Section 01 - Chemical And Product And Company Information

Product Identifier .................................. Hydrazine 35%

Product Use ............................................. Corrosion inhibitor and reducing agent

Supplier Name ........................................... ClearTech Industries Inc.

2302 Hanselman Avenue
Saskatoon, SK. Canada
S7L 5Z3

Prepared By ............................................. ClearTech Industries Inc. Technical Department

Phone: (306)664-2522

Preparation Date ..................................... May 4, 2009

24-Hour Emergency Phone ......................... 306-664-2522

Section 02 - Composition / Information on Ingredients

Hazardous Ingredients ......................... Hydrazine 35%

CAS Number ............................. Hydrazine 302-01-2

Synonym (s) ........................................ 54.7% Hydrazine Hydrate, Aqueous Hydrazine Solution, Diamide Hydrate

Section 03 - Hazard Identification

Inhalation ............................................. Irritating to respiratory tract. Can cause headache, dizziness and nausea. May cause coughing, runny nose and sore throat. May cause formation of methemoglobin which reduces ability of blood to carry oxygen.
Skin Contact / Absorption. Irritation upon direct contact. Can cause reddening, itching, swelling, burning and possible blistering. Prolonged or repeated skin contact may cause dermatitis in the form of erythema, blistering or eczema-like rashes. Some individuals have exhibited allergic skin reactions which disappear when removed from exposure.

Eye Contact. Irritation upon direct contact. Severe irritant, causing burning, reddening and tearing. Permanent damage is possible. Severe exposure to hydrazine vapours has been reported to cause temporary blindness, lasting for as long as 24 hours.

Ingestion. Highly toxic. Causes irritation and burning of the mucous membranes of the gastrointestinal tract.

Exposure Limits. ACGIH/TLV-TWA: 0.01ppm

Section 04 - First Aid Measures

Inhalation. Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.

Skin Contact / Absorption. Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists.

Eye Contact. Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention.

Ingestion. Dilute with small quantities of water (200-250 mL). Do not induce vomiting unless directed by medical personnel. Never give anything by mouth to an unconscious person. Get immediate medical attention.

Additional Information. There are no definitive antidotes for hydrazine exposure. Treat any ill effects symptomatically and supportively. Parenteral pyridoxine administration has been used by some physicians to treat patients suffering from acute central nervous system effects.

Section 05 - Fire Fighting

Conditions of Flammability. Not available

Means of Extinction. Water spray, carbon dioxide, foam or dry chemical.

Flash Point. > 100°C
Auto-ignition Temperature .................. > 310°C

Upper Flammable Limit ................. 83.4%

Lower Flammable Limit ................. 9.3%

Hazardous Combustible Products .... Toxic and irritating fumes may be given off during burning or thermal decomposition.

Special Fire Fighting Procedures ..... Wear NIOSH-approved self-contained breathing apparatus and protective clothing.

Explosion Hazards ......................... Not available

Section 06 - Accidental Release Measures

Leak / Spill .................................... Utilize recommended protective clothing. Spills should be contained by diking and digging a containment pit sufficiently large enough to hold at least 10 times the spill. Dilute to approximately 10 times the volume with water and add sufficient dry commercial calcium hypochlorite (dry chlorine, dry bleach) to completely oxidize the hydrazine (use 7-10 lbs per lb of hydrazine). Calcium hypochlorite or other oxidizing agents should never be allowed to mix with undiluted hydrazine solutions. The resulting reaction is very vigorous, releasing large amounts of heat and gas. Contaminated surfaces should be treated with household bleach or calcium hypochlorite solution to oxidize the residual hydrazine.

Deactivating Materials ................. Calcium hypochlorite, household bleach

Section 07 - Handling and Storage

Handling Procedures ...................... Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure. This product may become electrostatically charged during filling and transferring. Make sure equipment is properly bonded and grounded.

Storage Requirements .................... Store in a dry place away from heat (below 50°C) and away from ignition sources and oxidants, preferably outdoors. Shelter drums stored outdoors from direct sunlight. For indoor storage areas, continuous ventilation should be provided.
Section 08 - Personal Protection and Exposure Controls

Protective Equipment

Eyes………………………………………… Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

Respiratory………………………………… A positive pressure, supplied-air respirator or a self-contained breathing apparatus is recommended if airborne concentrations exceed the appropriate standards.

Gloves……………………………………… Impervious gloves of chemically resistant material (rubber, neoprene, nitrile or PVC) should be worn at all times. Wash contaminated clothing and dry thoroughly before reuse.

Clothing…………………………………… Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing and dry thoroughly before reuse.

Footwear………………………………… Impervious boots of chemically resistant material should be worn at all times.

Engineering Controls

Ventilation Requirements……………….. Mechanical ventilation (dilution or local exhaust), process or personnel enclosure and control of process conditions should be provided. Supply sufficient replacement air to make up for air removed by exhaust systems.

Other……………………………………….. Do not store or transfer hydrazine solutions in open containers. Because hydrazine can be absorbed into the body by all common routes of exposure, protective equipment must be used. Personal protective equipment is not an adequate substitute for safe work practices, proper equipment design and good maintenance practices. Eye wash facility should be close in proximity. emergency shower should be in close proximity.

Section 09 - Physical and Chemical Properties

Physical State………………………… Liquid

Odor and Appearance………………….. Colourless to light yellow ammonical liquid

Odor Threshold………………………… Not available

Specific Gravity (Water=1)…………….. 1.021 at 20°C

Vapor Pressure (mm Hg, 20°C)……….. 11.25
Vapor Density (Air=1) ................................... Not available
Evaporation Rate ........................................ Not available
Boiling Point ........................................... 109.4°C
Freeze/Melting Point ................................... -65°C
pH ................................................................. > 12 at 350g/L
Water/Oil Distribution Coefficient .......... Not available
Bulk Density ............................................... Not available
% Volatiles by Volume ......................... Not available
Solubility in Water .................................. Soluble
Molecular Formula .............................. N₂H₄ · H₂O
Molecular Weight ................................. 50.06 (active ingredient)

Section 10 - Stability and Reactivity

Stability ................................................... Stable at normal temperatures and pressures.
Incompatibility ........................................ Strong oxidizers, lead, copper, zinc, cobalt, silver and certain alloys (bronze, brass).
Hazardous Products of Decomposition... Under catalytic influence or elevated temperatures: hydrogen, nitrogen, ammonia. Slow reaction with oxygen from the air is possible at room temperature.
Polymerization ........................................ Will not occur

Section 11 - Toxicological Information

Irritancy .................................................. Moderate irritant
Sensitization ........................................... Skin contact may cause an allergic skin reaction.
Chronic/Acute Effects ......................... Chronic effects of this product include: dermatitis of the skin, conjunctivitis and permanent corrosive damage to eyes and damage to kidneys, liver, brain and blood supply if ingested.
Synergistic Materials ......................... Not available
Animal Toxicity Data

- \( \text{LD}_{50} \) (oral, rat) = 60-129mg/kg
- \( \text{LD}_{50} \) (dermal, rabbit) = 91mg/kg

Carcinogenicity

The NTP and IARC has listed hydrazine as a substance that may reasonably be anticipated to be a carcinogen. While hydrazine is known to be an animal carcinogen, no link has been established to cancer in humans in over forty years of use. Epidemiological studies performed to date on hydrazine production workers have not identified any association between hydrazine exposure and any increased risk of cancer.

Reproductive Toxicity

Animal testing did not show any effects on fertility. Fetotoxicity has been observed in animal studies.

Teratogenicity

Fetotoxicity only seen with maternal toxicity.

Mutagenicity

Hydrazine has demonstrated mutagenic potential in several test systems such as bacteria, phage, higher plants, drosophila, and the host-mediated assay. It was negative in the dominant lethal assay in mice. Dermal contact with hydrazine at a dose causing skin damage and systemic effects has produced embryolethality in rats.

Section 12 - Ecological Information

Fish Toxicity

- \( \text{LD}_{50} \) (Bluegill, 96 hrs) = 1.08mg/L
- \( \text{LD}_{50} \) (Fathead minnow, 96 hrs) = 5.98mg/L

Biodegradability

Not available

Environmental Effects

Any contaminated water, soil or residue resulting from a spill and subsequent cleanup is considered to be a hazardous waste.

Section 13 - Disposal Consideration

Waste Disposal

Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

Section 14 - Transportation Information

TDG Classification

- Class: 6.1
- Group: III
- PIN Number: UN 3293
PRODUCT CLASSIFICATION: This product has been classified on the preparation date specified at section 16 of this MSDS / SDS, for transportation in accordance with the requirements of part 2 of the Transportation of Dangerous Goods Regulations. If applicable, testing and/or published test data regarding the classification of this product are listed in the references at section 16 of this MSDS / SDS.

Section 15 - Regulatory Information

WHMIS Classification..................D1, D2

NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS.

Section 16 - Other Information

Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.

Attention: Receiver of the chemical goods / MSDS coordinator

As part of our commitment to the Canadian Association of Chemical Distributors (CACD) Responsible Distribution® initiative, ClearTech Industries Inc. and its associated companies require, as a condition of sale, that you forward the attached Material Safety Data Sheet(s) to all affected employees, customers, and end-users. ClearTech will send any available supplementary handling, health, and safety information to you at your request.

If you have any questions or concerns please call our customer service or technical service department.

ClearTech Industries Inc. - Locations

Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3
Phone: 306-664-2522
Fax: 306-665-6216
www.ClearTech.ca

<table>
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<th>Phone Number</th>
<th>Fax Number</th>
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<tr>
<td>Richmond, B.C.</td>
<td>12431 Horseshoe Way</td>
<td>V7A 4X6</td>
<td>604-272-4000</td>
<td>604-272-4596</td>
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<td>Calgary, AB.</td>
<td>5516E - 40th St. S.E.</td>
<td>T2C 2A1</td>
<td>403-279-1096</td>
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<td>Edmonton, AB.</td>
<td>11750 - 180th Street</td>
<td>T5S 1N7</td>
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<td>Saskatoon, SK.</td>
<td>2302 Hanselman Avenue</td>
<td>S7L 5Z3</td>
<td>306-933-0177</td>
<td>306-933-3282</td>
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<tr>
<td>Regina, SK.</td>
<td>555 Henderson Drive</td>
<td>S4X 5X2</td>
<td>306-721-7737</td>
<td>306-721-8611</td>
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<tr>
<td>Winnipeg, MB.</td>
<td>340 Saulteaux Crescent</td>
<td>R3J 3T2</td>
<td>204-987-9777</td>
<td>204-987-9770</td>
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<tr>
<td>Mississauga, ON.</td>
<td>7480 Bath Road</td>
<td>L4T 1L2</td>
<td>905-612-0566</td>
<td>905-612-0575</td>
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24 Hour Emergency Number - All Locations - 306-664-2522