

## SULFURIC ACID MATERIAL SAFETY DATA SHEET

### SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

**Product Identity:** Sulfuric Acid (93 percent)

**Manufacturer:**

Teck Cominco Metals Ltd.  
Trail Operations  
Trail, British Columbia  
V1R 4L8  
Emergency Telephone: 250-364-4214

**Supplier:**

Teck Cominco American Incorporated  
Industrial Chemicals  
15918 East Euclid Avenue  
P.O. Box 3087  
Spokane, WA 99216-1815

**MSDS Preparer:**

Teck Cominco Metals Ltd.  
600 - 200 Burrard Street  
Vancouver, British Columbia  
V6C 3L9

**Date of Last Review/Edit:** December 15, 2003.

**Product Use:** Used in the manufacturing of chlorine dioxide (a pulp and paper bleaching chemical), in the manufacturing of phosphate and sulphate fertilizers, in the manufacturing of metal sulfates, as a metal pickling chemical and as a component of lead storage batteries.

### SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	C.A.S. Number	Occupational Exposure Limits (OELs)	LD <sub>50</sub> / LC <sub>50</sub> Species and Route
Sulfuric Acid	93	7664-93-9	OSHA PEL 1 mg/m <sup>3</sup> ACGIH TLV 1 mg/m <sup>3</sup> NIOSH REL 1 mg/m <sup>3</sup>	LD <sub>50</sub> orl-rat 2140 mg/kg LC <sub>50</sub> ihl-rat 510 mg/m <sup>3</sup> /2H LC <sub>50</sub> ihl-mouse 320 mg/m <sup>3</sup> /2H

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit, PEL – Permissible Exposure Limit, TLV – Threshold Limit Value, REL – Recommended Exposure Limit.

**Trade Names and Synonyms:** Oil of vitriol, electrolyte acid, battery acid, matting acid, H<sub>2</sub>SO<sub>4</sub>.

### SECTION 3. HAZARDS IDENTIFICATION

**Emergency Overview:** A strong mineral acid present as a colorless and odorless oily liquid when pure but may appear yellow to dark brown when impure. Extremely corrosive to all body tissues, causing rapid tissue destruction and serious chemical burns. Skin or eye contact requires immediate first aid. Can decompose at high temperatures forming toxic gases such as sulfur oxides. Non-flammable but reacts violently with water generating large amounts of heat with potential for spattering of the acid. Can react with combustible materials to generate heat and ignition. Reacts with most metals, particularly when diluted with water, to form flammable hydrogen gas which may create an explosion hazard. It is highly toxic to aquatic organisms and plant life.

**Potential Health Effects:** Sulfuric acid is not very volatile and workplace exposures are therefore primarily due to accidental splashes or to processes or actions that generate an acid mist. It is extremely corrosive to all body tissues, causing rapid tissue destruction and serious chemical burns on contact with the skin or eyes. Skin or eye contact requires immediate first aid. Inhalation of sulfuric acid mist or fumes may produce irritation of the nose, throat and respiratory tract. High levels of acid mist are also irritating to the skin and eyes. Chronic inhalation of acid mist may cause pitting and erosion of tooth enamel. Sulfuric acid is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. IARC, the ACGIH and the NTP have concluded there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic or potentially carcinogenic to humans. (see Toxicological Information, Section 11)

**Potential Ecological Effects:** It is highly toxic to aquatic organisms and plant life but does not bioaccumulate or concentrate in the food chain. (see Ecological Information, Section 12)

**EU Risk Phrase:** R35 - Causes severe burns.

## SECTION 4. FIRST AID MEASURES

**Eye Contact:** Immediately flush with warm, running water, including under the eyelids, for at least 15 minutes. Seek medical attention immediately. Flushing must begin immediately if permanent eye tissue damage is to be avoided.

**Skin Contact:** Immediately remove contaminated clothing and footwear under shower and thoroughly flush affected area. Seek immediate medical attention. Discard contaminated clothing, shoes and leather goods (e.g. watch bands, belts, etc.).

**Inhalation:** Remove victim from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Medical oxygen may be administered, if available, where breathing is difficult. Seek medical attention immediately.

**Ingestion:** If victim is conscious and can swallow, dilute stomach contents with 2 to 4 cupfuls of water or milk. Do not induce vomiting. Seek medical attention immediately and bring a copy of this MSDS. Never give anything by mouth to an unconscious person.

## SECTION 5. FIRE FIGHTING MEASURES

**Fire and Explosion Hazards:** Sulfuric acid is not flammable or combustible. However, fires may result from the heat generated by contact of concentrated sulfuric acid with combustible materials. Sulfuric acid reacts with most metals, especially when diluted with water, to produce hydrogen gas which can accumulate to explosive concentrations inside confined spaces. It reacts violently with water and organic materials evolving a considerable amount of heat and is very hazardous when in contact with carbides, cyanides, and sulfides.

**Extinguishing Media:** Use dry chemical or carbon dioxide extinguishers. Use water spray to cool fire-exposed containers. Use water only if absolutely necessary and DO NOT USE WATER DIRECTLY ON ACID as a violent reaction may occur resulting in spattering of the acid.

**Fire Fighting:** Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask. For fires close to a spill or where vapors are present, use acid-resistant personal protective equipment.

**Flashpoint and Method:** Not Applicable.

**Upper and Lower Flammable Limit:** Not Applicable.

**Autoignition Temperature:** Not Applicable.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

**Procedures for Cleanup:** Control source of release if possible to do safely. Contain spill, isolate hazard area, and deny entry to unauthorized personnel. Dike area around spill and pump uncontaminated acid back to process if possible. Neutralize spilled material with alkali such as sodium carbonate or sodium bicarbonate, soda ash, lime or limestone granules. If neutralized with lime rock or soda ash, good ventilation is required during neutralization because of the release of carbon dioxide gas. Allow to stand for 1-2 hours to complete neutralization, then absorb any liquid in solid absorbent such as vermiculite or clay absorbents. Place spilled material in suitable labeled containers for final disposal. Treat or dispose of waste spilled material and/or contaminated absorbent material in accordance with all local, regional and national regulations.

**Personal Precautions:** Acid resistant protective clothing and gloves. Sleeves and pant legs should be worn outside, not tucked into gloves and rubber boots. Use close-fitting safety goggles or a combination of safety goggles and a face shield where splashing is a possibility. Respiratory protection equipment should be worn where exposure to hazardous levels of mist or fume is possible.

**Environmental Precautions:** This product can pose a threat to the environment. Contamination of soil and water should be prevented. Keep spillage from entering ground, streams or sewers.

## SECTION 7. HANDLING AND STORAGE

Store in a dry, cool, well-ventilated area away from incompatible substances. Keep in tightly closed containers which are appropriately labeled. Do not allow contact with water. Do not store near alkaline substances. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking.

**EU Safety Phrase(s):** S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice; S30 - never add water to this product; S45 – In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).

## SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Protective Clothing:** Protective clothing and gloves as well as glasses, goggles or face shield. Appropriate protective clothing should be worn where any possibility exists that skin contact can occur. Use close-fitting safety goggles or a combination of safety goggles and a face shield where any possibility exists that eye contact can occur. An eyewash and quick drench should be provided. Workers should wash immediately when skin becomes contaminated and at the end of each work shift.

**Ventilation:** Use adequate local or general ventilation to maintain the concentration of sulfuric acid aerosol mists below recommended occupational exposure limits.

**Respiratory Protection:** Where sulfuric acid mists are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a combination of a 42CFR84 Class N, R or P-100 particulate filter and an acid gas cartridge). Note: sulfuric acid mist also causes eye irritation at high concentrations and a full face respirator or supplied air respirator may be necessary in some cases.

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance:</b> Clear, Colorless, Oily Liquid	<b>Odor:</b> Odorless when cold	<b>Physical State:</b> Liquid	<b>pH:</b> Concentration dependant <0.1 (93% Sol'n), 0.3 (5% or 1N Sol'n)
<b>Vapor Pressure:</b> <0.04 kPa (<0.3 mm Hg) @ 25°C	<b>Vapor Density:</b> 3.4 (air = 1)	<b>Boiling Point/Range:</b> 280°C	<b>Freezing/Melting Point/Range:</b> -35°C
<b>Specific Gravity:</b> 1.84	<b>Evaporation Rate:</b> Not Applicable	<b>Coefficient of Water/Oil Distribution:</b> No Data Available	<b>Odor Threshold:</b> > 1 mg/m <sup>3</sup>
<b>Solubility in Water:</b> Completely soluble with generation of heat			

## SECTION 10. STABILITY AND REACTIVITY

**Stability & Reactivity:** Stable under normal temperatures and pressures. Decomposes at 340°C into sulfur trioxide and water. Extremely reactive with metals, alkalis and many other organic and inorganic chemicals. Hazardous gases such as hydrogen cyanide, hydrogen sulfide and acetylene are evolved on contact with chemicals such as cyanides, sulfides and carbides. Contact with combustible organic matter may cause fire or explosion. Dilution with water generates excessive heat and spattering or boiling may occur. Always add acid to water, NEVER ADD WATER TO ACID.

**Incompatibilities:** Combustible materials, organic materials, oxidizers, amines, bases, water, excess heat, and metals.

**Hazardous Decomposition Products:** Sulfur dioxide, sulfur trioxide.

## SECTION 11. TOXICOLOGICAL INFORMATION

**General:** Concentrated sulfuric acid exerts a strong corrosive action on all tissues due to its severe dehydration action (removing water from tissues). The severity of the chemical burn produced by the concentrated acid is proportional to the strength of the acid and the duration of contact. Burns are deep but typically not severely painful. Prolonged exposure to dilute solutions or acid mists may lead to irritation of the eyes and skin causing chronic conjunctivitis and dermatitis. Inhalation of sulfuric acid mist or fumes may result in irritation of the respiratory tract possibly leading to laryngeal spasm. Asthmatics may be more sensitive to inhaling sulfuric acid mists. IARC and the ACGIH have concluded there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic or potentially carcinogenic to humans.

**Acute:**

**Skin/Eye:** Splashes can cause severe eye burns and may cause irreversible eye injury and possible blindness. Skin contact results in severe burns and may result in permanent scarring. High levels of sulfuric acid mists and aerosols are also irritating to the eyes and skin.

**Inhalation:** Inhalation may cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath, laryngeal spasm and delayed lung edema. These symptoms may be aggravated by physical exertion.

**Ingestion:** Ingestion is unlikely in industrial use but will result in severe burns to the mouth, throat, esophagus and stomach which could lead to permanent damage to the digestive tract. Small amounts of acid can also enter the lungs during ingestion or subsequent vomiting and cause serious lung injury.

**Chronic:** Prolonged exposure to dilute solutions or mists may result in eye irritation (chronic conjunctivitis) and produce skin dermatitis. Exposure to high concentrations of acid mist has caused erosion and discoloration of the anterior teeth. Sulfuric acid is not listed as a carcinogen by OSHA, National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), ACGIH or the EU. IARC has concluded that there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans, resulting in an increased incidence of primarily laryngeal cancers. The ACGIH lists strong inorganic acid mists containing sulfuric acid as a suspect human carcinogen (A2) and the NTP have recently re-classified strong inorganic acid mists containing sulfuric acid to a known human carcinogen. OSHA and the EU do not list sulfuric acid mist as a carcinogen.

## SECTION 12. ECOLOGICAL INFORMATION

Sulfuric acid is very corrosive and is highly toxic to aquatic and terrestrial life at low concentrations.

## SECTION 13. DISPOSAL CONSIDERATIONS

Do not wash down drain or allow to reach natural watercourses. Dispose of neutralized waste consistent with regulatory requirements. If neutralized with lime rock or soda ash, good ventilation is required during neutralization because of the release of carbon dioxide gas.

## SECTION 14. TRANSPORT INFORMATION

Proper Shipping Name Transport Canada and U.S. DOT.....Sulfuric Acid  
Transport Canada and U.S. DOT Hazard Classification.....Class 8, Packing Group II  
Transport Canada and U.S. DOT Product Identification Number.....UN1830  
Marine Pollutant.....No  
IMO Classification.....Class 8

## SECTION 15. REGULATORY INFORMATION

### U.S.

Listed on TSCA Inventory.....Yes  
Hazardous Under Hazard Communication Standard.....Yes  
CERCLA Section 103 Hazardous Substances.....Sulfuric Acid      Yes      RQ: 1000 lbs. (454 kg.)  
EPCRA Section 302 Extremely Hazardous Substance .....Yes      RQ: 1000 lbs. (454 kg.)  
Threshold Planning Quantity: 1000 lbs.  
EPCRA Section 311/312 Hazard Categories .....Immediate (Acute) Health Hazard - Corrosive  
Immediate (Acute) Health Hazard - Highly Toxic  
EPCRA Section 313 Toxic Release Inventory.....Sulfuric Acid      CAS NO. 7664-93-9  
Percent by Weight: 93

### CANADIAN:

Listed on Domestic Substances List:.....Yes  
WHMIS Classification .....Controlled Product, Classification D1A (Immediate & Serious Toxic Effects), E (Corrosive Material)

### EUROPEAN UNION:

Listed on the European Inventory of Existing  
Commercial Chemical Substances (EINECS) .....Yes  
EU Classification:.....Corrosive

## SECTION 16. OTHER INFORMATION

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 1991, Documentation of the Threshold Limit Values and Biological Exposure Indices, 6th Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2002, Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, 2003, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- Canadian Centre for Occupational Health & Safety CHEMINFO Record No. 122 - Sulfuric Acid, 2003-04.
- Commission de la santé et la sécurité du travail, Service du Répertoire toxicologique, Acide Sulfurique, 2000-03.
- European Economic Community, Commission Directives 91/155/EEC, 93/21/EEC, and 67/548/EEC.
- Industry Canada, Controlled Products Regulations SOR/88-66, as amended.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0362 – Sulfuric Acid (Revised Oct 2000).
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, 2003, Hazardous Substance Data Bank.
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cofrssen & C.H. Powell, Ed.
- Sax, N. Irving, 1989, Dangerous Properties of Industrial Materials, Seventh Edition.
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition DHHS (NIOSH) Publication No. 2001-145, August 2001.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Sulfur Trioxide and Sulfuric Acid, December 1998.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.
- Urben, P.G., 1995, Bretherick's Handbook of Reactive Chemical Hazards, Fifth Edition.

### **Notice to Reader**

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