Hauser & Miller Co., Inc.

Precious Metals since 1909 ---- www.hauserandmiller.com

10950 Lin-Valle Drive
St. Louis, MO 63123
(314) 487-1311

MATERIAL SAFETY DATA SHEETS

You recently requested that we provide you with copies of OSHA forms 20, Material Safety Data Sheets (MSDS) for our various alloys. We do not have MSDS's for each of the alloys we sell, but as an alternative we have a list of all our alloys and their individual metal components. Since most of our alloys use different proportions of the same components we are supporting this list with our suppliers MSDS's which cover each of these components.

To the best of our knowledge this information is accurate based on the information supplied to us. As yet we do not have verification of the alloy components in Engelhard solders, but assume they contain the usual alloy components found in most karat gold solders.

We do not perceive any of our alloys as particularly hazardous in the forms which we supply them, but recommend caution when working with fine particles such as polishing dust and fumes generated from soldering. Use adequate ventilation and/or respirators (masks) when soldering and polishing and wash hands after polishing. Safety tips for soldering are available on request.

ENCLOSED:

1. Hauser & Miller list of all alloys we sell.
2. Supplier's MSDS's covering gold, silver, copper, nickel, zinc, and cadmium.

Sincerely,

Richard A. Wuennenberg
President

SOLDER ALLOY COMPONENTS

HAUSER & MILLER SOLDERS

	GOLD	SILVER	COPPER	ZINC	NICKEL	CADMIUM
6K YELLOW EASY	25.15%	33-36%	19-20%	8-12%		9-11%
6K WHITE MED.	25.15	56-59		15-18		
8K YELL EASY	33.48	25-27	18-21	9-11		9-11
8K WHITE MED.	33.48	41-43	8-11	8-11	4-6	
10K YELL EASY	41.817	23-25	15-17	8-10		8-10
10K YELL MED	41.817	31-33	15-17	9-11		
10K YELL HARD	41.817	33-36	20-23	1-2		
10K WHITE MED	41.817	29-31	7-6	14-16	4-6	
14K YELL EASY	58.484	19-21	8-10	11-14		
14K YELL MED	58.484	17-19	11-13	11-13		
14K YELL HARD	58.484	19-22	14-16	5-7		
14K WHITE MED	58.484	20-22	6-8	6-8	5-7	
18K YELL MED	75	7-9	11-13	1-4	Tin 0-2	1-2
19K WHITE HARD	79.317			7-9	10-14	

ENGLEHARD SOLDERS

(Currently we do not have information from Engelhard on their component alloys, but assume they contain the same metals as our solders in similar proportions.)

	GOLD	SILVER	COPPER	ZINC	NICKEL	CADMIUM
8K Y EASY 565A	33.333	XX	XX	XX		XX
10K Y EASY 569A	41.667	XX	XX	XX		XX
10K Y HARD 569B	41.667	XX	XX	XX		XX
10K W MED 601	41.667	XX	XX	XX	XX	
14K Y EASY 564A	58.333	XX	XX	XX		XX
14K Y HARD 564B	58.333	XX	XX	XX		XX
14K W EASY 602	58.333	XX	XX	XX	XX	
19K W HARD 699	79.167	XX	XX	XX	XX	

NOBLE BRAND SOLDERS

These solders may contain any or all of the following metals.
The percentage of each metal is not available to us at this time.

GOLD, SILVER, COPPER, ZINC, CADMIUM, NICKEL (WHITE ALLOYS)

PLATINUM SOLDERS

	GOLD	SILVER	PALL.	PLAT
1000	15-25	75-85	0-2	0-2
1100	45-54	35-42	8-13	
1200	54-65	20-30	10-16	
1300	65-80	5-15	10-20	
1400	60-80	0	20-40	
1500	60-80	0	20-40	
1600	50-70	0	20-40	10-20
1700	40-60	0	20-40	10-20
#747	0	0	0-5	5-100

	SILVER	COPPER	ZINC
EASY	65	15-25	10-20
MED	70	12-22	9-18
HARD	75	10-20	8-18
I. T.	80	8-20	5-15
EX. EASY	45	15-50	10-50

HAUSER & MILLER ALLOY COMPONENTS

KARAT GOLDS – Sheet, Wire/Sizing, and Grain

	GOLD	SILVER	COPPER	ZINC	NICKEL	OTHER
10K Yellow						
Sheet and Wire	41.8%	6-12%	40-50%	3-6%		
Grain	41.8	6-12	40-50	3-6		.05%
10K White	41.8	0-5	30-35	8-9	15-20%	
14K Yellow						
Sheet and Wire	58.48	8-10	28-30	2-5		
Grain	58.48	5-7	28-30	5-7		
14K White						
Sheet and Wire	58.48	0-5	28-30	2-5	9-15	
Grain	58.48	5-7	28-30	7-9	9-15	
14K Palladium White	58.48	18-22	0	0-2	(Palladium 18-22%)	
14K Pink	58.48	0-3	38-42	0		
14K Green	58.48	33-36	2-7	0-2		
18K Yellow						
Sheet and Wire	75.15	14-16	9-11	0-2		
Grain	75.15	14-16	7-6	0-2		
18K White	75.15	0-4	1-3	4-6	16-18	
22K Yellow	91.817	4-5	2-4			

SILVER – Sheet, Wire & Grain

	SILVER	COPPER
Fine	99.9+%	
Sterling	92.5	7.5%
Coin	90.0	10.0
Reticulation	82.0	18.0

PLATINUM AND PALLADIUM

	Platinum	Iridium	Palladium	Ruthenium
Pure Platinum	99.9%			
10% Iridium Platinum	90.0	10.0%		
Pure Palladium			99.9+%	
#839 Palladium (JLRS)			95.0	5.0%

MATERIAL SAFETY DATA SHEET (04/08/93)

Gold – Silver – Copper – Zinc – Cadmium

HANDY & HARMAN
Precious Metal Products Center
231 Ferris Ave
East Providence RI 02916

Company Contact: Environmental/Safety Office
Telephone Number: 401-434-6543

Emergency Contact: CHEMTREC
Emergency Phone Number: 800-424-9300

SECTION 1 – IDENTIFICATION

Product: Gold – Silver – Copper – Zinc – Cadmium

Chemical Family: Precious metal alloys/solder
Chemical Formula: Alloys of gold, silver, copper, zinc, and cadmium

The information in this MSDS is applicable to products with the following codes: 61-039, 61-066, 61-086, 61-286-, 61-379, 61-584, 61-709, 61-786, 61-839, and 61-894.

SECTION 2 – HAZARDOUS CHEMICAL COMPONENTS

Component: Cadmium
CAS Number: 7440-43-9
OSHA PEL (29CFR 1910.1027):
5 micrograms/m3 (TWA)

Percent of Mixture: 2.75 – 12.0
ACGIH TLVs (1991-92)
Dusts and salts: .05mg/m3 (TWA)
CdO Fume, as Cd: .05mg/m3 (“C”)

Component: Copper
CAS Number: 7440-50-8
OSHA PELs:
Fume: 0.1mg/mg3 (TWA)
Dusts and mists: 1mg/mg3 (TWA)

Percent of Mixture: 7.35 – 27.0
ACGIH TLVs (1991-92)
Fume: .2mg/mg3 (TWA)
Dusts and mists: 1mg/mg3 (TWA)

Component: Gold
CAS Number: 7440-02-0
No OSHA PELs or ACGIH TLVs

Percent of Mixture: 12.08 – 75.15

Component: Silver
CAS Number: 7440-22-4
OSHA PEL: .01mg/mg3 (TWA)

Percent of Mixture: 2.5 – 42.11
ACGIH TLC (1991-92):
.1mg/m3 (TWA)

Component: Zinc
CAS Number: 7440-66-6
OSHA PELs:
ZnO fume: 5mg/mg3 (TWA)
10mg/m3 (STEL)

Percent of Mixture: 2.5 – 11.5
ACIH TLVs (1991-92):
ZnO fume: 5mg/m3 (TWA)
10mg/m3 (STEL)

SECTION 3 – PHYSICAL DATA

Vapor Pressure: N/A
Vapor Density (Air = I): N/A
Solubility (H2O): Insoluble
Percent Volatiles: N/A
Evaporation Rate: Solid – N/A

Appearance

Light yellow metal in form of wire, rod, strip, powder, or preformed shapes.

Odor

Solid – N/A

SECTION 4 – FIRE FIGHTING AND EXPLOSION DATA

Flash Point: N/A F
Auto-ignition: N/A F

Flammability Class: N/A

Lower Explosive Limit: N/A
Upper Explosive Limit: N/A

Fire and Explosion Hazards

This material may react vigorously or ignite when exposed to incompatible materials (see Section 6 for incompatible materials). Explosions or fires involving this material may release potentially toxic emissions (see Section 2 for hazardous components and/or reaction products and Section 5 for effects of exposure).

Extinguishing Media

Use dry powder. Do not use water.

Special Fire Fighting Instructions

Use self-contained breathing apparatus with full face-piece operated in pressure-demand or other positive pressure mode.

SECTION 5 – EXPOSURE EFFECTS AND FIRST AID

Route of Exposure – Inhalation

Inhalation of the components of this material may produce the following:

1. GOLD: No significant acute or chronic effects are known from exposure to gold metal by inhalation.
2. SILVER: Chronic exposure may produce argyria, a permanent blue-gray discoloration of the skin, eyes, mucous membranes, and the respiratory tract.
3. CADMIUM: Symptoms of acute exposure to cadmium include irritation of the upper respiratory tract, metallic taste, shortness of breath, weakness, fever, headache, chills, and muscular ache. Acute pulmonary edema may occur within 24 hours, and may lead to death by asphyxia. Chronic exposure to cadmium may produce gastrointestinal symptoms, anemia, eosinophilia, rhinitis, discoloration of teeth, micro-fractures, kidney disease, and an increase risk of cancer of the lung and prostate.
4. COPPER: Acute exposure may cause respiratory tract irritation, fever, muscle ache, chills, cough, weakness, and a metallic taste. Chronic exposure may cause injury to the liver, kidney, spleen, pancreas, and brain.
5. ZINC: Acute exposure to zinc oxide fumes may cause respiratory tract irritation and “metal fume fever”, which is characterized by one or more of the following symptoms: metallic taste, dry throat, cough, chills, fever, tightness of chest, dyspnea, headache, nausea, vomiting, and fatigue. Chronic exposure to zinc metal or zinc oxide has not been determined to produce significant toxic effects in man.

First Aid – Inhalation

If signs and symptoms of toxicity are observed, remove subject from contaminated area, administer oxygen, and seek medical attention. Keep the subject warm and at rest. Perform artificial respiration if breathing has stopped.

Route of Exposure – Skin

Skin contact with this material in solid forms is not known to be hazardous. In powdered form, skin contact may produce localized irritation, localized argyria (from silver), and/or skin discoloration and contact dermatitis (from copper).

First Aid – Skin

Following repeated or prolonged contact, remove contaminated clothing. Wash affected area with large quantities of water for at least five minutes. Seek medical attention if necessary.

Route of Exposure – Eyes

Exposure of the eyes to this material in powdered form may produce localized argyria, irritation, conjunctivitis, and ulceration of the cornea.

First Aid – Eyes

Flush affected areas with water for at least 15 minutes. Seek medical assistance if necessary.

Route of Exposure – Ingestion

Ingestion of this material in finely divided form may produce gastric irritation, vomiting, abdominal pain, hemorrhage, and diarrhea. Long-term chronic ingestion may produce injury to the liver, kidney, spleen, pancreas, musculoskeletal system, blood forming organs, and brain.

First Aid – Ingestion

If subject is conscious, induce vomiting. If unconscious or convulsive, seek immediate medical assistance.

Miscellaneous Toxicological Information

Cadmium is regulated as a carcinogen by the Occupational Safety and Health Administration per 29CFR 1910.1027. It is also classified as a potential human carcinogen by the following organizations (with respective sub classifications):

1. IARC (Group 2A, probably carcinogenic in humans)
2. NIOSH (Carcinogen, no further classification)
3. NTP (Group 2, reasonably anticipated to be a carcinogen)
4. ACGIH (A2, suspected human carcinogen, proposed)

Cadmium has also caused teratogenic effects in experimental animal studies.

Neither gold, silver, copper, nor zinc are classified as potential or demonstrated human carcinogens by IARC, NIOSH, NTP, OSHA, or ACGIH.

Health Conditions Aggravated By Exposure

Pre-existing pulmonary diseases (e.g., bronchitis, emphysema) may be aggravated by inhalation exposure to this material, particularly as fume. Additionally, exposure to cadmium by inhalation and/or ingestion may aggravate pre-existing diseases of the kidney, hematopoetic system, and musculoskeletal system.

SECTION 6 – REACTIVITY AND POLYMERIZATION

Stability: Stable

Conditions to Avoid (Stability)

Stable at room temperature.

Incompatible Materials

Strong oxidizers, ammonia, ammonium nitrate, azides, halogens, hydrazine nitrate, hydrazoic acid, hydrozylamine, sulfur.

Hazardous Decomposition Products

Heating to elevated temperatures may generate metal/metal oxide fume (for specific hazardous components and decomposition products, see Section 2).

Conditions to Avoid (Polymerization)

N/A

Hazardous Polymerization: Does not occur

SECTION 7 – SPILL, LEAK, AND DISPOSAL PROCEDURES

Steps to be Taken in the Event of Spills, Leaks, or Release

Clean up spilled material so as to minimize dispersion of dust. Wet sweeping or vacuuming using HEPA filtration are recommended methods.

Waste Disposal Methods

Return to manufacturer for reclaim.

SARA Title III Notifications and Information

SARA Title III – Hazard Classes: Acute Health Hazard
Chronic Health Hazard

SARA Title III – Section 313 Supplier Notification:

This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS#	Chemical Name	Percent of Mixture
7440-43-9	Cadmium	2.75 – 12.0
7440-50-8	Copper	7.35 – 27.0
7440-22-4	Silver	2.5 – 42.11
7440-66-6	Zinc	2.5 – 11.5

This information must be included on all MSDS's that are copied and distributed for this material.

Other Environmental Information

Reportable quantities of the component materials under SARA Title III, Section 313 are as follows:

Silver: 1000lbs Cadmium: 1lb Copper: 5000lbs

SECTION 8 – SPECIAL PROTECTIVE MEASURES

Ventilation

Use mechanical local exhaust ventilation adequate to maintain airborne concentration of all concentrations of all components and their decomposition products to within their respective OSHA PELs.

Eye Protection

Wear eye protection (safety glasses, dust-proof goggles) adequate to protect eye contact with this material in finely divided form and to prevent eye injury from the hazards of soldering. Plastic frame spectacles with side shields and filter lenses (shade #3 or #4) are recommended.

Skin Protection

Wear appropriate protective gloves and clothing to prevent skin injuries from the hazards of soldering and/or for prolonged or repeated contact with finely divided material. If this material is used with a flame, avoid flammable fabrics.

Respiratory Protection

If exposure levels exceed OSHA PELs, wear a NIOSH/MSHA approved respirator having a protection factor appropriate to the airborne concentrations of the contaminant(s) generated. For specific respiratory protection requirements for exposure to cadmium, refer to 29CFR 1910.1027(g).

Other Protection

Solders may be used with a separately applied flux which, when heated, may emit irritating and/or toxic gases and fumes. Consult the MSDS for the specific flux in use to determine its hazards and appropriate protective measures. For general guidance, refer to American National Standards Institute (ANSI) Z49.1, “Safety in Welding and Cutting” (American Welding Society, Miami FL 33135).

Work/Hygienic Practices

To avoid ingestion of material, wash hands and face before eating, drinking, or consumption of tobacco.

SECTION 9 – SPECIAL PRECAUTIONS – STORAGE AND HANDLING

Hazard Class: Not controlled by DOT, IATA, ICAO, or IMO regulations.

Precautionary Label (OSHA)

DANGER
CONTAINS CADMIUM
CANCER HAZARD
AVOID CREATING DUST
CAN CAUSE LUNG AND KIDNEY DISEASE

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained therein, and assume no responsibility regarding the suitability of this information for the user’s intended purposes or for the consequences of this product’s use. Each individual must make his or her own determination as to the suitability of the information for such purpose(s) or use.

MATERIAL SAFETY DATA SHEET (MSDS Code 32-560)

Complies with 29CFR 1910

Section I

Manufacturer's Name: Handy & Harman	*Emergency Telephone No:* 212-207-2632
Address: 850 3rd Ave, New York NY 10022	*Telephone No:* 212-752-3400
Chemical Name and Synonyms: Braze Extra Easy; Silver Solder; Ag, Cu, Zn, Sn Alloy; Brazing Filler Metal	*Trade Name and Specifications:* QQ-B-654A, BAg-7, Braze 560, AWS A5.8, BAg-7
Chemical Family: Ag-Cu-Zn-Sn Alloy	*Formula:* 56% Ag, 22% Cu, 17% Zn, 5% Sn

Section II – Hazardous Ingredients and Decomposition Products*

Filler Metal Ingredients***	CAS#	%	Exposure Limits (mg/mg3)
***Silver (Ag) Dust	7440-22-4	56	.1 ACGIH .01 OSHA
***Copper (Cu) Dust	7440-50-8	22	1.0 ACGIH 1.0 OSHA
***Zinc (Zn) Dust	7440-66-6	17	None ACGIH None OSHA
Tin (Sn) Metal	7440-31-5	5	2. ACGIH 2. OSHA

Observed Brazing Hazardous Decomposition Products	CAS#	Observed Emission Max (mg/g)	Exposure Limits** (mg/m3)
Zinc Oxide Fume (Zn)	1314-13-2	1.0	5. ACGIH 10./15m ACGIH 5. OSHA C15/15m NIOSH
General Welding	-	25.	5. ACGIH
(Brazing) Fume, Total Particulate (Zn, K, B, F, Cu, Ag, Sn, O, C, etc)			5. OSHA

*Filler metals are hazardous only in the powder form as metal or metal oxide dust. Thought should also be given to the flux and the base metals being joined and to possible base metal coating which could emit fumes on heating, depending on their particular chemistry. Hazardous products of combustion, e.g. NO^2, O^3, and CO may also be produced by the heating source.
**American Conference of Governmental Industrial Hygienists-Threshold Limit Value-Time. Weighted Average per 8-hour workday, or Short Term Exposure Limit. Occupational Safety and Health Administration Permissible-Exposure Limit, 8 hour day TWA. National Institute for Occupational Safety and Health-REL, 10 hour day TWA or STEL. C Denotes "Ceiling Limit" – not to be exceeded at any time.
See ANSI/AWS F1.1, F1.4, F1.5 and NIOSH Criteria Documents for air sampling and testing methods.
***The indicated ingredients of this product are classified as toxic by EPA in 40 CFR 372.65 and subject to reporting requirements of SARA Title III section 313 and 40 CFR 372.45.

Section III – Physical Data

Boiling Point – Not Known
Specific Gravity (H^2O = l) - 9.42
Solubility in Water - NIL
Melting Temperature Range – 1145-1205°F
Appearance and Odor – Metallic, Rod, Wire, Strip, and Powder – No Odor

Section IV – Fire and Explosion Hazard Data

Flash Point (method used) – Not Applicable	Flammable Limits – Not Applicable
Extinguishing Media	Dry Powder for Metal Fires
Special Fire Fighting Procedures	None Known
Unusual Fire and Explosion Hazards	None Known
NFPA Hazard Rating:	Health 1, Flammability 0, Reactivity 0
CERCLA Hazard Rating:	Health 1, Flammability 0, Reactivity 0
CERCLA Hazard Category:	Acute Health Hazard – Yes; Chronic Health Hazard – No; Sudden Release of Pressure Hazard – No; Reactivity Hazard – No.

Section V – Health Hazard Data

Major Exposure Hazard – Inhalation

CUMULATIVE LIMITS: Welding (Brazing) Fumes – Total Particulate ($C^1 + C^2 + \ldots C^n$) ≤ 5mg/m³ (C=Concentration, T=TLV) $C^1/T^1 + C^2/T^2 + \ldots C^n/T^n \leq 1$; See Section IX – Other Precautions

EFFECTS OF OVEREXPOSURE: Overexposure to Zinc Oxide fumes can cause nausea and "brass chills". Silver, Copper, and Tin dust can result in metal fume fever (see attached C.F.S.). No known chronic effects. None of the ingredients have been determined to be carcinogenic or mutagenic by ACGIH, NTP, LARC, OSHA, EPA, or NIOSH. See attached Chemical Fact Sheets.

EMERGENCY AND FIRST AID PROCEDURE: Remove victim from contaminated area. Administer oxygen. Call a Doctor. Give artificial respiration if breathing has stopped. See attached Chemical Fact Sheets.

Section VI – Reactivity Data

STABILITY: Stable at room temperature; vaporization of Zinc occurs above 1145°F. Conditions to avoid: Do not over heat. See Section IX.
INCOMPATIBILTY: Acetylene, Ammonia, moist Chlorine or Fluorine, Cyanide, Mercury, Nitric Acid, Sulfur, or their compounds.
HAZARDOUS POLYMERIZATION: Will not occur; Conditions to Avoid – None known.

Section VII - Spill or Leak Procedures

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: No special procedures required.
WASTE DISPOSAL METHOD: Not applicable. CERCLA RQ (40CFR, 302) = None; RCRA Hazardous Waste No. (40CFR, 261) = None

Section VIII – Special Protection Information

VENTILATION: (Fumes and Gases):

Confined Spaces: Local exhaust mechanical ventilation and respiratory protection shall be used consisting of; an airline respirator or hose mask, NIOSH, U.S. Bureau of Mines approved hose type C or self-contained air respirator and local exhaust (mechanical) ventilation with air flow to produce a minimum velocity of 100 lineal ft/min. in brazing zone and for at least 2ft above the work.

Indoors: Local exhaust mechanical ventilation shall be used (see confined spaces above).

Outdoors: Respiratory protection approved by Mine Safety and Health Administration (MSHA), National Institute of Occupational Safety and Health (NIOSH), or other approving authority for these purposes may be required.

Adjacent Persons: All persons in the immediate vicinity of Brazing operations shall be similarly protected as necessary by ventilation and/or approved respirators.

PROTECTIVE GLOVES: Leather welding gloves

EYE PROTECTION: Plastic frame safety spectacles with side shields – filter lenses shade #3/4

OTHER PROTECTIVE EQUIPMENT: Normal clothing for torch brazing (avoid flammable fabrics).

Section IX – Special Precautions

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Avoid heating above recommended brazing temperature range (1205-1400°F) as excessive fumes may result. (Zinc boils at 1665°F) Use sufficient flux or atmosphere to protect the filler metal and minimize oxidation and vaporization during brazing.

OTHER PRECAUTIONS: This filler metal may be used with a separately applied flux which when heated gives off fluoride fumes and gases that can irritate eyes, nose and throat. (TLV = 2.5mg/m^3). Use only in well ventilated spaces. Avoid contact of flux with eyes or skin. Do not take flux internally. Products of combustion from torch or furnace may produce toxic NO^2, O^3 and CO gases (see Footnote).

FOOTNOTE: Refer to “OSHA Standard 2-CFR 1910 from the U.S. Government Printing Office, Washington D.C. 20402 and ANSI Standard Z49.1 – Safety in Welding and Cutting”, published by the American Welding Society, P.O. Box 351040, Miami FL 33135.

SHIPPING REGULATIONS: Packing or shipment of this filler metal is not controlled or restricted by DOT, IATA, ICAO, or IMO regulations.

Silver (Ag)

OSHA PEL: 0.01mg/m³ ACGIH TLV: 0.1mg/m³

Physical Data

Appearance: Soft, ductile, malleable lustrous metal.

Melting Point: 962°C

Physiological Effects

Chronic occupational exposure to silver results in argyria, a permanent pigmentation (gray to purple) of the skin and eyes. Localized argyria may occur on the skin from handling metallic/silver, from embedded particles or from skin absorption. Inhalation of silver may localize the argyria in the respiratory tract with chronic bronchitis as the only symptom.

Reactivity Data

Silver is incompatible with acetylene, ammonia, and hydrogen peroxide.

Copper (Cu)

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing, or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Metallic copper, copper (O); CAS 7440-50-8.

Trade Names: Allbri Natural Copper, CDA, C.I. Pigment Metal 2, Raney Copper, Arwood Copper, and others.

Uses: In the manufacture of copper alloys such as brass and bronze; as an electrical conductor; in the production of copper salts; and many others.

Physical Information

Appearance: Reddish, lustrous metal that becomes dull on exposure to air.

Odor: None.

Behavior in Water: Insoluble sinks.

Health Hazard Information

OSHA Standard: Average 8hr exposure – 1mg/m³ (dust and mists)
Average 8hr exposure – 0.1 mg/m³ (fumes).

NIOSH Recommended Limit: None established.

ACGIH Recommended Limit: Average 8hr exposure – 1mg/m³ (dust and mists)
Average 8hr exposure – 0.2 mg/m³ (fumes).

Short Term Exposure:

Inhalation: Copper or copper oxide fumes may cause metal fume fever which includes chills, fever, aching muscles, dry mouth and throat, headache, nausea, vomiting, diarrhea, and stomach pain. Onset may be delayed for several hours.

Skin: May cause irritation. Metal solution can cause swelling and itching.

Eyes: May cause irritation. See long term exposure.

Ingestion: May cause stomach pain, nausea, vomiting and diarrhea. These symptoms are reported from ingestion of 10mg of copper by an adult and 8.5mg by a child.

Long Term Exposure:

No long-term effects from inhalation or ingestion reported. Copper fragments in the cornea may cause cataracts, discoloration (Kaper - Fleischer rings), and loss of the eye.

Note: Individuals with Wilson's Disease may wish to limit occupational exposure to copper.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

Emergency and First Aid Instructions
Inhalation: Move victim to fresh air. Give oxygen or artificial respiration as necessary. Seek medical attention, if necessary.
Skin: Remove chemically soiled clothing. Wash with large amounts of water for at least 5 minutes. Seek medical attention if symptoms persist.
Eyes: Wash with large amounts of water for at least 15 minutes. See an ophthalmologist (eye doctor) if symptoms persist.
Ingestion: Seek medical attention.
Note to Physician: Penicillamine or triethylene tetramine dihydrochloride may be beneficial in reducing body burden.

Fire and Explosion Information
General: Fine copper powder is a moderate fire hazard.
Extinguisher: Powdered dolomite, sodium chloride (common salt) or graphite. Do **not** use water.

Reactivity
Materials to Avoid: Reacts violently with acetylene, ammonium nitrate, bromates, chlorates, fodates, chlorine trifluoride, ethylene oxide, fluorine, hydrogen peroxide, hydrazine mononitrate, hydrogen sulfide, hydrazoic acid, lead azide, potassium peroxide, sodium azide and sodium peroxide.
Conditions to Avoid: High temperatures of smelting, welding or fire may cause production of copper fumes.

Protective Measures
Storage and Handling: Avoid conditions that create fumes or fine dusts.
Engineering Controls: Ventilate as needed. Sinks, showers, and eyewash stations should be readily available.
Protective Clothing (Should not be substituted for proper handling and engineering controls): Dust and splash proof safety goggles.
Protective Equipment: If fumes are present: for levels up to 1mg/m³ use a high efficiency particulate respirator, a fume filter respirator, a supplied-air respirator or a self-contained breathing apparatus. Up to 5mg/m³ use the above, except fume filter respirator, with full face-piece. Up to 100mg/m³ use a powered air-purifying respirator with high efficiency filter or a Type C supplied-air respirator operated in a positive pressure mode. Up to 200mg/m³ use a Type C supplied-air respirator with full face-piece, helmet or hood operated in a positive pressure mode.
If fumes are NOT present: for levels up to 50mg/m³ use a high efficiency particulate respirator with full face-piece, a supplied-air respirator with full face piece of self-contained breathing apparatus with full face-piece. Up to 2000 mg/m³ use a supplied-air respirator with full face-piece operated in a positive pressure mode.

Procedures for Spills and Leaks

Warn other workers of spill. Put on proper protective equipment and clothing. Sweep or vacuum up solids, being careful not to raise dust levels. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information: Contact the Industrial Hygienist or Safety Officer at your work-site or the New York State Department of Health, Bureau of Toxic Substance Assessment, Empire State Plaza, Corning Tower, Albany, New York 12237.

Chemical Fact Sheet* **Zinc Oxide**

The information on this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Zinc white, CAS 1314-13-2.
Trade Names: Amalox, Calamine, Chinese-white, Emanay Zinc Oxide, Hubbuck's white, zincite, and many others.
Uses: White pigment in paints, rubber chemicals and ceramics; as a seed disinfectant, fungicide, food additive, vulcanizing aid; in photocopying, cosmetics, pharmaceuticals, dentistry and others.

Physical Information

Appearance: White to yellowish-white powder. Fume is white, produced by exposure of zinc compounds to high temperatures, as in welding.
Odor: None.
Behavior in Water: Not soluble; material will sink.

Health Hazard Information

OSHA Standard: Average 8-hour exposure – 5mg/m³ (Fume).
NIOSH Recommended Limit: Average 10-hour day/40 hour week – 5mg/m³ (Fume).
ACGIH Recommended Limit: Average 8 hour exposure – 5mg/m³

Short Term Exposure

Inhalation: Exposure to fumes over 52mg/m³ can cause "Metal Fume Fever". Onset of symptoms may be delayed 4-12 hours. Symptoms include irritation of the nose, mouth and throat, cough, stomach pain, headache, nausea, vomiting, metallic taste, chills, fever, pains in the muscles and joints, thirst, bronchitis or pneumonia, and a bluish tint to the skin. These symptoms go away in 24 to 48 hours and leave no effect.
Skin: Dust may cause irritation, which can result in rash.
Eyes: No information available.
Ingestion: May cause abdominal discomfort, watery diarrhea and cramps.

Long Term Exposure

No information available.

Emergency and First Aid Instructions

Inhalation: Move victim to fresh air. Give artificial respiration or oxygen as required. Seek medical attention, if necessary.
Skin: Wash affected area thoroughly with soap and water.
Eyes: Rinse eyes for at least 15 minutes with plenty of water. Seek medical attention, if necessary.
Ingestion: Seek medical attention, if necessary.
Note to Physician: In case of fume inhalation, treat pulmonary edema. Give prednisone or other corticosteroid orally to reduce tissue response to fume. Positive pressure ventilation may be necessary. Treat metal fume fever with bed rest, analgesics and antipyretics.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

Fire and Explosion Information

General: Not combustible.

Reactivity

Conditions to Avoid: Exposure to high heat can generate fumes.

Materials to Avoid: Can react violently with magnesium and chlorinated rubber.

Protective Measures

Storage and Handling: Store away from sources of high heat and materials listed above.

Engineering Controls: Adequate ventilation, sinks, showers and eyewash stations should be provided.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Safety goggles or masks; coveralls and gloves, if applicable. Change work clothing daily.

Protective Equipment: For levels up to 25mg/m³ use a single-use dust or fume filter. For up to 50mg/m³ use an air-purifying respirator with replaceable dust or fume filters, a Type-C supplied-air respirator, or a valve type single use dust or fume respirator. For up to 500 mg/m³ use the above (except single-use respirators) with a full face-piece. For up to 1000mg/m³ use a powered air-purifying respirator with applicable replaceable dust or fume filter. For levels greater than 1,000 mg/m³ use a Type-C continuous flow type supplied-air respirator.

Procedures for Spills and Leaks

Ventilate area. Vacuum up dust and place in suitable container. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information:

Contact the Industrial Hygienist or Safety Officer at your work-site or the New York State Department of Health, Bureau of Toxic Substance Assessment, Empire State Plaza, Corning Tower, Albany, New York 12237.

Tin (Sn)

OSHA PEL: 2mg/m³ (inorganic)

ACGIH TLV: 2mg/m³ (metal, oxide, inorganic)

Physical Data

Appearance: Crystalline metallic element

Melting point: 232°C

Physiological Effects

Chronic inhalation of tin oxide dust or fume leads to a benign pneumoconiosis without symptoms of interference with pulmonary function.

Reactivity Data

Tin is incompatible with chlorine and turpentine.