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## School Materials Safety Manual:

No. 129 Cupric Chloride  
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### ♦ SECTION 1 INTRODUCTION

**Material** Cupric Chloride, ca 100%

**Synonyms** Copper (II) chloride, copper bichloride, copper dichloride, kirticopper

**Chemical Formula**  $\text{CuCl}_2$  or  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$

**CAS Number** 1344-67-8

**DOT Classification** ORM-B, UN2802, and listed as a Hazardous Material for Transportation (49 CFR 172.101)

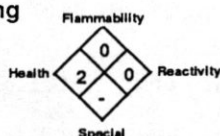
**EPA Classification** Listed as a CERCLA Hazardous Substance (40 CFR 302.4). Not listed as a RCRA Hazardous Waste (40 CFR 261.33), a SARA Extremely Hazardous Substance (40 CFR 355), or a SARA Toxic Chemical (40 CFR 372.65).

**OSHA Classification** Listed (as Cu dust and mist) as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

**NFPA Hazard Rating** Not found

**Genium Hazard Rating**

4 = Extreme  
3 = High  
2 = Moderate  
1 = Slight  
0 = Minimum



**HMIS**  
H 2  
F 0  
R 0

**Description**  $\text{CuCl}_2$  is a yellow-to-brown, hygroscopic (moisture-absorbing) powder.  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$  is a fine, light blue-green, needle-like crystal. Either form may have a hydrogen chloride (HCl) odor. Derived by union of copper and chlorine. It forms the dihydrate ( $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ ) in moist air. Used in metallurgy, photography, pulpwood preservation, deodorizing and desulfurizing petroleum distillates, water purification, fungicides, wood preservation, pyrotechnics, acrylonitrile manufacturing, electroplating baths; as a pigment for glass and ceramics, a feed additive, a disinfectant, a sympathetic ink, a mordant in dyeing and printing fabrics, and an isomerization and cracking catalyst.

**Overview** Cupric chloride is a stable, noncombustible material that is irritating to the skin and respiratory system. It is toxic by inhalation and ingestion. In the school environment, cupric chloride has a variety of applications in the chemistry lab, and may be found as an ingredient in materials the custodial/maintenance staff and the vocational or art students use. Although the information provided here pertains to this material alone, the hazards and precautions applicable to it are relevant to products containing it as well. Since other ingredients in a commercial formulation may have their own unique hazards too, consult your supplier's MSDS.

**Manufacturer** Always request an up-to-date MSDS from your chemical supplier. That sheet should include the substance's manufacturer and emergency phone numbers. This *Manual's* Resources/Manufacturers Index lists some larger manufacturers and available emergency phone numbers.

### ♦ SECTION 2 USE AND STORAGE DATA

**Preliminary Planning Considerations** Plan and provide for safe disposal of all school-generated chemical waste. Check applicable regulations prior to use. Copper chloride solutions are acidic and corrosive. Avoid contact with acids, acid fumes, extreme heat, and open flames, or highly toxic chloride fumes can evolve. Provide adequate ventilation or restrict use to fume

hood to avoid exceeding the TLV (Sec. 4). Contact lens use in the laboratory is controversial. In some cases, soft lenses can actually protect eyes from chemicals. In other cases, chemical entrapment is presumed a possible hazard. Particles adhering to contact lens surfaces can cause corneal damage. For safety, always wear safety glasses or goggles. Wear rubber or neoprene gloves to minimize skin contact. Employees and students should know the location of eyewash and shower facilities near where chemicals are used. Be sure eyewash stations and safety showers are in good working order.

**Usage Precautions and Procedure** Before using, read this material's container label and follow all precautions. Do not smoke in usage or storage areas. Since  $\text{CuCl}_2$  is hygroscopic, protect anhydrous salt from moisture. Practice good housekeeping to avoid unintentionally mixing incompatibles. Do not let chemical residue or dust buildup in lab or work areas. Wear safety glasses or goggles and appropriate protective clothing to work with this substance. Keep this material and products containing it away from notebooks, textbooks, and personal belongings to avoid transporting chemical residues from lab/work areas. After working with chemical materials, and before eating, drinking, or smoking, always wash hands and face. Remove and launder contaminated clothing before reusing.

**Additional Data** Cupric chloride is stable at room temperature under normal handling and storage conditions. It does not polymerize. Its incompatibilities include hydrazine, nitromethane, and sodium hypobromite. A mixture of either potassium or sodium with cupric chloride produces a strong explosion on impact. Cupric chloride is corrosive to aluminum when moisture is present.

**Preferred Storage Location and Methods** Store in tightly closed containers under dry conditions to preserve anhydrous salt or the crystalline hydrate. Avoid metal containers. To separate incompatible chemicals, store by chemical family, not by alphabetical name. Protect all chemical containers from physical damage. Empty containers are hazardous due to product residues. Prohibit smoking in chemical storage areas. Purchase amounts equal to only a year's needs, if at all.

### ♦ SECTION 3 SPILL/DISPOSAL PROCEDURES

**If Spilled** Ventilate spill area with cross-ventilation from open doors or windows, or provide mechanical ventilation to control airborne levels. Clean up spilled material promptly and thoroughly. Cleanup personnel should use appropriate personal protective equipment (goggles, gloves, respirators, etc.) to protect themselves against skin or eye contact and dust inhalation. For liquid (solution) spills, cover with an inert solid absorbent (vermiculite, dry sand, etc.) and scoop into appropriate disposal containers (with a secure lid) for disposal in accordance with existing regulations. Dike the spill area with an inert absorbent material, as needed, to contain the spilled material. For dry spills, carefully collect and scoop the spilled dry material into secure disposal or reclamation containers. Avoid creating airborne dust conditions. Vacuum (with an appropriate filter), or wet mop to minimize dust dispersion.

**Disposal of Small Quantities** Handle emptied containers carefully since residues may remain. Always check regulations before disposal. Investigate recycling, reclamation, or destruction to a less hazardous material rather than disposal of

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untreated waste to a landfill. Material dissolved in water can be treated with soda ash (sodium carbonate) to precipitate out copper; separate precipitate for disposal. If this method is not practical, feasible, or in accord with existing regulations, contact your supplier or a licensed disposal contractor for specific treatment/disposal procedures.

**Disposal of Larger Amounts** Contact your supplier or a licensed disposal company.

*Follow all applicable local, state, and Federal regulations for all waste disposal.*

### ◆ SECTION 4 HEALTH HAZARDS

Cupric chloride is an irritant of the skin, eyes, and mucous membranes. Copper is an essential trace element in the body, but can be toxic in excessive exposures. Short-term exposure to copper dusts and fumes may cause respiratory tract irritation and metal fume fever. Under normal circumstances, it is neither a cumulative nor chronic poison.

**1991-92 ACGIH TLV** 8-hr TWA: 1 mg/m<sup>3</sup> (copper dusts and mists, as Cu)

**1990 NIOSH REL** 10-hr TWA: 1 mg/m<sup>3</sup> (copper dusts and mists as Cu)

**1990 OSHA PEL** 8-hr TWA: 1 mg/m<sup>3</sup> (copper dust and mists as Cu)

**1985-6 Toxicity Data** Rat, oral, LD<sub>50</sub>: 140 mg/kg; Mouse, oral, LD<sub>50</sub>: 190 mg/kg

**Carcinogenicity** Not listed by the NTP, IARC, or OSHA

**Acute Effects** Inhalation of copper salt's mists, fumes, or dusts may irritate the upper respiratory airways. Nasal congestion, throat irritation, coughing, and even perforation of the nasal septum may occur. Skin contact causes an irritant effect with itching, redness, and an eczema-type rash. Copper salts may cause conjunctivitis and possible corneal damage with ulceration or cloudiness. Ingestion causes irritation of the GI tract, resulting in salivation, nausea, vomiting, abdominal pain, stomach bleeding, and diarrhea. These effects limit the likelihood of significant absorption by acute ingestion. If significant absorption occurs, injury to the liver and kidneys may result.

**Chronic Effects** Continued exposure to copper may cause mild dermatitis and degeneration of the mucous membranes. Chronic toxicities related to the copper in salt are found only in individuals unable to excrete copper, such as those with Wilson's disease (abnormal retention and storage of copper in the body resulting in damage to the liver, kidneys, brain, blood, bones, and endocrine glands).

### ◆ SECTION 5 FIRST AID PROCEDURES

**Eye Contact** Promptly flush eyes with plenty of running water for at least 15 min, including under the eyelids. Get prompt medical attention.

**Skin Contact** After flushing with large amounts of water, wash exposed areas with soap and water. If the skin is red, swollen, or painful, consult a physician.

**Inhalation** Remove victim from exposure to fresh air and support breathing as necessary.

**Ingestion** Get *prompt* medical attention. Never give anything by mouth to an unconscious or convulsing person. If ingested, have that conscious and alert person drink 1 to 2 glasses of water, then induce vomiting.

*Get proper in-school, paramedic, or community medical attention and support.*

### ◆ SECTION 6 FIRE PROCEDURES AND DATA

**Fire Hazards** Cupric chloride in a fire situation decomposes at extreme temperatures, releasing chlorine gas. For major fires, or for fires involving large quantities, firefighters should wear appropriate protective clothing and respirators. A self-contained breathing apparatus (SCBA) is recommended.

**Flash Point and Method** None reported

**Autoignition Temperature** None reported

**Flammability Limits in Air (vol. %)** None reported

**Hazardous Decomposition Products** Thermal oxidative decomposition of cupric chloride can evolve highly toxic chloride fumes.

**Extinguishing Media** Since cupric chloride is noncombustible, use extinguishing media appropriate to surrounding fire. Use water spray to cool fire-exposed containers.

### ◆ SECTION 7 PHYSICAL DATA

**CuCl<sub>2</sub>:**

**Boiling Point (at 1 atm)** 1819 °F (993 °C), decomposes to cuprous chloride

**Melting Point (at 1 atm)** 1148 °F (620 °C)

**Solubility in Water, g/100 ml, at 0 °C** 70.6

**pH of 0.2 Molar Solution** 3.6

**Molecular Weight** 134.45

**Specific Gravity (25 °C/4 °C)** 3.39

**CuCl<sub>2</sub>·2H<sub>2</sub>O:**

**Boiling Point (at 1 atm)** Loses water at 158 to 392 °F (70 to 200 °C)

**Melting Point (at 1 atm)** 212 °F (100 °C)

**Solubility in Water, g/100 ml, at 0 °C** 110.4

**pH of 0.2 Molar Solution** 3.6

**Molecular Weight** 170.5

**Specific Gravity (25 °C/4 °C)** 2.54

**References** 1, 2, 4-7, 9, 10, 12, 14, 26, 73, 85, 101, 103, 109, 124, 126, 127, 132, 136, 140, 143, 148, 162, 501, 510, 518, 527; Genium's *Material Safety Data Sheets Collection*, No. 121 (11/90)

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