JEE Main Chemistry Mock Test - April 2025 Attempt

Multiple Choice Questions (MCQs)

Q1. Which of the following salts will NOT undergo hydrolysis in aqueous solution?

(1) NH_4Cl

(2) Na_2CO_3

(3) NaCl

(4) CH_3COONa

Q2. The IUPAC name of the compound CH_3-CH(OH)-CH_2-CH(CH_3)-CHO is:

(1) 4-methylpentanal-2-ol

(2) 2-hydroxy-4-methylpentanal

(3) 4-methyl-2-hydroxypentanal

(4) 2-hydroxy-4-methylvaleraldehyde

Q3. The complex $[Co(NH_3)_4Cl_2]Cl$ exhibits which type of isomerism?

(1) Geometrical isomerism only

(2) Optical isomerism only

(3) Both geometrical and optical isomerism

(4) Neither geometrical nor optical isomerism

Q4. Which of the following statements is INCORRECT about hydrogen bonding?

(1) It leads to association of molecules

(2) It exists between molecules having F, O or N atoms

(3) It is stronger than covalent bonding

(4) It affects the boiling points of compounds

Q5. The correct order of acidic strength is:

(1) $HClO > HClO_2 > HClO_3 > HClO_4$

(2) $HClO_4 > HClO_3 > HClO_2 > HClO$

(3) $HClO_3 > HClO_4 > HClO_2 > HClO$

(4) $HClO_2 > HClO > HClO_4 > HClO_3$

Q6. The rate of a first order reaction doubles when the temperature changes from 300 K to 310 K. The activation energy of the reaction is (R = 8.314 J mol^{-1} K^{-1}):

(1) 35.28 kJ mol^{-1}

(2) 43.67 kJ mol^{-1}

(3) 54.20 kJ mol^{-1}

(4) 60.13 kJ mol^{-1}

Q7. In the complex ion $[Fe(CN)_6]^{4-}$, the oxidation state and coordination number of Fe are respectively:

(1) +2 and 6

(2) +2 and 4

(3) +4 and 6

(4) +3 and 6

Q8. Which of the following statements is NOT correct?

(1) The value of Henry's constant increases with increase in temperature

(2) Molality of a solution remains unchanged with temperature

(3) Osmotic pressure is a colligative property

(4) Addition of non-volatile solute to a solvent decreases its vapor pressure

Q9. The hybridization of central atoms in BrF_5, SF_4, and XeF_4 respectively are:

(1) sp^3d^2, sp^3d, sp^3d^2

(2) sp^3d^2, sp^3d, sp^3

(3) sp^3d, sp^3d^2, sp^3d^2

(4) sp^3d^2, sp^3, sp^3d

Q10. The correct decreasing order of basicity among the following is:

(I) **Ethylamine ($C_2H_5NH_2$)**

(II) **Aniline ($C_6H_5NH_2$)**

(III) **Dimethylamine ($(CH_3)_2NH$)**

(IV) **Nitroaniline ($p\text{-}NO_2C_6H_4NH_2$)**

(1) III > I > II > IV

(2) II > I > III > IV

(3) I > II > III > IV

(4) III > II > I > IV

Q11. When cyclohexanol is treated with hot concentrated H_2SO_4, the major product formed is:

(1) Cyclohexane

(2) Cyclohexene

(3) Cyclohexyl hydrogen sulfate

(4) 1,1-dicyclohexyl ether

Q12. The reaction of acetylene with H_2SO_4 and $HgSO_4$ in the presence of water produces:

(1) Ethanal

(2) Ethanoic acid

(3) Ethanol

(4) Glyoxal

Q13. Which of the following contains both ionic and covalent bonds?

(1) NaCl

(2) CH_4

(3) KCN

(4) NH_3

Q14. Which of the following is a biodegradable polymer?

(1) Nylon-6,6

(2) Polythene

(3) Polyglycolic acid

(4) Polyvinyl chloride

Q15. For the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, the equilibrium constant Kc is related to the equilibrium constant Kp as:

(1) $Kp = Kc(RT)^{-2}$

(2) $Kp = Kc(RT)^2$

(3) $Kp = Kc(RT)$

(4) $Kp = Kc$

Q16. Which of the following compounds will form racemic mixture during monobromination in presence of light?

(1) 2-methylbutane

(2) 2,2-dimethylbutane

(3) 2-methylpropane

(4) Propane

Q17. The pH of a buffer solution containing 0.2 M CH_3COOH and 0.3 M CH_3COONa is (pKa of CH_3COOH = 4.76):

(1) 4.46

(2) 4.76

(3) 5.06

(4) 4.94

Q18. The compound formed when benzaldehyde reacts with concentrated KOH is:

(1) Potassium benzoate and benzyl alcohol

(2) Benzyl alcohol only

(3) Potassium benzoate only

(4) Benzyl alcohol and potassium benzyloxide

Q19. The major product of the following reaction is:

$CH_3CH_2CH_2Br + NH_3$ (excess) $\rightarrow$

(1) $CH_3CH_2CH_2NH_2$

(2) $(CH_3CH_2CH_2)_2NH$

(3) $(CH_3CH_2CH_2)_3N$

(4) $(CH_3CH_2CH_2)_4N^+Br^-$

Q20. Identify the major product formed in the following reaction sequence:

C_6H_5-CH=CH_2 + HBr (1 equiv.) $\rightarrow$ X X + $NaOCH_3$ (excess) $\rightarrow$ Y Y + H_2/Pd-C $\rightarrow$ Z

(1) C_6H_5-OCH_3

(2) C_6H_5-CH_2-CH_2-OCH_3

(3) C_6H_5-CH(OCH_3)-CH_3

(4) C_6H_5-CH_2-OCH_3

Q21. Which of the following reactions represents a redox reaction?

(1) $NaOH + HCl \rightarrow NaCl + H_2O$

(2) $CaCO_3 \rightarrow CaO + CO_2$

(3) $2FeCl_3 + SnCl_2 \rightarrow 2FeCl_2 + SnCl_4$

(4) $NH_3 + HCl \rightarrow NH_4Cl\ MnO_2$

Q22. The decreasing order of basic strength of the following compounds is:

(1) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$

(2) $(CH_3)_3N > (CH_3)_2NH > NH_3 > CH_3NH_2$

(3) $NH_3 > CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$

(4) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N > NH_3$

Q23. During the electrolysis of aqueous sodium chloride (NaClNaClNaCl) using inert electrodes, different species compete for reduction and oxidation at the electrodes. Which of the following represents the main reaction occurring at the **cathode**?

(1) $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$

(2) $Na^+ + e^- \rightarrow Na$

(3) $2Cl^- \rightarrow Cl_2 + 2e^-$

(4) $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$

Q24. Which of the following compounds can act as both oxidizing and reducing agent?

(1) MnO_2

(2) H_2O_2

(3) $KMnO_4$

(4) $K_2Cr_2O_7$

Q25. The product formed when acetone reacts with Grignard reagent followed by hydrolysis is:

(1) Secondary alcohol

(2) Primary alcohol

(3) Tertiary alcohol

(4) Aldehyde

Numerical Value Type Questions (Integer Answer)

Q26. A saturated solution of $Mg(OH)_2$ has pH = 10. The solubility product (Ksp) of $Mg(OH)_2$ is _____ $\times 10^{-12}$ (Round off to the nearest integer).

Q27. Assuming complete ionization, the pH of 0.004 M H_2SO_4 is _____ $\times 10^{-1}$ (Round off to the nearest integer).

Q28. In the titration of 20 mL of 0.1 M oxalic acid solution with 0.1 M $KMnO_4$ solution in acidic medium, the volume of $KMnO_4$ required for complete reaction is _____ mL (Round off to the nearest integer).

Q29. The number of structural isomers possible for a compound with molecular formula C_4H_9Br is _____. (Round off to the nearest integer).

Q30. When 2-bromopentane reacts with alcoholic KOH, 80% of the product mixture is the Zaitsev product. If 15.1 g of 2-bromopentane is completely

reacted, calculate the mass of the Zaitsev product formed. (Molar mass of 2-bromopentane = 151 g/mol, molar mass of the Zaitsev product = 70 g/mol)