



# MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian NOHSC, Japanese and European Union Standards

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

### 1. PRODUCT IDENTIFICATION

<u>TRADE NAME (AS LABELED):</u>	<b>SPECTRAFLAIR® PIGMENT ALL GRADES</b>
<u>CHEMICAL NAME/CLASS:</u>	Magnesium Fluoride-Coated Aluminum Mixture
<u>SYNONYMS:</u>	None Allocated
<u>U.N. NUMBER:</u>	None Allocated
<u>U.N. DANGEROUS GOODS CLASS/SUBSIDIARY RISK:</u>	None Allocated
<u>HAZCHEM CODE (AUSTRALIA):</u>	None Allocated
<u>POISONS SCHEDULE NUMBER (AUSTRALIA):</u>	None Allocated
<u>PRODUCT USE:</u>	Pigmentation of a Variety of Products
<u>SUPPLIER/MANUFACTURER'S NAME:</u>	<b>JDSU</b>
<u>Address:</u>	1402 Mariner Way Santa Rosa, CA 95407-7307 1-(707) 525-9200
<u>Business Phone:</u>	
<u>AUSTRALIAN SUPPLIER/DISTRIBUTOR'S NAME:</u>	
<u>Address:</u>	
<u>Business Phone:</u>	
<u>EUROPEAN SUPPLIER/ DISTRIBUTOR'S NAME:</u>	
<u>Address:</u>	
<u>Business Phone:</u>	
<u>EMERGENCY PHONE:</u>	1-(800) 424-9300 (CHEMTREC) 24-hours [North America] +1-(703)-527-3887 (Chemtrec) 24-hours [International]
<u>EMAIL:</u>	
<u>DATE OF PREPARATION:</u>	January 26, 2010
<u>DATE OF REVISION:</u>	New

NOTE: ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, Canadian WHMIS [Controlled Products Regulations], European Union [Regulation (EC) 1907/2006 Annex II], and CLP Regulation (EC) 1272/2008 and Japanese Industrial Standard (JIS Z 7250: 2005) 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

GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION: This product meets the definition of the following hazard classification as defined by the CLP Regulation (EC) 1272/2008.

Classification: Water Reactive Category 2, Skin Irritant Category 2, Eye Irritant Category 2, Specific Organ Toxicity, Inhalation Category 3  
Hazard Class Codes: H315, H319, H335, H261 Signal Words: Warning

EU/AUSTRALIAN LABELING AND CLASSIFICATION: This product meets the definition of the following hazard classification, as defined by the European Union Council Directive 67/548/EEC and subsequent Directives and by the Australian National Occupational Health and Safety Commission [NOHSC(1008:2004)].





Classification: Irritant Risk Phrases: R:36/37/38 R: 15 Safety Phrases: S: (2-), S: 7/8, S: 43 Hazard Symbols: Irritant

See Section 16 for full text of Ingredient Risk, Safety Phrases, Hazard and Precautionary Statement Codes

**EMERGENCY OVERVIEW: Product Description:** This product consists of microflakes composed of Aluminum coated with Magnesium Fluoride. This product is an odorless, bright, metallic powder. **Health Hazards:** The primary hazard associated with overexposure to this product is the potential for irritation of skin, eyes, and other contaminated tissue. If exposed to extremely high temperatures, the products of thermal decomposition may include irritating fumes and toxic gases (e.g., magnesium, fluorine, and aluminum compounds). **Flammability Hazards:** This product is not flammable. It is important to note that under certain conditions, Aluminum dust clouds can explode when ignited by spark or flame. Though this is not anticipated to be a significant hazard with this product (due to the Magnesium Fluoride coating and the flake-shape), responders should minimize the generation of airborne particulates of this product. **Reactivity Hazards:** Contact with water can form hydrogen gas; under these conditions, closed containers may rupture (see Sections 7, Handling and Storage; 10, Stability and Reactivity; and 13, Disposal Considerations for further information). **Environmental Hazards:** This product may cause damage to the environment if released in large quantities. **Emergency Response Procedures:** Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

### 3. COMPOSITION and INFORMATION ON INGREDIENTS

There are two possible formulations of this product. The table below indicates when an ingredient is only in certain formulations. No notation indicates the components are in all formulations. This product consists of 01 micro/lakes that are thin layers of Magnesium Fluoride and Aluminum and a blend of Chromium, Molybdenum and Nickel as the outer layers. Over 65% of the total weight of the product is Magnesium Fluoride

Hazardous Ingredients:	CAS #	European EINECS #	Japanese ENC Inventory #	Australian AICS Inventory Listing	WT %	EU Hazard Symbol (67/548/EEC)	GHS/EU Hazard Symbol (1272/2008 EC)	EU Classification (67/548/EEC) GHS & EU Classification (1272/2008 EC) Risk Phrases/Hazard & Precautionary Statements
Aluminum	7429-90-5	231-072-3	Not Listed (mineral)	Listed	10-30			<b>EU 67/548 Hazard Classification:</b> Highly Flammable Risk Phrases: R: 11, R: 15 Hazard Symbol: F <b>GHS &amp; EU 1272/2008 Classification:</b> Water Reactive 2, Flammable Solid 2 <b>GHS &amp; EU 1272/2008 Hazard &amp; Precautionary Statements:</b> Hazard Codes: H261 Precautionary Codes: P231 + P232, P280, P370 + P378, P402 + P404, P501
Propylene Glycol n-Propyl Ether (present only in wetted flakes)	1569-01-3	216-372-4	2-2424	Listed	15-40%	Not Applicable	Not Applicable	<b>EU 67/548 Hazard Classification:</b> Not Applicable <b>GHS &amp; EU 1272/2008 Classification:</b> Not Applicable
Magnesium Fluoride	7783-40-6	231-995-1	1-328	Listed	30-60%			<b>SELF CLASSIFICATION:</b> <b>EU 67/548 Hazard Classification:</b> Irritant Risk Phrases: R: 36/37/38 Hazard Symbol: Xi <b>GHS &amp; EU 1272/2008 Classification:</b> Skin Irritation 2, Eye Irritation 2, Specific Target Organ Toxicity 3 <b>GHS &amp; EU 1272/2008 Hazard &amp; Precautionary Statements:</b> Hazard Codes: H315, H319, H335 Precautionary Codes: P261, P264, P271, P280, P302 + P352, P304 + P233, P312, P351 + P338, P321, P332 + P313, P337 + P313, P362, P405, P501

See Section 16 for full text of Ingredient Risk, Safety Phrases, Hazard and Precautionary Statement Codes

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

### 4. FIRST-AID MEASURES

Contaminated individuals must be taken for medical attention, especially if adverse effects continue after initial treatment. Remove or cover gross contamination to avoid exposure to rescuers. Rescuers should be taken for medical attention if necessary. Take a copy of label and MSDS to health professional with victim.

**SKIN EXPOSURE:** If this product contaminates the skin and irritation develops, immediately begin decontamination with running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. The contaminated individual must seek medical attention if adverse effects continue after flushing.

**EYE EXPOSURE:** If dusts or vapors of this product enter the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 20 minutes. The contaminated individual must seek medical attention if adverse effect continues after flushing.

**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. Victim should drink milk, egg whites, or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

**INHALATION:** If dusts or vapors of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse symptoms continue after removal to fresh air.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Pre-existing dermatitis, other skin conditions, and respiratory conditions may be aggravated by acute or chronic overexposures to this product.

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate overexposure.

### 5. FIRE-FIGHTING MEASURES

**FLASH POINT:** Not applicable.

**AUTOIGNITION TEMPERATURE:** Not established.

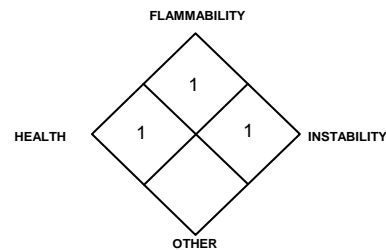
**FLAMMABLE LIMITS (in air by volume, %):** Not established.

**FIRE EXTINGUISHING MATERIALS:** Dry sand, talc, dry clay, dry ground limestone, sodium chloride, or approved Class D Extinguishers.

**FIRE EXTINGUISHING MATERIALS NOT TO BE USED:** Due to the presence of Aluminum, DO NOT use carbon dioxide, halogenated extinguishing agents, or water.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** This product may be combustible under some conditions. When involved in a fire, the products of thermal decomposition may include irritating fumes and toxic gases (e.g., hydrogen fluoride, magnesium, fluorine, and aluminum compounds).

#### NFPA RATING



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

## 5. FIRE-FIGHTING MEASURES (Continued)

**UNUSUAL FIRE AND EXPLOSION HAZARDS (continued):** If product is transferred to an airtight container, a hazard of pressure build-up and explosive overpressure exists when exposed to high temperatures such as in a fire situation. This product contains known sensitizers and so poses a contact hazard to firefighters. Contact with water will lead to the formation of hydrogen gas; under these conditions, closed containers may rupture (see Sections 7, Handling and Storage, and 10, Stability and Reactivity for further information).

**Explosion Sensitivity to Mechanical Impact:** Not applicable.

**Explosion Sensitivity to Static Discharge:** Not expected to occur.

**SPECIAL FIRE-FIGHTING PROCEDURES:** Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

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## 6. ACCIDENTAL RELEASE MEASURES

**SPILL AND LEAK RESPONSE:** Proper protective equipment should be used. In the event of a spill, clear the area and protect people. Eliminate all sources of ignition before cleanup begins. Use non-sparking tools. 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 (SCBA).

**Small Spills:** For Most Small Spills (i.e., one container, 5 kg in size): For accidental releases in which there is a minimum of dust, wear gloves, goggles, dust mask, and suitable body protection during clean up. Sweep-up spilled product, avoiding generating of dusts. Wash contaminated area with soap and water, absorb with paper towels or polypads, and rinse with water.

**Large Spills:** Trained personnel following pre-planned procedures should handle non-incident releases. Minimum Personal Protective Equipment should be as follows: Dust Levels Below 2.5 mg/m<sup>3</sup>: 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 high efficiency particulate filter. For dust Levels Above 2.5 mg/m<sup>3</sup>: Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard-hat, and Self-Contained Breathing Apparatus. Level B must be worn when oxygen levels are lower than 19.5% or unknown. Sweep-up or vacuum (non-sparking, explosion-proof vacuum must be used) spilled product and place in appropriate container for disposal/recovery. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area and confirm levels are below exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area.

Place all spill residue in an appropriate container and dispose of properly. CAUTION! If spilled material is wet and stored in a closed container, the container can rupture violently. If containers are stored they must be vented. See Sections 7 and 10 for more information. Decontaminate the area thoroughly. Wash the area with soap and water, absorb with paper towels, and rinse with water. If necessary, discard all stained response equipment or rinse with soapy water before returning such equipment to service. Do not mix with wastes from other materials. Dispose of in accordance with applicable International, National, State, and local procedures (see Section 13, Disposal Considerations). For spills on water, contain, minimize dispersion, and collect. Dispose of recovered material and report spill per regulatory requirements.

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## PART III *How can I prevent hazardous situations from occurring?*

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### 7. HANDLING and STORAGE

**SAFE WORK AND HYGIENE PRACTICES:** As with all chemicals, avoid getting this product ON YOU or IN YOU. Avoid breathing airborne dusts and vapors generated by this product. Wash thoroughly after using this product. Do not eat or drink while using this product. Remove contaminated clothing immediately. Periodically sweep-up or wipe-down area, to minimize the accumulation of particulates.

**STORAGE AND HANDLING PRACTICES:** All employees who handle this material should be trained to handle it safely. Use in a well ventilated location. Keep away from heat, sparks, and other sources of ignition. Open containers slowly on a stable surface. Only remove from the original container the amount you need to work with at any one time. Any material not used after you remove it from the original container should be disposed of properly (see Section 13, Disposal Considerations). Never expose product to temperatures above 49°C (120°F). Keep original container tightly closed when not in use. Do not expose containers to extreme temperatures. Store at room temperature, 20 to 25°C (68 to 77°F). Store containers in a cool, well-ventilated, dry location, away from sources of intense heat, water, and moist air. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers, as appropriate. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. Avoid unnecessary contact with water. Contact with water can generate flammable hydrogen gas and pressure buildup can cause the container to bulge or rupture. If this product is to be used in water-based applications (paint, ink, etc), it must first be evaluated for gassing and passivated as necessary. Refer to NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids*, for comprehensive guidance.

**SPECIFIC USE(S):** This product is for use as a colorant. Follow all industry standards for use of this product.

**PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:** Follow practices indicated in Section 6 (Accidental Release Measures). If necessary, ensure that application equipment is locked and tagged-out safely. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION, ENGINEERING, AND OCCUPATIONAL EXPOSURE CONTROLS:** Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in later in this Section. Use local exhaust ventilation. 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.

### EXPOSURE LIMITS:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH	OTHER
		TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	IDLH mg/m <sup>3</sup>	
Aluminum (exposure limits are for Aluminum Metal and Insoluble compounds)	7429-90-5	1 (resp. fraction)	NE	15 (total dust); 5 (resp. fraction)	NE	10 (total dust); 5 (resp. fraction)	NE	NE	DFG MAK: TWA = 1 (inhalable fraction); 1.5 (respirable fraction) DFG MAK Pregnancy Risk Classification: D AUSTRALIA: TWA = 10 (total dust); 2 (salts); 5 (fumes); 5 (resp. dust) Carcinogen: TLV-A4
Magnesium Fluoride (exposure limits are for Fluorides, as fluorine)	7783-40-6	2.5	NE	2.5	NE	2.5	NE	NE	DFG MAKs: TWA = 1 (inhalable fraction); Skin PEAK = 4•MAK 15 min., average value, 1 hour interval, 4 per shift DFG MAK Pregnancy Risk Classification: C AUSTRALIA: TWA = 2.5 Carcinogen: IARC-3, TLV-A4
Propylene Glycol <i>n</i> -Propyl Ether	1569-01-3	NE	NE	NE	NE	NE	NE	NE	NE

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

**INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS:** In addition to the exposure limit values cited in this section, other exposure limits have been established by various countries for the components of this mixture. More current limits may be available; individual countries should be consulted to determine if newer limits are available.

#### ALUMINUM:

Australia: TWA = 10 mg/m<sup>3</sup>, JAN 1993  
 Australia: TWA = 2 mg/m<sup>3</sup> (salts), JAN 1993  
 Australia: TWA = 5 mg/m<sup>3</sup> (fumes), JAN 1993  
 Australia: TWA = 5 mg/m<sup>3</sup> (resp. dust), JAN 1993  
 Belgium: TWA = 10 mg/m<sup>3</sup>, JAN 1993  
 Belgium: TWA = 2 mg/m<sup>3</sup> (salts), JAN 1993  
 Belgium: TWA = 5 mg/m<sup>3</sup> (fumes), JAN 1993  
 Denmark: TWA = 10 mg(AI)/m<sup>3</sup>, OCT 2002  
 Denmark: TWA = 10 mg/m<sup>3</sup> (dust), OCT 2002  
 Finland: TWA = 2 mg/m<sup>3</sup> (salts), JAN 1993  
 France: VME = 10 mg/m<sup>3</sup>, JAN 1999  
 France: VME = 5 mg/m<sup>3</sup> (fumes), JAN 1999  
 France: VME = 5 mg/m<sup>3</sup> (resp. dust), JAN 1993  
 Germany: MAK = 1.5 mg/m<sup>3</sup> (respirable), 2005  
 Hungary: STEL = 5 mg/m<sup>3</sup>, JAN 1993  
 Hungary: TWA = 2 mg/m<sup>3</sup>, STEL = 4 mg/m<sup>3</sup> (salts), JAN 1993  
 Japan: OEL = 0.5 mg/m<sup>3</sup> (respirable), 2 mg/m<sup>3</sup> (total), MAY 2006  
 Korea: TWA = 10 mg/m<sup>3</sup> (metal dust), 2006  
 Korea: TWA = 5 mg/m<sup>3</sup> (pyro powders), 2006  
 Korea: TWA = 5 mg/m<sup>3</sup> (welding fumes), 2006  
 Mexico: TWA = 10 mg/m<sup>3</sup>, STEL = 20 mg/m<sup>3</sup>, 2004

#### ALUMINUM (continued):

Mexico: TWA = 5 mg(Al)/m<sup>3</sup> (pyro powders), 2004  
 Mexico: TWA = 5 mg(Al)/m<sup>3</sup>, 2004  
 The Netherlands: MAC-TG = 10 mg/m<sup>3</sup>, 2003  
 New Zealand: TWA = 10 ppm (metal dust), JAN2002  
 New Zealand: TWA = 5 ppm (fumes), JAN2002  
 New Zealand: TWA = 5 ppm (pyro powders), JAN2002  
 Norway: TWA = 5 mg/m<sup>3</sup>, JAN 1999  
 Russia: STEL = 2 mg/m<sup>3</sup>, JUN 2003  
 Sweden: NGV = 4 mg/m<sup>3</sup> (resp. dust), JAN 1999  
 Sweden: NGV = 10 mg/m<sup>3</sup> (total dust), JAN 1999  
 Switzerland: MAK-W = 6 mg/m<sup>3</sup>, JAN 1999  
 United Kingdom: TWA = 10 mg/m<sup>3</sup> (inhalable), 2005  
 United Kingdom: TWA = 4 mg/m<sup>3</sup> (respirable), 2005  
 In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

#### MAGNESIUM FLUORIDE:

Australia: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN 1993  
 Belgium: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN 1993  
 Denmark: TWA = 2.5 mg(F)/m<sup>3</sup>, OCT 2002  
 Australia: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN 1993  
 Belgium: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN 1993  
 Denmark: TWA = 2.5 mg(F)/m<sup>3</sup>, OCT 2002

#### MAGNESIUM FLUORIDE (continued):

EC: TWA = 2.5 mg(F)/m<sup>3</sup>, FEB 2006  
 Finland: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN 1999  
 France: VME = 2.5 mg(F)/m<sup>3</sup>, JAN 1999  
 Germany: MAK = 1 mg(F)/m<sup>3</sup> (inhalable), 2005  
 Hungary: TWA = 1 mg(F)/m<sup>3</sup>, STEL = 2 mg(F)/m<sup>3</sup>, JAN 1993  
 Mexico: TWA = 2.5 mg(F)/m<sup>3</sup>, 2004  
 New Zealand: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN2002  
 Norway: TWA = 6 mg(F)/m<sup>3</sup>, JAN 1999  
 The Philippines: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN 1993  
 Poland: MAC(TWA) = 1 mg(HF)/m<sup>3</sup>, MAC(STEL) = 3 mg(HF)/m<sup>3</sup>, JAN 1999  
 Russia: STEL = 0.5 mg/m<sup>3</sup>, STEL = 2.5 mg/m<sup>3</sup>, JUN 2003  
 Sweden: NGV = 2 mg(F)/m<sup>3</sup>, JAN1999  
 Switzerland: MAK-W = 1.8 ppm (1.5 mg(F)/m<sup>3</sup>), KZG-W = 3/6 ppm (3.0 mg(F)/m<sup>3</sup>), JAN 1999  
 Thailand: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN 1993  
 Turkey: TWA = 2.5 mg(F)/m<sup>3</sup>, JAN 1993  
 United Kingdom: TWA = 2.5 mg(F)/m<sup>3</sup>, 2005  
 In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV  
**PROPYLENE GLYCOL *n*-PROPYL ETHER:**  
 Denmark: TWA = 100 ppm (tentative), OCT 2002

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-02), 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), or standards of Australia (including AS/NZS 1715:1994 for respiratory PPE, AS/NZS 4501.2:2006 for protective clothing, AS/NZS 2161.1:2000 for glove selection, and AS/NZS 1336:1997 for eye protection). Please reference applicable regulations and standards for relevant details.

**RESPIRATORY PROTECTION:** Dust Masks or 3M Particle Filters are recommended 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 Z94.4-02, the European Standard EN 529:2005, and EU 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 EU Member States.

**EYE PROTECTION:** Splash goggles or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian CSA Standard Z94.3-02, or the European Standard CR 13464:1999, the Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

**HAND PROTECTION:** Wear latex or rubber gloves for routine industrial use. Use triple gloves for spill response. If necessary, refer to U.S. OSHA 29 CFR 1910.138 appropriate Standards of Canada, the Australian Standard 2161-Industrial Safety Gloves and Mittens and the European Standard CEN/TR 15419:2006.

**BODY PROTECTION:** Use body protection appropriate for task (e.g., lab coat, coveralls, Tyvek suit). If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or appropriate Standards of Canada, the European Standard CEN/TR 15419:2006, or Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals. 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*.

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## 9. PHYSICAL and CHEMICAL PROPERTIES

**APPEARANCE, ODOR and COLOR:** This product is an odorless, iridescent powder.

**HOW TO DETECT THIS SUBSTANCE (warning properties):** The appearance of this product can be a distinguishing characteristic to identify it in event of accidental release.

**pH:** Not determined.

**BOILING POINT:** Not determined.

**FLASH POINT:** Not applicable.

**EXPLOSIVE PROPERTIES:** Not explosive

**VAPOR PRESSURE:** Not applicable.

**SOLUBILITY:** Insoluble.

**VISCOSITY:** Not determined.

**EVAPORATION RATE:** Not available.

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

**MELTING/FREEZING POINT:** Not determined.

**FLAMMABILITY:** Not flammable.

**OXIDIZING PROPERTIES:** Not an oxidizer.

**SPECIFIC GRAVITY:** Dry: 2.80 g/cc; Wet: 2.16 g/cc

**SOLUBILITY IN WATER:** Insoluble.

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

**ODOR THRESHOLD:** Not determined.

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## 10. STABILITY and REACTIVITY

**DECOMPOSITION CONDITIONS/STABILITY:** Stable under normal conditions of handling. This pigment is inorganic in nature and composed of aluminum and magnesium fluoride. The aluminum layer will undergo reaction with many waterborne systems to evolve hydrogen gas. Passivation may be necessary to prevent gassing due to interaction of the aluminum layer of the pigment with the waterborne system.

**DECOMPOSITION PRODUCTS:** Combustion: If exposed to extremely high temperatures, the products of thermal decomposition may include irritating fumes and toxic gases (e.g., magnesium, fluorine, and aluminum compounds).  
Hydrolysis: Hydrogen gas.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** This product is incompatible with strong oxidizers, strong bases, and strong acids. Contact with water will slowly liberate extremely flammable gas. Contact with strong acids, strong bases or alcohols can also release hydrogen.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**CONDITIONS TO AVOID:** Exposure or contact to extreme temperatures and incompatible chemicals.

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## 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 of dusts or particulates and contact with skin and eyes. The symptoms of overexposure to this product, via route of entry, are as follows:

**INHALATION:** Inhalation of this product can irritate the nose, throat, and other tissues of the respiratory system. Symptoms of such overexposure may include coughing, sneezing, sore throat, and nasal congestion. Long term inhalation overexposure to Magnesium Fluoride (a component of this product) may result in perforation of the nasal septum. Chronic inhalation of aluminum dusts may result in pulmonary fibrosis (a disorder of the lungs).

**CONTACT WITH SKIN or EYES:** If this product enters the eyes, it can cause redness and pain. Depending on the duration and concentration of exposure, skin contact may cause redness and irritation.

**SKIN ABSORPTION:** The components of this product are not known to be absorbed via intact skin.

**INGESTION:** Ingestion is not anticipated to be a significant route of occupational overexposure for this product. If this product is swallowed (i.e., through poor hygiene practices), it may irritate the mouth and throat.

**INJECTION:** Though not anticipated to be a significant route of overexposure for this product, injection (via punctures or lacerations by contaminated objects) may cause redness at the site of injection.

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

**ACUTE:** Contact with this product can mildly irritate the nose, throat, eyes, skin and other contaminated tissues.

**CHRONIC:** Long-term inhalation over-exposure to Aluminum dusts may result in lung damage.

**TARGET ORGANS:** ACUTE: Skin, eyes, respiratory system. CHRONIC: Chronic inhalation over-exposures: Lung

## 11. TOXICOLOGICAL INFORMATION (Continued)

**TOXICITY DATA:** The specific toxicology data are available for the components of this product:

**ALUMINUM:**

TCLo (Inhalation-Man) 4 mg/m<sup>3</sup>/1 year-intermittent: Lungs, Thorax, or Respiration: cough; Lungs, Thorax, or Respiration: dyspnea; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TCLo (Inhalation-Rat) 206 mg/m<sup>3</sup>/5 hours/30 days-intermittent: Lungs, Thorax, or Respiration: fibrosis (interstitial); Endocrine: hypoglycemia; Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol)

TDLo (Oral-Rat) 1260 mg/kg: Multi-generation: Reproductive: Effects on Newborn: behavioral, physical, other postnatal measures or effects

TDLo (Unreported-Rat) 67.5 mg/kg: female 2-27 day(s) after conception: Reproductive: Effects on Newborn: behavioral, Effects on Newborn: delayed effects

Rats injected with 100 mg aluminum powder directly into the trachea showed scarring in the lungs. Animals given about 1400 ppm aluminum in the diet had decreased phosphorus in the blood and bone. Aluminum particles implanted in rabbit eyes caused slight inflammation.

**MAGNESIUM FLUORIDE:**

LD<sub>50</sub> (Oral-Rat) 2330 mg/kg

LDLo (Oral-Guinea Pig) 1 g/kg

**PROPYLENE GLYCOL n-PROPYL ETHER:**

Skin Irritancy (rabbit) = 500 mg

Eye Irritancy (rabbit) = 100 mg; moderate

LD<sub>50</sub> (oral, rat) = 2504 mg/kg

LD<sub>50</sub> (skin, rabbit) = 3550 mg/kg

**CARCINOGENIC POTENTIAL OF COMPONENTS:** Components of this product are listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

**ALUMINUM:** ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen)

**MAGNESIUM FLUORIDE (as an inorganic fluoride compound):** ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen); IARC-3 (Unclassifiable as to Carcinogenicity in Humans)

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 are neither considered to be nor suspected to be cancer-causing agents by these agencies.

**IRRITANCY OF PRODUCT:** This product may be slightly irritating to the skin, eyes, and other contaminated tissue.

**SENSITIZATION TO THE PRODUCT:** The components of this product are not known to be human 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 produce mutagenic effects in humans.

**Embryotoxicity:** The components of this product are not reported to produce 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 reproductive effects in humans.

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.





**ACGIH BIOLOGICAL EXPOSURE INDICES:** The following ACGIH Biological Exposure Indices (BEIs) are associated with Magnesium Fluoride (a component of this product):

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
FLUORIDES (Magnesium Fluoride) • Fluorides in urine	• Prior to shift • End of shift	• 3 mg/g creatinine • 10 mg/g creatinine

**HAZARDOUS MATERIAL IDENTIFICATION SYSTEM**

<b>HEALTH HAZARD</b>	(BLUE)	1
<b>FLAMMABILITY HAZARD</b>	(RED)	1
<b>PHYSICAL HAZARD</b>	(YELLOW)	1

**PROTECTIVE EQUIPMENT**

EYES	RESPIRATORY	HANDS	BODY
			

For Routine Industrial Use and Handling Applications.

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

## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

**MOBILITY:** This product has not been tested for mobility in soil. The following information is available for a component.

**PROPYLENE GLYCOL n-PROPYL ETHER:**

Based upon an estimated log Kow of 0.62, a Koc of 3.0 has been estimated using a recommended regression equation. Based upon this estimated Koc, Propylene Glycol n-Propyl Ether will be expected to exhibit very high mobility in soil.

**PERSISTENCE AND BIODEGRADABILITY:** This product has not been tested for persistence or biodegradability. It is expected that the metal components of this product will persist in the environment indefinitely. It is expected that the other components will slowly degrade in the environment and form a variety of organic and inorganic materials; however, no specific information is known. Data for components of this product are available as follows:

**ALUMINUM:**

Terrestrial Fate: Air-dried, < 2 mm fractions of 3 soil samples from The Netherlands and 1 from New Hampshire, were taken from the surface and sub-surface horizons of two podzols (Haplorthods) and of a recent driftsand (Udipsamment). Duplicate samples of each emulsion soil horizon were leached with aqueous hydrogen chloride (pH 3.0). Charge balances of the leachates indicate that dissolved aluminum is present mainly as aquo-aluminum (+3). Only in leachates of podzol Bhs horizons is a significant fraction (20-30%) of dissolved Aluminum organically complexed. Dissolved aluminum concentrations are significantly correlated with the organic (Na4P2O7-extractable) aluminum content of the soil sample. Mobility of Aluminum in the Hubbard Brook soils is significantly lower than in the Dutch soils, because of higher soil-solution pH values. Albic and spodic soil horizons were sampled from old growth eastern white pine/mixed northern hardwoods. Adirondacks, and an ochric soil horizon was sampled from the Appalachian plateau of NY State. Three-horizon forest floor and 21 forest floor/mineral soil (field moist equivalent of 12.0 oven-dry albic, spodic, or ochric mineral soil) columns were leached in triplicate with either 10 µM nitric acid (pH 5), 5 µM sulfuric acid (pH 5), 100 µM nitric acid (pH 4), 50 µM sulfuric acid (pH 4), 1000 µM nitric acid (pH 3), 500 µM sulfuric acid (pH 3), or distilled, deionized water ((pH 5.7) control treatment). Nitric acid leached more Aluminum than did sulfuric acid from forest floor/spodic soil columns. Increasing the nitric acid concentration from pH 3-5 increased total Aluminum concentration in leachates from 0.70 to 0.85 mM, while increasing sulfuric acid had no effect. Addition of pH 3 sulfuric acid to forest floor/spodic columns raised leachate pH relative to pH 3 nitric acid and controls, and resulted in the lowest Aluminum concentration of all treatments in the first 3 of 4 sequential leachings.



## 12. ECOLOGICAL INFORMATION (Continued)

### PERSISTENCE AND BIODEGRADABILITY (continued):

#### **PROPYLENE GLYCOL *n*-PROPYL ETHER:**

If released to soil, it will be expected to exhibit very high mobility, based upon the reported infinite solubility of the compound in water and an estimated Koc of 3.0 calculated from an estimated log Kow. It is not known whether biodegradation will be an important environmental pathway in soil. It should not be subject to volatilization from moist near surfaces soil based upon a Henry's Law constant of 3.46X10<sup>-8</sup> atm-cu m/mole which has been estimated using a structure-based estimation method. However, it may volatilize from dry near surface soil and other dry surfaces based upon its vapor pressure of 1.7 mm Hg at 20°C. If released to water, it will not be expected to adsorb to sediment or suspended particulate matter or to bioconcentrate in aquatic organisms based upon its estimated Koc and BCF, respectively, calculated from the estimated log Kow. It is not known whether biodegradation will be an important environmental pathway in water. It will not hydrolyze or directly photolyze in environmental water. It should not be subject to volatilization from surface waters based upon the estimated Henry's Law constant. If Propylene Glycol *n*-Propyl Ether is released to the atmosphere, it can be expected to exist mainly in the vapor-phase in the ambient atmosphere based on its vapor pressure. The estimated half-life for vapor-phase reaction with photochemically produced hydroxyl radicals is 15 hours based upon an estimated rate constant for this process. It will not be susceptible to direct photolysis in the atmosphere. Based upon its miscibility with water, the compound may be susceptible to removal from the atmosphere by washout.

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

#### **PROPYLENE GLYCOL *n*-PROPYL ETHER:**

Based upon an estimated log Kow of 0.621, a BCF of 1.7 has been calculated using a recommended regression equation. Based upon this estimated BCF, Propylene Glycol *n*-Propyl Ether will not be expected to bioconcentrate in aquatic organisms.

**ECOTOXICITY:** This product has not been tested for aquatic or animal toxicity. Because of the form of this product, no significant environmental impact is anticipated; however, all releases to terrestrial, atmospheric and aquatic environments should be avoided.

**OTHER ADVERSE EFFECTS:** This product does not contain any component with known 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.

**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.

**U.S. EPA WASTE NUMBER:** Not applicable to wastes consisting only of this product.

**EUROPEAN WASTE CODE:** Wastes from MFSU of Printing Inks: waste ink containing dangerous substances 08-03-12

## 14. TRANSPORTATION INFORMATION

**U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS:** This product is NOT classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

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

**INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):** This product is not classified as Dangerous Goods, per rules of IATA.

**INTERNATIONAL MARITIME ORGANIZATION (IMO):** This product is not classified as Dangerous Goods, per rules of IMO.

**EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):** This product is not classified 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 classified as Dangerous Goods, per regulations of the 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	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Aluminum (fume or dust)	No	No	Yes

**U.S. SARA THRESHOLD PLANNING QUANTITY:** There are no specific Threshold Planning Quantities for 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):** Aluminum (dust or fume) = 10 lb (4.54 kg)

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

## 15. REGULATORY INFORMATION (Continued)

### ADDITIONAL UNITED STATES REGULATIONS (continued):

OTHER U.S. FEDERAL REGULATIONS: Aluminum is listed as a hazardous air pollutant (HAP) generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Aluminum is included on this list. Aluminum is designated as a toxic pollutant, pursuant to section 307(a)(1) of the Clean Water Act and is subject to effluent limitations. Aluminum is designated as hazardous substances under Section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of Aluminum.

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

U.S. ANSI STANDARD LABELING (Precautionary Statements): **CAUTION!** MAY CAUSE SKIN AND EYE IRRITATION. MAY CAUSE IRRITATION IF INHALED OR SWALLOWED. WILL REACT WITH WATER TO FORM HYDROGEN GAS AND CREATE A CONTAINER RUPTURE HAZARD. Keep away from water, moist air, heat, sparks, and other sources of ignition. Avoid contact with eyes, skin, and clothing. Avoid breathing dusts. Keep container tightly closed. Use only with adequate ventilation. Wash thoroughly after use. Wear gloves, eye protection, respiratory protection, and appropriate body protection. **FIRST-AID:** In case of contact, immediately flush skin and eyes with plenty of water. Remove contaminated clothing and shoes. Get medical attention if irritation develops or persists. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use dry sand, talc, dry clay, dry ground limestone, sodium chloride, or approved Class D Extinguishers. **IN CASE OF SPILL:** Sweep up spilled product, avoiding generation of dusts. Place all spill residue in an appropriate container and seal. Dispose of in accordance with international, national, state, and local hazardous waste disposal regulations. Consult Material Safety Data Sheet for additional information.

### ADDITIONAL CANADIAN REGULATIONS:

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

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION AGENCY (CEPA) PRIORITIES SUBSTANCES LIST: Magnesium Fluoride (as an Inorganic Fluoride) is on the Priority Substances List 1 (Substance Considered as Toxic Under CEPA Section 11 [25]). Aluminum is listed as Schedule 1 NPRI Substances.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: **Class B6:** Reactive Flammable Material; **Class D2B:** Other Toxic Effects-Irritation



### ADDITIONAL EUROPEAN UNION REGULATIONS:

GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION: This product meets the definition of the following hazard classification as defined by the CLP Regulation (EC) 1272/2008.

Classification: Water Reactive Category 2, Skin Irritant Category 2, Eye Irritant Category 2, Specific Organ Toxicity, Inhalation Category 3

Hazard Class Codes: H315: Skin Irritation, Category 2; H319: Eye Irritation Category 2; H335: May Cause Respiratory Irritation; H261: Contact with Water Emits Flammable Gases

Prevention Precautionary Statements: P232: Protect from moisture. P233: Keep container tightly closed. P261: Avoid breathing dust. P264: Wash thoroughly after handling. P271: Use only outdoors or in well-ventilated area. P280: Wear protective gloves, clothing, eye protection and face protection.

Response Precautionary Statements: P312: Call a POISON CENTER or doctor/physician if you feel unwell. P302 + P352: IF ON SKIN: wash with plenty of soap and water. P304 + P340: IF INHALED: remove victim to fresh air and keep at rest in a position for comfortable breathing. P305 + P351 + P338: IF IN EYES: rinse cautiously with water for several minutes; remove contact lenses, if present and easy to do so. P332 + P313: If skin irritation occurs: get medical advice/attention. P337 + P313: If eye irritation persists: get medical advice/attention. P370 + P378: In case of fire, use dry sand, talc, dry clay, dry ground limestone, sodium chloride or approved Class D extinguishers for extinction.

Storage Precautionary Statements: P402 + P404: Store in a dry place. Store in a closed container. P403 + P233: Store in well-ventilated place. Keep container tightly closed. P405: Store locked-up.

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

Signal Words: Warning

Hazard Symbols: GHS02, GHS07





## 15. REGULATORY INFORMATION (Continued)

### ADDITIONAL EUROPEAN UNION REGULATIONS (continued):

**EU LABELING AND CLASSIFICATION:** This product meets the definition of the following hazard classification, as defined by the European Union Council Directive 67/548/EEC and subsequent Directives.

**Classification:** Irritant

**Risk Phrases:** R:36/37/38: Irritating to eyes, respiratory system and skin. R: 15: Contact with water liberates extremely flammable gases.

**Safety Phrases:** S: (2-): Keep locked up and out of the reach of children. S: 7/8: Keep container tightly closed and dry. S: 43: In case of fire, use agent suitable for metal fires. Never use water.

**Hazard Symbols:** Irritant



### EUROPEAN UNION CLASSIFICATION FOR COMPONENTS:

**Aluminum (powdered):**

**EU CLASSIFICATION:** [F+]: Highly flammable.

**EU RISK PHRASES:** [R: 10]: Flammable. [R: 15]: Contact with water liberates extremely flammable gases.

**EU SAFETY PHRASES:** [S: (2-)]: Keep out of reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.*) [S: 7/8]: Keep container tightly closed and dry. [S: 43]: In case of fire, use agent suitable for metal fires. Never use water.

**Magnesium Fluoride: This is a self-classification.**

**EU Classification:** [Xi]: Irritant.

**EU Risk Phrases:** [R: 36/37/38]: Irritating to eyes, respiratory system and skin.

**EU Safety Phrases:** [S: (-2)]: Keep out of 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]: Avoid contact with skin. [S: 26]: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. [S: 37/39]: Wear suitable gloves and eye/face protection. [S: 60]: This material and its container must be disposed of as hazardous waste.

**Propylene Glycol n-Propyl Ether:**

**EU Classification:** An official classification for this substance has not been published in Commission Directives 93/72/EEC or 94/69EC.

### 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:** This product does not contain any components on the list of designated substances.

**LABELING AND CLASSIFICATION:** This product meets the definition of hazardous, as defined by the Australian National Occupational Health and Safety Commission [NOHSC (1008:2004)]. See above European classification under European Union Council Directive 67/548/EEC and subsequent Directives for classification information.

**POISONS SCHEDULE NUMBER:** Not applicable.

### JAPANESE INFORMATION FOR PRODUCT:

**JAPANESE EXISTING AND NEW CHEMICAL SUBSTANCE LIST (ENCS) STATUS:** The components of this product are on the Japanese ENCS as follows:

<u>Chemical</u>	<u>ENCS Number</u>
Magnesium Fluoride	1-328

**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.

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## 16. OTHER INFORMATION

**PREPARED BY:**

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**DATE OF PRINTING:**

April 19, 2012

**REVISION INFORMATION, December 2010:**

Addition of GHS and EU CLP 1272: 2008 compliance. Up-date of international exposure limits.

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. JDSU assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, JDSU assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

Product specifications and descriptions in this document subject to change without notice. © 2011 JDS Uniphase Corporation

# 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.

**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 exceptional 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 lead to 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, they are not sufficient for final evaluation.

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

**LOQ:** Limit of Quantitation.

**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:** 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, 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 LD<sub>50</sub> Rat:* > 5000 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC<sub>50</sub> 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 LD<sub>50</sub> Rat:* > 500-5000 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* > 1000-2000 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 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 LD<sub>50</sub> Rat:* > 50-500 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* > 200-1000 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 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 LD<sub>50</sub> Rat:* > 1-50 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* > 20-200 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 4-hrs Rat:* > 0.05-0.5 mg/L.);

## HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

**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 LD<sub>50</sub> Rat:* ≤ 1 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* ≤ 20 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 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:* Packing 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:* 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.

## DEFINITIONS OF TERMS (Continued)

### HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

**PHYSICAL HAZARD (continued): 3 (continued):** *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.).

### 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 LC<sub>50</sub> for acute inhalation toxicity is greater than 10,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is greater than 200 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is greater than 2000 mg/kg. Materials whose LD<sub>50</sub> 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 LC<sub>50</sub> for acute inhalation toxicity is greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials whose LD<sub>50</sub> 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 LC<sub>50</sub> for acute inhalation toxicity is greater than 3,000 ppm but less than or equal to 5,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD<sub>50</sub> 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 LC<sub>50</sub> for acute inhalation toxicity, if its LC<sub>50</sub> 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 LC<sub>50</sub> for acute inhalation toxicity is greater than 1,000 ppm but less than or equal to 3,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials whose LD<sub>50</sub> 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 LC<sub>50</sub> for acute inhalation toxicity, if its LC<sub>50</sub> 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 LC<sub>50</sub> for acute inhalation toxicity less than or equal to 1,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD<sub>50</sub> 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 LC<sub>50</sub> for acute inhalation toxicity, if its LC<sub>50</sub> 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 according 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.

### NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

**FLAMMABILITY HAZARD (continued): 1 (continued):** 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 cup 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. 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. **3** Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures: Materials that 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: **LD<sub>50</sub>** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC<sub>50</sub>** - 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/m<sup>3</sup>** 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 **TDLo**, the lowest dose to cause a symptom and **TCLo** 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.

## DEFINITIONS OF TERMS (Continued)

### 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<sub>m</sub>** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K<sub>ow</sub>** or **log K<sub>oc</sub>** and is used to assess a substance's behavior in the environment.

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

#### U.S.:

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

### REGULATORY INFORMATION (continued):

#### CANADA:

**WHMIS:** Canadian Workplace Hazardous Materials Information System. **TC:** Transport Canada. **DSL/NDSL:** Canadian Domestic/Non-Domestic Substances List.

#### EUROPE:

**EU:** European Union (formerly known as the EEC, European Economic Community). **EINECS:** European Inventory of Now-Existing Chemical Substances. **ARD:** European Agreement Concerning the International Carriage of Dangerous Goods by Road. **RID:** International Regulations Concerning the Carriage of Dangerous Goods by Rail.

#### AUSTRALIA:

**AICS:** Australian Inventory of Chemical Substances. **NOHSC:** National Occupational Health & Safety Code.