

CHEMISTRY DEFINITIONS AND TERMS FOR HIGHER SCHOOL CERTIFICATE

1. The relative atomic mass (A_r) of an element is the average mass of an atom in a normal isotopic mixture of the element, compared to an atom of carbon-12, which is assigned the value of exactly 12.
2. The relative isotopic mass of an isotope is the mass of one isotope of an element, compared to an atom of carbon-12, which is assigned the value of exactly 12.
3. The relative molecular mass (M_r) of a substance is the mass of one molecule of the substance, compared to the mass of one atom of carbon-12, which is assigned the value of exactly 12.
4. The relative formula mass (M_r) of a compound is the average mass of all the atoms in the formula, compared to an atom of carbon-12, which is assigned the value of exactly 12.
5. One mole is the SI unit of amount of substance and it consists of 6.02×10^{23} (Avogadro's number) particles.
6. The empirical formula of a compound is the simplest formula of the compound which shows the simplest ratio (by moles) in which the atoms combine.
7. The molecular formula of a compound shows the actual number of each type of atom in the compound.
8. The first ionisation energy (ΔH_{I_1}) is the energy required to remove one mole of electrons from one mole of atoms in the gaseous state.
9. The electron affinity (ΔH_A) is the energy released when one mole of electrons is attached to one mole of neutral atoms in the gaseous state.
10. A co-ordinate or dative bond is a particular type of covalent bond in which one of the atoms supplies both electrons.
11. A sigma bond is the chemical bond resulting from the head-on or end-on overlap of atomic orbitals.
12. A pi bond is the chemical bond resulting from the sideways overlap of atomic orbitals.
13. Hybridisation is the combining of orbitals to form specially shaped orbitals called hybrid orbitals.
14. Electronegativity is the ability of an atom in a molecule to attract the shared electrons in a covalent bond.
15. A hydrogen bond is an attractive interaction between a hydrogen atom bonded to a very electronegative atom and an unshared electron pair on another electronegative atom.
16. Bond energy is the average amount of energy that must be supplied to break one mole of chemical bonds in the isolated molecules in the gaseous state.
17. An ideal gas is one that obeys the general gas equation $pV = nRT$.
18. The standard conditions of temperature and pressure for thermochemical measurements are 25°C (298 K) and 1 atmosphere (101,325 Pa) respectively.
19. The enthalpy change of reaction (ΔH_r) is the amount of heat absorbed or evolved when the molar quantities of reactants as stated in the equation react together.
20. The enthalpy of formation (ΔH_f) of a substance is the heat absorbed or evolved when 1 mole of the substance is formed from its constituent elements.

21. The enthalpy of combustion (ΔH_c) of a substance is the heat evolved when 1 mole of the substance is completely burnt in oxygen.
22. The enthalpy of hydration (ΔH_{hyd}) is the heat evolved when 1 mole of gaseous ions dissolves in water to give an infinitely dilute solution.
23. The enthalpy of solution (ΔH_{soln}) of a substance is the heat absorbed or evolved when 1 mole of the substance is completely dissolved in water to give an infinitely dilute solution.
24. The enthalpy of neutralisation (ΔH_n) is the heat evolved when 1 mole of H^+ ions from an acid is completely neutralised by an alkali to give an infinitely dilute solution.
25. The enthalpy of atomisation (ΔH_{at}) of an element is the heat absorbed when one mole of gaseous atoms is formed from the element.
26. The lattice energy (ΔH_{latt}) is the energy evolved per mole if gaseous ions of the crystal were brought together from infinite distances to form the lattice.
27. Entropy is a measure of the 'randomness' or 'disorderliness' of a system or a substance.
28. The standard electrode (redox) potential of a half-cell is the potential of that half-cell relative to a standard hydrogen half-cell, under standard conditions.
29. The standard cell potential (E^\ominus) is the sum of the standard half-cell potentials for oxidation at the anode and reduction at the cathode.
30. A reversible reaction is one which can be made to go forward or backward by changing the conditions of the reaction.
31. In a reversible reaction, a state of dynamic equilibrium will be reached when the rate of the forward reaction is equal to the rate of the reverse reaction.
32. According to the Brønsted-Lowry theory, an acid is a substance which can donate a proton to another substance, while a base is a substance which can accept a proton from another substance.
33. A buffer solution is a mixture, which will resist changes in pH when small amounts of acids or bases are added.
34. The solubility product is the product of the concentrations of the ions, in a saturated solution of the salt, raised to the powers of the respective coefficients of the ions in the stoichiometric equation.
35. The common ion effect is the addition of an electrolyte having an ion in common with a sparingly soluble salt, so as to shift the equilibrium in the direction of precipitation.
36. Partition coefficient is the ratio of the concentrations of a solute in the two phases of a mixture of two immiscible solvents at equilibrium.
37. The activation energy, E_a , is defined as the minimum energy required for a chemical reaction to take place.
38. A reaction mechanism is the sequence of reaction steps that defines the pathway from reactants to products.
39. A catalyst is a substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change.
40. A homogeneous catalyst is one which is in the same physical state as the reactants.
41. A heterogeneous catalyst is one which is in a different physical state compared to the reactants.
42. The charge density of a cation is its electric charge per unit volume or per unit surface area.

43. Polarisability is the relative tendency of a charge distribution, like the electron cloud of an atom or molecule, to be distorted from its normal shape by an external electric field, which may be caused by the presence of a nearby ion.
44. A transition element is a d-block element, which can form one or more stable ions with a partly-filled subshell of d electrons.
45. A ligand is a species that contains a lone pair of electrons that forms a dative bond to a central metal atom or ion.
46. A complex is a molecule or ion formed by a central metal atom or ion surrounded by one or more ligands.
47. The co-ordination number of a metal is the number of ligand donor atoms that surround the central metal ion in a compound.
48. The stability constant of a complex ion is the equilibrium constant for the formation of the complex ion in a solvent, from its constituent ions or molecules.
49. A displayed formula shows both the relative placing of atoms and the number of bonds between them.
50. A skeletal formula is a line-angled formula that shows only the carbon-carbon bonds and the associated functional groups.
51. A functional group is the group of atoms responsible for the characteristic reactions of a class of compound.
52. A free radical is an atom or group of atoms with an unpaired valence electron.
53. Homolytic fission is the breaking of a bond in a compound to produce uncharged free radicals as fragments.
54. Heterolytic fission is the breaking of a bond in a compound to produce oppositely charged ions as fragments.
55. A nucleophile is an anion or molecule that can donate electrons because it is electron-rich.
56. An electrophile is a cation or molecule which is electron-deficient and which can therefore accept electrons.
57. An addition reaction is a chemical reaction in which two compounds, among which one is unsaturated, react to form a single product.
58. A substitution reaction is a chemical reaction in which one atom, molecule or radical is replaced by another.
59. An elimination reaction is a chemical reaction in which one molecule decomposes into two, with one molecule much smaller than the other.
60. A hydrolysis is the decomposition or alteration of a compound with water.
61. A condensation reaction is a chemical reaction in which two molecules combine to form a larger molecule, with the elimination of a small molecule of water or hydrogen chloride.
62. Isomers are molecules having the same molecular formula but different structural arrangements or different spatial arrangements of their atoms.
63. Chain isomerism is a type of structural isomerism that arises because of the possibility of branching in carbon chains.
64. Position isomerism is a type of structural isomerism in which the basic carbon skeleton remains unchanged, but important groups are moved around on that skeleton.
65. Functional group isomerism is a type of structural isomerism in which the isomers contain different functional groups.

66. Cis-trans isomerism is a type of stereoisomerism in which the isomers have different positions of groups with respect to a double bond.
67. Optical isomerism is a type of stereoisomerism in which two molecules exist as non-superimposable mirror images of each other.
68. A chiral centre is a carbon atom with four different groups of atoms.
69. An electrophilic addition is an addition reaction in which the first step is attack by an electrophile on an electron-rich part of a molecule.
70. Polymerisation is any chemical combination of a number of similar molecules to form a larger molecule.
71. An electrophilic substitution is a substitution reaction in which the first step is attack by an electrophile.
72. A nucleophilic substitution reaction is one in which a nucleophile displaces another atom or group from a compound.
73. S_N1 stands for first order substitution reactions because only one molecule is involved in the rate determining step of the reaction mechanism.
74. S_N2 stands for second order substitution reactions because two molecules are involved in the rate determining step of the reaction mechanism.
75. A nucleophilic addition reaction is a type of addition reaction in which the first step is attachment of a nucleophile to a positive or electron-deficient part of a molecule.
76. Electrophoresis is a method for separation and identification that depends on the movement of charged particles in an electric field.
77. Addition polymerisation is a process whereby the polymer is formed from unsaturated monomers which join together to form a single large molecule.
78. Condensation polymerisation is a process during which a polymer is formed, with the elimination of small molecules of water or hydrogen chloride.
79. The primary structure of a protein is the order in which specified amino acids are joined together.
80. The secondary structure of a protein is the nature and extent of its coiling and pleating which retains its shape due to hydrogen bonding.
81. The tertiary structure of a protein refers to the three-dimensional shapes produced by the folding of its coils or pleats themselves.