

CBSE
Class XII Chemistry
Sample Paper 3

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. What is a copolymer?
2. Why are amorphous solids sometimes called super cooled liquids?

OR

Frenkel defect is not found in halides of alkali metals. Why?

3. Name a reagent required to oxidise primary alcohol to aldehyde in good yield.
4. Can a bimolecular reaction ever be a first-order reaction? State the condition under which it is possible.
5. P_4O_{10} is a well-known dehydrating agent but cannot be used for drying ammonia. Why?

OR

Arrange the halo acids in the increasing order of their acidic character.

Section B

6. Define the following terms:
(a) Mole fraction
(b) van't Hoff factor

OR

Derive the relationship between mole fraction and vapour pressure of a component of an ideal solution in the liquid phase and vapour phase.

7. In a cell reaction, the equilibrium constant K_c is less than one.
 - (a) Is E^θ for the cell positive or negative?
 - (b) What will be the value of K_c if $E^\theta_{\text{cell}} = 0$?
8. Calculate the half-life of a first-order reaction whose rate constant is 200 s^{-1} .
9. Find the oxidation states of halogens in the following:
 - (a) Cl_2O
 - (b) KBrO_3
10. Give a chemical test to distinguish between methanol and ethanol.
11. Give IUPAC names of the following:
 - (a)

$$\begin{array}{c} \text{CH}_3\text{CH}_2\text{CH}-\text{COOCH}_3 \\ | \\ \text{NH}_2 \end{array}$$

(b) $\text{C}_6\text{H}_5\text{NHCH}_3$

OR

Illustrate the following with an example reaction:

- (a) Ambident nucleophile
 - (b) Hinsberg test
- 12.
- (a) What is the role of benzoyl peroxide in the polymerisation of ethene?
 - (b) What are LDPE and HDPE? How are they prepared?

Section C

13. An element has a body-centred cubic structure with a cell edge of 288 pm. The density of the element is 7.2 g cm^{-3} . Calculate the number of atoms present in 208 g of the element.
14. An aqueous solution of glucose is made by dissolving 10 g of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) in 90 g of water at 303 K. If the vapour pressure of pure water at 303 K is 32.8 mmHg, what would be the vapour pressure of the solution?

OR

Calculate the mass of a non-volatile solute (molar mass 40 g mol^{-1}) which should be dissolved in 114 g octane to reduce its vapour pressure to 80%.

15. The reaction $\text{SO}_2\text{Cl}_2 \rightarrow \text{SO}_2 + \text{Cl}_2$ is a first-order reaction with half-life of $3.15 \times 10^4 \text{ s}$ at 320°C . What percentage of SO_2Cl_2 would be decomposed on heating at 320°C for 90 minutes?

16. How do size of particles of adsorbent, pressure of gas and prevailing temperature influence the extent of adsorption of a gas on a solid?
17. An oxide ore of a metal contains oxides of Fe, Si and Ti as impurities. It is concentrated using a chemical method and further reduced using electrolysis. The metal is widely used as packing material for household purposes. Identify the metal, ore and give equations involved in its concentration.

OR

Explain:

- (a) Roasting
(b) Calcination

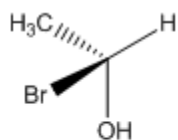
18. Calculate the number of unpaired electrons in the following gaseous state ions:
 Mn^{2+} , Ce^{3+} , V^{3+} and Fe^{2+}

19. Write the IUPAC names of the following compounds:

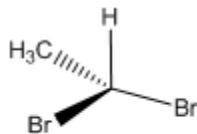
- (a) $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NO}_2)]$
(b) $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$
(c) $[\text{Ni}(\text{CO})_4]$

20. Identify chiral molecules in each of the following pairs of compounds:

(a)

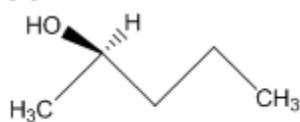


(a)

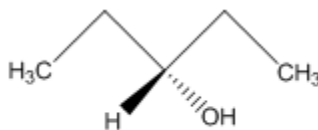


(b)

(b)

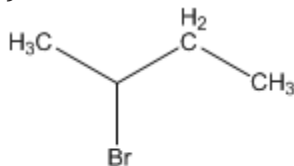


(a)

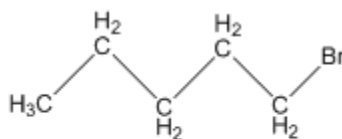


(b)

(c)



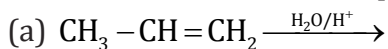
(a)



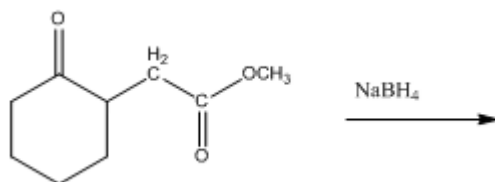
(b)

OR

Write the structures of the products of the following reactions:



(b)



21. Write the structures of the following organic halogen compounds:

- 2-chloro-3-methyl pentane
- p-Bromochlorobenzene
- Perfluorobenzene

22. Arrange the following:

- In the decreasing order of pK_b values:
 $\text{C}_2\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NHCH}_3$, $(\text{C}_2\text{H}_5)_2\text{NH}$ and $\text{C}_6\text{H}_5\text{NH}_2$
- In the increasing order of basic strength:
 $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NHCH}_3$, $(\text{C}_2\text{H}_5)_2\text{NH}$ and CH_3NH_2
- In the increasing order of boiling point:
 $\text{C}_2\text{H}_5\text{OH}$, $(\text{CH}_3)_2\text{NH}$, $\text{C}_2\text{H}_5\text{NH}_2$

23.

- Amylose and cellulose are both straight chain polysaccharides containing only D-glucose units.
- What is the structural difference between the two?
- Why does milk get coagulated when lemon juice is added to it?

24. What is paracetamol? Give its structure. Mention two medicinal effects it can have on the human body.

OR

Write a note on artificial sweetening agents.

Section D

25. The degree of dissociation of $\text{Ca}(\text{NO}_3)_2$ in dilute aqueous solution containing 7.0 g of salt per 100 g water at 100°C is 70%. If the vapour pressure of water at 100°C is 760 mmHg, calculate the vapour pressure of the solution.

OR

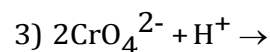
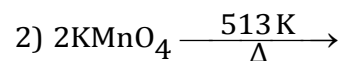
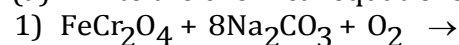
The molar volume of liquid benzene (density = 0.877 g mL^{-1}) increases by a factor of 2750 as it vaporises at 20°C and that of liquid toluene (density = 0.867 g mL^{-1}) increases by a factor of 7720 at 20°C . A solution of benzene and toluene at 20°C has a vapour pressure of 46.0 torr. Find the mole fraction of benzene in the vapour above the solution.

26. Give reasons:

- Cr^{2+} is a strong reducing agent, whereas Mn^{2+} is not. ($\text{Cr} = 24$, $\text{Mn} = 25$)
- The transition metal ions such as Cu^+ , Ag^+ and Sc^{3+} are colourless.
- The enthalpies of atomisation of transition metals of the 3d series do not follow a regular trend throughout the series.
- The radius of Fe^{2+} ($Z = 26$) is less than that of Mn^{2+} ($Z = 25$).
- Chemistry of the actinoids is more complicated than that of the lanthanoids.

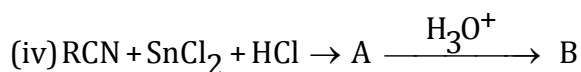
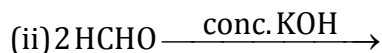
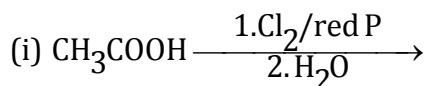
OR

(a) Write the chemical equations involved in the following:



(b) Use Hund's rule to derive the electronic configuration of Ce^{3+} ion, and calculate its magnetic moment on the basis of the 'spin only' formula.

27. Complete the equations and name the reaction represented.



OR

Complete the equations:

