



SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS Standards, European Union CLP EC 1272/2008 and the Global Harmonization Standard

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

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE

IDENTIFICATION of the SUBSTANCE or PREPARATION:

TRADE NAME (AS LABELED):

Arsenic trioxide Injection

CHEMICAL NAME/CLASS:

Aqueous Arsenic Trioxide Solution

SYNONYMS:

Arsenic Trioxide Injection (1 mg/mL); Aqueous Solution of Arsenic Trioxide (1 mg/mL); CT-2117 Finished Product; ATO

PRODUCT USE:

Pharmaceutical

COMPANY/UNDERTAKING ENTITY IDENTIFICATION:

U.S. SUPPLIER/MANUFACTURER'S NAME:

Nexus Pharmaceuticals, Inc.

ADDRESS:

175 E Hawthorn Pkwy Suite 155
Vernon Hills, IL 60061
847-996-3790

BUSINESS PHONE:

DATE OF PREPARATION:

October 5, 2005

DATE OF REVISION:

November 5, 2013

ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. The product is also classified per all applicable EU Directives through EC 1907: 2006, the European Union CLP EC 1272/2008 and the Global Harmonization Standard.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION: According to Article 1, item 5 (a) of CLP Regulation (EC) 1272/2008, medicinal products in the finished state for human use, as defined in 2001/83/EC, are excepted from classification and other criteria of 1272/2008.

EU LABELING/CLASSIFICATION: According to Article 1 of European Union Council Directive 92/32/EEC, medical products in the finished state for human use (as defined by European Union Council Directives 67/548/EEC and 87/21/EEC) are not subject to the regulations and administrative provisions of European Union Council Directive 92/32/EEC.

EMERGENCY OVERVIEW: Product Description: This product is a clear, colorless, odorless solution. **Health Hazards:** WARNING! THIS PRODUCT CONTAINS A CYTOTOXIC AGENT. EXPOSURE BY ALL ROUTES OF EXPOSURE MUST BE AVOIDED. This product may be harmful by inhalation, skin contact or ingestion. Ingestion may cause serious adverse effects on the gastrointestinal, central nervous, blood, cardiovascular, and peripheral nervous systems or may be fatal. May cause fetal harm. These effects may be possible as a result of workplace exposure. **Flammability Hazards:** This product is not flammable. When involved in a fire, may decompose and produce irritating vapors and toxic compounds (including arsenic compounds, arsine and hydrogen chlorides). **Reactivity Hazards:** This product is not reactive. **Environmental Hazards:** If large quantities are released to the environment, adverse effects to plants and animals may occur. **Emergency Recommendations:** Emergency responders must wear personal protective equipment suitable for the situation

3. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS #	% w/w	EU Classification (67/548/EEC) GHS & EU Classification (1272/2008 EC) Risk Phrases/Hazard Statements
Arsenic Trioxide	1327-53-3	215-481-4	Proprietary	EU 67/548/EEC <u>Classification:</u> Carcinogenic Cat. 1, Very Toxic, Corrosive, Dangerous for the Environment <u>Risk Phrases:</u> R45, R28, R34, R50/53 <u>Symbols:</u> T+, N GHS & EU CLP 1272/2008: <u>Classification:</u> Carcinogenic Cat.1A, Acute Toxicity Ingestion Cat. 2, Skin Corrosivity Cat. 1B, Aquatic Toxicity Acute Cat. 1, Aquatic Toxicity Chronic Cat. 1 <u>Hazard Statement Codes:</u> H300, H314, H350, H400, H410 <u>Hazard Symbols/Pictograms:</u> GHS05, GHS06, GHS08, GHS09
Excipients				
Water	7732-18-5	231-791-2	Balance	EU 67/548 Hazard Classification: Not Applicable GHS and EU 1272/2008 HAZARD CLASSIFICATION: Not Applicable

NOTE: This product contains hydrochloric acid and/or sodium hydroxide for pH adjustment. No hazard from these chemicals remains in the final product and so this SDS does not address hazards for these chemicals. See Section 16 for full classification information of this product.

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

4. FIRST-AID MEASURES

DESCRIPTION OF FIRST AID MEASURES: Upon contact of this product with skin, eyes, or mucous membranes, immediately decontaminate by flushing with water for at least 20 minutes. Remove contaminated clothing and shoes. Take a copy of this SDS to health professional with victim. Wash clothing and thoroughly clean shoes before reuse.

SKIN EXPOSURE: If contact with this product results in adverse effect, flush affected area with water. Minimum flushing is for 20 minutes. The contaminated individual must seek medical attention if any adverse effects occur after flushing.

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

INHALATION: If aerosols of this product are inhaled, remove victim to fresh air. The contaminated individual must seek medical attention if any adverse effects occur.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, seek immediate medical attention. If alert, give victim up to three glasses of water. Do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If victim is convulsing, maintain an open airway and obtain emergency medical attention.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: In therapeutic use, pre-existing renal disorders, hepatic impairment, dermatitis and other skin disorders may be aggravated by exposure. Workplace exposure may also aggravate these conditions. Persons who may have hypersensitivity reactions to this product or other disorders described in Section 11 (Toxicological Information) may experience aggravation upon exposure.

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

Industrial Exposure: Physical examinations of exposed personnel should be conducted periodically including a complete blood count, urinalysis, and a determination of urinary arsenic levels. Urinary levels should not exceed 0.5-1.0 mg/L.

ECG and Electrolyte Monitoring Recommendations During Therapy: Prior to initiating therapy with this product, a 12-lead ECG should be performed and serum electrolytes (potassium, calcium, and magnesium) and creatinine should be assessed; preexisting electrolyte abnormalities should be corrected and, if possible, drugs that are known to prolong the QT interval should be discontinued. For QTc greater than 500 msec, corrective measures should be completed and the QTc reassessed with serial ECGs prior to considering using this product. During therapy with this product, potassium concentrations should be kept above 4 mEq/L and magnesium concentrations should be kept above 1.8 mg/dL. Patients who reach an absolute QT interval value > 500 msec should be reassessed and immediate action should be taken to correct concomitant risk factors, if any, while the risk/benefit of continuing versus suspending this product therapy should be considered. If syncope, rapid or irregular heartbeat develops, the patient should be hospitalized for monitoring, serum electrolytes should be assessed, this product therapy should be temporarily discontinued until the QTc interval regresses to below 460 msec, electrolyte abnormalities are corrected, and the syncope and irregular heartbeat cease. There are no data on the effect of this product on the QTc interval during the infusion.

Treatment of Overdosage: If symptoms suggestive of serious acute arsenic toxicity (e.g., convulsions, muscle weakness and confusion) appear, therapy should be immediately discontinued and chelation therapy should be considered. A conventional protocol for acute arsenic intoxication includes dimercaprol administered at a dose of 3 mg/kg intramuscularly every 4 hours until immediate life-threatening toxicity has subsided. Thereafter, penicillamine at a dose of 250 mg orally, up to a maximum frequency of four times per day (≤ 1 gm per day), may be given.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not applicable.

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

FIRE EXTINGUISHING MEDIA: Unless incompatibilities exist for surrounding materials, carbon dioxide, water spray, 'ABC' type chemical extinguishers, foam, dry chemical and halon extinguishers can be used to fight fires involving this product.

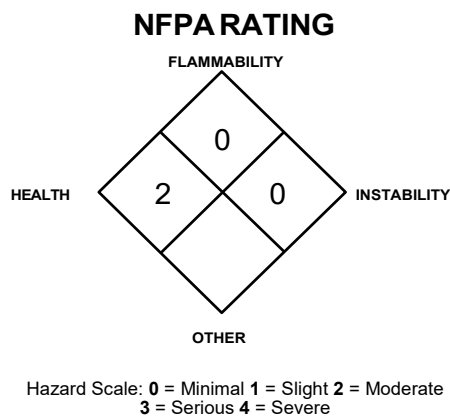
UNSUITABLE FIRE EXTINGUISHING MEDIA: None known.

SPECIAL FIRE AND EXPLOSION HAZARDS: This product is not flammable. When involved in a fire, this material may decompose and produce irritating vapors and toxic compounds (including arsenic compounds, arsine, and hydrogen chlorides).

Explosion Sensitivity to Mechanical Impact: Not applicable.

Explosion Sensitivity to Static Discharge: Not applicable.

ADVICE TO FIRE-FIGHTERS: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. All personal protective gear and contaminated fire-response equipment should be decontaminated with soapy water and thoroughly rinsed before being returned to service. Move fire-exposed containers if it can be done without risk to firefighters. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.



6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES: Spill kits, clearly labeled, should be kept in or near preparation and administrative areas. It is suggested that kits include a respirator, chemical splash goggles, two pairs of gloves, two sheets (12" x 12") of absorbent material, 250-mL and 1-liter spill control pillows and a small scoop to collect glass fragments (if applicable). Absorbents should be able to be incinerated. Finally, the kit should contain two large waste-disposal bags. Avoid generating aerosols from this product.

PROTECTIVE EQUIPMENT:

Small Spills/Spills in Hoods: Personnel wearing nitrile or other appropriate gloves, labcoat or other protective clothing and eye protection should immediately clean spills of less than 5 mL.

Large Spills: Use proper protective equipment, including double nitrile or appropriate gloves, protective clothing (i.e., Tyvek coveralls), and full-face respirator equipped with a High Efficiency Particulate (HEPA) filter. Self-Contained Breathing Apparatus (SCBA) can be used instead of an air-purifying respirator.

METHODS FOR CLEAN-UP AND CONTAINMENT:

Cleanup of Small Spills: The spilled product should be gently covered with absorbent pads. Clean spill with pad and dispose of properly. Decontaminate the spill area (three times) using a bleach and detergent solution and then rinse with clean water.

Spills in Hoods: Decontamination of all interior hood surfaces may be required after the above procedures have been followed. If the HEPA filter of a hood is contaminated, label the unit "Do not use-contaminated" and have trained personnel wearing appropriate protective equipment change and dispose of the filter properly as soon as possible.

Large Spills: Restrict access to the spill areas. For spills of amounts larger than 5 mL, limit spread by gently covering with absorbent sheets, or spill-control pads or pillows. Be sure not to generate aerosols. The dispersion of aerosols into surrounding air and the possibility of inhalation is a serious matter and should be treated as such. Do not apply chemical inactivators as they may produce hazardous by-products. Thoroughly clean all contaminated surfaces three times using a bleach and detergent solution and then rinse with clean water.

All Spills: Use procedures described above and then place all spill residues in an appropriate, labeled container and seal. Move to a secure area. Dispose of in accordance with Federal, State, and local hazardous waste disposal regulations (see Section 13, Disposal Considerations). For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements.

ENVIRONMENTAL PRECAUTIONS: Prevent product from entering sewer or confined spaces, waterways, soil or public waters. Do not flush to sewer. For spills on water, contain, minimize dispersion and collect.

REFERENCE TO OTHER SECTIONS: Review Sections 2, 8, 11 and 12 before proceeding with cleanup. See Section 13, Disposal Considerations for more information.

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

7. HANDLING and STORAGE

NOTE: Consistent with the OSHA Bloodborne Pathogen regulation (29 CFR 1910.1030), observe Universal Precautions while using this product. Place used or product-contaminated hypodermic needles and syringes in a rigid "Sharps" container. Do not recap or clip used or product-contaminated hypodermic needles. Dispose of materials in accordance with regulations.

PRECAUTIONS FOR SAFE HANDLING: THIS PRODUCT CONTAINS A CYTOTOXIC AGENT. ALL WORK PRACTICES MUST BE DESIGNED TO REDUCE HUMAN EXPOSURE TO THE LOWEST LEVEL. All employees who handle this product should be thoroughly trained to handle it safely. Special attention must be paid in avoiding releasing aerosols of this product in areas in which this material is handled or used. As with all chemicals, avoid getting this material ON YOU or IN YOU. Do not eat or drink while handling this material. After handling this material, wash face and hands thoroughly prior to eating, drinking, smoking or applying cosmetics. Ensure this material is used with adequate ventilation. Appropriate personal protective equipment must be worn (see Section 8, Exposure Controls - Personal Protection). Areas in which this product is used should be wiped down, so that this product does not accumulate. Particular care in working with this product must be practiced during manufacture of this product, in pharmacies and other preparation areas, and during patient administration. Operations of high risk associated with this product include:

- Filling, packaging and handling of vials
- Withdrawal of needles from drug vials;
- Drug transfers using syringes and needles or filter straws;
- Opening ampoules; and
- Expulsion of air from drug-filled syringes.

DO NOT CLIP OR CRUSH NEEDLE WITH WHICH THIS PRODUCT WAS IN CONTACT. Preparation and administration of this product should meet the following provisions:

- Work should be performed in a designated area for working with hazardous drugs;
- Containment devices, such as a Biological Safety Cabinet, should be used; contaminated waste must be properly handled; and
- Work areas must be regularly decontaminated.

7. HANDLING and STORAGE (Continued)

PRECAUTIONS FOR SAFE HANDLING (continued):

Good hygiene practices must be in place for workers handling this material, including change facilities and a work place clothing program. Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Contaminated clothing is required to be disposed of properly or remain in the work place for cleaning. No contaminated clothing should be taken from the employee's place of work.

CONDITIONS FOR SAFE STORAGE: Containers of this material must be properly labeled. Store containers in cabinet for cytotoxic materials in a cool, dry location, away from direct sunlight and sources of intense heat. Recommended Storage Temperature: 15° to 30°C (59° to 86°F). Protect from light. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers. Keep containers tightly closed when not in use. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Empty containers may contain residual material; therefore, empty containers should be handled with care and disposed of properly.

SPECIFIC END USE(S): This is a human pharmaceutical.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: When cleaning non-disposable equipment, wear nitrile or other appropriate gloves (double gloving is recommended), goggles, and lab coat or other protective clothing. Prevent dispersion of particulates by wetting or dampening surfaces prior to clean up of equipment. If applicable, wash equipment using a bleach and detergent solution and then rinse with clean water.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:

VENTILATION AND ENGINEERING CONTROLS: General: Use with adequate ventilation. Follow standard operating procedures and requirements for handling this product. Ensure eyewash stations and deluge showers are available and accessible in areas where this product is used. Wear appropriate personal protect equipment consistent with the recommendations of this SDS. Prevent accumulation of product on work surfaces by routinely cleaning areas appropriately.

WORKPLACE EXPOSURE LIMITS/CONTROL PARAMETERS:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							OTHER mg/m ³
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH IDLH mg/m ³	
		TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³		
Arsenic Trioxide	1327-53-3	0.01	NE	NE	NE	NE	NE	NE	Teva OEL Range µg/m³ ≥ 1 - < 10 (established 05Mar2012) DFG MAK Germ Cell Mutagen Category 3A Carcinogen: MAK-1, TLV-1A1
Water	7732-18-5	NE	NE	NE	NE	NE	NE	NE	NE

NE = Not Established See Section 15 for Definition of Other Terms Used

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: The following are international exposure limits currently determined for components of this product:

ARSENIC TRIOXIDE

Australia: Carcinogen, JUL 2008
Austria: TRK = 0.1 mg/m³ (inhalable), JAN 2006
Belgium: TWA = 0.1 mg(As)/m³, Carcinogen, MAR 2002
Denmark: TWA = 0.01 mg(As)/m³, OCT 2002
Finland: TWA = 0.01 mg(As)/m³, SEP 2009
France: VME = 0.2 mg/m³, C1 Carcinogen, FEB 2006
Hungary: CL = 0.1 mg/m³, Carcinogen, SEP 2000
Hungary: TWA = 0.1 mg/m³ (resp), STEL = 0.4 mg/m³, SEP 2000
Korea: TWA = 0.2 mg(As)/m³, 2006

Mexico: TWA = 0.5 mg/m³ (production), 2004
Mexico: TWA = 0.2 mg(As)/m³, 2004
New Zealand: TWA = 0.05 mg(As)/m³, carcinogen, JAN 2002
Norway: TWA = 0.01 mg(As)/m³, JAN 1999
The Philippines: TWA = 0.1 mg/m³, Carcinogen, JAN 1993
Poland: TWA = 0.01 mg(As)/m³, JAN 1999
Sweden: TWA = 0.01 mg(As)/m³, Carcinogen, JUN 2005
Switzerland: MAK-W = 0.1 mg(As)/m³, Carcinogen, DEC 2006
United Kingdom: TWA = 0.1 mg(As)/m³, 2005
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

PROTECTIVE EQUIPMENT: *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, including U.S. Federal OSHA Respiratory Protection (29 CFR 1910.134), OSHA Eye Protection 29 CFR 1910.133, OSHA Hand Protection 29 CFR 1910.138, OSHA Foot Protection 29 CFR 1910.136 and OSHA Body Protection 29 CFR 1910.132), equivalent standards of Canada (including CSA Respiratory Standard Z94.4-02, Z94.3-M1982, Industrial Eye and Face Protectors and CSA Standard Z195-02, Protective Footwear), or standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand protection, and CR 13464:1999 for face/eye protection). Please reference applicable regulations and standards for relevant details.*

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed above. For materials without listed exposure limits, minimize respiratory exposure. If necessary, use only respiratory protection authorized under appropriate regulations. Oxygen levels below 19.5% are considered IDLH by U.S. 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. OSHA's Respiratory Protection Standard (1910.134-1998).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

PROTECTIVE EQUIPMENT (continued):

EYE PROTECTION: Wear splash goggles or safety glasses as appropriate for the task. If necessary, refer to appropriate regulations.

HAND PROTECTION: Wash hands and wrists before putting on and after removing gloves. During manufacture or other similar operations, wear the appropriate hand protection for the process. When used in medical administration of the product, double glove with nitrile or other appropriate gloves to avoid contact and/or absorption of the product. Use double gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this SDS. Because all gloves are to some extent permeable and their permeability increases with time, they should be changed regularly (hourly is preferable) or immediately if torn or punctured. If necessary refer to appropriate regulations.

SKIN PROTECTION: Use appropriate protective clothing for the task (e.g., lab coat, etc.). If necessary, refer to the U.S. OSHA Technical Manual (Section VII: Personal Protective Equipment) or other appropriate regulations.

SPECIAL NOTE: Any contaminated protective clothing or gloves should be changed immediately and disposed of properly. Hands and wrists should be washed immediately after removing contaminated gloves.

9. PHYSICAL and CHEMICAL PROPERTIES

FORM: Liquid.

ODOR: Odorless.

RELATIVE VAPOR DENSITY (air = 1): Similar to water.

SPECIFIC GRAVITY (water = 1): ~ 1

SOLUBILITY IN WATER: Soluble.

VAPOR PRESSURE, mm Hg @ 20°C: Similar to water.

MOLECULAR FORMULA: As₂O₃(Arsenic Trioxide)

VISCOSITY: Not applicable.

OXIDIZING PROPERTIES: No data available.

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

HOW TO DETECT THIS SUBSTANCE (identification properties): There are no good warning properties in event of an accidental release of this product.

COLOR: Clear, colorless.

ODOR THRESHOLD: Not applicable.

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

ODOR THRESHOLD: Not applicable.

BOILING POINT: ~ 100°C (~ 212°F)

pH: 7.0-9.0

MELTING/FREEZING POINT: ~ 0°C (~ 32°F)

PERCENT VOLATILE BY VOLUME: Not applicable.

EXPLOSIVE PROPERTIES: Not applicable.

10. STABILITY and REACTIVITY

REACTIVITY/CHEMICAL STABILITY: Not reactive. Stable under normal conditions.

DECOMPOSITION PRODUCTS: *Combustion:* When exposed extreme temperatures, this product may generate arsenic compounds, arsine and hydrogen chlorides. *Hydrolysis:* None known.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids, strong bases, compounds that are incompatible with water.

POSSIBILITY OF HAZARDOUS REACTION/POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Exposure to or contact with extreme temperatures, incompatible chemicals.

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

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF EXPOSURE BY ROUTE OF EXPOSURE: The main routes of occupational exposure to this product are via contact with skin or eyes and possible inhalation of mists or sprays.

INHALATION: Inhalation of mists or sprays of this product may cause irritation to respiratory system upon inhalation. Symptoms can include cough, dyspnea, and pain in chest. If exposure is prolonged or severe, symptoms as described under "Other Potential Health Effects" may occur.

CONTACT WITH SKIN or EYES: Acute skin contact may cause mild to moderate irritation and symptoms described under 'Ingestion'. Prolonged contact may cause dermatitis, characterized by hyper-pigmentation, folliculitis, and superficial ulcerations. Contact with the eyes may cause irritation, pain, watering and conjunctivitis.

SKIN ABSORPTION: Information indicates potential absorption of this product through intact skin. All possible contact must be avoided.

SPECIAL NOTE: Any contaminated protective clothing or gloves should be changed immediately and disposed of properly. Hands and wrists should be washed immediately after removing contaminated gloves.

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11. TOXICOLOGICAL INFORMATION (Continued)

SKIN ABSORPTION: Information indicates potential absorption of this product through intact skin. All possible contact must be avoided.

INGESTION: Ingestion of this material is not anticipated to be a significant route of occupational exposure. Ingestion of this material (i.e., through poor hygiene practices) may be harmful. Symptoms may include fever, anorexia, melanosis, hepatomegaly, adverse gastrointestinal effects, hematopoietic effects, cardiac arrhythmia, peripheral neuropathy. Ingestion of large quantities may be fatal. Marked hepatic and renal damage have been observed following ingestion of Arsenic Trioxide. Other symptoms may include those described under "Other Potential Health Effects".

INJECTION: Accidental injection of this product, by a contaminated needle or via laceration or puncture wound from a contaminated object may cause symptoms described under "Other Potential Health Effects".

OTHER POTENTIAL HEALTH EFFECTS-Therapeutic Doses: Employees administering the product should not experience adverse effects if handled properly. Adverse effects from therapeutic doses can include:



- **APL Differentiation Syndrome:** Some patients undergoing therapy with this product have experienced symptoms similar to a syndrome called the retinoic-acid-Acute Promyelocytic Leukemia (RA-APL) or APL differentiation syndrome, characterized by fever, dyspnea, weight gain, pulmonary infiltrates and pleural or pericardial effusions, with or without leukocytosis. This syndrome can be fatal.
- **ECG Abnormalities:** Arsenic Trioxide can cause QT interval prolongation and complete atrioventricular block. QT prolongation can lead to a torsade de pointes-type ventricular arrhythmia, which can be fatal. The risk of torsade de pointes is related to the extent of QT prolongation, concomitant administration of QT prolonging drugs, a history of torsade de pointes, preexisting QT interval prolongation, congestive heart failure, administration of potassium-wasting diuretics, or other conditions that result in hypokalemia or hypomagnesemia.
- **General Disorders:** Fatigue, fever, non-specific edema, rigors, chest pain, injection site pain, non-specific pain, injection site edema, injection site erythema, weakness, hemorrhage, weight gain, weight loss, drug hypersensitivity.
- **Gastrointestinal Disorders:** Nausea, decreased appetite, vomiting, diarrhea, upper and lower abdominal pain, constipation, loose stools, gastrointestinal hemorrhage, abdominal tenderness, abdominal distension.
- **Metabolism and Nutritional Disorders:** Hypokalemia, hypomagnesemia, hyperglycemia, hyperkalemia, hypocalcemia, increased ALT, increased AST, acidosis.
- **Nervous System Disorders:** Headache, insomnia, paresthesia, dizziness, tremor, convulsion, somnolence, coma.
- **Respiratory Disorders:** Cough, dyspnea, epistaxis, hypoxia, pleural effusion, post-nasal drip, wheezing, decreased breath sounds, crepitations, rales, hemoptysis, tachypnea, rhonchi.
- **Skin and Subcutaneous Disorders:** Dermatitis, pruritis, ecchymosis, dry skin, non-specific erythema, increased swelling, facial edema, night sweats, petechiae, non-specific lesions, urticaria, local exfoliation, eyelid edema.
- **Cardiac Disorders:** Tachycardia, prolonged ECG interval, abnormal ECG, palpitations.
- **Infections and Infestations:** Sinusitis, herpes simplex, upper respiratory tract infections, non-specific bacterial infection, herpes zoster, nasopharyngitis, oral candidiasis, sepsis.
- **Hematologic Disorders:** Leukocytosis, anemia, thrombocytopenia, febrile neutropenia, neutropenia, disseminated intravascular coagulation, lymphadenopathy.
- **Vascular Disorders:** Hypotension, flushing, hyperventilation, pallor.
- **Psychiatric Disorders:** Anxiety, depression, agitation, confusion.
- **Ocular Disorders:** Dry eyes, painful red eyes, eye irritation, blurred vision.
- **Ear Disorders:** Ear ache, tinnitus.
- **Renal Disorders:** Renal failure, renal impairment.
- **Reproductive System Disorders:** Vaginal hemorrhage, inter-menstrual bleeding.

HEALTH EFFECTS OR RISKS FROM EXPOSURE:

Acute: Ingestion of this product may be fatal. May be harmful by inhalation and skin or eye contact. Acute exposure may cause systems described under 'Other Potential Health Effects'.

Chronic: Chronic exposure of this product by all routes of exposure may lead to arsenic poisoning. Dermatitis (inflammation and redness of the skin) may occur after chronic, low-level skin contact. No other chronic effects have been reported from workplace exposure. Chronic exposure may also lead to symptoms described under 'Other Potential Health Effects'.

TARGET ORGANS: It is anticipated that for Occupational Exposure the target organs are: **Acute:** Skin, eyes, respiratory system. **Chronic:** Skin, respiratory system. In therapeutic use this product may have an impact on the body systems described under 'Other Potential Health Effects'.

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

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

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA: The following are human toxicological data and LD₅₀ Oral-Rat, Oral-Mouse for the active component, Arsenic Trioxide.

ARSENIC TRIOXIDE:

TCLo (Inhalation-Human) 50 µg/m³/24 years-continuous: Tumorigenic: carcinogenic by RTECS criteria; Lungs, Thorax, or Respiration: tumors
TDLo (Oral-Woman) 600 mg/kg; female 30 week(s) after conception: Reproductive: Effects on Newborn: Apgar score (human only), other neonatal measures or effects
TDLo (Oral-Woman) 100 mg/kg; Cardiac: EKG changes not diagnostic of specified effects; Vascular: BP lowering not characterized in autonomic section; Gastrointestinal: nausea or vomiting
TDLo (Oral-Woman) 549 mg/kg; Lungs, Thorax, or Respiration: other changes; Gastrointestinal: nausea or vomiting; Blood: changes in bone marrow (not otherwise specified)
TDLo (Oral-Woman) 20 mg/kg; Gastrointestinal: nausea or vomiting, other changes; Liver: other changes
TDLo (Oral-Woman) 100 mg/kg; Cardiac: pulse rate; Gastrointestinal: nausea or vomiting, other changes
TDLo (Oral-Woman) 0.1 gm/kg; Cardiac: change in rate; Vascular: BP lowering not characterized in autonomic section; Gastrointestinal: nausea or vomiting
TDLo (Oral-Man) 14,857 µg/kg; Sense Organs and Special Senses (Eye): visual field changes; Gastrointestinal: hypermotility, diarrhea; Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol)
TDLo (Oral-Human) 2 mg/kg; Behavioral: headache; Cardiac: pulse rate; Gastrointestinal: nausea or vomiting

ARSENIC TRIOXIDE (continued):

TDLo (Oral-Human) 37.8 µg/kg/3 weeks-continuous: Kidney, Ureter, Bladder: other changes in urine composition
LDLo (Oral-Human) 114 mg/kg; Behavioral: muscle weakness; Lungs, Thorax, or Respiration: acute pulmonary edema; Kidney, Ureter, Bladder: urine volume decreased
LDLo (Oral-Human) 1429 µg/kg
LDLo (Oral-Man) 29 mg/kg; Behavioral: sleep, muscle weakness; gastrointestinal: hypermotility, diarrhea
LDLo (Oral-Man) 286 mg/kg; Cardiac: arrhythmias (including changes in conduction); Liver: liver function tests impaired; Musculoskeletal: other changes
LDLo (Oral-Man) 2857 mg/kg; Behavioral: coma; Liver: fatty liver degeneration; Kidney, Ureter, Bladder: renal function tests depressed
LDLo (Oral-Human) 123 mg/kg; Brain and Coverings: other degenerative changes; Gastrointestinal: nausea or vomiting; Liver: other changes
LDLo (Unreported-Man) 2941 µg/kg
LDLo (Unreported-Human) 0.29 mg/kg
LD₅₀ (Oral-Rat) 10 mg/kg
LD₅₀ (Oral-Mouse) 20 mg/kg

CARCINOGENIC POTENTIAL OF COMPONENTS: Carcinogenicity studies have not been conducted with this product by intravenous administration. The components of this product are listed by agencies tracking the carcinogenic potential of chemical compounds, as follows.

ARSENIC TRIOXIDE: ACGIH TLV-A1 (Confirmed Human Carcinogen); MAK-1 (Substances that Cause Cancer in Man and Can Be Assumed to Make a Significant Contribution to Cancer Risk)

The remaining components of this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, or CAL/OSHA and therefore is neither considered to be nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: This product may cause mild to moderate irritation to the skin or respiratory system, especially if contact is prolonged.

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

REPRODUCTIVE TOXICITY INFORMATION: This product is rated by the FDA as Pregnancy Category D (POSITIVE EVIDENCE OR RISK, There is a risk to fetus after drug is administered, but under certain circumstances [e.g., treatment of life-threatening illnesses], the benefits can outweigh the risk.) There are no studies in pregnant women using this product; however, use of this product may cause fetal harm when administered to a pregnant woman. If this drug is used during pregnancy or if the patient becomes pregnant while taking this drug, the patient should be apprised of the potential harm to the fetus. The following is information that is available on the potential reproductive toxicity of this product based on animal tests.

Mutagenicity: Arsenic Trioxide and trivalent arsenite salts have not been demonstrated to be mutagenic to bacteria, yeast or mammalian cells. Arsenite salts are clastogenic *in vitro* (human fibroblasts, human lymphocytes, Chinese hamster ovary cells, Chinese hamster V79 lung cells). Trivalent arsenic produced an increase in the incidence of chromosome aberrations and micronuclei in bone marrow cells of mice.

Embryotoxicity: The components of this product are not reported to cause embryotoxic effects in humans. An increase in resorptions, neural-tube defects, anophthalmia and microphthalmia were observed in rats administered 10 mg/kg of arsenic trioxide on gestation day 9 (approximately 10 times the recommended human daily dose on a mg/m² basis). Similar findings occurred in mice administered a 10 mg/kg dose of a related trivalent arsenic, sodium arsenite, (approximately 5 times the projected human dose on a mg/m² basis) on gestation days 6, 7, 8 or 9. Intravenous injection of 2 mg/kg sodium arsenite (approximately equivalent to the projected human daily dose on a mg/m² basis) on gestation day 7 (the lowest dose tested) resulted in neural-tube defects in hamsters.

Teratogenicity: One patient who became pregnant while receiving Arsenic Trioxide had a miscarriage.

Reproductive Toxicity: Studies in pregnant mice, rats, hamsters, and primates have shown that inorganic arsenicals cross the placental barrier when given orally or by injection. The reproductive toxicity of Arsenic Trioxide has been studied in a limited manner. Arsenic is excreted in human milk. Because of the potential for serious adverse reactions in nursing infants, nursing mothers should be advised of these effects and the appropriate action should be taken to prevent exposure.

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

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY IN SOIL: This product has not been tested for mobility in soil. It is expected to be mobile in soil.

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability. It is expected that some biodegradation will occur to this product; however, no specific information is known.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential.

12. ECOLOGICAL INFORMATION (Continued)

ECOTOXICITY: This product may be harmful or fatal to contaminated plant and animal-life (especially if large quantities are released). This product has not been tested for aquatic toxicity. This product may be harmful or fatal to contaminated aquatic plant and animal life.

ARSENIC TRIOXIDE:

LC₅₀ (*Oncorhynchus keta* Chum salmon) 48 hours = 8,330 µg/L/Conditions of bioassay not specified

LC₅₄ (*Oncorhynchus gorboscha* pink salmon) 10 days = 3,787 µg/L/Conditions of bioassay not specified

LC₁₀₀ (*Oncorhynchus gorboscha* pink salmon) 7 days = 7,195 µg/L/Conditions of bioassay not specified

HYDROCHLORIC ACID:

TL_m (*Gambusia affinis* mosquito fish) 96 hours = 282 ppm (fresh water) Conditions of bioassay not specified

Lethal (*Lepomis macrochirus* bluegill sunfish) 48 hours = 3.6 mg/L/Conditions of bioassay not specified

LC₅₀ (Shrimp) 48 hours = 100 to 330 ppm (salt water) Conditions of bioassay not specified

LC₅₀ (Starfish) 48 hours = 100 to 330 mg/L/Conditions of bioassay not specified

HYDROCHLORIC ACID (continued):

LC₅₀ (Cockle) 48 hours = 330 to 1,000 mg/L/Conditions of bioassay not specified
LC₅₀ (*Carassius auratus* goldfish) (1 to 2 hr survival time) 178 mg/L/Conditions of bioassay not specified

LC₅₀ (Shore crab) 48 hours = 240 mg/L/Conditions of bioassay not specified

LC₅₀ (*Lepomis macrochirus* bluegill sunfish) 96 hours at pH between 3.5 and 3.0 /hydrogen ion concentration/Conditions of bioassay not specified

LC₁₀₀ (Trout) 24 hours = 10 mg/L/Conditions of bioassay not specified

SODIUM HYDROXIDE:

Acute Hazard Level:

Lethal pH (goldfish) = 10.9

Lethal pH (bluegill) = 10.5

LC₁₀₀ (*Cyprinus carpio*) 24 hours = 180 ppm/ 25°C

TL_m (mosquito fish) 96 hours = 125 ppm/ fresh water

TL_m (bluegill) 48 hours = 99 mg/L tap water

RESULTS OF PBT AND vPvB ASSESSMENT: No data available. PBT and vPvB assessments are part of the chemical safety report required for some substances in European Union Regulation (EC) 1907/2006, Article 14.

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

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

13. DISPOSAL CONSIDERATIONS

WASTE TREATMENT/DISPOSAL METHODS: 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. All protective clothing, gloves, and disposable materials used in the preparation or handling of this drug should be disposed of in accordance with established hazardous waste disposal procedures and/or regulated medical waste requirements. 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. Incineration is recommended for the product and disposable equipment. Shipment of wastes must be done with appropriately permitted and registered transporters. Reusable equipment should be cleaned with soap and water and thoroughly rinsed.

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

EUROPEAN WASTE CODE: Wastes from natal care, diagnosis, treatment, or prevention of disease in humans: chemicals consisting of or containing dangerous substances, 18-01-06

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: This product is NOT classified or regulated as a hazardous material, per regulations of 49 CFR, U.S. DOT regulations.

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

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): This product is NOT regulated as Dangerous Goods under rules of IATA.

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

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is NOT classified as hazardous by the United Nations Economic Commission for Europe.

TRANSPORT IN BULK ACCORDING TO THE IBC CODE: Not applicable.

ENVIRONMENTAL HAZARDS: This product should be tested to determine if it meets the criteria of environmentally hazardous according to the criteria of the UN Model Regulations (as reflected in the IMDG Code, ADR, RID, and ADN); the Arsenic Trioxide compound may be listed in Annex III under MARPOL 73/78.

15. REGULATORY INFORMATION

ADDITIONAL U.S. 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)
Arsenic Trioxide	Yes	Yes	Yes

U.S. SARA EXTREMELY HAZARDOUS THRESHOLD PLANNING QUANTITY (TPQ): Arsenic Trioxide = 100 lb (45.4 kg). This TPQ is for Arsenic Trioxide in solution.

U.S. SARA EXTREMELY HAZARDOUS REPORTABLE QUANTITY (RQ): Arsenic Trioxide = 1 lb (0.45 kg)

U.S. CERCLA REPORTABLE QUANTITY (RQ): Arsenic Trioxide = 1 lb (0.45 kg)

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

U.S. TSCA INVENTORY STATUS: This product is regulated under Food and Drug Administration standards; it is not subject to requirements under TSCA.

STATE REGULATIONS: Regulated Medical Waste.

OTHER U.S. FEDERAL REGULATIONS: The components of this product have requirements under other U.S. Federal regulations, as follows (these regulations may not be applicable to this product as a pharmaceutical product):

ARSENIC TRIOXIDE:

Arsenic Trioxide 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. Arsenic trioxide is included on this list.

Arsenic Trioxide is designated as a Hazardous Substance 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 Arsenic Trioxide. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing Arsenic Trioxide.

As an arsenic compound, Arsenic Trioxide is a Toxic Pollutant designated pursuant to section 307(a)(1) of the Federal Water Pollution Control Act and is subject to effluent limitations.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): The Arsenic Trioxide component of this product is not on the California Proposition 65 lists. **WARNING!** This product contains a chemical known to the State of California to cause developmental harm.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL STATUS: This product regulated by the Therapeutic Products Programme (TPP) of Health Canada and so is exempt from requirements of the DSL/NDSL Inventory.

OTHER CANADIAN REGULATIONS: Requirements under the Canadian Health Canada, Laboratory Biosafety Guidelines may be applicable.

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

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: The WHMIS Requirements of the Hazardous Products Act does not apply in respect of the advertising, sale or importation of any cosmetic, device, drug or food within the meaning of the Food and Drugs Act.

ADDITIONAL EUROPEAN REGULATIONS:

SAFETY, HEALTH, AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE PRODUCT: When formulated in a finished medicinal product for human use, this material is subject to Directive 2001/83/EC and subsequent amendments to the directive.

CHEMICAL SAFETY ASSESSMENT: No Data Available. The chemical safety assessment is required for some substances according to European Union Regulation (EC) 1907/2006, Article 14.

16. OTHER INFORMATION

ANSI LABELING (Z129.1, Provided to Summarize Occupational Hazard Information): **DANGER!** CONTAINS CYTOTOXIC AGENT. ALL EXPOSURE MUST BE MINIMIZED. CAN CAUSE HARM BY INHALATION, SKIN CONTACT OR INGESTION. MAY CAUSE ADVERSE EFFECTS ON CENTRAL NERVOUS SYSTEM, CARDIOVASCULAR SYSTEM, PERIPHERAL NERVOUS SYSTEM, GASTROINTESTINAL SYSTEM, BLOOD EFFECTS OR MAY BE FATAL IF INGESTED. MAY CAUSE FETAL HARM. MAY CAUSE RESPIRATORY SYSTEM, EYE, AND SKIN IRRITATION. Do not taste or swallow. Avoid contact with skin, eyes, and clothing. Keep container closed. Use gloves, safety glasses, and appropriate respiratory and body protection. **FIRST-AID:** If exposed, seek immediate medical attention. If swallowed, do not induce vomiting. If alert, give victim up to three glasses of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush skin with copious amounts of warm water for 20 minutes. Remove contaminated clothing and shoes. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. **IN CASE OF FIRE:** Use water fog, dry chemical or CO₂, or alcohol foam. **IN CASE OF SPILL:** Refer to Safety Data Sheet for complete spill response procedures. Spill response should be performed by persons properly trained to do so. Decontaminate area with bleach and detergent solution and triple rinse area. Place spill debris in a suitable container. Refer to SDS for additional information.

SPECIAL HANDLING AND DISPOSAL REQUIRED

16. OTHER INFORMATION (Continued)

GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION: According to Article 1, item 5 (a) of CLP Regulation (EC) 1272/2008, medicinal products in the finished state for human use, as defined in 2001/83/EC, are excepted from classification and other criteria of 1272/2008.

67/548/EEC EU LABELING/CLASSIFICATION: According to Article 1 of European Union Council Directive 92/32/EEC, medical products in the finished state for human use (as defined by European Union Council Directives 67/548/EEC and 87/21/EEC) are not subject to the regulations and administrative provisions of European Union Council Directive 92/32/EEC.

CLASSIFICATION FOR COMPONENTS:

FULL TEXT GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION:

ARSENIC TRIOXIDE:

Classification: Carcinogenic Category 1A, Acute Toxicity Ingestion Category 2, Skin Corrosivity Category 1B, Aquatic Toxicity Acute Category 1, Aquatic Toxicity Chronic Category 1

Signal Word: Danger

Hazard Statements: H350: May cause cancer. H300: Fatal if swallowed. H314: Causes severe skin burns and eye damage. H400: Very toxic to aquatic life. H410: Very toxic to aquatic life with long-lasting effects.

Hazard Symbols/Pictograms: GHS05, GHS06, GHS08, GHS09

FULL TEXT EU LABELING AND CLASSIFICATION EUROPEAN COMMUNITY COUNCIL DIRECTIVE 67/548/EEC:

ARSENIC TRIOXIDE:

Hazard Classification: Carcinogen Category 1, Very Toxic, Corrosive, Dangerous for the Environment

Risk Phrases: R45: May cause cancer. R28: Very toxic if swallowed. R34: Causes burns. R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases: S53: Avoid exposure-obtain special instructions before use. S45: In case of accident, or if you feel unwell, seek medical advice immediately (show label where possible). S60: This material and its container must be disposed of as hazardous waste. S61: Avoid release to the environment. Refer to special instructions/Safety data sheets.

Hazard Symbols: T+, N

ALL OTHER COMPONENTS: These components are not classified in the European Union Annex I of Directive 67/548/EEC or subsequent directives.

REFERENCES AND DATA SOURCES: Contact the supplier for information.

METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION: Bridging principles were used to classify this product.

REVISION DETAILS: October 2011: Review and revised MSDS for current GHS format. December 2012: New contact information.

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc. • PO Box 1961, Hilo, HI 96721-1961 • (800) 441-3365

DATE OF PRINTING: November 6, 2013

REVISION HISTORY: December 2010: Addition of EU CLP 1272-2008 and Global Harmonization Standard compliance. December 2012: New contact information. September 2013: Dosage correction. November 2013: Update warnings; correct overall composition of product.

The Vendee (or any other third party) assumes full risk and responsibility for any injury or damage that may occur from the manufacture, use or other exposure to the material. No warranty is expressed or implied regarding the accuracy of the data set forth herein or the results that may be obtained from the use or reliance thereof. Cephalon, Inc. assumes no responsibility for any injury that may arise from the manufacture, use or other exposure to the material if reasonable safety procedures are not adhered to as stipulated in the data sheet attached hereto. Additionally, Cephalon, Inc. assumes no responsibility for injury to any person proximately caused by the inappropriate or unintended use of the material even if such reasonable safety procedures are followed.

DEFINITIONS OF TERMS

For information on medical terms used in this SDS consult an on-line database such as Medline Plus: <http://www.nlm.nih.gov/medlineplus/druginformation.html>.

A large number of abbreviations and acronyms appear on a SDS. 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.

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

Ceiling Level (C). Skin absorption effects must also be considered.

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

SKIN: Used when there is a danger of cutaneous absorption.

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

TLV-Threshold Limit Value: An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

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

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS:

This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD: 0 (Minimal Hazard): No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation:* Essentially non-irritating. PII or Draize = "0". *Eye Irritation:* Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. Draize = "0". *Oral Toxicity LD₅₀ Rat:* < 5000 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC₅₀ Rat:* < 20 mg/L; 1 (Slight Hazard): Minor reversible injury may occur; slightly or mildly irritating. *Skin Irritation:* Slightly or mildly irritating. *Eye Irritation:* Slightly or mildly irritating. *Oral Toxicity LD₅₀ Rat:* > 500-5000 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 1000-2000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 2-20 mg/L; 2 (Moderate Hazard): Temporary or transitory injury may occur. *Skin Irritation:* Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation:* Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. *Oral Toxicity LD₅₀ Rat:* > 50-500 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 200-1000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.5-2 mg/L; 3 (Serious Hazard): Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation:* Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation:* Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD₅₀ Rat:* > 1-50 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 20-200 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.05-0.5 mg/L; 4 (Severe Hazard): Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation:* Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation:* Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD₅₀ Rat:* ≤ 1 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* ≤ 20 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* ≤ 0.05 mg/L.

FLAMMABILITY HAZARD: 0 (Minimal Hazard): Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes; 1 (Slight Hazard): Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class IIIB, or; Most ordinary combustible materials [e.g. wood, paper, etc.];

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 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 and 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases:* Pressure below OSHA definition. *Pyrophorics:* No Rating. *Oxidizers:* Packaging Group III; *Solids:* any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. *Liquids:* any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%) cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives:* Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.; 2 (*Water Reactivity:* Materials that may react violently with water. *Organic Peroxides:* Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives:* Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases:* Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics:* No Rating. *Oxidizers:* 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 and 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 with an LC₅₀ for acute inhalation toxicity greater than 10,000 ppm. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 200 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 2000 mg/kg. Materials with an LD₅₀ for acute oral toxicity greater than 2000 mg/kg. Materials essentially non-irritating to the respiratory tract, eyes, and skin. 1 Materials that, under emergency conditions, can cause significant irritation. Gases and vapors with an LC₅₀ for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 10 mg/L but less than or equal to 200 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials that slightly to moderately irritate the respiratory tract, eyes and skin. Materials with an LD₅₀ for acute oral toxicity greater than 500 mg/kg but less than or equal to 2000 mg/kg. 2 Materials that, under emergency conditions, can cause temporary incapacitation or residual injury. Gases with an LC₅₀ for acute inhalation toxicity greater than 3,000 ppm but less than or equal to 5,000 ppm.

DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

HEALTH HAZARD (continued): 2 (continued): Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 2 mg/L but less than or equal to 10 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 200 mg/kg but less than or equal to 1000 mg/kg. 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. Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 10 mg/L but less than or equal to 200 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials that slightly to moderately irritate the respiratory tract, eyes and skin. Materials with an LD₅₀ for acute oral toxicity greater than 500 mg/kg but less than or equal to 2000 mg/kg. **3** (materials that, under emergency conditions, can cause serious or permanent injury): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 1,000 ppm but less than or equal to 3,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials that are corrosive to the skin. **4** (materials that, under emergency conditions, can be lethal): Gases and vapors whose LC₅₀ for acute inhalation toxicity less than or equal to 1,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD₅₀ for acute oral toxicity is less than or equal to 5 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 1000 ppm.

FLAMMABILITY HAZARD: 0 Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand: Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur: Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the UN *Recommendation on the Transport of Dangerous Goods, Model Regulations* (current edition) and the related *Manual of Tests and Criteria* (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to a boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed up flash point of the solvent. Most ordinary combustible materials. **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. 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.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

INSTABILITY HAZARD: 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: **LD₅₀** - Lethal Dose (solids and 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 **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, **RTCS** - 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.

REPRODUCTIVE TOXICITY INFORMATION:

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.

United States FDA Pharmaceutical Pregnancy Categories: Pregnancy Category A: Adequate and well-controlled human studies have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters). **Pregnancy Category B:** Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women OR Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in any trimester. **Pregnancy Category C:** Animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks. **Pregnancy Category D:** There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks. **Pregnancy Category X:** Studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risks involved in use of the drug in pregnant women clearly outweigh potential benefits. **Pregnancy Category N:** FDA has not classified this drug.

ECOLOGICAL INFORMATION:

EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifetimes 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/NDL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA** or **Superfund**); and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label. **OSHA** - U.S. Occupational Safety and Health Administration.

EUROPEAN and INTERNATIONAL:

The DFG: This is the Federal Republic of Germany's Occupation Health Agency, similar to the U.S. OSHA. **EU** 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.