

Most Chemistry definitions carry a condition – a state, an amount, a set of standard conditions – and the condition is usually the second mark. Where “one mole” or “gaseous” appears below, it is not padding. 化学定义中的限定条件往往就是得分点。

Atoms, moles and formulae

Relative atomic mass 相对原子质量 — the weighted mean mass of an atom of an element relative to one twelfth of the mass of an atom of carbon-12

Isotope 同位素 — atoms of the same element with the same number of protons but different numbers of neutrons

Mole 摩尔 — the amount of substance containing the same number of particles as there are atoms in 12 g of carbon-12

Empirical formula 实验式 — the simplest whole-number ratio of atoms of each element in a compound

First ionisation energy 第一电离能 — the energy required to remove one electron from each atom in one mole of gaseous atoms to form one mole of gaseous $1+$ ions

Electron affinity 电子亲和能 — the energy change when one electron is added to each atom in one mole of gaseous atoms to form one mole of gaseous $1-$ ions

Electronegativity 电负性 — the ability of an atom to attract the bonding electrons in a covalent bond

Bonding and structure

Ionic bond 离子键 — the electrostatic attraction between oppositely charged ions

Covalent bond 共价键 — a shared pair of electrons between two atoms, attracted to both nuclei

Dative covalent bond 配位键 — a covalent bond in which both electrons of the shared pair come from the same atom

Metallic bond 金属键 — the electrostatic attraction between positive metal ions and a sea of delocalised electrons

Hydrogen bond 氢键 — an intermolecular attraction between a lone pair on N, O or F and a hydrogen atom bonded to N, O or F in another molecule

Van der Waals forces 范德华力 — weak intermolecular attractions caused by instantaneous and induced dipoles, increasing with the number of electrons

Energetics

Standard conditions 标准状况 — 298 K and 101 kPa, with all substances in their standard states and solutions at 1 mol dm^{-3}

Enthalpy change of formation 生成焓 — the enthalpy change when ONE MOLE of a compound is formed from its elements in their standard states under standard conditions

Enthalpy change of combustion 燃烧焓 — the enthalpy change when one mole of a substance is completely burnt in oxygen under standard conditions

Enthalpy change of neutralisation 中和焓 — the enthalpy change when an acid and a base react to form one mole of water under standard conditions

Lattice energy 晶格能 — the enthalpy change when one mole of an ionic solid is formed from its gaseous ions; it is always exothermic

Hess's law 盖斯定律 — the total enthalpy change of a reaction is independent of the route taken, provided the initial and final conditions are the same

Entropy 熵 — a measure of the disorder of a system; it increases with temperature and with the number of gaseous particles

Gibbs free energy 吉布斯自由能 — $\Delta G = \Delta H - T\Delta S$; a reaction is feasible when ΔG is negative

Kinetics and equilibrium

Activation energy 活化能 — the minimum energy that colliding particles must have for a reaction to occur

Catalyst 催化剂 — a substance that increases the rate of a reaction by providing an alternative route of lower activation energy, and is unchanged at the end

Rate of reaction 反应速率 — the change in concentration of a reactant or product per unit time

Order of reaction 反应级数 — the power to which the concentration of a reactant is raised in the rate equation; it is found by experiment, never from the stoichiometry

Rate-determining step 决速步 — the slowest step in a multi-step mechanism, which determines the overall rate; only species up to and including it appear in the rate equation

Half-life (kinetics) 半衰期 — the time for the concentration of a reactant to fall to half its value; a constant half-life indicates first order

Dynamic equilibrium 动态平衡 — in a closed system, the forward and reverse reactions occur at equal rates, so concentrations remain constant

Le Chatelier's principle 勒沙特列原理 — when a change is applied to a system at equilibrium, the position of equilibrium shifts to oppose that change

Acids, bases and redox

Brønsted–Lowry acid 布朗斯特酸 — a proton donor

Conjugate base 共轭碱 — the species formed when an acid loses a proton

Strong acid 强酸 — an acid that is completely dissociated in aqueous solution – strength is about dissociation, not concentration

pH pH 值 — the negative logarithm to base ten of the hydrogen ion concentration in mol dm^{-3}

K_a 酸解离常数 — the acid dissociation constant, the equilibrium constant for the dissociation of a weak acid; a larger K_a means a stronger acid

Buffer solution 缓冲溶液 — a solution that resists a change in pH when small amounts of acid or base are added, made of a weak acid and its conjugate base

Oxidation 氧化 — loss of electrons, or an increase in oxidation number

Standard electrode potential 标准电极电势 — the e.m.f. of a half cell relative to the standard hydrogen electrode under standard conditions

Disproportionation 歧化反应 — a reaction in which the same element is simultaneously oxidised and reduced

Organic chemistry

Homologous series 同系物 — a family of compounds with the same general formula and functional group, differing by CH_2 , with a gradual change in physical properties

Functional group 官能团 — the atom or group of atoms in a molecule responsible for its characteristic reactions

Structural isomers 结构异构体 — compounds with the same molecular formula but different structural formulae

Stereoisomers 立体异构体 — compounds with the same structural formula but a different arrangement of atoms in space

Chiral centre 手性中心 — a carbon atom bonded to four different groups, giving rise to two non-superimposable mirror images

Electrophile 亲电试剂 — an electron-pair acceptor, attracted to a region of high electron density

Nucleophile 亲核试剂 — an electron-pair donor, attracted to a region of low electron density

Free radical 自由基 — a species with an unpaired electron, formed by homolytic fission

Addition polymerisation 加成聚合 — the joining of many alkene monomers to form a long chain with no other product

Condensation polymerisation 缩合聚合 — the joining of monomers with the elimination of a small molecule, usually water or HCl