Reg No. …….
Name …….
Part III

CHEMISTRY

Maximum : 60 Score
Time : 2 Hours
Cool-off time : 15 Minutes

HSE II

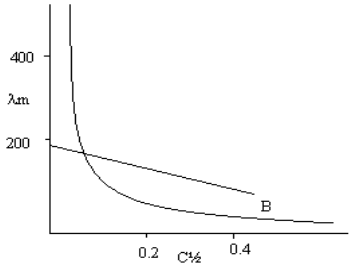
General Instruction to Candidates:

- There is a 'cool-off time' of 15 minutes in addition to the writing time of 2 Hrs.
- You are not allowed to write your answer or to discuss anything with others during the 'cool off' time.
- Use the 'cool-off' time to get familiar with questions and to plan answers.
- Read questions carefully before answering.
- All questions are compulsory and only internal choice is allowed.
- When you select a question, all the sub- questions must be answered from the same question itself.
- Calculations, figures and graphs should be shown in the answer sheet itself.

1. Teacher explained the stoichiometric defects in a class room.
   a. Explain the differences in Schottky defect and Frenkal defects? (2)
   b. What are the consequences? (1)
   c. How is the density of a crystal affected by these defects? (1)

2. Give reasons for the following:
   a. At higher altitudes, people suffer from a disease called anoxia. In this disease they became weak and cannot think properly.
   b. When Mercuric Iodide is added to an aqueous solution of KI, the freezing point is raised. (2)

3. The following curve is obtained when molar conductivity λm (Y axis) is plotted against the squre root of concentration C½ (X axis) for two electrolytes A and B.



a) What can you say about the nature of the two electrolytes A and B?
b) How do you account for the increase in molar conductivity λm for the electrolytes
c) A and B on dilution? (2)

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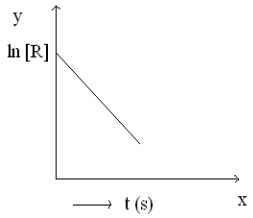
4. For a certain chemical reaction variation in the concentration ln [R] vs time (s) plot is given below.



For this reaction write

i) What is the order of the reaction?
ii) What the units are of rate constant K?
iii) Give the relation ships between K and t½?
iv) What does the slope of the above line indicates?
v) Draw the plot $\log[R]_0/[R]$ vs time t (s)? (5)

5. Explain the following observations:
a) Ferric hydroxide sol gets coagulated on addition of sodium chloride solution.
b) Physical adsorption is multilayered, while chemi adsorption is mono layered. (2)

6.. A mixed oxide of iron and chromium $FeOCr_2O_3$ is fused with sodium carbonate in the presence of air to form an yellow coloured compound (A). On acidification the compound (A) forms an orange coloured compound (B), Which is a strong oxidizing agent. Identify

i) The compounds (A) and (B)

ii) Write the balanced chemical equation for each step. (2)

7. a) Name the method used for refining of
i) Nickel ii) Zirconium

b) The extraction of Au by Leaching with NaCN involves both oxidation and reduction. (3)

8. (a) Give the products and balance the reactions:
i) $Cu + H_2SO_4$ (conc) ⟶
ii) $XeF_4 + H_2O$ ⟶
(b) Explain Ostwald's process. (4)

9. Asha got some compounds and elements

NH_2, $SOCl_2$, Na, aq.KOH, HCl, alco.KOH, CH_3-CH_2Cl, an. $ZnCl_2$

From the box which of the compounds are used for the preparation of alkyl halides? (2)

10. a) Give the number of unpaired electrons in the following complex ions $[FeF6]^{4-}$ and $[Fe(CN_6)]^{4-}$

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b) Match the following (4)

A	B
$[Co(NH_3)_5 NO_2] Cl_2$ $[Co(NH_3)_5 ONO] Cl_2$	Tri amine tri nitro cobalt (III)
$[Co(NH_3)_5 SO_4] Cl$ $[Co(NH_3)_5 Cl] SO_4$	Linkage isomerism
$[Cu(NH_3)_4] [PtCl_4]$ $[Pt(NH_3)_4] [CuCl_4]$	Dicyano silver (II)
$[Co(NO_2)_3 (NH_3)_3]$	Ionisation isomerism
$[Ag(CN)_2$	Coordination isomerism

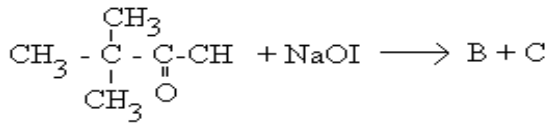
11. a) Out of Ag_2SO_4, CuF_2, MgF_2 and CuCl which compound will be colored?
b) Explain
i. CrO_4^{2-} is a strong oxidizing agent while MnO_4^{2-} is not?
ii. Zr and HF have identical sizes?
iii. The lowest oxidation state of Mn is basic while highest is acidic?
iv. Mn (II) shows maximum paramagnetic character amongst the divalent ions of the first transition series? (5)

12. a) In the titration of $FeSO_4$ with $KMnO_4$ in the acidic medium, why dil. H_2SO_4 used instead of dil.HCl?
b) Give reasons:
i. Among transition metals, the highest oxidation state is exhibited in oxanions of a metal
ii. Transition metals form a number of interstitial compounds
iii. Ce^{4+} is used as an oxidizing agent in volumetric analysis
iv. Zn^{2+} salts are white, while Cu^{2+} salts are blue? (5)

13. (a) An organic compound 'A' with molecular formula C_8H_8O gives positive DNP and iodoform tests. It does not reduce Tollen's or fehling's reagent and does not decolourise bromine water also. On oxidation with chromic acid (H_2CrO_4), it gives a carboxylic acid (B) with molecular formula $C_7H_6O_2$. Deduce the structures of A and B.
(b) Complete the following reactions by identifying A, B and C
(i)

$$A + H_2(g) \xrightarrow{Pd/BaSO_4} (CH_3)_2 CH\text{-}CHO$$

(ii)



(4)

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14.A compound 'X' (C_2H_4O) on oxidation gives 'Y' ($C_2H_4O_2$). 'X' undergoes haloform reaction. On treatment with HCN 'X' forms a product 'Z' which on hydrolysis gives 2- hydroxy propanoic acid?

(i) Write down structures of 'X' and 'Y'.
(ii) Name the product when 'X' reacts with dil NaOH.
(iii) Write down the equations for the reactions involved. (5)

15. Expalin the following terms: (i) Anomers, (ii) Peptide bond, (iii) Zwitter ion, (iv) Denaturation. (4)

16. Bakelite is a thermosetting polymer while polythene is a thermoplastic polymer.

(i) Do you agree with this statement? (1)
(ii) Write down the monomers of PVC, Buna –S, Teflon (3)

17.a) While antacids and antiallergic drugs interfere with the function of histamines, why do these not interfere with the function of each other?

b) Low level of noradrenaline is the cause of depression. What types of drugs are needed this problem? Name two drugs.

c) Though sodium bicarbonate is a better alternate for controlling acidity, still it is not nowadays (3)

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