C6.1.12 Reducing Corrosion

Previous knowledge:

- Corrosion is the reaction of a metal with chemicals in its surroundings, such as oxygen in air or water
- Corrosion is more likely if the metal is more reactive
- Rust is a specific example of corrosion for iron/steel

Previous knowledge recap quiz

- Answer the questions on the office forms quiz

Learning Objectives

- Describe how physical barriers can be used to reduce corrosion

- Explain how sacrificial protection works

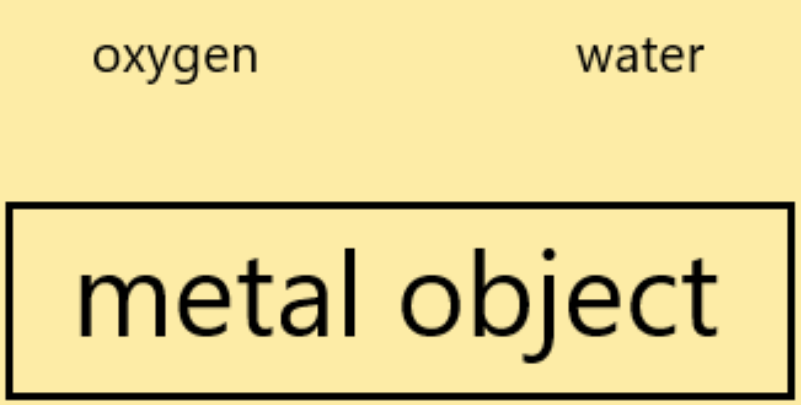
Preventing corrosion by using barriers

- Chemical reactions occur when particles of the reacting chemicals collide with each other. They cannot react unless they collide. This is covered in **C5**.

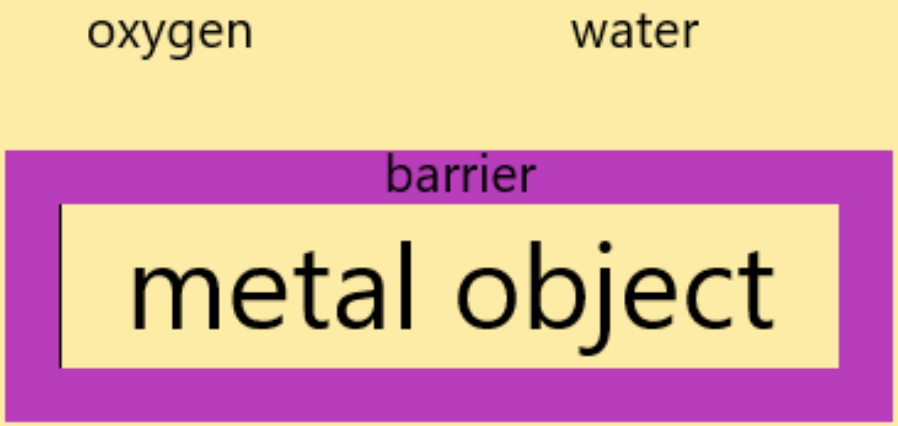
- Corrosion is a metal reacting with water and/or oxygen

- If a barrier is placed between the metal and the water / oxygen then no reaction can occur

no barrier, reactant particles can collide - reaction/corrosion occurs



barrier, reactant particles cannot collide - reaction/corrosion doesn't occur



Preventing corrosion by using barriers

A barrier can take different forms depending on the object. It can be achieved by:

1. Painting
2. Coating in oil or grease
3. Covering in plastic
4. Plating in a less reactive metal

Advantages: Barrier stops reaction completely, it can also improve the appearance e.g. painting a car different colours

Disadvantages: If the barrier is damaged then corrosion can occur, if method 4 is used, the corrosion is quicker than if the barrier wasn't there at all

Preventing corrosion by sacrificial protection

In everyday language a sacrifice is when you offer up something of value in order to get something even more valuable.

Sacrificial protection is when we use a more reactive metal as a sacrifice to protect an object made from a less reactive metal.

Preventing corrosion by sacrificial protection

An example is when ships made from steel have magnesium or zinc blocks attached to their hulls (the part of the ship which is underwater). The water and oxygen will react with the magnesium or zinc instead.

Galvanising is a specific example where an object is coated in zinc. It acts as a barrier initially, but if the layer of zinc is damaged and the metal underneath is exposed then the zinc acts as a sacrificial metal and continues to protect the object.

Advantages: Galvanising protects the object even when the barrier is damaged

Disadvantages: The 'sacrificial' metal is eventually used up and will need continually replacing

How sacrificial protection works

Corrosion is a redox reaction.

The metal is gaining oxygen (being oxidised).

We know that oxidation is also loss of electrons (OILRIG).

A more reactive metal is better at giving away its electrons so will react in place of the less reactive metal.

These are the 5 methods of preventing corrosion

1. Painting
2. Coating in oil or grease
3. Covering in plastic
4. Plating in a less reactive metal
5. Sacrificial protection

TASK 1:

Explain the principle behind how methods 1-4 work

Explain the principle behind how method 5 works

For each method 1-5 name an object that this would be a suitable method for

TASK 2: Using what you have learnt, write a paragraph answering the following question. You must give at least 3 reasons why.

There are two shipwrecks. Explain why one might be less rusty than the other.

Lesson recap quiz

- Answer the questions on the office forms quiz