Material Safety Data Sheet
Hydrazine hydrate, 100% (Hydrazine, 64%)

Section 1 - Chemical Product and Company Identification

MSDS Name: Hydrazine hydrate, 100% (Hydrazine, 64%)

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>302-01-2</td>
<td>Hydrazine</td>
<td>64</td>
<td>206-114-9</td>
</tr>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>36</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid. Flash Point: 75 deg C.

**Danger!** Toxic if swallowed, inhaled or absorbed through the skin. Causes eye and skin burns. Corrosive. May cause allergic skin reaction. May be absorbed through intact skin. **Combustible liquid and vapor.** Cancer suspect agent. May cause blood abnormalities. May cause severe respiratory and digestive tract irritation with possible burns. May cause liver and kidney damage. Air sensitive. May cause reproductive and fetal effects.

**Target Organs:** Blood, kidneys, liver, respiratory system, eyes, skin.

**Potential Health Effects**

**Eye:** Causes eye burns. Effects may be delayed. May cause temporary blindness. May cause visual impairment.

**Skin:** Causes skin burns. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Toxic in contact with skin. Substance is readily absorbed through the skin.

**Ingestion:** Poison by ingestion. May cause liver and kidney damage. Causes digestive tract burns with immediate pain, swelling of the throat, convulsions, and possible coma. Exposure may cause anemia and other blood abnormalities.

**Inhalation:** Effects may be delayed. May cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). May cause liver and kidney damage. Causes chemical burns to the respiratory tract. May cause lung damage. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Toxic if inhaled. Inhalation may produce burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. May cause respiratory sensitization.

**Chronic:** Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated exposure may cause adverse reproductive effects. Repeated inhalation may cause chronic bronchitis. May cause fetal effects. Repeated exposure may cause
sensitization dermatitis. Tumorigenic Data has been reported in a mouse study with skin dosing.

Section 4 - First Aid Measures

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Discard contaminated clothing in a manner which limits further exposure.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

**Notes to Physician:** Treat symptomatically and supportively.

**Antidote:** None reported.

Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Combustible liquid. Containers may explode when heated. Powerful reducing agent.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers.

**Flash Point:** 75 deg C (167.00 deg F)

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** 3.5%

**Upper:** 99.99%

**NFPA Rating:** (estimated) Health: 3; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Use a spark-proof tool. Provide ventilation. Place under an inert atmosphere.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Empty containers retain
product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Do not ingest or inhale. Handle under an inert atmosphere. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation.

**Storage:** Keep away from sources of ignition. Do not store in direct sunlight. Keep refrigerated. (Store below 4°C/39°F.) Store in a tightly closed container. Corrosives area. Do not expose to air. Store under an inert atmosphere.

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**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. Use only under a chemical fume hood.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrazine</td>
<td>0.01 ppm TWA; Skin potential significant contribution to overall exposure by the cutaneous route</td>
<td>50 ppm IDLH</td>
<td>1 ppm TWA; 1.3 mg/m3 TWA</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Hydrazine monohydrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Hydrazine hydrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles and face shield.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

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**Section 9 - Physical and Chemical Properties**

**Physical State:** Liquid

**Appearance:** colorless

**Odor:** strong odor - ammonia-like

**pH:** Strong Base

**Vapor Pressure:** Not available.

**Vapor Density:** Not available.

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** 118 deg C

**Freezing/Melting Point:** -51.7 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Miscible in water.

**Specific Gravity/Density:** Not available.

**Molecular Formula:** H4N2.H2O

**Molecular Weight:** 50.06
Section 10 - Stability and Reactivity

**Chemical Stability:** Stable. However becomes unstable if dehydrated.

**Conditions to Avoid:** Incompatible materials, ignition sources, exposure to air, excess heat, temperatures above 100°C.

**Incompatibilities with Other Materials:** Oxidizing agents, acids, alkali metals, copper, glass, halogens, iron, nitric acid, nitrates, perchlorates, sodium hydroxide, zinc, potassium, hydrogen peroxide, sodium, lead, dinitrogen tetraoxide, molybdenum(IV) oxide, mercuric oxide, organic matter, metal salts, stannous chloride, 2,4-Dinitrochlorobenzene, thiocyanates, rust, metal oxides.

**Hazardous Decomposition Products:** Nitrogen oxides, ammonia and/or derivatives, hydrogen gas.

**Hazardous Polymerization:** Has not been reported.

Section 11 - Toxicological Information

**RTECS#:**
CAS# 302-01-2: MU7175000
CAS# 7732-18-5: ZC0110000
CAS# 7803-57-8: MV8050000
CAS# 10217-52-4: MV4590000

**LD50/LC50:**
CAS# 302-01-2:
- Dermal, guinea pig: LD50 = 190 mg/kg;
- Inhalation, mouse: LC50 = 252 ppm/4H;
- Inhalation, mouse: LC50 = 1000 mg/m3/2H;
- Inhalation, mouse: LC50 = 320 mg/m3/4H;
- Inhalation, rat: LC50 = 570 ppm/4H;
- Inhalation, rat: LC50 = 130 mg/m3/2H;
- Oral, mouse: LD50 = 59 mg/kg;
- Oral, mouse: LD50 = 59 mg/kg;
- Oral, rat: LD50 = 60 mg/kg;
- Oral, rat: LD50 = 60 mg/kg;
- Skin, rabbit: LD50 = 91 mg/kg;<BR.

CAS# 7732-18-5:
- Oral, rat: LD50 = >90 mL/kg;<BR.

CAS# 7803-57-8:
- Oral, mouse: LD50 = 83 mg/kg;
- Oral, rabbit: LD50 = 55 mg/kg;
- Oral, rat: LD50 = 129 mg/kg;<BR.

CAS# 10217-52-4:
- Inhalation, rat: LC50 = 80 mg/m3;
- Oral, mouse: LD50 = 83 mg/kg;
- Oral, rabbit: LD50 = 55 mg/kg;
- Oral, rat: LD50 = 129 mg/kg;<BR.

**Carcinogenicity:**
CAS# 302-01-2:
- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/88
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7803-57-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 10217-52-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** Mutation data has been reported.
**Teratogenicity:** No data available.
**Reproductive Effects:** Adverse reproductive effects have occurred in experimental animals.
**Mutagenicity:** Mutagenic effects have occurred in experimental animals.
**Neurotoxicity:** No information found.
**Other Studies:**

### Section 12 - Ecological Information

**Ecotoxicity:** No data available. European carp: LC50 = 1.48mg/L (unknown time)
Zebra fish: LC50 = 3.18mg/L (unknown time)
Roach: LC50 = 0.85mg/L (unknown time)
**Environmental:** Substance shows moderate biological oxygen demand and it may cause some oxygen depletion in aquatic systems. It has a high potential to affect aquatic organisms. Substance is biodegradable and is not likely to bioconcentrate.
**Physical:** No information available.
**Other:** None.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
**RCRA P-Series:** None listed.
**RCRA U-Series:**
CAS# 302-01-2: waste number U133 (Reactive waste, Toxic waste).

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>IATA</th>
<th>HYDRAZINE AQUEOUS SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>HYDRAZINE AQUEOUS SOLUTION</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td>8</td>
</tr>
<tr>
<td>UN Number:</td>
<td>UN2030</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>II</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**Hazard Symbols:**
T C N
**Risk Phrases:**
R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.
R 34 Causes burns.
R 43 May cause sensitization by skin contact.
R 45 May cause cancer.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #5 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall INDO GULF GROUP be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if INDO GULF GROUP has been advised of the possibility of such damages.