

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS Standards and European Union Directives

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):

ATTWOOD HULL CLEANER

PRODUCT #s:

30101-1

SYNONYMS:

Not Applicable

CHEMICAL NAME/CLASS:

Oxalic Acid Solution

PRODUCT USE:

Boat Hull Cleaning Compound

U.S. MANUFACTURED FOR:

ATTWOOD CORPORATION

ADDRESS:

1016 North Monroe Street

Lowell, MI 49331

PHONE:

(616) 897-2290

BUSINESS PHONE:

(616) 897-2290

EUROPEAN DISTRIBUTOR ADDRESS:

ADDRESS:

PHONE:

EMERGENCY PHONE:

Chemtrec (24 hrs)

1-800-424-9300 (U.S., Canada, Puerto Rico, U.S Virgin Islands)

+ 1-703-527-3887 (Outside North America)

DATE OF PREPARATION:

August 24, 2008

DATE OF REVISION:

NOTE: ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, Canadian WHMIS [Controlled Products Regulations] and the European Union [Regulation (EC) 1907/2006 Annex II] required information is included in appropriate sections based on the U.S. ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the countries listed above.

2. HAZARD IDENTIFICATION

EU LABELING AND CLASSIFICATION: This product meets the definition of the hazard class of Harmful and Irritant, as defined by the European Economic Community Guidelines.

EU CLASSIFICATION: [Xn] Harmful. [Xi]: Irritant.

EU RISK PHRASES: [R: 20/21/22]: Harmful by inhalation, in contact with skin and if swallowed. [R: 36/38]: Irritating to eyes and skin.

EU SAFETY PHRASES: [S: 2-]: Keep out of the reach of children. *(This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only).* [S: 24/25]: Avoid contact with skin and eyes. [S: 36/37]: Wear suitable protective clothing, gloves and eye/face protection. [S: 46]: If swallowed, seek medical advice immediately and show this container or label.

EMERGENCY OVERVIEW: Product Description: This product is a clear, combustible liquid with a sweet, pleasant odor. **Health Hazards:** The main hazard associated with over exposure to this product is the potential for moderate to severe irritation of eyes, skin, and other contaminated tissue. **Flammability Hazards:** This solution is combustible and can be ignited if exposed to temperatures above 67.7°F (154°C). If involved in a fire, this product will produce oxides of carbon and formic acid. **Reactivity Hazards:** This product is not reactive. **Environmental Hazards:** This material may be harmful or fatal to contaminated plant, animal, and aquatic life. **Emergency Recommendations:** Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

3. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS #	% w/v	EU CLASSIFICATION FOR COMPONENTS
Ethylene Glycol <i>n</i> -Butyl Ether (2-Butoxyethanol)	111-76-2	203-905-0	1-5%	HAZARD CLASSIFICATION: Xn (Harmful); Xi (Irritant) RISK PHRASES: R: 20/21/22; R: 36/38
Oxalic Acid	144-62-7	205-634-3	5-10%	HAZARD CLASSIFICATION: Xn (Harmful) RISK PHRASES: R: 21/22
Water and other trace compounds. Each of the other components is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).			Balance	HAZARD CLASSIFICATION: Not Applicable RISK PHRASES: Not Applicable

See Section 15 for full EU classification information of product and components.

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

4. FIRST-AID MEASURES

Contaminated individuals must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Remove or cover gross contamination to avoid exposure to rescuers. Take a copy of label and MSDS to health professional with the contaminated individual.

4. FIRST-AID MEASURES (Continued)

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. The contaminated individual must seek immediate medical attention if any adverse health effect occurs.

EYE EXPOSURE: If this product's liquid or vapors enter the eyes, open the contaminated individual's eyes while under gently running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. Minimum flushing is for 15 minutes. The contaminated individual must seek immediate medical attention.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove the contaminated individual to fresh air. If necessary, use artificial respiration to support vital functions.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Have victim rinse mouth with water or drink several cupfuls of water, if conscious. Never induce vomiting or give a diluent (e.g., 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: Preexisting respiratory problems, dermatitis, and other skin disorders can be aggravated by exposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: 67.7°C (154°F)

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable. Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: This product is not flammable. Fire extinguishers used should be for the surrounding materials.

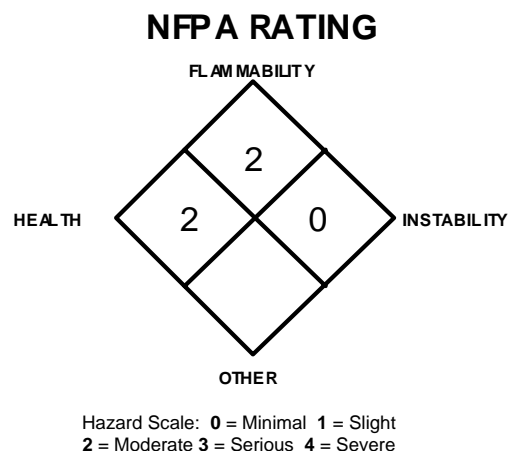
FIRE EXTINGUISHING MATERIALS NOT TO BE USED: None known.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This solution is combustible and is a primary irritant and presents a contact hazard to firefighters. When involved in a fire, this material may decompose and produce irritating vapors and toxic gases (e.g., carbon monoxides, formic acid).

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, clean contaminated fire response equipment with an acid neutralizing agent (e.g., sodium bicarbonate) and rinse thoroughly with water before returning such equipment to service.



6. ACCIDENTAL RELEASE MEASURES

RELEASE RESPONSE: Trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people. Eliminate all sources of ignition before cleanup begins. The atmosphere must have levels of components lower than those listed in Section 8, (Exposure Controls and Personal Protective Equipment), if applicable, and have at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus.

Small Spills: In the event of an incidental release (e.g., under 1 L), wear apron, gloves and goggles. Absorb releases with polypads or other inert material. Neutralize spill and spill area with material appropriate for basic corrosive material. Place spill and adsorbent materials in appropriate container for disposal, sealing tightly. Remove all residue before decontamination of spill area.

Large Spills: In the event of a non-incidental release, minimum Personal Protective Equipment should be as follows: Level C: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard-hat, and an air-purifying respirator with a high-efficiency particulate filter. Wear Self-Contained Breathing Apparatus when oxygen levels are below 19.5% or are unknown. Dike or otherwise contain spill and absorb spilled liquid with polypads or other appropriate inert material. Neutralize spill and spill area with material appropriate for with citric acid, or other agents suitable for neutralization of basic materials. Decontaminate the area thoroughly with flooding quantities of water.

Prevent material from entering sewer or confined spaces. Decontaminate the area thoroughly. Test area with litmus paper to ensure neutralization. Place all spill residue in an appropriate container and seal. If necessary, decontaminate spill-response equipment and spill area with soap and water solution. Do not mix with wastes from other materials. For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

PART III How can I prevent hazardous situations from occurring?

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Open containers slowly on a stable surface. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers. Keep container tightly closed when not in use. Storage areas should be made of corrosion-resistant materials. 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. Post warning and "NO SMOKING" signs in storage and use areas as appropriate. Have appropriate extinguishing equipment in the storage area (e.g., sprinkler system, portable fire extinguishers). Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Refer to NFPA 30, *Flammable and Combustible Liquids Code* for additional information on storage. Empty containers may contain residual liquid or vapors that are flammable; therefore, empty containers should be handled with care. Never perform any welding, cutting, soldering, drilling, or other hot work on an empty container or piping until all liquid, vapors, and residue have been cleared.

PRODUCT USE: This product is used as a cleaning compound. Follow all industry standards during handling and use.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely, if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures, and those of Canada and its Provinces and those of EU Member States.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits below, if applicable. Ensure eyewash/safety shower stations are available near areas where this product is used.

EXPOSURE LIMITS/GUIDELINES:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH	OTHER
		TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	IDLH mg/m ³	mg/m ³
Ethylene Glycol <i>n</i> -Butyl Ether (2-Butoxyethanol)	111-76-2	97	NE	240 (skin) 125 (Vacated 1989 PEL)	NE	24 (skin)	NE	700 (ppm)	DFG MAKs: TWA = 98 (skin) PEAK = 4•MAK 15 min., average value, 1-hr interval DFG MAK Pregnancy Risk Classification: C Carcinogen: EPA-C, EPA-CBD, IARC-3, MAK-4, TLV-A3
Oxalic Acid	144-62-7	1	2	1	2	1	2	500	NE

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

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: In addition to the exposure limit values cited above, other exposure limits have been established by various countries for the components of this mixture, as provided below. More current limits may be available and should be checked.

2-BUTOXYETHANOL:

Australia: TWA = 25 ppm (120 mg/m³), Skin, JAN 1993
Austria: MAK = 20 ppm (100 mg/m³), Skin, JAN 1999
Belgium: TWA = 25 ppm (121 mg/m³), Skin, JAN 1993
Denmark: TWA = 25 ppm (120 mg/m³), Skin, JAN 1999
Finland: TWA = 25 ppm (120 mg/m³), STEL 75 ppm (350 mg/m³), Skin, JAN 1999
France: VME = 25 ppm (120 mg/m³), Skin, JAN 1999
Germany: MAK = 20 ppm (100 mg/m³), Skin, JAN 1999
Hungary: TWA = 100 mg/m³, STEL 200 mg/m³, Skin, JAN 1993
The Netherlands: MAC-TGG = 20 ppm (100 mg/m³), STEL = 40 ppm, Skin, JAN 1999
Norway: TWA = 20 ppm (100 mg/m³), JAN 1999
The Philippines: TWA = 50 ppm (240 mg/m³), Skin, JAN 1993
Poland: MAC(TWA) = 100 mg/m³, MAC(STEL) 360 mg/m³, JAN 1999
Russia: STEL = 5 mg/m³, JAN 1993
Sweden: NGV = 10 ppm (50 mg/m³), KTV 20 ppm (100 mg/m³), Skin, JAN 1999
Switzerland: MAK-W = 20 ppm (100 mg/m³), KZG-W = 40 ppm (200 mg/m³), Skin, JAN 1999
Turkey: TWA = 50 ppm (240 mg/m³), JAN 1993

2-BUTOXYETHANOL (continued):

United Kingdom: TWA = 25 ppm (123 mg/m³), Skin, SEP 2000
In Argentina, Bulgaria, Colombia, Jordan, Korea, New Zealand, Singapore, Vietnam, New Zealand, Singapore, Vietnam check ACGIH TLV
OXALIC ACID:
ARAB Republic of Egypt: TWA = 1 mg/m³, JAN 1993
Australia: TWA = 1 mg/m³, STEL = 2 mg/m³, JAN 1993
Denmark: TWA = 1 mg/m³, JAN 1999
Finland: TWA = 1 mg/m³, STEL = 3 mg/m³, JAN 1999
France: VME = 1 mg/m³, JAN 1999
Norway: TWA = 0.01 mg(Ag)/m³, JAN 1999
The Philippines: TWA = 1 mg/m³, JAN 1993
Poland: MAC(TWA) = 1 mg/m³, MAC(STEL) = 2 mg/m³, JAN 1999
Sweden: NGV = 1 mg/m³, KTV = 2 mg/m³, JAN 1999
Switzerland: MAK-W = 1 mg/m³, JAN 1999
United Kingdom: TWA = 1 mg/m³, STEL = 0.2 mg/m³, SEP 2000
In Argentina, Bulgaria, Colombia, Jordan, Korea, New Zealand, Singapore, Vietnam check ACGIH TLV

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with regulations found in U.S. OSHA 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-07) or standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand protection, and CR 13464:1999 for face/eye protection. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-02, the European Standard EN 529:2005, and EU member state standards. 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 OSHA's Respiratory Protection Standard (1910.134-1998). The following are NIOSH respiratory protection equipment guidelines for the components of this product.

2-BUTOXYETHANOL

CONCENTRATION

Up to 50 ppm:

Up to 125 ppm:

Up to 250 ppm:

Up to 700 ppm:

Emergency or Planned Entry into Unknown Concentration or IDLH Conditions: SCBA or positive pressure, full-faced SAR with an auxiliary SCBA.

Escape:

OXALIC ACID

CONCENTRATION

Up to 25 mg/m³:

Up to 50 mg/m³:

Up to 500 mg/m³:

Emergency or Planned Entry into Unknown Concentration or IDLH Conditions: Positive-pressure, full-facepiece SCBA or positive-pressure, full-facepiece SAR with an auxiliary positive-pressure.

Escape:

RESPIRATORY EQUIPMENT

Chemical Cartridge Respirator with an organic vapor cartridge.

Supplied Air Respirator (SAR) operated in a continuous-flow mode, or a Powered Air Purifying Respirator (PAPR) with an organic vapor cartridge.

Full-Face Chemical Cartridge Respirator with organic vapor cartridge(s), or gas mask with organic vapor canister, or PAPR with a tight-fitting facepiece and organic vapor cartridge(s), or full-face Self Contained Breathing Apparatus (SCBA), or full-facepiece SAR.

Positive pressure, full-facepiece SAR.

Gas mask with organic vapor canister or escape-type SCBA

RESPIRATORY EQUIPMENT

Powered Air-Purifying Respirator (PAPR) with dust and mist filter(s), or Supplied Air Respirator (SAR) operated in a continuous-flow mode.

Full-Facepiece Respirator with high-efficiency particulate filter(s), or Full-Facepiece, Self Contained Breathing Apparatus (SCBA), or Full-Facepiece SAR.

Positive pressure, full-facepiece SAR.

Full-Facepiece, Air-Purifying Respirator with high-efficiency particulate filter(s), or escape-type SCBA.

EYE PROTECTION: Splash goggles or safety glasses. Face-shields should be worn if operations will generate splashes or sprays. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian CSA Standard Z94.3-07 or the European Standard CR 13464:1999.

HAND PROTECTION: Wear Nitrile rubber, Polyethylene, Viton™ gloves for routine industrial use. Natural rubber and butyl rubber gloves are not recommended. Resistance of specific materials can vary from product to product. Evaluate resistance under conditions of use and maintain clothing carefully. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS. Wash hands before putting on gloves and after removing gloves. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada or the European Standard CEN/TR 15419:2006.

BODY PROTECTION: If operations will generate splashes or sprays, use body protection appropriate for task (e.g., coveralls or apron). If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) appropriate Standards of Canada or the European Standard CEN/TR 15419:2006. 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 U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-M1984, *Protective Footwear*.

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Not determined.

SPECIFIC GRAVITY (water = 1): 1.01

SOLUBILITY IN WATER: Completely soluble.

VAPOR PRESSURE, mm Hg @ 20°C (68°F): Not determined.

ODOR THRESHOLD: 0.1-0.48 ppm (for 2-Butoxyethanol).

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.

APPEARANCE, ODOR and COLOR: This product is a clear liquid with a sweet, pleasant odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): Litmus paper will turn red when in contact with this solution. The odor may also be distinguishing characteristics.

EVAPORATION RATE (n-BuAc = 1): Similar to water.

MELTING/FREEZING POINT: Not determined.

BOILING POINT: ~100°C (~212°F)

pH: ~1

10. STABILITY and REACTIVITY

STABILITY: Normally stable.

DECOMPOSITION PRODUCTS: Thermal: Carbon oxides and formic acid. Hydrolysis: None known.

10. STABILITY and REACTIVITY (Continued)

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is not compatible with the following substances: strong bases, strong oxidizers, silver oxalate, alkali metals, iron and iron compounds and acid chlorides.

HAZARDOUS POLYMERIZATION: Will not occur.

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

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

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are described below.

INHALATION: Inhalation of vapors, mists, or sprays of this product can be moderately irritating to the respiratory system. Depending on the concentration and duration of contact, symptoms of inhalation overexposure can include coughing, sore throat, nasal congestion, and breathing difficulty. The Oxalic Acid component of this component is considered a systemic toxin and can be readily absorbed into the system after inhalation exposure, resulting in headache and nausea. Animal data suggest that adverse effects on the blood (red blood cell fragility, hemoglobinuria) may result from inhalation exposure to the 2-Butoxyethanol component of this product. Chronic inhalation of this product can result in chronic inflammation of upper respiratory tract and permanent damage to lung tissue, resulting in bronchitis or pulmonary edema.

CONTACT WITH SKIN or EYES: Skin contact can cause moderate to severe irritation, depending on the duration and concentration of exposure. Symptoms of such overexposure may result in redness and pain. Repeated contact with this product may produce delayed pain in the area of contamination, discoloration of the skin and may cause the fingernails to become brittle. The 2-Butoxyethanol and Oxalic Acid components are both considered severe eye irritants; contact of this product with the eyes can be moderately to severely irritating to contaminated eyes. Symptoms of eye contact can include pain, redness, and watering. Prolonged eye contact may result in tissue damage and blindness.

SKIN ABSORPTION: The 2-Butoxyethanol component of this product can be absorbed via intact skin. Symptoms of exposure via this route may include adverse central nervous system effects and other symptoms as described under "Inhalation".

INGESTION: Ingestion is not anticipated to be a significant route of exposure for any component of this product. If this product is swallowed, symptoms of such exposure may include nausea, vomiting, diarrhea, and a burning sensation in the mouth, throat, and in other tissues of the digestive system. Other symptoms of ingestion may include headache, pain and twitching in muscles or cramps. Severe ingestion exposures may result in bloody vomiting, weak and irregular heartbeat, drop in blood pressure, signs of heart failure, shock, convulsions, kidney damage or renal failure, coma and may possibly be fatal.

INJECTION: Injection of this product (as may occur if skin is punctured by a contaminated object) can result in pain, redness, and local swelling.

OTHER HEALTH EFFECTS: Due to the presence of Oxalic Acid, chronic exposure to this product via ingestion, skin absorption and inhalation may cause formation of stones (calculi) in kidneys and urinary tract, painful abdominal spasms, and painful urination, weight loss.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. In the event of overexposure, the following symptoms may be observed:

ACUTE: The primary acute health effect associated with this product is the potential for moderate to severe irritation of contaminated eyes, skin, or other contaminated tissue. Severe ingestion exposures can be fatal.

CHRONIC: Repeated skin contact can result in dermatitis (inflammation of the outer layer of the skin). Chronic exposure via inhalation may cause damage to respiratory system, bronchitis, or pulmonary edema. Chronic exposure via ingestion, inhalation or skin absorption may cause kidney stones and other kidney damage.

TARGET ORGANS: ACUTE: Skin, eyes, respiratory system, blood system (based on animal evidence). CHRONIC: Skin, respiratory system, kidneys.



HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	2
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FLAMMABILITY HAZARD	(RED)	2
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PHYSICAL HAZARD	(ORANGE)	0
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PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8

For Routine Industrial Use and Handling Applications

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate
3 = Serious 4 = Severe * = Chronic hazard

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA: The specific toxicology data available for components greater than 1% in concentration are as follows.

2-BUTOXYETHANOL:

Skin Irritancy (rabbit) = 500 mg/open; mild
Eye Irritancy (rabbit) = 100 mg; severe
Eye Irritancy (rabbit) = 100 mg/24 hours; moderate
Mutation in Microorganisms (bacteria, *Salmonella typhimurium*) = 19 μ mol/plate
TDLo (oral, rat) = 139 gm/kg/90 days/continuous; Liver: changes in liver weight; Kidney, Urethra, Bladder: changes in bladder weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain
TDLo (oral, rat) = 9324 mg/m³/21 days/continuous; Behavioral: fluid intake; Nutritional and Gross Metabolic: weight loss or decreased weight gain
TDLo (oral, rat) = 1500 mg/kg/12 days/intermittent; Blood: pigmented or nucleated red blood cells, changes in erythrocyte (RBC) count
TDLo (oral, rat) = 13290 mg/kg/6 weeks/intermittent; Liver: changes in liver weight; Blood: changes in erythrocyte (RBC) count; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels phosphatases
TDLo (oral, rat) = 6279 mg/kg/male 13 weeks pre-mating; Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count)
TCLo (oral, rat) = 9440 mg/kg/female 7–14 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)
TCLo (inhalation, rat) = 200 ppm/6 hours/female 6–15 days after conception; Reproductive: Maternal Effects: uterus, cervix, vagina; post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants); litter size (e.g. # fetuses per litter; measured before birth)
TCLo (inhalation, rat) = 25 ppm/6 hours/female 6–15 days after conception; Reproductive: Specific Developmental Abnormalities: musculoskeletal system
TCLo (inhalation, rat) = 12 mg/kg/4 hours/female 1–19 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)
TCLo (inhalation, rat) = 10 mg/m³/24 hours/13 weeks/intermittent; Endocrine: hypoglycemia; Blood: changes in erythrocyte (RBC) count; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels transaminases
TCLo (inhalation, rat) = 432 ppm/7 hours/30 days/intermittent; Kidney, Urethra, Bladder: hematuria; Blood: other changes; Related to Chronic Data: death
TCLo (inhalation, rat) = 245 ppm/6 hours/9 days/intermittent; Liver: changes in liver weight; Blood: pigmented or nucleated red blood cells; Blood: changes in erythrocyte (RBC) count

2-BUTOXYETHANOL (continued):

TCLo (inhalation, rat) = 1540 mg/m³/7 hours/5 weeks/intermittent; Blood: changes in erythrocyte (RBC) count
TDLo (oral, mouse) = 5180 mg/kg/2 weeks/continuous; Endocrine: changes in thymus weight
TDLo (oral, mouse) = 7 gm/kg/female 8–14 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)
TDLo (oral, mouse) = 9440 mg/kg/female 6–13 days after conception; Reproductive: Fertility: litter size (e.g. # fetuses per litter; measured before birth)
TCLo (inhalation, mouse) = 396 ppm/7 hours/30 days/intermittent; Liver: changes in liver weight; Kidney, Urethra, Bladder: hematuria; Blood: other changes
TCLo (inhalation, mouse) = 401 ppm/7 hours/90 days/intermittent; Liver: changes in liver weight; Kidney, Urethra, Bladder: hematuria; Blood: other changes
TCLo (inhalation, dog) = 415 ppm/7 hours/12 weeks/intermittent; Blood: microcytosis with or without anemia; Kidney, Urethra, Bladder: other changes in urine composition
TCLo (inhalation, dog) = 385 ppm/7 hours/28 days/intermittent; Blood: other changes erythrocyte (RBC) count; Related to Chronic Data: death
TCLo (inhalation, rabbit) = 200 ppm/6 hours/female 6–18 days after conception; Reproductive: Maternal Effects: uterus, cervix, vagina; pre-implantation mortality (e.g. reduction in number of implants per female; total number of implants per corpora lutea)
TCLo (inhalation, rabbit) = 100 ppm/6 hours/female 6–18 days after conception; Reproductive: Specific Developmental Abnormalities: cardiovascular (circulatory) system
TCLo (inhalation, guinea pig) = 376 ppm/7 hours/30 days/intermittent; Lungs, Thorax, or Respiration: chronic pulmonary edema; Kidney, Urethra, Bladder: changes in bladder weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain
TDLo (skin, rabbit) = 4500 μ L/kg/9 days/intermittent; Liver: changes in liver weight; Blood: pigmented or nucleated red blood cells; changes in erythrocyte (RBC) count
TDLo (oral, woman) = 600 mg/kg
TDLo (oral, woman) = 7813 μ L/kg; Behavioral: coma; Vascular: BP lowering not characterized in autonomic section; Nutritional and Gross Metabolic: metabolic acidosis
TCLo (inhalation, human) = 195 ppm/8 hours; Gastrointestinal tract
TCLo (inhalation, human) = 100 ppm; Nose, Eye, Central nervous system

2-BUTOXYETHANOL (continued):

LD₅₀ (oral, rat) = 470 mg/kg
LD₅₀ (oral, mouse) = 1230 mg/kg; Behavioral: altered sleep time (including change in righting reflex), somnolence (general depressed activity); Skin and Appendages: hair
LD₅₀ (oral, rabbit) = 300 mg/kg
LD₅₀ (oral, guinea pig) = 1200 mg/kg; Behavioral: general anesthetic; Gastrointestinal: other changes; Kidney, Urethra, Bladder: other changes
LD₅₀ (intraperitoneal, rat) = 220 mg/kg
LD₅₀ (intraperitoneal, mouse) = 536 mg/kg
LD₅₀ (intravenous, rat) = 340 mg/kg
LD₅₀ (intravenous, rat) = 307 mg/kg
LD₅₀ (intravenous, mouse) = 1130 mg/kg
LD₅₀ (intravenous, rabbit) = 252 mg/kg
LD₅₀ (unreported, mouse) = 1050 mg/kg; Behavioral: somnolence (general depressed activity), excitement; Lungs, Thorax, or Respiration: other changes
LD₅₀ (skin, rabbit) = 220 mg/kg
LD₅₀ (skin, guinea pig) = 230 μ g/kg
LC₅₀ (inhalation, rat) = 2900 mg/m³
LC₅₀ (inhalation, rat) = 450 ppm/4 hours; Behavioral: ataxia; Nutritional and Gross Metabolic: weight loss or decreased weight gain
LC₅₀ (inhalation, mouse) = 700 ppm/7 hours
LDLo (subcutaneous, mouse) = 500 mg/kg
OXALIC ACID:
Standard Draize Test (Skin-Rabbit, adult) 500 mg/24 hours Mild irritation effects
Standard Irritation Test (Eye effects-Rabbit, adult) 250 mg/24 hours Severe irritation effects
Standard Irritation Test (Eye effects-Rabbit, adult) 100 mg/4 seconds: rns Severe irritation effects
LD₅₀ (Oral-Rat) 7500 mg/kg
LD₅₀ (Intraperitoneal-Mouse) 270 mg/kg
LD₅₀ (Unreported-Rat) 1400 mg/kg
LDLo (Oral-woman) 600 mg/kg; Gastrointestinal: changes in structure or function of esophagus, hypermotility, diarrhea, other changes
LDLo (Oral-Dog) 1 gm/kg
LDLo (Subcutaneous-Cat, adult) 112 mg/kg
LDLo (Subcutaneous-Frog, adult) 757 mg/kg
TDLo (Oral-Mouse) 8400 mg/kg: male 7 day(s) pre-mating female 7 day(s) pre-mating: 21 day(s) after conception; Reproductive: Fertility: other measures of fertility, Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus)
TDLo (Oral-Mouse) 8400 mg/kg (male 7 days pre): Reproductive effects
TDLo (Oral-Rat) 175 gm/kg/70 days-continuous: Endocrine: changes in thyroid weight; Musculoskeletal: other changes; Nutritional and Gross Metabolic: weight loss or decreased weight gain

CARCINOGENIC POTENTIAL: The components of this product are listed as follows by agencies tracking the carcinogenic potential of chemical compounds, as follows:

2-BUTOXYETHANOL: ACGIH TLV-A3 (Confirmed Animal Carcinogen); EPA-C (Possible Human Carcinogen); EPA-CBD (Cannot Be Determined); IARC-3 (Unclassifiable as to Carcinogenicity in Humans); MAK-4 (Substances with Carcinogenic Potential for Which Genotoxicity Plays No or at Most a Minor Role. No Significant Contribution to Human Cancer Risk is Expected, Provided the MAK Value is Observed)

The remaining components of this product are not found on the following lists: U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, GERMAN MAK, IARC, or ACGIH and therefore is neither considered to be nor suspected to be cancer causing agents by these agencies.

IRRITANCY OF PRODUCT: This product can be moderately to severely irritating to eyes, skin, and other contaminated tissue.

SENSITIZATION TO THE PRODUCT: The components of this product are not known to be skin or respiratory sensitizers.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: The components of this product are not reported to cause mutagenic effects in humans.

Embryotoxicity: The components of this product are not reported to cause embryotoxic effects in humans.

Teratogenicity: The components of this product are not reported to cause teratogenic effects in humans.

Reproductive Toxicity: The components of this product are not reported to cause adverse reproductive effects in humans. There are data on the adverse effects on fertility observed in female mice in a continuous breeding study involving high levels of the 2-Butoxyethanol component of this product. Testicular atrophy and seminiferous tubule degeneration has been observed in rats and mice during studies of the 2-Butoxyethanol component of this product. Data also exist that demonstrate adverse reproductive effects in both females and embryos, from studies involving high levels of Oxalic Acid in mice.

11. TOXICOLOGICAL INFORMATION (Continued)

REPRODUCTIVE TOXICITY INFORMATION (continued): A *mutagen* is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An *embryotoxin* is a chemical which 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 which causes damage to a developing fetus, but the damage does not propagate across generational lines. A *reproductive toxin* is any substance which interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES: Currently, there are no Biological Exposure Indices (BEIs) determined for the components of this product.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for mobility in soil. It is expected to be highly mobile as an aqueous solution. The following is information for components of this product.

2-BUTOXYETHANOL

Soil Adsorption/Mobility: The Koc of 2-Butoxyethanol is estimated as 67, using a log Kow of 0.83 and a regression-derived equation. According to a classification scheme, this estimated Koc value suggests that 2-Butoxyethanol is expected to have high mobility in soil.

OXALIC ACID:

Soil Adsorption/Mobility: Based on an average experimental water solubility of 220,000 mg/L at 25°C and a regression derived equation, the Koc for undissociated Oxalic Acid can be estimated to be approximately 5. This Koc value indicates that oxalic acid will have very high mobility in soil; therefore, adsorption to soil and sediment may not be an important fate process. Based on pKa1 and pKa2 values of 1.25 and 4.28 respectively, Oxalic Acid will exist primarily as the oxalate ion under environmental conditions (pH 5-9). No experimental data are available to determine whether the oxalate ion will adsorb to sediment or soil more strongly than its estimated Koc value indicates.

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence and biodegradability. The following is information for components of this product.

2-BUTOXYETHANOL

Persistence and Biodegradability: If released to air, a vapor pressure of 0.88 mm Hg at 25°C indicates 2-Butoxyethanol will exist solely as a vapor in the ambient atmosphere. Vapor-phase 2-Butoxyethanol 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 16 hours. If released to soil, 2-Butoxyethanol is expected to have high mobility based upon an estimated Koc of 67. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 1.60×10^{-6} atm-cu m/mole. If released into water, 2-Butoxyethanol is not expected to adsorb to suspended solids and sediment based upon the estimated Koc. 2-Butoxyethanol reached 91% of its theoretical BOD in 14 days using an activated sludge inoculum. Therefore this compound has the potential to biodegrade rapidly in water. Based upon this compound's estimated Henry's Law constant it is concluded that the volatilization of 2-Butoxyethanol from water surfaces may be an important fate process. The estimated volatilization half-lives for a model river and model lake are 25 and 185 days, respectively. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions.

OXALIC ACID:

Persistence and Biodegradability: If released to soil, Oxalic Acid under environmental conditions (pH 5-9) will be in the form of the oxalate ion (pKa1 and pKa2 of 1.25 and 4.28, respectively) and is expected to leach in soil. Photolysis is expected to be an important fate process; the daytime persistence of Oxalic Acid on soil surfaces is not expected to exceed a few hours. Based upon screening biodegradation tests, biodegradation in soil is expected to be important. If released to water, Oxalic Acid will not volatilize, adsorb to sediment, bioconcentrate in aquatic organisms, oxidize or hydrolyze. The predominant aquatic fate processes are expected to be photolysis in surface waters and aerobic and anaerobic biodegradation. If released to the atmosphere, removal from air via wet deposition, dry deposition, and photolysis is likely to occur.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential. The following is information for components of this product.

2-BUTOXYETHANOL

Bioconcentration: An estimated BCF of 3 was calculated for 2-Butoxyethanol, using an estimated log Kow of 0.83 and a regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is low.

OXALIC ACID:

Bioconcentration: Based on an average experimental water solubility of 220,000 mg/L at 25°C and a regression derived equation, the BCF for Oxalic Acid can be estimated to be approximately 0.6 and therefore should not be expected to bioconcentrate in aquatic organisms.

ECOTOXICITY: This solution is designed to be toxic to certain forms of marine life; High concentrations of this solution may be detrimental to any aquatic environment. The following aquatic toxicity data are available for some components of this product.

2-BUTOXYETHANOL:

EC₀ (bacteria, *Pseudomonas putida*) = 700 mg/L/16 hours
EC₀ (algae, *Microcystis aeruginosa*) = 35 mg/L/8 days
EC₀ (green algae, *Scenedesmus quadricauda*) = 900 g/L/7 days
EC₀ (protozoa, *Entosiphon sulcatum*) = 91 mg/L/72 hours
EC₀ (protozoa, *Uronema parduczi* Chatton-Lwoff) = 463 mg/L
LC₅₀ (brown shrimp, *Crangon crangon*) = 600–1000 mg/L/48 hours
LC₅₀ (brown shrimp, *Crangon crangon*) = 550–950 mg/L/96 hours
LC₅₀ (goldfish) = 1650 mg/L/24 hours
LC₅₀ (guppy, *Poecilia reticulata*) = 983 mg/L/7 days

OXALIC ACID:

EC₀ (*Pseudomonas putida*) 16 hours = 1,550 mg/L

OXALIC ACID (continued):

EC₀ (*Microcystis aeruginosa* algae) 8 hours = 80 mg/L
EC₀ (*Scenedesmus quadricauda* green algae) 7 days = 790 mg/L
EC₀ (*Entosiphon sulcatum* protozoa) 72 hours = 222 mg/L
Perturbation Level (*Gammarus pulex*) = 25 mg/L
Perturbation Level (*Vorticella campanula*) = 50 mg/L
Perturbation Level (*Paramecium caudatum*) = 50 mg/L
Perturbation Level (*Tubifex tubifex*) = 80 mg/L
Perturbation Level (*Limnaea ovata*) = 60 mg/L
Perturbation Level (*Sialis fluvilatera*) = 1,000 mg/L
Period of Survival (goldfish) 0.40–0.5 hour = 1,000 ppm, pH: 2.6
Period of Survival (goldfish) 4 days = 200 ppm, pH: 5.3

OTHER ADVERSE EFFECTS: The components of this product are not listed as having ozone depletion potential.

ENVIRONMENTAL 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

DISPOSAL METHODS: It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. Shipment of wastes must be done with appropriately permitted and registered transporters.

13. DISPOSAL CONSIDERATIONS (Continued)

DISPOSAL CONTAINERS: Waste materials must be placed in and shipped in appropriate 5-gallon or 55-gallon poly or metal waste pails or drums. Permeable cardboard containers are not appropriate and should not be used. Ensure that any required marking or labeling of the containers be done to all applicable regulations.

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials. Dispose of in accordance with applicable Federal, State, and local procedures and standards

EPA WASTE NUMBER: Wastes of this product should be tested for D002 (Characteristic/Corrosivity).

EUROPEAN WASTE CODES: 16 10: aqueous liquid wastes destined for off-site treatment. 16 10 01* aqueous liquid wastes containing dangerous substances

14. TRANSPORTATION INFORMATION

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION. This product has been tested and was found to NOT meet the shipping classification of Corrosive, per DOT criteria.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is NOT considered as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): This product is NOT considered as dangerous goods under rules of IATA.

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION: This product is NOT considered as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is NOT regulated as Dangerous Goods by the United Nations Economic Commission for Europe to be dangerous goods.

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 THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for any component of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

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

LABELING (Precautionary Statements) ANSI LABELING (Z129.1): **WARNING! COMBUSTIBLE LIQUID AND VAPOR. CAUSES MODERATE TO SEVERE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE HARMFUL OR FATAL IF SWALLOWED. CAN IGNITE IF EXPOSED TO TEMPERATURE ABOVE 67.7°C (154°F).** Avoid contact with skin or eyes. Avoid breathing vapors or mists. Do not taste or swallow. Wash thoroughly after handling. Wear gloves and goggles. Wear appropriate body protection and face-shield if operations will involve splashes or sprays. Keep away from heat, spark or flame. **FIRST-AID:** In case of contact with skin or eyes, flush immediately with plenty of water for at least 15 minutes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with sodium bicarbonate or other acid-neutralizing material and place in suitable container. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

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

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The components of this product are not on the CEPA Priority Substances Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: **Class B3:** Combustible Liquid

Class D2B: Chronic Toxic Effects-skin and respiratory irritation.



EUROPEAN UNION INFORMATION FOR PRODUCT:

EU LABELING AND CLASSIFICATION: This product meets the following definitions, per the European Union Council Directives.

EU CLASSIFICATION: [Xn] Harmful. [Xi]: Irritant.

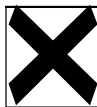
EU RISK PHRASES: [R: 20/21/22]: Harmful by inhalation, in contact with skin and if swallowed. [R: 36/38]: Irritating to eyes and skin.

15. REGULATORY INFORMATION (Continued)

EU LABELING AND CLASSIFICATION (continued):

EU SAFETY PHRASES: [S: 1/2-]: Keep out of the reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only*). [S: 24/25]: Avoid contact with skin and eyes. [S: 36/37]: Wear suitable protective clothing, gloves and eye/face protection. [S: 46]: If swallowed, seek medical advice immediately and show this container or label.

EUROPEAN UNION ANNEX II HAZARD SYMBOL:



EUROPEAN UNION INFORMATION FOR CONSTITUENTS: The following information is available for primary components of this product.

2-Butoxyethanol:

EU EINECS/ELINCS NUMBER: 203-905-0

EU CLASSIFICATION: [Xn] Harmful; [Xi] Irritant

EU RISK PHRASES: [R: 20/21/22]: Harmful by inhalation, in contact with skin and if swallowed. [R: 36/38]: Irritating to eyes and skin.

EU SAFETY PHRASES: [S: 2-]: Keep out of the reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only*). [S: 24/25]: Avoid contact with skin and eyes. [S: 36/37]: Wear suitable protective clothing, gloves and eye/face protection. [S: 46]: If swallowed, seek medical advice immediately and show this container or label.

Oxalic Acid:

EU EINECS/ELINCS NUMBER: 205-634-3

EU CLASSIFICATION: [Xn] Harmful;

EU RISK PHRASES: [R: 21/22]: Harmful in contact with skin and if swallowed.

EU SAFETY PHRASES: [S: 2-]: Keep out of the reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only*). [S: 24/25]: Avoid contact with skin and eyes.

16. OTHER INFORMATION

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DATE OF PRINTING:

September 15, 2008

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DEFINITIONS OF TERMS

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

EXPOSURE LIMITS IN AIR:

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

DFG MAK Germ Cell Mutagen Categories: **1:** Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed humans. **2:** Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed mammals. **3A:** Substances which have been shown to induce genetic damage in germ cells of human 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 which are suspected of being germ cell mutagens because of their genotoxic effects in mammalian somatic cell *in vivo*; in additional cases, substances for which there are no *in vivo* data, but which 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 cause damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed. **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. **Group D:** Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, **Group D:** Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend.

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.

MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.

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

NIC: Notice of Intended Change.

EXPOSURE LIMITS IN AIR:

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. 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-Permissible Exposure Limit: 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.

STEL-Short Term Exposure Limit: 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 or REL-TWA.

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 effect. The duration must be considered, including the 8-hour.

TWA-Time Weighted Average: 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.

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:

0 (Minimal Hazard): No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation:* Essentially non-irritating. *PII or Draize = "0".* *Eye Irritation:* Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. *Draize = "0".* *Oral Toxicity LD₅₀ Rat:* < 5000 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC₅₀ Rat:* < 20 mg/L.; **1** (Slight Hazard: Minor reversible Injury may occur; slightly or mildly irritating. *Skin Irritation:* Slightly or mildly irritating. *Eye Irritation:* Slightly or mildly irritating. *Oral Toxicity LD₅₀ Rat:* > 500-5000 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 1000-2000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 2-20 mg/L); **2** (Moderate Hazard: Temporary or transitory injury may occur. *Skin Irritation:* Moderately irritating; primary irritant; sensitizer. *PII or Draize > 0, < 5.* *Eye Irritation:* Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. *Draize > 0, ≤ 25.* *Oral Toxicity LD₅₀ Rat:* > 50-500 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 200-1000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.5-2 mg/L.).

DEFINITIONS OF TERMS (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

HEALTH HAZARD (continued):

3 (Serious Hazard: Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation*: Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation*: Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD₅₀ Rat*: > 1-50 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit*: > 20-200 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat*: > 0.05-0.5 mg/L.); **4** (Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation*: Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation*: Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD₅₀ Rat*: ≤ 1 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit*: ≤ 20 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat*: ≤ 0.05 mg/L).

FLAMMABILITY HAZARD:

0 (Minimal Hazard-Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.); **1** (Slight Hazard-Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class IIIB, or; Most ordinary combustible materials [e.g. wood, paper, etc.]); **2** (Moderate Hazard-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 in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air, including: Liquids having a flash-point at or above 37.8°C [100°F]; Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp; Solids and semisolids that readily give off flammable vapors.); **3** (Serious Hazard-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, unaffected by ambient temperature, are readily ignited under almost all conditions, including: Liquids having a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]); **4** (Severe Hazard-Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: 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] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric]).

PHYSICAL HAZARD:

0 (*Water Reactivity*: Materials that do not react with water. *Organic Peroxides*: Materials that are normally stable, even under fire conditions and will not react with water. *Explosives*: Substances that are Non-Explosive. *Unstable Compressed Gases*: No Rating. *Pyrophorics*: No Rating. *Oxidizers*: No "0" rating allowed. *Unstable Reactives*: Substances that will not polymerize, decompose, condense or self-react.); **1** (*Water Reactivity*: Materials that change or decompose upon exposure to moisture. *Organic Peroxides*: Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives*: Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases*: Pressure below OSHA definition. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group III; *Solids*: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. *Liquids*: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives*: Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.); **2** (*Water Reactivity*: Materials that may react violently with water. *Organic Peroxides*: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives*: Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases*: Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group II; *Solids*: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. *Liquids*: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Reactives*: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); **3** (*Water Reactivity*: Materials that may form explosive reactions with water. *Organic Peroxides*: Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives*: Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases*: Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group I; *Solids*: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture. *Liquids*: Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):

3 (continued): *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.; **4** (*Water Reactivity*: Materials that react explosively with water without requiring heat or confinement. *Organic Peroxides*: Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. *Explosives*: Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. *Compressed Gases*: No Rating. *Pyrophorics*: Add to the definition of Flammability "4". *Oxidizers*: No "4" rating. *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a high potential to cause significant heat generation or explosion.).

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: 0 (materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 10,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 200 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 2000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 2000 mg/kg. Materials that are essentially non-irritating to the respiratory tract, eyes and skin. **1** (materials that, under emergency conditions, can cause significant irritation): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2000 mg/kg. Materials that cause slight to moderate irritation to the respiratory tract, eyes and skin. **2** (materials that, under emergency conditions, can cause temporary incapacitation or residual injury): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 3,000 ppm but less than or equal to 5,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause severe tissue damage, depending on duration of exposure. Materials that are respiratory irritants. Materials that cause severe, but reversible irritation to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers. **3** (materials that, under emergency conditions, can cause serious or permanent injury): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 1,000 ppm but less than or equal to 3,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials that are corrosive to the skin. **4** (materials that, under emergency conditions, can be lethal): Gases and vapors whose LC₅₀ for acute inhalation toxicity less than or equal to 1,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD₅₀ for acute oral toxicity is less than or equal to 5 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 1000 ppm.

FLAMMABILITY HAZARD: 0 Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand: Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur: Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the UN *Recommendation on the Transport of Dangerous Goods, Model Regulations* (current edition) and the related *Manual of Tests and Criteria* (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to a boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed up flash point of the solvent. Most ordinary combustible materials. **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 in air.

DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 2 (continued): 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 percent 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 37.8°C (73°F) and below 37.8°C (100°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 a representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent 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 materials 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 percent 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 estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 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 estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100W/mL. 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 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. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures.

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 vapors to form an ignitable mixture with air. **Autoignition Temperature**: The minimum temperature required to initiate combustion in air with no other source of ignition. **LEL** - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. **UEL** - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

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. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** 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; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDL₀**, the lowest dose to cause a symptom and **TCL₀** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - 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.

ECOLOGICAL INFORMATION:

EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. **TL_m** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

This section explains the impact of various laws and regulations on the material. **ACGIH:** American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **EPA** is the U.S. Environmental Protection Agency. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA** or **Superfund**); and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label. **OSHA** - U.S. Occupational Safety and Health Administration.