

## CORROSION OF COPPER

The deformation of a metal by the reaction with oxygen (Oxidation) is rust. Tarnishing means the outer layer of metals combines with other elements (Oxidation) and loses their shine and colour.

Tarnish is a thin layer of corrosion that forms over copper, brass, silver, and other similar metals or metallic compounds as their outer most layer undergoes a chemical reaction.

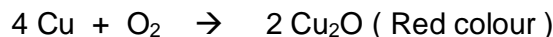
The air around us causes copper to tarnish. It can happen at any time. Statue of liberty is made up of copper. Green layer is formed on it due to oxidation.

Copper oxides are two types. They are Copper (I) oxide means cuprous oxide ( $\text{Cu}_2\text{O}$ ) which is in Red colour and Copper (II) oxide means cupric oxide ( $\text{CuO}$ ) which is in black colour.

### **How can Green layer formed on copper articles?**

Reaction with oxygen is called oxidation. But loss of electrons is also called as oxidation. Corrosion of copper means copper can be oxidized.

At first copper reacts with oxygen in air to form Copper (I) oxide. It is red colour.



And in next stages it forms Copper (II) oxide. It is black colour.



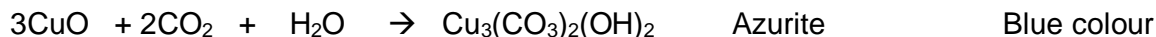
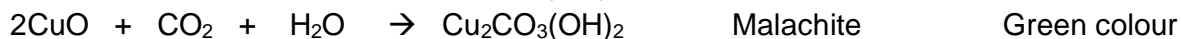
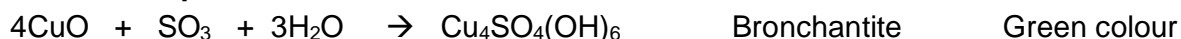
And in the presence of sulphur Copper sulphide is formed. It is also black.



After some years in the presence of humidity, rain and gases available due to pollution it forms mainly three different types of substances. These three different Copper compounds are formed due to reaction with Sulphur dioxide ( $\text{SO}_2$ ) and Carbon dioxide ( $\text{CO}_2$ ). This process occurs slowly.

- Bronchantite  $\text{Cu}_4\text{SO}_4(\text{OH})_6$  Hydrated copper sulphate Green colour
- Malachite  $\text{Cu}_2\text{CO}_3(\text{OH})_2$  Hydrated copper carbonate Green colour
- Azurite  $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$  Hydrated copper carbonate Blue colour

### **Chemical equations for reactions :**



The formation of natural green patina as seen on copper roofs and statues requires a long time and several different methods have been takes place.

So Copper corrode and fade. The green layer / bluish green layer formed at the surface of copper roofs and statues is called patina. Copper will tarnish and changes to green colour.

More over the corrosion of less reactive metals is very less compared to that of the corrosion of high reactive metals. As Copper is a less reactive metal, it takes long time to corrode.

