SAFETY DATA SHEET

DynaPoxy™ Low Mod Epoxy Part B

PART I  What is the material and what do I need to know in an emergency?

1. PRODUCT IDENTIFICATION

IDENTIFICATION of the SUBSTANCE or PREPARATION

<table>
<thead>
<tr>
<th>TRADE NAME (AS LABELED):</th>
<th>DynaPoxy™ Low Mod Epoxy Part B</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT DESCRIPTION:</td>
<td>Part B of Two-Part Epoxy Sealant</td>
</tr>
<tr>
<td>CHEMICAL NAME/CLASS:</td>
<td>Amine and Alcohol Blend</td>
</tr>
<tr>
<td>SYNONYMS:</td>
<td>None</td>
</tr>
<tr>
<td>RELEVANT USE:</td>
<td>Part B for Low Modulus, Low Viscosity Epoxy Bonding Agent</td>
</tr>
<tr>
<td>USES ADVISED AGAINST:</td>
<td>Other Than Relevant Use</td>
</tr>
</tbody>
</table>

COMPANY/UNDERTAKING IDENTIFICATION:

<table>
<thead>
<tr>
<th>SUPPLIER/MANUFACTURER'S NAME:</th>
<th>Pecora Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADDRESS:</td>
<td>165 Wambold Road, Harleysville, PA 19438</td>
</tr>
<tr>
<td>EMERGENCY PHONE:</td>
<td>800-424-9300 (CHEMTREC, 24-hours)</td>
</tr>
<tr>
<td>BUSINESS PHONE:</td>
<td>215-723-6051 (Mon–Fri, 8 AM–5 PM ET)</td>
</tr>
<tr>
<td>PREPARATION DATE:</td>
<td>October 2009</td>
</tr>
<tr>
<td>REVISION DATE:</td>
<td>September 19, 2012</td>
</tr>
</tbody>
</table>

This product is sold for commercial use. This MSDS has been developed to address safety concerns of those individuals working with bulk quantities of this material, as well as those of potential users of this product in industrial/occupational settings. ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, and Canadian WHMIS [Controlled Products Regulations] and the Global Harmonization Standard required information is included in appropriate sections based on the U.S. ANSI Z400.1-2010 format. This product has been classified in accordance with the hazard criteria of the countries listed above.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION LABELING AND CLASSIFICATION: This product has been classified per GHS Standards.

- Classification: Combustible Liquid Cat. 4, Reproductive Toxicity Cat. 2, Acute Oral Toxicity Cat. 4, Acute Dermal Toxicity Cat. 4, Acute Inhalation Toxicity Cat. 4, Skin Corrosion Cat. 1B, Skin Sensitization Cat. 1, Aquatic Acute Toxicity Cat. 1, Aquatic Chronic Toxicity Cat. 1
- Hazard Statement Codes: H227, H361fd, H302 + H312 + H332, H314, H317, H410
- Hazard Symbols/Pictograms: GHS05, GHS07, GHS08, GHS09

EMERGENCY OVERVIEW:

- PHYSICAL DESCRIPTION: This product is an amber liquid with an odor characteristic of amines (ammonia-like).
- HEALTH HAZARDS: Corrosive and can cause burns by all routes of exposure. Eye exposure may cause blindness. Harmful by inhalation, ingestion or skin contact. May be fatal if ingested. Symptoms of toxicity by all routes may be delayed. Ingestion may cause adverse central nervous system effects. May cause toxic systemic effects by skin absorption. Can cause skin sensitization and may cause respiratory sensitization and allergic reaction in individuals susceptible to amines. Limited evidence of reproductive toxicity for the 4-Nonylphenol Branched Mixed Isomers component.
- FLAMMABILITY HAZARD: This product is combustible and may ignite if exposed to high temperature or direct flame.
- REACTIVITY HAZARD: Closed containers may develop pressure and rupture on prolonged exposure to heat or if involved in a fire.
- ENVIRONMENTAL HAZARD: This product is harmful to marine organisms. All release to the environment should be avoided.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS®)

<table>
<thead>
<tr>
<th>Health</th>
<th>3*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>2</td>
</tr>
<tr>
<td>Physical Hazard</td>
<td>0</td>
</tr>
</tbody>
</table>

See Section 16 for definitions of ratings

0 = Minimal  3 = Serious
1 = Slight  4 = Severe
2 = Moderate  * = Chronic

HMIS® is a registered trademark of the National Paint and Coatings Association.

CANADIAN WHMIS CLASSIFICATION: Class B3, D1B, D2B and E. See Section 15 (Regulatory Information) for all classification details.

U.S. OSHA REGULATORY STATUS: This material has a classification under the Global Harmonization Standard, as applied under OSHA regulations, as given earlier in this Section.
3. COMPOSITION AND INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>W/W%</th>
<th>GHS Classification Hazard Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amine Blend</td>
<td></td>
<td>60.0-80.0</td>
<td>SELF-CLASSIFICATION</td>
</tr>
<tr>
<td>Consists of the following:</td>
<td></td>
<td></td>
<td>Cat. 2, Acute Oral Toxicity Cat. 4, Acute Dermal Toxicity Cat. 4, Acute Inhalation Toxicity Cat. 4, Skin Corrosion Cat. 1, Skin Sensitization Cat. 1, Aquatic Acute Toxicity Cat. 1, Aquatic Chronic Toxicity Cat. 1</td>
</tr>
<tr>
<td>1-Aminoethylpiperazine</td>
<td>140-31-8</td>
<td>Proprietary</td>
<td>Classification: Acute Oral Toxicity Cat. 4, Acute Dermal Toxicity Cat. 4, Skin Corrosion Cat. 1B, Skin Sensitization Cat. 1, Aquatic Acute Toxicity Cat. 3</td>
</tr>
<tr>
<td>Benzyl Alcohol</td>
<td>100-51-6</td>
<td>Proprietary</td>
<td>Classification: Acute Oral Toxicity Cat. 4, Acute Inhalation Toxicity Cat. 4</td>
</tr>
<tr>
<td>Bis(hexamethylenetriamine)</td>
<td>143-23-7</td>
<td>Proprietary</td>
<td>SELF CLASSIFICATION</td>
</tr>
<tr>
<td>Isomers</td>
<td></td>
<td></td>
<td>Cat. 1B, Skin Sensitization Cat. 1, Aquatic Chronic Toxicity Cat. 1, Acute Oral Toxicity Cat. 5, Skin Corrosion Cat. 1B, Skin Irritation Cat. 2A, Skin Irritation Cat. 2</td>
</tr>
<tr>
<td>1,2-Cyclohexanediamine</td>
<td>694-83-7</td>
<td>Proprietary</td>
<td>Classification: Acute Oral Toxicity Cat. 5, Skin Corrosion Cat. 1B</td>
</tr>
<tr>
<td>4-Nonylphenol Branched Mixed</td>
<td>84852-15-3</td>
<td>20.0-30.0</td>
<td>Classification: Reproductive Toxicity Cat. 2, Acute Oral Toxicity Cat. 4, Skin Corrosion Cat. 1B, Aquatic Acute Toxicity Cat. 1, Aquatic Chronic Toxicity Cat. 1, Skin Irritation Cat. 2A, Skin Irritation Cat. 2, Skin Irritation Cat. 2, Skin Sensitization Cat. 1, Aquatic Acute Toxicity Cat. 3, Aquatic Chronic Toxicity Cat. 1</td>
</tr>
<tr>
<td>Isomers</td>
<td></td>
<td></td>
<td>Cat. 1, Combustible Liquid, Cat. 4, Reproductive Toxicity Cat. 2, Acute Oral Toxicity Cat. 4, Acute Dermal Toxicity Cat. 4, Acute Inhalation Toxicity Cat. 4, Skin Corrosion Cat. 1B, Skin Sensitization Cat. 1, Aquatic Acute Toxicity Cat. 1, Aquatic Chronic Toxicity Cat. 1</td>
</tr>
<tr>
<td>Tris-2,4,6-(dimethylaminomethyl)</td>
<td>90-72-2</td>
<td>5.0-10.0</td>
<td>Classification: Acute Oral Toxicity Cat. 4, Eye Irritation Cat. 2A, Skin Irritation Cat. 2</td>
</tr>
</tbody>
</table>

See Section 16 for full text of Ingredient Hazard and Precautionary Statements.

PART II What should I do if a hazardous situation occurs?

4. FIRST-AID MEASURES

PROTECTION OF FIRST AID RESPONDERS: Rescuers should not attempt to retrieve victims of exposure to this material without adequate personal protective equipment. Rescuers should be taken for medical attention, if necessary. Fire protective gear may be necessary.

DESCRIPTION OF FIRST AID MEASURES: Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Remove and isolate contaminated clothing and shoes. Seek immediate medical attention. Take copy of label and MSDS to physician or other health professional with victim(s).

INGESTION: If this material is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING, unless directly by medical personnel. Have victim rinse mouth with water or give several cupfuls of water, if conscious. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions and central nervous system conditions or skin problems may be aggravated by overexposure to this product.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT (COC): > 60°C (> 140°F)  AUTOIGNITION: Not known.

FLAMMABLE LIMITS IN AIR: Not known.

EXTINGUISHING MEDIA:

SUITABLE EXTINGUISHING MEDIA: Use materials appropriate for surrounding materials.

UNSUITABLE EXTINGUISHING MEDIA: Do not use water jet; water used directly on burning product may cause frothing and spread fire. May be incompatible with halons.

PROTECTION OF FIREFIGHTERS:

SPECIAL HAZARDS ARISING FROM THE SUBSTANCE: This product is combustible and can be ignited when exposed to high temperature for prolonged period or direct flame. The product is corrosive and presents a severe contact hazard to fire-fighters. Not sensitive to mechanical impact under normal conditions. Vapors may form explosive mixtures in air. Vapors are heavier than air and can accumulate in confined spaces creating a toxicity and explosion hazard. Vapors can travel long distances and flashback to ignition source. Closed containers may develop pressure and rupture in event of fire.

DynaPoxy™ Low Mod Epoxy Part B  Page 2 of 12  September 19, 2012
5. FIRE-FIGHTING MEASURES (Continued)

PROTECTION OF FIREFIGHTERS (continued):
SPECIAL PROTECTIVE ACTIONS FOR FIREFIGHTERS: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move containers from fire area if it can be done without risk to personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS AND EMERGENCY PROCEDURES: An accidental release can result in a fire in the presence of ignition source. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. Use only non-sparking tools and equipment during the response. The atmosphere must at least 19.5 percent Oxygen before non-emergency personnel can be allowed in the area without Self-Contained Breathing Apparatus and fire protection. Avoid contact with water.

PERSONAL PROTECTIVE EQUIPMENT: Responders should wear the level of protection appropriate to the type of chemical released, the amount of the material spilled, and the location where the incident has occurred.

Small Spills: For releases of 1 drum or less, Level D Protective Equipment (gloves, chemical resistant apron, boots, and eye protection) should be worn.

Large Spills: Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit, fire-retardant clothing and boots, hard hat, and Self-Contained Breathing Apparatus.

METHODS FOR CLEAN-UP AND CONTAINMENT:
All Spills: Access to the spill area should be restricted. Spread should be limited by gently covering the spill with polypads. Absorb spilled liquid with clay, sand, polypads, or other suitable inert absorbent materials. Neutralize spill and spill area with material appropriate for basic amine compounds. All contaminated absorbents and other materials should be placed in an appropriate container and sealed. Do not mix with wastes from other materials. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). Dispose of recovered material and record spill per regulatory requirements. Remove all residue before decontamination of spill area. Clean spill area with soap and copious amounts of water. Monitor area for combustible vapor levels and confirm levels are below exposure limits given in Section 8 (Exposure Controls – Personal Protection) before non-response personnel are allowed into the spill area. Purge equipment with inert gas prior to reuse.

ENVIRONMENTAL PRECAUTIONS: Minimize use of water to prevent environmental contamination. Prevent spill or rinsate from contaminating storm drains, sewers, soil or groundwater. Place all spill residues in a suitable container and seal. Do not discharge effluent containing this product into streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

OTHER INFORMATION: U.S. regulations may require reporting of spills of this material that reach surface waters if a sheen is formed. If necessary, the toll-free phone number for the US Coast Guard National Response Center is 1-800-424-8802.

REFERENCE TO OTHER SECTIONS: See information in Section 8 (Exposure Controls – Personal Protection) and Section 13 (Disposal Considerations) for additional information.

PART III

7. HANDLING and STORAGE

PRECAUTIONS FOR SAFE HANDLING: Danger! Corrosive; avoid all contact with this product. As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat or drink while handling this material. Avoid contact with eyes, skin, and clothing. Avoid breathing fumes, dusts, vapors or mist. Do not taste or swallow. Use only with adequate ventilation. Contaminated clothing needs to be laundered prior to reuse. Keep away from heat and flame. In the event of a spill, follow practices indicated in Section 6: ACCIDENTAL RELEASE MEASURES. Empty containers may contain residual product; therefore, empty containers should be handled with care. Keeping work areas clean is essential. Use work surfaces that can be easily decontaminated. Maintain good personal hygiene.

CONDITIONS FOR SAFE STORAGE: Keep container tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Containers should be separated from oxidizing materials by a minimum distance of 20 ft. or by a barrier of non-combustible material at least 5 ft. high having a fire-resistance rating of at least 0.5 hours. Storage areas should be made of fire resistant materials. Local Fire Departments should be notified of the storage of this product on site. Storage and processing areas of this product should be identified with a NFPA 704 placard (diamond) large enough to be seen from a distance. Post warning and “NO SMOKING” signs in storage and use areas, as appropriate. Refer to NFPA 30, Flammable and Combustible Liquids Code, for additional information on storage. Have appropriate extinguishing equipment in the storage area (such as sprinkler systems or portable fire extinguishers). Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

PRODUCT USE: This product is a Part B in a three-part sealant product. Follow all industry standards for use of this product.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:
VENTILATION AND ENGINEERING CONTROLS: Use with adequate, explosion proof ventilation to ensure exposure levels are maintained below the limits provided in this section.
8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EXPOSURE LIMITS/CONTROL PARAMETERS (continued):

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>Guideline</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Aminohexylpiperazine</td>
<td>140-31-8</td>
<td>NE</td>
<td>NE</td>
</tr>
<tr>
<td>Benzyl Alcohol</td>
<td>100-51-6</td>
<td>AIIA WEEL TWA</td>
<td>10 ppm</td>
</tr>
<tr>
<td>Bis(hexamethylenetramine)</td>
<td>143-23-7</td>
<td>NE</td>
<td>NE</td>
</tr>
<tr>
<td>1,2-Cyclohexanediamine</td>
<td>694-83-7</td>
<td>NE</td>
<td>NE</td>
</tr>
<tr>
<td>4-Nonylphenol Branched Mixed Isomers</td>
<td>84852-15-3</td>
<td>NE</td>
<td>NE</td>
</tr>
<tr>
<td>Tris-(2,4,6-(dimethylaminomethyl)phenol</td>
<td>90-72-2</td>
<td>NE</td>
<td>NE</td>
</tr>
</tbody>
</table>

NE = Not Established. See Section 16 for Definitions of Terms Used.


EYE/FACE PROTECTION: Use approved safety goggles or safety glasses with side-shield. When handling more than 1 quart a full-faceshield should be used. If necessary, refer to appropriate regulations.

SKIN PROTECTION: Wear chemical impervious gloves (e.g., Nitrile or Neoprene). Gloves should have a gauntlet to cover the arms. Use triple gloves for spill response. If necessary, refer to appropriate regulations.

BODY PROTECTION: Use body protection appropriate for task (e.g., lab coat, coveralls, Tyvek suit). If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or appropriate Standards of Canada. Full body protective suit is appropriate for spill response. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee’s feet may be exposed to electrical hazards, use foot protection, as described in appropriate regulations.

RESPIRATORY PROTECTION: If mists or sprays from this product are created during use, use appropriate respiratory protection. If necessary, use only respiratory protection authorized in appropriate regulations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under appropriate regulations.

9. PHYSICAL and CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORM</td>
<td>Liquid</td>
</tr>
<tr>
<td>MOLECULAR WEIGHT</td>
<td>Mixture</td>
</tr>
<tr>
<td>ODOR</td>
<td>Characteristic of amines/like ammonia.</td>
</tr>
<tr>
<td>VAPOR DENSITY (air = 1) &gt; 1</td>
<td></td>
</tr>
<tr>
<td>FREEZING/HEATING POINT</td>
<td>Not available</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY (water = 1) @ 21°C</td>
<td>0.97</td>
</tr>
<tr>
<td>SOLUBILITY IN WATER</td>
<td>Slightly soluble</td>
</tr>
<tr>
<td>VAPOR PRESSURE</td>
<td>Not available</td>
</tr>
<tr>
<td>COEFFICIENT WATER/OIL DISTRIBUTION</td>
<td>Not available</td>
</tr>
<tr>
<td>VOC (less water and exempt)</td>
<td>&lt;50 g/L</td>
</tr>
<tr>
<td>HOW TO DETECT THIS SUBSTANCE</td>
<td>(IDENTIFICATION/WARNING PROPERTIES)</td>
</tr>
<tr>
<td></td>
<td>The odor and appearance may be good warning property in the event of an accidental release.</td>
</tr>
</tbody>
</table>

10. STABILITY and REACTIVITY

CHEMICAL STABILITY: Stable under normal circumstances of use and handling.

CONDITIONS TO AVOID: Avoid contact with incompatible chemicals and exposure to extreme temperatures.

INCOMPATIBLE MATERIALS: Based upon component incompatibility, this product may be incompatible with halogenated materials, acids and oxidizers. This product may attack some types of plastic and coatings due to the Benzyl Alcohol component.

HAZARDOUS DECOMPOSITION PRODUCTS: Combustion: Thermal decomposition of this product can generate carbon and nitrogen oxides, formaldehyde. Hydrolysis: None known.

POSSIBILITY OF HAZARDOUS REACTIONS/POLYMERIZATION: Polymerization will not occur.

PART IV Is there any other useful information about this material?

11. TOXICOLOGICAL INFORMATION

Potential Health Effects: The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are as follows:

CONTACT WITH SKIN OR EYES: This product is corrosive; direct skin or eye contact can cause severe irritation or burns, depending on concentration and duration of exposure. Burns may not be immediately visible or painful. Direct eye contact may cause blindness. Eye contact with vapors is irritating and can cause a disturbance of vision known as ‘halo eyes’. This is a visual disturbance of a blue halo or ring seen when looking into light. This disturbance normally disappears after several hours when exposure has ended.

SKIN ABSORPTION: Prolonged skin contact may cause adverse systemic toxicity by skin absorption as described under ingestion or inhalation.

INGESTION: Corrosive by ingestion. May be harmful or fatal swallowed. If the product is swallowed, it severe irritation of the mouth, throat, and other tissues of the gastro-intestinal system and may cause nausea, vomiting, and diarrhea as well as adverse effects on the central nervous system. Less significant adverse effects may be delayed for a week and can include skin problems (rash, thickening and flaking), abdominal pain, gastrointestinal ulcers and bleeding, loss of appetite and muscle pain.
11. TOXICOLOGICAL INFORMATION (Continued)

INHALATION: Corrosive by inhalation and may cause severe irritation or burns to the respiratory system, depending on concentration and duration of exposure. Symptoms of inhalation exposure include a burning sensation, cough, labored breathing, sore throat and unconsciousness. Symptoms of injury from inhalation may be delayed and can include, coughing, wheezing and severe shortness of breath. Severe inhalation exposure may be fatal due to development of pulmonary edema, and accumulation of fluid in the lungs. Chronic inhalation of low vapor concentration may cause permanent damage to the lungs and reduced lung function. Inhalation of vapors or fumes from this product may result in sensitization and allergic reaction in sensitive individuals. Refer to ‘Sensitization to the Product’ for additional information on possible sensitization effects by inhalation.

INJECTION: Accidental injection of this product (e.g. puncture with a contaminated object) may cause burning, redness, and swelling in addition to the wound.

TARGET ORGANS: Acute: Skin, eyes, respiratory system. Chronic: Skin, respiratory system.

TOXICITY DATA: This product has not been tested for toxicity. The following data are for components.

3-AMINOETHEXYLPYPERAZINE:

Open Irritation Test (Skin-Rabbit) 100 µg/24 hours
Standard Draize Test (Skin-Rabbit) 5 mg/24 hours: Severe
Standard Draize Test (Eye-Rabbit) 20 mg/24 hours: Moderate
LD₅₀ (Oral-Rat) 2140 µL/kg
LD₅₀ (Oral-Chicken) 1500 µg/kg
LD₅₀ (Skin-Rabbit) 60 µL/kg
LD₅₀ (Intrapерitoneal-Mouse) 250 mg/kg
TLDo (Oral-Rat) 1680 mg/kg: male 28 day(s) pre-mating: Reproductive: Paternal Effects: spermato genesis (incl. genetic material, sperm morphology, motility, and count)

BENZYL ALCOHOL:

LC₅₀ (Inhalation-Human) 10 ppb/day-intermittent: Behavioral: somnolence (general depressed activity), ataxia; Lungs, Thorax, or Respiration: respiratory depression
LD₅₀ (Skin-Rabbit) 1200 mg/kg: Behavioral: somnolence (general depression activity), excitement, coma
LD₅₀ (Oral-Mouse) 1360 mg/kg
LD₅₀ (Oral-Mouse) 1360 mg/kg: Behavioral: somnolence (general depression activity), ataxia; Lungs, Thorax, or Respiration: respiratory depression
LD₅₀ (Oral-Rabbit) 1040 mg/kg: Behavioral: somnolence (general depression activity)
LD₅₀ (Oral-Rabbit) 1040 mg/kg: Behavioral: somnolence (general depression activity), ataxia; Lungs, Thorax, or Respiration: respiratory depression
LD₅₀ (Oral-Rabbit) 400 mg/kg: Behavioral: somnolence (general depression activity), excitement, coma, vomiting
LD₅₀ (Intradose-Mouse) 324 mg/kg
LD₅₀ (Subcutaneous-Rat) 1700 mg/kg: Sense Organs and Special Senses (Eye): miosis (pupillary constriction);
Behavioral: coma; Kidney/Ureter/Bladder: changes in kidney weight
LC₅₀ (Inhalation-Rat) > 500 mg/m³: Behavioral: somnolence (general depression activity), ataxia; Lungs, Thorax, or Respiration: respiratory depression
LC₅₀ (Inhalation-Rat) > 500 mg/m³: Behavioral: somnolence (general depression activity), ataxia; Lungs, Thorax, or Respiration: respiratory depression
LC₅₀ (Inhalation-Mouse) > 500 mg/m³: Behavioral: somnolence (general depression activity), ataxia; Lungs, Thorax, or Respiration: respiratory depression
LC₅₀ (Inhaled-Mouse) > 500 mg/m³: Behavioral: somnolence (general depression activity), ataxia; Lungs, Thorax, or Respiration: respiratory depression
LD₅₀ (Inhaled-Rat) 53 mg/kg: Lungs, Thorax, or Respiration: dyspnea
LD₅₀ (Intrapерitoneal-Rat) 625 mg/kg
LD₅₀ (Intradose-Dog) 50 mg/kg: Behavioral: ataxia; Lungs, Thorax, or Respiration: dyspnea; Gastrointestinal: hypermotility, diarrhea
LD₅₀ (Parenteral-Dog) 9 mg/kg: Behavioral: tremor; Lungs, Thorax, or Respiration: other changes
LD₅₀ (Skin-Cat) 10 mg/kg: Behavioral: tremor, muscle weakness; Gastrointestinal: changes in structure or function of gastrointestinal system; Behavioral: alteration of classical conditioning
LD₅₀ (Intrapерitoneal-Rat) 650 mg/kg: Behavioral: somnolence (general depression activity), ataxia; Lungs, Thorax, or Respiration: respiratory depression
LC₅₀ (Inhaled-Rat) 1000 ppm/8 hours
LC₅₀ (Inhaled-Rat) 46 mg/m³: Brain and Coverings: other degenerative changes; Behavioral: alteration of classical conditioning
TC₅₀ (Inhalation-Mammal-Species Unspecified) 42 mg/m³/122 days-intermittent: Cardiac: other changes; Liver: other changes; Kidney/Ureter/Bladder: other changes
TLDo (Oral-Rat) 2100 mg/kg/21 days-intermittent: Nutritional and Gross Metabolic: weight loss or decreased weight gain; Related to Chronic Data: death
TLDo (Oral-Rat) 13 mg/24 days-intermittent: Brain and Coverings: other degenerative changes; Related to Chronic Data: death
TLDo (Oral-Rat) 24 mL/kg/12 days-intermittent: Liver: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: dehydrogenases
TLDo (Oral-Rat) 105 weeks/100 days-continuous: Endocrine: tumors; Tumorigenic: active as anti-cancer agent
TLDo (Oral-Rat) 25,200 mg/kg/weeks-intermittent: Nutritional and Gross Metabolic: metabolic acidosis
TLDo (Oral-Rat) 52,000 mg/kg/13 weeks-intermittent: Brain and Coverings: other degenerative changes; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis); Related to Chronic Data: death
TLDo (Oral-Rat) 206,000 mg/kg/103 weeks-intermittent: Related to Chronic Data: death
11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

4-NONYPHENOL BRANCHED MIXED ISOMERS (continued):
TDLo (Oral-Rat) 12.6 gm/kg; Male 84 day(s) pre-mating Female 54 day(s) pre-mating; 3 week(s) post-birth: Reproductive: Maternal Effects: ovariases, fallopian tubes
TDLo (Oral-Rat) 202.5 mg/kg; Multi-generations: Reproductive: Paternal Effects: spermatozoa (incl. genetic material, sperm morphology, motility, and count), Paternal Effects: testes, epididymis, sperm duct; growth statistics (e.g., reduced weight gain)

4-NONYLPHENOL BRANCHED MIXED ISOMERS (continued):
BENZYL ALCOHOL:
If released to air, an estimated vapor pressure of 6.6X10-2 mm Hg at 25°C indicates this compound will exist solely as a vapor in the atmosphere. Vapor-phase material will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 1.8 hrs. This compound does not contain strong hydrogen bond donors or strong hydrogen bond acceptors, and it may be rapidly absorbed from the skin. It is expected to be rapidly absorbed from the lungs and the gastrointestinal tract. It will be degraded in the ambient atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 1.8 hrs. It will be eliminated from the body primarily via the lungs in less than 2 days. It is estimated to be more mobile in the soil than their neutral counterparts. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 13.8 X 10^-13 atm-cu m/mole. Utilizing the Japanese MITI test, 0.1% of the theoretical BOD was reached in four weeks indicating that biodegradation is not an important environmental fate process. Volatilization from water surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Benzyl Alcohol lacks hydrolyzable functional groups.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AVOIDED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for mobility in soil. It is expected to have some mobility. The following information is available for some components.

1-AMINOETHYLPIPERAZINE: Using a structure estimation method based on molecular connectivity indices, the Koc can be estimated to be 43. According to a classification scheme, this estimated Koc value suggests that this compound is expected to have very high mobility in soil. However, the material will exist primarily as a cation in the environment, and cations are expected to adsorb more strongly to soils containing organic carbon and clay than their neutral counterparts, suggesting that mobility may be much lower in some soils.

BENZYL ALCOHOL: Experimental Koc values for Benzyl Alcohol are < 5 for three different soils; Apison (0.11% organic carbon), Fullerton (0.06% organic carbon), and Dormont (1.2% organic carbon). An experimental Koc of 15 was determined for Benzyl Alcohol on a red-brown Australian soil (1.09% organic carbon). According to a classification scheme, these Koc values suggest that Benzyl Alcohol is expected to have very high mobility in soil.

4-NONYLPHENOL BRANCHED MIXED ISOMERS: The Koc of this compound is estimated as 31,000, using a log Kow of 5.71 (1) and a regression-derived equation. According to a classification scheme, this estimated Koc value suggests that this material is expected to be immobile in soil. This compound has been found to strongly absorb to sewage sludge and stream and pond sediment.

PERSISTENCE AND BIODegrADABILITY: This product has not been tested for persistence or biodegradability. The following information is available for some components.

1-AMINOETHYLPIPERAZINE: If released to air, an estimated vapor pressure of 6.6X10-2 mm Hg at 25°C indicates this compound will exist solely as a vapor in the atmosphere. Vapor-phase material will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 1.8 hrs. This compound does not contain strong hydrogen bond donors or strong hydrogen bond acceptors, and it may be rapidly absorbed from the skin. It is expected to be rapidly absorbed from the lungs and the gastrointestinal tract. It will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 1.8 hrs. It will be eliminated from the body primarily via the lungs in less than 2 days. It is estimated to be more mobile in the soil than their neutral counterparts. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 13.8 X 10^-13 atm-cu m/mole. Utilizing the Japanese MITI test, 0.1% of the theoretical BOD was reached in four weeks indicating that biodegradation is not an important environmental fate process. Volatilization from water surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Benzyl Alcohol lacks hydrolyzable functional groups.

BENZYL ALCOHOL: If released to air, a vapor pressure of 0.094 mm Hg at 25°C indicates Benzyl Alcohol will exist solely as a vapor in the ambient atmosphere. Vapor-phase Benzyl Alcohol will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 1.8 hrs. It will be eliminated from the body primarily via the lungs in less than 2 days. It is estimated to be more mobile in the soil than their neutral counterparts. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 13.8 X 10^-13 atm-cu m/mole. Benzyl Alcohol is not expected to volatilize rapidly from dry soil surfaces based on its vapor pressure. Benzyl Alcohol is expected to undergo biodegradation under both aerobic and anaerobic conditions based upon results in a number of aqueous biodegradation tests. If released into water, Benzyl Alcohol is not expected to adsorb to suspended solids and sediment based upon the Koc data. Volatilization from water surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 75 days and 2.2 years, respectively. Hydrolysis is not expected to be an important environmental fate process since Benzyl Alcohol lacks hydrolyzable functional groups.
12. ECOLOGICAL INFORMATION (Continued)

PERSISTENCE AND BIODEGRADABILITY (continued):

4-NONYLPHENOL BRANCHED MIXED ISOMERS: If released to air, a vapor pressure of 2.36X10-5 mm Hg at 25°C indicates this compound will exist in both the vapor and particulate phases in the ambient atmosphere. Vapor-phase material will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 7.5 hours. Particulate-phase material will be removed from the atmosphere by wet and dry deposition. If released to soil, this compound is expected to be immobile based upon an estimated Koc of 31,000.

Volatilization is expected to be important from moist soil surfaces given an estimated Henry's Law constant of 1.1X10-6 atm-cu m/mole, derived from its vapor pressure and water solubility of 0.35 mg/L. However, adsorption to soil is expected to attenuate volatilization. If released to water, this compound is expected to adsorb strongly to suspended solids and sediment. Volatilization from water surfaces is expected to be an important fate process based upon this compound's Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 11 and 17 days, respectively. However, volatilization from water surfaces is expected to be attenuated by adsorption to suspended solids and sediment in the water column. Limited data from sludge-amended soil studies indicate that this material may undergo aerobic biodegradation. After a 5-day lag period, 100 mg/kg of this material applied to a sewage sludge-amended soil decreased to approximately 10% of its original concentration during a 40-day incubation. In the upper layers of surface water, this compound may undergo sensitized photolysis.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential. The 4-Nonylphenol Branched Mixed Isomers component has BCFs ranging from approx 2 to 350 suggest the potential for bioconcentration in aquatic organisms ranges from low to high; however, under most conditions, depuration in fish will be rapid and indicating that Nonylphenol uptake is readily reversible which suggest that long-term bioconcentration will be low if exposure to the material ceases. Available information for the other components does not indicate a hazard of bioconcentration.

ECOTOXICITY: This product is harmful to aquatic organisms and may cause both acute and long-lasting adverse effects. All release to terrestrial, atmospheric and aquatic environments should be avoided. This product has not been tested for aquatic toxicity; however, the 4-Nonylphenol Branched Mixed Isomers component is toxic to aquatic organisms. The following aquatic toxicity data are available this material and the Benzyl Alcohol component (only select data for the Benzyl Alcohol component are presented).

BENZYL ALCOHOL:
LC₅₀ (Pinna nobilis, sheep, oral administration) 96 hours = 16 mg/kg

LC₅₀ (Medina borylina, tidal water, mussels) 96 hours = 5 mg/L

EC₅₀ (Flounder, greenling, oral administration) 96 hours = 90 mg/kg

EC₅₀ (European eel, oral administration) 96 hours = 130 mg/L

Nonylphenol Branched Mixed Isomers:
LC₅₀ (Fathead minnow) 96 hours = 2.1 mg/L

EC₅₀ (Fathead minnow) 96 hours = 4.7 mg/L

Other adverse effects: This material is not expected to have any ozone depletion potential.

ENVIROMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: As supplied, this product would not be a hazardous waste as defined by U.S. federal regulations (40 CFR 261) if discarded or disposed. State and local regulations may differ from federal regulations. The generator of the waste is responsible for proper waste determination and management.

U.S. EPA WASTE NUMBER: Wastes of this product should be tested to see if they meet the criteria of D002 (Corrosivity Characteristic) and D001 (Ignitability characteristic).

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: This product is classified as Dangerous Goods, per U.S. DOT regulations, under 49 CFR 172.101.

UN IDENTIFICATION NUMBER: UN 2735

PROPER SHIPPING NAME: Polymamines, liquid, corrosive, n.o.s. (1-Aminoethylpiperazine, Bis(hexamethylene)triamine)

HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)

PACKING GROUP: PG III

DOT LABEL(S) REQUIRED: Class 8 (Corrosive)

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2012): 153

MARINE POLLUTANT: The 4-Nonylphenol Branched Mixed Isomers component meets the criteria of a Marine Pollutant (as defined by 49 CFR 172.101).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified as Dangerous Goods, per regulations of Transport Canada.

UN IDENTIFICATION NUMBER: UN 2735

PROPER SHIPPING NAME: Polymamines, liquid, corrosive, n.o.s. (1-Aminoethylpiperazine, Bis(hexamethylene)triamine)

HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)

PACKING GROUP: PG III

HAZARD SHIPPING LABEL(S) REQUIRED: Class 8 (Corrosive)

SPECIAL PROVISIONS: None

EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 5

ERAP INDEX: None

PASSENGER CARRYING SHIP INDEX: None

PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: 5

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is classified as dangerous goods, per the International Air Transport Association.

UN IDENTIFICATION NUMBER: UN 2735

PROPER SHIPPING NAME: Polymamines, liquid, corrosive, n.o.s. (1-Aminoethylpiperazine, Bis(hexamethylene)triamine)

HAZARD CLASS or DIVISION: 8 (Corrosive)

HAZARD LABEL(S) REQUIRED: Class 8 (Corrosive)

PACKING GROUP: III
14. TRANSPORTATION INFORMATION (Continued)

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA) [continued]:

**EXCEPTED QUANTITIES:**
- E1

**PASSENGER and CARGO AIRCRAFT PACKING INSTRUCTION:** 852

**PASSENGER and CARGO AIRCRAFT MAXIMUM NET QUANTITY PER PKG:** 5 L

**PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY PACKING INSTRUCTION:** Y841

**PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY MAXIMUM NET QUANTITY PER PKG:** 1 L

**CARGO AIRCRAFT ONLY PACKING INSTRUCTION:** 856

**CARGO AIRCRAFT ONLY MAXIMUM NET QUANTITY PER PKG:** 60 L

**SPECIAL PROVISIONS:** A3, A803

**ERG CODE:** 8L

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is classified as dangerous goods, per the International Maritime Organization.

**UN No.:** 2735

**PROPER SHIPPING NAME:** Polyamines, liquid, corrosive, n.o.s. (1-Aminoethylpiperazine, Bis(hexamethylene)triamine)

**HAZARD CLASS NUMBER:** 8 (Corrosive)

**LABELS:** Class 8 (Corrosive)

**PACKING GROUP:** III

**SPECIAL PROVISIONS:** 223, 274

**LIMITED QUANTITIES:** 5 L

**EXCEPTED QUANTITIES:** E1

**PACKING:**
- Instructions: P001; Provisions: LP01
- IBCs: Instructions: IBC03; Provisions: None
- TANKS: Instructions: T7; Provisions: TP1, TP28
- EmS: F-A, S-B

**STOWAGE CATEGORY:** Category A. ‘Separated from acids.’

**MARINE POLLUTANT:** The 4-Nonylphenol Branched Mixed Isomers meets the criteria of a marine pollutant.

15. REGULATORY INFORMATION

**ADDITIONAL U.S. REGULATIONS:**

**U.S. SARA REPORTING REQUIREMENTS:** The components of this product are not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

**U.S. SARA HAZARD CATEGORIES (SECTION 311/312, 40 CFR 370-21):**
- ACUTE: Yes; CHRONIC: Yes; FIRE: No; REACTIVE: No; SUDDEN RELEASE: No

**U.S. TSCA INVENTORY STATUS:** All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

**U.S. CERCLA REPORTABLE QUANTITY (RQ):** The default RQ for corrosive liquids of 100 lb (45.4 kg) for unlisted hazardous wastes of characteristic of corrosivity (D002) is applicable.

**U.S. CLEAN AIR ACT (CA 112r) THRESHOLD QUANTITY (TQ):** Not applicable.

**U.S. CLEAN WATER ACT REQUIREMENTS:** Not applicable.

**CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):** No component of this product is on the California Proposition 65 lists.

**ADDITIONAL CANADIAN REGULATIONS:**

**CANADIAN DSL/NDSL INVENTORY STATUS:** The components of this product are on the DSL Inventory.

**CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:** Not applicable

**CANADIAN WHMIS REGULATIONS:** This product is classified as a Controlled Product, Hazard Classes B3 (Combustible Liquid), D1B (Poisonous and Infectious Material, Toxic); and D2B (Poisonous and Infectious Material, Other effects/Toxic: Eye Irritation, Skin Irritation, Respiratory Tract and Skin Sensitization, Limited Evidence of Reproductive Effects), E (Corrosive) as per the Controlled Product Regulations.

**ADDITIONAL MEXICAN REGULATIONS:**

**MEXICAN WORKPLACE REGULATIONS (NOM-018-STPS-2000):** This product is classified as hazardous.

16. OTHER INFORMATION

**U.S. ANSI STANDARD LABELING (Precautionary Statements):**

DANGER! CORROSIVE BY ALL ROUTES OF EXPOSURE; CAN CAUSE SEVERE IRRITATION OR BURNS DEPENDING ON CONCENTRATION AND DURATION OF CONTACT. BURNS MAY NOT BE IMMEDIATELY VISIBLE OR PAINFUL. EYE CONTACT MAY CAUSE BLINDNESS. MAY BE FATAL IF INGESTED OR BY SEVERE INHALATION EXPOSURE. MAY CAUSE TOXIC EFFECT BY INHALATION, INGESTION OR SKIN CONTACT. TOXIC EFFECTS MAY BE DELAYED. CAN CAUSE SKIN SENSITIZATION AND MAY CAUSE RESPIRATORY SENSITIZATION. CONTAINS COMPOUND WITH LIMITED EVIDENCE OF REPRODUCTIVE TOXICITY IN ANIMALS. COMBUSTIBLE LIQUID; CAN IGNITE IF EXPOSED TO DIRECT FLAME OR IF EXPOSED TO HIGH TEMPERATURE. CONTAINS COMPOUND WITH ACUTE AND CHRONIC TOXICITY TO AQUATIC ORGANISMS; HARMFUL IF RELEASED TO THE ENVIRONMENT. Avoid contact with eyes, skin, and clothing. Avoid breathing mist, vapors or fume. Do not taste or swallow. Wash thoroughly after handling. Keep container tightly closed. Use only with adequate ventilation. Keep away from heat and flame. Wear gloves, eye protection, respiratory protection, and appropriate body protection.
16. OTHER INFORMATION (Continued)

U.S. ANSI STANDARD LABELING (continued): FIRST-AID: In case of contact, immediately flush skin and eyes with plenty of water. Remove contaminated clothing and shoes. Get medical attention if irritation develops or persists. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, do not induce vomiting. Get medical attention. IN CASE OF FIRE: Use water fog, foam, dry chemical, or CO₂. Do not use halogenated media. IN CASE OF SPILL: Absorb spilled product with polypond or other suitable absorbing material. Place all spill residue in an appropriate container and seal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations and those of Canada.

GLOBAL HARMONIZATION SYSTEM CLASSIFICATION:

Classification: Combustible Liquid Category 4, Reproductive Toxicity Category 2, Acute Oral Toxicity Category 4, Acute Dermal Toxicity Category 4, Acute Inhalation Toxicity Category 4, Skin Corrosion Category 1B, Skin Sensitization Category 1, Aquatic Acute Toxicity Category 1, Aquatic Chronic Toxicity Category 1

Signal Word: Danger


Precautionary Statements:


Response: P370 + P378: In case of fire: Use materials appropriate for surrounding fire for extinction. Do not use halons. P308 + P313: IF exposed or concerned: Get medical advice/attention. P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P304 + P340 + P310: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or 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 or doctor. P302 + P352: IF ON SKIN: Wash with plenty of soap and water. P333 + P313: If skin irritation or rash occurs: Get medical advice/attention. P362 + P364: Take off contaminated clothing and wash it before reuse. P363: Wash contaminated clothing before reuse. P321: Specific treatment (remove from exposure and treat symptoms). Refer to other portions of precautionary text on this label, SDS or other product information sheets, as appropriate. P391: Collect spillage.


Disposal: P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Hazard Symbols/Pictograms: GHS05, GHS07, GHS08, GHS09

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information presented in this Material Safety Data Sheet is presented in good faith based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. In no case shall the descriptions, information, data or designs provided be considered a part of our terms and conditions of sale.

All materials may present hazards and should be used with caution. Because many factors may affect processing or application/use, we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices or applicable federal, state, or local laws or regulations. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

REFERENCES AND DATA SOURCES:

Contact the supplier for information.

METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION:

Bridging principles were used to classify this product.

REVISION DETAILS:

September 2012: Up-date and revise entire MSDS to include current GHS requirements; change in formulation.

DATE OF PRINTING:

March 27, 2013

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these, which are commonly used, include the following:

KEY ACRONYMS:

CHEMTREC: Chemical Transportation Emergency Center, a 24-hour emergency information and/or emergency assistance to emergency responders.

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

DFG MAKs: Federal Republic of Germany Maximum Concentration Values in the workplace. Exposure limits are given as TWA (Time-Weighted Average) or PEAK (short-term exposure) values.

DFG MAK Germ Cell Mutagen Categories: 1: Germ cell mutations that have been shown to increase the mutation frequency in the progeny of exposed humans. 2: Germ cell mutations that have been shown to increase the mutation frequency in the progeny of exposed mammals. 3A: Substances that have been shown to induce genetic damage in germ cells of humans of animals, or which produce mutagenic effects in somatic cells of mammals in vivo and have been shown to reach the germ cells in an active form. 3B: Substances that are suspected of being germ cell mutagens because of their genotoxic effects in mammalian somatic cell in vivo; in exceptional cases, substances for which there are no in vivo data, but that are clearly mutagenic in vitro and structurally related to known in vivo mutagens. 4: Not applicable (Category 4 carcinogenic substances are those with non-genotoxic mechanisms of action. By definition, germ cell mutagens are genotoxic. Therefore, a Category 4 for germ cell mutagens cannot apply. At some time in the future, it is conceivable that a Category 4 could be established for genotoxic substances with primary targets other than DNA [e.g. purely aneugenic substances] if research results make this seem sensible.) 5: Germ cell mutagens, the potency of which is considered to be so low that, provided the MAK value is observed, their contribution to genetic risk for humans is expected not to be significant.

DFG MAK Pregnancy Risk Group Classification: Group A: A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can lead to damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed.

KEY ACRONYMS (continued):

DFG MAK Pregnancy Risk Group Classification (continued): Group B: Currently available information indicates a risk of damage to the developing embryo or fetus must be considered to be probable. Damage to the developing organism cannot be excluded when pregnant women are exposed, even when MAK and BAT values are observed. Group C: There is no reason to fear a risk of damage to the developing embryo or fetus when MAK and BAT values are observed.

DFG MAK Pregnancy Risk Group Classification (continued): Group D: Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, they are not sufficient for final evaluation.

IDLH: Immediately Dangerous to Life and Health. This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

LOQ: Limit of Quantitation.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NHC: Notice of Intended Change.

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workplace. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELs: NIOSH’s Recommended Exposure Limits.

PEL: OSHA’s Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, “Vacated 1989 PEL” is placed next to the PEL that was vacated by Court Order.

SKIN: Used when there is a danger of cutaneous absorption.
KEY ACRONYMS (continued)

STEL: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA, TLV-PEL, or TLV.

TLV: Threshold Limit Value. An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effects on health. Individual variability may cause some persons to experience toxicity at lower concentrations. TLVs are revised periodically.

TWA: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

WEEL: Workplace Environmental Exposure Limit from the AIHA

DEFINITIONS OF TERMS (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS: This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD: Minimal Hazard: No significant health risk, irritation of skin or eyes not expected under conditions that reach the human body. Skin irritation may occur at high concentrations.

Flammable Liquids: Materials that can be ignited under almost all conditions. This usually includes the following: Liquids having a flash point below 113°F (45°C) or that will ignite in the absence of inhibitors.

Pyrophorics: Materials that have a fire hazard for a period of time, or pyrophoric substances that will react explosively with water.

PHYSICAL HAZARD

Flash and Fire Points by Cleveland Open Cup: Flash and fire points by Cleveland open cup methods are defined as the minimum temperature at which a material will flash or ignite when exposed to an external ignition source. This property is affected by many factors, including the presence of inhibitors, volatility, and the condition of the material. The flash point is a measure of the flammability of a material, with lower flash points indicating a greater risk of ignition.

Inhalation Toxicity LC50: Inhalation Toxicity LC50 is the concentration of a substance that results in the death of 50% of the test animals over a specified period of time. This parameter is often used to assess the toxicity of respiratory hazards and is expressed in parts per million (ppm) of air or milligrams per cubic meter (mg/m3) of air.

Inhalation Toxicity LC50 for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity.

Inhalation Toxicity LC50 for acute inhalation toxicity greater than 1,000 ppm but less than or equal to 3,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity but less than or equal to 1,000 ppm.

Inhalation Toxicity LC50 for acute inhalation toxicity less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity.

Flash and Fire Points by Cleveland Open Cup: Flash and fire points by Cleveland open cup methods are defined as the minimum temperature at which a material will flash or ignite when exposed to an external ignition source. This property is affected by many factors, including the presence of inhibitors, volatility, and the condition of the material. The flash point is a measure of the flammability of a material, with lower flash points indicating a greater risk of ignition.

Inhalation Toxicity LC50: Inhalation Toxicity LC50 is the concentration of a substance that results in the death of 50% of the test animals over a specified period of time. This parameter is often used to assess the toxicity of respiratory hazards and is expressed in parts per million (ppm) of air or milligrams per cubic meter (mg/m3) of air.

Inhalation Toxicity LC50 for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity.

Inhalation Toxicity LC50 for acute inhalation toxicity greater than 1,000 ppm but less than or equal to 3,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity but less than or equal to 1,000 ppm.

Inhalation Toxicity LC50 for acute inhalation toxicity less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity.

Flash and Fire Points by Cleveland Open Cup: Flash and fire points by Cleveland open cup methods are defined as the minimum temperature at which a material will flash or ignite when exposed to an external ignition source. This property is affected by many factors, including the presence of inhibitors, volatility, and the condition of the material. The flash point is a measure of the flammability of a material, with lower flash points indicating a greater risk of ignition.

Inhalation Toxicity LC50: Inhalation Toxicity LC50 is the concentration of a substance that results in the death of 50% of the test animals over a specified period of time. This parameter is often used to assess the toxicity of respiratory hazards and is expressed in parts per million (ppm) of air or milligrams per cubic meter (mg/m3) of air.

Inhalation Toxicity LC50 for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity.

Inhalation Toxicity LC50 for acute inhalation toxicity greater than 1,000 ppm but less than or equal to 3,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity but less than or equal to 1,000 ppm.

Inhalation Toxicity LC50 for acute inhalation toxicity less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC50 for acute inhalation toxicity.

Flash and Fire Points by Cleveland Open Cup: Flash and fire points by Cleveland open cup methods are defined as the minimum temperature at which a material will flash or ignite when exposed to an external ignition source. This property is affected by many factors, including the presence of inhibitors, volatility, and the condition of the material. The flash point is a measure of the flammability of a material, with lower flash points indicating a greater risk of ignition.

Inhalation Toxicity LC50: Inhalation Toxicity LC50 is the concentration of a substance that results in the death of 50% of the test animals over a specified period of time. This parameter is often used to assess the toxicity of respiratory hazards and is expressed in parts per million (ppm) of air or milligrams per cubic meter (mg/m3) of air.
DEFINITIONS OF TERMS (Continued):

FLAMMABILITY HAZARD (continued): 1. (continued): Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Most ordinary combustible materials. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 2. Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air. Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.)* Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures with air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal, and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 3. Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions. Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 73.8°C (164°F) (i.e. Class IB and IC liquids). Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocumulene and many organic peroxides). Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 4. Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily. Flammable gases. Flammable cryogenic materials. Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, even under fire conditions. Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.1 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. 1 Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures. Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.1 W/mL and below 10 W/mL. 2 Materials that readily undergo violent chemical change at elevated temperatures and pressures. Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100 W/mL. 3 Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. 4 Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 1000 W/mL or greater.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). Flash Point: Minimum temperature at which a liquid gives off sufficient vapor to form an ignitable mixture with air near the surface of the liquid or within the test vessel used. Autoignition Temperature: Minimum temperature of a solid, liquid, or gas required to initiate or cause self-sustained combustion in air with no other source of ignition. LEL: Lowest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame. UEL: Highest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. LD50: Lethal Dose (solids & liquids) that kills 50% of the exposed animals. LC50: Lethal concentration expressed in parts of material per million parts of air or water. mg/m³: Concentration expressed in weight of substance per volume of air. µg/kg: Quantity of material by weight, administered to a test subject, based on their body weight in kg. TDI: Lowest dose to cause a symptom. TCL: Lowest concentration to cause a symptom. TDLo, LDLo, and LCLo, or TC, TC50, and LC50: Lowest concentration (or concentration) to cause lethal or toxic effects. Cancer Information: IARC, International Agency for Research on Cancer. NTP, National Toxicology Program. RTECS, Registry of Toxic Effects of Chemical Substances. IARC and NTR rate chemicals on a scale of decreasing potential to cause human cancer from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other Information: ACGIH, Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

REPRODUCTIVE INFORMATION: A mutagen is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxic is a chemical that causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance that interferes in any way with the reproductive process.

ECOLOGICAL INFORMATION:

EC: Effect concentration in water. BC: Bioconcentration Factor, which is used to determine if a substance will concentrate in living organisms that consume contaminated plant or animal matter. LDLo: Median threshold limit. log Kow or log Koc: Coefficient of Oil/Water Distribution is used to assess a substance’s behavior in the environment.

REGULATORY INFORMATION: This section explains the impact of various laws and regulations on the material.

U.S.:

EPA: U.S. Environmental Protection Agency. ACGIH: American Conference of Governmental Industrial Hygienists, a professional association that establishes exposure limits. OSHA: U.S. Occupational Safety and Health Administration. NIOSH: National Institute of Occupational Safety and Health, which is the research arm of OSHA. DOT: U.S. Department of Transportation. TC: Transport Canada. SARA: Superfund Amendments and Reauthorization Act. TSCA: U.S. Toxic Substance Control Act. CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act. Marine Pollutant status according to the DOT; CERCLA or Superfund; and various state regulations. This section also includes information on the precautionary warnings that appear on the material’s package label.

CANADA: