

JASCO MSDS

MATERIAL SAFETY DATA SHEET

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): JASCO TSP NO-RINSE SUBSTITUTE
CHEMICAL NAME/CLASS: Not applicable.
PRODUCT CODE: 0408-0410, 0408-30-12, 0410-30-04
PRODUCT USE: Cleaner/pre-paint preparation, various surfaces
SUPPLIER/MANUFACTURER'S NAME: HOMAX PRODUCTS, Inc.
ADDRESS: 200 Westerly Rd.
Bellingham, WA 98226
CHEMTREC EMERGENCY NO.: 1-800-424-9300 (United States)
1-703-527-3887 (International Collect)
BUSINESS PHONE: 1-800-729-9029
DATE OF PREPARATION: March 9, 2004

This product is sold to consumers for household use in containers of relatively small volume (i.e. 5 gallon or less in size). This MSDS has been developed to address safety concerns affecting those individuals working in warehouses and other places where large numbers of these containers are stored, as well as those affecting potential users of this product in industrial /occupational settings. All pertinent health, safety and environmental information have been presented in this document, per the requirements of the US Federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and Canadian WHMIS.

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR						
			ACGIH-TLV		OSHA-PEL		NIOSH-REL		
			TWA	STEL	TWA	STEL	TWA	STEL	IDLH
			ppm	ppm	ppm	ppm	ppm	ppm	ppm
Dimethyl glutarate	1119-40-0	10 - 30	NE	NE	NE	NE	NE	NE	NE
Dimethyl adipate	627-93-0	3 - 7	NE	NE	NE	NE	NE	NE	NE
Dimethyl succinate	106-65-0	3 - 7	NE	NE	NE	NE	NE	NE	NE
Ethoxylated octyl phenol	9063-89-2	1 - 5	NE	NE	NE	NE	NE	NE	NE
Monoethanolamine	141-43-5	.5 - 1.5	3	6	3	6	3	6	30
Water and ingredients present in concentrations of less than 1%(or less than 0.1% if carcinogens)		Balance	The ingredients in the balance of this product do not contribute significant hazards beyond those described in this document. All pertinent health, safety and environmental information have been presented, per the requirements of the US Federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and Canadian WHMIS.						

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

NOTE(1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 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.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:

PHYSICAL DESCRIPTION: This product is a green liquid with slight, ammonia odor.

HEALTH HAZARD: This product is harmful if swallowed or inhaled. This product may cause mild irritation to the eyes or skin. If vapors or mists of this product are inhaled, mild irritation of the nose or throat could occur.

FIRE HAZARD: This product does not significantly contribute to the intensity of a fire.

REACTIVITY HAZARD: The product is stable under ordinary conditions. This product is not compatible with strong acids, bases or oxidizers.

ENVIRONMENTAL HAZARD: This product does not normally present a significant hazard to aquatic or terrestrial life in consumer quantities.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:

The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are as follows:

INHALATION: Vapors, mists or sprays of this solution may cause irritation to the respiratory tract. Exposure to high concentrations may cause fatigue and difficulty breathing.

CONTACT WITH SKIN or EYES: Contact can cause mild eye or skin irritation. Symptoms of eye exposure may include redness, pain, tearing and blurred vision. Prolonged skin contact may result in redness and irritation. Symptoms are generally alleviated when overexposure ends.

SKIN ABSORPTION: No component of this product is reported to be absorbed through intact skin.

INGESTION: Though an unlikely route of occupational exposure, if this product is swallowed, gastric discomfort could occur. Symptoms of ingestion exposure include irritation of the throat, esophagus, and other tissues of the digestive system. Ingestion of large amounts may cause irritation, pain, vomiting and diarrhea. If vomiting results in aspiration, chemical pneumonia could follow.

INJECTION: Accidental injection of this product can cause burning, reddening, and swelling in addition to the wound. Symptoms of such exposure can include those described under "Inhalation", "Contact with Skin or Eyes," and "Ingestion".

Hazardous Materials Identification System (HMIS)

Health	2*
Flammability	1
Physical Hazard	0
Protective Equipment	C

See Section 16 for Definition of Ratings

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

ACUTE: Depending on the duration of contact, overexposures can severely irritate the eyes, skin, mucous membranes, and any other exposed tissue.

CHRONIC: Chronic over-exposure to this product may lead to severe dermatitis.

TARGET ORGANS: Acute: Eyes, skin. Chronic: skin.

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

4. FIRST-AID MEASURES

Victims of chemical exposure must be taken for medical attention if any adverse effects occur. Take a copy of label and MSDS to physician or health professional with victim.

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention if any adverse exposure symptoms develop.

4. FIRST-AID MEASURES - continued

EYE EXPOSURE: If this product enters the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek medical attention.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. Victim must seek immediate medical attention if any adverse exposure symptoms develop. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING, unless directed by medical personnel. Have victim rinse mouth with water, if conscious. Never induce vomiting or give a diluent (e.g., water) to someone who is unconscious, having convulsions, or unable to swallow. If contaminated individual is convulsing, maintain an open airway and obtain immediate medical attention.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Persons with pre-existing skin disorders, eye problems, impaired liver, kidney, respiratory or lymphoid system function can be more susceptible to health effects associated with overexposures to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure. Provide oxygen, if necessary. Pulmonary function tests, chest X-rays, and nervous system evaluations can prove useful. Consultation with an ophthalmologist is recommended if eye exposure leads to tissue damage.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower: Not applicable.

Upper: Not applicable.

FIRE EXTINGUISHING MATERIALS: This material will not significantly contribute to the intensity of a fire. Use extinguishing material suitable to the surrounding fire.

Water Spray: OK.

Carbon Dioxide: OK

Foam: OK

Dry Chemical: OK

Halon: OK

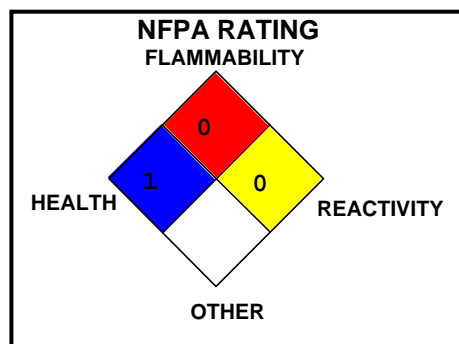
Other: Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may decompose and produce irritating fumes and toxic gases (e.g., Oxides of nitrogen, carbon monoxide, carbon dioxide)

Explosion Sensitivity to Mechanical Impact: Not sensitive under normal conditions.

Explosion Sensitivity to Static Discharge: Not sensitive under normal conditions.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move containers from fire area if it can be done without risk to personnel. Prevent product contamination with metal. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.



**See Section 16 for
Definition of Ratings**

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.

RESPONSE TO INCIDENTAL RELEASES: Personnel who have received basic chemical safety training can generally handle small-scale releases, such as 1 container of this product. Respond to incidental chemical releases by wearing gloves, goggles, and appropriate body protection.

RESPONSE TO NON-INCIDENTAL RELEASES: Respond to non-incident chemical releases of this product, such as the simultaneous puncturing of several containers, by clearing the impacted area and contacting appropriate emergency personnel. Clean up should only be done by qualified personnel. Responders should wear the level of protection appropriate to the type of chemical released, the volume of the material spilled, and the location where the incident has occurred. Minimum Personal Protective Equipment should be Level B: triple-gloves, chemical resistant apron, boots, and splash goggles and Self-Contained Breathing Apparatus. Level B should also be used when oxygen levels are below 19.5% or are unknown.

6. ACCIDENTAL RELEASE MEASURES - continued

RESPONSE EQUIPMENT AND PROCEDURES: Absorb spilled liquid with polypads or other suitable absorbent materials. Decontaminate the area thoroughly. Prevent spill rinsate from contamination of storm drains, sewers, soil or groundwater. Place all spill residues in a suitable container and seal. Dispose of in accordance with applicable U.S. Federal, State, or local procedures or appropriate standards of Canada (see Section 13, Disposal Considerations).

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

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after using this product. Do not eat or drink while using this material. Avoid generating mists and sprays of this product. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to use it safely. Open containers carefully on a stable surface. Empty containers may contain residual liquid; therefore, empty containers should be handled with care. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Keep container tightly closed when not in use. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

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

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: None needed under normal conditions of use. Use NIOSH approved respirators if ventilation is inadequate to control dusts, mists, fumes or vapors. Maintain airborne contaminate concentrations below guidelines listed in Section 2 (Composition and Information on Ingredients). Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres use of a full-face-piece pressure/demand SCBA or a full face-piece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (29 CFR 1910.134).

EYE PROTECTION: For consumer use, wearing eye protection (such as splash goggles) is advisable. However, for specific industrial applications, enhanced eye protection may be necessary. Use approved safety goggles or safety glasses, as described in OSHA 29 CFR 1910.133. If necessary, refer to U.S. OSHA 29 CFR 1910.133, or appropriate Canadian standards.

HAND PROTECTION: For consumer use, wearing protective gloves is recommended. For specific industrial applications, wear chemical impervious gloves (e.g., Neoprene, nitrile). If necessary, refer to U.S. OSHA 29 CFR 1910.138 or the appropriate standards of Canada.

BODY PROTECTION: For consumer use, no specific body protection is normally needed. For specific industrial applications, body protection is not normally needed. Use body protection appropriate for task (e.g., Tyvek suit, rubber apron). 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.

HMS PERSONAL PROTECTIVE EQUIPMENT RATING: Industrial Use situations: C (eye, hand and body protection).

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): > 1

SPECIFIC GRAVITY: 1.02

SOLUBILITY IN WATER: 25%

VAPOR PRESSURE, mm Hg @ 24°C: Not available.

ODOR THRESHOLD: 2.6 ppm (monoethanolamine)

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

V.O.C., less water and exempt: 1032 g/L

wt% VOC: 19.8%

APPEARANCE, ODOR AND COLOR: Green liquid with slight, ammonia odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance and odor of this product may act as warning properties in the event of an accidental release.

EVAPORATION RATE (water =1): approximately 1

MELTING/FREEZING POINT: < 32°F (0°C)

BOILING POINT: > 212°F (100°C)

pH: Not available.

10. STABILITY and REACTIVITY

STABILITY: Stable under normal circumstances of use and handling.

DECOMPOSITION PRODUCTS: Thermal decomposition of this product may generate carbon monoxide, carbon dioxide, ammonia, nitrogen oxides, and a variety of hydrocarbons.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is not compatible with strong oxidizers, strong bases, and strong acids; it will also be incompatible with all water-reactive materials.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid contact with incompatible chemicals.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology information is available for components greater than 1% in concentration.

The following data is available for Dimethyl adipate:

Intraperitoneal-Rat TDL₀:181 mg/kg (5-15D preg):Reproductive effects

Intraperitoneal-Rat TDL₀:362 mg/kg (5-15D preg):Teratogenic effects

Intraperitoneal-Rat LD₅₀:1809 mg/kg

The following data is available for Dimethyl succinate:

Oral-Rat LD₅₀:>5 g/kg

Skin-Rabbit, adult LD₅₀:>5 g/kg

The following data is available for Monoethanolamine:

Skin-Rabbit, adult 505 mg open Moderate irritation effects

Eye effects-Rabbit, adult 763 mg Severe irritation effects

Cytogenetic Analysis-Human: lym 100 mmol/L

Sister Chromatid Exchange-Human: lym 1 mmol/L

Oral-Rat TDL₀:500 mg/kg (female 6-15D post):Teratogenic effects

Oral-Rat LD₅₀:1720 mg/kg

Intraperitoneal-Rat LD₅₀:67 mg/kg

Subcutaneous-Rat LD₅₀:1500 mg/kg

Intravenous-Rat LD₅₀:225 mg/kg

Intramuscular-Rat LD₅₀:1750 mg/kg

Oral-Mouse LD₅₀:700 mg/kg

Intraperitoneal-Mouse LD₅₀:50 mg/kg

Skin-Rabbit, adult LD₅₀:1000 mg/kg

SUSPECTED CANCER AGENT: The following table summarizes the carcinogenicity listing for the components of this product. "NO" indicates that the substance is not considered to be, or suspected to be, a carcinogen by the listed agency.

CHEMICAL	IARC	NTP	NIOSH	ACGIH	OSHA	CA PROP 65
Dimethyl glutarate	NO	NO	NO	NO	NO	NO
Dimethyl adipate	NO	NO	NO	NO	NO	NO
Dimethyl succinate	NO	NO	NO	NO	NO	NO
Ethoxylated octyl phenol	NO	NO	NO	NO	NO	NO
Monoethanolamine	NO	NO	NO	NO	NO	NO

IRRITANCY OF PRODUCT: This product can be mildly irritating to contaminated tissue.

SENSITIZATION TO THE PRODUCT: The components of this product are not reported to be sensitizers.

TOXICOLOGICAL SYNERGISTIC PRODUCTS: None known.

11. TOXICOLOGICAL INFORMATION – continued

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

Mutagenicity: This product is not expected to produce mutagenic effects in humans when used as instructed.

Embryotoxicity: This product is not expected to produce embryotoxic effects in humans when used as instructed.

Teratogenicity: This product is not expected to cause teratogenic effects in humans when used as instructed.

Reproductive Toxicity: This product is not expected to cause reproductive effects in humans when used as instructed.

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

BIOLOGICAL EXPOSURES INDICES (BEIs): None.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: When released into the soil, this product is expected to evaporate. When released into the water, this product may biodegrade to a moderate extent. This product is not expected to significantly bioaccumulate. The following information is pertinent to the components of this product:

Monoethanolamine: Phytobacterium phosphoreum: EC₅₀ = 13.7 mg/L for 30 minutes Goldfish LC₅₀ = 179mg/L

Dimethyl glutarate 48 hour LC₅₀ (Daphnia): 112-150 mg/L
28 day closed bottle test: considered readily biodegradable (70% biodegradability in day 7)

Dimethyl adipate 48 hour LC₅₀(Daphnia): 112-150 mg/L
28 day closed bottle test: considered readily biodegradable (58% biodegradability in day 7)

Dimethyl succinate 48 hour LC₅₀(Daphnia): 112-150 mg/L
28 day closed bottle test: considered readily biodegradable (67% biodegradability in day 7)

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product can be harmful to terrestrial plant and animal life if large volumes of it are released into the environment. Refer to Section 11, "Toxicological Information", for specific animal data.

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product can be harmful to animal life if large volumes of it are released into an aquatic environment.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: **Consumer Waste:** Dispose of according to pertinent state and local household waste and requirements. **Industrial Use:** Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada.

EPA WASTE NUMBER: The specific RCRA codes depend on the exact nature of the discarded material.

14. TRANSPORTATION INFORMATION

THIS PRODUCT IS NOT HAZARDOUS PER 49 CFR 172.101, THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Not regulated.

HAZARD CLASS NUMBER and DESCRIPTION: Not regulated.

UN IDENTIFICATION NUMBER: Not regulated.

DOT LABEL(S) REQUIRED: Not regulated.

PACKAGING GROUP: Not regulated.

NORTH AMERICAN RESPONSE GUIDEBOOK NUMBER (2000): Not applicable.

MARINE POLLUTANT: No component is designated as a DOT Marine Pollutant.

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

NORTH AMERICAN RESPONSE GUIDEBOOK NUMBER (2000): Not applicable.

MARINE POLLUTANT: No component is designated as a DOT Marine Pollutant.

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

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

EPA REPORTING REQUIREMENTS: The following reporting requirements are applicable to components of this product:

CHEMICAL	SECTION 302 (40 CFR 355, Appendix A)	SECTION 304 (40 CFR Table 302.4)	SECTION 313 (40 CFR 372.65)
Dimethyl glutarate	No	No	No
Dimethyl adipate	No	No	No
Dimethyl succinate	No	No	No
Ethoxylated octyl phenol	No	No	No
Monoethanolamine	No	No	No

U.S. SARA SECTION 311/312 FOR PRODUCT: Acute health effects.

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

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Not regulated.

ANSI LABELING (Z129.1): Label Hazard Warning: CAUTION! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. EYE, SKIN AND RESPIRATORY TRACT IRRITANT.

Label Precautions: Do not breathe fumes, dusts, vapors or mist. Do not swallow or take internally. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Keep container closed. Use only in a well-ventilated area.

ENVIRONMENTAL HAZARDS: Do not discharge effluent containing this product into streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

ADDITIONAL CANADIAN REGULATIONS:

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

CANADIAN WHMIS SYMBOLS: **D2B: Poisonous and infectious materials – other effects – toxic**



This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

16. OTHER INFORMATION

PREPARED BY:

ADVANCED CHEMICAL SAFETY, Inc.
7563 Convoy Court
San Diego, CA 92111
(858)-874-5577
January 10, 2007

DATE OF PRINTING

DEFINITIONS OF TERMS

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

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

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

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 Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - 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.

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. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **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**). NIOSH issues exposure guidelines called **Recommended Exposure Levels (RELs)**. When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can cause permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. **LEL** - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. **UEL** - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, **LDo**, **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. Ecological Information: **EC** is the effect concentration in water.

Data from several sources are used to evaluate the cancer-causing potential of the material. The sources and ratings are: **IARC** - the International Agency for Research on Cancer; 1 = Carcinogenic to humans, 2A, 2B = Probably carcinogenic to humans, 3 = Unclassifiable as to carcinogenicity in humans, and 4 = Probably not carcinogenic to humans. **NTP** - the National Toxicology Program; K = Known to be a human carcinogen, and R = Reasonably anticipated to be a human carcinogen. **RTECS** - the Registry of Toxic Effects of Chemical Substances. **OSHA** - Occupational Safety and Health Administration and **CAL/OSHA** - California's subunit of the Occupational Safety and Health Administration; Ca = Carcinogen defined with no further categorization. **ACGIH** - American Conference of Governmental Industrial Hygienists; A1 = Confirmed human carcinogen, A2 = Suspected human carcinogen, A3 = Confirmed animal carcinogen with unknown relevance to humans, A4 = Not classifiable as a human carcinogen, and A5 = Not suspected as a human carcinogen. **NIOSH** - U.S. National Institute for Occupational Safety and Health; Ca = Potential occupational carcinogen, with no further categorization. **EPA** - U.S. Environmental Protection; A = Human carcinogen, B = Probable human carcinogen, C = Possible human carcinogen, D = Not classifiable as to human carcinogenicity, E = Evidence of Non-carcinogenicity for humans, K = Known human carcinogen, L = Likely to produce cancer in humans, CBD = Cannot be determined, NL = Not likely to be carcinogenic in humans, and I = Data are inadequate for an assessment of human carcinogenic potential.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDSL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA or Superfund**); and various state regulations. This section also includes information on the precautionary warnings that appear on a material's industrial package label.

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