Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
AMMONIA, ANHYDROUS

Synonyms
ANHYDROUS AMMONIA; AMMONIA GAS; AMMONIA; SPIRIT OF HARTSHORN; AMMONIA, ANHYDROUS, LIQUIFIED; UN 1005; H3N;

Chemical Family
inorganic, Gas

Product Use
Industrial and Specialty Gas Applications.

Restrictions on Use
None known.

Details of the supplier of the safety data sheet
MATHESON TRI-GAS, INC.
150 Allen Road, Suite 302
Basking Ridge, NJ 07920
General Information: 1-800-416-2505
Emergency #: 1-800-424-9300 (CHEMTREC)
Outside the US: 703-527-3887 (Call collect)

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Flammable Gases - Category 1
Gases Under Pressure - Liquefied gas
Acute Toxicity - Oral - Category 4
Acute Toxicity - Inhalation - Gas - Category 3
Skin Corrosion/Irritation - Category 1
Serious Eye Damage/Eye Irritation - Category 1
Respiratory Sensitization - Category 1
Germ Cell Mutagenicity - Category 2
Specific target organ toxicity - Single exposure - Category 1 (Respiratory system)
Specific target organ toxicity - Repeated exposure - Category 2 (Respiratory system)
Hazardous to the Aquatic Environment - Acute - Category 1
Hazardous to the Aquatic Environment - Chronic - Category 1

GHS Label Elements
Symbol(s)
Signal Word
Danger

Hazard Statement(s)
Extremely flammable gas.
Contains gas under pressure; may explode if heated.
Toxic if inhaled.
Harmful if swallowed.
Causes severe skin burns and eye damage.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Suspected of causing genetic defects.
Causes damage to organs.
May cause damage to organs through prolonged or repeated exposure.
Very toxic to aquatic life with long lasting effects.

Precautionary Statement(s)
Prevention
Do not handle until all safety precautions have been read and understood.
Do not breathe gas.
Do not eat, drink or smoke when using this product.
Obtain special instructions before use.
Wear protective gloves/protective clothing/eye protection/face protection.
Use Personal Protective equipment as required.
Keep away from heat, sparks, open flame, and hot surfaces - No smoking.
Use only outdoors or in a well-ventilated area.
Keep container tightly closed.
Avoid release to the environment.

Response
In case of inadequate ventilation wear respiratory protection.
Wash thoroughly after handling.
Wash contaminated clothing before reuse.
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources if safe to do so.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
Safety Data Sheet

Material Name: AMMONIA, ANHYDROUS
SDS ID: MAT01050

Remove/Take off immediately all contaminated clothing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Specific treatment is urgent, see first aid section of Safety Data Sheet.
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
Get medical advice/attention if you feel unwell.
Collect spillage.

Storage
Store in a well-ventilated place.
Protect from sunlight.
Store locked up.

Disposal
Dispose in accordance with all applicable regulations.

Statement of Unknown Toxicity
100% of the mixture consists of ingredient(s) of unknown acute toxicity.

Other Hazards
Frostbite may occur from rapid evaporation of the liquified gas.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS</th>
<th>Component Name</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7664-41-7</td>
<td>AMMONIA, ANHYDROUS</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

Inhalation
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.

Skin
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.

Eyes
Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion
If swallowed, get medical attention.
Safety Data Sheet

Material Name: AMMONIA, ANHYDROUS
SDS ID: MAT01050

Most Important Symptoms/Effects

Acute
respiratory tract burns, skin burns, eye burns, allergic reactions, lung damage

Delayed
Causes genetic defects, respiratory tract burns, skin burns, eye burns, lung damage, respiratory system effects

Note to Physicians
For inhalation, consider oxygen.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media
carbon dioxide, regular dry chemical, Large fires: Use regular foam or flood with fine water spray.

Unsuitable Extinguishing Media
None known.

Special Hazards Arising from the Chemical
Moderate explosion hazard. Containers may rupture or explode if exposed to heat.

Hazardous Combustion Products
ammonia, oxides of nitrogen

Fire Fighting Measures
Do not get water inside container. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. Keep unnecessary people away, isolate hazard area and deny entry. Stop flow of gas. Do not attempt to extinguish fire unless flow of material can be stopped first.

Special Protective Equipment and Precautions for Firefighters
Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures
Wear personal protective clothing and equipment, see Section 8.

Methods and Materials for Containment and Cleaning Up
Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Stop leak if safe to do so - Prevent entry into waterways, drains, or confined areas. Eliminate all ignition sources if safe to do so. Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Damaged cylinders should be handled only by specialists.
Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling
Keep away from heat, sparks and flame. When using, do not eat, drink or smoke. Do not breathe gas, fumes, vapor, or spray. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation.

Conditions for Safe Storage, Including any Incompatibilities
Store in a well-ventilated place.
Protect from sunlight.
Store locked up.

Incompatible Materials
Acids, combustible materials, metals, oxidizing materials, metal salts, halo carbons, halogens, amines, reducing agents, Cyanides, bases

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

<table>
<thead>
<tr>
<th>Component</th>
<th>Exposure Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIA, ANHYDROUS</td>
<td>7664-41-7</td>
</tr>
<tr>
<td>ACGIH:</td>
<td>25 ppm TWA</td>
</tr>
<tr>
<td></td>
<td>35 ppm STEL</td>
</tr>
<tr>
<td>NIOSH:</td>
<td>25 ppm TWA; 18 mg/m3 TWA</td>
</tr>
<tr>
<td></td>
<td>35 ppm STEL; 27 mg/m3 STEL</td>
</tr>
<tr>
<td></td>
<td>300 ppm IDLH</td>
</tr>
<tr>
<td>Europe:</td>
<td>20 ppm TWA; 14 mg/m3 TWA</td>
</tr>
<tr>
<td></td>
<td>50 ppm STEL; 36 mg/m3 STEL</td>
</tr>
<tr>
<td>OSHA (US):</td>
<td>50 ppm TWA; 35 mg/m3 TWA</td>
</tr>
<tr>
<td>Mexico:</td>
<td>25 ppm TWA LMPE-PPT; 18 mg/m3 TWA LMPE-PPT</td>
</tr>
<tr>
<td></td>
<td>35 ppm STEL [LMPE-CT]; 27 mg/m3 STEL [LMPE-CT]</td>
</tr>
</tbody>
</table>

EU - Occupational Exposure (98/24/EC) - Binding Biological Limit Values and Health Surveillance Measures
Safety Data Sheet

Material Name: AMMONIA, ANHYDROUS

There are no biological limit values for any of this product’s components.

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)
There are no biological limit values for any of this product’s components.

Engineering Controls
Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection
Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection
Wear appropriate chemical resistant clothing.

Respiratory Protection
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Glove Recommendations
For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Not available</td>
</tr>
<tr>
<td>Odor</td>
<td>Pungent odor</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>1 - 5 ppm</td>
</tr>
<tr>
<td>Melting Point</td>
<td>-78 °C (-108 °F)</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Boiling Point Range</td>
<td>Not available</td>
</tr>
<tr>
<td>Autoignition</td>
<td>651 °C (1204 °F)</td>
</tr>
<tr>
<td>Lower Explosive Limit</td>
<td>15 %</td>
</tr>
<tr>
<td>Upper Explosive Limit</td>
<td>28 %</td>
</tr>
<tr>
<td>Vapor Density (air=1)</td>
<td>0.5967</td>
</tr>
<tr>
<td>Physical State</td>
<td>Gas</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless</td>
</tr>
<tr>
<td>pH</td>
<td>11.6 at 25 °C</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>-33 °C (-27 °F)</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>6658 mmHg at 21 °C</td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>Not available</td>
</tr>
</tbody>
</table>
Material Name: AMMONIA, ANHYDROUS

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Solubility</td>
<td>38% (@ 20 °C)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>0.475 cp</td>
</tr>
<tr>
<td>Density</td>
<td>0.7067 g/L at 25 °C</td>
</tr>
<tr>
<td>pH Solution</td>
<td>1 N</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>N-H3</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>Not available</td>
</tr>
<tr>
<td>Solubility (Other)</td>
<td>Not available</td>
</tr>
<tr>
<td>Log KOW</td>
<td>0.03</td>
</tr>
<tr>
<td>Physical Form</td>
<td>liquefied gas</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>17.03</td>
</tr>
</tbody>
</table>

Solvent Solubility

Soluble
methanol, ethanol, chloroform, ether, organic solvents

Section 10 - STABILITY AND REACTIVITY

Reactivity
No reactivity hazard is expected.

Chemical Stability
Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions
Will not polymerize.

Conditions to Avoid
Minimize contact with material. Avoid inhalation of material or combustion by-products. Containers may rupture or explode if exposed to heat. Avoid heat, flames, sparks and other sources of ignition.

Incompatible Materials
Acids, combustible materials, metals, oxidizing materials, metal salts, halo carbons, halogens, amines, reducing agents, Cyanides, bases

Hazardous decomposition products
ammonia, oxides of nitrogen

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation
Toxic if inhaled. burns May cause allergic or asthmatic symptoms or breathing difficulties if inhaled.

Skin Contact
burns
Safety Data Sheet

Material Name: AMMONIA, ANHYDROUS

Eye Contact
burns

Ingestion
burns

Acute and Chronic Toxicity

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:
AMMONIA, ANHYDROUS (7664-41-7)
Oral LD50 Rat 350 mg/kg
Inhalation LC50 Rat 2000 ppm 4 h

Immediate Effects
respiratory tract burns, skin burns, eye burns, allergic reactions, lung damage

Delayed Effects
respiratory tract burns, skin burns, eye burns, lung damage, respiratory system effects

Irritation/Corrosivity Data
From human experience the gas is recognized as a skin and eye irritant.

Respiratory Sensitization
Human experience and animal testing indicate the substance is sensitizing.

Dermal Sensitization
Animal testing with an aqueous solution indicates the substance is not sensitizing.

Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA

Germ Cell Mutagenicity
May cause genetic defects.

Tumorigenic Data
No data available

Reproductive Toxicity
No data available.

Specific Target Organ Toxicity - Single Exposure
Respiratory system, lungs

Specific Target Organ Toxicity - Repeated Exposure
Respiratory system, lungs

Aspiration hazard
Not applicable.

Medical Conditions Aggravated by Exposure
eye disorders, respiratory disorders, skin disorders and allergies
Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity
Very toxic to aquatic life with long lasting effects.

Component Analysis - Aquatic Toxicity

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIA, ANHYDROUS</td>
<td>7664-41-7</td>
</tr>
</tbody>
</table>

Fish:
- LC50 96 h Cyprinus carpio 0.44 mg/L; LC50 96 h Lepomis macrochirus 0.26 - 4.6 mg/L; LC50 96 h Lepomis macrochirus 1.17 mg/L [flow-through]; LC50 96 h Pimephales promelas 0.73 - 2.35 mg/L; LC50 96 h Pimephales promelas 5.9 mg/L [static]; LC50 96 h Poecilia reticulata >1.5 mg/L; LC50 96 h Poecilia reticulata 1.19 mg/L [static]
- LC50 48 h Daphnia magna 25.4 mg/L IUCLID

Persistence and Degradability
No information available for the product.

Bioaccumulative Potential
No information available for the product.

Mobility
No information available for the product.

Bioconcentration
No information available for the product.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods
Dispose in accordance with all applicable regulations.

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product's components

Section 14 - TRANSPORT INFORMATION

Component Marine Pollutants
This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>Minimum Concentration</th>
</tr>
</thead>
</table>


Safety Data Sheet

Material Name: AMMONIA, ANHYDROUS

| AMMONIA, ANHYDROUS | 7664-41-7 | DOT regulated marine pollutant |

US DOT Information:
Shipping Name: Ammonia, anhydrous
Hazard Class: 2.2
UN/NA #: UN1005
Required Label(s): 2.2

IMDG Information:
Shipping Name: Ammonia, anhydrous
Hazard Class: 2.3
UN#: UN1005
Required Label(s): 2.3 8

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations
This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

<table>
<thead>
<tr>
<th>AMMONIA, ANHYDROUS</th>
<th>7664-41-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARA 302:</td>
<td>500 lb TPQ</td>
</tr>
<tr>
<td>SARA 313:</td>
<td>1% de minimis concentration (includes anhydrous Ammonia and aqueous Ammonia from water dissociable Ammonium salts and other sources, 10% of total aqueous Ammonia is reportable under this listing)</td>
</tr>
<tr>
<td>CERCLA:</td>
<td>100 lb final RQ; 45.4 kg final RQ</td>
</tr>
<tr>
<td>OSHA (safety):</td>
<td>10000 lb TQ anhydrous; 15000 lb TQ solution, &gt;44% Ammonia by weight</td>
</tr>
<tr>
<td>SARA 304:</td>
<td>100 lb EPCRA RQ</td>
</tr>
</tbody>
</table>

SARA Section 311/312 (40 CFR 370 Subparts B and C)
Acute Health: Yes Chronic Health: No Fire: No Pressure: Yes Reactivity: No

U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
<th>NJ</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIA, ANHYDROUS</td>
<td>7664-41-7</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Not listed under California Proposition 65
Safety Data Sheet

Material Name: AMMONIA, ANHYDROUS

Canadian WHMIS Ingredient Disclosure List (IDL)
Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL.

<table>
<thead>
<tr>
<th>Component</th>
<th>IDL Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIA, ANHYDROUS</td>
<td>7664-41-7</td>
</tr>
<tr>
<td></td>
<td>1 %</td>
</tr>
</tbody>
</table>

WHMIS Classification
A,, B1,, D1A,, E

Component Analysis - Inventory
AMMONIA, ANHYDROUS (7664-41-7)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>DSL</td>
<td>EIN</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Section 16 - OTHER INFORMATION

NFPA Ratings
Health: 3 Fire: 1 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Summary of Changes
Updated: 05/01/2015

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of Lists™ - ChemADVISOR’s Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National
Safety Data Sheet

Material Name: AMMONIA, ANHYDROUS

Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH - Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States.

Other Information

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