

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **CO-BRA BOND® REPLENISHER A**
CHEMICAL NAME/CLASS: Sulfuric Acid Solution
PRODUCT CODE NUMBER: 4034
PRODUCT USE: Printed Wiring Board Chemistry
SUPPLIER/MANUFACTURER'S NAME: **ELECTROCHEMICALS, Inc.**
ADDRESS: 5630 Pioneer Creek Drive
Maple Plain MN 55359
EMERGENCY PHONE: 1-800-424-9300 (**CHEMTREC**) - 24 hours
BUSINESS PHONE: 763-479-2008
DATE OF REVISION: December 5, 2006

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		IDLH mg/m ³	OTHER mg/m ³
			TLV mg/m ³	STEL mg/m ³	PEL mg/m ³	STEL mg/m ³		
Proprietary Compound		10-20%	NE	NE	NE	NE	NE	DFG MAK: 1000 mg/m ³ (C)
Sulfuric Acid	7664-93-9	0-10	1 (strong inorganic acid mist: A2 (Suspected Human Carcinogen)	3	1	NE	15	NIOSH REL; TWA = 1 DFG MAK; TWA = 1 Carcinogen: Mist - IARC-1
Water and other components. Each of the other components are 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 components contribute significant additional hazards at the concentrations present in this product. All pertinent hazard information has been provided in this document, per the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards and Canadian Workplace Hazardous Materials Identification System Standards (CPR 4).					

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

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This is a clear to light-brown, odorless solution. This solution is corrosive and can irritate, redden, and damage exposed tissue. Though the product is not flammable nor reactive, if involved in a fire, the product can decompose to release phosphorous oxides, sulfur oxides, and acidic vapors. Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational overexposure are inhalation, and contact with skin and eyes. The symptoms of over-exposure to this product, via route of entry, are as follows:

INHALATION: If mists or sprays of this solution are inhaled, this product may cause pulmonary irritation, irritation of the mucus membranes, coughing, and a sore throat. Damage to the tissues of the respiratory system may occur, especially after prolonged overexposures or exposures to high concentrations of mists or sprays of this solution. Pulmonary edema, chemical pneumonitis, and other adverse health consequences may occur after severe overexposures. Additional inhalation symptoms may include the following: laryngitis, headache, nausea, and vomiting.

CONTACT WITH SKIN or EYES: Contact with the eyes will cause irritation, pain, reddening and possibly, blindness. Skin contact may cause reddening, discomfort, and irritation. Skin contact can also cause chemical burns, blistering of the skin and possible scarring. Prolonged or repeated skin overexposures may result in dermatitis (reddening and inflammation of the skin).

SKIN ABSORPTION: Skin absorption is not a significant route of exposure for any component of this product.

INGESTION: Ingestion is not anticipated to be a likely route of exposure to this product. If ingestion does occur, irritation and burns of the mouth, throat, esophagus, and other tissues of the digestive system will occur immediately upon contact. Symptoms of such over-exposure can include nausea, vomiting, diarrhea. Ingestion of large volumes of this product may be fatal.




INJECTION: Accidental injection of this product, via laceration or puncture by a contaminated object, may cause pain and irritation in addition to the wound.

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

ACUTE: This solution is corrosive and can be severely irritating and damaging to eyes, skin, mucous membranes, and any other exposed tissue. Skin contact can cause chemical burns, blisters, and cars; eye contact may cause blindness. If inhaled, irritation of the respiratory system may occur, with coughing, and breathing difficulty. Severe overexposures by inhalation and ingestion may be fatal.

CHRONIC: Persistent irritation and dermatitis (reddening and inflammation of the skin) may result from repeated exposures to this solution. See Section 11 (Toxicological Information) for additional information.

TARGET ORGANS: Respiratory system, skin, eyes.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	3
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			D
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		
For routine applications.			

See Section 16 for Definition of Ratings

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

4. FIRST-AID MEASURES

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention.

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

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

4. FIRST-AID MEASURES (Continued)

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Victim should drink milk, egg whites, or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to health professional with victim.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not flammable.

FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES

Foam: YES

Halon: YES

Carbon Dioxide: YES

Dry Chemical: YES

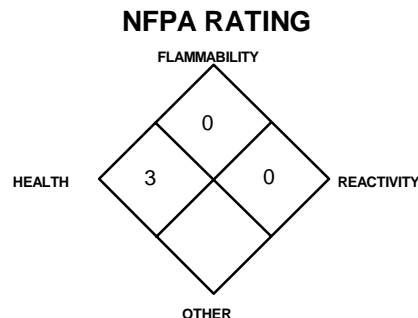
Other: Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is corrosive and presents a contact hazard to firefighters. Though this product is not flammable, Sulfuric Acid (a component of this product) can react with most metals to produce flammable hydrogen gas. When involved in a fire, this material may decompose and release toxic gasses (including carbon oxides, sulfur oxides, and acidic vapors).

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Chemical resistant clothing may be necessary. Responders must protect all downwind exposures from inhalation of the acid mist or vapors. Move containers from fire area if it can be done without risk to personnel. Water fog or spray can also be used by trained fire-fighters to disperse this product's vapors and to protect personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. Rinse contaminated equipment thoroughly with sodium bicarbonate solution (or another neutralizer for acids) before returning such equipment to service.



**See Section 16 for
Definition of Ratings**

6. ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people.

For small releases, clean-up spilled liquid wearing gloves, goggles, faceshield, and suitable body protection. The minimum Personal Protective Equipment recommended for response to non-incident releases should be **Level B: triple-gloves (neoprene gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard-hat, and Self-Contained Breathing Apparatus.**

Monitor the area for vapors of this product's components and the level of oxygen. Monitoring must indicate that exposure levels are below those provided in Section 2 (Composition and Information on Ingredients) and that oxygen levels are above 19.5% before anyone is permitted in the area without Self-Contained Breathing Apparatus.

Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue with sodium bicarbonate or other neutralizing agent for acids. Decontaminate the area thoroughly. Test area with litmus paper to ensure neutralization. Place all spill residue in a suitable container. Dispose of in accordance with applicable U.S. Federal, State, or local procedures, or appropriate Canadian standards (see Section 13, Disposal Considerations).

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

7. HANDLING and STORAGE

WORK AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

7. HANDLING and STORAGE (Continued)

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Keep container tightly closed when not in use. If this product is transferred into another container, only use portable containers and dispensing equipment (faucet, pump, drip can) approved for corrosive, acidic liquids.

Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Storage areas should be made of corrosion resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate.

Empty containers may contain residual liquid or vapors which are corrosive; therefore, empty containers should be handled with care. Never store food, feed, or drinking water in containers which held this product.

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 and 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), if applicable. Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients), if applicable. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the appropriate standards of Canada and its Provinces. Use supplied air respiration protection if oxygen levels are below 19.5% or are unknown.

EYE PROTECTION: Splash goggles or safety glasses. Wear face shields when using more than 1 gallon of solution.

HAND PROTECTION: Wear Neoprene Rubber or Vinyl gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task. An apron, or other impermeable body protection is suggested. Full-body chemical protective clothing is recommended for emergency response procedures.

9. PHYSICAL and CHEMICAL PROPERTIES

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

SPECIFIC GRAVITY (water = 1): 1.08

SOLUBILITY IN WATER: Complete soluble.

VAPOR PRESSURE, mm Hg @ 20 °C: Approximately 18

ODOR THRESHOLD: Not Available.

LOG WATER/OIL DISTRIBUTION COEFFICIENT: Not available.

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

FREEZING/MELTING POINT: < 0°C

BOILING POINT: Approximately 100°C

pH: < 2

APPEARANCE AND COLOR: This product is clear to light-brown, odorless solution.

HOW TO DETECT THIS SUBSTANCE (warning properties): Litmus paper will turn red upon contact with this solution.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Carbon oxides, sulfur oxides, and acidic vapors.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This solution is incompatible with strong bases and metals. This solution would also be incompatible with water-reactive materials.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for components greater than 1 percent in concentration are provided below.

PROPRIETARY COMPOUND:

Standard Draize test - skin - rabbit: 500 mg/24 hours: Mild

Standard Draize test - eye: Rodent - rabbit: 500 mg/24 hours: Mild

LDLo: Intravenous - rat: 22 gm/kg: Cardiac - arrhythmias; Vascular - BP lowering not characterized in autonomic section; Kidney, Urethra, Bladder - hematuria

TCLo: Inhalation - rat: 567 mg/m³/6 hours/2 weeks (intermittent): Lungs, Thorax, or Respiration - changes in lung weight
Nutritional and Gross Metabolic - weight loss or decreased weight gain

SULFURIC ACID:

Standard Draize test: eye - rabbit: 250 µg: Severe

Rinsed with water: eye - rabbit: 5 mg/30 seconds: Severe

SULFURIC ACID (continued):

LDLo: Unreported - man: 135 mg/kg

LD₅₀: Oral - rat: 2140 mg/kg

LC₅₀: Inhalation - rat: 510 mg/m³/2 hours

LC₅₀: Inhalation - mouse: 320 mg/m³/2 hours

LC₅₀: Inhalation - guinea pig: 18 mg/m³

TCLo: Inhalation - Human: 3 mg/m³/24 weeks: Musculoskeletal - changes in teeth and supporting structures

TCLo: Inhalation - rat: 784 µg/m³/24 hours/84 days (continuous): Behavioral: muscle contraction or spasticity; Kidney, Urethra, Bladder: other changes in urine composition; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: true cholinesterase

SULFURIC ACID (continued):

TCLo: Inhalation - dog: 900 µg/m³/21 hours/89 weeks (intermittent): Cardiac: changes in heart weight; Lungs, Thorax, or Respiration: other changes; Lungs, Thorax, or Respiration: changes in lung weight

TCLo: Inhalation - monkey: 2 mg/m³/23 hours/78 weeks (intermittent): Lungs, Thorax, or Respiration: other changes

TCLo: Inhalation - guinea pig: 30 mg/m³/7 days (continuous): Lungs, Thorax, or Respiration - acute pulmonary edema; Related to Chronic Data: death

TCLo: Inhalation - rabbit: 20 mg/m³/7 hours: female 6-18 day(s) after conception: Reproductive: Specific Developmental Abnormalities: musculoskeletal system

Cytogenetic analysis: hamster Ovary: 4 mmol/L

SUSPECTED CANCER AGENT: Sulfuric Acid (Strong Inorganic Acid Mist) is listed as follows:

ACGIH - A2: Suspected Human Carcinogen

IARC - 1: Confirmed Human Carcinogen

The other components of this solution are not found on the following lists: U.S. FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA and, therefore, are not considered to be, nor suspected to be, a cancer causing agent by these agencies.

IRRITANCY OF PRODUCT: This product is irritating to contaminated tissue, especially after prolonged contact.

SENSITIZATION OF PRODUCT: This product contains no known sensitizer.

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 reported to cause mutagenic effects in humans. Animal mutation data are reported for Sulfuric Acid (a component of this product); this data was obtained during clinical studies involving animals exposed to relatively high doses of this compound.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans. Animal embryotoxicity data are reported for Sulfuric Acid (a component of this product); this data was obtained during clinical studies involving animals exposed to relatively high doses of this compound.

Teratogenicity: This product is not reported to cause teratogenic effects in humans; however, clinical studies on test animals exposed to relatively high doses of Sulfuric Acid (a component of this product) indicate teratogenic effects.

Reproductive Toxicity: This product is not reported to cause reproductive toxicity effects in humans.

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

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions or disorders involving the "Target Organs" (see Section 3, "Hazard Identification") may be aggravated by overexposure to vapors or mists of this product.

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

ACGIH BIOLOGICAL EXPOSURE INDICES: Currently there are no ACGIH Biological Exposure Indices (BEIs) associated with the components of this product.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of this product will decompose to release water, oxygen and salts of sulfur, carbon compounds.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Due to its corrosive properties, this solution can be harmful to plant and animal life if released into the environment.

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product can substantially lower the pH of an aquatic environment and can be extremely toxic to fish and aquatic plants. Also, due to its corrosive properties, this solution can adversely affect aquatic environments if large quantities are released into water. Additional aquatic toxicity data are available as follows:

PROPRIETARY COMPOUND: Toxic to fishes.

SULFURIC ACID:

TLm (*Gambusia affinis*, mosquito fish) 48 hours = 42 mg/L/ turbid water

Acute Hazard Level: pH = 4.5; fish survive; pH = 5.5, other aquatic lifeforms survive

Chronic Hazard Level: Harmless concentrations have been reported as below 3.68 ppm/ distilled/ 1 month/ bluegills; 17 ppm/ soft/ 4 days/ goldfish; 20 ppm/ 24 hours/ minnows; 100 ppm/ hard/ goldfish

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada and its Provinces. 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.

U.S. EPA WASTE NUMBER: D002 (Characteristic/Corrosive), applicable to wastes consisting only of this solution.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS, PER THE U.S. DEPARTMENT OF TRANSPORTATION (49 CFR 172.101).

PROPER SHIPPING NAME: Sulfuric Acid Solution

HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)

UN IDENTIFICATION NUMBER: UN 2796

PACKING GROUP: II

DOT LABEL(S) REQUIRED: Corrosive

EMERGENCY RESPONSE GUIDE NUMBER (2004): 157

MARINE POLLUTANT: This product does not contain any products which are designated by the Department of Transportation to be Marine Pollutants as per 49 CFR 171.101, Appendix B.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Refer to the information above for Canadian Shipments.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

SARA REPORTING REQUIREMENTS: This product is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Sulfuric Acid	Yes	Yes	Yes (Aerosol Form Only)

U.S. SARA THRESHOLD PLANNING QUANTITY: Sulfuric Acid = 5000 LB.

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

U.S. CERCLA REPORTABLE QUANTITY (RQ): Sulfuric Acid = 1000 lb.

15. REGULATORY INFORMATION (Continued)

U.S. STATE REGULATORY INFORMATION: The components of this solution are covered under these specific U.S. State regulations:

Alaska - Designated Toxic and Hazardous Substances: Sulfuric Acid.

California - Permissible Exposure Limits for Chemical Contaminants: Sulfuric Acid.

Florida - Substance List: Sulfuric Acid.

Illinois - Toxic Substance List: Sulfuric Acid.

Kansas - Section 302/313 List: Sulfuric Acid.

Massachusetts - Substance List: Sulfuric Acid.

Michigan - Critical Materials Register: None.

Minnesota - List of Hazardous Substances: Sulfuric Acid.

Missouri - Employer Information/Toxic Substance List: Sulfuric Acid.

New Jersey - Right to Know Hazardous Substance List: Sulfuric Acid.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: Sulfuric Acid.

Pennsylvania - Hazardous Substance List: Sulfuric Acid.

Rhode Island - Hazardous Substance List: Sulfuric Acid.

Texas - Hazardous Substance List: Sulfuric Acid.

West Virginia - Hazardous Substance List: Sulfuric Acid.

Wisconsin - Toxic and Hazardous Substances: Sulfuric Acid.

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

ANSI LABELING (Z129.1): **DANGER!** CAUSES SEVERE BURNS TO SKIN AND EYES. MAY BE FATAL IF INHALED OR SWALLOWED. Do not get on skin or in eyes. Avoid breathing mists and sprays. Do not take internally. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, face shield, appropriate body protection and NIOSH/MSHA-approved respiratory protection, as appropriate. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material or acid-neutralizing agent and place in suitable container. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

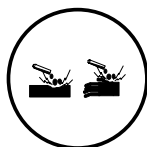
CANADIAN DSL/NDL INVENTORY STATUS: The components of this product are listed on the DSL Inventory.

OTHER CANADIAN REGULATIONS: Not applicable.

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

CANADIAN WHMIS SYMBOLS:

Class E: Corrosive Material.



16. OTHER INFORMATION

PREPARED BY: Electrochemicals, Inc.

DATE OF PRINTING: December 5, 2006

All statements, technical information and recommendations herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. **THE FOLLOWING IS MADE IN LIEU OF ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE.** Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risks and liability whatsoever in connection therewith.

NEITHER SELLER NOR MANUFACTURER SHALL BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, DIRECT, INCIDENTAL OR CONSEQUENTIAL, ARISING OUT OF THE USE OR THE INABILITY TO USE THE PRODUCT.

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 which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which 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 which 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: This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards. Health Hazard: **0** (minimal 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 result in 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). PPE Rating D: Hand, eye, face, and body protection is required for routine chemical use.

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 causes 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:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. **Ecological Information:** EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. **TL_m** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **U.S.:** **EPA** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA:** **CEPA** is the Canadian Environmental Protection Act. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDL** are the Canadian Domestic/Non-Domestic Substances Lists.