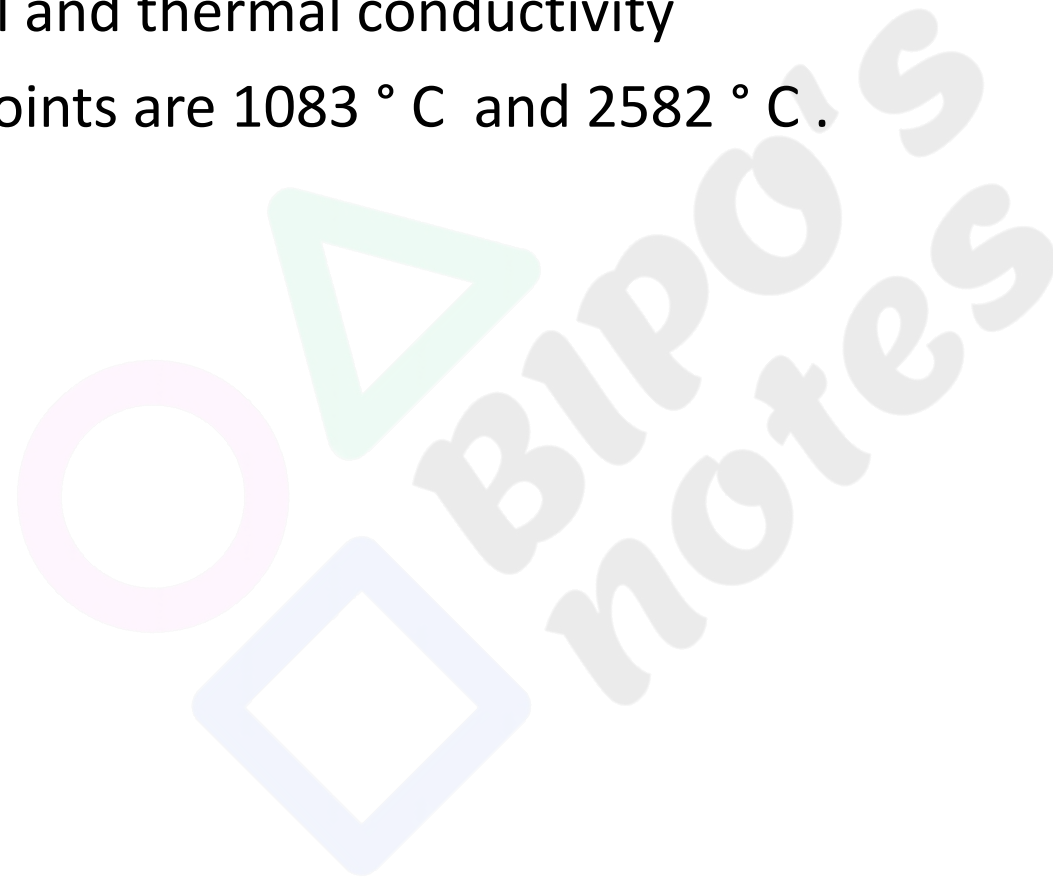


Physical properties of copper

- ❖ It is flesh pink colour
- ❖ it is malleable and ductile
- ❖ it exhibits high electrical and thermal conductivity
- ❖ Its melting and boiling points are 1083°C and 2582°C .



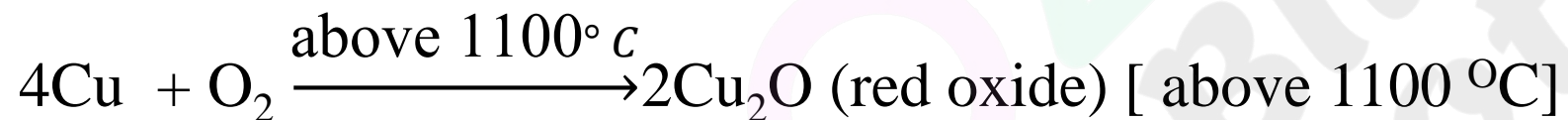
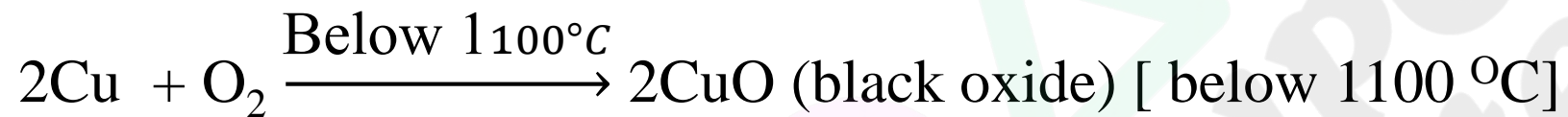
Chemical properties of copper

Dry air has no action with copper

1. With moist air:[NEB] : When copper is exposed to moist air, a thin green film of basic copper carbonate is formed. Ie Malachite green.



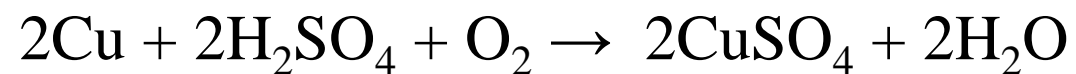
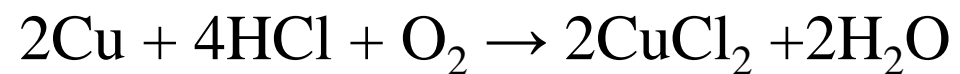
2. With oxygen: When copper is heated with O_2 (air) cupric oxide (black oxide) is formed which on further heating above 1100°C changes to cuprous oxide (red oxide)



Contd...

3. With acids:

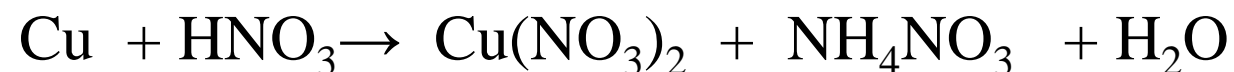
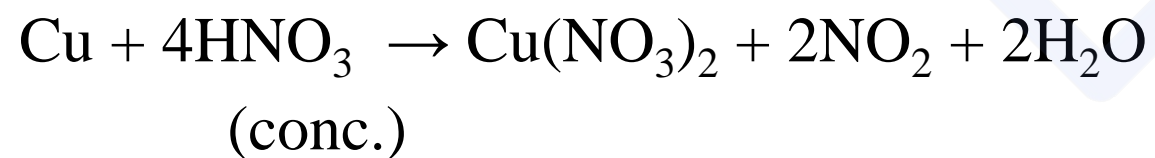
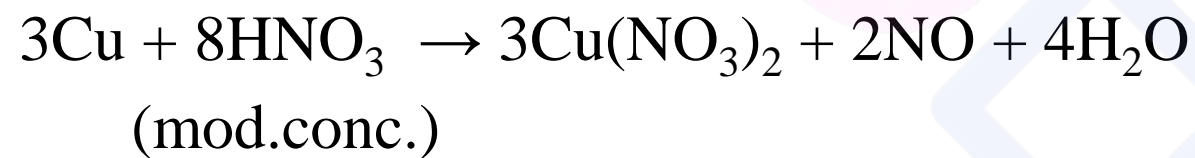
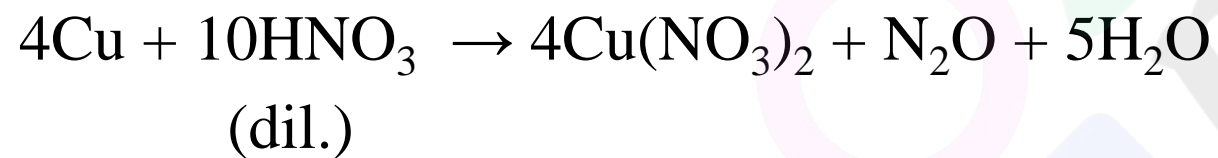
a. With dil. HCl and dil. H₂SO₄: Copper reacts with dil. HCl and dil. H₂SO₄ in presence of air to give salt and water.



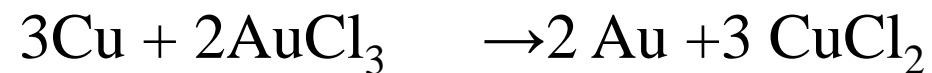
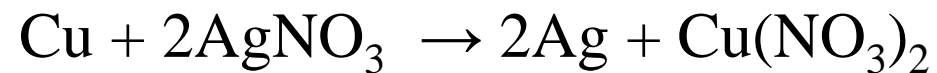
b. With conc. H₂SO₄ [NEB]: Copper reacts with conc. H₂SO₄ to give CuSO₄ and SO₂



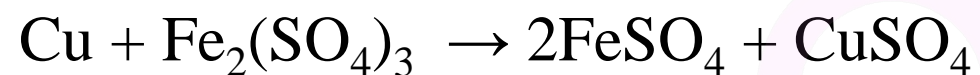
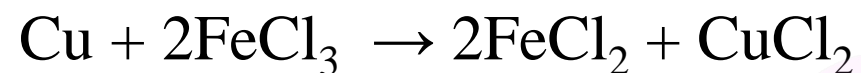
c. With nitric acid: Nitric acid oxidizes copper to copper nitrate and itself gets reduced.



4.Displacement reaction: Copper can displace metals below it in electrochemical series from their salt solution.



5.Reducing nature of copper: Copper acts as reducing agent. It reduces ferric salts to ferrous salts.



Uses of Copper

- ✓ Copper is a very good conductor of electricity. Therefore ,it is used for making electric cables and electric appliances.
- ✓ Copper in the form of sheet is used in making utensils, kettles and other containers.
- ✓ Salts of copper are used in agriculture as insecticides and pesticides.
- ✓ It is one of the important constituents of many alloys like brass,gun-metal, bronze etc.

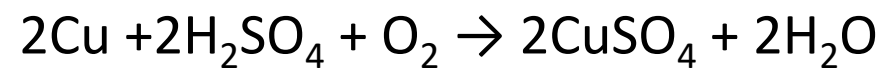
Alloy	COmposition
Brass	Cu+ Zn
Bronze	Cu + Sn
German silver	Cu + Zn + Ni
Bell metal	Cu + Sn

Compounds of copper

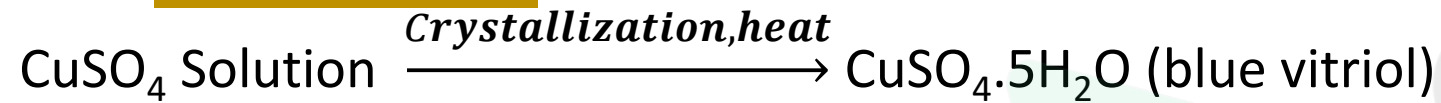
VVimp1. Copper Sulphate/ Pentahydrated copper sulphate [Blue Vitrol, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$]

Preparation

1.From Copper: When copper scraps are treated with hot and dil. Sulphuric acid in presence air copper sulphate is formed which on crystallization gives blue vitriol.



Hot and dilute



2. Copper sulphate pentahydrate can also be prepared by the action of hot and concentrated Sulphuric acid on metallic copper which is small scale preparation. Crystals of blue vitrol can be obtained by crystallization.

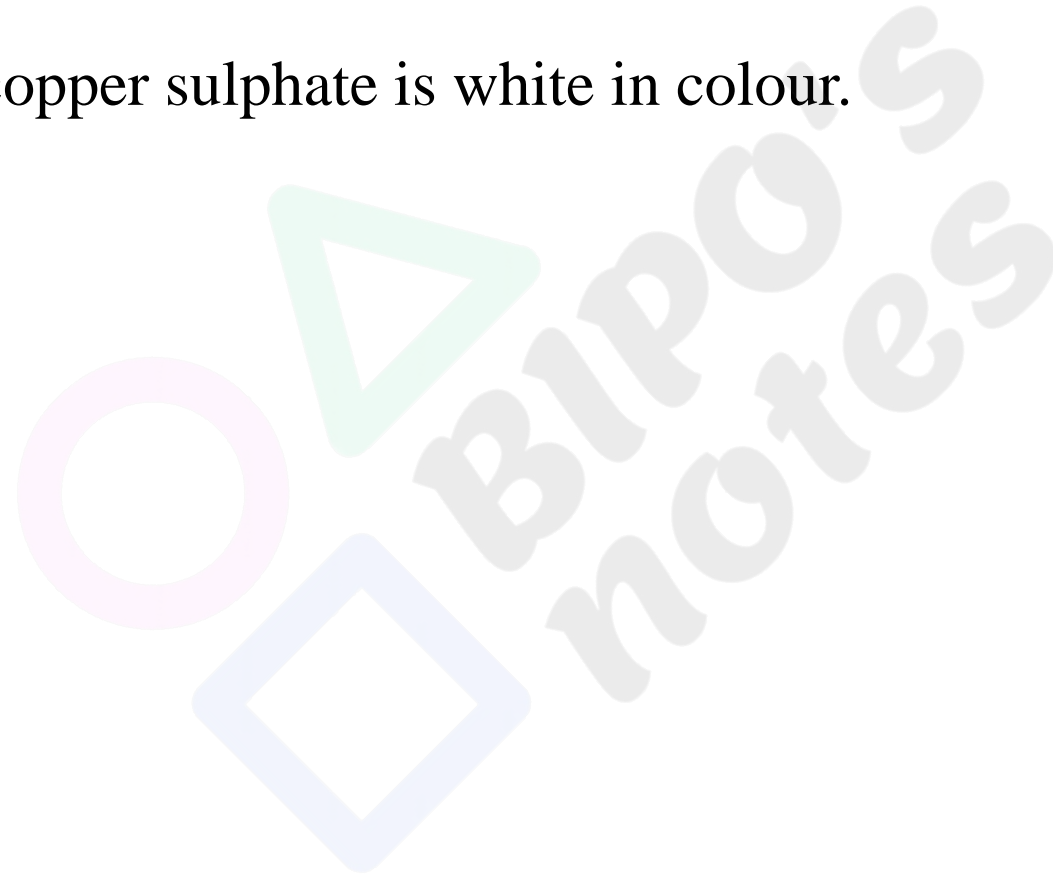


Hot and Conc.



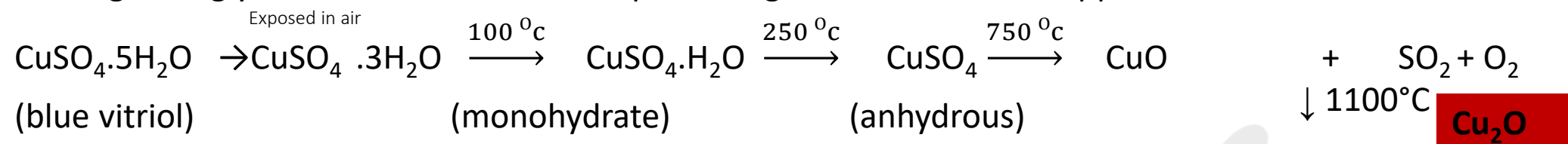
Physical properties

- It is a blue crystalline solid readily soluble in water.
- Copper sulphate is blue coloured crystalline solid having five molecules of water of crystallization
- The anhydrous form of copper sulphate is white in colour.



Chemical properties

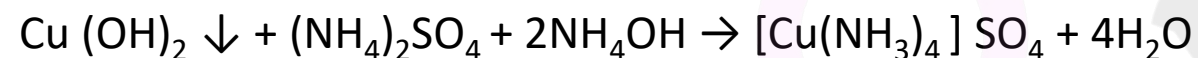
1.Action of heat: When blue vitriol is heated to 100°C , it becomes monohydrate, at 250°C it becomes anhydrous on further heating strongly to about 750°C it decomposes to give black oxide of copper.



2.With alkali: Copper sulphate reacts with caustic soda or caustic potash to give bluish white ppt. of cupric hydroxide.

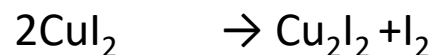


3.Action with ammonia[NEB]: When ammonia gas is passed through the copper sulphate solution, at first bluish white ppt. of cupric hydroxide is formed. On further passing excess ammonia a deep blue solution of tetra amine copper II sulphate is formed. This is called as Schweitzer's reagent which has capacity to dissolve cellulose.



Tetramine Copper(II) sulphate

4.Action with potassium iodide: When copper sulphate solution is treated with potassium iodide (KI), dark brown ppt. of iodine is precipitated.

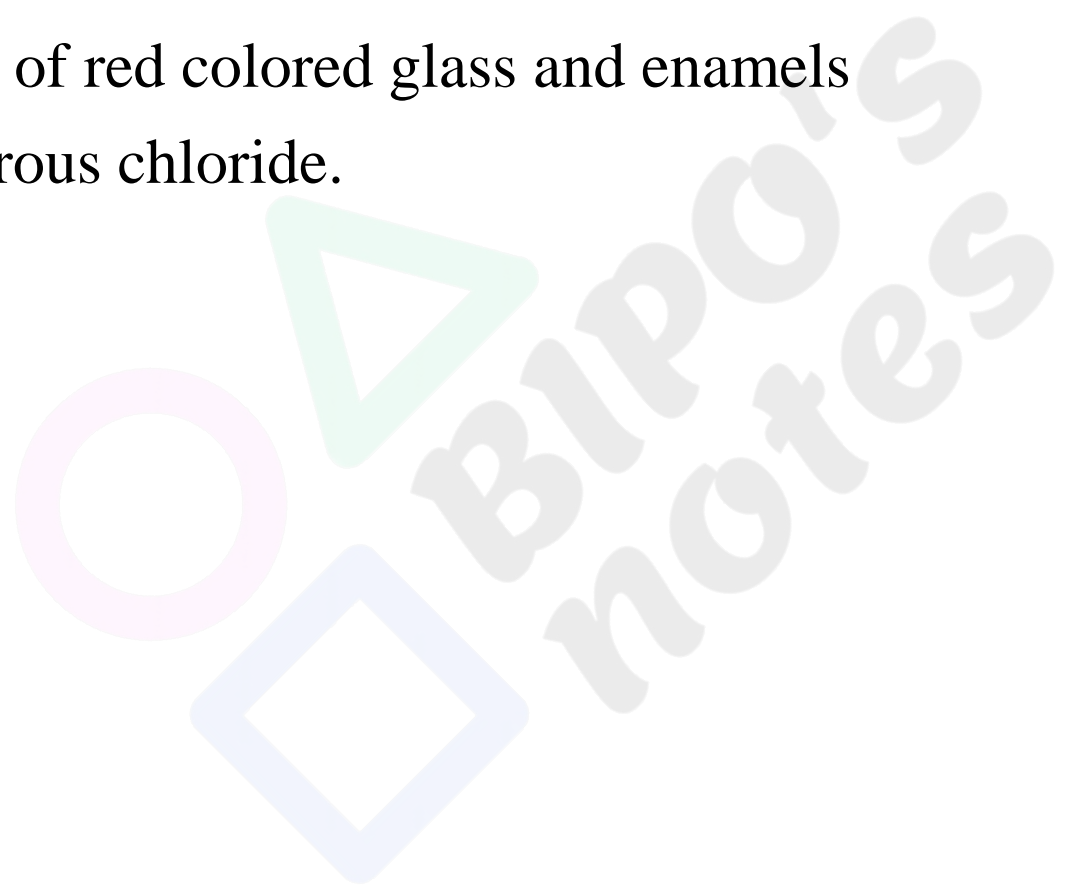


Uses of copper sulphate

- It is used as germicide in agriculture.
- It is used as an antiseptic.
- It is used as a laboratory reagent.
- It is used in electroplating and electro refining of copper.
- Anhydrous copper sulphate is used in the detection of presence of water molecule

Uses of red oxide:

- It is used as an anti-rust paint
- It is used in manufacture of red colored glass and enamels
- it is used to prepare cuprous chloride.



Cupric Oxide [CuO]/ Black oxide/ Copper(II) oxide

- It is used to provide blue or black color to glass
- It is used to estimate carbon and hydrogen present in organic compounds.
- It is used to remove Sulphur from petroleum products
- It is used as oxidizing agents.



1. What happens when copper is exposed to moist air?

With moist air: When copper is exposed to moist air, a thin green film of basic copper carbonate is formed.



2. What happens when copper is treated with concentrated sulphuric acid?

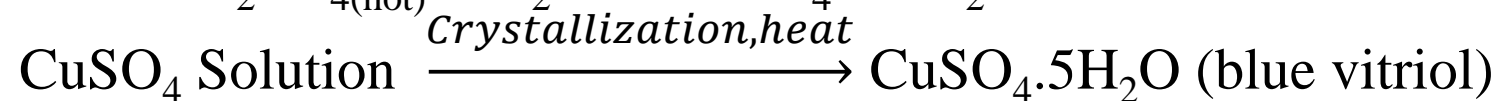
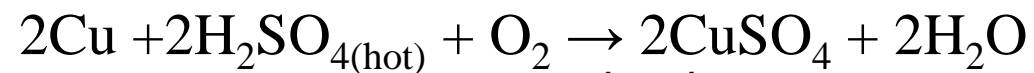
With conc. H_2SO_4 : Copper reacts with conc. H_2SO_4 to give CuSO_4 and SO_2



Contd...

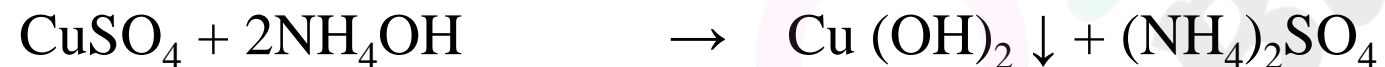
QN. **Starting from copper how can would you obtain blue vitrol?**

When copper scraps are treated with hot and dil. Sulphuric acid in presence air copper sulphate is formed which on crystallization gives blue vitriol.



QN. What happens when ammonia solution is treated with copper sulphate solution?

When ammonia solution is passed through the copper sulphate solution, at first bluish white ppt. of cupric hydroxide is formed. On further passing excess ammonia a deep blue solution of tetra amine copper (II) sulphate is formed.



Deep blue

QN. **What happens when copper turning is treated with concentrated nitric acid?**



(conc.)

Mcq

1. An alloy that does not contain copper

- a. **Solder** b. Brass c. Bronze c. Bell metal

2. Bordeaux mixture is a

- a. Insecticide b. fungicide c. CuSO_4 solution d. **(Fungicide)Lime in aqueous CuSO_4**

3. Which of the following is not a coinage metal

- a. Cu b. Ag c. Au d. Ni

4. Solution of Schwetizer's reagent gives positive test of

- a. Cu^{++} b. NH_3 **c. SO_4^{--}** d. All of above

Alloy	COmposition
Brass	Cu+ Zn
Bronze	Cu + Sn
German silver	Cu + Zn + Ni
Bell metal	Cu + Sn