I–TERM EXAMINATION : 2021–22

CLASS : XII (ISC)

Time : 3 hrs. **Chemistry Paper-1 (Theory)** M.M.: 70

Instructions :

Candidates are allowed additional 15 minutes for only reading the paper. They must NOT start writing during this time.
All questions are compulsory.
Question 1 is of 20 marks having four subparts, all of which are compulsory.
Question 2 to 8 carry 2 marks each with two questions having Internal choice.
Question 9 to 15 carry 3 marks each, with any two questions having Internal choice.
Questions 16 to 18 carry 5 marks each, with an internal choice.
When solving numericals, All essential working must be shown. In working out problems, use the following data R = 1.987 Cal deg^{-1} mol^{-1} = 0.0821 lt atm K^{-1} mol^{-1} = 8.314 JK^{-1} mol^{-1}

Q.1. (a) Fill in the blanks by choosing the appropriate word from those given in the brackets [4×1]

(Above, below, d^2sp^3 , sp^3d^2 , dsp^2 , sp^3 , at, Raoult's , Henery's, form, donot form, more, less, same, Vant Hoff's)

(i) The acidic strength of phenol is ____ than ethanol but ____ than nitrophenol.
(ii) Ideal solution obeys ____ Law and they ____ azeotropic mixture.
(iii) Hybridization of Co in $[Co(NH_3)_6]^{3+}$ is ____ white in $[CoC\ell_6]^3$ is ____
(iv) An aqueous solution of glucose freezes ____ 0°C and boils ____ 100°C.

(b) Choose the correct alternative: [4×1]

(i) Maximum freezing point is shown by
(a) 5% urea solution (b) 5% glucose solution
(c) 5% sucrose solution (d) 5% ethylene glycol solution

(ii) Which among the following reacts fastest by SN^1 reaction :
(a) $(CH_3)_3$ C–Br (b) $(CH_3)_2$CH-Br (c) CH_3-CH_2 Br (d) $C_6H_5CH_2Br$

(iii) The numbers of unpaired electron in $[Fe(CN)_6]^{3-}$ complex is :
(a) 5 (b) 1 (c) 2 (d) 0

(iv) Which of the following is paramagnetic :
(a) $[Fe(CN)_6]^{4-}$ (b) $[Ni(CO)_4]$ (c) $[Ni(CN)_4]^{2-}$ (d) $[CoF_6]^{3-}$

(c) Match the following: [4×1]

a)	Raoult's Law	i)	Ethanol
b)	Henery's Law	ii)	Benzoic acid
c)	Iodoform Test	iii)	Solubility of gas in liquid
d)	Abnormal molecular mass	iv)	Relative lowereng in vapour pressure

(d) Answer the following questions : [4×2]

(i) Chlorobenzene is less reactive then chloromethane in nucleophitic substitution reaction.
(ii) Draw geometrical isomers of $[Co(en)_2C\ell_2]^+$
(iii) (a) Define Raoult's Law
(b) Boiling point of 1 M glucose solution is 100.5°C what will be boiling point of 1 M NaCℓ solution.
(iv) Write balanced equation for following named reaction :
(a) Sandmayer's reaction (b) Willamson's syntheses

Q.2. (a) Vapour pressure of water is 12.3 kpa at 300 k calculate vapour pressure of 1 molal solution of a non volatile solute. [2]

OR

(b) Calculate osmotic pressure of 6% urea solution at 27°C.

Q.3. Write the formula of the following compounds :
(i) Triamminetriaqua chromium (III) chloride [2]
(ii) Potassium hexacyanidoferrate (III)

Q.4. Complete and balance the following equation : [2]
(i) $KMnO_4 + H_2SO_4 + H_2C_2O_4 \longrightarrow$ (ii) $K_2Cr_2O_7 + H_2SO_4 + KI \longrightarrow$

Q.5. Write balanced equation of following reaction : [2]
(a) Chlorobenzene is treated with sodium in presence of dry ether.
(b) Chloroform is exposed to air in presence of sunlight.

Q.6. Arrange the following as directed : [2]
(i) Bromomethane, bromoform, chloromethane, dibromomethane (Increasing order of boiling point)
(ii) RCH_2OH, $R_2CH\text{-}OH$, R_3COH (Increasing order of acidic character)

Q.7. (a) Give balanced equation for the following conversion : [2]
(i) Chlorobenzene to phenol (ii) Propene to propan-1-ol

OR

(b) Complete the following reaction :

(i) $CH_3CH_2Br + NaI \xrightarrow[\text{reflux}]{\text{Acetone}} \text{———} + \text{———}$

(ii) $CH_3\text{–}CH_2\text{–}\underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}}\text{=}CH_2 + HBr \xrightarrow{\text{Peroxide}}$

Q.8. Find out type of isomerism in the following pair of compounds/ions : [2]
(i) $[Fe(H_2O)_5 C\ell]SO_4$, $[Fe(H_2O)_5 SO_4]C\ell$
(ii) $[Co(NH_3)_5 CN]C\ell_2$, $[Co(NH_3)_5 NC]C\ell_2$

Q.9. Calculate the amount of $KC\ell$ which must be added to 500 gm of water to lower its freezing point by 2 k assuming $KC\ell$ is completely dissociated. (K_f for H_2O= 1.86 K kg mol^{-1}) . [3]

OR

Calculate the boiling point of an aqueous solution of non volatile solute which freezes at - 0.2°C. Also calculate molality of solution and lowering in vapour pressure at 298 K. Give that K_f=1.86 K kg. mol^{-1} K_b=0.512 K kg mol^{-1}, vapour pressure of water at 298 K is 23.756 mm.

Q.10. Write IUPAC name of following compound/ion : [3]
(i) $[Cr(H_2O)C\ell(en)_2]^{++}$ (ii) $K_2[Zn(OH)_4]$ (iii) $[Co(NH_3)_6][CrC\ell_6]$

Q.11. Complete the following equation and write name of reaction : [3]

(i) $C_6H_5C\ell + CH_3C\ell + Na \xrightarrow[\text{Ether}]{\text{dry}}$

(ii) $CH_3CH_2OH + I_2 + NaOH \longrightarrow \text{———} + \text{———} + \text{———} + \text{———}$

Q.12. Give reason why ? [3]
(i) Solubility of gas in aqueous solution decreases with rise in temperature. why?
(iii) $[Fe(CN)_6]^{4-}$ is diamagnetic but $[FeC\ell_6]^{4-}$ is paramagnetic why?
(iii) Alkyl halids are polar but insoluble in water why ?

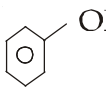
Q.13. Write following named reaction (balanced equation): [3]
(i) Reimer-Tiemann reaction (ii) Wurtz-fittig reaction
(iii) Esterification

OR

Identify A, B in following reactions :

(i) $CH_3CH_2\text{-}Cl \xrightarrow[Alc]{KCN} A \xrightarrow[(dil.HCl)]{H_2o/H^+} B$

(ii) $CH_3CH_2 - Cl \xrightarrow{Aq.KOH} A \xrightarrow[573\ K]{Cu} B$

(iii)  $\xrightarrow{NaOH} A \xrightarrow{CH_3Br} B$

Q.14. A 1.2% solution of NaCl is isotonic with 7.2% solution of glucose. Calculate Vant Hoff factor and degree of dissociation of NaCℓ. [3]

Q.15. Answer the following : [3]

(i) Phenol is more acidic than ethanol why?

(ii) A mixture of ethanol and cyclohexane shows positive deviation from Raoult's LawWhy?

(iii) What is Azeotropic mixture?

Q.16. (a) (i) The freezing point of a solution containing 0.2 g of Acetic acid in 20 gm benzene is lowered by 0.45°C. Calculate Vant Hoff factor, degree of association and abnormal molecular mass of acetic acid. (K_f for Benzene=4.9 K kg mol^{-1}) [5]

ii) Vapour pressure of pure benzene and toluene is 160 mm Hg and 60 mm Hg respectively. Calculate the total pressure of solution and mole fraction of each in vapour state. If in solution 1 mole benzene is mixed with 4 mole toluene

OR

(b) (i) 10 gm glucose and 10 gm of sucrose are dissolved in 1 lit aqueous solution at 298 K. Calculate osmotic pressure of solution.

(ii) Vapour pressure of an aqueous solution of urea is 732 mm at 100 °C. What is B.P. of this solution K_b for water = 0.52 K kg mol^{-1}.

Q.17. (a) (i) On the basis of valence bond theory find out hybridisation, shape, magnetic behaviour oxidation state of central metal ion, and IUPAC name of $[Fe(H_2O)_6]^{3+}$ [5]

(ii) Draw optical isomers of $[PtC\ell_2(en)_2]^+$

OR

(b) (i) Give one example of coordiantion compound used in :

(1) Medicinal field (2) Extraction of metal

(ii) Draw crystal field diagram and crystal field configuration of $[FeC\ell_6]^{4-}$

Q.18. (a) (i) Do the following conversion : [5]

(1) Phenol to benzene (2) Phenol to picric acid

(3) Benzene diazonium chloride to fluorobenzene

(ii) Give one chemical test to distinguish between :

(1) Ethanol and phenol (2) 1-propanol and 2-propanol

OR

(b) (i) Give balanced equation when :

(1) Phenol is treated with bromine water

(2) Diethylether is treated with $C\ell_2$ in pressure of sunlight.

(3) Chloroform is heated with silver powder.

(ii) Identify A, B, C, D :

$$CH_3 - CH = CH_2 + H_2O \xrightarrow{H^+} A \xrightarrow{PCl_5} B$$

$$Cu \downarrow 573K$$

$$C$$

$$^{(2)}H_2O/H^+ \downarrow {}^{(1)}\ CH_3MgBr$$

$$D$$

#####