

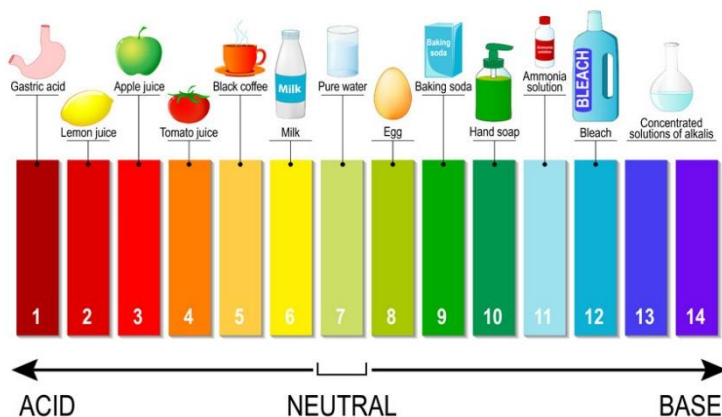
Knowledge organiser – 6.1 Acid and alkali

Signs that a chemical reaction is taking place:

- Flames or sparks
- Smell (sweet or foul)
- Change in temperature (hot / cold)
- Loud pop / bang or gentle fizzing (a gas is being given off)

Chemical reactions are very useful as they make useful substances (medicine, fabrics or building materials). They also transfer energy (burning coal or gas to generate electricity). Sometimes they are not useful (rotting food, rust on bicycles).

Universal indicator (solution or paper) is a mixture of different indicators. It can show us whether a solution is acid or alkali AND how strongly acidic or alkaline a solution is. This is measured using the pH scale.

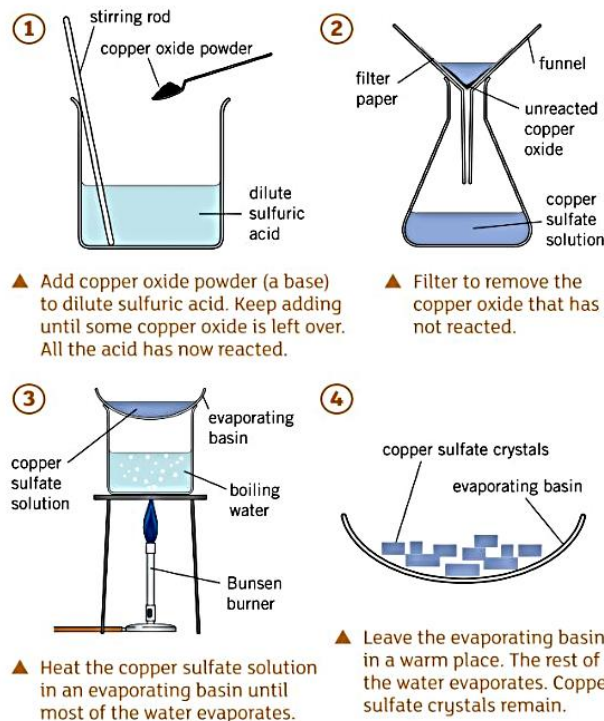


neutral solutions = pH 7 exactly
acidic solutions have pH values < 7
alkaline solutions have pH values > 7

Litmus indicator solution turns red in acidic solutions and blue in alkaline solutions. It turns purple in neutral solutions.

How can you make crystals of salts?

The reactions of acids with metals or bases make salt solutions. Removing water makes salt crystals. The diagrams show how to make copper sulfate crystals.



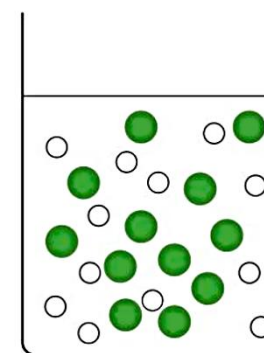
▲ Add copper oxide powder (a base) to dilute sulfuric acid. Keep adding until some copper oxide is left over. All the acid has now reacted.

▲ Filter to remove the copper oxide that has not reacted.

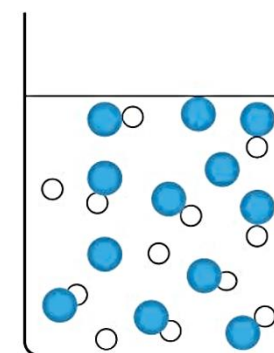
▲ Heat the copper sulfate solution in an evaporating basin until most of the water evaporates.

▲ Leave the evaporating basin in a warm place. The rest of the water evaporates. Copper sulfate crystals remain.

KEYWORD	DEFINITION
Acid	Solution with a pH value less than 7.
Alkali	A soluble base with a pH value more than 7
Chemical reaction	A change in which atoms are rearranged to create new substances.
Concentrated	A solution is concentrated if it has a large number of solute particles per unit volume.
Concentration	A measure of the number of particles in a given volume.
Dilute	A solution is dilute if it has a small number of solute particles per unit volume.
Indicator	Substances used to identify whether unknown solutions are acidic or alkaline.
pH scale	Shows whether a substance is acid, alkali or neutral. It ranges from 0 – 14.
Physical change	A change that is reversible, in which new substances are not made. E.g. ice → water.
Reversible	A change in which it is possible to get back to the original substance.
Salt	A compound in which the hydrogen atoms of an acid are replaced by atoms of a metal element.



Strong acid

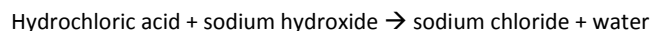
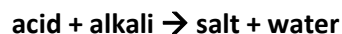


Weak acid

▲ All particles split up in a strong acid, such as hydrochloric acid. Only a few particles split up in a weak acid, such as ethanoic acid. The water particles in the solutions are not shown. *Not to scale.*

NEUTRALISATION

A chemical reaction happens if you mix together an acid and an alkali. The reaction is called neutralisation. A **neutral solution** is made if you add just the right amount of acid and base together. The products formed are **salt and water**.



USES:

- Soil for crops: Can add base (alkali) to the soil to neutralise some of the soil acid. This makes it suitable to grow crops, like tea.
- Acidic lakes: Acid rain falls in lakes and makes it more acidic. Some animals and plants cannot live there. Base is added to increase the pH.