1. Identification

Product identifier: Anhydrous Ammonia, Liquified

Other means of identification:

- SDS number: 600 - GHS
- Synonyms: Anhydrous Ammonia, Liquid Ammonia, Nitromite, Nitro-Sil, Ammonia (liquefied)

See section 16 for complete information.

Recommended 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.

Recommended restrictions:

None known.

Manufacturer/Importer/Supplier/Distributor information:

Manufacturer/Supplier: Valero Marketing & Supply Company and Affiliates

- One Valero Way
- San Antonio, TX 78269-6000

General Assistance: 210-345-4593

E-Mail: CorpHSE@valero.com

Contact Person: Industrial Hygienist

Emergency Telephone: 24 Hour Emergency 866-565-5220

1-800-424-9300 (CHEMTREC USA)

2. Hazard(s) Identification

Physical hazards:

- Flammable gases
- Gases under pressure

Health hazards:

- Acute toxicity, inhalation
- Skin corrosion/irritation
- Serious eye damage/eye irritation

Environmental hazards:

- Hazardous to the aquatic environment, acute hazard

OSHA defined hazards:

Not classified.

Label elements:

Signal word: Danger

Hazard statement:

- Flammable gas. Contains gas under pressure; may explode if heated. Toxic if inhaled. Causes severe skin burns and eye damage.

Precautionary statement:

Prevention:

- Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not breathe gas. Wear protective gloves/protective clothing/eye protection/face protection. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area.

Response:

- Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If inhaled: Remove person to fresh air and keep comfortable for breathing. Wash contaminated clothing before reuse.

Storage:

- Protect from sunlight. Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal:

- Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)  
None known.

3. Composition/information on ingredients
Mixtures

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous</td>
<td>7664-41-7</td>
<td>&gt;99.5</td>
</tr>
</tbody>
</table>

4. First-aid measures

**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.

**Skin contact**  
Wash frost-bitten areas with plenty of water. Do not remove clothing. Get medical attention immediately.

**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.

**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.

**Most important symptoms/effects, acute and delayed**  
Symptoms include itching, burning, redness, and tearing of eyes. Contact with liquefied gas may cause frostbite. Be aware that symptoms of lung edema (shortness of breath) may develop up to 24 hours after exposure.

**Indication of immediate medical attention and special treatment needed**  
Treat symptomatically.

5. Fire-fighting measures

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

**Unsuitable extinguishing media**  
None known.

**Specific hazards arising from the chemical**  
Heat may cause the containers to explode.

**Special protective equipment and precautions for firefighters**  
Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

**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.

6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**  
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).

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

**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.

7. Handling and storage

**Precautions for safe 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.

**Conditions for safe storage, including any incompatibilities**  
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. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)**

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (CAS 7664-41-7)</td>
<td>PEL</td>
<td>35 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 ppm</td>
</tr>
</tbody>
</table>

**US. ACGIH Threshold Limit Values**

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (CAS 7664-41-7)</td>
<td>STEL</td>
<td>35 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 ppm</td>
</tr>
</tbody>
</table>

**US. NIOSH: Pocket Guide to Chemical Hazards**

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (CAS 7664-41-7)</td>
<td>STEL</td>
<td>27 mg/m³</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>35 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 mg/m³</td>
</tr>
</tbody>
</table>

**Biological limit values**

No biological exposure limits noted for the ingredient(s).

**Appropriate 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.

**Individual protection measures, such as personal protective equipment**

**Eye/face protection**

Wear approved safety glasses or goggles.

**Skin protection**

Hand protection

Wear appropriate chemical resistant gloves.

Other

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.

**Thermal hazards**

Wear appropriate thermal protective clothing, when necessary.

**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 and chemical properties

**Appearance**

Colorless gas or cold, mobile liquid.

**Physical state**

Gas.

**Form**

Gas or liquid.

**Color**

Colorless

**Odor**

Penetrating odor.

**Odor threshold**

Not available.

**pH**

Not available.

**Melting point/freezing point**

-107.99 °F (-77.77 °C)

**Initial boiling point and boiling range**

-43.96 - 11.12 °F (-42.2 - -11.6 °C)

**Flash point**

Not available.

**Evaporation rate**

Not available.

**Flammability (solid, gas)**

Not available.

**Upper/lower flammability or explosive limits**

Flammability limit - lower (%)

15 %
Flammability limit - upper (%) 28 %
Explosive limit - lower (%) Not available.
Explosive limit - upper (%) Not available.

Vapor pressure Not available.
Vapor density 0.6
Relative density 0.68

Solubility(ies)
Solubility (water) Partially soluble.

Partition coefficient (n-octanol/water) Not available.

Auto-ignition temperature 1204 °F (651.11 °C)
Decomposition temperature Not available.
Viscosity Not available.

Other information
Molecular formula NH3
Molecular weight 17.04 g/mol

10. Stability and reactivity
Reactivity Not available.
Chemical stability Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions Polymerization will not occur.
Conditions to avoid In a fire or if heated, a pressure increase will occur and the container may burst or explode.
Hazardous decomposition products Nitrous gases.

11. Toxicological information

Information on likely routes of exposure
Ingestion Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.
Inhalation Toxic if inhaled. Causes respiratory tract burns.
Skin contact Causes severe skin burns.
Eye contact Causes serious eye damage.

Symptoms related to the physical, chemical and toxicological characteristics Symptoms include itching, burning, redness, and tearing of eyes. Contact with liquefied gas may cause frostbite. Be aware that symptoms of lung edema (shortness of breath) may develop up to 24 hours after exposure.

Information on toxicological effects
Acute toxicity Toxic if inhaled. 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").

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (CAS 7664-41-7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50</td>
<td></td>
<td>2000 ppm, 4 Hours</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td></td>
<td>Causes severe skin burns.</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td></td>
<td>Causes serious eye damage.</td>
</tr>
<tr>
<td>Respiratory or skin sensitization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory sensitization</td>
<td></td>
<td>Based on available data, the classification criteria are not met.</td>
</tr>
<tr>
<td>Skin sensitization</td>
<td></td>
<td>Based on available data, the classification criteria are not met.</td>
</tr>
</tbody>
</table>

Prepared by 3E Company
Germ cell mutagenicity
Based on available data, the classification criteria are not met.

Carcinogenicity
Based on available data, the classification criteria are not met.

Reproductive toxicity
Based on available data, the classification criteria are not met.

Specific target organ toxicity - single exposure
Based on available data, the classification criteria are not met.

Specific target organ toxicity - repeated exposure
Based on available data, the classification criteria are not met.

Aspiration hazard
Based on available data, the classification criteria are not met.

12. Ecological information

Ecotoxicity
Very toxic to aquatic organisms.

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (CAS 7664-41-7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aquatic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>LC50</td>
<td>Silver carp (Hypophthalmichthys molitrix) 0.38 mg/l, 96 hours</td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algae</td>
<td>EC50</td>
<td>Chlorella vulgaris &lt; 2700 mg/l, 432 hours</td>
</tr>
<tr>
<td>Crustacea</td>
<td>EC50</td>
<td>Daphnia 25.4 mg/l, 48 hours</td>
</tr>
<tr>
<td></td>
<td>NOEC</td>
<td>Daphnia &lt; 0.79 mg/l</td>
</tr>
<tr>
<td>Fish</td>
<td>LC50</td>
<td>Rainbow Trout 0.16 - 1.1 mg/l, 96 Hours</td>
</tr>
<tr>
<td></td>
<td>NOEC</td>
<td>Rainbow Trout &lt; 1.2 mg/l</td>
</tr>
<tr>
<td><strong>Chronic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crustacea</td>
<td></td>
<td>Daphnia 0.79 mg/l, 4 days</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td>Ictalurus punctatus 0.048 mg/l, 31 days</td>
</tr>
</tbody>
</table>

Persistence and degradability
Not available.

Bioaccumulative potential
Not available.

Mobility in soil
Not available.

Other adverse effects
Not 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.

Hazardous waste code
Waste codes should be assigned by the user based on the application for which the product was used.

Waste from residues / unused products
Dispose of in accordance with local regulations.

Contaminated packaging
Offer rinsed packaging material to local recycling facilities.

14. Transport information

DOT
UN number UN1005
UN proper shipping name Ammonia, anhydrous
Transport hazard class(es) 2.3
Class
Subsidiary risk 8
Packing group Not applicable.
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Special provisions 13, T50
Packaging exceptions None
Packaging non bulk 304
Packaging bulk 314, 315

DOT BULK
BULK
UN number UN1005
Ammonia, anhydrous

UN proper shipping name

Transport hazard class(es)

Class 2.2

Special precautions for user

Read safety instructions, SDS and emergency procedures before handling.

Special provisions

13, T50

Packaging exceptions

None

Packaging non bulk

304

Packaging bulk

314, 315

IATA

UN number

UN1005

UN proper shipping name

Ammonia, anhydrous

Transport hazard class(es)

Class 2.3

Subsidiary risk

8

Label(s) 2.3, 8

Packing group

Not applicable.

Environmental hazards

Yes

ERG Code

2CP

Special precautions for user

Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number

UN1005

UN proper shipping name

AMMONIA, ANHYDROUS

Transport hazard class(es)

Class 2.3

Subsidiary risk

8

Label(s) 2.3, 8

Packing group

Not applicable.

Environmental hazards

Marine pollutant

Yes

EmS

F-C, S-U

Special precautions for user

Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable. This product is a compressed or liquefied gas and when transported in bulk is covered under IGC code.

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. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Ammonia, anhydrous (CAS 7664-41-7) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

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

SARA 302 Extremely hazardous substance

Chemical name

Reportable quantity

Threshold planning quantity, lower value

Threshold planning quantity, upper value

Ammonia, anhydrous

7664-41-7

100

500 lbs

SARA 311/312 Hazardous chemical

Yes

Anhydrous Ammonia, Liquified

914378 Version #: 01 Revision date: 28-May-2014 Print date: 28-May-2014
Prepared by 3E Company
### SARA 313 (TRI reporting)

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>% by wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous</td>
<td>7664-41-7</td>
<td>&gt;99.5</td>
</tr>
</tbody>
</table>

### Other federal regulations

**Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**

Not regulated.

**Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**

Ammonia, anhydrous (CAS 7664-41-7)

**Clean Water Act (CWA)**

Section 112(r) (40 CFR 68.130)

Hazardous substance

**Safe Drinking Water Act (SDWA)**

Not regulated.

### US state regulations

This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

**US. Massachusetts RTK - Substance List**

Ammonia, anhydrous (CAS 7664-41-7)

**US. New Jersey Worker and Community Right-to-Know Act**

Ammonia, anhydrous (CAS 7664-41-7)

**US. Pennsylvania Worker and Community Right-to-Know Law**

Ammonia, anhydrous (CAS 7664-41-7)

**US. Rhode Island RTK**

Ammonia, anhydrous (CAS 7664-41-7)

**US. California Proposition 65**

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

### International Inventories

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

*A “Yes” indicates this product complies with the inventory requirements administered by the governing country(s).
A “No” indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

### 16. Other information, including date of preparation or last revision

**Issue date** 28-May-2014

**Revision date** -

**Version #** 01

**Further information** HMIS® is a registered trade and service mark of the NPCA.
NFPA Ratings

Disclaimer

This material Safety Data Sheet (SDS) 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 SDS 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.