Y8 Chemistry: T1- Acids and Alkalis

Hazard warning symbols

in the laboratory and tankers carrying chemicals road all have to carry hazard warning labels to snow when there is a chemical hazard. Some of the common warning signs are:

Moderate hazard — *Substance is an irritant or is harmful. Not corrosive but will make the skin red or blister. Not as dangerous as toxic.*

Flammable — *Catches fire easily.*

Corrosive — *Attacks and destroys living tissues, such as skin and eyes. Attacks metals.*

Acutely toxic — *Can cause death if swallowed, breathed in or absorbed by skin.*

Explosive — *Substances that can self-react or detonate easily.*

Naming salts

When acids react with metals or metal compounds they make salts. The name of the salt has two parts. The first part is the name of the metal and the second part comes from the type of acid.

Hydro**chloric** acid makes a **chloride**
Nitric acid makes a **nitrate**
Sulfuric acid makes a **sulfate**

Acids and alkalis

Acids taste sour and are often found in foods, common acids include vinegar and lemon juice. Fizzy drinks, pickles and spicy sauces also contain acids. Stronger acids such as sulphuric and nitric acids can be more dangerous and often they are **corrosive**.
Alkalis feel soapy. They are often used in cleaning products and can also be corrosive. Weak alkalis include soap and toothpaste.

Indicators

Indicators are coloured dyes which often come from plants such as red cabbage and beetroot. They change colours when added to acids and alkalis.

Litmus is an indicator which turns red in acids and blue in alkali. **Red cabbage** indicator is red in acids, purple when neutral and green in alkalis.
Most indicators only tell us if a substance is an acid or alkali; they don't tell us how strong or weak they are.
Universal indicator is a mixture of dyes that changes colour gradually, telling us the level of acidity or alkalinity of a substance. The colours can be linked to the pH scale.

Neutralisation

Metal oxides and hydroxides are referred to as **bases**. A **soluble base** (usually a metal hydroxide) is called an **alkali**. Bases can cancel out acids, making them **neutral.** A base reacts with an acid to form water and a salt. This reaction is called **neutralisation**.

Acid + base → salt + water

For example:

hydrochloric acid + potassium hydroxide → potassium chloride + water
sulfuric acid + copper oxide → copper sulfate + water

We can check to see if neutralisation has occurred using universal indicator. The pH of the solution gets closer to neutral (pH7).

Neutralisation reactions can be important:
- in gardening and agriculture, to make sure the soil is the correct pH
- when dealing with insect stings and bites
- to control indigestion caused by excess acid in the stomach
- to neutralise lakes affected by acid rain.

The pH scale

The strengths of acids and alkalis can be measured on the **pH scale**, which runs from 1 to 14. pH numbers **1 to 6** are acids, **7** is neutral, and **8 to 14** are alkalis.
You can find out the pH number using a **universal indicator**, or by using a pH meter.

Metal carbonates and acids

A metal carbonate will also neutralise an acid. This time the products are a salt, carbon dioxide and water.

The general equation is:

acid + metal carbonate → salt + carbon dioxide + water

For example:

Sulfuric acid + copper carbonate → copper sulfate + carbon dioxide + water

We can test for carbon dioxide using limewater. Limewater goes milky if carbon dioxide is bubbled through it.

Metals and acids

Many metals react with acids. Some unreactive metals will only react very slowly with strong acids, some will not react at all. Some metals are more reactive and explode when added to acid.
When a metal reacts with an acid, hydrogen gas is given off. The reaction also produces a compound called a salt.

metal + acid → salt + hydrogen

For example:

hydrochloric acid + zinc → zinc chloride + hydrogen

We can test for hydrogen by putting a burning splint into a test tube of gas. If hydrogen is present, it will explode with a squeaky 'pop'.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Strong acid			Weak acid			Neutral	Weak alkali			Strong acid			
red			orange / yellow			green	green - blue			purple			