

COPPER ARSENATE SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Copper Arsenate

Trade Names and Synonyms: Copper orthoarsenate, Copper arsenate hydrate, Sodium copper arsenate, Arsenic acid, Copper sodium salt.

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

Supplier:
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Trail Operations
Trail, British Columbia
V1R 4L8

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V6C 0B3

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Product Use: This material is a feed stock for the production of wood treatment chemicals.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health	Physical	Environmental
Acute Toxicity – does not meet criteria Skin Irritation – does not meet criteria Eye Irritation – Category 2 Sensitization – does not meet criteria Mutagenicity – does not meet criteria Carcinogenicity – Category 1A Reproductive – Category 2 plus Lactation Specific Target Organ Toxicity Acute – Category 2 Chronic – Category 1	Does not meet criteria for any Physical Hazard	Aquatic Toxicity – Category 4

LABEL:

<p>Symbols:</p> <div style="text-align: center;">  </div>	<p>Signal Word: DANGER</p>
<p style="text-align: center;"><u>Hazard Statements</u></p> <p>DANGER! Causes eye irritation. May cause cancer. Suspected of damaging fertility or the unborn child. May cause harm to breast-fed children. Causes damage to nerves, respiratory tract, liver, kidneys and skin through prolonged or repeated exposure. May cause long lasting harmful effects to aquatic life.</p>	<p style="text-align: center;"><u>Precautionary Statements:</u></p> <p>Do not handle until all safety precautions have been read and understood. Do not breathe dust or fumes. Avoid contact during pregnancy/while nursing. Use personal protective equipment as required. Do not eat, drink or smoke while using this product. Wash hands thoroughly after handling. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If exposed or concerned: Get medical advice/attention. Avoid release to the environment. Dispose of contents/container in accordance with local regulations.</p>

Emergency Overview: A turquoise blue powder that does not burn or readily decompose in a fire situation. Copper arsenate dust particles may cause eye, skin and respiratory irritation. Inhalation or ingestion of dust or fumes may produce both acute and chronic health effects. In a fire situation freshly-formed fume may be an intense pulmonary irritant and may result in development of pulmonary edema several hours after exposure. Arsenic and cadmium compounds are a cancer hazard and a potential reproductive toxin. Contact with acid or alkaline solutions under reducing conditions (e.g., in the presence of zinc or galvanized steel) may generate highly toxic arsine gas. Such circumstances should be regarded as being immediately life threatening. SCBA and full protective clothing are required for fire emergency response personnel.

Potential Health Effects: Copper arsenate dust may be irritating to the eyes, skin and respiratory passages. Inhalation or ingestion of dust may result in dryness and irritation of the nose and throat, metallic taste, headache, nausea, vomiting, diarrhea, abdominal pain, muscle spasms, weight loss and anemia. Prolonged exposure may also cause central and peripheral nervous system damage, liver and kidney dysfunction, cardiovascular and gastrointestinal disturbances, skin rashes and dermatitis. Due to the presence of arsenic and cadmium, which are classified as known human carcinogens by various regulatory and advisory bodies, this product is considered carcinogenic. It may also be a reproductive toxin (see Toxicological Information, Section 11).

Potential Environmental Effects: This product is known to have low water solubility and therefore its constituents have limited bioavailability. However, it can be hazardous in aquatic and terrestrial environments; low concentrations of copper and cadmium can be potentially toxic to fish, and elevated concentrations of the arsenic from the product in soils can lead to increased bioaccumulation and can therefore be detrimental to terrestrial plants and invertebrates (see Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Copper Arsenate	146504-31-6	98.7 – 99.7%
Cadmium Compounds	N/A	0.3 – 1.3% (as Cd)

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: Quickly and gently blot or brush chemical off face. 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 in order to 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: Remove contaminated clothing, shoes and leather goods (e.g., watchbands, belts). Quickly and gently blot or brush away excess chemical. Wash gently and thoroughly with lukewarm gently flowing water and non-abrasive soap for 5 minutes. If irritation persists, repeat flushing. Obtain medical advice. 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 has stopped, trained personnel should begin artificial respiration. If the heart has stopped, immediately start cardiopulmonary resuscitation (CPR), or automated external defibrillation (AED). 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 rinse mouth with water again. Obtain medical advice 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.

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

Fire Fighting: Highly toxic cadmium oxide fumes may evolve in fires. 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. If possible, move material from fire area and cool material exposed to flame. Do not allow run-off to enter sewers or watercourses.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Restrict access to the area until completion of clean up. 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: Persons responding to an accidental release should wear protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust. Workers should wash and change clothing following cleanup of a spill to prevent personal contamination with copper arsenate dust.

Environmental Precautions: This product can pose a threat to the environment. Contamination of soil and water should be prevented. Do not allow spillage or run-off to enter storm drains, sewers or watercourses.

SECTION 7. HANDLING AND STORAGE

Store containers in a dry, cool, well-ventilated area, separate from strong acids, other incompatible materials, active metals and foods or feedstuffs. Avoid exposure to incompatible materials such as acids or alkalis and galvanized (zinc) surfaces. Keep container tightly closed. Minimize dust generation and accumulation. Avoid breathing dust.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines:

<u>Component</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>NIOSH REL</u>
Copper Arsenate	<i>see note below</i>	<i>see note below</i>	<i>see note below</i>
Cadmium Compounds	0.01 mg/m ³ (Total Cd) 0.002 mg/m ³ (Respirable Cd)	0.005 mg/m ³ PEL 0.015 or 0.05 mg/m ³ ‡ SECAL	Lowest Feasible Level

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction. ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit, SECAL – Separate Engineering Control Airborne Limit.

NOTE: The OSHA PEL and ACGIH TLV for inorganic arsenic compounds are both 0.01 mg/m³. The NIOSH REL is 0.002 mg/m³ as a 15 minute ceiling limit. The OSHA PEL, the ACGIH TLV and NIOSH REL for copper dust and mist are 1.0 mg/m³. For copper fume the OSHA TLV and NIOSH REL are 0.1 mg/m³ and the ACGIH TLV is 0.2 mg/m³. Based on the composition of this product, the airborne arsenic concentration would be the controlling factor in maintaining copper, arsenic and cadmium concentrations below their respective OELs.

‡ Separate Engineering Control Airborne Limits: to be achieved in specified processes and workplaces where it is not possible to achieve the PEL through engineering and work practices alone. The OSHA SECAL for cadmium is 0.015 or 0.050 mg/m³, depending on the processes involved. See Table 1 of 29 CFR § 1910.1027.

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of copper arsenate in the working environment well below recommended occupational exposure limits, especially when fumes are generated. Supply sufficient replacement air to make up for air removed by the exhaust system. Use process enclosure, local exhaust ventilation, moist rather than dry handling techniques or other engineering controls to minimize airborne dust generation.

Protective Clothing: Coveralls or other work clothing and gloves are recommended to prevent prolonged or repeated direct skin contact. Close-fitting safety goggles should be worn to prevent eye contact if excessive dust is generated or where any possibility exists that eye contact may occur. 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 heavily contaminated and should be changed daily if there is reasonable probability that the clothing may be contaminated. Inform laundry personnel of contaminant's hazards.

Respirators: Where copper arsenate dust 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-100 particulate filter cartridge). All cutting and burning of copper arsenate contaminated surfaces should be done under local exhaust ventilation or else with appropriate respiratory protection (an assigned protection factor of at least 1,000 recommended). When exposure levels are unknown, a self-contained breathing apparatus which supplies a positive air pressure within a full face piece mask should be worn.

General Hygiene Considerations: 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 as well as at the end of the workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Turquoise blue powder	Odour: None	Odour Threshold: None	pH: 6.4 (saturated solution)
Vapour Pressure: <10-5 Pa @ 50°C	Vapour Density: Not Applicable	Boiling Point/Range: No Data	Melting Point/Range: >300°C
Relative Density (Water = 1): 3.1	Evaporation Rate: Not Applicable	Coefficient of Water/Oil Distribution: No Data	Solubility: Very slightly soluble
Flash Point: Not Applicable	Flammable Limits (LEL/UEL): Not Applicable	Auto-ignition Temperature: Not Applicable	
Molecular Formula: Cu ₅ NaH(AsO ₄) ₄ •5H ₂ O	Molecular Weight: 987.5	Particle Size: 24 µm	

SECTION 10. STABILITY AND REACTIVITY

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

Incompatibilities: Contact with acids in the presence of active metals such as zinc or galvanized steel may form nascent hydrogen and possibly result in the generation of highly toxic arsine gas.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting or electric arc welding on dust-contaminated surfaces will generate highly toxic arsenic and cadmium oxide fumes. Freshly-formed cadmium fume is an intense pulmonary irritant and may result in development of pulmonary edema several hours after exposure.

SECTION 11. TOXICOLOGICAL INFORMATION

General: NOTE: There is very limited available data on the health effects of this product. Therefore, much of the information provided in this MSDS is based on analogy with other copper, arsenic and cadmium compounds for which more extensive health hazard data and industrial experience is available. The primary routes of exposure to copper arsenate are by inhalation or ingestion of dust. Individuals with "Wilson's Disease" are predisposed to accumulate copper in their body and should not be occupationally exposed. Individuals with pre-existing lung, liver, kidney, and blood ailments should be precluded from exposure until approved by a physician.

Acute:

Skin/Eye: Contact with copper arsenate may cause local irritation of skin and eyes, including redness and pain in the eyes. Dermatitis may also be experienced by some individuals.

Inhalation: Copper arsenate dust may be irritating to the nose, throat and upper respiratory tract with symptoms of sneezing, cough, dryness of the mouth and throat, metallic taste and headache. Severe over-exposure may cause shortness of breath, stomach pains, muscle spasms, vertigo, delirium and coma. **Arsine gas may be generated when arsenic-containing compounds are in contact with acid solutions and an active metal such as zinc or galvanized steel. Exposure to arsine gas should be regarded as potentially life threatening.** Fumes from cutting or burning of copper arsenate-contaminated surfaces will contain oxides of copper, arsenic and cadmium. They may be highly toxic by inhalation, causing serious systemic poisoning and possible permanent damage to the lungs. Early symptoms of excessive exposure include dryness of the throat; irritation of the nose, throat, and respiratory tract; headache; coughing; and a metallic taste. After a delay of several hours (up to 10), a person may develop constriction of the chest, persistent cough, and progressive shortness of breath. There may be headache, chills, diarrhea, muscle aches, nausea, vomiting, irritability, and restlessness. Pulmonary congestion may progress rapidly causing wheezing and symptoms of oxygen deficiency. Death may follow. Recovery from an acute exposure episode is slow but generally without ongoing or lingering effects. Milder cases of acute exposure have produced symptoms resembling metal fume fever with some symptoms and signs of acute gastroenteritis as well.

Ingestion: Ingestion of arsenic compounds can cause nausea and gastrointestinal upset, abdominal pain, vomiting, diarrhea, muscle spasms and, in severe cases, can cause delirium, vertigo, acute kidney failure, cardiopulmonary depression and coma.

Chronic:

Prolonged exposure to copper arsenate dust may produce many of the symptoms of short term exposure and may also cause anemia, weight loss, central and peripheral nervous system damage, gastrointestinal and cardiovascular disturbances, skin

EPCRA SECTION 313 TOXIC RELEASE INVENTORY: ...Arsenic Compounds (Copper Arsenate) CAS No. 146504-31-6
Percent by Weight98.7 - 99.7

Cadmium Compounds CAS No. N/A
Percent by Weight.....0.3 – 1.3

SECTION 16. OTHER INFORMATION

Date of Original Issue: May 5, 1998 **Version:** 01

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The information in this 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, 7th Edition, plus updates.
- American Conference of Governmental Industrial Hygienists, 2014, Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, 2014, 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. Urban, Ed.) 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, ON, CHEMINFO Record No. 3454 - Cadmium.
- European Economic Community, Commission Directives 91/155/EEC, 93/21/EEC, and 67/548/EEC.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0020 – Cadmium.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0648 – Copper (II) Orthoarsenate.
- Industry Canada, Controlled Products Regulations SOR/88-66, 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, 1997, Hazardous Substance Data Bank.
- Patty's Toxicology, 5th Edition, (E Bingham, B Cohnsen & C H Powell, Ed.) 2001.
- U.S. Dept. 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. Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Cadmium (Draft) Sept 2008.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.
- National Institute of Technology and Evaluation (NITE) - GHS Classification Guidance by the Japanese Government - Copper Arsenate (Revised 2008).
- American Conference of Governmental Industrial Hygienists (ACGIH) - Documentation of the TLV® - Arsenic and Its Inorganic Compounds.
- Recognition and Management of Pesticide Poisoning, 5th edition, U.S. EPA, Chapter 14, page 129.
- Australian National Industrial Chemicals Notification & Assessment Scheme (NICNAS) - Human Health Tier II Assessment for Trivalent Arsenites.
- Cadmium and its compounds - Evaluation of the effects on reproduction, recommendation for classification - Health Council of the Netherlands -2000.
- Arsenic & inorganic arsenic compounds - Health-based calculated occupational cancer risk values - Health Council of the Netherlands – 2012.
- National Institute of Health - HazMap web site - Arsenic Acid, Copper Salt (www.hazmap.nlm.nih.gov/index - accessed 29 Dec 2014).
- Arsenic Hazards to Fish, Wildlife and Invertebrates: A Synoptic Review - Ronald Eisler, U S Fish & Wildlife Service Report 85 (1.12) January 1988.

Notice to Reader

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