HSC Chemistry Important Questions & Answers

Q: State the modern periodic law. (2 Marks)

Ans: The physical and chemical properties of elements are the periodic function of their atomic numbers.

Q: Define ionization enthalpy. (2 Marks)

Ans: It is the minimum energy required to remove the most loosely bound electron from an isolated gaseous atom in its ground state.

Q: What is electronegativity? (2 Marks)

Ans: It is the tendency of an atom in a molecule to attract the shared pair of electrons towards itself.

Q: State Hund’s rule of maximum multiplicity. (2 Marks)

Ans: Electron pairing in orbitals starts only after each orbital is singly filled in a given subshell.

Q: Define atomic radius. (2 Marks)

Ans: The distance from the center of the nucleus to the outermost shell of an atom is called atomic radius.

Q: What are isobars? Give one example. (2 Marks)

Ans: Atoms of different elements having the same mass number but different atomic numbers are called isobars. Example: ^{40}Ar and ^{40}Ca.

Q: Write the equation for the decomposition of hydrogen peroxide. (2 Marks)

Ans: $2H_2O_2 \rightarrow 2H_2O + O_2$.

Q: State Faraday’s first law of electrolysis. (2 Marks)

Ans: The mass of substance deposited or liberated at an electrode is directly proportional to the quantity of electricity passed through the electrolyte.

Q: Define molarity. (2 Marks)

Ans: It is the number of moles of solute dissolved per liter of solution.

Q: State Raoult’s law for a solution containing a volatile solute. (2 Marks)

Ans: The relative lowering of vapor pressure of a solution is equal to the mole fraction of the solute present.

Q: What is the common ion effect? (2 Marks)

Ans: The suppression of ionization of a weak electrolyte by adding a strong electrolyte having a common ion.

Q: Write Nernst equation for a single electrode potential. (3 Marks)

Ans: $E = E^\circ - (2.303RT / nF) \log (1/[M^{n+}])$.

Q: Explain the preparation of colloids by peptization. (3 Marks)

Ans: Peptization is the process of converting a precipitate into colloidal solution by shaking it with a small amount of suitable electrolyte.

Q: State Henry’s law. (2 Marks)

Ans: The solubility of a gas in a liquid is directly proportional to the pressure of the gas at constant temperature.

Q: Write the expression for Freundlich adsorption isotherm. (3 Marks)

Ans: x/m = k · P^(1/n), where x is mass of gas adsorbed, m is mass of adsorbent, P is pressure.

Q: Derive the integrated rate law for first order reaction. (4 Marks)

Ans: For a → Products: ln([a]/[a–x]) = kt. Or, [A]t = $[A]_0$ e^(–kt). Half-life $t_{1/2} = 0.693/k$.

Q: State Kohlrausch’s law of independent migration of ions. (2 Marks)

Ans: At infinite dilution, each ion contributes independently to the molar conductivity of the electrolyte.

Q: Write the IUPAC name of $CH_3–CH_2–CH_2–OH$. (1 Mark)

Ans: Propan-1-ol.

Q: What is polymerization? Give one example. (2 Marks)

Ans: The process of forming large molecules (polymers) from small repeating units (monomers). Example: Polyethylene from ethene.

Q: State Markovnikov’s rule. (2 Marks)

Ans: When an unsymmetrical reagent adds to an unsymmetrical alkene, the negative part of the reagent attaches to the carbon with fewer hydrogens.

Q: Explain the term saponification. (2 Marks)

Ans: It is the alkaline hydrolysis of fats or oils to give glycerol and soap.

Q: Write the structural formula of glucose. (3 Marks)

Ans: Glucose: $C_6H_{12}O_6$, with an aldohexose structure (open-chain form: H–(CHOH)$_4$–CHO).

Q: What are primary, secondary and tertiary alcohols? Give examples. (3 Marks)

Ans: Primary: OH attached to C with one alkyl group (e.g., ethanol).
Secondary: OH attached to C with two alkyl groups (e.g., isopropanol).
Tertiary: OH attached to C with three alkyl groups (e.g., tert-butanol).

Q: What is green chemistry? (2 Marks)

Ans: It is the use of chemical processes that reduce or eliminate the use and generation of hazardous substances.

Q: Define Le Chatelier’s principle. (2 Marks)

Ans: When a system at equilibrium is disturbed, the equilibrium shifts in a direction that tends to reduce the disturbance.

Q: Explain the structure of benzene. (3 Marks)

Ans: Benzene has a planar hexagonal ring with delocalized π-electrons over six carbon atoms, represented by resonance structures.

Q: State the law of multiple proportions. (2 Marks)

Ans: When two elements combine to form more than one compound, the masses of one element that combine with a fixed mass of the other are in a simple ratio.

Q: Write the equation for Haber's process. (2 Marks)

Ans: $N_2 + 3H_2 \rightleftharpoons 2NH_3$ ($\Delta H = -92$ kJ/mol).

Q: What is the pH of 0.001 M HCl solution? (2 Marks)

Ans: $pH = -\log[H^+] = -\log(0.001) = 3$.

Q: Calculate the number of moles of oxygen in 11.2 L at STP. (2 Marks)

Ans: At STP, 22.4 L = 1 mole. So, 11.2 L = 0.5 mole.