



PALLABRITE MIRROR MATERIAL SAFETY DATA SHEET

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

1. PRODUCT IDENTIFICATION

<u>TRADE NAME (AS LABELED):</u>	PALLABRITE MIRROR
<u>CHEMICAL NAME/CLASS:</u>	Aqueous Solution
<u>SYNONYM:</u>	Not applicable
<u>PRODUCT USE:</u>	Jewelry Preparation
<u>SUPPLIER/MANUFACTURER'S NAME:</u>	Cohler Enterprises
<u>ADDRESS:</u>	101 N. Haven St. Baltimore, MD 21224
<u>24 HOUR EMERGENCY NO.:</u>	800-424-9300 (CHEMTREC)
<u>BUSINESS PHONE:</u>	410-342-1400
<u>DATE OF PREPARATION:</u>	March 25, 2008 (New)

This Material Safety Data Sheet (MSDS) has been developed to address safety concerns of those individuals working this product in industrial/occupational settings. All pertinent health, safety and environmental information has been presented based on ANSI Z400.1-2003, the US Federal OSHA Hazard Communication Standard (29 CFR 1910.1200), Canadian Workplace Hazardous Materials Information System (WHMIS) and Controlled Products Regulations (CPR), and the United Nations Globally Harmonized System (GHS) Standards.

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL DESCRIPTION: This product is clear, pale-pink liquid with a slight ammonia odor.

WARNINGS (per ANSI Z129.1)

WARNING! MAY CAUSE EYE AND SKIN IRRITATION. MAY BE HARMFUL IF SWALLOWED OR INHALED.

PRECAUTIONS (per ANSI Z129.1)

Target Organs: Skin, eyes. **Instructions:** Avoid contact with eyes and prolonged or repeated contact with skin. Avoid breathing mist or vapor. Do not taste or swallow. Use with adequate ventilation. Wear suitable eye and hand protection. Wash thoroughly after handling. Refer to Material Safety Data Sheet for additional information. **FIRST-AID:** **In case of contact:** Immediately flush eyes or skin with running water for at least 15 minutes while removing contaminated clothing and shoes. **If inhaled:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. **If swallowed:** If the victim is conscious, DO NOT induce vomiting. If victim is fully conscious, give cupful of water. Never give anything by mouth to an unconscious person. **For additional aid:** Get medical attention immediately if symptoms occur. Contact the U.S. Poison Control Center at 1-800-222-1222. **Note to Physician:** Treat symptoms.

2. HAZARDS IDENTIFICATION (continued)

ADDITIONAL PRECAUTIONS: Routine users of this product must take precautions to avoid eye and skin contact, as well as inhalation of vapors and mists of this product.

HAZARD SYMBOLS

HMIS: HAZARDOUS MATERIALS IDENTIFICATION SYSTEM:

Health	2
Flammability	0
Physical Hazard	0
Protective Equipment	B/C

HMIS PERSONAL PROTECTIVE EQUIPMENT RATING: Industrial Use situations: B: Safety glasses and gloves. C: Safety glasses, gloves, and body protection.

WHMIS: CANADIAN WORKPLACE HAZARDOUS MATERIALS IDENTIFICATION SYSTEM
SYMBOLS: D2-B: Materials Causing Other Toxic Effects/Toxic Material.

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.

GHS: UNITED NATIONS GLOBALLY HARMONIZED SYSTEM SYMBOLS: Skin irritation.
Eye irritation.



NFPA: NATIONAL FIRE PROTECTION ASSOCIATION:

OSHA REGULATORY STATUS

MSDS should be retained and available for employees and other users of this product. This material is classified as hazardous under OSHA regulations.

POTENTIAL HEALTH EFFECTS

The most significant routes of occupational overexposure to this product are inhalation and contact with skin and eyes. The symptoms of overexposure are described in the following sections.

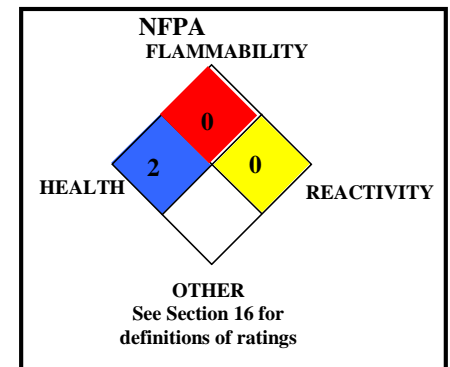
ACUTE EFFECTS

CONTACT WITH SKIN or EYES: Contact may cause eye or skin irritation. Eye contact can cause redness, pain, and tearing. Skin contact can result in redness and irritation. Prolonged or repeated skin contact can result in dermatitis.

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

INGESTION: If the product is swallowed, irritation of the mouth, throat, and other tissues of the gastro-intestinal system may occur. Ingestion of large amounts can cause irritation, pain, vomiting, and diarrhea.

INHALATION: Overexposure to mists or sprays of this product may cause irritation to the respiratory tract. Symptoms of such exposure can cause coughing, wheezing, and inflammation of the tissues of the nose, throat, and other respiratory system organs.



2. HAZARDS IDENTIFICATION (continued)

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".

CHRONIC EFFECTS: Prolonged or repeated exposures to this product may result in dermatitis, eczema, and other allergic skin reactions (depending on dose and route of exposure).

SIGNS AND SYMPTOMS OF OVEREXPOSURE: The primary symptoms of over-exposure include eye and skin irritation (redness or swelling). Coughing, sneezing, or other symptoms of respiratory system irritation may also occur. See Section 11: TOXICOLOGICAL INFORMATION.

POTENTIAL ENVIRONMENTAL EFFECTS

This product does not normally present a significant hazard to aquatic or terrestrial life in small quantities. 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. See Section 12: ECOLOGICAL INFORMATION.

3. MATERIAL IDENTIFICATION

CHEMICAL NAME	CAS #	% w/w
Palladium (II) Complex	Proprietary	< 5%
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.		

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.

FIRST AID PROCEDURES

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.

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 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.

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 and respiratory system conditions can be more susceptible to health effects associated with overexposures to this product.

NOTE TO PHYSICIANS

Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLAMMABLE PROPERTIES

This product is non-combustible. This product does not significantly contribute to the intensity of a fire. Use extinguishing material suitable to the surrounding fire. Not sensitive to mechanical impact under normal conditions. Not sensitive to static discharge under normal conditions.

EXTINGUISHING MEDIA

SUITABLE EXTINGUISHING MEDIA:

<u>Water Spray:</u>	OK	<u>Carbon Dioxide:</u>	OK
<u>Foam:</u>	OK	<u>Dry Chemical:</u>	OK
<u>Halon:</u>	OK	<u>Other</u>	Any "ABC" Class

UNSUITABLE EXTINGUISHING MEDIA: None known.

PROTECTION OF FIREFIGHTERS

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: When involved in a fire, this material can decompose and produce irritating fumes and toxic gases (e.g., carbon monoxide, carbon dioxide, and oxides of sulfur and nickel).

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS: 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. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. Isolate from incompatible chemicals (see Section 10: STABILITY AND REACTIVITY).

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS

Responders should wear the level of protection appropriate to the type of chemical released, the volume or amount of the material spilled, and the location where the incident has occurred. For large-scale releases of this product, minimum Personal Protective Equipment should be Level C: triple-gloves, chemical resistant apron, boots, and splash goggles and air purifying respirator equipped with a HEPA filter. Level B protection should be used when oxygen levels are below 19.5% or are unknown.

ENVIRONMENTAL PRECAUTIONS

Minimize use of water to prevent environmental contamination. Prevent spill or 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).

METHODS FOR CONTAINMENT

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.

METHODS FOR CLEAN-UP

Absorb spilled liquid with poly pads or other suitable absorbent materials. Triple rinse affected area with water. Decontaminate the area thoroughly. Decontaminate all spill response equipment after clean-up operations are concluded. Place all spill residue in an appropriate container and seal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations, or the appropriate standards of Canada and its provinces (see Section 13: DISPOSAL CONSIDERATIONS).

OTHER INFORMATION

US regulations require reporting spills of this material that could reach any surface waters. The toll-free phone number for the US Coast Guard National Response Center is 1-800-424-8802.

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

7. HANDLING and STORAGE

HANDLING

All employees who use this material should be trained to handle it safely. Avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Avoid breathing vapors, sprays or mists generated by this product. Use in a well-ventilated location. Do not eat, drink, smoke or use cosmetics while using this product. Use ventilation and other engineering controls to ensure exposure limits are below those stated in Section 8: EXPOSURE CONTROLS – PERSONAL PROTECTION. Remove contaminated clothing immediately.

Open containers slowly, on a stable surface. Containers of this product must be properly labeled. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care.

STORAGE

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). Material should be stored in secondary containers, or in a diked area, as appropriate. Keep container tightly closed when not in use. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

Follow practices indicated in Section 6: ACCIDENTAL RELEASE MEASURES. Make certain application equipment is locked and tagged-out safely. Decontaminate equipment: triple rinse with water before maintenance begins. Collect all rinsates and dispose of according applicable U.S. Federal, State, or local procedures or those of Canada and its Provinces.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE GUIDELINES

CHEMICAL NAME	CAS #	<u>Guideline</u>	<u>Value</u>
Palladium (II) Complex	Proprietary	Not applicable.	Not applicable.

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

ENGINEERING CONTROLS

Use with adequate ventilation to ensure exposure levels are maintained as low as practical.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

EYE/FACE PROTECTION: For specific industrial applications, enhanced eye protection is 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.

SKIN PROTECTION: For specific industrial applications, wear chemical impervious gloves (e.g., Neoprene or Nitrile). If necessary, refer to U.S. OSHA 29 CFR 1910.138 or the appropriate standards of Canada.

BODY PROTECTION: For routine industrial applications, chemically protective clothing is not normally needed. If splashes or sprays may be generated during the product's use, then wear chemically protective clothing appropriate for task (e.g., Tyvek suit, rubber apron).

RESPIRATORY PROTECTION: None needed under normal conditions of use or handling. Use NIOSH approved respirators if ventilation is inadequate to control mists or vapors. Maintain airborne contaminate concentrations below guidelines listed above. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres use of a full-face-piece pressure/demand Self-Contained Breathing Apparatus 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).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (continued)

GENERAL HYGIENE CONSIDERATIONS: The following general hygiene considerations are recognized as common good industrial practices to follow when using this product:

- Avoid contact with eyes.
- Avoid prolonged or repeated contact with skin.
- Avoid breathing mist or vapor.
- Do not taste or swallow.
- Keep container tightly closed.
- Use with adequate ventilation.
- Wear suitable eye and hand protection.
- Wash thoroughly after handling.

9. PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

<u>RELATIVE VAPOR DENSITY</u> (air = 1):	Not Available	<u>EVAPORATION RATE</u> (Water =1):	Approx. 1.0
<u>SPECIFIC GRAVITY:</u>	1.05 – 1.10	<u>MELTING/FREEZING POINT:</u>	Approx. 0°C (32°F)
<u>SOLUBILITY IN WATER:</u>	Soluble.	<u>BOILING POINT:</u>	Approx. 100°C (212°F)
<u>VAPOR PRESSURE</u> , mm Hg @ 20°C:	Approx. 17.5	<u>pH:</u>	5-7
<u>COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT)</u>			Not available.

PHYSICAL STATE, APPEARANCE AND COLOR This product is clear, pale-pink liquid with a slight ammonia odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): Color and odor are the primary warning properties for this solution.

CHEMICAL PROPERTIES

<u>ODOR THRESHOLD:</u>	Not applicable.
<u>VOC, less water and exempt:</u>	Not applicable.
<u>Weight % VOC:</u>	Not applicable.
<u>FLASH POINT:</u> Not applicable.	<u>AUTOIGNITION TEMPERATURE:</u> Not applicable.
<u>FLAMMABLE LIMITS (in air by volume, %):</u>	Not applicable.
<u>Lower:</u>	<u>Upper:</u>

10. STABILITY and REACTIVITY

CHEMICAL STABILITY

Stable under normal circumstances of use and handling.

CONDITIONS TO AVOID

Avoid contact with incompatible chemicals and exposure to extreme temperatures.

INCOMPATIBLE MATERIALS

This product is not compatible with strong oxidizers, strong reducing agents, acids, bases and water-reactive substances.

HAZARDOUS DECOMPOSITION PRODUCTS

Thermal decomposition of this product can generate irritating vapors and toxic gases (e.g., carbon monoxide, carbon dioxide, sulfur and metal-containing substances).

POSSIBILITY OF HAZARDOUS REACTIONS

This product is not expected to undergo hazardous polymerization, decomposition, condensation or self-reactivity.

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.

Palladium (II) Complex

LD₅₀ (oral, rat): 2704 mg/kg

LD₅₀ (IPR, rat): 70 mg/kg

LD₅₀ (IVN, rat): 3 mg/kg

LD₅₀ (oral, mouse): > 1000 mg/kg

LD₅₀ (IPR, mouse): 87 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; see section 16 for definition of other ratings.

CHEMICAL	IARC	NTP	NIOSH	ACGIH	OSHA	CA PROP 65
Palladium (II) Complex	No	No	No	No	No	No

ADDITIONAL TOXICOLOGY DATA

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

SENSITIZATION TO THE PRODUCT: Palladium compounds do not exhibit the sensitizing effect of Platinum analogs.

TOXICOLOGICAL SYNERGISTIC PRODUCTS: None.

11. TOXICOLOGICAL INFORMATION (continued)

REPRODUCTIVE TOXICITY INFORMATION: When used as directed, this product is not expected to cause any human reproductive effects. Listed below is information concerning the effects of this product's components obtained during clinical testing on microorganisms and/or human and animal tissues.

Mutagenicity: No component of this product is known to be a mutagen.

Embryotoxicity: No data are available for this product's components related to embryotoxic effects.

Teratogenicity: No component of this product is known to be a teratogen.

Reproductive Toxicity: No component of this product is suspected to cause reproductive harm.

*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): There are no BEI's established for any component of this product at this time.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ECOTOXICITY

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. This product may also be harmful to animal life if large volumes of it are released into an aquatic environment. No specific data are available for this product.

PERSISTENCE/DEGRADABILITY

No specific data are available for this product.

BIOACCUMULATION/ACCUMULATION

There is no accumulation data for any component of this product at this time.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Recover or recycle if possible. **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: Not applicable to wastes consisting only of this product; however, the specific RCRA codes depend on the exact nature of the discarded material.

14. TRANSPORTATION INFORMATION

BASIC SHIPPING DESCRIPTION

This product is not hazardous per 49 CFR 172.101, the U.S. Department of Transportation.

<u>PROPER SHIPPING NAME:</u>	Not Regulated
<u>HAZARD CLASS NUMBER and DESCRIPTION:</u>	Not Regulated
<u>UN IDENTIFICATION NUMBER:</u>	Not Regulated
<u>DOT LABEL(S) REQUIRED:</u>	Not Regulated
<u>PACKAGING GROUP:</u>	Not Regulated
<u>NORTH AMERICAN RESPONSE GUIDEBOOK NUMBER (2000):</u>	Not Regulated
<u>MARINE POLLUTANT:</u>	No component is designated as a DOT Marine Pollutant.

14. TRANSPORTATION INFORMATION (Continued)

ADDITIONAL INFORMATION

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

UPS GUIDE FOR SHIPPING GROUND and AIR HAZARDOUS MATERIALS: This product not is hazardous for UPS Shipment.

<u>PROPER SHIPPING NAME:</u>	Not Regulated
<u>HAZARD CLASS NUMBER and DESCRIPTION:</u>	Not Regulated
<u>UN IDENTIFICATION NUMBER:</u>	Not Regulated
<u>LABEL(S) REQUIRED:</u>	Not Regulated
<u>PACKAGING GROUP:</u>	Not Regulated

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS

U.S. E.P.A. REPORTING REQUIREMENTS: The following reporting requirements are applicable to components of this product:

<u>CHEMICAL</u>	<u>SECTION 302 EHS (TPQ) (40 CFR 355, Appendix A)</u>	<u>SECTION 304 RQ (40 CFR Table 302.4)</u>	<u>SECTION 313 TRI (threshold) (40 CFR 372.65)</u>
Palladium (II) Complex	No	No	No

U.S. E.P.A. SARA SECTION 311/312 CATEGORIES FOR PRODUCT: Acute health effects.

U.S. E.P.A. 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): None

UNITED NATIONS GLOBAL HARMONIZATION SYSTEM WARNINGS

Signal Word: WARNING!

Classification: Acute Toxicity – Category 5;

Hazard Statement: Causes eye and skin irritation. May be harmful if swallowed or inhaled.

Precautionary Statements: **Prevention:** Wear protective gloves. Avoid breathing mist/vapors/sprays. Contaminated clothing should not be allowed out of the workplace. **Response:** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical attention. Wash hands have handling. IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash develops, seek medical advice. Wash contaminated clothing before reuse.

Storage: Store in a cool place. **Disposal:** Dispose of container in accordance with national, state, and local regulations. Symbols: See SECTION2: HAZARDS IDENTIFICATION.

ADDITIONAL CANADIAN REGULATIONS

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

16. OTHER INFORMATION

PREPARED BY:	ADVANCED CHEMICAL SAFETY, Inc. 7563 Convoy Court San Diego, CA 92111 (858)-874-5577
DATE OF PRINTING	March 31, 2008

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of the most commonly used ones are defined below.

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 can 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.

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.

OEL - Occupational Exposure Level - In some cases, specific exposure guidelines have been assigned by industry. These are referred to as "Occupational Exposure Levels."

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 can be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). An "*" indicates that the health hazard is chronic. 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]). Physical 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; **TD₀**, **LDLo**, **LD₀**, **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/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 that appear on a material's industrial package label.