Pre ISC Examination 2017-2018

Std. : XII
Subject : CHEMISTRY

Full Marks : 70
Time : 3hrs.+15min.

[Question 1 is of 20 marks and all questions are compulsory. Question 2 to 8 carry 2 marks with two questions having internal choices. Question 9 to 15 carry 3 marks each with two questions having internal choices. Question 16 to 18 carry 5 marks each and each questions have internal choices]

Part - I [20 marks]

Q1) (a) Fill in the blanks by choosing the appropriate word/words from those given in the bracket :- [4]

[decreases, more, diamagnetic, increases, less, antipyretics, square planar, broad spectrum antibiotic, octahedral, transquilizer, paramagnetic]

(i) The molar conductance of a solution _______ with dilution while its specific conductance _______ with dilution.

(ii) Van't Hoff factor of acetic acid solution is _______ than one and the value of normal colligative properties are _______ than observed colligative properties.

(iii) Aspirin acts as _______ and chloramphenicol is a _______.

(iv) The geometry of complex ion $[Ni(CN)_6]^{2-}$ [Ni=28] is _______ and it shows _______ behaviour.

(b) Complete the following sentences by selecting the correct alternatives from the choices given :— [4]

(i) In a plot of K vs 1/T, the slope is :

(a) — Ea / 2.303 (b) Ea / 2.303 R (c) — Ea / 2.303 R

(d) Ea / 2.303

(ii) Which of the following is correct about H-bonding in nucleotide ?

a) A—T, G—C (b) A—G, T—C (c) G—T, A—C (d) A—A, T—T

(iii) When 2 hydroxy benzoic acid is distilled with zinc dust, it gives :

(a) phenol (b) benzoic acid (c) benzaldehyde

(d) A polymeric compound.

(iv) In rock salt structure each Cl^- ion is surrounded by :

(a) 4 Na^+ions (b) 6 Na^+ions (c) 8Na^+ions (d) 12Na^+ions

(c) Match the following :— [4]

(i)	Electrophoresis	(a)	Sc^{+3}
(ii)	Sweetening agent	(b)	Bakelite
(iii)	Colourless	(c)	Saccharine
(iv)	Thermosetting polymer	(d)	Coagulation

[4x2=8]

(d) Answer the following questions :—

(i) Can you store copper sulphate in zinc pot ? Justify your answer. [E^{o} Cu^{2+}/Cu = 0.34, V, $E^{o}_{Zn2+/Zn}$ = — $0^{o}.76$ V]

(ii) KCN gives cyanides as major products on treatment with alkyl halides but AgCN gives isocyanides as major product. Explain.

(iii) Zn^{2+} salts are white but Cu^{2+} salts are blue in colour — explain. [Cu = 29, Zn = 30]

(iv) Draw the structure of $XeOF_2$. State the oxidation state and hybridisation of xenon.

Part - II

Q2) The freezing point of a solution containing 0.2 gm of acctic acid in 20.0g of benzene is lowered by $0.45^{o}C$. Calculate the degree of association of acetic acid in benzene. [Kf for benzene is = 5.12 K $gmmol.^{-1}$]

OR

What is the mass of non volatile solute (molar mass 60) that needs to be dissolved in 100g of water is order to decrease the vapour pressure of water by 25% ? What will be the molality of the solution?

3) The rate constant of a reaction is $1.5 \times 10^{7} s^{-1}$ at $50^{o}C$ and $4.5 \times 10^{7} s^{-1}$ at $100^{o}C$. Evaluate Arrhenius parameters A and Ea. [R = 1.987 Cal K^{-1} mol^{-1}].

4) Why do transition metals have higher enthalpies of atomisation ? In 3d series (SC to Zn), which element has the lowest enthalpy of atomisation and why ?

5) What type of structural isomers are $[Co(NH_3)_5(NO_3)]SO_4$ and $[C_O(NH_3)_5SO_4]NO_3$? Give a chemical test to distinguish between the two isomers.

OR

Write IUPAC names of the following compounds :—

(i) $[Pt(NH_3)_4Cl_2][PtCl_4]$

(ii) $[Cr(en)_2(H_2O)(ONO)]Cl_2$

6) Account for the following :

(i) The two O–O bond length in ozone molecule are equal.

(ii) Transition elements form complex compounds.

7) (i) Differentiate between antiseptic and disinfectant.

(ii) What may be added to soaps to improve its antiseptic action ?

8) (a) Write the mechanism of acid dehydration of ethanol to yield ethane.

(b) Convert aniline to chlorobenzene.

9) Write balanced chemical equations for the following reactions :—

a) Preparation of chlorine gas from sodium chloride, manganese dioxide and concentrated sulphuric acid.

b) Acidified potassium permanganate reacts with oxalic acid.

c) Acidified potassium dichromate reacts with KI solution.

OR

a) Zr (Z = 40) and Hf (Z = 72) have almost identical radii — explain.

b) How is silver extracted from its ore ? Explain the process with relevant equations.

10) a) The resistance of 0.01 M NaCl solution in a conductivity cell was found to be 210Ω. The equivalent conductances of this solution is $4.5 \times 10^{-3}\ \Omega^{-1}\ cm^2\ eq^{-1}$. What is the cell constant of the cell ?

b) Write the cell reaction for the cell represented by $Cd\ /\ Cd^{2+}_{(.1M)}\ //\ Ag^{+}_{(.2M)}\ /\ Ag$

11) Arrange the following in increasing order of osmotic pressure and give reasons in support of your answer.

(i) 34.2g / L of sucrose (MW = 342)

(ii) 90 g/L of glucose (MW = 180)

(iii) 5.85 g/L of NaCl (MW = 58.5)

b) Rate law for the reaction RCl + NaOH —> ROH + NaCl where rate = K [RCl].

What happens to the rate when concentration of (i) RCl and (ii) NaOH is doubled separately?

12) a) How many unit cells are there in a 1g cubic crystal of NaCl. NaCl crystallises in a face-centred crystal structure and molar mass of NaCl = 58.5.

b) What is peptization ?

13) Distinguish between the following compounds by a suitable chemical test :

a) Ethanol and 2 - methyl propanol.

b) Aniline and ethyl amine.

c) Formic acid and benzonic acid.

14) How will you convert :

a) Acetic acid to methayl cyanide.

b) Benzoic acid to phenol.

OR

a) Benzoic acid to aniline.

b) Methyl amine to methyl iodide.

15) Identify A to F.

a) $CH_3-\underset{\displaystyle |}{\overset{\displaystyle CH_3}{\overset{|}{C}H}}-CONH_2 \xrightarrow{Br_2 + NaOH} A \xrightarrow{HNO_2} B$

b) $C_6H_5NO_2 \xrightarrow{Br_2\ /\ Fe3^+} C \xrightarrow{Sn + HCl} D$

c) $CH_3CN \xrightarrow[H^+]{H_2O} E \xrightarrow{LiAlH_4} F$

16) a) Write balanced equations for the following named reactions :—

(i) Sandmeyer's reaction

(ii) Cannizzaro reaction

(iii) Kolbe's reaction

b) Explain : Aldehydes are more reactive than ketones in nucleophilic reactions.

(c) Arrange the following compounds in increasing order of basicity in aqueous medium : CH_3NH_2, $(CH_3)_2NH$, $C_6H_5NH_2$, $(CH_3)_3N$

OR

a) Write balanced equations for the following reactions :—

i) Benzonic acid is treated with concentrated nitric acid and concentrated sulphuric acid.

ii) Benzaldehyde is reacted with potassium cyanide.

iii) Treatment of phenol with chloroform in presence of aqueous alkali at 340 K.

b) Arrange the following compounds in increasing order of acidic strength : Phenol, chloroacetic acid, ethanol and acetic acid.

c) Write the monomers of :

(i) Buna — N (ii) Teflon.

17) a) Calculate the value of E_{cell} at 298 K for the following cell :

$Al\ /\ Al^{3+}\ (0.01M)\ //\ Sn^{2+}\ (0.015M)\ /\ Sn.$

$E^o_{Al3+/Al} = -1.66$ V and $E^o_{sn2+/sn} = -0.14$ volt.

b) If a current of 0.5 ampere flows through metallic wire for two hours, then how many electrons flow through the wire ?

OR

a) From the following conductivities at infinite dilution, calculate $\wedge^o_m$ for NH_4OH

$\wedge^o_m$ for Ba $(OH)_2 = 457.6\ \Omega^{-1}\ cm^2\ mol^{-1}$

$\wedge^{o}_{m}$ for Ba Cl_2 = 240 . 6 Ω^{-1} cm^2 mol^{-1}

$\wedge^{o}_{m}$ for NH_4Cl = 129.8 Ω^{-1} cm^2 mol^{-1}

b) Zinc displaces hydrogen from acid solution — explain.

[$E^{O}_{Zn2+/zn}$ = — 0.76 V]

c) If the Faraday were to be 60230 coulomb instead of 96500 coulomb what will be the charge of an electron ?

18) a) Draw the structure of permanganate ion.

b) Write balanced equations for the following reactions :—

(i) Phosphorus is treated with sulphuric acid.

(ii) Chlorine reacts with cold dilute sodium hydroxide.

(iii) Preparation of phosphine (PH_3) from phosphorus.

c) Name the type of isomerism shown by the following complex is :

(i) $[Co (NH_3)_5 NO_2] Cl_2$ and $[Co (NH_3)_5 ONO]Cl_2$

(ii) $[Cr (H_2O)_5 Cl_2] Cl_2 . H_2O$ and $[Cr (H_2O)_4 Cl_2] Cl. 2H_2O$.

<u>OR</u>

a) Draw the optical isomers of the complex ion $[Co(en)_2Cl_2]^+$.

b) Account for the following :—

(i) Transition metals and their compounds are widely used as calalyst.

(ii) NH_3 is basic but BiH_3 is only feebly basic.

(iii) Chlorine water has both oxidising and bleaching action.

c) Give an equation to show how zinc oxide is converted to zinc is extraction process.