SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Ammonia

Product Number: 294993
Brand: Aldrich
Index-No.: 007-001-00-5
CAS-No.: 7664-41-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO  63103
UNITED STATES

Telephone: +1 314 771-5765
Fax: +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone #: 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Gases under pressure (Liquefied gas), H280
Acute toxicity, Inhalation (Category 3), H331
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

[Image of pictograms]
Signal word: Danger

Hazard statement(s)
H280  Contains gas under pressure; may explode if heated.
H314  Causes severe skin burns and eye damage.
H331  Toxic if inhaled.
H400  Very toxic to aquatic life.
H411  Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P260  Do not breathe gas.
P261  Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264  Wash skin thoroughly after handling.
P271  Use only outdoors or in a well-ventilated area.
P273  Avoid release to the environment.
P280  Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P363  Wash contaminated clothing before reuse.
P391  Collect spillage.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405  Store locked up.
P410 + P403 Protect from sunlight. Store in a well-ventilated place.
P501  Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
Corrosive to the respiratory tract.

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous</td>
<td>Press. Gas Liquefied gas; Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Aquatic Acute 1; Aquatic Chronic 2; H280, H331, H314, H318, H400, H411 M-Factor - Aquatic Acute:</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>
For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Nitrogen oxides (NOx)
Not combustible.

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

Use water spray to cool unopened containers.
SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Clean up promptly by sweeping or vacuum.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Contents under pressure.
Storage class (TRGS 510): 2A: Gases

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous</td>
<td>7664-41-7</td>
<td>TWA 50 ppm</td>
<td>35 mg/m³</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remarks</td>
<td></td>
<td>The value in mg/m³ is approximate.</td>
</tr>
<tr>
<td>PEL</td>
<td></td>
<td>25 ppm</td>
<td>18 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
</tr>
<tr>
<td>STEL</td>
<td></td>
<td>35 ppm</td>
<td>27 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
</tr>
<tr>
<td>TWA</td>
<td></td>
<td>25 ppm</td>
<td></td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Remarks
Upper Respiratory Tract irritation
<table>
<thead>
<tr>
<th></th>
<th>Eye damage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STEL</strong></td>
<td>35 ppm</td>
</tr>
<tr>
<td><strong>USA. ACGIH Threshold Limit Values (TLV)</strong></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td><strong>Eye damage</strong></td>
<td></td>
</tr>
<tr>
<td><strong>TWA</strong></td>
<td>25 ppm</td>
</tr>
<tr>
<td><strong>USA. NIOSH Recommended Exposure Limits</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Often used in an aqueous solution.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ST</strong></td>
<td>35 ppm</td>
</tr>
<tr>
<td><strong>USA. NIOSH Recommended Exposure Limits</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27 mg/m³</td>
</tr>
</tbody>
</table>

**8.2 Exposure controls**

**Appropriate engineering controls**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Personal protective equipment**

**Eye/face protection**
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

- **Full contact**
- **Material:** butyl-rubber
- **Minimum layer thickness:** 0.3 mm
- **Break through time:** 480 min
- **Material tested:** Butoject® (KCL 897 / Aldrich Z677647, Size M)

- **Splash contact**
- **Material:** butyl-rubber
- **Minimum layer thickness:** 0.3 mm
- **Break through time:** 480 min
- **Material tested:** Butoject® (KCL 897 / Aldrich Z677647, Size M)

Data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

- **Appearance**: Form: Liquefied gas
  Colour: colourless

- **Odour**: stinging, Do not attempt to smell the product as it is hazardous.

- **Odour Threshold**: No data available

- **pH**: ca.10 - 12 at 50 g/l at 20 °C (68 °F)

- **Melting point/freezing point**
  Melting point/range: -78 °C (-108 °F) - lit.

- **Initial boiling point and boiling range**
  -33 °C - 27 °F - lit.

- **Flash point**: ()Not applicable

- **Evaporation rate**: Not applicable

- **Flammability (solid, gas)**
  The product is not flammable.

- **Upper/lower flammability or explosive limits**
  Upper explosion limit: 25 %(V)
  Lower explosion limit: 16 %(V)

- **Vapour pressure**: 8,600 hPa at 20 °C (68 °F)

- **Vapour density**: 0.6 - (Air = 1.0)

- **Relative density**: 0.7 g/cm3 at -33 °C (-27 °F) - liquid

- **Water solubility**: 531 g/l at 20 °C (68 °F) - OECD Test Guideline 105

- **Partition coefficient:** n-octanol/water
  Not applicable for inorganic substances

- **Auto-ignition temperature**: 651 °C (1204 °F)

- **Decomposition temperature**: > 450 °C (> 842 °F) -

- **Viscosity**: No data available

- **Explosive properties**: No data available

- **Oxidizing properties**: No data available

9.2 Other safety information
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Nitrogen oxides (NOx)
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available
LC50 Inhalation - Rat - male - 4 h - 4.93 mg/l
Remarks: (ECHA)
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Corrosive - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Ames test
Escherichia coli/Salmonella typhimurium
Result: negative
OECD Test Guideline 474
Mouse - male - Bone marrow
Result: negative
(in analogy to similar products)

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
Repeated dose toxicity - Rat - male and female - Oral - 35 Days - No observed adverse effect level - 250 mg/kg - Lowest observed adverse effect level - 750 mg/kg
(in analogy to similar products)
RTECS: BO0875000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

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**SECTION 12: Ecological information**

12.1 **Toxicity**

Toxicity to fish
flow-through test LC50 - Pimephales promelas (fathead minnow) - 0.75 - 3.4 mg/l - 96 h
Remarks: (in analogy to similar products)(ECHA)

Toxicity to daphnia and other aquatic invertebrates
static test LC50 - Daphnia magna (Water flea) - 101 mg/l - 48 h
Remarks: (ECHA)

EC50 - Daphnia pulicaria - 1.16 mg/l - 48 h
Remarks: (Lit.)

12.2 **Persistence and degradability**

Biodegradability
Result: - rapidly biodegradable
Remarks: Readily biodegradable.

12.3 **Bioaccumulative potential**
No data available
12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 1005  Class: 2.3 (8)
Proper shipping name: Ammonia, anhydrous
Reportable Quantity (RQ): 100 lbs
• Marine pollutant: yes
Poison Inhalation Hazard: Hazard Zone D

IMDG
UN number: 1005  Class: 2.3 (8)
Proper shipping name: AMMONIA, ANHYDROUS
Marine pollutant: yes
Marine pollutant: yes

IATA
UN number: 1005  Class: 2.3 (8)
Proper shipping name: Ammonia, anhydrous
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

SECTION 15: Regulatory information

SARA 302 Components
Ammonia, anhydrous  CAS-No.  Revision Date
7664-41-7  1993-04-24

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous</td>
<td>7664-41-7</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

**SARA 311/312 Hazards**
Sudden Release of Pressure Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**
No components are subject to the Massachusetts Right to Know Act.

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**SECTION 16: Other information**

**Further information**
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