LTS Research Laboratories, Inc.
Safety Data Sheet
Zirconium Copper Nickel Metal

1. Product and Company Identification

Trade Name:	Zirconium Copper Nickel
Chemical Formula:	Zr-Cu-Ni
Recommended Use:	Scientific research and development
Manufacturer/Supplier:	LTS Research Laboratories, Inc.
Street:	37 Ramland Road
City:	Orangeburg
State:	New York
Zip Code:	10962
Country:	USA
Tel #:	855-587-2436 / 855-lts-chem
24-Hour Emergency Contact:	800-424-9300 (US & Canada) +1-703-527-3887 (International)

2. Hazards Identification

Signal Word: Danger

Hazard Statements:
H228: Flammable solid
H317: May cause an allergic skin reaction
H319: Causes serious eye irritation
H335: May cause respiratory irritation
H351: Suspected of causing cancer
H372: Causes damage to organs through prolonged or repeated exposure

Precautionary Statements:
P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
P240: Ground/bond container and receiving equipment
P241: Use explosion-proof electrical/ventilating/light/…/equipment
P261: Avoid breathing dust/fume/gas/mist/vapours/spray
P280: Wear protective gloves/protective clothing/eye protection/face protection
P363: Wash contaminated clothing before reuse
P370+P378: In case of fire: Use special powder for metal fires for extinction
P405: Store locked up
P501: Dispose of contents/container in accordance with local/regional/national/international regulations

HMIS Health Ratings (0-4):

Health:	1
Flammability:	3 (powder only)
Physical:	2

3. Composition

Chemical Family:	Alloy
Additional Names:	N/A
Zirconium (Zr):	
Percentage:	0-100 wt%
CAS #:	7440-67-7
EC #:	231-176-9
Copper (Cu):	
Percentage:	0-100 wt%
CAS #:	7440-50-8
EC #:	231-159-6
Nickel (Ni):	
Percentage:	0-100 wt%
CAS #:	7440-02-0
EC #:	028-002-01-4

4. First Aid Procedures

General Treatment:	Seek medical attention if symptoms persist.
Special Treatment:	None
Important Symptoms:	None
Inhalation:	Remove victim to fresh air. Supply oxygen if breathing is difficult.
Ingestion:	Give one to two glasses of water and induce vomiting. Never induce vomiting or give anything by mouth to an unconscious person.
Skin:	Wash affected area with mild soap and water. Remove any contaminated clothing.
Eyes:	Flush eyes with water, blinking often for several minutes. Remove contact lenses if present and easy to do. Continue rinsing

5. Firefighting Measures

Flammability:	Flammable only as powder
Extinguishing Media:	Do not use water for metal fires – use sand, and extinguishing powder.
Spec. Fire Fighting Procedure:	Use full-face, self-contained breathing apparatus with full protective clothing to prevent contact with skin and eyes. See section 10 for decomposition products.
Ignition point:	Solid metal will not ignite. High surface area material such as 10 micron powder may autoignite at room temp. Fine chips, turnings, or grinding dust produced from this metal are flammable. Ignition point for sponge varies from 200 to above 500^{o}C depending on particle size.
Minimum explosible Concentration (g/m^3):	Less than 100. Varies with particle size.
Extinguishing media:	Dry table salt. Type d fire extinguisher. Do not use water, carbon dioxide or halocarbon extinguishing agent.

Unusual fire and explosion hazard:	Do not spray water on burning zirconium. Carbon dioxide is not effective in extinguishing burning zirconium. If a fire starts in a mass of fine wet metal, the initial fire may be followed by an explosion. Therefore, when in doubt, personnel should retire and not attempt to extinguish the fire. The explosive characteristic of such material is caused by the steam and hydrogen generated within the burning mass. Spontaneously combustible in dry powder form. Flammable and explosive as dust or powder, also in the form of borings and shavings. Zirconium metal is a very dangerous fire hazard in the form of dust when exposed to heat, flame or by chemical reaction with oxidizing agents. May be an explosion hazard in the form of dust by chemical reaction with air, alkali hydroxides, alkali metal chromates, dichromates, molybdates, sulfates, tungstates, borax, CCl_4, Copper oxide, lead, lead oxide, phosphorous, $KClO_3$, KNO_3, nitryl fluoride. May be extremely sensitive to shock and static electricity may cause spontaneous ignition.

6. Accidental Release Measures

If Material Is Released/Spilled:	Wear appropriate respiratory and protective equipment specified in special protection information. Isolate spill area and provide ventilation. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for disposal. Take care not to raise dust.
Environmental Precautions:	Isolate runoff to prevent environmental pollution.

7. Handling and Storage

Handling Conditions:	Wash thoroughly after handling.
Storage Conditions:	Store in a cool dry place in a tightly sealed container. Store apart from materials and conditions listed in section 10. Protect against electrostatic charges.
Work/Hygienic Maintenance:	Do not use tobacco or food in work area. Wash thoroughly before eating and smoking. Do not blow dust off clothing or skin with compressed air.
Ventilation:	Provide sufficient ventilation to maintain concentration at or below threshold limit.

8. Exposure Controls and Personal Protection

Permissible Exposure Limits:	0.1 mg/m^3 as Cu, long-term value
Threshold Limit Value:	0.2 mg/m^3 as Cu, long-term value 10 mg/m^3 as Zr, short-term value
Special Equipment:	None
Respiratory Protection:	Dust Respirator
Protective Gloves:	Rubber gloves
Eye Protection:	Safety glasses or goggles
Body Protection:	Protective work clothing. Wear close-toed shoes and long sleeves/pants.

9. Physical and Chemical Characteristics

Color	Metallic gray or silver gray
Form:	Powder, Granules, Pellets, Sputtering target, Custom parts
Odor:	Odorless
Water Solubility:	Insoluble
Boiling Point:	3580 °C
Melting Point:	1852 °C
Flash Point:	N/A
Autoignition Temperature:	N/A
Density:	6.506 g/cc
Molecular weight:	N/A

10. Reactivity

Stability:	Stable under recommended storage conditions
Reacts With:	Oxidizing agents
Incompatible Conditions:	Strong oxidizing agents, Oxygen, air, alkali hydroxides, alkali metal chromates, dichromates, molybdates, sulfates, tungstates, borax, CCl_4, copper oxide, lead, lead oxide, phosphorus, $KClO_3$, KNO_3, and acids. Zirconium metal is rapidly dissolved by hydrofluoric acid or hydrofluoric-nitric acid mixtures. Above 200 °c, zirconium reacts exothermically with halogen gases, fluorine, chlorine, bromine, iodine, and halocarbons, including carbon tetrachloride, carbon tetrafluoride and freons. Nitryl-fluoride, fno_2 will initiate a reaction with zirconium metal at room temperature to produce a glowing or white incandescence.
Hazardous Decomposition Products:	Metal oxide fume, Nickel oxides

11. Toxicological Information

Potential Health Effects:	
Eyes:	Causes serious eye damage
Skin:	May cause irritation and dermatitis
Ingestion:	Copper ingestion causes nausea, vomiting, abdominal pain, metallic taste, and diarrhea. Ingestion of large doses may cause stomach and intestine ulceration, jaundice, and kidney and liver damage.
Inhalation:	May cause sneezing, irritation, ulceration of mucus membrane including perforation of nasal septum, nausea, weakness, and metal fume fever.
Chronic effects:	Prolonged exposure may cause discolor skin and hair, dermatitis, irritation of mucus membrane. Ingestion may cause liver and kidney damage. Inhalation of zirconium compounds may cause pulmonary granulomas.
Skin:	May cause skin granulomas. No other chronic health effects recorded.
Target organs:	May affect the respiratory system and skin. Medical conditions generally aggravated by exposure: pre-existing respiratory disorders.
Carcinogenicity:	
NTP:	No
IARC:	No
OSHA:	No
Copper effects of exposure:	To the best of our knowledge the acute and chronic toxicity of copper is not fully known.

	Copper compounds may be irritating to the skin, eyes and respiratory tract. They may cause metal fume fever, hemolysis of the red blood cells and injury to the liver, lungs, kidneys and pancreas. Ingestion may also cause vomiting, gastric pain, dizziness, anemia, cramps, convulsions, shock, coma and death. Copper solutions may cause sensitization reactions.
Nickel	
Effects of exposure:	Under normal handling and use, exposure to massive forms of nickel presents few health hazards. If, however, massive forms are converted to particulates, then both acute and chronic health hazards are possible. Nickel is a confirmed carcinogen with experimental carcinogenic, neoplastigenic, tumorigenic and teratogenic data. Poison by ingestion, intratracheal, intraperitoneal, subcutaneous and intravenous routes. An experimental teratogen. Ingestion of soluble salts causes nausea, vomiting and diarrhea. Hypersensitivity to nickel is common and can cause allergic contact dermatitis, pulmonary asthma, conjunctivitis and inflammatory reactions around nickel containing medical implants and prosthesis (sax, dangerous properties of industrial materials, eighth edition).
Signs & Symptoms:	N/A
Aggravated Medical Conditions:	N/A
Median Lethal Dose:	N/A
Carcinogen:	IARC-2B: Possibly carcinogenic to humans: limited evidence in human in the absence of sufficient evidence in experimental animals. NTP-R: Reasonably anticipated to be a carcinogen, limited evidence of carcinogenicity from epidemiologic studies. ACGIH A5: Not suspected as a human carcinogen: Not suspected as a human carcinogen on the basis of properly conducted epidemiologic studies in humans. Studies have sufficiently long follow-up, reliable exposure histories, sufficiently high dost, and adequate statistical power to conclude that exposure to the agent does not convey a significant risk of cancer to humans. Evidence suggesting a lack of carcinogenicity in experimental animals will be considered if it is supported by other relevant data.

12. Ecological Information

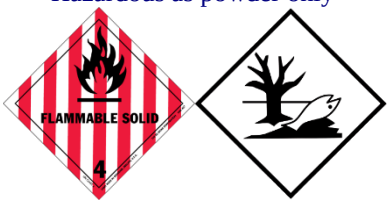
Aquatic Toxicity:	High
Persistent Bioaccumulation Toxicity:	Yes
Very Persistent, Very Bioaccumulative:	Yes
Notes:	Do not allow material to be released to the environment without proper governmental permits. Danger to drinking water if even extremely small quantities leak into the ground. Do not allow product to reach any water sources. Also poisonous for fish and plankton in water bodies. Avoid transfer into the environment.

13. Disposal Considerations

Dispose of in accordance with local, state, national, and international regulations.

14. Transportation Data

Hazardous:	Hazardous as powder only



Hazard Class:	4.1 Flammable solids, self-reactive substances, and solid desensitized explosives
Packing Group:	III
UN Number:	UN3089
Proper Shipping Name:	Metal Powder, Flammable, n.o.s. (Copper, Zirconium, Nickel)

15. Regulatory Information

Sec 302 Extremely Hazardous:	No
Sec 304 Reportable Quantities:	N/A
Sec 313 Toxic Chemicals:	Yes

16. Other Information

This safety data sheet should be used in conjunction with technical sheets. It does not replace them. The information given is based on our knowledge of this product, at the time of publication. It is given in good faith. The attention of the user is drawn to the possible risks incurred by using the product for any other purpose other than that for which it was intended. This does not in any way excuse the user from knowing and applying all the regulations governing his activity. It is the sole responsibility of the user to take all precautions required in handling the product. The aim of the mandatory regulations mentioned is to help the user to fulfill his obligations regarding the use of hazardous products.

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