APEEJAY SCHOOL, PITAMPURA

1ST TERMINAL EXAMINATION (2016-17)

Class XII **M.M : 70**

SUBJECT-CHEMISTRY **TIME : 3HRS**

Note : This paper carries 26 Questions printed on five pages

GENERAL INSTRUCTIONS :

- All questions are compulsory.
- Marks for each question are indicated against it.
- Q.No. 1 to 5 are very short answer questions, each of one mark. Answer these in one sentence each.
- Q.No. 6 to 10 are short answer questions of two marks each. Answer these in about 30 words each.
- Q.No. 11 to 22 are short answer questions of three marks each. Answer these in about 40 words each.
- Q.No. 23 is a value based question of 4 marks
- Q.No. 24 to 26 are long answer questions of five marks each. Answer these in about 70 words each.
- Use log tables if necessary. Calculators are not permitted.

Q.1 What type of coordination is possible in a crystal if the involved radius ratio is in the range of 0.73-1.00? Also give its co-ordination number. (1)

Q. 2 What is meant by critical micelle concentration? (1)

Q. 3 Give the equation for Finkelstein's reaction . (1)

Q. 4 What do you mean by ionisation isomerism? Give an example. (1)

Q. 5 What are the units of rate constant for a second order reaction. (1)

Q. 6 Differentiate between intrinsic and extrinsic semi-conductors ? Also give examples. (2)

Q. 7 Explain as to how the elevation in boiling point is a colligative property. (2)

Q. 8 Explain the role of the following in the extraction of metals from their ores: (2)

i) CO in the extraction of Ni

ii) Silica in the extraction of Cu.

Q. 9 The following chemical reaction is occurring in an electrochemical cell (2)

$Mg(s) + 2Ag^{+}(0.0001\ M) \longrightarrow Mg^{2+}(0.10M) + 2Ag(s)$

E^{o} electrode values are

$Mg^{2+} / Mg = -2.36V$
$Ag^{+} / Ag = 0.81V$

For this cell calculate/write :
a) i) E^{o} value for $2Ag^{+} / 2Ag$
ii) Standard cell potential E^{o}_{cell}

b) Cell potential E_{cell}

Q. 10 A metal ion M^{n+} having d^4 valence electron configuration combines with with three didentate ligands to form a complex compound. Assuming $\Delta_0 > P$ (2)
i) Draw the diagram showing d –orbital splitting during this complex formation.
ii) Write the electron configuration of the valence electrons of M^{n+} ion in terms of t_{2g} and e_g.
iii) What type of hybridization will M^{n+} have?
iv) Name the type of isomerism exhibited by this complex.

Q. 11 Explain the terms with suitable examples. (3)

i) Alcosol

ii) Aerosol

iii) Hydrosol

Q. 12 An element (atomic mass = 60) having face centred cubic structure has a cell edge of 400pm. What is its density? [$N_A = 6.023 \times 10^{23}$] (3)

Q. 13 A first order reaction has a rate constant $1.15 \times 10^{-3}\ s^{-1}$. (3)
i)How long will 5g of this reactant take to reduce to 3g?

ii) What is half life period?

Q. 14 Name the principal ore of Aluminium. Explain the significance of leaching in the extraction of Aluminium. (3)

Q. 15 Draw the structure of the following molecules and also give equation for their formation (3)

i) N_2O_4

ii) XeO_3

Q. 16 Heptane and octane form an ideal solution at 373K. The vapour pressures of the pure liquids at this temperature are 105.2 kPa respectively. If the solution contains 25g of Heptane and 28.5 g of octane, calculate : (3)

a) vapour pressure exerted by heptane
b) vapour pressure exerted by solution
c) mole fraction of octane in the vapour phase

Q. 17 Account for the following observations : (3)

i) among the halogens F_2 is the strongest oxidizing agent
ii) fluorine exhibits only -1 oxidation state whereas the other halogens exhibit higher positive oxidation states also
iii) acidity of oxo acid of chlorine is
$HOCl < HOClO < HOClO_2 < HOClO_3$

Q. 18 (3)

i) Define molal cryoscopic constant.

ii) Calculate the freezing point (in deg C) of a solution containing 0.1 g of $K_3[Fe(CN)_6]$ (molar mass: 329g/mol) in 100g of water(Kf= 1.86 $Kkgmol^{-1}$)

Q. 19 a) What is corrosion? Describe the electrochemical phenomenon of rusting of iron. (3)
b) Conductivity of 0.00241 M acetic acid is 7.896×10^{-5} S cm^{-1}. Calculate its molar conductivity . If Λ^o_m for acetic acid 390.5 $Scm^2\ mol^{-1}$, what is its dissociation constant?

Q. 20 Explain (3)
i) $S_N1$mechanism for the reactivity of haloalkanes.
ii) Haloarenes prefer to undergo electrophilic substitution instead of nucleophilic substitution reactions.

Q. 21 a) Show that the time required for 99 % completion of a reaction is twice the time required to complete 90% of the reaction. (3)

b) A first order reaction takes 40 min for 30% decomposition. Calculate its half life period.

Q. 22 How are colloids classified on the basis of their affinity of phases? Explain. (3)

OR

Define :Coagulation, peptization and electrodialysis

Q. 23 i) Which of the following two compounds would react faster by S_N2 pathway: (4)

1- bromobutane or 2-bromobutane and why?

ii) Allyl chloride is more reactive than n-propyl chloride towards nucleophilic substitution reaction. Explain why.

iii) Haloalkanes react with KCN to give alkyl cyanide as main product while with AgCN they form isocyanide as main product.Give reason.

Q. 24 A. Which has a higher boiling point and why? (5)

i) 1-Chloropentane or 2- Chloro-2-methylbutane.

ii) p-Nitrochlorobenzene undergoes nucleophilic substitution faster than chlorobenzene. Explain giving resonating structures as well.

B. Carry out the following conversions :

i) Isopropyl alcohol to iodoform

ii) 2-Bromopropane to 1-bromopropane

OR

A.i) Give two examples of molecules which contain chiral centres but possess achiral structure.

ii) What is meant by racemic mixture?

iii) Whart are meso compounds?

B. i)What is a beta-elimination reaction?

ii) Explain Wurtz's reaction.

Q. 25 A. An element 'A' exists as a yellow solid in standard state. It forms a volatile hydride 'B' which is foul smelling gas and is extensively used in qualitative analysis of salts .When treated with oxygen, 'B' forms an oxide 'C' which is a colourless pungent smelling gas.The gas is passed through acidified $KMnO_4$ solution, decolourises it, 'C' gets oxidized to another oxide 'D' in the presence of a (5)

heterogeneous catalyst .Identify A,B,C,D and also give the chemical equation of C with acidified $KMnO_4$ solution and for conversion of C to D.

B.Account for the following:
i)Iron on reaction with HCl forms a dichloride and not a trichloride.
ii)H_3PO_2 is a stronger reducing agent than H_3PO_3.

OR

A. Complete the following chemical equations:
i) $P_4 + SOCl_2 \rightarrow$
ii) $XeF_4 + H_2O \rightarrow$
iii) $Cl_2(g) + NaOH(hot\ and\ conc) \rightarrow$

B.Give the reason for the following :

i) Dinitrogen is a gas but phosphorus is a solid.
ii) Bond angle decreases from H_2O to H_2Te

Q. 26 A. Write the Nernst equation and calculate the emf of the following cells at 298 K. (5)
i) $Fe(s) / Fe^{2+}(0.001M) // H^+(1\ M) / H_2(g)(1\ bar) / Pt(s)$
ii) $Sn(s) / Sn^{2+}(0.05\ M) // H^+(0.02M) / H_2(g)(1\ bar) / Pt(s)$
Standard Electrode reduction potential for Fe is -0.44 V and that of Sn is -0.14 V

*B.*Draw a well labeled diagram for lead storage battery.

OR

i) Explain the fuel cell with the help of a diagram. How is it better than the galvanic cell ?
ii) Give the overall cell equation for mercury cell and Ni-Cd cell.