

CBSE
Class XII Chemistry
Sample Paper 4

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. The use of a calculator is not allowed.
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Section A

1. Which point defect in crystals does not alter the density of the relevant solid? [1]
2. Colloidal particles show zigzag motion. What is the name given to this motion? [1]

OR

Define Tyndall effect.

3. What is the maximum oxidation state shown by actinoids? [1]

OR

Name the transition element which does not exhibit variation in the oxidation state in its compounds.

4. 2, 4, 6 Trinitrophenol is soluble in aqueous Na_2CO_3 , while phenol is not. Why? [1]
5. What are elastomers? How are they different from fibres? [1]

Section B

6. State Henry's law. Give any one of its applications. [2]

OR

What would be the molality of an aqueous solution which has a boiling point elevation of 1.00 K? (For H_2O , $k_{\text{bp}} = 0.512 \text{ K kg mol}^{-1}$)

7. Calculate the e.m.f. of the following cell at 298 K: [2]



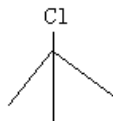
$$E^\ominus_{\text{Fe}^{2+}|\text{Fe}} = -0.44\text{ V}$$

8. Name the crystal system of the compound with unit cell dimensions $\alpha = \beta = 90^\circ$, $\gamma = 120^\circ$ and $a = 0.387$, $b = 0.387$ and $c = 0.504$ nm.
Give an example of a compound in which this type of crystal system is present. [2]

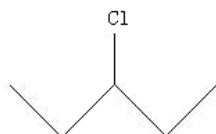
9. How will you prepare Cl_2 from HCl and HCl from Cl_2 ? Write the reactions only. [2]

10. Which of the following undergoes $\text{S}_{\text{N}}1$ faster and why? [2]

(a)



(b)

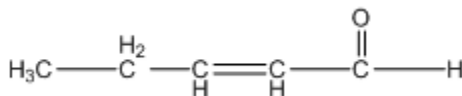


11. Arrange the following in the increasing order of acidic character: [2]
 HCOOH , CH_2ClCOOH , CF_3COOH , CCl_3COOH

OR

Write the IUPAC name of the following:

(a)



(b)



12. Give the names and structures of monomers of [2]

(a) Dacron

(b) Buna-N

Section C

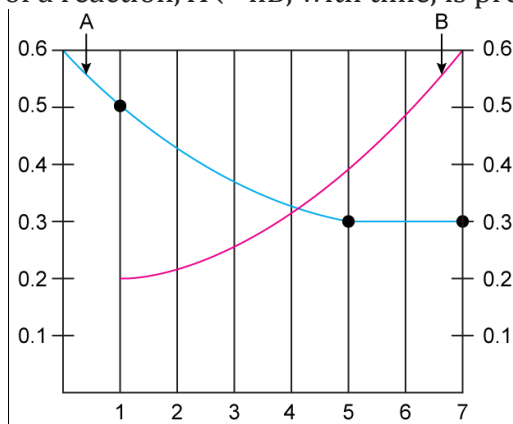
13. The density of mercury is 13.6 g/ml. Calculate approximately the diameter of an atom of mercury assuming that each atom occupies a cube of edge length equal to the diameter of the mercury atom. [3]

14. Calculate the degree of dissociation of a decimolar solution of NaCl with osmotic pressure of 4.6 atm at 300 K. [3]

OR

- Why is the vapour pressure of a liquid constant at constant temperature?
- Two liquids A and B are mixed. The resulting solution is found to be cooled. What do you conclude?
- 2 g each of the solute A and B (mol. mass of A > B) are dissolved separately in 20 g each of the same solvent C. Which will show greater lowering of vapour pressure and why?

15. The progress of a reaction, $A \rightleftharpoons nB$, with time, is presented in the figure below: [3]



Determine:

- Value of n
 - Equilibrium constant k
 - Initial rate of conversion of A
16. What happens when [3]
- Freshly prepared $\text{Fe}(\text{OH})_3$ is shaken with a little amount of dilute solution of FeCl_3 .
 - Light is passed through a colloidal solution.
 - Electric current is passed through a colloid.
17. Account for the following: [3]
- Zn is not extracted from ZnO through reduction using CO .
 - Copper matte is put in silica lined converter
 - Graphite is used in electrometallurgy of Al.
18. [3]
- An alloy A finds application in making bullets, shells etc. Name the alloy and give its composition.
 - Which of the two is more basic: $\text{La}(\text{OH})_3$ or $\text{Lu}(\text{OH})_3$, and why?
 - Why does Zr ($Z = 40$) and Hf ($Z = 72$) have similar atomic radii?

OR

Account for the following:

- Cr^{2+} is strongly reducing because it changes to Cr^{3+} which is more stable because manganese (III) is strongly oxidising.
- Cobalt (III) is stable in aqueous solution, but in the presence of complexing reagents, it is easily oxidised.
- The d^1 configuration is very unstable in ions.

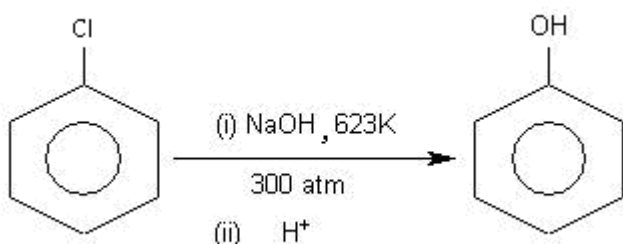
19. [3]

- (a) What are ambidentate ligands? Give an example.
 (b) Write the names of the following:
 (i) $K_3[Cr(C_2O_4)_3]$
 (ii) $Pt[(NH_3)_2Cl_2]$
 (c) Draw the structure of the cis isomer of $[Co(NH_3)_4Cl_2]^+$.

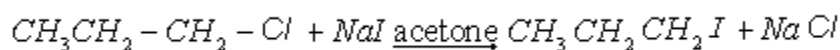
20. [3]

- (a) Name the reaction represented by the following equations:

(i)



(ii)



- (b) Which of these has a higher boiling point and why?

Iodobenzene or chlorobenzene

OR

Write the structure of the main product:

- (a) Chlorination of benzene in the presence of UV light.
 (b) Propene is treated with HBr in the presence of benzoyl peroxide.
 (c) Chlorobenzene is treated with NaOH at 623 K and high pressure.

21. Account for the following: [3]

- (a) Alcohols act as weak acids.
 (b) Phenols have smaller dipole moment than alcohols.
 (c) How can ethers be distinguished from alcohols? Give the equation involved.

22. Write short notes on [3]

- (a) Gabriel phthalimide synthesis
 (b) Hoffmann bromamide degradation method

23. [3]

- (a) What happens when D-Glucose is made to react with Br_2 water? Give the equation also.
 (b) Why are carbohydrates generally optically active?
 (c) Why can't vitamin C be stored in the body?

OR

- (a) Structurally differentiate between insulin and myosin.
(b) Two strands of DNA are complementary to each other. Account for it.
(c) Why is sucrose known as invert sugar?

24. What is saccharin and aspartame? Also give their uses. [3]

Section D

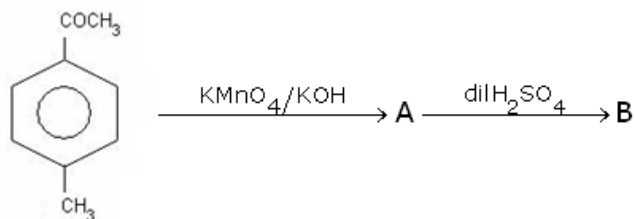
25. [5]

- (a) Convert:
(i) Ethanal to crotonaldehyde
(ii) Propanoic acid to lactic acid
(b) Draw the structure of methyl hemiacetal of formaldehyde.
(c) How do carbonyl compounds react with sodium hydrogen sulphite? Explain giving a reaction.

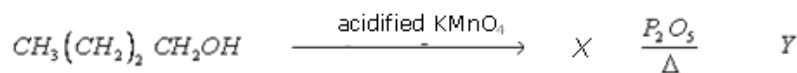
OR

Complete the equations:

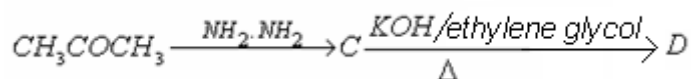
(a)



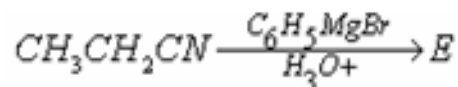
(b)



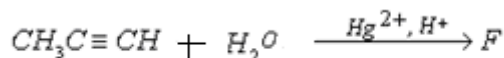
(c)



(d)



(e)



26. Explain:

[5]

- (a) Perchloric acid is a stronger acid than sulphuric acid.
- (b) Noble gases are bigger in size than halogens of the respective period.
- (c) Solid PCl_5 exhibits some ionic character.
- (d) Oxygen has lower electron gain enthalpy than S.
- (e) Gaseous N_2 is used in food packaging.

OR

- (a) What is aqua regia? Where is it used?
- (b) Draw the shape of XeO_3 . What is the hybridisation of Xe in XeO_3 ?
- (c) Can PCl_5 act as both oxidising and reducing agent? Give reason to support your answer.

27.

[5]

- (a) The decomposition of N_2O_5 , $2\text{N}_2\text{O}_5 \text{ g} \rightleftharpoons 4\text{NO}_2 \text{ g} + \text{O}_2 \text{ g}$ is a first-order reaction. After 30 min from the start of decomposition in a closed vessel, the total pressure developed is found to be 284.5 mmHg. On complete decomposition, the total pressure is 584.5 mmHg. Calculate the rate constant of the reaction.
- (b) The rate of a particular reaction quadruples when the temperature changes from 293 K to 313 K. Calculate activation energy for the reaction.

OR

- (a) ^{90}Sr has half-life of 28.1 years. If $1 \mu\text{g}$ of ^{90}Sr was absorbed in the bones of a new born baby, then how much of it will remain after 20 years if not lost metabolically?
- (b) For the reaction $2\text{A} + \text{B} \rightarrow \text{A}_2\text{B}$, the rate constant is $0.5 \text{ mol}^{-1}\text{L s}^{-1}$

Rate law is $\text{rate} = k[\text{A}]^2$. Calculate the rate when

(i) $[\text{A}] = 0.60 \text{ mol L}^{-1}$, $[\text{B}] = 0.05 \text{ mol L}^{-1}$

(ii) Concentrations of A and B are reduced to $\frac{1}{4}$.