CBSE
Class XII Chemistry
Sample Paper - 1

Time: 3 Hrs Total marks: 70

General Instructions:

- *All questions are compulsory.*
- *Section A: Q.no. 1 to 5 are very short answer questions and carry 1 mark each.*
- *Section B: Q.no. 6 to 12 are short answer questions and carry 2 marks each.*
- *Section C: Q.no. 13 to 24 are also short answer questions and carry 3 marks each.*
- *Section D: Q.no. 25 to 27 are long answer questions and carry 5 marks each.*
- *There is no overall choice. However, an internal choice has been provided in two questions of one mark, two questions of two marks, four questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.*
- *Use log tables if necessary. Use of a calculator is not allowed.*

Section A

1. A compound contains A atoms at the corners and B atoms at the centres of all faces. What is the formula of the compound? [1]

OR

What kind of attractive forces are present in molecular crystalline solids?

2. What are the physical states of the dispersed phase and the dispersion medium of a cloud? [1]

3. Which is the most common oxidation state of lanthanoids? [1]

OR

What is the common oxidation state of Cu, Ag and Au?

4. Give the IUPAC name of the following compound: [1]

$(CH_3)_3CCH_2Br$

5. Name the monomers of the nylon-2-nylon-6 polymer. [1]

Section B

6. State Henry's law. What is the significance of K_H? [2]

OR

What would be the value of van't Hoff factor for a dilute solution of K_2SO_4 in water?

7. Account for the following: [2]
(a) Alkaline medium inhibits the rusting of iron.
(b) Iron does not rust even if the zinc coating is broken in galvanised iron pipes.

8. Calculate the overall order of a reaction which has the rate expression [2]
(a) Rate = $k[A]^{1/2}[B]^{3/2}$
(b) Rate = $k[A]^{3/2}[B]^{-1}$

9. Complete the following chemical reaction equations: [2]
(a) $XeF_2 + H_2O \rightarrow$
(b) $PH_3 + HgCl_2 \rightarrow$

10. What happens when [2]
(a) Phenol reacts with Br_2 in CS_2 at 273 K.
(b) Phenol reacts with conc. HNO_3.

11. Out of acetophenone and benzophenone, which gives the iodoform test? Write the reactions involved. [2]

OR

Draw the structures of the following compounds:
(a) 3-methyl butanal
(b) 4-chloropentan-2-one

12. Write the structure of the monomers of the following polymers: [2]
(a) PVC
(b) Polypropene

Section C

13. Chromium crystallises in BCC structure. If its atomic diameter is 245 pm, find its density. Atomic mass of Cr = 52 amu and $N_A = 6.02 \times 10^{23}$ mol^{-1}. [3]

14. A solution is made by dissolving 30 g of a non-volatile solute in 90 g of water. It has a vapour pressure of 2.8 kPa at 298 K. The vapour pressure of pure water is 3.64 kPa. Calculate the molar mass of the solute. [3]

OR

Calculate the freezing point of depression expected for 0.0711 m aqueous solution of Na_2SO_4. If this solution actually freezes at −0.320°C, then what would be the value of van't Hoff factor? (K_f = 1.86°C)

15. The decomposition of Cl_2O_7 at 400 K in the gas phase to Cl_2 and O_2 is a first-order reaction. [3]
(a) After 55 s at 400 K, the pressure of Cl_2O_7 falls from 0.062 to 0.044 atm. Calculate the rate constant.
(b) Calculate the pressure of Cl_2O_7 after 100 s of decomposition at this temperature.

16. [3]

(a) Why are deltas formed at places where the river meets the sea?

(b) List two characteristics of catalysts.

(c) What are macromolecular colloids? Give an example.

17. State briefly the principles which serve as the basis for the following operations in metallurgy: [3]

(a) Froth flotation process

(b) Zone refining

(c) Refining by liquation

18. Complete the following chemical equations: [3]

(a) $MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow$

(b) $KMnO_4 \xrightarrow{\text{Heat}}$

(c) $Cr_2O_7^{2-} + H_2S + H^+ \longrightarrow$

19. [3]

(a) Give the IUPAC name of $K_3[Cr(C_2O_4)_3]$.

(b) What is the number of unpaired electrons in $[CoF_6]^{3-}$ and $[Co(NH_3)_6]^{3+}$?

(c) Name the isomerism exhibited by the following pair of compounds:
$[Co(en)_2(H_2O)Cl]Cl_2$ and $[Co(en)_2Cl_2]Cl.H_2O$]

20. Answer the following questions: [3]

(a) What is meant by chirality of a compound? Give an example.

(b) Which of the following compounds is more easily hydrolysed by KOH and why?
$CH_3CHClCH_2CH_3$ or $CH_3CH_2CH_2Cl$

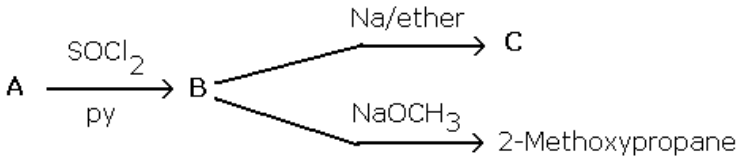
(c) Which one undergoes S_N2 substitution reaction faster and why?

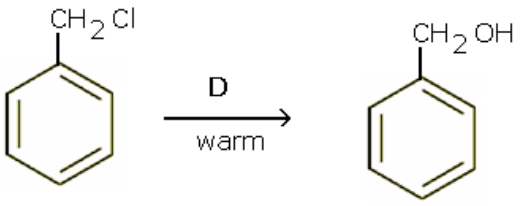
and

OR

(a) Give a chemical test to distinguish between chlorobenzene and benzyl chloride.

(b) Identify A, B, C and D:





21. Give the equation of the following reactions: [3]
(a) Oxidation of propan-1-ol with alkaline $KMnO_4$ solution.
(b) Bromine in CS_2 with phenol.
(c) Dilute nitric acid with phenol.

22. In the following cases, rearrange the compounds as directed: [3]
(a) In the increasing order of basic strength:
$C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$ and CH_3NH_2

(b) In the decreasing order of basic strength:
Aniline, p-nitroaniline and p-toluidine

(c) In the increasing order of pK_b value:
$C_2H_5NH_2$, $C_6H_5NHCH_3$, $(C_2H_5)_2NH$ and $C_6H_5NH_2$

23. Name three fat-soluble vitamins, their source and the diseases caused by their deficiency in the diet. [3]

OR

Explain the following terms:
(a) Peptide linkage
(b) Pyranose structure of glucose
(c) Glycosidic linkage

24. Give reason for the following: [3]
(a) Sulpha drugs work like antibiotics, but they are not antibiotics.
(b) Aspirin helps in the prevention of heart attack.
(c) Soaps are biodegradable, whereas detergents are non-biodegradable.

Section D

25. [5]
(a) Name two transition elements which show +1 oxidation state.
(b) Name the transition element which does not exhibit variable oxidation state.
(c) Transition elements show catalytic properties. Why?
(d) Explain why Cu^+ ion is not stable in aqueous solutions.

OR

(a) Write the steps involved in the preparation of
(i) Na_2CrO_4 from chromite ore
(ii) K_2MnO_4 from pyrolusite ore
(b) What is the effect of increasing pH on $K_2Cr_2O_7$ solution?
(c) Draw the structure of dichromate ion indicating the bond angles and bond lengths.

26. The emf of the cell reaction [5]

$3Sn^{4+} + 2\ Cr \rightarrow 3Sn^{2+} + 2Cr^{3+}$ is 0.89 V.

Calculate:

(a) ΔG^{θ} for the reaction.

(b) Equilibrium constant for the reaction relating to

(i) ΔG^{θ}

(ii) E^{θ} cell

OR

Given:

$Cu^{2+} + 2e^- \rightarrow Cu \quad E^{\theta} = +0.34$ V

$Ag^+ + e^- \rightarrow Ag \quad E^{\theta} = +0.80$ V

(a) Write the cell reaction.

(b) Construct the galvanic cell.

(c) For what concentration of Ag+ ions will the emf of the cell be zero at 25°C if the concentration of Cu^{2+} is 0.01 M?

27. [5]

(a) Ethanol reacts with acetic acid in the presence of conc. H_2SO_4 to give a sweet smelling substance. Give the equation involved in the reaction.

(b) Write a note on

(i) Rosenmund's reduction

(ii) Hell Volhard Zelinsky reaction

OR

(a) Complete the equations:

(i) $CH_3CH_2COOH \xrightarrow{NH_3} A \xrightarrow{Br_2/KOH} B$

(ii) $(CH_3)C{=}O \xrightarrow{HCN} X \xrightarrow{H_2/Ni} Y$

(iii) $C_6H_5CHO + CH_3COCH_3 \xrightarrow{dil\ OH^-} C + D$

(b) Semicarbazide contains two NH_2 groups, but only one participates in the reaction with carbonyl compounds. Why?

(c) Which of the two will give a yellow precipitate with iodine and sodium hydroxide: pentan-2-one or pentan-3-one?