

Corrosion Notes

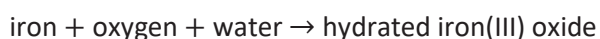


For GCSE we need to know the conditions that are required for corrosion (rusting) to occur. We also need to know the experiment that investigates the conditions for corrosion. Finally, we need to know methods to prevent corrosion occurring.

Corrosion: the gradual deterioration of a substance when it reacts with substances in the environment. When a metal corrodes it reacts with oxygen. The metal becomes weaker over time, and eventually all of it may become metal oxide.

Hydrated iron(III) oxide = rust

What conditions are needed for corrosion? Oxygen and Water – both have to be present for rusting to occur. The equation below shows the reaction of iron with oxygen and water.

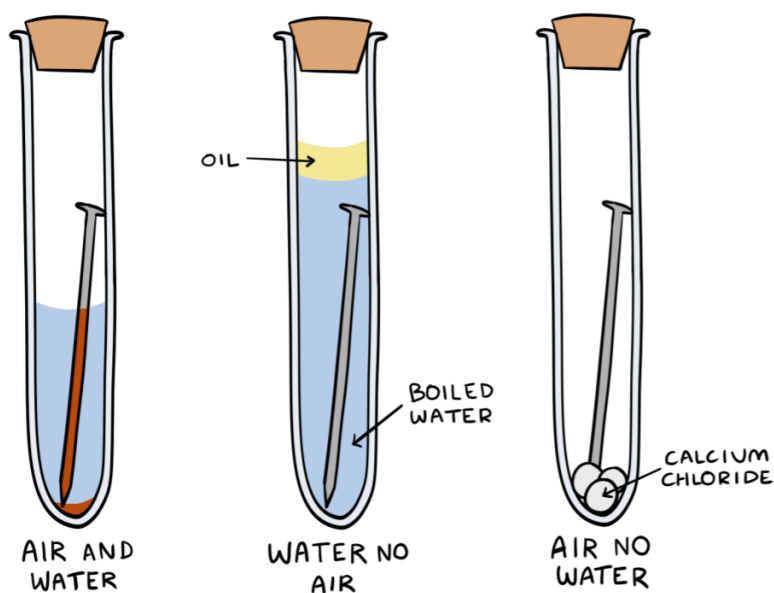


Rusting is an oxidation reaction.

The Rusting Experiment

In class you will have done the experiment on rusting with iron nails. If you haven't or missed it don't worry, we cover everything you need here 😊

Aim: To show the conditions necessary for rusting to occur.



Exam note: A lot of exam questions are based on this practical and many look like the practical above. You should learn WHY rusting has occurred in the first tube and just as importantly WHY rusting did not occur in either of the other tubes.

1. **Rusting occurs** in the first tube as it has both conditions needed, **oxygen and water are present**.
2. **Rusting did not occur** in the second tube as where **there was water but no oxygen**.
Note: Boiling the water beforehand removed most of the oxygen. The oil layer prevents oxygen in the air diffusing back into the boiled water.
3. **Rusting did not occur** in the third tube as **there was oxygen (air) but no water present**.
The calcium chloride is a drying agent and has absorbed all the water vapour from the air inside the tube.

Preventing Corrosion

The main thing to consider in preventing corrosion is how to keep oxygen and water away from the metal. The following are the methods that we need to know for GCSE.

Physical Barriers

These include:

1. Painting.
2. Oiling and greasing.
3. Coating with plastic.

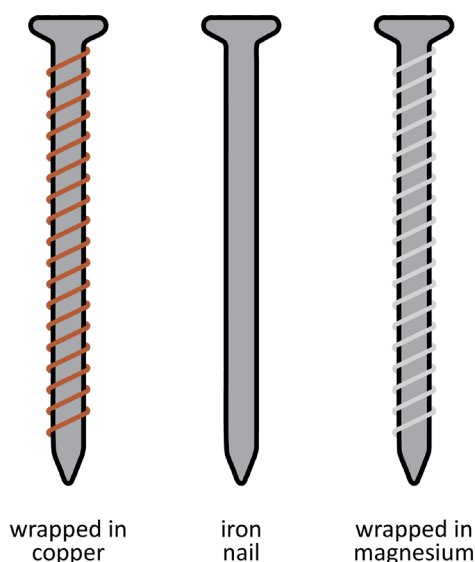
These all keep oxygen and water away from the surface of the material 😊

Electroplating

Electroplating involves using electrolysis to put a thin layer of a metal on the object. Cutlery is often electroplated with silver. This prevents corrosion as silver is unreactive.

Sacrificial protection

Iron can be protected from rusting if it is in contact with a more reactive metal, such as zinc. The more reactive metal oxidises more readily than iron, so it '**sacrifices**' itself and corrodes instead of the iron while the iron does not rust. Once the sacrificial metal has corroded away, it can simply be replaced.



Results: magnesium is more reactive than iron. It oxidises more easily than iron so the nail does not rust. Iron is more reactive than copper. This means it oxidises more easily than copper, so it rusts faster than the nail alone which I realise is the opposite of what we want.

Galvanising

When iron is coated in zinc, the process is called galvanising. The zinc oxide layer stops oxygen and water reaching the iron. Zinc is more reactive than iron, so it also acts as a sacrificial metal. This protection works, even if the zinc layer is scratched.