



Right to Know Hazardous Substance Fact Sheet

Common Name: **COPPER**

Synonyms: Bronze Powder; Gold Bronze

Chemical Name: Copper

Date: September 2008 Revision: September 2016

CAS Number: 7440-50-8

RTK Substance Number: 0528

DOT Number: UN 3077

Description and Use

Copper is a reddish-brown, odorless metal. It is used in electrical wiring and plumbing, in alloys and protective coatings for other metals, and in insecticides, fungicides and herbicides.

Reasons for Citation

- ▶ **Copper** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, DEP and EPA.

[SEE GLOSSARY ON PAGE 5.](#)

FIRST AID

Eye Contact

- ▶ Immediately flush with large amounts of water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention.

Skin Contact

- ▶ Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Inhalation

- ▶ Remove the person from exposure
- ▶ Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- ▶ Transfer promptly to a medical facility.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

NJDEP Hotline: 1-877-927-6337

National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS >>>> SEE BACK PAGE

Hazard Summary

| Hazard Rating | NJDHSS | NFPA |
|---------------|--------|------|
| HEALTH | 2 | - |
| FLAMMABILITY | 1 | - |
| REACTIVITY | 1 | - |

FINELY DIVIDED **COPPER** MAY BURN OR EXPLODE IN AIR
POISONOUS GASES ARE PRODUCED IN FIRE

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- ▶ **Copper** can affect you when inhaled
- ▶ Contact can irritate and burn the skin and eyes.
- ▶ Inhaling **Copper** can irritate the nose and throat.
- ▶ Inhaling **Copper** can cause a sore and/or a hole in the "bone" (septum) dividing the inner nose.
- ▶ **Copper** can cause headache, nausea, vomiting, diarrhea and abdominal pain.
- ▶ Exposure to **Copper** can cause a flu-like illness called *metal fume fever*.
- ▶ **Copper** may cause a skin allergy.
- ▶ **Copper** may affect the liver and kidneys.

Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is **1 mg/m³** (as **Copper dusts and mists**) and **0.1 mg/m³** (as **Copper fume**) averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit (REL) is **1 mg/m³** (as **Copper dusts and mists**) and **0.1 mg/m³** (as **Copper fume**) averaged over a 10-hour workshift.

ACGIH: The threshold limit value (TLV) is **1 mg/m³** (as **Copper dusts and mists**) and **0.2 mg/m³** (as **Copper fume**) averaged over an 8-hour workshift.

High-temperature operations such as welding, brazing, soldering, plating, cutting, and metallizing often generate fumes that have different health effects and exposure standards than the metal, metal compound or metal alloy originally used.

Determining Your Exposure

- ▶ Read the product manufacturer's Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- ▶ For each individual hazardous ingredient, read the New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet, available on the RTK Program website (<http://www.state.nj.us/health/workplacehealthandsafety/right-to-know/>) or in your facility's RTK Central File or Hazard Communication Standard file.
- ▶ You have a right to this information under the New Jersey Worker and Community Right to Know Act, the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- ▶ The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Copper**:

- ▶ Contact can irritate and burn the skin and eyes.
- ▶ Inhaling **Copper** can irritate the nose and throat, causing coughing and wheezing.
- ▶ **Copper** can cause headache, nausea, vomiting, diarrhea and abdominal pain.
- ▶ Exposure to **Copper** can cause "*metal fume fever*." This is a flu-like illness with symptoms of metallic taste in the mouth, headache, fever and chills, aches, chest tightness and cough. The symptoms may be delayed for several hours after exposure and usually last for a day or two.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Copper** and can last for months or years:

Cancer Hazard

- ▶ While **Copper** has been tested, it is not classifiable as to its potential to cause cancer.

Reproductive Hazard

- ▶ **Copper** may decrease fertility in males and females.

Other Effects

- ▶ Inhaling **Copper** can cause a sore and/or a hole in the "bone" (septum) dividing the inner nose, sometimes with bleeding, discharge, and/or formation of a crust.
- ▶ Repeated exposure may cause a greenish discoloration of the skin, hair and teeth.
- ▶ **Copper** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
- ▶ **Copper** may affect the liver and kidneys.

Medical

Medical Testing

For frequent or potentially high exposure (half the PEL or greater), the following are recommended before beginning work and at regular times after that:

- ▶ Serum and urine **Copper** levels

If symptoms develop or overexposure is suspected, the following are recommended:

- ▶ Evaluation by a qualified allergist can help diagnose skin allergy
- ▶ Liver and kidney function tests
- ▶ Examination of the skin and nose

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures

- ▶ More than light alcohol consumption can cause liver damage. Drinking alcohol may increase the liver damage caused by **Copper**.

Conditions Made Worse By Exposure

- ▶ "Wilson's Disease" is a rare condition which interferes with the body's ability to get rid of **Copper**. If you have this illness, consult your doctor about **Copper** exposure.

Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following work practices are also recommended:

- ▶ Label process containers.
- ▶ Provide employees with hazard information and training.
- ▶ Monitor airborne chemical concentrations.
- ▶ Use engineering controls if concentrations exceed recommended exposure levels.
- ▶ Provide eye wash fountains and emergency showers.
- ▶ Wash or shower if skin comes in contact with a hazardous material.
- ▶ Always wash at the end of the workshift.
- ▶ Change into clean clothing if clothing becomes contaminated.
- ▶ Do not take contaminated clothing home.
- ▶ Get special training to wash contaminated clothing.
- ▶ Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- ▶ Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- ▶ Before entering a confined space where *finely divided Copper powder* may be present, check to make sure that an explosive concentration does not exist.
- ▶ Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.

Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Gloves and Clothing

- ▶ Avoid skin contact with **Copper**. Wear personal protective equipment made from material which cannot be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
- ▶ Safety equipment manufacturers recommend Nitrile and Natural Rubber for gloves and DuPont Tyvek®, or the equivalent, as a protective material for clothing.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- ▶ Wear eye protection with side shields or goggles.
- ▶ Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- ▶ Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- ▶ Where the potential exists for exposure over **0.1 mg/m³** (as **Copper fume**) or over **1 mg/m³** (as **Copper dusts and mists**), use a NIOSH approved air-purifying, particulate filter respirator with an N95 filter. More protection is provided by a full facepiece respirator than by a half-mask respirator, and even greater protection is provided by a powered-air purifying respirator.
- ▶ Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Copper**, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- ▶ Consider all potential sources of exposure in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- ▶ Where the potential exists for exposure over **1 mg/m³** (as **Copper fume**) or over **10 mg/m³** (as **Copper dusts and mists**), use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- ▶ Exposure to **100 mg/m³** (as **Copper dusts and mists**) is immediately dangerous to life and health. If the possibility of exposure above **100 mg/m³** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- ▶ Extinguish fire using an agent suitable for type of surrounding fire. **Copper** itself does not burn.
- ▶ *Finely divided Copper powder* may burn in air or become an explosion hazard.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE, including *Copper fumes* and *Copper Oxides*.
- ▶ Use water spray to keep fire-exposed containers cool.

Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If **Copper** is spilled, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.
- ▶ Ventilate and wash area after clean-up is complete.
- ▶ DO NOT wash into sewer.
- ▶ It may be necessary to contain and dispose of **Copper** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

Handling and Storage

Prior to working with **Copper** you should be trained on its proper handling and storage.

- ▶ *Finely divided Copper powder* reacts violently on contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); AZIDES; ETHYLENE OXIDE; IODATES; HYDRAZINES; POTASSIUM COMPOUNDS; SODIUM COMPOUNDS; and ACETYLENES.
- ▶ **Copper** is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); 1-BROMO-2-PROPENE; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and ANHYDROUS AMMONIA.
- ▶ Store in tightly closed containers in a cool, well-ventilated area away from MOISTURE.
- ▶ Sources of ignition, such as smoking and open flames, are prohibited where *finely divided Copper powder* is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

Occupational Health Information Resources

The New Jersey Department of Health and Senior Services, Occupational Health Service, offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health & Senior Services
 Right to Know Program
 PO Box 368
 Trenton, NJ 08625-0368
 Phone: 609-984-2202
 Fax: 609-984-7407
 E-mail: rtk@doh.nj.gov
 Web address:
<http://www.state.nj.us/health/workplacehealthandsafety/right-to-know/>

The Right to Know Hazardous Substance Fact Sheets are not intended to be copied and sold for commercial purposes.

GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGs) are established by the EPA. They describe the risk to humans resulting from once-in-a lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values are intended to provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionization Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database maintained by federal EPA. The database contains information on human health effects that may result from exposure to various chemicals in the environment.

LEL or **Lower Explosive Limit**, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

Permeated is the movement of chemicals through protective materials.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

UEL or **Upper Explosive Limit** is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

Common Name: **COPPER**

Synonyms: Bronze Powder; Gold Bronze

CAS No: 7440-50-8

Molecular Formula: Cu

RTK Substance No: 0528

Description: Reddish-brown, odorless metal

HAZARD DATA

| Hazard Rating | Firefighting | Reactivity |
|--|--|--|
| <p>2 - Health</p> <p>1 - Fire</p> <p>1 - Reactivity</p> <p>DOT#: UN 3077</p> <p>ERG Guide #: 171</p> <p>Hazard Class: 9 (Environmentally Hazardous Material)</p> | <p>Extinguish fire using an agent suitable for type of surrounding fire. Copper itself does not burn.</p> <p><i>Finely divided Copper powder</i> may burn in air or become an explosion hazard.</p> <p>POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Copper fumes</i> and <i>Copper Oxides</i>.</p> <p>Use water spray to keep fire-exposed containers cool.</p> | <p><i>Finely divided Copper powder</i> reacts violently on contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); AZIDES; ETHYLENE OXIDE; IODATES; HYDRAZINES; POTASSIUM COMPOUNDS; SODIUM COMPOUNDS; and ACETYLENES.</p> <p>Copper is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); 1-BROMO-2-PROPENE; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); and ANHYDROUS AMMONIA.</p> |

SPILL/LEAKS

Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Copper is a toxic water pollutant.

PHYSICAL PROPERTIES

Odor Threshold: Odorless

Flash Point: Noncombustible *solid*

Combustible/Explosive *finely divided powder*

Vapor Pressure: 1 mm Hg at 2,962°F (1,628°C)

Specific Gravity: 8.9 (water = 1)

Water Solubility: Insoluble

Boiling Point: 4,653°F (2,567°C)

Melting Point: 1,981°F (1,083°C)

Molecular Weight: 63.6

EXPOSURE LIMITS

OSHA: 1 mg/m³(Dust), 0.1 mg/m³(Fume), 8-hr TWA

NIOSH: 1 mg/m³(Dust), 0.1 mg/m³(Fume), 10-hr TWA

ACGIH: 1 mg/m³(Dust), 0.2 mg/m³(Fume), 8-hr TWA
(All the above are for *Copper dust and fume*)

IDLH: 100 mg/m³ (as *Copper*)

PAC: PAC-1 = 3 mg/m³; PAC-2 = 33 mg/m³
PAC-3 = 200 mg/m³

PROTECTIVE EQUIPMENT

Gloves: Nitrile and Natural Rubber

Coveralls: DuPont Tyvek®

Respirator: >0.1 mg/m³ - Full facepiece APR with High efficiency filter

>1 mg/m³ - Supplied air (Fume)

>10 mg/m³ - Supplied air (Dust/Mist)

HEALTH EFFECTS

Eyes: Irritation and burns

Skin: Irritation and burns

Inhalation: Nose and throat irritation with coughing and wheezing

Headache, nausea, vomiting and abdominal pain

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility