Material Safety Data Sheet

1 - 1000 ppm Ammonia/Air

Section 1: Product and Company Identification

Liquid Technology Corporation
2048 Apex Court
Apopka, FL 32703
Toll Free: 800-465-0405
Phone: 407-292-2990
Fax: 407-292-3313
http://www.liquidtechcorp.com/contact.htm

Product Code: 1 - 1000 ppm Ammonia/Air

Gas Name	Concentration
Anhydrous Ammonia	1 - 1000 ppm
Air	Balance

	Chemical Substance	Chemical Family	Trade Names
Anhydrous Ammonia	AMMONIA, ANHYDROUS	inorganic, gas	ANHYDROUS AMMONIA; AMMONIA GAS; AMMONIA; SPIRIT OF HARTSHORN; AMMONIA, ANHYDROUS, LIQUIFIED; UN 1005; H3N
Air	AIR, COMPRESSED		AIR; UN 1002

Section 2: Hazards Identification

	Description	Main Health Hazard
Anhydrous Ammonia	Colorless, pungent odor Containers may rupture or explode if exposed to heat. Flammable. Can decompose at high temperatures forming very flammable hydrogen and toxic nitrogen dioxide gases. Corrosive.	Respiratory tract burns, skin burns, eye burns, mucous membrane burns, corrosive to eyes
Air	Colorless Containers may rupture or explode if exposed to heat.	No significant target effects reported.

Likely Routes of Exposure:

	Inhalation	Ingestion	Eye	Skin	Health Effects	Target Organs	Medical Condition Aggravated by -
Anhydrous Ammonia	Burns, severe irritant, pulmonary edema at concentrations over 1500 ppm	Burns, not a likely route of exposure for gas	Burns, blindness	Burns, liquefied gas can cause frostbite	Respiratory tract burns, skin burns, eye burns, mucous membrane burns, corrosive to eyes	Lungs, upper respiratory tract, skin, eyes	Eye disorders, respiratory disorders, skin disorders and allergies
Air		Ingestion of harmful amounts is unlikely	No information is available	No information is available	No significant target effects reported.		

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Section 3: Composition/Information on Ingredients

	CAS #	% by Weight
Anhydrous Ammonia	7664-41-7	1 - 1000 ppm

	CAS #	% by Weight
Air	Not assigned.	Balance

Section 4: First Aid Measures

	Skin Contact	Eye Contact	Ingestion	Inhalation	Note to Physicians
Anhydrous Ammonia	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. Destroy contaminated shoes.	Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	Gas: Not a likely route of exposure	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. Wear personal protective equipment if gas still present.	For inhalation, consider oxygen.
Air	Wash exposed skin with soap and water.	Flush eyes with plenty of water.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Get medical attention.	

Section 5: Fire Fighting Measures

	Suitable Extinguishing Media	Products of Combustion	Protection of Firefighters
Anhydrous Ammonia	Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray.	Nitrogen dioxide, ammonium nitrate	▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply, with full-body encapsulating, chemical protective suit. ▪ Wear protective gear with respiratory support.
Air	Use extinguishing agents appropriate for surrounding fire.		▪ No respirator is required under normal conditions of use.

Section 6: Accidental Release Measures

	Personal Precautions	Environmental Precautions	Methods for Containment
Anhydrous Ammonia	Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Evacuation radius: 150 feet.	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.	Stop leak if possible without personal risk. Reduce vapors with water spray. Do not get water directly on material. Do not get water inside container. Trap spilled material at bottom in deep water pockets, excavated holding areas or within sand bag barriers.
Air			Stop leak if possible without personal risk.

	Methods for Cleanup	Other Information
Anhydrous Ammonia	Small spills: Flood with water. Large spills: Dike for later disposal. Collect spilled material using mechanical equipment. Dike for later disposal. Add dilute acid. Absorb with sand or other non-combustible material. Collect runoff for disposal as potential hazardous waste. Do not direct water at source of leak of liquid ammonia.	Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).
Air		

Section 7: Handling and Storage

	Handling	Storage

	Handling	Storage
Anhydrous Ammonia	Avoid heat, flames, sparks and other sources of ignition. Keep separated from incompatible substances.	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.111. Protect from physical damage. Store outside or in a detached building. Inside storage: Store in a cool, dry place. Store in a well-ventilated area. Store in a cool, dry place. Store in a well-ventilated area. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355.30).
Air	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	

Section 8: Exposure Controls/Personal Protection

	Exposure Guidelines
Anhydrous Ammonia	AMMONIA, ANHYDROUS: 50 ppm (35 mg/m3) OSHA TWA 35 ppm (27 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 25 ppm ACGIH TWA 35 ppm ACGIH STEL 25 ppm (18 mg/m3) NIOSH recommended TWA 10 hour(s) 35 ppm (27 mg/m3) NIOSH recommended STEL
Air	AIR, COMPRESSED: No occupational exposure limits established.

Engineering Controls

Handle only in fully enclosed systems.

	Eye Protection	Skin Protection	Respiratory Protection
Anhydrous Ammonia	Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	Wear appropriate chemical resistant clothing.	Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply, with full-body encapsulating, chemical protective suit.
Air	Eye protection not required under normal conditions.	Protective clothing is not required under normal conditions.	No respirator is required under normal conditions of use.

General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

Section 9: Physical and Chemical Properties

	Physical State	Appearance	Color	Change in Appearance	Physical Form	Odor	Taste
Anhydrous Ammonia	Gas	Colorless	Colorless	N/A	Gas, liquid	Pungent odor	N/A
Air	Gas		Colorless			Not available	

	Flash Point	Flammability	Partition Coefficient	Autoignition Temperature	Upper Explosive Limits	Lower Explosive Limits
Anhydrous Ammonia	Not available			1204 F (651 C)	0.28	0.15
Air						

	Boiling Point	Freezing Point	Vapor Pressure	Vapor Density	Specific Gravity	Water Solubility	pH	Odor Threshold	Evaporation Rate	Viscosity
Anhydrous Ammonia	-27 F (-33 C)	-108 F (-78 C)	6658 mmHg @ 21 C	0.5967 (Air=1)	Not applicable (gas); 0.682 @ -33.4 C (liquefied gas)	38% @ 20 C	11.6 (1.0 N solution)	1-5 ppm	Not applicable	0.255 mPa.s (0.255 centipoises) @ -33.5 C (liquefied gas)

	Boiling Point	Freezing Point	Vapor Pressure	Vapor Density	Specific Gravity	Water Solubility	pH	Odor Threshold	Evaporation Rate	Viscosity
Air	-317 F (-194 C)	Not available	760 mmHg @ -194 C	1	Not applicable	Slightly soluble	Not applicable	Not available	Not applicable	0.01853 cP @ 26.85 C

	Molecular Weight	Molecular Formula	Density	Weight per Gallon	Volatility by Volume	Volatility	Solvent Solubility
Anhydrous Ammonia	17.03	N-H3	0.7067 g/L @ 25 C	Not available	Not available	Not applicable	Soluble: Methanol, ethanol, chloroform, ether, organic solvents
Air			1.29 g/L @ 0 C			Not applicable	Slightly Soluble

Section 10: Stability and Reactivity

	Stability	Conditions to Avoid	Incompatible Materials
Anhydrous Ammonia	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Acids, combustible materials, metals, oxidizing materials, metal salts, halo carbons, halogens, amines, reducing agents, cyanides, bases
Air	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	None known

	Hazardous Decomposition Products	Possibility of Hazardous Reactions
Anhydrous Ammonia	Ammonia, oxides of nitrogen	Will not polymerize.
Air	No hazard expected.	Will not polymerize.

Section 11: Toxicology Information

Acute Effects

	Oral LD50	Dermal LD50	Inhalation
Anhydrous Ammonia	2000 ppm/4 hour(s) inhalation-rat LC50	Not established	Burns, severe irritant, pulmonary edema at concentrations over 1500 ppm
Air	Not available	Not available	

	Eye Irritation	Skin Irritation	Sensitization
Anhydrous Ammonia	Burns, blindness	Burns, liquefied gas can cause frostbite	Respiratory tract burns, skin burns, eye burns, mucous membrane burns, corrosive to eyes
Air	No information is available	No information is available	No significant target effects reported.

Chronic Effects

	Carcinogenicity	Mutagenicity	Reproductive Effects	Developmental Effects
Anhydrous Ammonia	Not listed	Available.	Not established	No data
Air	Not available	Not available	No data	No data

Section 12: Ecological Information

Fate and Transport

	Eco toxicity	Persistence / Degradability	Bioaccumulation / Accumulation	Mobility in Environment
Anhydrous Ammonia	Fish toxicity: Acute LC50 0.88 mg/L 96 hour(s) Orangethroat; 1600 ug/L 96 hour(s) LC50 (Mortality) Common jollytail (Galaxias maculatus) Invertibrate toxicity: 7700 ug/L 96 hour(s) LC50 (Immobilization) Ark shell (Anadara granosa) Algal toxicity: 2100-2300 ug/L NR hour(s) (Abundance) Algae, phytoplankton, algal mat (Algae)	Not available	Not available	Not available

	Phyto toxicity: 16500 ug/L 30 hour(s) (Abundance) Common water-nymph (Najas guadalupensis) Other toxicity: Not available			
Air	Fish toxicity: Not available	Not available	Not available	Not available

Section 13: Disposal Considerations

Anhydrous Ammonia	Dispose in accordance with all applicable regulations.
Air	Dispose in accordance with all applicable regulations.

Section 14: Transportation Information

U.S. DOT 49 CFR 172.101

	Proper Shipping Name	ID Number	Hazard Class or Division	Packing Group	Labeling Requirements	Passenger Aircraft or Railcar Quantity Limitations	Cargo Aircraft Only Quantity Limitations	Additional Shipping Description
Anhydrous Ammonia	Ammonia, anhydrous	UN1005	2.2, 2.3	Not applicable	2.3; 8	Forbidden	Forbidden	Toxic-Inhalation Hazard Zone D
Air	Air, compressed	UN1002	2.2	Not available	2.2	Not available	Not available	Not available

Canadian Transportation of Dangerous Goods

	Shipping Name	UN Number	Class	Packing Group / Risk Group
Anhydrous Ammonia	AMMONIA, ANHYDROUS; or ANHYDROUS AMMONIA	UN1005	2.3; 8	Not applicable
Air	Air, compressed	UN1002	2.2	Not available

Section 15: Regulatory Information

U.S. Regulations

	CERCLA Sections	SARA 355.30	SARA 355.40
Anhydrous Ammonia	100 LBS RQ	500 LBS TPQ	100 LBS RQ
Air	Not regulated.	Not regulated.	Not regulated.

SARA 370.21

	Acute	Chronic	Fire	Reactive	Sudden Release
Anhydrous Ammonia	Yes	No	No	No	Yes
Air	No	No	No	No	Yes

SARA 372.65

Anhydrous Ammonia	AMMONIA, ANHYDROUS
Air	Not regulated.

OSHA Process Safety

Anhydrous Ammonia	10000 LBS TQ
Air	Not regulated.

State Regulations

	CA Proposition 65
Anhydrous Ammonia	Not regulated.
Air	Not regulated.

Canadian Regulations

	WHMIS Classification
Anhydrous Ammonia	A, B1, D1A, E
Air	A

National Inventory Status

	US Inventory (TSCA)	TSCA 12b Export Notification	Canada Inventory (DSL/NDSL)
Anhydrous Ammonia	Listed on inventory.	Not listed.	Not determined.
Air	Not listed on inventory.	Not listed.	Not determined.

Section 16: Other Information

	NFPA Rating
Anhydrous Ammonia	HEALTH=3 FIRE=1 REACTIVITY=0
Air	HEALTH=0 FIRE=0 REACTIVITY=0

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard