DEFINITIONS

ATOMIC STRUCTURE & AMOUNT OF SUBSTANCE

Term	Exam Definition
Isotopes	Atoms of the same element with the same number of protons but different numbers of neutrons and therefore different masses.
Atomic number	The number of protons in the nucleus of an atom.
Mass number	The total number of protons and neutrons in the nucleus of an atom.
Relative isotopic mass	The mass of an atom of an isotope compared with 1/12th of the mass of a carbon-12 atom.
Relative atomic mass, Ar	The weighted mean mass of an atom of an element compared with 1/12th of the mass of a carbon-12 atom.
Relative molecular mass, Mr	The sum of the relative atomic masses of all atoms in a molecule.
Amount of substance	A measure of how many particles are present in a substance.
Mole, mol	The unit for amount of substance. One mole contains the Avogadro constant number of particles.
Avogadro constant, NA	The number of particles in one mole, equal to **6.02×10^{23} mol^{-1}**.
Molar mass	The mass per mole of a substance, usually measured in **g mol^{-1}**.
Molar gas volume	The volume occupied by one mole of gas, usually measured in **dm^3 mol^{-1}**.
Empirical formula	The simplest whole-number ratio of atoms of each element in a compound.
Molecular formula	The actual number and type of atoms of each element in a molecule.

DEFINITIONS

FORMULAE, HYDRATION & CRYSTALS

Term	Exam Definition
Anhydrous	A substance that contains no water molecules.
Hydrated	A substance that contains water molecules within its crystal structure.
Water of crystallisation	Water molecules that form part of the crystal structure of a hydrated compound.

DEFINITIONS

BONDING & STRUCTURE

Term	Exam Definition
Ionic bonding	The strong electrostatic attraction between positive and negative ions.
Covalent bond	A shared pair of electrons between two atoms.
Single covalent bond	One shared pair of electrons between two atoms.
Multiple covalent bond	More than one shared pair of electrons between two atoms.
Dative covalent bond / coordinate bond	A shared pair of electrons where both electrons are donated by one atom.
Metallic bonding	The strong electrostatic attraction between positive metal ions and delocalised electrons.
Electronegativity	The ability of an atom to attract the bonding pair of electrons in a covalent bond.
Average bond enthalpy	The enthalpy change required to break one mole of a specified covalent bond in gaseous molecules, averaged over different compounds.
Sigma bond, σ bond	A covalent bond formed by direct overlap of orbitals between two atoms.
Pi bond, π bond	A covalent bond formed by sideways overlap of adjacent p-orbitals above and below the bonding atoms.

DEFINITIONS

IONISATION ENERGY & PERIODICITY

Term	Exam Definition
First ionisation energy	The enthalpy change when one mole of electrons is removed from one mole of gaseous atoms to form one mole of gaseous 1+ ions.
Successive ionisation energy	The enthalpy change when each further mole of electrons is removed from one mole of gaseous ions.
Electron affinity	The enthalpy change when one mole of electrons is added to one mole of gaseous atoms to form one mole of gaseous negative ions.
Enthalpy of atomisation	The enthalpy change when one mole of gaseous atoms is formed from an element in its standard state.

DEFINITIONS

ACIDS, BASES & BUFFERS

Term	Exam Definition
Acid	A proton donor.
Base	A proton acceptor.
Brønsted–Lowry acid	A species that donates a proton, H^+.
Brønsted–Lowry base	A species that accepts a proton, H^+.
Strong acid	An acid that fully dissociates in aqueous solution.
Weak acid	An acid that only partially dissociates in aqueous solution.
Strong base	A base that fully dissociates in aqueous solution.
Weak base	A base that only partially dissociates in aqueous solution.
Conjugate acid-base pair	Two species that differ by one proton, H^+.
Monobasic acid	An acid that can donate one proton per molecule.
Dibasic acid	An acid that can donate two protons per molecule.
Tribasic acid	An acid that can donate three protons per molecule.
Buffer solution	A system that minimises pH changes when small amounts of acid or base are added.
Acidic buffer	A buffer made from a weak acid and a salt of that weak acid.
Basic buffer	A buffer made from a weak base and a salt of that weak base.

DEFINITIONS

REDOX & OXIDATION NUMBERS

Term	Exam Definition
Oxidation	Loss of electrons or an increase in oxidation number.
Reduction	Gain of electrons or a decrease in oxidation number.
Oxidising agent	A species that accepts electrons and is reduced.
Reducing agent	A species that donates electrons and is oxidised.
Oxidation number	A number assigned to an element to show its level of oxidation in a species.

DEFINITIONS

ENERGETICS & ENTHALPY

Term	Exam Definition
Enthalpy change, ΔH	The heat energy change measured under conditions of constant pressure.
Exothermic reaction	A reaction that releases heat energy to the surroundings. ΔH is negative.
Endothermic reaction	A reaction that absorbs heat energy from the surroundings. ΔH is positive.
Standard conditions	Usually **100 kPa** pressure and a stated temperature, often **298 K**.
Standard state	The physical state of a substance under standard conditions.
Standard enthalpy change	An enthalpy change measured under standard conditions, with substances in their standard states.
Enthalpy change of reaction	The enthalpy change associated with a reaction in the molar quantities shown in the chemical equation.
Standard enthalpy of formation, ΔfHϴ	The enthalpy change when one mole of a compound is formed from its elements in their standard states under standard conditions.
Standard enthalpy of combustion, ΔcHϴ	The enthalpy change when one mole of a substance is completely burned in oxygen under standard conditions.
Standard enthalpy of neutralisation	The enthalpy change when one mole of water is formed by neutralisation between an acid and an alkali.
Mean bond enthalpy	The average enthalpy change required to break one mole of a specified covalent bond in gaseous molecules.
Activation energy	The minimum energy particles must have to react.

DEFINITIONS

LATTICE ENTHALPY, HYDRATION & ENTROPY

Term	Exam Definition
Lattice enthalpy of formation	The enthalpy change when one mole of an ionic lattice is formed from its gaseous ions.
Lattice enthalpy of dissociation	The enthalpy change when one mole of an ionic lattice is separated into its gaseous ions.
Enthalpy change of solution, ΔsolH	The enthalpy change when one mole of solute dissolves completely in water.
Enthalpy change of hydration, ΔhydH	The enthalpy change when one mole of gaseous ions dissolves in water to form aqueous ions.
Entropy	A measure of the dispersal of energy in a system; entropy is greater when a system is more disordered.
Feasibility	Whether a process can occur depends on enthalpy change, entropy change and temperature.

DEFINITIONS

KINETICS & CATALYSTS

Term	Exam Definition
Rate of reaction	The change in concentration of a reactant or product per unit time.
Catalyst	A substance that increases the rate of reaction without being used up or chemically changed overall.
Activation energy	The minimum energy particles need to react.
Homogeneous catalyst	A catalyst in the same phase as the reactants.
Heterogeneous catalyst	A catalyst in a different phase from the reactants. The reaction usually occurs on active sites on the surface.
Rate order	The power to which the concentration of a reactant is raised in the rate equation.
Overall order	The sum of the orders with respect to each reactant in the rate equation.
Rate constant, k	The constant of proportionality in the rate equation.
Half-life	The time taken for the concentration of a reactant to decrease by half.
Rate-determining step	The slowest step in a reaction mechanism that determines the overall rate of reaction.
Arrhenius equation	An equation showing the exponential relationship between rate constant, activation energy and temperature.

DEFINITIONS

EQUILIBRIUM

Term	Exam Definition
Dynamic equilibrium	The state reached in a closed system when the rate of the forward reaction equals the rate of the reverse reaction and the concentrations of reactants and products remain constant.
Closed system	A system where no substances can enter or leave.
Mole fraction	The fraction of the total moles in a gas mixture made up by one gas.
Partial pressure	The pressure that one gas would exert if it occupied the whole container by itself.

DEFINITIONS

ORGANIC CHEMISTRY BASICS

Term	Exam Definition
General formula	The simplest algebraic formula for members of a homologous series.
Structural formula	The minimum detail needed to show the arrangement of atoms in a molecule.
Displayed formula	A formula showing all atoms and all bonds in a molecule.
Skeletal formula	A simplified organic formula showing the carbon skeleton, with hydrogens on carbon atoms omitted.
Homologous series	A series of organic compounds with the same functional group, where each successive member differs by CH_2.
Functional group	The atom or group of atoms responsible for the characteristic reactions of a compound.
Aliphatic compound	A compound containing carbon and hydrogen joined in straight chains, branched chains or non-aromatic rings.
Alicyclic compound	An aliphatic compound arranged in a non-aromatic ring, with or without side chains.
Aromatic compound	A compound containing a benzene ring.
Saturated compound	A compound containing only single carbon-carbon bonds.
Unsaturated compound	A compound containing multiple carbon-carbon bonds, such as C=C bonds or aromatic rings.
Hydrocarbon	A compound containing hydrogen and carbon atoms only.

DEFINITIONS

ISOMERISM

Term	Exam Definition
Structural isomers	Compounds with the same molecular formula but different structural formulae.
Stereoisomers	Compounds with the same structural formula but a different arrangement of atoms in space.
E/Z isomerism	A type of stereoisomerism caused by restricted rotation around a C=C double bond, where each carbon in the double bond has two different groups attached.
Cis-trans isomerism	A special case of E/Z isomerism where two substituent groups attached to each carbon of the C=C bond are the same.
Optical isomerism	A form of stereoisomerism caused by chirality, where molecules exist as non-superimposable mirror images.
Chiral centre	A carbon atom bonded to four different groups.
Enantiomers	Optical isomers that are non-superimposable mirror images of each other.
Racemic mixture / racemate	A mixture containing equal amounts of two enantiomers.

DEFINITIONS

ORGANIC MECHANISMS

Term	Exam Definition
Homolytic fission	Bond breaking where each bonding atom receives one electron from the bonded pair, forming two radicals.
Heterolytic fission	Bond breaking where one bonding atom receives both electrons from the bonded pair.
Radical	A species with an unpaired electron.
Curly arrow	A symbol used in mechanisms to show the movement of an electron pair.
Nucleophile	An electron pair donor.
Electrophile	An electron pair acceptor.

DEFINITIONS

ALKANES & ALKENES

Term	Exam Definition
Alkane	A saturated hydrocarbon containing only single C–C and C–H bonds.
Alkene	An unsaturated hydrocarbon containing at least one C=C double bond.
Sigma bond in alkanes	A bond formed by direct overlap of orbitals between bonding atoms, allowing free rotation.
C=C double bond in alkenes	Made from one sigma bond and one pi bond.
Restricted rotation	The inability to freely rotate around a C=C double bond because of the pi bond.

DEFINITIONS

ELECTRODE POTENTIALS & FUEL CELLS

Term	Exam Definition
Standard electrode potential, EΘ	The voltage measured for a half-cell compared with the standard hydrogen electrode under standard conditions.
Standard hydrogen electrode	The reference half-cell used to measure electrode potentials.
Fuel cell	A cell that uses the energy from the reaction of a fuel with oxygen to produce a voltage.
Cell potential / EMF	The potential difference between two half-cells.

DEFINITIONS

TRANSITION METALS

Term	Exam Definition
Transition element	A d-block element that forms at least one ion with a partially filled d-subshell.
Ligand	A molecule or ion that donates a pair of electrons to a central metal ion to form a coordinate bond.
Complex ion	A central metal ion surrounded by ligands.
Coordination number	The number of coordinate bonds formed to the central metal ion.
Bidentate ligand	A ligand that forms two coordinate bonds to a central metal ion.
Chelate effect	The increased stability of a complex when a multidentate ligand replaces monodentate ligands.

DEFINITIONS

ANALYTICAL CHEMISTRY

Term	Exam Definition
Infrared radiation	Radiation that causes covalent bonds to vibrate more strongly.
IR absorption	Bonds absorb infrared radiation at specific frequencies depending on the bond and functional group.
Fingerprint region	The region of an IR spectrum that is unique to a molecule and can be used for identification.
Retention time	The time taken for a substance to pass through a chromatography column and reach the detector.

DEFINITIONS

POLYMERS & BIOLOGICAL MOLECULES

Term	Exam Definition
Condensation polymer	A polymer formed when monomers join together with the elimination of a small molecule, such as water or HCl.
Polyester	A condensation polymer formed from a dicarboxylic acid and a diol.
Polyamide	A condensation polymer formed from a dicarboxylic acid and a diamine.
Peptide link	The amide bond formed between amino acids.
Protein	A sequence of amino acids joined together by peptide bonds.