passenger aircraft Quantity limitation: Forbidden.</p> <p>Cargo aircraft Quantity limitation: Forbidden.</p> <p>Special provisions 4, T50, N87</p>
TDG Classification	UN1005	AMMONIA, ANHYDROUS; OR ANHYDROUS AMMONIA	2.2	Not applicable (gas).	 	<p>Explosive Limit and Limited Quantity Index 0</p> <p>ERAP Index 3000</p> <p>Passenger Carrying Ship Index Forbidden</p> <p>Passenger Carrying Road or Rail Index Forbidden</p> <p>Special</p>

Ammonia

						provisions 4,T50
Mexico Classification	UN1005	AMMONIA, ANHYDROUS	2.2	Not applicable (gas).		-

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Section 15. Regulatory information

United States

- U.S. Federal regulations** : **United States inventory (TSCA 8b)**: This material is listed or exempted.
SARA 302/304/311/312 extremely hazardous substances: ammonia, anhydrous
SARA 302/304 emergency planning and notification: ammonia, anhydrous
SARA 302/304/311/312 hazardous chemicals: ammonia, anhydrous
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: ammonia, anhydrous: Sudden release of pressure, Immediate (acute) health hazard
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: ammonia, anhydrous
Clean Air Act (CAA) 112 accidental release prevention: ammonia, anhydrous
Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
Clean Air Act (CAA) 112 regulated toxic substances: ammonia, anhydrous

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Form R - Reporting requirements	: Ammonia	7664-41-7	100
Supplier notification	: Ammonia	7664-41-7	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

- State regulations** : **Connecticut Carcinogen Reporting**: This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

Canada

- WHMIS (Canada)** : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

Ammonia

CEPA Toxic substances: This material is not listed.

Canadian ARET: This material is not listed.

Canadian NPRI: This material is listed.

Alberta Designated Substances: This material is not listed.

Ontario Designated Substances: This material is not listed.

Quebec Designated Substances: This material is not listed.

Section 16. Other information

United States

Label requirements

: CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS.
HARMFUL IF INHALED.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Canada

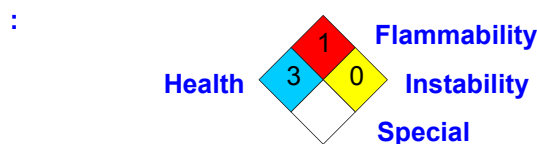
Label requirements

: Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

Hazardous Material Information System (U.S.A.)

Health	*	3
Flammability		1
Physical hazards		0

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



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.