

12- STD CHEMISTRY PTA & PREVIOUS EXAM COMPULSORY QUESTIONS

QUESTIONS FROM FIRST MID TERM

- CO is reducing agent. Justify the answer
- Barium has a body centered cubic unit cell with a length of 508 pm along an edge. What is the density of barium in g/cm^3 ? (REPEATED)
- Complete the following reaction $\text{CH}_3 - \text{O} - \text{CH}_2 - \text{CH}_3 + \text{HI} \rightarrow$
- Calculate the number of atoms in a fcc unit cell (REPEATED)
- The rate constant for a first order reaction is $1.54 \times 10^{-3} \text{ S}^{-1}$. Calculate half life (REPEATED).
- Sodium metal crystallizes in bcc structure with the edge length of the unit cell $4.3 \times 10^{-8} \text{ cm}$. Calculate the radius of the sodium atom. (REPEATED)
- Write the equation when tert - butyl methyl ether allowed to react with 1 mole of HI.
- Calculate the percentage efficiency of packing in case of FCC crystal (REPEATED)
- Explain Williamson synthesis of preparing ether.
- Define Metamerism. Give one example
- In the reaction Ethanol $\xrightarrow{\text{PCl}_5} \text{X} \xrightarrow{\text{alc. KOH}} \text{Y}$. Identify X and Y (REPEATED).
- Complete the reaction 2- Methyl propane $\xrightarrow[\text{H}_2\text{O}]{\text{H}_2\text{SO}_4} >$
- Describe the structure of diborane
- Show that in case of first order reaction, the time required for 99.9% completion is nearly ten times the required for half completion of the reaction. (REPEATED).
- Write Kolbe's reaction.
- Define Average rate and Instantaneous rate
- Distinguish Order of a reaction and Molecularity of a reaction.
- Atom X is present at the corners of the cube and atom Y is at the centre of the cube in bcc crystalline structure. What is the formula of the compound?
- Show that for a first order reaction half life is independent of initial concentration.
- How is Phenol prepared from 1) Chloro benzene 2) Isopropyl benzyne
- How will you prepare Butan - 2- ol from Grignard Reagent?

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QUESTIONS FROM QUARTERLY EXAM

22. Identify the Conjugate acid base pair for the following reaction in aqueous solution.



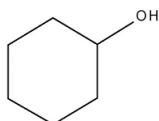
23. What happens when ammonia react with following compounds?

- a) Acetaldehyde b) Benzaldehyde

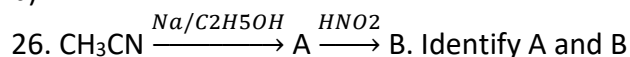
24. Write the expression for the solubility product of $\text{Ca}_3(\text{PO}_4)_2$

25. Write IUPAC name for the following structure.

a) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{OH}$



b)



27. Calculate the molar solubility of 1M AgNO_3 Solution if the K_{sp} of AgCl is 1.8×10^{-10}

28. Identify the order of the following reactions (REPEATED)

- a) Rusting of Iron
 b) Radioactive disintegration of ${}_{92}\text{U}^{235}$
 c) $2\text{A} + 3\text{B} \longrightarrow \text{Product}$. Rate = $K (\text{A})^{1/2}(\text{B})^2$

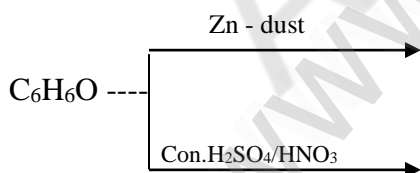
29. Arrange the following compounds in the increasing order of the property indicated against each. (REPEATED)

- a) $\text{CH}_3\text{CH}_2\text{OH}$, $\text{CF}_3\text{CH}_2\text{OH}$, $\text{CCl}_3\text{CH}_2\text{OH}$ (Acidic Nature)
 b) Propanol, Propane, Propanal (Boiling point)
 c) Formic acid, Propanoic acid, acetic acid (Acidity)

30. Compound (A) with a molecular formula $\text{C}_7\text{H}_6\text{O}$ reacts with Cl_2 in the presence of a catalyst gives (B) and without catalyst gives (C). Find (A), (B) & (C).

31. Phenol is distilled with zinc dust followed by Friedel craft alkylation with propyl chloride to give a compound (A). (A) On further oxidation gives (B). Identify A and B.

32. From the following reaction, identify A and B



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33. Calculate the number of unpaired electrons in Ti^{3+} , Mn^{2+} . And calculate the spin only magnetic moment.
34. Arrange the following in the increasing order of their property indicated.
- Benzoic acid, Phenol, Picric acid, Salicylic acid (pKa)
 - Ethanol, Ethanoic acid, Benzoic acid (Boiling point)
35. A hydride of 2nd period metal (A) on reaction with compound of boron (B) to give reducing agent (C). Identify A, B, C (**REPEATED**).
36. Complete the following
- $C_6H_5OCH_3 + HI \rightarrow ?$
 - $C_2H_5OCH_3 + HI \rightarrow ?$
37. Write IUPAC Name for
- C_6H_5CHO
 - $CH_3 - \underset{\substack{| \\ OH}}{CH} - CH_3$
38. Calculate the pH of 0.4M HNO_3 Solution (**REPEATED**).
39. Explain why atomic radii of zinc is greater than copper.
40. Complete the following reaction
- $$CH_3 - CH_2 - CH_2 - \underset{\substack{|| \\ O}}{C} - CH_3 \xrightarrow[Con.HNO_3]{(O)} ?$$
41. Write the expression for the solubility product of Hg_2Cl_2
42. Which is more stable Fe^{2+} (or) Fe^{3+} ? Explain
43. K_b for NH_4OH is 1.8×10^{-5} . Calculate the percentage ionization of 0.06 M ammonium hydroxide solution.
44. Identify A, B, & C. $C_6H_5MgBr \xrightarrow{CO_2} A \xrightarrow[H_2O]{H^+} B \xrightarrow[FeBr_3]{Br_2} C$
45. Phenol is treated with 20% nitric acid at room temperature gives a mixture of compound (A) and (B). In these compound (A) and (B), the compound (B) is more soluble in water than compound (A) why? Identify the compound A and B.
46. Establish the relation between solubility product & molar solubility for Ag_2CrO_4 , $Ca_3(PO_4)_2$
47. Ethanoic acid $\xrightarrow{SOCl_2} A \xrightarrow{Pd/BaSO_4} B \xrightarrow{NaOH} C$. Find A, B and C

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QUESTIONS FROM SECOND MID TERM

48. A conductivity cell has two platinum electrodes separately by a distance 1.5 cm and the cross sectional area of each electrode is 4.5 sq.cm. Using this cell, the resistance of 0.5 N electrolytic solution was measured as 15 Ω . Find the specific conductance of the solution.
49. A solution of silver nitrate is electrolysed for 20 minutes with a current of 2 amperes. Calculate the mass of silver deposited at the cathode (**REPEATED**).
50. Nitrobenzene does not undergo Friedel Crafts reaction. Give reason
51. What is chloropicrin? How is it prepared?
52. In the complex $[\text{Pt}(\text{NH}_3)_3\text{NO}_3]\text{Cl}$ identify the following
 a) Central metal atom/ion b) ligands c) Coordination Number d) IUPAC Name
53. Calculate pH of 0.1 M CH_3COOH Solution K_a for acetic acid is 1.8×10^{-3}
54. What is buffer index?
55. Write any two electrophilic substitution reactions of nitrobenzene.
56. Calculate the Standard emf of the $\text{Cd} | \text{Cd}^{2+} || \text{Cu}^{2+} | \text{Cu}$ and determine the cell reaction. The standard reduction potentials of $\text{Cu}^{2+} | \text{Cu}$ and $\text{Cd}^{2+} | \text{Cd}$ are 0.34 V and -0.40 V respectively. Predict the feasibility of the cell reaction.
57. Complete the following reaction
 a) $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow[4[\text{H}]]{\text{Zn}/\text{NH}_4\text{OH}} ?$
 b) $\text{CH}_3\text{NO}_2 + \text{Cl}_2 \xrightarrow{\text{NaOH}} ?$
 c) $\text{C}_6\text{H}_5\text{NH}_2 + \text{CS}_2 \xrightarrow{\Delta} \text{A} \xrightarrow{\text{Con.HCL}} \text{B}$
58. Addition of alum purifies water. Why?
59. $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$ – write down a) IUPAC Name b) oxidation number c) Ligands & its types
60. Is it possible to store copper sulphate in an iron vessel for a long time?
 Given $E^\circ_{(\text{Cu}^{2+}/\text{Cu})} = -0.34 \text{ V}$ $E^\circ_{(\text{Fe}^{2+}/\text{Fe})} = -0.44 \text{ V}$
61. What is the major product obtained when 2,3 – dimethyl pentane -3-ol is heated in the presence of H_2SO_4 ?
62. Write the expression for the solubility product of Hg_2Cl_2
63. Write about lithium ion battery

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QUESTIONS FROM HALF YEARLY EXAM

64. Distinguish nitro – acinitro form

65. $C_6H_5OH \xrightarrow{zn\ dust} A \xrightarrow[anhydrous\ AlCl_3]{CH_3Cl} B \xrightarrow{\Delta} C$. Identify A, B, C and name it.

66. Write a short note on Gomberg reaction (REPEATED)

67. Can Fe^{3+} oxidizes bromide to bromine under STP? Given $E^\circ_{Fe^{3+}/Fe^{2+}} = 0.771V$

$E^\circ_{Br_2/Br^-} = 1.09V$. Calculate the electrochemical equivalent of $AgNO_3$.

68. Why is AC current used instead of DC in measuring the electrolytic conduction?

69. Write the two isomers for CH_3NO_2 . How will you distinguish between them?

(Note: Refer Q.No: 64)

70. Calculate the extent of hydrolysis and the pH of 0.1 M ammonium acetate from given $K_a = K_b = 1.8 \times 10^{-8}$

71. A copper electrode is dipped in 0.1M Copper sulphate solution at 25° C. Calculate the electrode potential of copper. [Given: $E^\circ_{Cu^{2+}/Cu} = 0.34 V$]

72. Write short note on trans-esterification reaction.

73. Identify A and B in the following reaction



74. Write the structure of $\alpha - D(+)$ glucopyranose

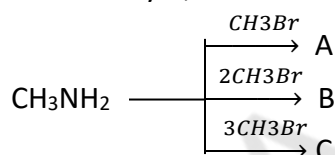
75. Give IUPAC Name for the following compounds

a) Hexamethylenediamine b) Crotonaldehyde c) Ethyl methyl isopropylamine d) adipic acid

76. Calculate the pH of 0.1M CH_3COOH . The dissociation constant of acetic acid is 1.8×10^{-4}

77. The rate constant for a first order reaction is $1.54 \times 10^{-3} S^{-1}$. Calculate its half life time.

78. Identify A, B and C



79. $CH_3COCl + H_2 \xrightarrow[BaSO_4]{Pd} A \xrightarrow{\Delta} B \xrightarrow{NaOH} C$. Identify A, B and C.

80. Consider the oxidation of nitric oxide to form NO_2 . $2NO + O_2 \longrightarrow 2NO_2$ at a particular instant, when $[O_2]$ is decreasing at $0.2 \text{ mol L}^{-1} S^{-1}$ at what rate is $[NO_2]$ increasing at that instant?

81. Find out the compounds A, B and C: $CH_3CONH_2 \xrightarrow{NaOH} A \xrightarrow{NaNO_2/HCl} B \xrightarrow{i) (O)mild\ ii) NH_2} C$

82. Distinguish between antiseptic and disinfectants

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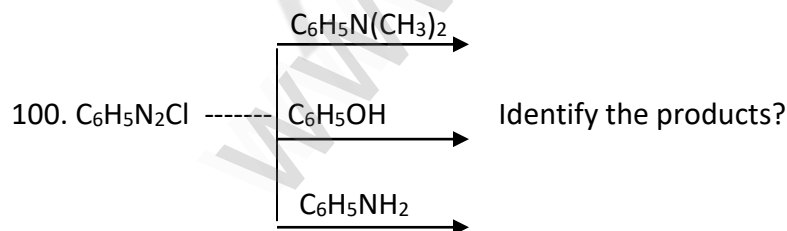
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QUESTIONS FROM REVISION EXAM

83. Identify A and B. Ethanoic acid $\xrightarrow{SOCl_2}$ A $\xrightarrow{Pd/BaSO_4}$ B (**Note: Refer Q.No: 47**)
84. Ionic conductance at infinite dilution of Al^{3+} and SO_4^{2-} are 189 and 160 mho cm^2 equiv⁻¹. Calculate the equivalent and molar conductance of the electrolyte $Al_2(SO_4)_3$ at infinite dilution.
85. **A** $\xrightarrow[4[H]]{Na-Hg/C_2H_5OH}$ $CH_3-CH_2-NH_2$, **B** $\xrightarrow[4[H]]{Na-Hg/C_2H_5OH}$ $CH_3-NH-CH_3$
86. Differentiate Primary, Secondary and Tertiary alcohols using Lucas Test
87. Draw the structure of zwitter ion
88. Ethylamine is soluble in water whereas aniline is not why?
89. Convert Ethene to Ethane 1, 2-diol
90. How will get P- hydroxyl azo benzene from Phenol? (**Coupling Reaction**)
91. Aniline does not undergo Friedel Craft reaction why? (**Note: Refer Q.No: 50**)
92. A first order reaction is 40% complete in 50 minutes. Calculate the value of the rate constant. In what time will the reaction be 80% complete?
93. How will you prepare Malachite green?
94. Ksp of AgCl is 1.8×10^{-10} . Calculate molar solubility in 1M $AgNO_3$
95. ZnO is colourless at room temperature and turns yellow on heating. Why? (**REPEATED**)
96. Find A, B, and C of the following reaction (**REPEATED**):
- $$C_6H_5OH \xrightarrow{NaOH} A + CO_2 \xrightarrow[4-7 \text{ bar}]{400 \text{ K}} B \xrightarrow{H^+/H_2O} C$$
97. The half life of the homogeneous gaseous reaction $SO_2Cl_2 \longrightarrow SO_2 + Cl_2$ which obeys first order kinetics is 8.0 minutes. How long will it take for the concentration of SO_2Cl_2 to be reduced to 1% of the initial value?
98. Identify the enzyme catalyst in the following reactions
a) Oxidation of ethanol into acetic acid b) Hydrolysis of starch into maltose c) Hydrolysis of urea
99. What are sugar substituents? Give examples.



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101. Calculate the molar conductance of 0.001 M aqueous KCl solution at 25°C. The specific conductance of KCl at 25°C is $14.114 \times 10^{-2} \text{ Sm}^{-1}$
102. Calculate the packing fraction in simple cubic unit cell
103. Write Sandmeyer reaction
104. Mention any three characteristics of catalyst?
105. Write IUPAC name a) $\text{CH}_3 - \underset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{CH}_3$ b) $\text{CH}_2 = \text{CH} - \text{CHO}$ c) $\text{HOOC} - (\text{CH}_2)_2 - \text{COOH}$
106. What are fat soluble vitamins?
107. Calculate the concentration of OH^- ion in a fruit juice, which contains $2 \times 10^{-3} \text{ M H}_3\text{O}^+$ ion. Identify the nature of solution.
108. How will you conduct the following changes?
 a) Acetone to Diacetone amine b) Formaldehyde to Hexamethylene tetramine
 c) Benzaldehyde to Hydro benzamide
109. Complete the following reaction: $\text{CH}_3\text{CHO} \xrightarrow{\text{NH}_2\text{OH}} \text{A} \xrightarrow{\text{P}_2\text{O}_5} \text{B}$
110. An organic compound (A) having molecular formula C_3H_8 is heated with zinc amalgam and hydrochloric acid produces compound (B) having molecular formula C_3H_8 . Identify A and B.
111. An organic compound (A) $\text{C}_3\text{H}_8\text{O}_3$ used as a sweetening agent which on oxidation with Fenton's reagent gives a mixture of compounds B and C. Identify A, B and C write possible reactions.
112. Identify A and B
- $$\text{C}_6\text{H}_5\text{-NO}_2 \begin{cases} \xrightarrow[6[\text{H}]]{\text{Sn/HCl}} > \text{A} \\ \xrightarrow[4[\text{H}]]{\text{Zn/HCl}} > \text{B} \end{cases}$$
113. Define equivalent conductance
114. An organic compound (A) $\text{C}_3\text{H}_9\text{N}$ treated with nitrous acid, gave an alcohol (B) and N_2 gas. (A) Undergoes carballyamine reaction to give (C) which on reduction gave isopropyl methylamine. Identify the compound (A), (B), (C) and write the reaction.
115. Identify the conjugate acid base pair for the following reaction in aqueous solution.
 a) $\text{HS} + \text{HF} \rightleftharpoons \text{F} + \text{H}_2\text{S}$ b) $\text{HPO}_4^{2-} + \text{SO}_3^{2-} \rightleftharpoons \text{PO}_4^{3-} + \text{HSO}_3^-$

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116. Calculate the magnetic moment and magnetic property of $[\text{Fe}(\text{CN})_6]^{3-}$
117. i) Arrange the following in the increasing order of their reactivity.
 CH_3CONH_2 , CH_3COCl , $(\text{CH}_3\text{CO})_2\text{O}$ and $\text{CH}_3\text{COOCH}_2\text{CH}_3$
- ii) Arrange the following in decreasing order of their acidity CH_3OH , C_2H_2 , CH_3COOH , H_2O
118. Draw the structure of trimethylamine and mention the following.
 i) Hybridisation of N atom. ii) C-N-C bond angle and C-N bond length
119. A copper electrode is dipped in 0.1 M copper sulphate solution at 25°C .
 Calculate the electrode potential of copper (Given $E^\circ_{(\text{Cu}^{2+}/\text{Cu})} = 0.34\text{V}$)
120. How will you prepare the following rubbers i) Buna- N ii) Buna - S
121. The activation energy of a reaction is $225 \text{ K.Cal mol}^{-1}$ and the value of rate constant at 40°C is $1.8 \times 10^{-5} \text{ S}^{-1}$. Calculate the frequency factor 'A'.
122. Give IUPAC names for the following compounds a) $\text{CH}_2=\text{CHCH}_2\text{NH}_2$ b) $\text{CH}_3\text{-NH-CH}(\text{CH}_3)_2$
123. Write the zwitter ion structure for alanine. **(Note: Refer Q.No:87)**
124. The K_a value for HCN is 10^{-9} . What is the pH of 0.4 M HCN Solution?
125. There is an only marginal difference in ionization enthalpy from Aluminium to Thallium. Explain why?
126. $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{Fe/HCl}} \text{A} \xrightarrow{\text{HNO}_2} \text{B} \xrightarrow{\text{C}_6\text{H}_5\text{OH}} \text{C}$. Identify A, B and C **(Note: Refer Q.No: 90, 100)**
127. An aromatic simplest nitro compound A on reduction using Sn/HCl gives B. B undergoes carbylamine reaction. Identify A and B.
128. 50ml of 0.05 M HNO_3 is added to 50ml of 0.025 M KOH. Calculate the pH of the resultant solution.
129. $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{Fe/HCl}} \text{A} \xrightarrow{\text{HNO}_2} \text{B} \xrightarrow{\text{H}_2\text{O}} \text{C}$ **(Note: Refer Q.No: 90, 100, 125)**

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QUESTIONS FROM PUBLIC EXAM

130. Give the schematic representation of proper and improper alignment of reactant for a general reaction. $A_2 + B_2 \longrightarrow 2AB$

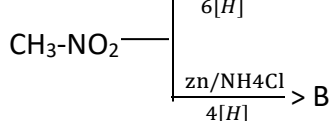
131. Write the IUPAC name of the following coordination compounds.

i) $Na_2[Ni(EDTA)]$ ii) $[Co(en)_3]_2(SO_4)_3$ iii) $[Pt(NH_3)_2Cl.NO_2]$

132. Why is C-O-C bond angle is either slightly greater than the tetrahedral bond angle?

133. Write a note on denaturation of proteins

134. $CH_3-NO_2 \xrightarrow[6[H]]{Sn/HCl} A$ Identify A and B



135. Classify the following into covalent, molecular, ionic and metallic solids

i) Diamond ii) Brass iii) NaCl iv) Naphthalene v) Glucose vi) SiO_2

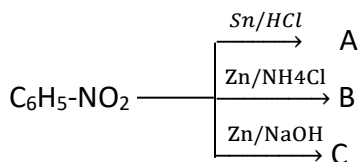
136. Write a note on HVZ reaction.

137. Calculate the pH of 0.01M HCl

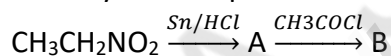
138. Identify A and B in the following sequences of reactions. $CH_3Br \xrightarrow{NaN_3} A \xrightarrow{LiAlH_4} B + N_2$

139. Write the following for the complex $[Ag(NH_3)_2]^+$. a) Ligand b) CMA c) IUPAC Name

140. Identify compound A, B and C for the following



141. Identify the compounds A and B in the following sequence of reactants:



142. Calculate the concentration of OH^- ion in a fruit juice which contains $2 \times 10^{-3} M H_3O^+$ ion. Identify the nature of the solution.

143. Explain the mechanism of Cannizaro reaction.

144. The reaction $Zn + Co^{2+} \rightleftharpoons Co + Zn^{2+}$ occurs in a cell. Compute the standard emf of the cell.

Given that $E^\circ_{Zn/Zn^{2+}} = +0.76V$ and $E^\circ_{Co/Co^{2+}} = +0.28V$

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145. Derive Arrhenius equation to calculate activation energy from the rate constant K_1 & K_2 at temperature T_1 & T_2
146. An organic compound (A) – $C_3H_8O_3$ used as a sweetening agent which on oxidation with Fenton's reagent gives a mixture of compound B and C. Identify A, B and C. Write possible reactions.
147. What are food preservatives?
148. An organic compound CNCl react with CH_3MgBr to give compound B- (C_2H_3N) . Upon catalytic reduction to give Compound C (C_2H_7N). C gives Carbylamine test. Identify compound A,B and C and write the reactions.
149. An organic compound C_3H_5Br (A) on treatment with Mg in dry ether gives (B) which on treatment with CO_2 followed by acidification gives (C). Identify (A), (B), (C) and write possible reaction.
150. Identify compounds A, B, C in the following sequence of reaction.
- $$CH_3CH_2NC \xrightarrow{HgO} A \xrightarrow{H_2O} B \xrightarrow{NaNO_2/HCl} C$$
151. $C_8H_4O_3 \xrightarrow{NH_3/\Delta} A \xrightarrow[i) B]{i) KOH} C \xrightarrow{H_3O^+} D + CH_3-\underset{\substack{| \\ CH_3}}{CH}-NH_2$. Identify A, B, C and D
152. A solution of 0.10 M of a weak electrolyte is found to be dissociated to the extent of 1.20% at $25^\circ C$. Find the dissociation constant of the acid.
153. Aluminium Crystallizes in cubic close packed structure. Its metallic radius is 125pm. Calculate the Edge length of the unit cell.
154. Complete the reaction $P_4 + NaOH + H_2O \rightarrow$
155. The equivalent conductance of M/36 solution of weak monobasic acid is $6 \text{ mho cm}^2 \text{ equiv}^{-1}$ at infinite dilution is $400 \text{ mho cm}^2 \text{ equiv}^{-1}$. Calculate the dissociation constant of this acid.

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