

MATERIAL SAFETY DATA SHEET

1. PRODUCT IDENTIFICATION

<u>TRADE NAME (AS LABELED):</u>	ProfilerPro Kinase Selectivity Assay Kits 7 and 8
<u>CODE NUMBERS:</u>	PN 760474, PN 760475
<u>U.N. NUMBER:</u>	Not Applicable
<u>U.N. DANGEROUS GOODS CLASS/SUBSIDIARY RISK:</u>	Not Applicable
<u>HAZCHEM CODE (AUSTRALIA):</u>	Not Applicable
<u>POISONS SCHEDULE NUMBER (AUSTRALIA):</u>	Not Applicable
<u>PRODUCT USE:</u>	Laboratory Biological Research
<u>U.S. SUPPLIER/MANUFACTURER'S NAME:</u>	Caliper Life Sciences
<u>Address:</u>	68 Elm Street Hopkinton, MA 01748
<u>Business Phone:</u>	1-800-LAB-CHIP (toll-free) 1-800-522-2447 (toll-free) +1-508-435-3439 (outside North America)

AUSTRALIAN SUPPLIER/DISTRIBUTOR'S NAME:

Address:

Business Phone:

EUROPEAN SUPPLIER/ DISTRIBUTOR'S NAME:

Address:

Business Phone:

EMERGENCY PHONE: CHEM-TEL: 1-800-255-3924 (U.S., Canada, Puerto Rico, U.S. Virgin Islands)
+1-813-248-0585 (Worldwide Intl.)

EMAIL ADDRESS/COMPETENT PERSON FOR MSDS: Techsupport@caliperls.com

DATE OF PREPARATION: June 25, 2009

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], Australian [NOHSC:2011 (2003)], and Japanese Industrial Standard (JIS Z 7250: 2000) 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

This Material Safety Data sheet describes the ProfilerPro Kinase Selectivity Assay Kits 7 and 8. This product consists of one hundred forty-eight solutions. This Material Safety Data Sheet provides complete information on all the components described in the following tables. Unless otherwise specified, the information in each of the following sections (Sections 3–16) of this document is pertinent to each solution.

EU/AUSTRALIAN LABELING AND CLASSIFICATION: The solutions in this product do not meet the definition of any hazard class 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)].

Health Hazards:

Dithiothreitol Solution: Inhalation of vapors, mists, or sprays of this component may irritate the nose, throat, and lungs and cause nausea, headache, and vomiting. Skin and eye contact may irritate contaminated tissue. If this component is swallowed, it may irritate the mouth, throat, and other tissues of the digestive system.

DKP Termination Buffer: Inhalation of vapors, mists, or sprays of this component may irritate the nose, throat, and lungs and cause nausea, headache, and vomiting. Skin and eye contact may irritate contaminated tissue. The Dimethyl Sulfoxide constituent of this component can be absorbed through the skin and may carry dissolved chemicals with it into the body. Symptoms of overexposure for a prolonged period of time and a large area of skin may include redness, burning, itching, scaling, vision disturbance, photophobia, headache, and diarrhea. If this component is swallowed, it may cause gastric distress. Large doses may cause nausea, vomiting, chills, cramps, and lethargy. Chronic ingestion of the Dimethyl Sulfoxide constituent of these components may affect the liver and kidneys.

All Other Components: The chief hazard in event of overexposure is the potential for irritation of contaminated skin or eyes.

Flammability Hazards: The components of this product present no significant fire hazards. In the event of a fire, this product will not contribute significant additional hazards.

Reactivity Hazards: This product is not reactive.

Environmental Hazards: Negligible.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS#	ENCS#	% v/v	EU CLASSIFICATION FOR COMPONENTS
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COMPONENTS 1–48: DKP ENZYME REAGENTS 145–192

Water and other constituents. Each of the other constituents is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).	Balance	None of the constituents in these solutions contribute significantly to the hazards associated with these solutions.
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COMPONENTS 49–96: DKP SUBSTRATE REAGENTS 145–192

Water and other constituents. Each of the other constituents is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).	Balance	None of the constituents in these solutions contribute significantly to the hazards associated with these solutions.
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3. COMPOSITION AND INFORMATION ON INGREDIENTS (Continued)

CHEMICAL NAME	CAS #	EINECS#	ENCS#	% v/v	EU CLASSIFICATION FOR COMPONENTS
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COMPONENTS 145-192: DKP SUBSTRATE CONTROLS 145-192

Water and other constituents. Each of the other constituents is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).	Balance	None of the constituents in these solutions contribute significantly to the hazards associated with these solutions.
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COMPONENT 145: DKP TERMINATION BUFFER

HEPES Free Acid	7365-45-9	230-907-9	NE	1-5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
HEPES Sodium Salt	75277-39-3	75277-39-3	NE	1-5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Dimethyl Sulfoxide	67-68-5	200-664-3	2-1553	3-7	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).	Balance	None of the other constituents in these solutions contribute significantly to the hazards associated with these solutions.			

COMPONENT 146: DKP RECONSTITUTION BUFFER

Water and other constituents. Each of the other constituents is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).	Balance	None of the constituents in these solutions contribute significantly to the hazards associated with these solutions.
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COMPONENT 147: DITHIOTHREITOL SOLUTION, 1M

Dithiothreitol	3483-12-3	222-468-7	NE	10-20	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).	Balance	None of the other constituents in these solutions contribute significantly to the hazards associated with these solutions.			

COMPONENTS 148: PROTEASE INHIBITOR

AESBF Hydrochloride	30827-99-7	Unlisted	Unlisted	1-5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).	Balance	None of the other constituents in these solutions contribute significantly to the hazards associated with these solutions.			

See Section 16 for full text of Ingredient Risk Phrases

NOTE: Unless otherwise indicated, the hazard assessments in the following sections are pertinent to all component reagents.

4. FIRST-AID MEASURES

Contaminated individuals must seek medical attention if any adverse effect occurs. 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 physician or health professional with the contaminated individual.

SKIN EXPOSURE: If this product contaminates the skin, begin decontamination with copious amounts of running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Contaminated clothing must be removed and laundered before re-use. The contaminated individual must seek medical attention if any adverse effect develops after the area is flushed.

EYE EXPOSURE: If this product contaminates the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. Minimum flushing is for 20 minutes. The contaminated individual must seek medical attention if adverse effects occur after flushing.

INHALATION: If vapors, mists or sprays from this product are inhaled, remove contaminated individual to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect continues after removal to fresh air.

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

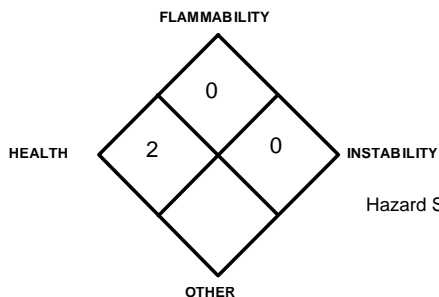
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing dermatitis, other skin conditions, respiratory conditions, and liver disorders may be aggravated by overexposure to components of this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

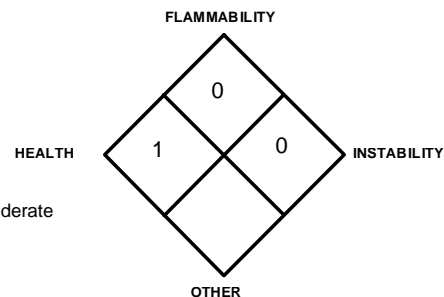
DKP Termination Buffer

NFPA RATING



All Other Reagents

NFPA RATING



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

5. FIRE-FIGHTING MEASURES (Continued)

FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not applicable.

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

FIRE EXTINGUISHING MATERIALS: In the event of a fire, use suppression methods for surrounding materials (e.g., water spray, dry chemical, carbon dioxide, foam, any "ABC" class extinguisher).

FIRE EXTINGUISHING MATERIALS NOT BE USED: Halon extinguishers should not be used for fires involving this product.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this product's components can decompose and produce small amounts of irritating vapors and toxic gases (including carbon and nitrogen oxides).

SPECIAL FIRE-FIGHTING PROCEDURES: Do not use halogenated extinguishing media. Move containers from fire area if it can be done without risk to personnel. Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people. The atmosphere must have levels of constituents 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: Lightweight gloves, a lab coat, and eye protection should be worn. Absorb spilled liquid with paper towels. Wash contaminated area with soap and water, absorb with paper towels, and rinse with water.

Large Spills: Minimum Personal Protective Equipment should be **Level D: lab-gloves, chemical resistant apron, boots, and splash goggles. Respiratory protection should not be necessary.** Absorb spilled liquid with polypads or other suitable absorbent materials. Dike or otherwise contain spill and remove with vacuum truck or pump to storage/salvage vessels. Decontaminate the area thoroughly. 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 a double plastic bag or other containment and seal. Decontaminate the area thoroughly. Do not mix with wastes from other materials. Dispose of in accordance with applicable International, National, 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.

7. HANDLING and STORAGE

SAFE WORK AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product's components ON YOU or IN YOU.

Wash thoroughly after handling this product's components. Avoid splashing or spraying this product's components. Do not eat or drink while handling this product's components.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing vapors or mists generated by this product's components. Ensure containers of this product's components are properly labeled. Open containers slowly on a stable surface. Store vials as directed in the product insert. Keep vials tightly closed when not in use. Store away from incompatible materials. Inspect vials containing this product's components for leaks or damage. Read instructions provided with the product prior to use.

SPECIFIC USE(S): This product is for use in laboratory biological research. Follow all industry standards for use.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely, as applicable. Collect all rinsates and dispose of according to applicable International, National, and local hazardous waste disposal regulations.

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 below if applicable. 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/GUIDELINES:

NOTE: For Component Numbers not specifically listed, those components primarily of water and trace constituents-no exposure limits are applicable.

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR									
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELs		NIOSH	AIHA WEELs		OTHER
		TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	IDLH mg/m ³	TWA mg/m ³	STEL mg/m ³	mg/m ³
COMPONENT 145: DKP TERMINATION BUFFER											
HEPES Free Acid	7365-45-9	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HEPES Sodium Salt	75277-39-3	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Dimethyl Sulfoxide	67-68-5	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
COMPONENT 147: DITHIOHREITOL SOLUTION, 1M											
Dithiothreitol	3483-12-3	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: Currently the following international exposure limits are in place for the some constituents of this product. Values given may not be the most current; individual country lists should be consulted to determine most current values available.

DIMETHYL SULFOXIDE:

Germany: No MAK Established, JAN 1999
Russia: STEL = 20 mg/m³, JUN 2003

DIMETHYL SULFOXIDE (continued):

Sweden: TWA = 50 ppm (150 mg/m³), KTV = 150 ppm (500 mg/m³), Skin, JAN 1999

DIMETHYL SULFOXIDE (continued):

Switzerland: MAK-W = 50 ppm (160 mg/m³), Skin, JAN 1999
The Netherlands: MAC-TGG = 150 mg/m³, Skin, 2003

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

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 Z94.3-07), standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand/body protection, and CR 13464:1999 for face/eye protection), 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), or standards of Japan (including JIS T 8116:2005 for glove selection, JIS T 8150:2006 for respiratory PPE, JIS T 8147:2003 for eye protectors, and JIS T 8030:2005 for protective clothing). Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Respiratory protection is not generally needed when using this product. Maintain airborne contaminant concentrations below limits listed above. In instances where inhalable mists or sprays of product may be generated and respiratory protection is 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, European Standard EN 529:2005, EU member state standards, Australian Standard 1716-Respiratory Protective Devices and Australian Standard 1715-Selection, Use, and Maintenance of Respiratory Protective Devices, or Japanese Standard JIS T 8150:2006. 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).

EYE PROTECTION: Depending on the use of this product, splash goggles or safety glasses may be worn. Use goggles or safety glasses for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian CSA Standard Z94.3-07, European Standard CR 13464:1999, Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment, or Japanese Standard JIS T 8147:2003.

HAND PROTECTION: Wear butyl rubber, neoprene, or nitrile rubber or latex gloves for routine use. Use triple gloves for spill response. If necessary, refer to U.S. OSHA 29 CFR 1910.138, Australian Standard 2161-Industrial Safety Gloves and Mittens, European Standard CEN/TR 15419:2006, or Japanese Standard JIS T 8116:2005.

BODY PROTECTION: Use body protection appropriate for task, such as a lab coat. If necessary, refer to OSHA Technical Manual (Section VII: Personal Protective Equipment), European Standard CEN/TR 15419:2006, Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals, or Japanese Standard JIS T 8030:2005. 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, Canadian CSA Standard Z195.1-02, *Guideline on Selection, Care, and Use of Protective Footwear*, or European Standard CEN ISO/TR 18690:2006.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE, ODOR AND COLOR:

DKP Termination Buffer, DKP Substrate Reagents, and DKP Substrate Controls: Clear, colorless liquids with a very faint garlic-like odor.

Dithiothreitol Solution: Clear, colorless solutions with a mildly sulfurous odor.

All Other Components: Clear, odorless, colorless liquids.

HOW TO DETECT THIS SUBSTANCE: There are no unusual warning properties associated with these solutions.

pH: 6.0-10.7

BOILING POINT: Not established.

FLASH POINT: Not applicable.

EXPLOSIVE PROPERTIES: Not explosive

VAPOR PRESSURE: Not established.

SOLUBILITY: Not miscible in organic solvents.

VISCOSITY: Not established.

EVAPORATION RATE: Similar to water.

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

MELTING/FREEZING POINT: Not established.

FLAMMABILITY: Not flammable.

OXIDIZING PROPERTIES: Not an oxidizer.

SPECIFIC GRAVITY: Not established.

SOLUBILITY IN WATER: Completely soluble.

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

ODOR THRESHOLD: Not established.

10. STABILITY AND REACTIVITY

DECOMPOSITION CONDITIONS/STABILITY: Stable.

DECOMPOSITION PRODUCTS:

Combustion: Carbon oxides and nitrogen oxides. Hydrolysis: None known.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:

DKP Termination Buffer, DKP Substrate Reagents, and DKP Substrate Controls: Strong oxidizers, acetyl chloride, cyanuric chloride, acid chlorides, phosphorus halides, strong acids, strong reducers and substances that are incompatible with water.

All Other Components: Strong oxidizers, strong acids, some metals, and substances that are incompatible with water.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Any conditions that are incompatible with water, mixing this product with incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An explanation in lay terms:

Acute:

Dithiothreitol Solution: Inhalation of vapors, mists, or sprays of this component may cause nausea, headache, and vomiting. Depending on the duration and concentration of overexposure, skin and eye contact may irritate contaminated tissue.

DKP Termination Buffer: Large oral doses may cause nausea, vomiting, chills, cramps, and lethargy.

All Other Components: Beyond mild irritation of the skin or eyes, contact with these components does not usually cause acute health effects.

Chronic:

DKP Termination Buffer: The Dimethyl Sulfoxide component of this product can cause anaphylactic reaction by unspecified exposure routes; symptoms may include rash, abdominal cramps, nausea, chills, and chest pain. Chronic ingestion of the Dimethyl Sulfoxide constituent of these components may affect the liver and kidneys.

All Other Components: These components are not known to cause any significant chronic health effects.

11. TOXICOLOGICAL INFORMATION (Continued)

TARGET ORGANS:

Acute:

Dithiothreitol Solution: Eyes, Skin.

DKP Termination Buffer: Eyes, Gastrointestinal Tract.

All Other Solutions: Eyes, Gastrointestinal Tract.

Chronic:

Dithiothreitol Solution: Skin.

DKP Termination Buffer: Liver, Kidneys.

All Other Solutions: None Known.

TOXICITY DATA: The following information is available for the constituents in constituents in this product present in greater than 1 percent concentration.

AESBF HYDROCHLORIDE:

Currently, there are no toxicological data available for this component.

DIMETHYLSULFOXIDE:

TDLo (intravenous, man) = 606 mg/kg;
Gastrointestinal: nausea or vomiting; Liver: jaundice, other or unclassified

LD₅₀ (oral, rat) = 14500 mg/kg; Eye: hemorrhage, conjunctive irritation

LD₅₀ (oral, mouse) = 7920 mg/kg

LD₅₀ (oral, dog) > 10 g/kg

LD₅₀ (oral, chicken) = 12 g/kg

LD₅₀ (skin, rat) = 40 g/kg

LD₅₀ (skin, mouse) = 50 g/kg

LD₅₀ (intraperitoneal, rat) = 8200 mg/kg

LD₅₀ (subcutaneous, rat) = 12 g/kg; Behavioral: changes in motor activity (specific assay); Lungs, Thorax, or Respiration: dyspnea

LD₅₀ (intravenous, rat) = 5360 mg/kg; Behavioral: tremor; muscle weakness; Lungs, Thorax, or Respiration: dyspnea

LD₅₀ (intravenous, mouse) = 3100 mg/kg; Eye: hemorrhage; conjunctive irritation

LD₅₀ (intraperitoneal, mouse) = 2500 mg/kg

LD₅₀ (subcutaneous, mouse) = 14 g/kg; Behavioral: changes in motor activity (specific assay); Lungs, Thorax, or Respiration: other changes; Kidney, Ureter, Bladder: hematuria

TDLo (oral, rat) = 1070 g/kg/13 weeks/intermittent; Blood changes; weight loss or decreased weight gain

DIMETHYLSULFOXIDE (continued):

TDLo (oral, rat) = 59 g/kg/81 weeks/intermittent; Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Skin and Appendages: tumors

TDLo (oral, mouse) = 65340 mg/kg/66 weeks/intermittent; Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Blood: leukemia; Skin and Appendages: tumors

TDLo (oral, mouse) = 16 mg/kg/female 5–9 days after conception; Reproductive: Fertility: pre-implantation mortality; Effects on Fetus: fetotoxicity; Specific Developmental Abnormalities: musculoskeletal system

TDLo (oral, hamster) = 11 g/kg/female 7 days after conception; Reproductive: Specific Developmental Abnormalities: Central Nervous System, musculoskeletal system

TDLo (oral, monkey) = 4864 g/kg/78 weeks/intermittent

TDLo (subcutaneous, rat) = 220 g/kg/82 weeks/intermittent; Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Skin and Appendages: tumors

TDLo (intraperitoneal, mouse) = 210 g/kg/female 6–12 days after conception; Reproductive: Specific Developmental Abnormalities: Central Nervous System, musculoskeletal system

TDLo (intraperitoneal, hamster) = 5500 mg/kg/female 8 days after conception; Reproductive: Specific Developmental Abnormalities: musculoskeletal system, Central Nervous System, craniofacial

DIMETHYLSULFOXIDE (continued):

TDLo (intraperitoneal, rat) = 192 g/kg/4 weeks/intermittent; Blood: normocytic anemia; weight loss or decreased weight gain

TDLo (intraperitoneal, rat) = 56 g/kg/female 6–12 days after conception; Reproductive: Fertility: abortion

TDLo (ocular, rabbit) = 250 µg/kg/30 days/intermittent; Eye: effect, not otherwise specified

TDLo (skin, pig) = 4698 mL/kg/58 weeks/intermittent; Eye: changes in refraction; Behavioral: fluid intake Mutation in Microorganisms (*Salmonella typhimurium*) = 25 pph

Mutation in Microorganisms (*Escherichia coli*) = 551 g/L

Mutation Test Systems (*Salmonella typhimurium*) = 70 g/L

Open Irritation Test (skin, rabbit) = 10 mg/24 hours Standard Draize Test (skin, rabbit) = 500 mg/24 hours; mild

Standard Draize Test (eye, rabbit) = 100 mg Standard Draize Test (eye, rabbit) = 500 mg/24 hours; mild

Standard Draize Test (eye, rabbit) = 100 mg Standard Draize Test (eye, rabbit) = 500 mg/24 hours; mild

DITHIOTHREITOL:

LD₅₀ (Intraperitoneal-Mouse) 154 mg/kg

LD₅₀ (Intramuscular-Mouse) 108 mg/kg; Behavioral: convulsions or effect on seizure threshold

HEPES FREE ACID:

LD₅₀ (Oral-Rat) > 316 mg/kg

HEPES SODIUM SALT:

Currently, there are no toxicological data available for this component.

IRRITANCY OF PRODUCT:

Dithiothreitol Solution and DKP Termination Buffer: Depending on the duration and concentration of overexposure, skin and eye contact can irritate contaminated tissue.

All Other Components: Contact with the skin or eyes may cause mild irritation, which is alleviated upon rinsing.

SENSITIZATION TO THE PRODUCT:

DKP Termination Buffer: The Dimethyl Sulfoxide constituent of this solution can cause anaphylactic reaction by unspecified exposure routes; symptoms may include rash, abdominal cramps, nausea, chills, and chest pain.

All Other Components: All other components of this product are not known to cause skin or respiratory sensitization.

CARCINOGENICITY INFORMATION: The constituents in the solutions 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.

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

Mutagenicity: The constituents in the components in this product are not reported to produce mutagenic effects in humans. Human mutation data are available for the Dimethyl Sulfoxide constituent in this product's components; these data were obtained during clinical studies on specific human tissues exposed to high doses of this compound.

Embryotoxicity: The constituents in the components in this product are not reported to cause human embryotoxic effects.

Teratogenicity: The constituents in the components in this product are reported to cause teratogenic effects in humans. Clinical studies on test animals exposed to relatively high doses of the Dimethyl Sulfoxide constituent in this product's components, indicate teratogenic effects.

Reproductive Toxicity: The constituents in the components in this product are not reported to cause adverse reproductive effects in humans. Clinical studies on test animals exposed to relatively high doses of the Dimethyl Sulfoxide constituent in this product's components indicate adverse reproductive effects.

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

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

12. ECOLOGICAL INFORMATION

MOBILITY: This product has not been tested for mobility in soil.

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

DIMETHYL SULFOXIDE:

Biological Half-Life: Dermal application resulted in 50-60 mg % in blood in 4-8 hr; half-life 11-14 hr. 220-340 mg % reported following oral admin of 1,000 mg/kg; half-life 20 hours.

Biodegradation: No degradation of Dimethyl Sulfoxide (%) was noted in a screening test using an activated sludge inoculum. Dimethyl Sulfoxide is considered to be very difficult to degrade in water, based on available data. The data used to make this classification were not indicated. A variety of microorganisms, including some that are found in anaerobic lake mud, have the ability to transform Dimethyl Sulfoxide to dimethyl sulfide.

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

12. ECOLOGICAL INFORMATION (Continued)

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. All releases to terrestrial, atmospheric and aquatic environments should be avoided. Additional aquatic toxicity data are available as follows:

DIMETHYL SULFOXIDE:

TLm (bluegill) 48 hours = 33,500 ppm; fresh water

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: Do NOT dispose of any solution of this product by pouring down the drain. 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.

EWC WASTE CODE: Wastes from research, diagnoses, treatment, or preventions of disease involving animals: chemicals other than containing dangerous substances: 18-02-06

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/ICAO (IATA/ICAO): 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 the 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 dangerous goods, per regulations of the Office of Road Safety.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The constituents in components of this product are not subject to Sections 302, 304, and 313 reporting requirements under the Superfund Amendment and Reauthorization Act.

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

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

U.S. TSCA INVENTORY STATUS: Some solutions of this product contain ingredients not included in the TSCA Inventory. In accordance with the conditions listed in 40 CFR 720.36 and 721.47, this product must be used only for research and development, pharmaceutical manufacture, or export. It must be used by, or directly under the supervision of, a technically qualified individual. The manufacturer should be consulted prior to using this product for other applications. Other requirements may apply.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

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

ANSI LABELING (Z129.1; Provided to Summarize Occupational Hazard Information):

DKP Termination Buffer: CAUTION! MAY CAUSE SENSITIZATION BY UNSPECIFIED ROUTE OF EXPOSURE. MAY CAUSE SKIN, EYE, AND RESPIRATORY TRACT IRRITATION. MAY CAUSE DISCOMFORT IF SWALLOWED. Do not taste or swallow. Avoid skin or eye contact. Avoid prolonged or repeated skin contact. Avoid breathing mists or sprays. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves and goggles. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention if necessary. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with polypads and place in suitable container. Consult Material Safety Data Sheet for additional information.

All Other Solutions: CAUTION! MAY CAUSE SKIN, EYE, AND RESPIRATORY TRACT IRRITATION. MAY CAUSE DISCOMFORT IF SWALLOWED. Do not taste or swallow. Avoid skin or eye contact. Avoid prolonged or repeated skin contact. Avoid breathing mists or sprays. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves and goggles. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention if necessary. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with polypads and place in suitable container. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: Some solutions of this product contain ingredients not included in the DSL/NDSL Inventory. This product must be used only for research and development purposes. The manufacturer should be consulted prior to using this product for other applications. Other requirements may apply.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL CANADIAN REGULATIONS (continued):

OTHER CANADIAN REGULATIONS: Not applicable.

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

CANADIAN WHMIS CLASSIFICATION AND SYMBOLS:

DKP Termination Buffer: D2B Materials Causing Other Toxic Effects (Contains sensitizer in greater than 1%)



All Other Solutions: Not applicable.

EUROPEAN UNION INFORMATION:

LABELING/CLASSIFICATION: This product does not meet the definition of any hazard class, as defined by EU Council Directive 67/548/EEC and subsequent directives. Caution; this preparation has not been fully tested.

FOR CONSTITUENTS:

All Constituents:

An official classification for these substances has not been published in Commission Directives 93/72/EEC, 94/69/EC, 96/56/EC, or 98/98/EC.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: Some solutions of this product contain ingredients not included in the AICS. Any chemical not included in AICS is regarded as a new industrial chemical unless it is outside the scope of the Industrial Chemicals (Notification and Assessment) Act 1989 OR is otherwise exempt from notification. New industrial chemicals must be notified and assessed before being manufactured or imported into Australia.

HAZARDOUS SUBSTANCES INFORMATION SYSTEM (HSIS): The constituents in this product's solutions are not listed in the HSIS.

CLASSIFICATION: This product does not meet the definition of any hazard class, as defined by the Australian National Occupational Health and Safety Commission [NOHSC (1008:2004)].

POISONS SCHEDULE NUMBER: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE ENCS: Some solutions of this product contain ingredients not included in the ENCS Inventory.

POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW: No constituent in this product's solutions is listed under the Poisonous and Deleterious Substances Control Law.

16. OTHER INFORMATION

PREPARED BY:

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