EPITOME MODEL ISLAMIC SCHOOLS
CHEMISTRY INTERVIEW QUESTIONS

Instruction: Attempt all questions from this section
Time Allowed for this section: 20 minutes
SECTION A: MCQ

1. The quantum number that specifies the orientation of an orbital in space is: A) Principal (n) B) Azimuthal (l) C) Magnetic (m_l) D) Spin (m_s)
2. According to Hund's rule, electrons in degenerate orbitals: A) Pair up immediately B) Occupy orbitals singly with parallel spins before pairing C) Have opposite spins in the same orbital D) Fill from higher to lower energy
3. The element with the highest first ionization energy in the periodic table is: A) Helium B) Neon C) Fluorine D) Argon
4. In the Aufbau principle, the order of filling orbitals is: A) 1s, 2s, 2p, 3s, 3p, 4s, 3d... B) 1s, 2s, 2p, 3s, 3d, 4s, 4p... C) 1s, 2p, 2s, 3s, 3p, 4s, 3d... D) 1s, 2s, 3s, 2p, 3p, 4s, 3d...
5. The electron affinity trend down a group in the periodic table is: A) Increases B) Decreases C) Remains constant D) Fluctuates irregularly
6. Which quantum mechanical model best explains the stability of atoms with half-filled or fully filled subshells? A) Bohr model B) Exchange energy and symmetry in molecular orbital theory C) Rutherford model D) Thomson plum pudding model
7. The atomic radius of transition metals generally: A) Increases across the period B) Decreases across the period C) Remains constant D) Increases down the group only
8. Isotopes of an element differ in: A) Atomic number B) Number of protons C) Number of neutrons D) Electron configuration
9. In VSEPR theory, the bond angle in SF_6 is: A) 90° B) 109.5° C) 120° D) 180° (octahedral)
10. The hybridization of the carbon atom in CH_3^+ is: A) sp^3 B) sp^2 C) sp D) sp^3d
11. Fajans' rules predict that the ionic character increases with: A) Smaller cation and larger anion B) Larger cation and smaller anion C) High charge on both ions D) Low polarizing power
12. The bond order in O_2 molecule is: A) 1 B) 2 C) 3 D) 1.5
13. Which molecule exhibits hydrogen bonding? A) CH_4 B) NH_3 C) CCl_4 D) CO_2
14. In coordinate bonding, the shared pair of electrons comes from: A) Both atoms equally B) One atom only C) Neither atom D) Valence shell overlap
15. The lattice energy of an ionic compound is highest for: A) Small ions with high charges B) Large ions with low charges C) Only cations small D) Only anions small
16. The van der Waals equation corrects for: A) Ideal gas assumptions of point masses and no interactions B) Volume of molecules and intermolecular forces C) Temperature dependence only D) Pressure-volume work
17. Raoult's law applies to: A) Ideal solutions where vapor pressure is proportional to mole fraction B) Non-ideal solutions C) Pure solvents only D) Gases in solution
18. The elevation in boiling point is a colligative property dependent on: A) Number of solute particles B) Nature of solute C) Temperature D) Pressure
19. In critical solution temperature, for upper consolute temperature systems like phenol-water: A) Miscibility increases with temperature B) Miscibility decreases with temperature C) No effect D) Only for lower consolute
20. Henry's law constant increases with: A) Increase in temperature for gases B) Decrease in pressure C) Increase in solubility D) Decrease in temperature
21. For a spontaneous process at constant T and P, ΔG must be: A) Positive B) Negative C) Zero D) Greater than ΔH

22. The rate law for a reaction is rate = k $[A]^2$ [B]. If [A] is doubled and [B] halved, the rate becomes: A) Same B) Doubled C) Quadrupled D) Halved
23. Activation energy is related to rate constant by Arrhenius equation: $k = A e^{(-Ea/RT)}$. To increase k, Ea should: A) Increase B) Decrease C) Remain same D) Depend on A only
24. In an endothermic reaction, the enthalpy change ΔH is: A) Positive B) Negative C) Zero D) Equal to ΔS
25. Hess's law allows calculation of ΔH for a reaction from: A) Standard enthalpies of formation B) Bond energies only C) Entropy values D) Free energy
26. For the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$, $K\_c = [NH_3]^2 / ([N_2][H_2]^3)$. If volume doubles, K_c: A) Doubles B) Halves C) Remains same D) Quadruples
27. The pH of a 0.1 M solution of a weak acid with Ka = 10^{-5} is approximately: A) 1 B) 3 C) 5 D) 7
28. Buffer capacity is maximum when: A) [Acid] = [Salt] B) [Acid] >> [Salt] C) [Salt] >> [Acid] D) pH = 0
29. In electrolysis of NaCl solution, the product at cathode is: A) Cl_2 B) Na C) H_2 D) O_2
30. The standard electrode potential of a half-cell indicates: A) Tendency to gain electrons (reduction) B) Tendency to lose electrons (oxidation) C) Neutral D) Depends on concentration
31. Le Chatelier's principle predicts that for endothermic reaction, increasing temperature shifts equilibrium: A) Left B) Right C) No shift D) Depends on pressure
32. The common ion effect suppresses: A) Dissociation of weak electrolytes B) Ionization of strong electrolytes C) Solubility of sparingly soluble salts D) Both A and C
33. The reaction of alkene with $KMnO_4$ (cold, dilute) gives: A) Carboxylic acid B) Diol C) Aldehyde D) Ketone only
34. In SN1 reaction, the rate depends on: A) Both substrate and nucleophile B) Substrate only (carbocation intermediate) C) Nucleophile only D) Solvent only
35. The hybridization in ethyne (C_2H_2) is: A) sp^3 B) sp^2 C) sp D) sp^3d
36. Lanthanide contraction refers to: A) Decrease in atomic size from La to Lu due to poor shielding of 4f electrons B) Increase in size down the group C) Expansion in actinides D) No effect on size
37. The test for unsaturation in organic compounds uses: A) Br_2 water (decolorization) B) Fehling's solution C) Tollens' reagent D) Iodoform test
38. In coordination compounds, the isomerism due to ligand arrangement around metal is: A) Structural B) Geometrical (cis-trans) C) Optical D) Ionization
39. The functional group in alcohols that reacts with Lucas reagent to give turbidity is: A) -OH (tertiary fastest) B) -COOH C) -CHO D) $-NH_2$
40. The ore of aluminum, bauxite, is purified by: A) Froth flotation B) Bayer's process (precipitation as $Al(OH)_3$) C) Roasting D) Smelting