Teck

GERMANIUM DIOXIDE SOLUTION TGO
MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Germanium Dioxide Solution TGO

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

Supplier:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8

MSDS Preparer:
Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of MSDS Preparation: March 7, 2012.

Product Use: Catalyst Solution.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)		LD_{50} / LC_{50} Species and Route	
Germanium Dioxide	11%	1310-53-8	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	LD_{50}, rat, oral LD_{50}, mouse, oral LC_{50}, rat, inhal	1250 mg/kg 1250 mg/kg >1420 mg/m³/4hr
Ethylene Glycol	32%	107-21-1	OSHA PEL ACGIH TLV NIOSH REL	None established 100 mg/m³ (C) None established	LD_{50}, rat, oral LD_{50}, mouse, oral	4000 mg/kg 5500 mg/kg
Organic Acid	29%	Proprietary †	OSHA PEL ACGIH TLV NIOSH REL	1 mg/m³ 1 mg/m³ 1 mg/m³	LD_{50}, rat, oral	375 mg/kg
Water	28%	-	-	-	-	-

NOTE: The calculated Rat, Oral LD_{50} for the complete mixture is greater than or equal to 1062 mg/kg

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction.

In 1988 OSHA proposed a PEL for ethylene glycol of 125 mg/m³ as a ceiling limit. However this OSHA PEL limit is currently non-enforceable due to a court decision. There is therefore no PEL for ethylene glycol at present. 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, C – Ceiling Limit.

† HMIRC Exemption: An exemption was granted on December 22, 2004 by the Hazardous Materials Information Review Commission to withhold the chemical identity of one ingredient of this product under HMIRC Registry No. 5099.

Trade Names and Synonyms: TGO.

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A colourless, odourless liquid which is non-combustible but, in a fire, may decompose with the possible production of toxic fumes. Skin or eye contact will also cause irritation.

Potential Health Effects: Skin or eye contact will cause corrosion and/or irritation of tissue, which may be severe in the case of eye contact. Vapours or mist may be irritating to the upper respiratory system. Moderately toxic by ingestion. Reproductive effects have also been demonstrated in experimental animals for one of the major components. None of the components is listed as a human carcinogen by OSHA, the NTP, IARC, the ACGIH or the European Union (EU). (See Toxicological Information, Section 11)

Potential Environmental Effects: Germanium compounds are believed to pose a low level of environmental hazard but there is little documentation on this subject. Ethylene glycol is known to have a relatively low level of toxicity to organisms. However, the product is hazardous because of its substantial acid content and low pH (see Ecological Information, Section 12).

EU Risk Phrase(s): R21/22 – Harmful in contact with skin and if swallowed; R34 – Causes burns.

SECTION 4. FIRST AID MEASURES

Eye Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water, for 15-20 minutes, while holding the eyelid(s) open. If a contact lens is present, DO NOT delay irrigation or attempt to remove the lens. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately obtain medical attention.

Skin Contact: As quickly as possible, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Immediately flush with lukewarm, gently flowing water for 15 – 20 minutes. Immediately obtain medical attention. Completely decontaminate clothing, shoes and leather goods before reuse or else discard.

Inhalation: Remove source of contamination or move victim from exposure area to fresh air immediately. If breathing is difficult, trained personnel should administer medical oxygen. If breathing has stopped, trained personnel should begin artificial respiration. If either of the above adverse circumstances occurs, quickly transport victim to an emergency care facility.

Ingestion: NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 2 – 8 oz. (60 – 240 ml) of water. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Have victim rinse mouth with water again. Quickly transport victim to an emergency care facility and bring a copy of this MSDS.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: This product is not considered a fire or explosion hazard. However, if involved in a fire it will decompose with the possible production of toxic fumes.

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

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 facepiece mask.

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 material back to process if possible. Absorb spilled liquid in solid absorbent such as vermiculite or clay absorbents. Place spilled material in suitable labelled containers for final disposal. Wash site of spillage with large amounts of water. Do not let wash water enter natural watercourses. Treat or dispose of waste spilled material in accordance with all local, regional and national regulations.

Personal Precautions: Protective clothing, chemical resistant gloves, and eye protection are recommended for persons responding to an accidental release (see also Section 8). Close-fitting safety goggles or a face mask should be worn to prevent eye contact when splashing is a possibility.

Environmental Precautions: Components of this product can pose a threat to the environment. Contamination of watercourses should be prevented. Do not allow spills of this solution to enter sewers or watercourses.

SECTION 7. HANDLING AND STORAGE

Store in its original container in a dry, cool, well-ventilated area away from potentially incompatible materials. Keep container tightly closed in storage. Protect from physical damage.

EU Safety Phrases(s): S24/25 - Avoid contact with skin and eyes; S36/37/39 - Wear suitable protective clothing, gloves and eye/face protection; S45 – In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Gloves and coveralls, shop coat or other work clothing with long sleeves are recommended to prevent prolonged or repeated direct skin contact when handling bulk solution. Eye protection should be worn where mist is generated and where any possibility exists that eye contact may occur. An eyewash and quick drench shower should be provided near the work area. Workers should wash immediately when skin becomes contaminated and at the end of each work shift. Work clothing should be removed immediately if it becomes contaminated and laundered before reuse.

Ventilation: Use adequate local or general ventilation to maintain the concentration of aerosol mist well below recommended occupational exposure limits.

Respirators: Where mist or aerosol is generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-95 particulate filter cartridge).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear, colourless solution	**Odour:** Odourless	**Physical State:** Liquid	**pH:** <1
Vapour Pressure: 0.05 mm Hg @ 20°C (Ethylene Glycol)	**Vapour Density:** 2.14 (Ethylene Glycol)	**Boiling Point/Range:** >100 ºC	**Freezing Point/Range:** Approx. –20 ºC
Specific Gravity: 1.3	**Evaporation Rate:** No Data	**Coefficient of Water/Oil Distribution:** No Data	**Odour Threshold:** Not Applicable
Solubility in Water: Aqueous solution			

SECTION 10. STABILITY AND REACTIVITY

Stability and Reactivity: This solution is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur. No specific reaction hazards are known. The components are reported as presenting the following hazards: vigorous reactions with strong oxidizing agents such as chlorosulphonic acid or oleum, formation of explosive products after mixing with perchloric acid, and violent reaction with phosphorus pentasulphide. The organic acid is reported as forming explosive compounds with silver and undergoing a violent reaction with sodium chlorite, urea and/or sodium hypochlorite.

Incompatibilities: Strong oxidizing agents such as nitric and perchloric acid, alkaline substances, urea, sodium chlorite/hypochlorite, phosphorus pentasulphide etc.

Hazardous Decomposition Products: Oxides of carbon.

SECTION 11. TOXICOLOGICAL INFORMATION

General: *CAUTION:* The toxicological properties of this material have not been fully investigated. The information contained in this MSDS is therefore based on information in the technical and scientific literature about the material's constituent components. Corrosive and/or irritating to the eyes and skin, moderately toxic by ingestion. Hazards are largely those from acute exposure to overheated vapours or direct contact with the eyes rather than chronic or repeated low level exposure.

Acute:
Skin/Eye: Direct liquid contact with the eye will cause severe irritation and possible eye tissue damage. Skin contact may also cause stinging, irritation, redness and/or corrosive tissue damage.

Inhalation: Vapour concentrations at room temperature are normally too low to cause health effects. Upon heating, vapour and mist can cause irritation of the nose, throat and upper respiratory passages.

Ingestion: May cause nausea, vomiting, abdominal pain, and weakness, as well as symptoms of central nervous system depression (dizziness, stupor, lack of co-ordination, drunkenness). Probably irritating to the mouth, throat and gastrointestinal passages. Ethylene glycol has produced cardiopulmonary effects, kidney damage and neurological impairment in humans after ingestion of large amounts.

Chronic: Prolonged exposure to germanium dioxide solution can irritate the upper respiratory passages, and occasionally the skin or eyes. A few cases of health effects have been reported in humans taking large amounts of germanium dioxide medicinally. They have generally resulted in renal dysfunction and failure. Chronic ingestion of ethylene glycol has resulted in effects in the kidneys, bone marrow, liver and sperm of animals. Reproductive effects have also been demonstrated in

experimental animals at doses that were not toxic to the mothers. None of the components is listed as a human carcinogen by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

SECTION 12. ECOLOGICAL INFORMATION

The low pH of this solution will result in acidic toxicity effects to aquatic and terrestrial organisms if present in high concentrations. Little is known about the toxicity of germanium compounds but it is believed to be relatively low. The ethylene glycol content of this product has generally low toxicity to organisms in all environmental media.

SECTION 13. DISPOSAL CONSIDERATIONS

Do not wash down drain or allow to reach natural watercourses. If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations. Empty and thoroughly clean all residues from containers before reuse or disposal.

SECTION 14. TRANSPORT INFORMATION

UN (ICAO, IMO) PROPER SHIPPING NAME	Corrosive Liquid, Acidic, Organic, n.o.s. (ethanedioic acid solution)
UN CLASSIFICATION	Class 8, Packing Group III
UN PRODUCT IDENTIFICATION NUMBER	UN3265
MARINE POLLUTANT	No

SECTION 15. REGULATORY INFORMATION

U.S.

INGREDIENTS LISTED ON TSCA INVENTORY	Yes
HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD	Yes
CERCLA SECTION 103 HAZARDOUS SUBSTANCES	Ethylene Glycol – Yes RQ: 5,000 lbs (2270 kg.)
EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE	No ingredients qualify.
EPCRA SECTION 311/312 HAZARD CATEGORIES	Immediate (Acute) Health Hazard – Corrosive Immediate (Acute) Health Hazard – Effects on gastrointestinal tract, nervous system, cardiovascular system and kidneys. Chronic (Delayed) Health Hazard – Effects on kidneys, liver and bone marrow. Teratogen and Fetotoxin
EPCRA SECTION 313 Toxic Release Inventory	Ethylene Glycol CAS 107-21-1 Percent by Weight: 32%

CANADIAN:

Ingredients Listed on DSL	Germanium Dioxide is listed on NDSL, others on DSL
WHMIS CLASSIFICATION:	D2A – Teratogenicity & Fetotoxicity, E – Corrosive

EUROPEAN UNION:

Listed on the European Inventory Of Existing Commercial Chemical Substances (EINECS)	Yes
EU CLASSIFICATION:	Harmful, 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, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.

- American Conference of Governmental Industrial Hygienists, 2010, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2010, Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P.G. Urben Ed.) 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) CHEMpendium Chemical Information Data Base (last accessed 23 March 2011).
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC and 93/21/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.
- International Agency for Research on Cancer (IARC), Monograms on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – 2011, (multi-volume work), World Health Organization, Geneva.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0270 – Ethylene Glycol.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C.H. Powell, Ed.
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition September 2005.
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS) (last accessed 23 March 2011).
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, National Toxicology Program (NTP), 11th Report on Carcinogens, January 2005.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

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