



# Why do metals rust and corrode over time?

KS4 CHEMISTRY

KS3 SCIENCE

Ages 11-14 ⌚ 3 min read

## What is rust and corrosion?

**Rust** is the reddish-brown coating that forms on iron and steel when they sit around for a while. **Corrosion** is the general term for when any metal breaks down and changes because of a **chemical reaction** with its environment. They're both examples of metals slowly falling apart!

Rust might look harmless, but it weakens metal. A rusty bicycle frame won't work as well. A rusty bridge becomes unsafe. Understanding rust helps engineers protect important metal structures.

## How does rust form?

Rust happens when three things come together: **iron** (or steel, which contains iron), **oxygen** from the air, and **water**. When these three meet, a **chemical reaction** occurs — the metal atoms bond with oxygen atoms to create a new substance called **iron oxide**, which is rust.

Think of it like a cake recipe. You need flour, eggs, and sugar to make a cake. When you mix them together, a chemical reaction happens and you get something totally new — cake! Similarly, iron + oxygen + water = rust.

The reaction doesn't need to happen quickly. Rust forms slowly, which is why a car left outside for years gradually turns orange and brown. Even on a rainy day, a tiny amount of rust might start forming on an unprotected nail.

## Why do different metals corrode differently?

Not all metals rust the same way. **Iron** and **steel** rust relatively easily because iron loves combining with oxygen. **Copper** turns green over time (this is called a **patina**). **Aluminium** corrodes too, but it forms a protective layer that stops further damage. **Gold** and **platinum** hardly corrode at all — that's why they stay shiny for centuries!

## How do we stop rust?

Humans have developed clever ways to protect metals. **Painting** covers metal so oxygen and water can't reach it. **Galvanizing** means coating steel with a layer of **zinc**, which corrodes slowly instead. **Stainless steel** is an alloy (metal mixture) that resists rusting because it contains **chromium**. Some metals are even **electroplated** — covered with a protective layer using electricity.

Think of it like protecting your skin from the sun. Sunscreen blocks the sun's harmful rays. Paint on metal blocks oxygen and water from reaching the iron underneath.