



# Metallic irritants III

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Professor & HOD

# COPPER



Poisonous compound – copper sulphate(blue vitriol)

Copper subacetate(verdigris)



# Physical Appearance

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- Copper is a lustrous, ductile, malleable, odourless solid with a distinct golden-red or reddish-brown colour.



# Uses

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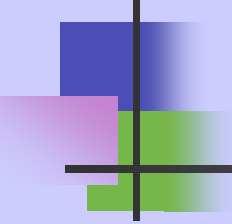
- Copper acetate is used as a paint pigment, insecticide, and fungicide
- Copper chloride is used as a disinfectant, in metallurgy, for the preservation of wood pulp, in photography, in water purification



# Acute poisoning

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- Metallic taste, ^salivation, colicky abdominal pain, nausea and vomiting
- Hepatomegaly, liver tenderness
- cough, sore throat, and conjunctivitis

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- Diarrhoea with much straining, motions are liquid and brown but not bloody
  - Oliguria, haematuria, acidosis and uraemia
  - Death occurs due to hepatic or renal failure
  - Exposure of skin may cause greenish-blue discoloration

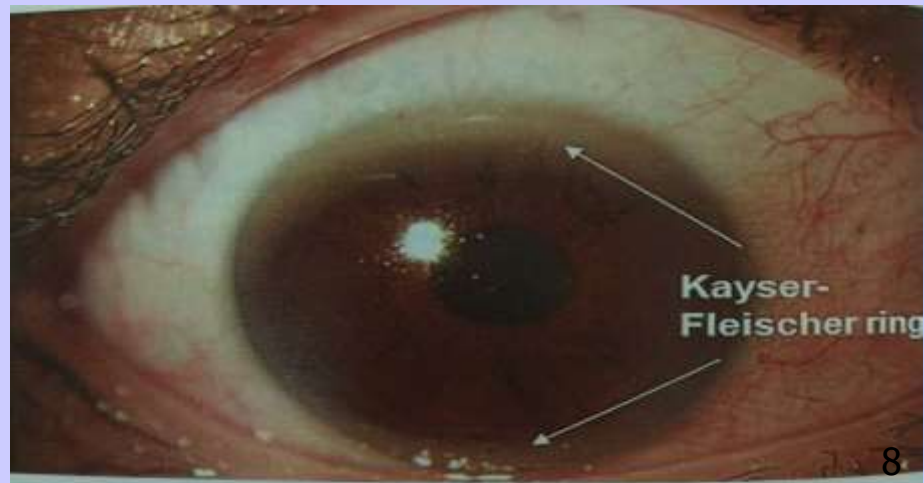


# Chronic copper poisoning

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- **Causes**
- **Vineyard sprayers lung disease-**  
chronic inhalation of copper sulphate  
causes histiocytic granulomatous lung

- **Chalcosis-** copper deposited in the tissue
- Discolouration of the peripheral part of the cornea (**Kayser-Fleischer ring**) is a pathognomonic feature of this condition characterised by deposition of copper in parenchymal tissue.



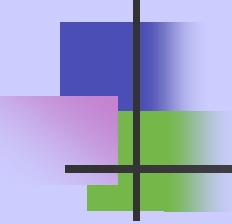


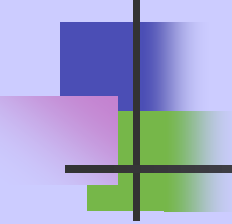


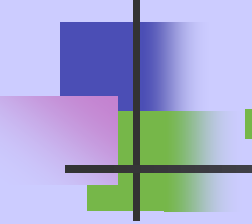
# Diagnosis

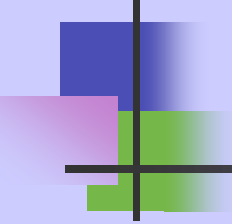
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- **Blood copper level:** If this is elevated beyond 1.5 mg/100 ml, there is likelihood of serious toxicity. Average normal levels are 1.09 mg/L

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- **Urine level:** Normal daily excretion of copper in the urine is less than 0.6 micromole/day
  - **Radiography:**

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- Fatal dose- copper sulphate 30gm
  - Fatal period- one to three days
  - **Treatment**
    - Stomach wash with 1% potassium ferrocyanide (antidote)
    - Demulcent drinks, castor oil to remove poison from intestine
    - Chelation with BAL, penicillamine/EDTA

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- **D-penicillamine** is considered the drug of choice for Wilson's disease
  - Usual Adult Dose: 1000 to 1500 mg/day divided every 6 to 12 hours, before meals.
  - Usual Paediatric Dose: Initially 10 mg/kg/day, gradually increase to 30 mg/kg/day divided in two or three doses as tolerated.

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- **Dimercaprol-** The usual dose is 3 to 5 mg/kg/dose deep IM every 4 hours for 2 days, every 4 to 6 hours for an additional 2 days, then every 4 to 12 hours for up to 7 additional days.
  - **Calcium disodium edetate-** The usual dose is 75 mg/ kg/24 hours deep IM, or slow IV infusion given in 3 to 6 divided doses up to 5 days



# POSTMORTEM APPEARANCE

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- Greenish-blue froth may be present at mouth
- Gastric mucosa greenish blue in colour
- Liver may be soft and fatty
- Spontaneous haemolysis and degenerative changes in the proximal tubules.





# MLI

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- Abortifacient
- Cattle poison



# Iron

## Physical Appearance

- Metallic iron is silvery white in colour
- ferrous sulfate (green vitriol) occurs as bluish green crystals





# Uses/Sources

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## Dietary Sources:

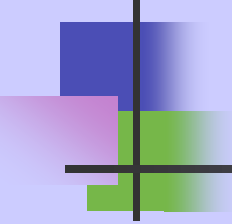
- The required daily amount of iron of 10–20 mg for adults is supplied through average diet.



## Uses:

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- Iron is primarily used in powder metallurgy and serves as a catalyst in chemical reactions
- Steel is the most important alloy of iron

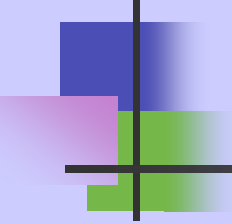
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- F.D- 20-30gm
  - F.P- 24hr-30hr



# Clinical Features

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- Stage I (0.5 to 2 hours) includes vomiting, haematemesis, abdominal pain, diarrhoea, haematochezia, lethargy, shock, acidosis, and coagulopathy.
- Stage II (after *Stage I*) includes apparent recovery and may contribute to a false sense of security.

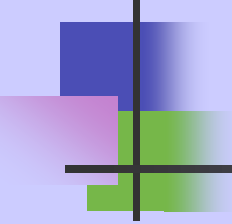
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- Stage III (2 to 12 hours after *Stage I*) includes profound shock, severe acidosis, cyanosis and fever.
  - Stage IV (2 to 4 days) includes possible hepatotoxicity, convulsions, and coma.
  - Stage V (days to weeks) includes GI scarring and strictures.



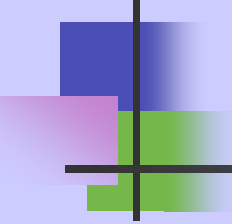
# Diagnosis

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- **Serum iron level:** Poisoning is indicated if this exceeds 150 mcg/100 ml
  
- **Xray**

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- **Qualitative desferrioxamine colour test (QDCT):** 2 ml of gastric fluid and 2 drops of 30% hydrogen peroxide are placed in 2 plastic tubes. 0.5 ml of solution of desferrioxamine (500 mg in 4 ml distilled water) is added into one tube and the resulting colour change is compared with the other tube (control).





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If the test is positive, an orange to red colour will develop in the tube in which desferrioxamine was added. The test must be done within 2 hours of ingestion of iron.



# Treatment

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- Stomach wash
- Magnesium hydroxide solution (1%) administered orally may help reduce absorption of iron by precipitating the formation of ferrous hydroxide.

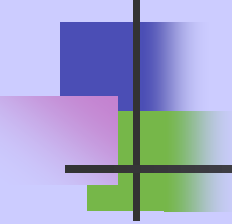


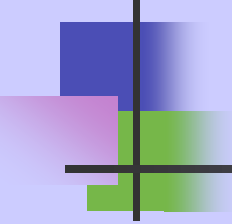
# Chelation therapy:

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## Desferrioxamine

- Intravenous Dose: Administer by continuous infusion at a rate of up to 15 mg/kg/hr.
- Intramuscular Dose: Administer 90 mg/kg, up to a maximum of 1 gm/dose, every 8 hours as needed.

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- Total Daily Dose: The recommended total intravenous or intramuscular daily dose should not generally exceed 6 grams.

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- Duration of Infusion: Duration of infusion is guided by the patient's clinical condition.
  - Patients with moderate toxicity are generally treated for 8 to 12 hours, those with severe toxicity may require desferrioxamine for 24 hours or longer.



# Autopsy Features

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- Haemorrhagic necrosis of gastric mucosa.
- Hepatic and renal necrosis





# MLI

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- Accidental poisoning- iron preparations (syrups and tablets) are brightly coloured and pleasantly flavoured, they constitute an irresistible, fatal attraction for these innocent victims.





# MCQ

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**'Red velvety' stomach mucosa is seen in poisoning with:**

- **A. Mercury**
- **B. Arsenic**
- **C. Lead**
- **D. Copper**



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**Arsenic causes all, *except*:**

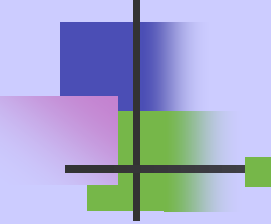
- **A.** Raindrop pigmentation
- **B.** Alopecia
- **C.** Palmar hyperkeratosis
- **D.** Blue line in gums



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## **Hatter's shakes are seen in:**

- **A.** Lead poisoning
- **B.** Mercury poisoning
- **C.** Arsenic poisoning
- **D.** Copper poisoning



**A middle aged man presented with paraesthesia of hands and feet. Examination revealed presence of 'Mees' lines in the nails and raindrop pigmentation in the hands. The most likely diagnosis is:**

- A.** Lead poisoning
- B.** Arsenic poisoning
- C.** Thallium poisoning
- D.** Mercury poisoning



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## **Acrodynia / Pink disease occurs in poisoning with:**

- **A. Mercury**
- **B. Arsenic**
- **C. Lead**
- **D. Thallium**



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## **Cholera presents with symptoms mimicking:**

- **A.** Arsenic poisoning
- **B.** Dhatura poisoning
- **C.** Barbiturate poisoning
- **D.** Morphine poisoning



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## **Minamata Bay disease refers to chronic toxicity with:**

- **A. Ergot**
- **B. Dhatura**
- **C. Organophosphorus**
- **D. Mercury**



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## **Burton's line is seen in:**

- **A.** Lead poisoning
- **B.** Arsenic poisoning
- **C.** Phosphorus poisoning
- **D.** Zinc poisoning





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**Punctate basophilia is seen in poisoning with:**

- **A. Lead**
- **B. Mercury**
- **C. Cadmium**
- **D. Potassium**