Glossary

A

acids dissolve in water to produce solutions with a pH of less than 7

acid rain rain which has been made more acidic by pollutant gases

activation energy the energy needed for a chemical reaction to happen

addition polymer a very long molecule resulting from polymerisation, e.g. polythene

aggregate gravel added to cement and sand to make concrete

alkali metals the metals in Group 1 of the periodic table

alkalis compounds which produce hydroxide ions in water

alkanes a family of hydrocarbons with all single carbon-carbon covalent bonds and general formula C_nH_{2n+2}

alkenes a family of hydrocarbons with one double carbon-carbon bond and general formula C_nH_{2n}

allotropes different forms of the same element

alloy a mixture of a metal with one or more other metals or non-metals to change the properties of the metal

alpha particles radioactive particles which are helium nuclei – helium atoms without the electrons (they have a positive charge)

ammeter meter used in an electric circuit for measuring current

anion ion with a negative charge; they move to the anode during electrolysis

anode electrode in electrolysis with a positive charge

aquifer underground layer of permeable rock or loose materials (gravel or silt) where groundwater is stored

atom the basic 'building block' of an element, the smallest part of an element that can take part in a chemical reaction

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

Avogadro's constant the number of atoms, molecules or ions in one mole of a given substance, and is 6.02×10^{23} per mole

B

balanced symbol equation chemical equation written in chemical symbols showing the number of atoms on each side of the equation balance

base reacts with an acid to form a salt

bioleaching process that uses bacteria to leach metal compounds from rocks

biological catalyst molecules in cells of living organisms that speed up chemical reactions

boiling point temperature at which the bulk of a liquid turns to vapour

buckminsterfullerene a very stable spherical structure of 60 carbon atoms joined by covalent bonds (an allotrope of carbon)

C

carbon an element present in all living things and forms a huge range of compounds with other elements

carbon-14 radioactive isotope of carbon

carbon dioxide (CO_2) a greenhouse gas which is emitted into the atmosphere as a product of combustion

carbon footprint the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event.

catalyst a chemical that speeds up a reaction but is not used up by the reaction

cathode the negative electrode in electrolysis

charge(s) a property of matter, charge exists in two forms, positive and negative, which attract each other

chemical properties the characteristic chemical reactions of substances

chlorination addition of chlorine to water supplies to kill micro-organisms

chromatography a method for separating substances, used to identify compounds and check for purity

close-packed atoms structure of many metals

collision frequency the number of collisions between particles that happen in one unit of time

combustion exothermic reaction of a substance with oxygen

compound two or more elements which are chemically joined together, e.g. H_2O

concentration the amount of chemical dissolved in a certain volume of solution

conductors materials which transfer thermal energy easily; electrical conductors allow electricity to flow through them

conservation of energy principle stating that energy cannot be created or destroyed

conservation of mass the total mass of reactants equals the total mass of products formed in a chemical reaction

covalent bonds bonds between atoms where a pair of electrons is shared

cracking the process of breaking down large hydrocarbons into smaller molecules

curved line line of changing gradient

D

decay to rot or decompose

delocalised electrons electrons which are free to move from atom to atom in a giant structure or a molecule

density the density of a substance is its mass divided by its volume

diesel oil fuel for diesel engines, traditionally obtained from crude oil but other forms such as biodiesel have been developed

direct current an electric current that flows in one direction only

displacement reaction chemical reaction where an element takes the place of or 'pushes out' another element from a compound

distillation the process of evaporation followed by condensation

dot and cross diagram a diagram representing the number of electrons in the outer shell of atoms or ions

E

electrical conductivity a measurement of the ability to conduct electricity

electrical conductors materials that let electricity pass through them

electrode ions are discharged at the electrodes during electrolysis

electrolysis the process of passing direct current through a melted ionic compound or a solution of an ionic compound so ions are discharged and the compound is broken down

electrolyte a liquid or solution that conducts electricity and breaks down during electrolysis

electronic structure the arrangement of electrons in the sequence that they occupy the shells or energy levels, e.g. the 11 electrons of sodium are arranged 2,8,1

electrons small negatively charged particles within an atom that are outside the nucleus

electrostatic attraction attraction between opposite charges, e.g. between Na^+ and Cl^-

elements substances made out of only one type of atom with the same number of protons in the nucleus

empirical formula simplest ratio of atoms or ions in a compound

endothermic reaction chemical reaction which takes in thermal energy

energy the ability to 'do work '

enzymes biological catalysts that increase the speed of chemical reactions

equilibrium when the forwards and backwards reactions are occurring at the same rate in a closed system

estimate calculate approximately the value of something

evaporation when a liquid changes to a gas, it evaporates

exhaust gases gases discharged into the atmosphere from an engine as a result of combustion of fuels

exothermic reaction chemical reaction in which thermal energy is given out

explosion a sudden, loud, violent release of energy by a chemical reaction

extrapolation making an estimate by continuing a trend or graph line beyond the range of results

F

filtration the process of using a porous material to remove solids from water or solutions

formulation a mixture that has been designed as a useful product

fractional distillation crude oil is separated into fractions using this process of distillation where a mixture of liquids is vaporised and compounds with different boiling points condense at different temperatures

force a push or pull which is able to change the velocity or shape of a body

fossil fuels fuels which are the fossilised remains of plants or animals, such as coal, oil and gas

fullerenes cage-like carbon molecules containing many carbon atoms, e.g. buckyballs

G

giant covalent structure a large regular arrangement of atoms all joined together by covalent bonds

giant ionic lattice the regular three-dimensional arrangement of ions in an ionic compound , also called a giant ionic structure

gradient rate of change of two quantities on a graph; change in *y* divided by change in *x*

graphite a type of carbon made of layers of atoms

greenhouse gas any of the gases whose absorption of solar radiation is responsible for the greenhouse effect, e.g. carbon dioxide, methane

group within the periodic table the vertical columns are called groups

Group 1 the elements in Group 1 of the periodic table, the alkali metals

Group 7 the elements in Group 7 of the periodic table, the halogens

H

half equation a redox reaction is made up of two half equations, one in which electrons are lost and one in which electrons are gained.

halogens reactive non-metals in Group 7 of the periodic table, e.g. chlorine

hardness resistance of a solid material to cutting, indentation or scratching

homologous series a series of organic compounds that have the same general formula, i.e. the general formula of alkanes is C_nH_{2n+2}

hydrocarbons compounds containing only hydrogen and carbon

I

incomplete combustion takes place when there is not enough oxygen present for complete combustion

indicator used to show pH of a solution or when the end point of a titration is reached

insoluble salt salt which is not soluble in water

intermolecular force force between molecules

interpolation making an estimate of a value from values on either side of the point

ionic bond the chemical bond between ions of opposite charges

ionic equation an equation showing changes to the ions involved in a reaction

ionises adds or removes electrons from an atom leaving it charged

ions charged particles (can be positive or negative)

isotopes atoms with the same number of protons but different numbers of neutrons

J

joule unit of work done and energy

K

kilogram (kg) unit of mass

kinetic energy the energy that moving objects have

L

Le Châtelier's principle if a system is at equilibrium and a change is made to any of the conditions, then the system responds to counteract the change

life cycle assessments (LCAs) are carried out to assess the environmental impact of products in each of the stages involved in their manufacture, use and disposal

limewater a solution of calcium hydroxide in water – the colourless solution turns milky in the presence of carbon dioxide

limiting reactant chemical used up in a reaction that limits the amount of product formed

line spectrum a spectrum produced by gaseous atoms showing individual lines at particular wavelengths that is unique for each element

lustrous shiny

lysis to split apart

M

magnitude size of something

mass the amount of matter in something; it is measured in kilograms (kg)

mass number the sum of the number of protons and neutrons in a nucleus

melting point the temperature at which a solid turns into a liquid

metal halide a compound of a halogen and a metal, e.g. potassium bromide

metallic bonding the bonding between atoms in a metal due to delocalised electrons

metallic properties the physical and chemical properties specific to a metal, such as lustre, electrical conductivity and the ability to form positive ions

metalloids elements with properties of both metals and non-metals; in the periodic table they are between the metals and non-metals

metals elements that are usually solid, lustrous, conduct electricity and form ions by losing electrons

minerals natural solid materials with a fixed chemical composition and structure, rocks are made of collections of minerals

mobile phase in chromatography this is the phase that moves

mole a unit for a standard amount of a substance. One mole of any substance contains the same number of particles, atoms, molecules or ions as one mole of any other substance

molecular formula the formula of a chemical using chemical symbols, e.g. methane has the molecular formula CH_4

molecule two or more atoms covalently bonded to form the smallest unit of an element or compound, e.g. O_2, H_2O

molten a substance in its liquid state, often referring to a substance which is solid at ordinary temperatures, such as rock, ores, metals or salts, when heated to temperatures above its melting point

N

negative ion an ion with a negative charge, such as when atoms gain electrons

neutral a neutral solution has a pH of 7

neutralisation the reaction that takes place when an acid and base react to produce a salt and water

neutron particle which does not have a charge found in the nucleus of an atom

non-metals elements that are solids, liquids or gases that do not conduct electricity and bond covalently or form negative ions by their atoms gaining electrons

non-renewable something which is used up at a faster rate than it can be replaced e.g. fossil fuels

nucleus central part of an atom that contains protons and neutrons

O

optimum conditions the conditions, such as temperature and pressure, that give the products of a chemical process at the lowest cost

order of magnitude values that differ by one order of magnitude are 10 times larger or smaller than each other

oxidation when a reactant gains oxygen or loses electrons

P

particulates small particles in the air often caused by burning fuels

period a row in the periodic table

periodic table a table of all the chemical elements in order of their atomic numbers

petrol volatile mixture of mainly hydrocarbons used as a fuel

pharmaceuticals medical drugs

physical property property that can be measured without changing the chemical composition of a substance, e.g. hardness

phytomining process that uses plants to extract metals

pollutants substances that can cause damage to the environment

pollute put unwanted or harmful substances into the environment

pollution contamination of the environment as a result of human activities

polymer very large molecule formed from many similar smaller molecules (monomers) linked together

positive ion an ion with a positive charge, such as when atoms lose electrons

potable water water that is safe to drink

precipitate solid formed in a solution by a chemical reaction

precipitation reaction chemical reaction in which a solid is formed when two solutions are mixed, e.g. in chemical tests for ions

product substance produced by a chemical reaction (shown on the right-hand side of the chemical equation)

protons positively charged particles found in the nucleus of an atom

pure a pure substance is a single element or compound that is not mixed with any other substance

R

random having no regular pattern

rate of reaction the speed with which a chemical reaction takes place, measured by the amount of a reactant used or amount of product formed in a given time

reactants chemicals that react together in a chemical reaction (shown on the left-hand side of the chemical equation)

recharging battery or cell being charged with a flow of electric current

reduction when a reactant loses oxygen or gains electrons

refine the refining process turns crude oil into usable forms such as petrol

relative atomic mass the mass of an atom compared to 1/12 of the mass of a carbon-12 atom

relative formula mass the sum of the relative atomic masses in a compound

renewable energy energy from a resource that is rapidly replaced

renewable resource any resource that can be replenished at the same rate that it is used, e.g. biofuels

reservoir a water resource where large volumes of water are held

reversible reaction a chemical reaction where the reactants form products that, in turn, react together to give the reactants back

R_f in chromatography is the distance a substance moved divided by the distance the solvent moved

S

saturated hydrocarbon a hydrocarbon containing the maximum number of hydrogen atoms and only single carbon-carbon bonds; alkanes are saturated hydrocarbons

sea water water from the sea that contains high levels of dissolved salts making it undrinkable

sedimentation a process during water purification where small solid particles are allowed to settle

single covalent bond chemical bond between atoms where each atom shares one pair of electrons

solar energy energy from the Sun

soluble a soluble substance can dissolve in a liquid, e.g. sugar is soluble in water

solution when a solute dissolves in a solvent, a solution forms

solvent the liquid used to dissolve a solute

stable electronic structure the electronic structure of a noble gas, with two electrons in the first shell and eight electrons in every other outer shell, e.g. He 2; Ne 2,8; Ar 2,8,8; Kr 2,8,18,8

standard form a way of writing a large number with one number before the decimal point, multiplied by a power of 10, e.g. 1 200 = 1.2×10^3

stationary phase the phase in chromatography that does not move; in paper chromatography it is the paper

straight line line of constant gradient

strength (of an acid) strong acids ionise completely in water; weak acids partially ionise

sub-atomic particles particles that make up an atom, e.g. protons, neutrons and electrons

sublimation change of state of a substance from a solid directly to a gas; e.g. iodine

T

thermal decomposition the breaking down of a compound into two or more products on heating

thermal energy energy that can be transferred as heat

toxic a toxic substance is one which is poisonous and causes harm to living organisms

transition element an element in the middle section of the periodic table, between the block containing Groups 1 and 2 and the block containing Group 3 to Group 0

U

unsaturated hydrocarbon a hydrocarbon containing fewer than the maximum number of hydrogen atoms possible, and so at least one double bond.

V

vacuum space containing no particles of matter

voltage (also called the potential difference) the difference in electrical potential between two points or objects

voltmeter instrument used to measure voltage (potential difference)

volt (V) unit used to measure voltage

W

water conservation reducing water consumption through planned choice, e.g. hosepipe bans and water metering

water resources places from where water is extracted or where it is stored, e.g. aquifers, reservoirs or lakes

wavelength distance between two wave peaks or the distance between identical points in adjacent cycles of a wave