Material Safety Data Sheet

Section 1 - Product and Company Information

Product Name: Ammonium hydroxide volumetric standard, 5.0N solution in water
Product Number: 316612
Brand: Fluka Chemical
Company: Sigma-Aldrich
Address: 3080 Spruce Street
City, State, Zip: SAIN LOUIS, MO 63110-US
Technical Phone: 660-333-5832
Emergency Phone: 314-776-6556
Fax: 660-333-5032

Section 2 - Composition/Information on Ingredient

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>CAS #</th>
<th>SARA 313</th>
<th>EC No</th>
<th>Annex I Index Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIA SOLUTION 10%&lt;C&lt;25%</td>
<td>None</td>
<td>No</td>
<td>216-847-6</td>
<td>007-001-01-2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>CAS #</th>
<th>Percent</th>
<th>SARA 313</th>
<th>EC No</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIUM HYDROXIDE</td>
<td>1336-21-8</td>
<td>&gt;= 10.000 %</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>WATER</td>
<td>7732-18-5</td>
<td>&gt;= 75.000 %, &lt; 90.000 %</td>
<td></td>
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</tr>
</tbody>
</table>

Formula: NH4OH
Synonym: 

Section 3 - Hazards Identification

Emergency Overview: Corrosive. Harmful if swallowed. Lashmyotator.
HMIS Rating:
Health: 3
Flammability: 0
Reactivity: 0
NFPA Rating:
Health: 3
Flammability: 0
Reactivity: 0

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

Oral Exposure: If swallowed, wash out mouth with water provided person is conscious. Call a physician. Do not induce vomiting.

Inhalation Exposure: If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Section 5 - Fire Fighting Measures

Explosion Limits:
Lower: 16 %
Upper: 27 %

Autoignition Temp: N/A

Extinguishing Media:
Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

Firefighting:
Protective Equipment:
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s):
Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill:
Evacuate area.

Procedure(s) of Personal Precaution(s):
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up:
Cover with dry lime or soda ash; pick up, keep in a closed container, and hold for waste disposal/Wet flake area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling:
User Exposure:
Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Avoid prolonged or repeated exposure.

Storage:
Suitable:
Keep tightly closed.

Special Requirements:
Refrigerate before opening.

Section 8 - Exposure Controls / PPE

Engineering Controls:
Safety shower and eye wash. Use only in a chemical fume hood.

Personal Protective Equipment:
Respiratory:
Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate, use a full-face respirator with multi-purpose combination (US) or type ABEK (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.

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Sigma-Aldrich Corporation
www.sigma-aldrich.com
Hand
Compatible chemical-resistant gloves.
Eye
Chemical safety goggles
Other
Face shield (6-inch minimum).

General Hygiene Measures
Wash contaminated clothing before reuse. Discard contaminated shoes. Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Physical State</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear liquid</td>
<td></td>
<td>Colorless</td>
</tr>
</tbody>
</table>

Molecular Weight 35.05 AMU

pH NA
BP/VP Range NA
MP/MP Range NA
Freezing Point NA
Vapor Pressure NA
Vapor Density NA
Saturated Vapor Conc. NA
SG/Density NA
Bulk Density NA
Odor Threshold NA
Volatile% NA
VOC Content NA
Water Content NA
Solvent Content NA
Evaporation Rate NA
Viscosity NA
Partition Coefficient NA
Decomposition Temp. NA
Flash Point °F NA
Flash Point °C NA

Explosion Limits
Lower 16 %
Upper 27 %

Flammability NA
Autoignition Temp NA
Solubility NA

N/A = not available

Section 10 - Stability and Reactivity

Stability
Stable

Materials to Avoid
Copper, Copper alloys, Galvanized iron, Zinc

Hazardous Decomposition Products

Nitrogen oxides, Ammonia

Hazardous Polymerization

Will not occur.

Section 11 - Toxicological Information

Route of Exposure
Skin Contact
Causes burns.

Skin Absorption
May be harmful if absorbed through the skin.

Eye Contact
Causes burns. Lachrymator.

Inhalation
May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

Ingestion
Harmful if swallowed.

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract. Eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynx and bronchus, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

RTECS Number: NA

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation
Contact a licensed professional waste disposal service to dispose of this material.

Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Ammonia solutions, [relative density between 0.880 and 0.957 at 15 degrees C in water, with more than 10 percent but not more than 35 percent ammonia]
UN No.: 2672
Class: 8
Packaging Group: Packing Group III
Hazard Label: Corrosive
PIH: Not PIH

IATA
Proper Shipping Name: Ammonia solution
IATA UN Number: 2672
Hazard Class: 8
Packaging Group: III
Section 15 - Regulatory Information

EU Directives Classification
Symbol of Danger: C
Indication of Danger
Corrosive
Risk Statements
Causes burns.
Safety Statements
S: 26 39/45
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US Classification and Label Text
Indication of Danger
Corrosive
Risk Statements
Harmful if swallowed.
Safety Statements
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US Statements
Lachrymator.

United States Regulatory Information
SARA Listed: No

Canada Regulatory Information
WHMIS Classification
This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: No
NDSL: No

Section 16 - Other Information

Disclaimer
For R&D use only. Not for drug, household or other uses.

Warranty
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc. shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of label or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.