

## INDIUM POWDER MATERIAL SAFETY DATA SHEET

### SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

**Product Identity:** Indium Powder

**Manufacturer:**

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

**Supplier:**

Teck Advanced Materials Inc.  
13670 Danielson Street  
Suite H & I  
Poway, CA 92064

**MSDS Preparer:**

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

**Date of MSDS Preparation:** June 1, 2009.

**Product Use:** Indium powder is used in dentistry as well as the production of pharmaceuticals and electronic components.

### SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)	LD <sub>50</sub> /LC <sub>50</sub> Species and Route
Indium	99.9	7440-74-6	OSHA PEL ACGIH TLV NIOSH REL	None Established* 0.1 mg/m <sup>3</sup> 0.1 mg/m <sup>3</sup> LD <sub>50</sub> Rat-oral 4200 mg/kg

\*NOTE: In 1998 OSHA proposed a PEL of 0.1 mg/m<sup>3</sup> for indium and indium compounds in its Final Rule on occupational exposure limits. However, this Final Rule PEL was vacated by a court decision and is currently not enforceable. 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:** None.

### SECTION 3. HAZARDS IDENTIFICATION

**Emergency Overview:** A soft, grey metal powder that is not readily combustible but may burn or explode when dispersed into the air in very high concentrations and exposed to heat, flame, or other sources of ignition. Indium has a very low melting point (157°C) and could potentially form a molten metal pool in a fire situation. Indium is relatively non-toxic and poses little immediate hazard to personnel or the environment in an emergency situation.

**Potential Health Effects:** Relatively non-toxic to humans by inhalation or ingestion. Chronic exposure may cause irritation to the lungs and gastrointestinal disorders. It is not considered a human carcinogen by the OSHA, NTP, ACGIH, IARC or the EU. (see Toxicological Information, Section 11)

**Potential Environmental Effects:** As indium metal is known to have very low water solubility, its bioavailability is limited. Although there are no specific ecotoxicity data for this product, the limited bioavailability indicates that it likely poses no immediate ecological risk. However, contamination of surface water and soils should be prevented (see Ecological Information, Section 12).

**European Union (EU) Risk Phrase(s):** Not applicable - Indium powder is not listed as a dangerous substance.

### SECTION 4. FIRST AID MEASURES

**Eye Contact:** No effects expected. If irritation occurs, flush contaminated eye(s) with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice.

**Skin Contact:** No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice.

**Inhalation:** If symptoms are experienced remove source of contamination or move victim to fresh air. Obtain medical advice.

**Ingestion:** If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if irritation or discomfort occurs, obtain medical advice.

## SECTION 5. FIRE FIGHTING MEASURES

**Fire and Explosion Hazards:** Indium metal dust or powder is not flammable in bulk but it may be flammable or explosive when dispersed in the air at high concentrations and exposed to heat, flame, or other sources of ignition. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10). Indium has a very low melting point (157°C) and could potentially form a molten metal pool in a fire situation.

**Extinguishing Media:** Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam. Do not use direct water streams on fires where molten metal is present.

**Fire Fighting:** Fire fighters should 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 spillage if possible to do so safely. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection and using methods which will minimize dust generation (e.g., vacuum solids, dampen material and shovel or wet sweep). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labeled containers for recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

**Personal Precautions:** Protective clothing, gloves, and a respirator 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 indium powder.

**Environmental Precautions:** Indium metal is considered to have low toxicity. However, there is limited information on the effects and fate of indium in the environment. Good management practices should be applied in the storage and use of indium and its compounds.

## SECTION 7. HANDLING AND STORAGE

Store in a cool, dry, covered area away from incompatible materials. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas. No special packaging materials are required.

**EU Safety Phrase(s):** Not applicable - Indium powder is not listed as a dangerous substance.

## SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Protective Clothing:** Work clothes and gloves are recommended to prevent prolonged or repeated direct skin contact. Eye protection should be worn where dust is generated.

**Ventilation:** Use adequate local or general ventilation to maintain the concentration of indium in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system.

**Respirators:** Where indium dust or fumes are 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> Soft, grey metal powder	<b>Odour:</b> None	<b>Physical State:</b> Solid	<b>pH:</b> Not applicable
<b>Vapour Pressure:</b> Negligible @ 20°C	<b>Vapour Density:</b> Not applicable	<b>Boiling Point/Range:</b> 2000° C	<b>Melting Point/Range:</b> 157° C
<b>Specific Gravity:</b> 7.3	<b>Evaporation Rate:</b> Not applicable	<b>Coefficient of Water/Oil Distribution:</b> Not applicable	<b>Odour Threshold:</b> None
<b>Solubility:</b> Insoluble in water			

## SECTION 10. STABILITY AND REACTIVITY

**Stability & Reactivity:** Indium powder is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

**Incompatibilities:** An explosive reaction may occur on contact with dinitrogen tetraoxide and acetonitrile. Indium reacts vigorously with mercury (II) bromide at high temperatures (350°C). Mixtures with sulfur ignite when heated. Avoid oxidizing agents and acids.

**Hazardous Decomposition Products:** Indium oxide fumes will form at elevated temperatures, such as during welding or burning on dust-contaminated surfaces. The particle size of metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

## SECTION 11. TOXICOLOGICAL INFORMATION

**General:** The information available on the toxic properties of indium in humans is limited. It is known that soluble indium salts are extremely toxic when injected into laboratory animals with a direct effect on the heart, liver, kidneys and blood. However, indium salts are far less toxic when administered orally or by inhalation. Teratogenic effects have also been reported in laboratory animals injected with indium but its applicability to human exposure is unknown. The inhalation route is by far the most significant route in the occupational setting.

### **Acute:**

**Skin/Eyes:** Indium metal powder is not irritating to the eyes or skin other than by direct abrasive action of metal particles on eye or skin tissue. Soluble indium salts are very irritating to the eyes.

**Inhalation/Ingestion:** Inhalation of indium fume or dust may cause irritation and damage to the respiratory tract. It may also irritate the gastrointestinal tract if ingested.

**Chronic:** Prolonged exposure to indium fume or dust may cause irritation and damage to the lung. Workers exposed to indium compounds during the production of indium complained of tooth decay, pain in joints and bones, nervous and gastrointestinal disorders, heart pains, and general debility. Indium and indium oxide are not listed as human carcinogens 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

There is limited information on the effects and fate of indium and its compounds in the environment. As indium metal is known to have very low water solubility, its bioavailability is limited. Although there are no specific ecotoxicity data for this product, the limited bioavailability indicates that it likely poses no immediate ecological risk. However, contamination of surface water and soils should be prevented since its processing or longer-term exposure in the environment may lead to the release of indium in more bioavailable forms.

## SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process, dispose of only in accordance with applicable regulations.

## SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not regulated  
TRANSPORT CANADA AND U.S. DOT  
HAZARD CLASSIFICATION ..... Not applicable  
TRANSPORT CANADA AND U.S. DOT

PRODUCT IDENTIFICATION NUMBER..... Not applicable  
MARINE POLLUTANT ..... No

## SECTION 15. REGULATORY INFORMATION

### U.S.

Listed On TSCA Inventory: ..... Yes  
Hazardous under Hazard Communication Standard: ..... Yes  
CERCLA Section 103 Hazardous Substance: ..... No  
EPCRA Section 302 Extremely Hazardous Substance: ..... No  
EPCRA Section 311/312 Hazard Categories: ..... Immediate (Acute) Health Hazard - Irritant  
EPCRA Section 313 Toxic Release Inventory: ..... This product does not contain any toxic chemicals subject to the Toxic Release reporting requirements.

### CANADIAN:

Ingredient Listed On Domestic Substances List: ..... Yes  
WHMIS Classification: ..... Not applicable. Indium powder is not a controlled product under WHMIS. This Material Safety Data Sheet is provided for information purposes only.

### EUROPEAN UNION:

Ingredients Listed on the European Inventory of Existing Commercial Chemical Substances (EINECS)..... Yes  
EU Classification ..... Not applicable - Indium is not listed as a dangerous substance.

## SECTION 16. OTHER INFORMATION

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

- American Conference of Governmental Industrial Hygienists, 2008, Documentation of the Threshold Limit Values and Biological Exposure Indices, 7<sup>th</sup> Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2008, Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, 2008, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) CHEMINFO Online Chemical Substance Data Base.
- Commission de la santé et la sécurité du travail, Service du Répertoire toxicologique – Indium.
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.
- 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. Cohnsen & 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 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). CCOHS on-line version.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

### Notice to Reader

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