

Base	<i>A base is any substance that reacts with an acid to form a salt and water only</i>
Examples of soluble bases	<i>Alkalis e.g. sodium hydroxide, potassium hydroxide</i>

Reactions with acids		
Metals	<i>Metal + acid → metal salt + hydrogen</i>	Magnesium + hydrochloric acid → magnesium chloride + hydrogen
Metal oxides	<i>Metal oxide + acid → metal salt + water</i>	Copper oxide + sulfuric acid → copper sulfate + water
Metal hydroxides	<i>Metal hydroxide + acid → metal salt + water</i>	Sodium hydroxide + nitric acid → sodium nitrate + water
Metal carbonates	<i>Metal carbonates + acid → metal salt + carbon dioxide + water</i>	Calcium carbonate + sulfuric acid → calcium sulfate + carbon dioxide + water

Concentrated	<i>High mass of substance in a given volume of solution</i>
Dilute	<i>Low mass of substance in a given volume of solution</i>
Strong acids	<i>Completely ionised in aqueous solutions e.g. hydrochloric, nitric and sulfuric acids.</i>
Weak acids	<i>Only partially ionised in aqueous solutions e.g. ethanoic acid, citric acid.</i>
Hydrogen ion concentration	<i>As the pH decreases by one unit (becoming a stronger acid), the hydrogen ion concentration increases by a factor of 10.</i>

Acids

Strong and weak acids (HT ONLY)

EDEXCEL TOPIC 3: CHEMICAL CHANGES 1

Acids

Reactions with acids

Producing salts from insoluble reactants

Gas tests

Soluble salts	<i>Soluble salts can be made from reacting acids with solid insoluble substances (e.g. metals, metal oxides, hydroxides and carbonates).</i>
Production of soluble salts	<i>Add the solid to the acid until no more dissolves. Filter off excess solid and then crystallise to produce solid salts.</i>

Producing salts from soluble reactants

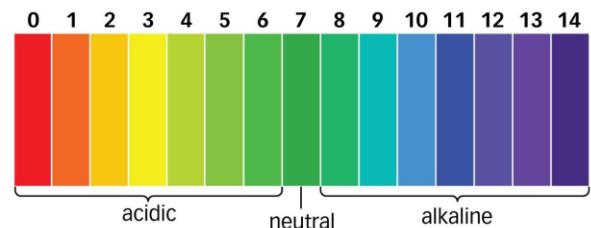
Titration

The acid and the soluble reactant are mixed in the correct proportions and the remaining solution is only salt and water

Gas	Test	Positive result
Hydrogen	<i>Burning splint</i>	'Pop' sound.
Carbon dioxide	<i>Limewater</i>	Goes cloudy (as a solid calcium carbonate forms).

Acids	<i>Acids produce hydrogen ions (H⁺) in aqueous solutions.</i>
Alkalis	<i>Aqueous solutions of alkalis contain hydroxide ions (OH⁻).</i>

Universal indicator	<i>Red in acid, green in neutral and blue in alkali</i>
Litmus	<i>Red in acid, purple in neutral and blue in alkali</i>
Methyl orange	<i>Red in acid, yellow in neutral and yellow in alkali</i>
Phenolphthalein	<i>Colourless in acid and in neutral and pink in alkali</i>



The pH scale and indicators

A neutralisation reaction is between an acid and a base

In neutralisation reactions, hydrogen ions react with hydroxide ions to produce water:
 $H^+ + OH^- \rightarrow H_2O$