Summary Sheet Year 8 Acids and Alkalis:

Acids and Alkalis

Acids and alkalis are two groups of chemicals which are incredibly useful in everyday life. However, they can be dangerous.

An **acid** is a substance that has a pH lower than 7.
For example, hydrochloric acid, sulphuric acid, citric acid, ethanoic acid (vinegar).

A **base** is a substance that neutralises an acid – those that dissolve in water are called alkalis.

An **alkali** is a soluble substance with a pH higher than 7.
For example, sodium hydroxide (used to make soap), potassium hydroxide, oven cleaner, toothpaste, shampoo.

Hazard symbols

A **hazard** is something that can cause harm. A **hazard symbol** is used to show the level and type of danger.

Corrosive
(the substance can attack metals, stoneware and skin)

Toxic
(the substance is poisonous)

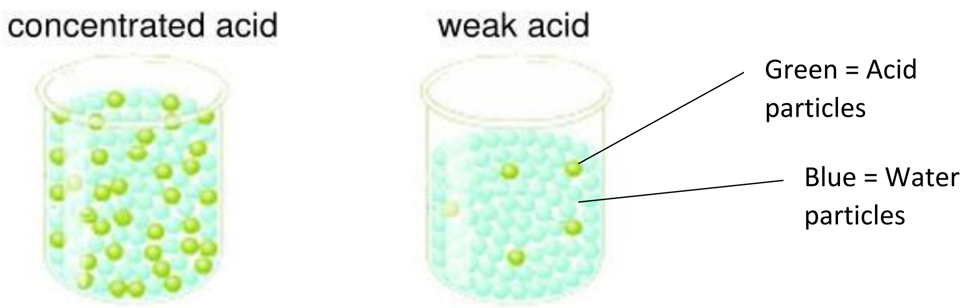
Irritant
(the substance is not corrosive but can still hurt you)

If acids are strong, they are likely to be labelled with one of these symbols.

If acids are weak, they are safe to handle and will not have one of these labels. Some are found in household items and can even be safe to eat or drink.

Concentration is a measure of the number of particles in a given volume.

Strong acids can be very concentrated (lots of particles in the volume) and can be very dangerous (**corrosive**). They can be **diluted** with water to make them less dangerous (**irritant**). This means they have less acid particles in the same volume.

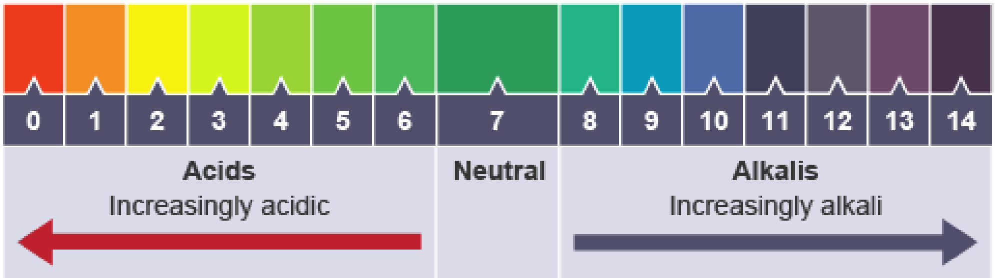


Summary Sheet Year 8 Acids and Alkalis:

The pH Scale

The pH of a solution depends on the strength of the acid: **strong acids** have **lower pH** values (pH 1-3) than weak acids.

Neutral solutions have a pH of 7. For example, pure water.



We can use **indicators** to test the pH of a substance. An indicator is a substance that changes colour when it is added to acidic or alkaline solutions. There are different indicators we can use:

Litmus (paper or liquid): Litmus indicator solution turns red in acidic solutions and blue in alkaline solutions. It turns purple in neutral solutions.

	Red litmus	Blue litmus
Acidic solution	**Stays red**	**Turns red**
Neutral solution	Stays red	Stays blue
Alkaline solution	**Turns blue**	**Stays blue**

Universal indicator (paper or liquid): Universal indicator has many different colour changes, from red for strongly acidic solutions to dark purple for strongly alkaline solutions. In the middle, neutral pH 7 is indicated by green.

There are also many natural substances that work as indicators, for example red cabbage, tea and rose petals.

Summary Sheet Year 8 Acids and Alkalis:

Neutralisation

When you add an alkali to an acid a **chemical reaction** occurs and a new substance is made. If exactly the right amounts of acid and alkali are mixed, you will end up with a neutral solution. This is called a **neutralisation reaction**.

We can describe neutralisation using an equation:

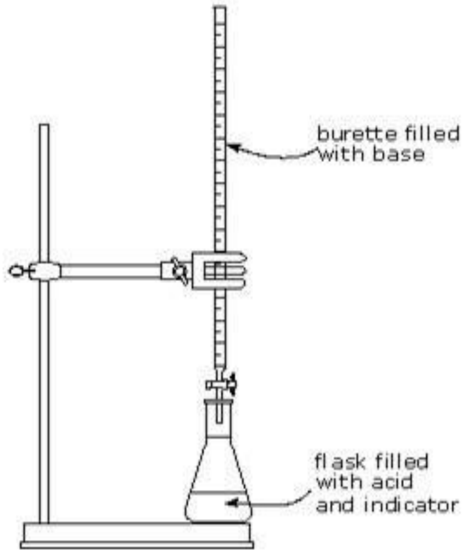
Acid + Alkali (or base) → Salt + Water

e.g.1 sulfuric acid + copper oxide → copper sulfate + water

e.g.2 hydrochloric acid + sodium hydroxide → sodium chloride + water

e.g.3 nitric acid + potassium hydroxide → potassium nitrate + water

Accurate neutralisation reactions can be carried out in a science lab in a process called **titration**.



Neutralisation reactions are really useful. They occur in your circulatory and digestive system.

If you produce too much acid during digestion, you may suffer from **indigestion** or heart burn. Remedies such as **antacids** contain alkalis to help increase the pH and restore the correct balance.

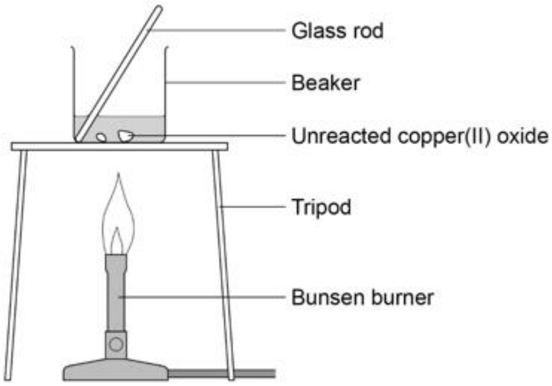
Summary Sheet Year 8 Acids and Alkalis:

Making Salts

1 Reacting the metal oxide with the acid

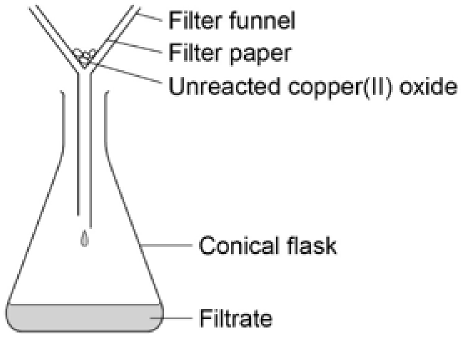
Excess solid (more than is really needed) is added to make sure the acid is fully neutralised

The mixture is stirred and warmed to ensure that it fully reacts



2 Filtering to remove any excess solid

When no more copper oxide will react, the left over solid is filtered off to leave a solution of copper sulfate



3 Evaporating some of the water to leave crystals

The solution is heated in an evaporating basin to remove some of the water

The rest of the water is left to evaporate slowly at room temperature over a day or two to get larger crystals