ANANDALAYA
Pre- Board Examination 1
Class : XII

Subject: CHEMISTRY   M.M: 70
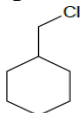Date   : 24/11/ 2015   Time: 3 Hour

General Instructions:
1. All questions are compulsory.
2. Q. No. 1 to 5 are very short answer questions and carry 1 mark each.
3. Q. No. 6 to 10 are short answer questions and carry 2 marks each.
4. Q. No. 11 to 22 are short answer questions and carry 3 marks each.
5. Q. No. 23 is a value based question and carry 4 marks.
6. Q. No. 24 to 26 are long answer questions and carry 5 marks each.
7. Use log tables, if necessary. Use of calculator is not allowed.

1 Which of the following is the most effective electrolyte in the coagulation of AgI/Ag^+ sol? K_2SO_4,   1
   $MgCl_2$, $K_4[Fe(CN)_6]$

2 Give the formula of a noble gas species which is isostructural with IBr_2^- 1

3 What is the effect of synergic bonding interactions in a metal carbonyl complex?   1

4 PCl_5 acts as an oxidizing agent. Justify.   1

5 Write the name of the product formed when benzenediazonium chloride solution is treated with   1
   potassium iodide.

6 Name the crystal defect which reduces the density of an ionic solid? What type of ionic substances   2
   show this defect?

7 The molar conductivity of a 1.5 M solution of an electrolyte is found to be 138.9 S cm^2 mol^{-1}.   2
   Calculate the conductivity of this solution.

8 Aluminum crystallizes in fcc structure. Atomic radius of the metal is 125 pm. What is the length of   2
   the side of the unit cell of the metal?

9 Draw the structure of the following compounds: 2
   (i) $H_2S_2O_7$ (ii) $XeOF_4$
                                            OR
   Write balanced chemical equations for the following:
      (i) Reaction of chlorine with hot and concentrated NaOH.
      (ii) Sulphur dioxide is passed through an aqueous solution of Fe (III) salt.

10 0.5 g of KCl was dissolved in 100 g of water and the solution originally at 20^0C, froze at   2
    -0.24^0C. Calculate the percentage dissociation of the salt. (Given :Kf for water = 1.86 K kg /mol,
    Atomic mass: K = 39 u, Cl= 35.5 u)

11 State briefly the principles involved in the following operations in metallurgy. Give an example. (i) Hydraulic washing. (ii) Zone refining.   3

12 (i) What type of deviation from Raoult's law is observed, when two volatile liquids A and B on mixing produces a warm solution? Explain with the help of a well labeled vapour pressure graph.
    ii) Consider separate solutions of 0.5 M CH_3OH, 0.250 M KCl (aq) and 0.125 M Na_3PO_4 (aq). Arrange the above solutions in the increasing order of their Van't Hoff factor.

13 Write the Nernst equation and calculate the emf for the following cell at 298 K:
    Mg(s) / Mg^{2+} (0.001 M) // Cu^{2+} (0.0001 M) / Cu(s). How does **Ecell** vary with the concentration of both Mg^{2+} and Cu^{2+} ions?(Given **E$_o$ cell**= 2.71 V)

14 Explain the following observations giving appropriate reasons:
    (i) Ozone is thermodynamically unstable with respect to oxygen. .
    (ii) The HEH bond angle of the hydrides of group 15 elements decrease as we move down the group.
    (iii) Bleaching effect of chlorine is permanent.

15 (i) Predict the number of unpaired electrons in the tetrahedral $[MnBr_4]^{2-}$ ion.
    (ii) Draw structures of geometrical isomers of $[Co(NH_3)_4Cl_2]+$.
    (iii) Write the formula for the following coordinate compound: Amminebromidochloridonitrito-N-platinate(II)

16 Explain what is observed when
    (i) Silver nitrate solution is added to potassium iodide solution.
    (ii) The size of the finest gold sol particles increases in the gold sol.
    (iii) Two oppositely charged sols are mixed in almost equal proportions.

17 (i) In the following pairs of halogen compounds, which would undergo SN1 reaction faster? Explain.
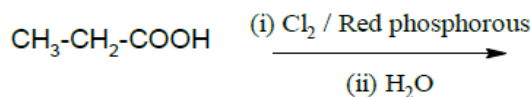

    (ii) Amongst the isomeric dihalobenzenes which isomer has the highest melting point and why?
    (iii) Arrange the following haloalkanes in the increasing order of density. Justify your answer. CCl_4, CH_2Cl_2 and $CHCl_3$.

18 An organic compound (A) has characteristic odour. On treatment with NaOH, it forms compounds (B) and (C). Compound (B) has molecular formula C_7H_8O which on oxidation gives back (A). The compound (C) is a sodium salt of an acid. When (C) is treated with soda-lime, it yields an aromatic compound (D). Deduce the structures of (A), (B), (C) and (D). Write the sequence of reactions involved.

19 (a) Give one chemical test to distinguish between the following pairs of compounds:
    (i) Methylamine and dimethylamine.
    (ii) Aniline and benzylamine
    (b) Write the structures of different isomers corresponding to the molecular formula C3H9N, which will liberate nitrogen gas on treatment with nitrous acid

20   Exemplify the following reactions:
(i) Rosenmund reduction reaction.
(ii) Kolbe electrolysis reaction.
(b) Arrange the following compounds in increasing order of their reactivity towards HCN:
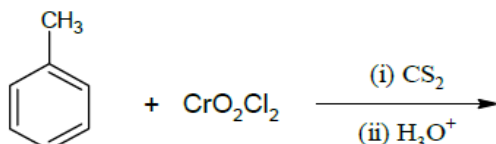Acetaldehyde, Acetone, Di-tert-butyl ketone.

OR

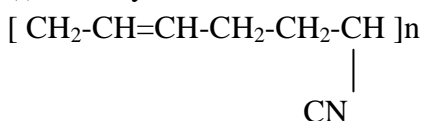(a) Predict the products of the following reactions:

(i)

$$CH_3-CH_2-COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } Cl_2 \text{ / Red phosphorous}}$$

(ii)

[benzene ring with CH_3 group] $+$ $CrO_2Cl_2 \xrightarrow[\text{(ii) } H_3O^+]{\text{(i) } CS_2}$

(b) Arrange the following compounds in increasing order of acid strength:
        Benzoic acid, 4-Nitrobenzoic acid, 4-Methoxybenzoic acid.

21   (i) Identify the monomer in the following polymeric structure:
[CH_2-CH=CH-CH_2-CH_2-CH]n
                                   |
                                  CN
(ii) On the basis of forces between their molecules in a polymer to which class does neoprene belong?
(iii) Can both addition and condensation polymerization result in the formation of a copolymer?

22   (i) Which of the following biomolecule is insoluble in water? Justify.
Insulin, Haemoglobin, Keratin.
(ii) Draw the Haworth structure for α-D-Glucopyranose.
(iii) Write chemical reaction to show that glucose contains aldehyde as carbonyl group.

23   John had gone with his mother to the doctor as he was down with fever. He then went to the chemist shop with his mother to purchase medicines prescribed by the doctor. There he observed a young man pleading with the chemist to give him medicines as he had nasal congestion. The chemist gave him cimetidine. John advised and also explained to the young man that he should only take the medicines prescribed by the doctor.
Answer the following questions:
a) Did the chemist give an appropriate medicine? Justify your answer.
b) John's action was appreciated by his mother. List any two reasons.

24   (a) Give names of the reagents to bring about the following transformations: i) Ethanoic acid to ethanol ii) Propane-1-ol to propanal iii) Pent-3-en-2-ol to pent-3-en-2-one iv) Sodium benzoate to benzene
(b) Arrange the following in the uncreasing order of:
i) Methanal, Propanal, Butanone, Ethanal, Propanone (nucleophilic addition reaction)
ii) Formaldehyde, Acetone, Acetaldehyde (reactivity towards HCN)
iii) Acetophenone, p-tolualdehyde, p- nitrobenzaldehyde, Benzaldehyde (nucleophilic addition reaction)

OR

(a) Bring out the following conversions:.

(i) 4-nitrotoluene to 2-bromobenzoic acid. (ii) Ethylcyanide to 1- phenyl propanone.

(b) Give a reason for the following :

(i) Chloroacetic acid is more acidic than acetic acid.

(ii) Carboxylic acids have higher boiling point than alcohols.

(iii) 4-nitrobenzoic acid is more acidic than 4-methoxy benzoic acid.

25   Account for the following : (i) Transition elements show highest oxidation state in their oxides than fluorides. (ii) Cu has positive electrode potential in the first transition series. (iii) Ionisation enthalpy of lanthanides is higher than actinides. (iv) Potassium dichromate is a good oxidising agent in acidic medium. (v) Actinides show more number of oxidation states than lanthanides.

OR

(a) Compare non transition and transition elements on the basis of their (i) Variability of oxidation states (ii) stability of oxidation states. (b) Give chemical reactions for the following observations: (i) Potassium permanganate is a good oxidising agent in basic medium. (ii) Inter convertibility of chromate ion and dichromate ion in aqueous solution depends Upon pH of the solution. (iii) Potassium permanganate is thermally unstable at 513K.

26   (a) Define the terms
        (i) temperature co-efficient of a reaction
        (ii) energy of activation
    (b) The energy of activation for a chemical reaction is 100 kJ/mol. The presence of a catalyst lowers the energy of activation by 75%. What will be effect on the rate of reaction at 20°C, if other things are equal.

OR

(a) A chemical reaction is of second order w.r.t. a reactant. How will the rate of reaction be affected if the concentration of this reactant is : (a) Doubled; (b) Reduced to 1/8th.

(b) From the following data for a chemical reaction between A and B at 300 K

[A] mol/L	[B] mol/L	Initial rate (mol L^{-1} sec^{-1})
2.5×10^{-4}	3×10^{-5}	5×10^{-4}
2.5×10^{-4}	6×10^{-5}	4×10^{-3}
1×10^{-3}	6×10^{-5}	1.6×10^{-2}

Calculate (i) the order of reaction with respect to A and with respect to B. (ii) the rate constant at 300K.