

**GERMANIUM DIOXIDE SOLUTION TG11  
MATERIAL SAFETY DATA SHEET**

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

**Product Identity:** Germanium Dioxide Solution TG11

**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:** June 1, 2009.

**Product Use:** Catalyst Solution.

**SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS**

Hazardous Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)		LD <sub>50</sub> /LC <sub>50</sub> Species and Route
Germanium Dioxide	8%	1310-53-8	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	Rat, Oral LD <sub>50</sub> 1250 mg/kg Mouse, Oral LD <sub>50</sub> 1250 mg/kg Rat, Inhl LC <sub>50</sub> 3080 mg/m <sup>3</sup> /4hr
Ethylene Glycol	26%	107-21-1	OSHA PEL ACGIH TLV NIOSH REL	None established 100 mg/m <sup>3</sup> (C) None established	Rat, Oral LD <sub>50</sub> 4000 mg/kg Mouse, Oral LD <sub>50</sub> 5500 mg/kg Mouse, LC >200 mg/m <sup>3</sup> /2 hr Rat, LC >200 mg/m <sup>3</sup> /4 hr
Organic Acids	26%	Proprietary †	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	Rat, Oral LD <sub>50</sub> ≥375 mg/kg
Water	40%	-	-	-	-

**NOTE: The calculated Rat, Oral LD<sub>50</sub> for the complete mixture is equal to or greater than 1216 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/m<sup>3</sup> 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.

**† HMIRC Exemption:** An exemption was granted on December 22, 2004 by the Hazardous Materials Information Review Commission to withhold the chemical identity of two ingredients of this product under HMIRC Registry No. 5100.

**Trade Names and Synonyms:** TG11

**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. If breathing is difficult, trained personnel should administer medical oxygen. If breathing has stopped, trained personnel should begin artificial respiration. Obtain medical advice.

**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 washwater 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 may be necessary in some circumstances to prevent eye contact with splashed liquid.

**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

<b>Appearance:</b> Clear, colourless solution	<b>Odour:</b> Odourless	<b>Physical State:</b> Liquid	<b>pH:</b> <1
<b>Vapour Pressure:</b> 0.05 mm Hg @ 20°C (Ethylene Glycol)	<b>Vapour Density:</b> 2.14 (Ethylene Glycol)	<b>Boiling Point/Range:</b> >100 °C	<b>Freezing Point/Range:</b> Approx. -20 °C
<b>Specific Gravity:</b> 1.2	<b>Evaporation Rate:</b> No Data	<b>Coefficient of Water/Oil Distribution:</b> No Data	<b>Odour Threshold:</b> Not Applicable
<b>Solubility in Water:</b> Aqueous solution			

## SECTION 10. STABILITY AND REACTIVITY

**Stability and Reactivity:** Stable under normal temperatures and pressures. No specific reaction hazards are known. The components are reported as presenting the following hazards: vigorous reactions with strong oxidizing agents, formation of explosive products after mixing with perchloric acid, violent reaction with phosphorus pentasulphide. The organic acids are 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, 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

PROPER SHIPPING NAME ..... Not dangerous to transport.  
TRANSPORT CANADA/US DOT HAZARD CLASSIFICATION ..... Not applicable.  
TRANSPORT CANADA/US DOT  
PRODUCT IDENTIFICATION NUMBER ..... Not applicable.  
MARINE POLLUTANT ..... No.  
IMO CLASSIFICATION ..... Not regulated.

## 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

EPCRA SECTION 313 Toxic Release Inventory ..... Ethylene Glycol  
CAS 107-21-1  
Percent by Weight: 26%

### CANADIAN:

Ingredients Listed on DSL ..... Germanium Dioxide is listed on NDSL, other ingredients are listed 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, 2007, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition.
- American Conference of Governmental Industrial Hygienists, 2007, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2007, 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, On-Line.
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.

- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – 2007, (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.
- 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, 1990, 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) On-Line.
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, National Toxicology Program (NTP), 11<sup>th</sup> Report on Carcinogens, January 2005.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

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