

Preparation of copper

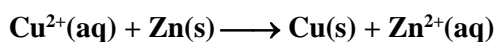
Powdered copper is very reactive. Its surface covers with black copper(II) oxide. In wet air containing carbon dioxide its surface covers with pale green copper(II) dihydroxide-carbonate (known as malachite). As a noble metal, copper may be prepared by the *cementation*, *i. e.* its displacement from copper(II) salt solution with some non-noble metal, such as zinc, aluminium, iron, magnesium *etc.*

Chemicals

- copper(II) sulphate pentahydrate, light blue crystalline substance, or another soluble copper(II) salt,
- zinc, light grey metal, powdered, or another non-noble metal (aluminium, iron, magnesium *etc.*),
- sulphuric acid, concentrated 96 wt% solution, oily colourless liquid,
- acetone, colourless liquid,
- diethyl ether, colour liquid.

Work

Prepare copper by the reaction of zinc with copper(II) sulphate solution.



Procedure

Dissolve the calculated amount of copper(II) sulphate pentahydrate in 100 cm³ ground-glass flask in water to prepare 10 wt% solution. Add few drops of concentrated sulphuric acid. Carefully add powdered zinc in small portions until the final solution is very light blue. On the bottom of the flask only dark red copper (no unreacted zinc) must be visible. Filter out copper and save the filtrate for the next experiment. Wash prepared copper on the filter with sufficiency of acidified water to remove all traces of zinc sulphate.

Safety instructions

Zinc – Zn

- R10** Flammable.
- R15** Contact with water liberates extremely flammable gases.
- S7/8** Keep container tightly closed and dry.
- S43** In case of fire use ... (indicate in the space the precise type of fire-fighting equipment. If water increases the risk add: Never use water).

Copper(II) sulfate pentahydrate – CuSO₄ · 5H₂O

- R22** Harmful if swallowed.
- R36/38** Irritating to eyes and skin.
- S22** Do not breathe dust.

Sulfuric acid – H₂SO₄

- R23** Toxic by inhalation.
- R34** Causes burns.
- R49** May cause cancer by inhalation.
- S23** Do not breathe gas/fumes/vapour/spray (appropriate wording to be specified by the manufacturer).
- S45** In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).
- S36/37/39** Wear suitable protective clothing, gloves and eye/face protection.

Copper – Cu

- R36/37/38** Irritating to eyes, respiratory system and skin.
- S26** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S37/39** Wear suitable gloves and eye/face protection.

Zinc(II) sulfate heptahydrate – ZnSO₄ · 7H₂O

- R36/38** Irritating to eyes and skin.
- R50/53** Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- S22** Do not breathe dust.
- S25** Avoid contact with eyes.
- S60** This material and its container must be disposed of as hazardous waste.
- S61** Avoid release to the environment. Refer to special instructions/safety data sheet.