A

acid A substance which produces $H^+(aq)$ ions.

acid solution One which contains a greater concentration of $H^+(aq)$ ions than pure water.

activity series A list of metals in order of reactivity (also called a 'reactivity series').

addition polymerisation A process whereby many small molecules (monomers) join to form one large molecule (a polymer) and nothing else.

addition reaction One in which two (or more) molecules join to produce a single larger molecule and nothing else.

alcohol Common name for the alkanol called ethanol, $C_2H_5OH$.

alkanols A homologous series with general formula $C_nH_{2n+2}OH$. (The simplest is methanol, $CH_3OH$.)

alkali A substance which dissolves in water to give a solution with a pH greater than 7.

alkaline solution One which contains a greater concentration of $OH^-(aq)$ ions than pure water.

alkali metal Metal in Group 1 of the periodic table (Li, Na, K, Rb, Cs, Fr).

alkanes A homologous series with general formula $C_nH_{2n+2}$. (The simplest is methane, $CH_4$.)

alkenes A homologous series with general formula $C_nH_{2n}$. (The simplest is ethene, $C_2H_4$.)

alloy A mixture of metals or of metals and non-metals. (The mixture must be melted together.) For example, bronze – copper/tin, steel – iron/carbon.

anode The positive electrode during electrolysis where oxidation takes place.

atom The smallest part of an element that can exist. It has a nucleus of protons and neutrons surrounded by moving electrons.

atomic number The number of protons in the nucleus of an atom.

B

balanced equation One with the same number of atoms of each element on both sides of the equation.

base A substance which reacts with an acid and neutralises it giving water as a product.

battery A series of chemical cells joined together.

Benedict’s solution A solution which turns from blue to orange-red when warmed with a reducing sugar such as glucose.

biodegradable Able to rot away by natural biological processes.

C

catalyst A substance which speeds up a reaction without itself being changed.

cathode The negative electrode during electrolysis where reduction takes place.

cell In a chemical cell, chemical energy is changed into electrical energy. In an electrolytic cell, electrical energy is used to produce chemical changes.

chemical equation Uses chemical formulae to show the reactants and products during a chemical reaction, for example:

$$C + O_2 \rightarrow CO_2$$

chemical formula Shows the number of atoms of each element in a molecule or the ions in a compound. For example, $CO_2$ and $Ca^{2+}(Cl^-)_2$.

chemical reaction A chemical process in which one or more new substances are formed (usually accompanied by an energy change and a change in appearance).

chromatography A method of separating and identifying similar substances, for example glucose and fructose by paper chromatography.

combustion The burning of a substance during which it combines with oxygen.

compound A substance in which two or more elements are joined together chemically.

concentration The amount of solute dissolved in a given volume of solution. The usual units are moles per litre $(mol/l)$.

condensation polymerisation A process whereby many small molecules (monomers) join to form a large molecule (a polymer), with water or another small molecule formed at the same time.

condensation reaction One in which two (or more) molecules join to produce a single larger molecule, with water or another small molecule formed at the same time.

corrosion A chemical reaction in which the surface of a metal changes from an element to a compound. This is an oxidation process.

covalent bond Bond formed between two non-metal atoms by the sharing of a pair of electrons.

cracking The breaking up of larger hydrocarbon molecules (usually alkanes) to produce a mixture of smaller molecules (usually alkanes and alkenes). The use of a catalyst (in catalytic cracking) allows the process to be carried out at a lower temperature.
cycloalkanes A homologous series of ring molecules with general formula \( C_nH_{2n} \). (The simplest is cyclopropane, \( C_3H_6 \).)

decomposition The breaking down of a compound into two or more substances (usually by heating). For example,

\[
2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2
\]

diatomic molecule Molecule which contains only two atoms, for example \( \text{H}_2 \) and \( \text{HCl} \).

disaccharide A carbohydrate which is formed when two monosaccharide molecules join in a condensation reaction, for example sucrose, \( C_{12}H_{22}O_{11} \).

displacement Formation of a metal from a solution containing its ions by reaction with a metal higher in the electrochemical series.

distillate The liquid which is collected as a result of distillation.

distillation A process of separation or purification dependent on differences in boiling point. The changes of state involved are:

liquid → gas → liquid.

ductile The ability to be drawn out into wires—a physical property of metals.

equilibrium State attained when forward and reverse reactions are taking place at the same rate.

exothermic process Process in which heat energy is given out.

F

fermentation The breakdown of glucose to form alcohol (ethanol) and carbon dioxide, brought about by the presence of yeast.

ferroxylin indicator Used to show the production of \( \text{Fe}^{2+}(aq) \) ions (by the formation of a blue colour) and \( \text{OH}^- (aq) \) ions (by the formation of a pink colour) during corrosion of iron experiments.

filtrate The liquid which passes through filter paper during filtration.

filtration The separation of an insoluble solid from a liquid by passage through filter paper.

finite Limited.

formula mass The sum of the relative atomic masses of all the atoms present in a formula.

fossil fuel One which has been formed from the remains of living things, for example coal, oil and natural gas.

fraction A mixture of hydrocarbons with similar boiling points obtained by fractional distillation of crude oil.

fractional distillation A means of separating crude oil into groups of hydrocarbons with similar boiling points (fractions).

fuel A substance which is used as a source of energy. This is released when the fuel burns.

G

galvanising Process by which iron is coated with a protective layer of zinc (by dipping into molten zinc).

group A column of elements in the periodic table.

H

Haber process The industrial production of ammonia from nitrogen and hydrogen, using high pressure and moderately high temperature, with iron as a catalyst.

halogen An element in Group 7 of the periodic table (\( \text{F}, \text{Cl}, \text{Br}, \text{I}, \text{At} \)).

homologous series A group of chemically similar compounds which can be represented by a general formula. Physical properties change gradually through the series, for example the alkanes, general formula \( C_nH_{2n+2} \).

hydrocarbon A compound containing the elements carbon and hydrogen only.

hydrolysis reaction Reaction in which a large molecule is broken down into two (or more) smaller molecules by reaction with water.

I

indicator A substance whose colour is dependent on pH.

ionic bond Bond formed as a result of attraction between positive and negative ions.
ion bridge Used to complete the circuit in a chemical cell by allowing a flow of ions through it.

ion-electron equation Equation which shows either the loss of electrons (oxidation) or the gain of electrons (reduction).

ionic equation Equation which shows any ions that may be present among the reactants and products.

ions Atoms or groups of atoms which possess a positive or negative charge due to loss or gain of electrons, e.g. Na⁺ and CO₃²⁻.

isomers Compounds which have the same molecular formula but different structural formulae.

isotopes Atoms of the same element which have different numbers of neutrons. They have the same atomic number but different mass numbers.

L

lime-water Calcium hydroxide solution. Used to test for carbon dioxide, which turns it milky white.

M

malleable The ability to be beaten out into thin sheets – a physical property of metals.

mass number The total number of protons and neutrons in the nucleus of an atom.

metals Shiny, malleable and ductile elements found on the left of the periodic table. They all conduct electricity.

mixture Two or more substances mixed together but not joined chemically, for example air, which is a mixture of gases.

mole A formula mass expressed in grams.

molecular formula Formula which shows the number of atoms of the different elements which are present in one molecule of a substance.

molecule A group of atoms held together by covalent bonds.

monatomic Existing as single atoms. For example, the noble gases.

monomers Relatively small molecules which can join together to produce a very large molecule (a polymer) by a process called polymerisation.

monosaccharide Carbohydrate with molecular formula C₉H₁₂O₆, for example glucose and fructose.

nucleus The extremely small centre of an atom where the neutrons and protons are found.

nutrient Something that helps a plant or animal to grow.

O

Ostwald process The industrial production of nitric acid from ammonia by a process which includes catalytic oxidation.

oxidation reaction One in which electrons are lost.

oxidising agent An electron acceptor.

P

period A horizontal row in the periodic table.

periodic table An arrangement of the elements in order of increasing atomic number, with chemically similar elements occurring in the same main vertical columns (groups).

pH A number which indicates the degree of acidity or alkalinity of a solution. Acidic solutions pH < 7; neutral solutions pH = 7; alkaline solutions pH > 7.

pH indicator See universal indicator.

photosynthesis A process whereby green plants convert carbon dioxide and water into carbohydrates such as glucose, and release oxygen into the air.

pollutant Something that harms the environment.

polymer A very large molecule which is formed by the joining together of many smaller molecules (monomers).

polymerisation The process whereby a polymer is formed. (See addition polymerisation and condensation polymerisation.)

polysaccharide A carbohydrate which is formed when many monosaccharide molecules join by condensation, for example starch.

precipitate An insoluble solid which is formed on mixing certain solutions.

precipitation reaction One in which a precipitate is formed.

proton A particle found in the nucleus of an atom. It has a single positive charge and the same mass as a neutron.

R

reactivity series See activity series.

redox reaction Reaction in which reduction and oxidation take place. Electrons are lost by one substance and gained by another.

reducing agent An electron donor.

reducing sugar Sugar which gives a positive test with Benedict's (or Fehling's) solution, for example glucose.

reduction reaction One in which electrons are gained.

relative atomic mass The average mass of one atom of an element on a scale where one atom of ¹²C has a mass of 12 units exactly. It is the average of the mass numbers of the isotopes present, taking into account the proportion of each.
residue  Solid left behind in the filter paper after filtration.

renewable energy source  One which will not run out in the foreseeable future e.g. solar, wind and tidal power.

respiration  A process whereby carbohydrates are broken down by reaction with oxygen to release energy. Carbon dioxide and water are formed in this process, which takes place in both plants and animals.

reversible reaction  One which proceeds in both directions, for example:

\[ \text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3 \]

rusting  The corrosion of iron. It is caused by oxygen and water (which contains a dissolved electrolyte).

S

sacrificial protection  A method for protecting a metal from corrosion by attaching it to a metal which is higher in the electrochemical series.

salt  A compound which is formed when hydrogen ions in an acid are replaced by metal ions or ammonium ions.

saturated hydrocarbon  Hydrocarbon in which all carbon-to-carbon covalent bonds are single bonds.

saturated solution  Solution in which no more solute will dissolve at a given temperature.

solute  A substance which dissolves in a liquid to give a solution.

solution  A liquid with something dissolved in it.

solvent  A liquid in which a substance dissolves.

spectator ion  Ion which is present in a reaction mixture but takes no part in the reaction.

standard solution  Solution of known concentration.

starch  A polysaccharide, with molecular formula \((\text{C}_6\text{H}_{10}\text{O}_5)_n\).

state symbols  Symbols used to indicate the state of atoms, ions or molecules: \((s) = \text{solid}; (l) = \text{liquid}; (g) = \text{gas}; (aq) = \text{aqueous (dissolved in water)}\).

structural formula  Formula which shows the arrangement of atoms in a molecule or ion. A full structural formula shows all of the bonds, for example propane:

\[
\begin{array}{c}
\text{H} & \text{H} & \text{H} \\
\text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\
\text{H} & \text{H} & \text{H}
\end{array}
\]

A shortened structural formula shows the sequence of groups of atoms, for example propane: \(\text{CH}_3\text{CH}_2\text{CH}_3\).

sugars  Sweet-tasting, water-soluble carbohydrates, e.g. glucose and sucrose.

synthetic  Man-made.

T

thermoplastic  Plastic which softens on heating and can be reshaped.

thermosetting plastic  Plastic which does not soften on heating.

titration  An experiment in which volumes of reacting liquids are measured. In acid/alkali titrations, it is normal practice to use a pipette for measuring out the alkali and to add the acid from a burette.

toxic  Poisonous.

transition metals  The elements which form a ‘bridge’ in the periodic table between Groups 2 and 3, for example iron and copper.

U

universal indicator  A solution containing several indicators which can be used to give the approximate pH of a solution. It gives a range of colours depending on the pH of the solution.

unsaturated hydrocarbon  Hydrocarbon in which there is a carbon-to-carbon double bond, \(\text{C} = \text{C}\), for example ethene.

V

valency  A number which indicates the ‘combining power’ of atoms or ions.

variable  Something that can be changed in a chemical reaction e.g. temperature, particle size, concentration, etc.

viscosity  A description of how ‘thick’ a liquid is, for example engine oil is ‘thicker’ (more viscous) than petrol.

volatile  Having a low boiling point and therefore easily vapourised.

W

word equation  Use of words to show the reactants and products during a chemical reaction, for example:

\[
\text{magnesium} + \text{oxygen} \rightarrow \text{magnesium oxide}
\]