

General reactions

1	Metal + oxygen	Metal oxide
2	Metal + water	Metal hydroxide
3	Metal + acid	Salt + hydrogen
4	Acid + base/alkali	Salt + water
5	Acid + metal carbonate	Salt + water + carbon dioxide

Reactivity series

Metal	Extraction method
Potassium	Electrolysis – electricity used to split the metal from its compound E.g. $2\text{MgO} \rightarrow 2\text{Mg} + \text{O}_2$
Sodium	
Lithium	
Calcium	
Magnesium	
Carbon	Non-metal
Zinc	Reduction with carbon: carbon removes the metal from the metal oxide E.g. $2\text{CuO} + \text{C} \rightarrow 2\text{Cu} + \text{CO}_2$
Iron	
Copper	
Gold	Does not form compounds, found in native state

Oxidation and reduction
(HT only)

1	OILRIG	O xidation I s L oss, R eduction I s G ain (of electrons)
2	Oxidation	Happens when an atom loses electrons e.g. $\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$
3	Reduction	Happens when an atom gains electrons e.g. $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$

Acids and their salts

Acid	Formula	Salt	Formula
Hydrochloric acid	HCl	Chloride	Cl^-
Nitric acid	HNO_3	Nitrate	NO_3^-
Sulfuric acid	H_2SO_4	Sulfate	SO_4^{2-}

Other useful ions

Hydroxide	OH^-
Hydrogen ion	H^+
Ammonium	NH_4^+
Carbonate	CO_3^{2-}

Required Practical
Making a soluble salt

1	Measure out a volume of dilute sulphuric acid using a measuring cylinder
2	Warm dilute acid in a beaker with a Bunsen burner
3	Add metal oxide one spatula at a time until it is in excess (when you can see unreacted metal oxide)
4	Filter the mixture using a funnel and filter paper
5	Pour the filtrate into an evaporating basin
6	Warm on a water bath until crystals form

Key Vocabulary

1	Oxidation	Gain of oxygen or loss of electrons
2	Reduction	Loss of oxygen or gain of electrons
3	Displacement reaction	A reaction where a more reactive metal displaces a less reactive metal from a compound
4	Base	A metal oxide or hydroxide
5	Alkali	A soluble base

pH

1	Acids	Contain aqueous H^+ ions; $pH < 7$
2	Alkalis	Contain aqueous OH^- ions; $pH > 7$
3	Neutral	A solution with a pH of 7, has equal concentration of H^+ and OH^- ions
4	Neutralisation	$H^+ (aq) + OH^- (aq) \rightarrow H_2O (l)$
5	How to measure pH	Universal Indicator with colour chart or pH probe

Strong and weak acids (HT only)

1	Concentration	Measure of the amount of substance per litre (dm^3) of solution
2	Concentrated	Solution with a high amount of substance per dm^3
3	Dilute	Solution with a low amount of substance per dm^3
4	Strong acid	An acid that completely ionises in aqueous solution
5	Weak acid	An acid that only partially ionises in aqueous solution
6	pH scale	As the pH decreases by one unit, the H^+ concentration increases by a factor of 10.

Required practical – Titration (Chemistry only)

1	Fill burette with solution of known concentration
2	Measure out $25.0cm^3$ of solution with unknown concentration with a pipette
3	Add unknown solution into a conical flask and place on a white tile
4	Add an indicator (usually phenolphthalein which is pink in alkali and colourless in acid/neutral)
5	Add known solution slowly to the unknown solution
6	Swirl regularly and add dropwise close to the endpoint

Electrolysis

	Formed at positive electrode	Formed at negative electrode
Molten compound	Non-metal	Metal
Aqueous compound	Halogen (if electrolyte contains halide) or oxygen (if electrolyte contains sulfate)	Hydrogen

Half-equations (HT only)

Formation of metal	e.g. $Cu^{2+} + 2e^- \rightarrow Cu$
Formation of halogen	e.g. $2Cl^- \rightarrow Cl_2 + 2e^-$
Formation of hydrogen	$2H^+ + 2e^- \rightarrow H_2$
Formation of oxygen	$4OH^- \rightarrow O_2 + 2H_2O + 4e^-$

Key Vocabulary

1	Electrolysis	Process where electric current is passed through an electrolyte to separate ions
2	Anode	Positive electrode
3	Cathode	Negative electrode
4	Anion	Negative ion (e.g. non-metal ions)
5	Cation	Positive ion (e.g. metal ions)
6	Electrolyte	Molten or aqueous ionic compound.
7	Cryolite	Substance added to aluminium oxide to lower melting point