



MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identification

Product Name: SolaChrome® Inks
 Commonly used in the following printer(s):
 DisplayMaker 110S

Product Numbers: 0900873 Series P/N to include the following colors and their densities: Cyan, Magenta, Yellow, Black

Chemical Name: Solvent-based Inkjet Printing Fluid
 Chemical Family: Glycol Ether/Polymer/Pigment Blend
 CAS Number: Blend

Company Identification

MacDermid ColorSpan Corporation
 7090 Shady Oak Road
 Eden Prairie, MN 55344 USA

In case of exposure, please contact local Poison Control Center
 Emergency phone for spills, leaks, fire, exposure or accident call
 CHEMTREC: 1-800-424-9300 or 1-703-527-3887
 Product information: (800) 925-0563
 Revision Date: 03/31/03

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS #	Proportion (% v/v)	EXPOSURE LIMITS IN AIR					OTHER mg/m3
				ACGIH-TLV		OSHA-PEL		NIOSH	
				TWA mg/m3	STEL mg/m3	TWA mg/m3	STEL mg/m3	IDLH mg/m3	
Alkyl Glycol Ether Compound	Proprietary		60-70	NE	NE	NE	NE	NE	NIOSH REL: TWA = 33 (skin) DFG MAK: TWA = 130 (skin) PEAK = 2•MAK 30 min. average value Pregnancy Risk Group: C
Aliphatic Ether Alcohol Ester Compound	Proprietary		15-25	NE	NE	NE	NE	NE	NE
Glycol Ether Acetate Compound	Proprietary		5-15	NE	NE	NE	NE	NE	NE
Red Pigment	Proprietary		0-10	NE	NE	NE	NE	NE	NE
Yellow Pigment	Proprietary		0-10	NE	NE	NE	NE	NE	NE
Violet Pigment	Proprietary		0-10	NE	NE	NE	NE	NE	NE

CHEMICAL NAME	CAS #	EINECS #	Proportion (% v/v)	EXPOSURE LIMITS IN AIR					
				ACGIH-TLV		OSHA-PEL		NIOSH	OTHER
				TWA mg/m3	STEL mg/m3	TWA mg/m3	STEL mg/m3	IDLH mg/m3	
Polymer with Chloroprene and Ethylenyl Acetate	Proprietary		1-5	NE	NE	NE	NE	NE	NE
Blue Pigment	Proprietary		0-5	NE	NE	NE	NE	NE	NE
Acetic Acid Vinyl Ester Polymer	Proprietary		0-5	NE	NE	NE	NE	NE	NE
Black Pigment	Proprietary		0-5	3.5	NE	3.5	NE	1750	NIOSH REL: TWA = 3.5 Carcinogen:IARC-2B, NIOSH-X, TLV-A4
Other components each present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).			Balance	None of the other components contribute significant additional hazards at the concentrations present in this product. All pertinent hazard information has been provided in this document, per the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards; Canadian Workplace Hazardous Materials Identification System Standards (CPR 4); and the applicable Council Directives of the European Community.					

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



3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a clear, combustible liquid that has a distinct odor and comes in a variety of colors (black, magenta, cyan, yellow). Health Hazards: The primary health hazard associated with this product is the potential for moderate irritation of contaminated tissue. Inhalation exposure may result in adverse effects on the central nervous system. Inhalation of high concentration levels or prolonged inhalation and ingestion may be harmful or fatal. The ink may stain skin, eyes, other contaminated tissue, and objects. Flammability Hazards: This product must be substantially preheated for ignition to become a potential hazard. Reactivity Hazards: This product is not reactive. Environmental Hazards: This product may have adverse effects when released into the environment. Emergency Recommendations: Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

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, via route of entry, are as follows:

INHALATION: This product does not normally present a significant inhalation hazard under anticipated circumstances of use. If inhalation of vapors, mists, or sprays of this product occurs, irritation of the nose, throat, and other tissues of the respiratory system result. Symptoms of severe overexposure, especially as may occur in poorly ventilated areas, may include central nervous system effects (e.g., headaches, dizziness, anesthesia, drowsiness, and unconsciousness), coughing, nausea, abdominal pain, vomiting, and inflammation of the gums. Chronic inhalation exposure may cause headache, throat irritation, low backache, and symptoms described under "Other Health Effects".

CONTACT WITH SKIN or EYES: Due to the colorants, skin contact may discolor contaminated areas. Skin contact may cause redness, pain, or itching in sensitive individuals. Repeated or prolonged skin overexposure may cause dermatitis (dry, red skin). Eye contact with this product can moderately irritate the eyes, causing pain, tearing, and redness.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD		(BLUE)	2
FLAMMABILITY HAZARD		(RED)	2
PHYSICAL HAZARD		(YELLOW)	0
PROTECTIVE EQUIPMENT			B
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8
For Routine Industrial Use and Handling Applications			

Because the eye tissue may be stained, vision may be temporarily blurred. There are some reports that the Alkyl Glycol Ether Compound component of this product may cause allergic skin reaction in susceptible individuals. Symptoms may include dryness, redness, itching, rash or welts.

SKIN ABSORPTION: The Alkyl Glycol Ether Compound component of this product is suspected to be absorbed through the skin, especially if the skin is abraded or affected by dermatitis or eczema.

INGESTION: Though not anticipated to be a significant route of occupational exposure, ingestion of large quantities of this product may cause stomach pains, nausea, vomiting, and discoloration of the mouth, teeth, and tissues of the throat. If large quantities are ingested, respiratory arrest or cardiovascular collapse could cause death. In humans, a dose of 100 mL of the Alkyl Glycol Ether Compound component may cause death. If the victim survives, kidney failure may develop within the next several days.

INJECTION: Accidental injection of this liquid (as may occur by a puncture with a contaminated object) will cause local pain, irritation, and redness.

OTHER HEALTH EFFECTS: In acute poisoning from products containing Alkyl derivatives of Ethylene Glycol, such as the 2-Buoxyethyl Acetate component of this product, there is often renal injury, albuminuria (abnormal presence of serum albumin in the urine), and hematuria (presence of blood in the urine). Other symptoms of overexposure to products that contain Alkyl Glycol Ether Compound may include nausea, vomiting, diarrhea, prominent headache, and delayed abdominal and lower back pain. Observations in animal tests indicate the possibility of pulmonary edema, intravascular hemolysis, and bone marrow depression. Chronic exposure to this product may adversely affect the kidneys and liver.

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

ACUTE: The ink may stain hair, skin, and other contaminated tissue. Acute exposure to low concentrations of this product via skin contact, eye contact, and inhalation may irritate contaminated tissue. Inhalation of higher levels may cause significant irritation and adverse effects on the central nervous system. Ingestion of small amounts will cause nausea, vomiting, abdominal pain, and adverse effects on the central nervous system. Ingestion of large amounts may be fatal or cause kidney failure.

CHRONIC: Chronic skin exposure to this product may cause dermatitis or allergic reaction in susceptible individuals. Chronic exposure to this product can adversely affect the kidneys and liver. Based on animal data, exposure to products containing Alkyl Glycol Ether Compound may cause adverse reproductive effects. Refer to Section 11 (Toxicology Information) for additional data.

TARGET ORGANS: ACUTE: Skin, respiratory system, eyes, kidneys. CHRONIC: Skin, kidneys, reproductive system.

4. FIRST AID MEASURES

Contaminated individuals must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention if necessary. Take a copy of the label and MSDS to health professional with victim.

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

EYE EXPOSURE: If vapors, sprays, or mists of this product 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 medical attention if any adverse effect occurs.

INHALATION: If vapors, sprays, or mists of this product are inhaled, remove the contaminated individual to fresh air. If necessary, remove or cover gross contamination to avoid exposure to rescuers. Seek medical attention if adverse effect occurs.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING, unless directed by medical personnel. Have victim rinse mouth with 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: Skin, respiratory, liver, or kidney disorders may be aggravated by prolonged overexposures to this product.

RECOMMENDATIONS TO PHYSICIANS: Treatment should include gastric lavage for removal of residual Alkyl Glycol Ether Compound, correction of dehydration and shock, and management of fluid balance in the presence of pulmonary edema, which might be due to the toxic effects of Alkyl Glycol Ether Compound metabolites or the sodium overload. In addition, hypocalcemia should be corrected with calcium chloride, depending on serum calcium levels. Prompt diagnosis and initiation of treatment, including ethanol therapy and hemodialysis, is necessary to ameliorate the effects of Alkyl Glycol Ether Compound ingestion.

5. FIRE FIGHTING MEASURES

FLASH POINT: 72.0°C (161.6°F) [estimated]

AUTOIGNITION TEMPERATURE: Not established

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not established

Upper (UEL): Not established

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES (for cooling)

Foam: YES

Carbon Dioxide: YES

Halon: YES

Dry Chemical: YES

Other: Any "A" Class

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is a Class IIIA combustible liquid. This product must be substantially preheated for ignition to become a potential hazard. There are some reports that the Alkyl Glycol Ether Compound component of this product may cause allergic skin reaction in susceptible individuals and so this product poses a contact hazard to fire-fighters. When involved in a fire, this material may decompose and produce irritating vapors and toxic gases (e.g., carbon oxides, nitrogen oxides, copper oxides).

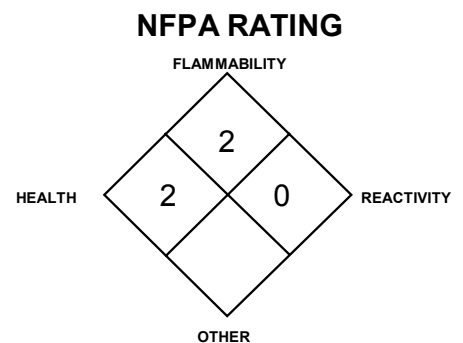
Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive under normal conditions. Vapors of this product may ignite by static discharge if this product is exposed to extremely high temperatures.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Due to the presence of colorants, the runoff water from these products can discolor contaminated objects. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, rinse fire-response equipment with soapy water before returning to service.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: For incidental spills (e.g., less than 1 L of liquid from a bottle), wear rubber gloves, splash goggles, and appropriate body protection. Non-sparking tools should be used. Trained personnel following pre-planned procedures should handle non-incident releases (e.g., 10 L of liquid leaking from a crate of several containers). In the event of a non-incident spill, clear the area and protect people. The minimum personal protective equipment for response to a non-incident spill is as follows: rubber gloves, rubber boots, face shield, and Tyvek suit. Control sources of ignition before cleaning up. The 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 and boots, hard hat, and Self-Contained Breathing Apparatus. Absorb spilled liquid with polypads or other suitable absorbent materials. Rinse area thoroughly with soapy water after liquid has dried. Decontaminate the area thoroughly. If necessary, discard all stained response equipment or rinse with soapy water before returning such equipment to service. Place all spill residue in an appropriate container and seal. Dispose of in accordance with applicable U.S. Federal, State, or local procedures, or appropriate



standards of Canada, Australia, or EC Member States (see Section 13, Disposal Considerations).

7. HANDLING AND STORAGE

WORK 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. Keep away from heat, sparks, and other sources of ignition. Keep container tightly closed when not in use. Use non-sparking tools. Bond and ground containers during transfers of material. If this product is transferred into another container, only use portable containers and dispensing equipment (e.g., faucet, pump, drip can) approved for combustible liquids. 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. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). 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 combustible; 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.

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 appropriate Canadian standards.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). Use local exhaust ventilation. Normal office ventilation conforming to the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standards is adequate under normal circumstances of use. Persons using this product should consult a qualified Ventilation Engineer and/or Industrial Hygienist if concerns about exposures arise. If necessary, refer to Australian National Code of Practice for the Control of Workplace Hazardous Substances [NOHSC: 2007 (1994)] for further information. As with all products that contain chemicals, ensure proper decontamination equipment (e.g., eyewash/safety shower stations) are available near areas where this product is used as necessary.

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: In addition to the exposure limit values cited in Section 2 (Composition and Information on Ingredients), other exposure limits have been established by various countries for the components of this mixture, as provided below (no listing for a component indicates no values are available): Note: All limits given are 1993 and 1999 values; refer to current country limits for complete information.

BLACK PIGMENT:

Australia: TWA = 3 mg/m³
Belgium: TWA = 3.5 mg/m³
Denmark: TWA = 3.5 mg/m³
Finland: TWA = 3.5 mg/m³; STEL = 7 mg/m³
France: TWA = 3.5 mg/m³
The Netherlands: TWA = 3.5 mg/m³

The Philippines: TWA = 3.5 mg/m³
Russia: STEL = 4 mg/m³
Sweden: TWA = 3 mg/m³
United Kingdom: TWA= 3.5mg/m³;STEL= 7 mg/m³
In Bulgaria, Columbia, Jordan, Korea, New Zealand, Singapore, and Vietnam check ACGIH TLV.

ALKYL GLYCOL ETHER COMPOUND:
Austria: MAK = 20 ppm (135 mg/m³), Skin,
JAN 1999
Germany: MAK = 20 ppm (135 mg/m³), Skin,
JAN 1999
Poland: MAC (TWA) = 100 mg/m³, JAN 1999
Sweden: TWA 10 ppm (70 mg/m³), STEL = 20
ppm (140 mg/m³), Skin, JAN 1999

Switzerland: MAK-W = 20 ppm (135 mg/m³),
KZG-W = 40 ppm (270 mg/m³), Skin, JAN
1999
United Kingdom: LTEL = 10 ppm (54 mg/m³),
Skin, JAN 1993
United Kingdom: LTEL = 5 ppm (24 mg/m³),
Skin, JAN 1993

RESPIRATORY PROTECTION: None needed under normal circumstances of use. 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 Z94.4-93, the European Standard EN149, and EC member states, or the Australian Standard 1716-Respiratory Protective Devices and Australian Standard 1715-Selection, Use, and Maintenance of Respiratory Protective Devices. 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 U.S. Federal OSHA's Respiratory Protection Standard (1910.134-1998) or the regulations of various U.S. States, Canada, Australia, or EC Member States. The NIOSH Respiratory Guidelines for the Alkyl Glycol Ether Compound component are given for additional information.

ALKYL GLYCOL ETHER COMPOUND

CONCENTRATION

RESPIRATORY PROTECTION

Up to 50 ppm:	Any Chemical Cartridge Respirator with organic vapor cartridge(s) or any Supplied-Air Respirator (SAR).
Up to 125 ppm:	Any SAR operated in a continuous-flow mode or any Powered, Air-Purifying Respirator with organic vapor cartridge(s).
Up to 250 ppm:	Any Chemical Cartridge Respirator with a full facepiece and organic vapor cartridge(s), any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister, any Powered, Air-Purifying Respirator with a tight-fitting facepiece and organic vapor cartridge(s), any Self-Contained Breathing Apparatus (SCBA) with a full facepiece, or any SAR with a full facepiece.
Up to 700 ppm:	Any SAR that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions:	Any SCBA that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode or any SAR that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode.
Escape:	Any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister or any appropriate escape-type SCBA.

HAND PROTECTION: Wear butyl rubber gloves for routine use to prevent staining. Check gloves for leaks. If necessary, refer to U.S. OSHA 29 CFR 1910.138, Australian Standard 2161-Industrial Safety Gloves and Mittens and appropriate Standards of the EC and Canada for further information.

EYE PROTECTION: None needed under normal circumstances of use. Splash goggles or safety glasses should be worn during operations in which sprays of liquid may occur. If necessary, refer to U.S. OSHA 29 CFR 1910.133, the European Standard EN166, or the Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment for further information.

BODY PROTECTION: None needed under normal circumstances of use. Use body protection appropriate for task (e.g., rubber apron when cleaning equipment; Tyvek suit and rubber boots during non-incident spill response). If necessary, refer to Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals for further information. 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.

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT: 183.5°C (362.3°F) [estimated] MELTING/FREEZING POINT: Not established
VAPOR PRESSURE, mm Hg @ 20°C: Not established pH: Not applicable
VAPOR DENSITY (air = 1): Not established SOLUBILITY IN WATER: Insoluble
EVAPORATION RATE (n-BuAc = 1): Not established ODOR THRESHOLD: Not established
SPECIFIC GRAVITY (water = 1): Not established
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not established
APPEARANCE, ODOR AND COLOR: This product is a clear liquid that has a distinct odor and comes in a variety of colors (cyan, magenta, yellow, black).
HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance of this product may be a distinguishing characteristic.

10. STABILITY AND REACTIVITY

STABILITY: Stable.
DECOMPOSITION PRODUCTS: If exposed to extremely high temperatures, this product can decompose to generate carbon oxides, nitrogen oxides, and copper oxides.
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizers, strong bases.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Exposure to or contact with extremely high temperatures, incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Specific toxicology data available for components greater than 1% in concentration are as follows.
ACETIC ACID VINYL ESTER POLYMER:
Currently, there are no data for this compound.
ALKYL GLYCOL ETHER COMPOUND:
Open Irritation Test (skin, rabbit) = 500 mg; Mild
Standard Draize Test (eye, rabbit) = 500 mg/24 hours; Mild
LD₅₀ (oral, rat) = 2400 mg/kg; Kidney, Ureter, Bladder: hematuria, other changes in urine composition
LD₅₀ (oral, mouse) = 3200 mg/kg
LD₅₀ (skin, rabbit) = 1500 mg/kg; Kidney, Ureter, Bladder: hematuria, other changes in urine composition; Blood: normocytic anemia
LDLo (skin, guinea pig) = 5 mL/kg
BLACK PIGMENT:
Mutation in microorganisms (*Salmonella typhimurium*, bacteria) = 1 mg/plate
DNA adduct (inhalation, mouse) = 6200 µg/m³/16 hours/12 weeks/intermittent
TCLo (inhalation, rat) = 50 mg/m³/6 hours/90 days/intermittent; Lungs, Thorax, or Respiration: other changes
TCLo (inhalation, rat) = 11600 µg/m³/18 hours/2 years/intermittent; Tumorigenic: Carcinogenic by RTECS criteria; Lungs, Thorax, or Respiration: tumor
YELLOW PIGMENT:
Currently, there are no data for this compound.
BLUE PIGMENT:
LD (oral, rat) >15 g/kg
LD (intraperitoneal, rat) > 3 g/kg; Kidney, Ureter, Bladder: urine volume decreased, proteinuria
LD (oral, rat) > 2000 mg/kg
RED PIGMENT:
LD₅₀ (oral, rat) > 5000 mg/kg
GLYCOL ETHER ACETATE COMPOUND:
Open Irritation Test (skin, rabbit) = 500 mg; mild
Standard Draize Test (eye, rabbit) = 500 mg; moderate
TDLo (oral, rat) = 96 g/kg; Kidney, Ureter, Bladder: other changes in urine composition; Nutritional and Gross Metabolic: weight loss or decreased weight gain; Related to Chronic Data: death
TCLo (inhalation, rat) = 480 mg/m³/6 hours/2 weeks/intermittent; Lungs, Thorax, or Respiration: other changes; Lungs, Thorax, or Respiration: changes in lung weight

SUSPECTED CANCER AGENT: The components of this product are listed by agencies tracking carcinogenic potential as follows:

BLACK PIGMENT: ACGIH-TLV-A4: (Not Classifiable as a Human Carcinogen); IARC-2B (Possibly Carcinogenic to Humans); MAK-3 (Substances that Cause Concern They Could Be Carcinogenic for Man, But Which Cannot Be Assessed Conclusively Because of Lack of Data); NIOSH-Ca (Potential Occupational Carcinogen with no Further Designation)

BLUE PIGMENT (as a copper compound-dusts and mists): EPA-D (Not Classifiable as to Human Carcinogenicity)

The remaining components of this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA and therefore are not considered to be, nor suspected to be, a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Skin contact will be moderately irritating. Contact with the eyes will be irritating and may cause temporary visual impairment.

SENSITIZATION TO THE PRODUCT: The Alkyl Glycol Ether Compound component of this product is suspected to be a skin sensitizer which may cause allergic skin reaction in susceptible individuals.

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

Mutagenicity: This product is not reported to produce mutagenic effects in humans. Animal mutation data are available for the Black Pigment and the Polymer with Chloroprene & Ethylenyl Acetate components of this product; these data were obtained during clinical studies on specific animal tissues exposed to high doses of this compound.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.

Teratogenicity: This product is not reported to cause teratogenic effects in humans.

Reproductive Toxicity: This product is not reported to cause reproductive effects in humans.

A *mutagen* is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An *embryotoxin* 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.

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

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: This product is relatively stable under ambient environmental conditions. Additional environmental data are available as follows:

ALKYL GLYCOL ETHER COMPOUND:

Terrestrial Fate: Based on a recommended classification scheme, an estimated Koc value of 22, determined from a measured water solubility and a recommended regression-derived equation, indicates that Alkyl Glycol Ether Compound will have very high mobility in soil. Volatilization of Alkyl Glycol Ether Compound may occur from moist soil surfaces given an estimated Henry's Law constant of 5.3×10^{-6} atm-cu m/mole, calculated from experimental values for vapor pressure and water solubility. Volatilization from dry soil surfaces is not expected to be environmentally important based on a measured vapor pressure of 0.375 mm Hg. Based on limited screening data, the dominant removal process for Alkyl Glycol Ether Compound in soil is expected to be biodegradation. Total degradation using the Zahn-Wellens screening method exceeded 90% with a measured rate of 12%/day.

Aquatic Fate: Based on a recommended classification scheme, an estimated Koc value of 22, Alkyl Glycol Ether Compound should not adsorb to suspended solids and sediment in water. Alkyl Glycol Ether Compound may volatilize from water surfaces based on its estimated Henry's Law constant, experimental values for vapor pressure, and water solubility. Estimated half-lives for a model river and model lake are 9 and 70 days, respectively. According to a classification scheme, an estimated BCF value of 3, from a measured water solubility, suggests that bioconcentration in aquatic organisms is low. Based on limited screening data, the dominant removal process for Alkyl Glycol

Ether Compound in water is expected to be biodegradation. Total degradation using the Zahn-Wellens screening method exceeded 90% with a measured rate of 12%/day.

Atmospheric Fate: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere, Alkyl Glycol Ether Compound (which has a measured vapor pressure of 0.375 mm Hg at 25°C), will exist solely as a vapor in the ambient atmosphere. Vapor-phase Alkyl Glycol Ether Compound is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be about 18 hours.

Biodegradation: Alkyl Glycol Ether Compound was determined to be "completely" biodegradable using the Zahn-Wellens screening method; total degradation exceeded 90% with a measured rate of 12%/day under the test conditions; no observable lag period was required before onset of degradation.

VIOLET PIGMENT:

Terrestrial Fate: The insolubility of Quinacridone red will cause it to collect in soils and sediments.

Aquatic Fate: Due to its insolubility, Quinacridone may reside in the water column for a substantial period, long enough to become part of deep sea sediments.

Biodegradation: Biodegradation is expected to be slow. The strong crystal lattice (e.g. low sol) is partially responsible.

Bioconcentration: Quinacridone should not bioconcentrate, since it is insoluble, and therefore, will not be taken up into the body.

ALIPHATIC ETHER ALCOHOL ESTER COMPOUND:

Biological Oxygen Demand (BOD) = 5% (3.63 gO₂/g); 20% (1.05 gO₂/g); Theoretical OD: 1.82 gO₂/g

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product may be harmful to plant or animal life, especially if large volumes of this product are released. Plants may be discolored and damaged (depending on the severity of the contamination).

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product may be harmful to aquatic plant or animal life, especially if large volumes of this product are released into a body of water. Additional aquatic toxicity data are available as follows:

ALKYL GLYCOL ETHER COMPOUND:

EC₁₀ (*Pseudomonas putida* bacteria) 17
hours = 720 mg/L
EC₅₀ (*Pseudomonas putida*-bacteria) 17
hours = 960 mg/L
EC₉₀ (*Pseudomonas putida*-bacteria) 17
hours = 1,200 mg/L
EC₅₀ (*Scenedesmus subspicatus* algae) 72
hours = > 500 mg/L
EC₀ (*Daphnia magna* Straus giant water
flea) 24 hours = 58 mg/L
EC₅₀ (*Daphnia magna* Straus giant water
flea) 24 hours = 150 mg/L

ALKYL GLYCOL ETHER COMPOUND (continued):

EC₁₀₀ (*Daphnia magna* Straus giant water
flea) 24 hours = 320 mg/L
EC₀ (*Daphnia magna* Straus giant water
flea) 48 hours = 10 mg/L
EC₅₀ (*Daphnia magna* Straus giant water
flea) 48 hours = 37 mg/L
EC₁₀₀ (*Daphnia magna* Straus giant water
flea) 48 hours = 320 mg/L

ALIPHATIC ETHER ALCOHOL ESTER COMPOUND:

LC₅₀ (*Pimephales promelas* fathead minnow)
/96 hours = 161 mg/L
LC₅₀ (*Daphnia*) 48 hours = 408 mg/L

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada, Australia, or EC Member States. 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.

EPA WASTE NUMBER: Not applicable to wastes consisting only of this product

14. TRANSPORTATION INFORMATION

THIS PRODUCT IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Combustible liquid, n.o.s. (Alkyl Glycol Ether Compound, Aliphatic Ether Alcohol Ester Compound)
HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable (combustible liquid has no Class Number)
UN IDENTIFICATION NUMBER: NA 1993
PACKING GROUP: III

DOT LABEL(S) REQUIRED: None

EMERGENCY RESPONSE GUIDEBOOK NUMBER, 2000: 128

MARINE POLLUTANT: No component of this product is designated by the DOT to be a Marine Pollutant (per Appendix B to 49 CFR 172.101).

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is not considered as dangerous goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is not considered as dangerous goods.

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is not considered as dangerous goods.

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

AUSTRALIAN FEDERAL OFFICE OF ROAD SAFETY CODE FOR THE TRANSPORTATION OF DANGEROUS GOODS BY ROAD OR RAIL: This product is not considered as dangerous goods, per regulations of the Australian Federal Office of Road Safety.

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Alkyl Glycol Ether Compound, Aliphatic Ether Alcohol Ester Compound and Glycol Ether Acetate Compound (in generic Glycol Ether category)	No	Yes	N230

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Alkyl Glycol Ether Compound, Aliphatic Ether Alcohol Ester Compound and Glycol Ether Acetate Compound = Under the generic Glycol Ether category, this compound does not have a RQ assigned, but is considered a CERCLA Hazardous Waste.

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

U.S. HAZARDOUS AIR POLLUTANT (HAPs): No component of this product is listed by the EPA under the Clean Air Act [CAA 112(r)] as a HAP and so no component of this product has a Threshold Quantity under this regulation.

OTHER U.S. FEDERAL REGULATIONS: OSHA Standard for Flammable and Combustible Liquids (29 CFR 1910.106). Depending on specific operations involving the use of the this product, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation, the components of this product are/are not listed in Appendix A (provided Threshold Quantities for Listed Substances); however, any process that involves a flammable or combustible liquid on-site, in one location, in quantities of 10,000 lb. (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.

U.S. STATE REGULATORY INFORMATION: Components of this product are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Black Pigment

California - Permissible Exposure Limits for Chemical Contaminants: Black Pigment

Florida - Substance List: None

Illinois - Toxic Substance List: Black Pigment

Kansas - Section 302/313 List: None

Massachusetts - Substance List: Black Pigment

Michigan - Critical Materials Register: None

Minnesota - List of Hazardous Substances: Black Pigment
Missouri - Employer Information/Toxic Substance List: Black Pigment
New Jersey - Right to Know Hazardous Substance List: Black Pigment
North Dakota - List of Hazardous Chemicals, Reportable Quantities: None
Pennsylvania - Hazardous Substance List: Black Pigment
Rhode Island - Hazardous Substance List: Black Pigment
Texas - Hazardous Substance List: Black Pigment
West Virginia - Hazardous Substance List: Black Pigment
Wisconsin - Toxic and Hazardous Substances: Black Pigment

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

ANSI LABELING (Z129.1): CAUTION! COMBUSTIBLE LIQUID AND VAPOR. MAY CAUSE SKIN AND EYE IRRITATION. INHALATION AND INGESTION MAY BE HARMFUL. MAY CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. MAY CAUSE ALLERGIC SKIN REACTION IN SUSCEPTIBLE INDIVIDUALS. MAY DISCOLOR CONTAMINATED SKIN, EYES, HAIR, AND CLOTHES. FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN. Use with adequate ventilation. Keep away from heat, sparks, or open flame. Avoid contact of liquid with skin, eyes, and clothing. Avoid exposure to vapors, mists, or sprays. Wash thoroughly after handling. Wear appropriate hand and eye protection. FIRST-AID: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. If inhaled, remove to fresh air. If swallowed, do not induce vomiting. Get medical attention if irritation develops or persists or if any other adverse effect occurs. IN CASE OF FIRE: Use water fog, dry chemical, or CO₂, or alcohol foam. IN CASE OF SPILL: Absorb spill with inert materials (e.g., polypads, dry sand). Rinse area with soapy water. Consult Material Safety Data Sheet for additional information.

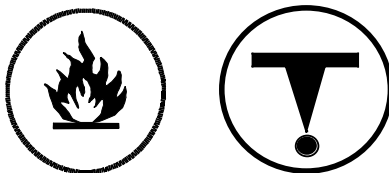
ADDITIONAL CANADIAN REGULATIONS:

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

OTHER CANADIAN REGULATIONS: Not applicable.

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

CANADIAN WHMIS SYMBOLS: Class B3: Combustible Liquid
Class D2B: Materials Causing Other Toxic Effects-Chronic Toxic Effects Sensitization



EUROPEAN COMMUNITY INFORMATION:

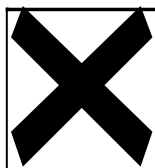
EC LABELING/CLASSIFICATION: This product is considered to be dangerous according to current European Community Guidelines. This product meets the definition of EC hazard class Xn (Harmful).

EC CLASSIFICATION: Xn

EC RISK PHRASES: Harmful by inhalation and in contact with skin. May cause sensitization by skin contact. [R: 20/21-43]

EC SAFETY PHRASES: Keep out of reach of children.* Do not breathe vapour or spray. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable gloves and eye/face protection. [S: (2-)* 23, 26, 37/39] *This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.

EUROPEAN COMMUNITY ANNEX II HAZARD SYMBOL: Xn



AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: The components of this product are listed on the AICS.

LIST OF DESIGNATED SUBSTANCES: Not applicable.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Schedule 6

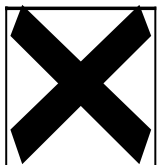
LABELING AND CLASSIFICATION: The following hazard classification data have been selected, based a review of the regulation [NOHSC: 10005 (1994)]:

CLASSIFICATION: Harmful. [Xn].

RISK PHRASES: Harmful by inhalation and in contact with skin. May cause sensitization by skin contact. [R: 20/21-43]

SAFETY PHRASES: Keep out of reach of children.* Do not breathe vapour/spray. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable gloves and eye/face protection. [S:(2-)* 23, 26, 37/39] *This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.

HAZARD SYMBOL:



ADDITIONAL LABELING: POISON. NOT TO BE TAKEN. KEEP OUT OF REACH OF CHILDREN.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

16. OTHER INFORMATION

The data in this Material Safety Data Sheet relates only to the specific material designated herein. It does not relate to use in combination with any other material or in any process.

The information contained herein is based upon data obtained from the manufacturer and/or recognized technical sources. This information is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. Since the condition of handling and use are beyond our control, MacDermid ColorSpan Corporation assumes no liability for loss or injury resulting from the use of this product or the information herein. All chemicals may present unknown health hazards and should be used with caution. No representation or warranties, either expressed or implied, of merchantability, fitness for a particular purpose or any other nature are made hereunto with respect to the information contained herein or the product to which the information refers. User must be familiar with and follow generally accepted safe handling procedures of chemicals, and is solely responsible for any effects caused by its misuse or mixing of this chemical with any other substance. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions and/or compliance with federal, state, and local laws and regulations.

DEFINITIONS OF TERMS

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

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

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

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.

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.

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.

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.; **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.;

HEALTH HAZARD (continued): **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 coarse 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.);

(continued on following page)

DEFINITIONS OF TERMS (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):

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:** Packing 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. **Unstable 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:** Packing 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. **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.). PPE Rating B: Hand and eye protection is required for routine chemical use. PPE Rating C: Hand, eye, and body protection may be required for routine chemical use.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: 0 (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury).

FLAMMABILITY HAZARD AND REACTIVITY HAZARD: Refer to definitions for “Hazardous Materials Identification System”.

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 **TDL_o**, the lowest dose to cause a symptom and **TCL_o** 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:

ACGIH: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. This section explains the impact of various laws and regulations on the material. **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/NDSL**); 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.

EUROPEAN and INTERNATIONAL:

The DFG: This is the Federal Republic of Germany's Occupation Health Agency, similar to the U.S. OSHA. **EC** is the European Community (formerly known as the **EEC**, European Economic Community). **EINECS:** This is the European Inventory of Now-Existing Chemical Substances. The **ARD** is the European Agreement Concerning the International Carriage of Dangerous Goods by Road and the **RID** are the International Regulations Concerning the Carriage of Dangerous Goods by Rail. **AICS** is the Australian Inventory of Chemical Substances. **MITI** is the Japanese Minister of International Trade and Industry