

Chemistry Knowledge Organiser

Acids and Bases

KPI 2.1: Identify substances as acid, alkali or neutral based on observations with indicators and the pH scale

Acids

- Acids** are a family of chemicals, examples are lemon juice, vinegar and Coca Cola. There is also acid in our stomach.
- Acids contain H^+ ions**, when dissolved in water. This is hydrogen which has lost an electron.



- Strong acids** like hydrochloric acid are very corrosive this means they destroy skin cells and cause burns
- Weak acids** like vinegar are safe to eat but are still irritant to sensitive parts of the body.

Bases and Alkalis

- Bases** are a family of chemicals which neutralise alkalis (more on neutralisation on the next page)
- Alkalis** are a type of base. Therefore all alkalis are bases.
- Alkalis dissolve in water and contain OH^- ions.
- An example of a base and a base which is an alkali are summarised below

	Copper oxide	Sodium hydroxide
Can it neutralise acids?	Yes	Yes
Is it a base?	Yes	Yes
Can it dissolve in water?	No	Yes
Is it an alkali?	No	Yes

Indicators

- Indicators** are chemicals that show whether a substance is an **acid** or an **alkali**
- There are many examples of indicators for example **litmus paper** and **universal indicator**
- There are also natural indicators like **red cabbage**

Key Terms	Definitions
Acid	A substance which forms H^+ ions.
Alkali	A soluble base that contains OH^- ions
Base	A substance that will neutralise an acid
The pH scale	A scale which measure how acidic a substance is
Indicator	A chemical which will change colour depending on the acidity of the substance

Safety

- When handling acids and alkalis in the lab we need to take many **safety precautions** for example wearing goggles.
- If an acid is dilute (lots of water has been added) it will be irritant and cause redness or blistering of the skin.
- If an acid is concentrated it will destroy skin cells.



Hazard Symbol for irritant



Hazard Symbol for Corrosive

The pH Scale

- The pH scale measures how **strong an acid or alkali is**
- The pH scale runs from 0-14
- The pH scale measures the **concentration of H^+ ions**, the lower the number the higher the concentration.
- Acids have a pH between 0 and 6, pH 1-3 are strong acids, 4-6 are weak acids
- Alkalis have a pH between 8 and 14, 8-10 weak alkalis, 11-14 strong alkalis
- Anything with a **pH of 7 is neutral**, for example water



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Acids and Bases

KPI 2.2: Describe neutralisation in terms of acids and alkalis reacting

Neutralisation

- When an acid reacts with a base a **neutralisation reaction occurs, this means what you make has a pH of 7.**
- When a neutralisation reaction happens the **products are a salt and water. (See below for how to name a salt)**
- There are many examples of neutralisation reactions, for example a wasp sting is alkali so we add vinegar (an acid) to it to neutralise it.
- Farmers also spread alkalis onto fields to **neutralise the acid in the soil.**
- Another example is indigestion when there is too much acid in our stomach, we neutralise this with alkali tablets

Salts

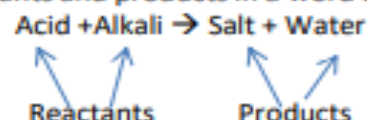
- When a neutralisation reaction happens a **salt is made**
- To name a salt you need to use the alkali to form the first part of the name and the acid to form the second part of the name
- Hydrochloric acid makes **chlorides**
- Nitric acid make **nitrates**
- Sulphuric acid makes **sulphates**

Alkali	Acid	Salt?
Calcium hydroxide	Hydrochloric acid	Calcium Chloride
Magnesium oxide	Nitric acid	Magnesium Nitrate
Calcium carbonate	Sulphuric acid	Calcium Sulphate
Aluminium hydroxide	Nitric acid	Aluminum Nitrate
Potassium hydroxide	Sulphuric acid	Potassium Sulphate

Key Terms	Definitions
Neutralisation	A reaction where an acid and an alkali make a salt and water
Reactant	What you start with in a chemical reaction
Product	What is made in a chemical reaction
Soluble	Will dissolve in water
Insoluble	Does not dissolve in water

Chemical Reactions

- In chemical reactions, what we start with is known as the reactants and what we make is known as the products.
- We can show reactants and products in a word equation



Salts

- There are two types of salt that could be made in a neutralisation reaction, soluble or insoluble salt
- Insoluble salts can be separated using filtration
- Soluble salts dissolve in water and can be separated using evaporation



Examples of neutralisation reactions

Reactants	General equation	Example
Acid and Alkali	Acid + Alkali \rightarrow Salt + Water	Sodium Hydroxide + Sulphuric Acid \rightarrow Sodium Sulphate + Water
Acid and Metal Carbonate	Acid + Metal Carbonate \rightarrow Salt + Water + Carbon Dioxide	Hydrochloric acid + Magnesium Carbonate \rightarrow Magnesium Chloride + Carbon Dioxide + Water
Acid and metal Oxide	Acid + Metal Oxide \rightarrow Salt + Water	Sulphuric acid + Calcium Oxide \rightarrow Calcium Sulphate + Water