MATERIAL SAFETY DATA SHEET
OSHA HAZARD COMMUNICATION RULE

DATE OF LAST REVISION: 06-24-96

CHEMICAL IDENTITY

LABEL IDENTITY
Aluminum, copper and tungsten mixture
CHEMICAL SYNONYM(S)
Aluminum, copper and tungsten alloy
CHEMICAL FAMILY
Metallic Elements
FORMULA
Al
Cu
W
MOLECULAR WEIGHT
26.981539
63.546
183.85
CAS REGISTRY NUMBER
7429-90-5
7440-50-8
7440-33-7

(the data that follows is for the individual elements and not the mixture as a whole)

INGREDIENTS % PEL TLV
Aluminum 99.8 to 90% Not established 10mg/m3
Copper 00.1 to 5.0% 0.1mg/m3 (fume) 0.2mg/m3 (fume)
1mg/m3 (dust, mist) 1mg/m3 (dust, mist)
Tungsten 00.1 to 5.0% 5mg/m3 5mg/m3

PHYSICAL AND CHEMICAL PROPERTIES

COLOR, FORM AND ODOR
Silvery colored metal, odorless
BOILING POINT
Unknown
VAPOR DENSITY (air=1) NA
VAPOR PRESSURE @ 20°C Unknown
% VOLATILE BY VOLUME (%) NA
REACTION WITH WATER ND
EVAPORATION RATE (butyl acetate=1) Essentially 0
SOLUBILITY IN WATER Insoluble
MELTING POINT Unknown
SPECIFIC GRAVITY Unknown

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT ND
AUTOIGNITION TEMPERATURE (°C) ND
FLAMMABLE LIMITS IN AIR, % by volume Upper & Lower: no data
EXTINGUISHING MEDIA DO NOT USE WATER, use carbon dioxide, dry
chemical extinguishing agents, dry sand or dry ground dolomite.
SPECIAL FIRE FIGHTING PROCEDURES No special fire fighting procedures needed,
use normal procedures which include wearing NIOSH/MSHA approved self-contained
breathing apparatus, flame and chemical resistant clothing; hats, boots and gloves. If without
risk remove material from fire area.
HEALTH HAZARD INFORMATION

TOXICITY DATA:

<table>
<thead>
<tr>
<th></th>
<th>Aluminum</th>
<th>Copper</th>
<th>Tungsten</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50:</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>LC50:</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Other:</td>
<td>No data</td>
<td>orl-hmn TDLO: 120mg/kg; intr-rat TDLO: 100mg/kg</td>
<td>No data</td>
</tr>
</tbody>
</table>

NFPA RATING:

HEALTH: 0  FLAMMABILITY: 0  REACTIVITY: 0  PERSONAL PROTECTION: ND

EFFECTS OF EXPOSURE:

Aluminum:

Acute:

- **Ingestion**: causes a burning in the mouth and throat, vomiting and diarrhea.
- **Skin contact**: may cause irritation.
- **Eye contact**: may cause irritation.
- **Inhalation**: may cause irritation.

Chronic:

**Ingestion**: kidney and liver damage.

**Skin contact**: Aluminum salts can cause dermatitis, eczema.

**Eye contact**: with aluminum can cause corneal necrosis.

**Inhalation**: of aluminum fumes causes metal-fume fever.

MEDICAL CONDITIONS (IF ANY) AGGRAVATED BY THE CHEMICAL: None known

OTHER HEALTH HAZARDS: None known

MOST LIKELY ROUTES OF ENTRY: Ingestion, inhalation and skin absorption.

Copper:

Acute:

- **Ingestion**: large doses may cause nausea, vomiting, abdominal pain, metallic taste and diarrhea. Acute poisoning is characterized by hemolysis, jaundice, anemia, hypertension and convulsions.
- **Skin contact**: may cause irritation.
- **Eye contact**: dust or powder may cause irritation.
- **Inhalation**: dust or fumes may cause irritation, metallic taste, metal-fume fever, discoloration of skin and hair.

MEDICAL CONDITIONS (IF ANY) AGGRAVATED BY THE CHEMICAL: Pre-existing skin disorders, impaired liver, kidney or pulmonary function.

OTHER HEALTH HAZARDS: None known

MOST LIKELY ROUTES OF ENTRY: **Ingestion**
Copper:

Ingestion: renal damage.
Skin contact: prolonged skin contact may produce sensitization, dermatitis. Chronic skin contact with copper solutions will cause erythema and other skin reactions in some individuals.
Eye contact: None known.
Inhalation: Atrophic changes and irritation of mucous membranes, renal damage.

TUNGSTEN:

Acute:
Ingestion: None known.
Skin contact: dust or powder may cause irritation.
Eye contact: dust or powder may cause irritation.
Inhalation: dust or powder may cause irritation.

MEDICAL CONDITIONS (IF ANY) AGGRAVATED BY THE CHEMICAL: None known
OTHER HEALTH HAZARDS: None known.
MOST LIKELY ROUTES OF ENTRY: Ingestion

Chronic:
Ingestion: None known.
Skin contact: may cause dermatitis.
Eye contact: None known.
Inhalation: dust may cause pulmonary fibrosis.
Other: reproductive effects in experimental animals have been reported.

EMERGENCY AND FIRST AID PROCEDURES:

Aluminum:
Ingestion: no data available but one should obtain medical attention.
Skin contact: remove contaminated clothing, flood skin with large amounts of water. If irritation persists seek medical attention.
Eye contact: immediately flush eyes, including under eyelids, with large amounts of water for at least 15 minutes. Call a physician.
Inhalation: no specific information available, one should obtain medical attention.

Copper:
Ingestion: no data available but one should obtain medical attention.
Skin contact: remove contaminated clothing, flood skin with large amounts of water.
Eye contact: immediately flush eyes, including under eyelids, with large amounts of water for at least 15 minutes. Call a physician.
Inhalation: no specific information available, one should obtain medical attention.
Aluminum, Copper, Tungsten Alloy
MATERIAL SAFETY DATA SHEET

HEALTH HAZARD INFORMATION CONTINUED

Tungsten:
Ingestion: no data available but one should obtain medical attention.
Skin contact: remove contaminated clothing, flood skin with large amounts of water. If irritation persists seek medical attention.
Eye contact: immediately flush eyes, including under eyelids, with large amounts of water for at least 15 minutes. Call a physician.
Inhalation: no specific information available, one should obtain medical attention.

REACTIVITY DATA

Aluminum:
Incompatibility materials: acids, acid chlorides, oxidizing agents, halogens.
Hazardous Decomposition Products: toxic fumes of aluminum oxide; hydrogen when reacted with some acids and caustic solutions.
Conditions to avoid: Incompatibilities
Stability: Stable Hazardous Polymerization: Will not occur
Other: No data

Copper:
Incompatibility materials: strong acids, strong oxidizers, halogens, acid chlorides, chlorates, bromates, iodates, C2H2, NH4NO3, CIF3, (Cl+F2), ethylene oxide, H2O2, hydrazine mononitride, hydrazoic acid, H2S, Pb(N3)2, K2O2, NaN3, Na2O2.
Hazardous Decomposition Products: toxic fumes
Conditions to avoid: Incompatible with prolonged heating in air.
Other: powder and salts react with acetylene or hydrazonic acid making explosive compounds.

Tungsten:
Incompatibility materials: F2, Cl2, CIF3, strong oxidizers, air.
Hazardous Decomposition Products: tungsten oxide.
Conditions to avoid: Incompatibles.
Other: No data
Aluminum, Copper, Tungsten Alloy
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ENVIRONMENTAL INFORMATION

RCRA CODE: None
TSCA Registered: Yes

SPILL AND LEAK PROCEDURES: wearing full protective equipment, cover spill with dry sand or vermiculite. Mix well and carefully transfer to a container.

WASTE DISPOSAL: Consult state, local and federal EPA regulations for proper disposal.

SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION: Use a high efficiency particle respirator if exposed to fine fumes.
PROTECTIVE GLOVES: Rubber
EYE/FACE PROTECTION: ANSI approved safety goggles
VENTILATION REQUIREMENTS: Laboratory fume hood

SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING/STORAGE: Keep containers tightly closed. Store in a cool, dry, well-ventilated area. Wash thoroughly after use.
OTHER PRECAUTIONS: Lab coat and apron, flame and chemical resistant coveralls, eyewash capable of sustained flushing, safety drench shower and hygienic facilities for washing.

TRANSPORTATION REQUIREMENTS

DOT CLASS: ND
UN NUMBER: ND
IMCO CLASS: ND

This product contains Aluminum which is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR 372. (if fume or dust)

This product contains Copper which is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR 372.

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NA= NOT APPLICABLE
ND= NO DATA FOUND
NR= NOT RECORDED