

CODE - 043 (S) B

Time: 3 hours

M.M.: 70

- 1 Q.no. 1 to 5 are very short answer questions carrying 1 mark each.
- 2 Q. no. 6 to 10 are short answer questions carrying 2 marks each.
- 3 Q.no. 11 to 22 are short answer questions carrying 3 marks each.
- 4 Q.no. 23 is value based question carrying 4 marks.
- 5 Q.no. 24 to 26 are long answer questions carrying 5 marks each.
- 6 Use of calculator is not permitted. Log tables can be used, if necessary.

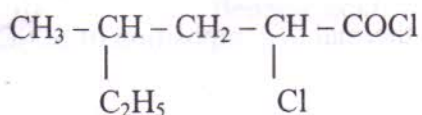
Q1 Define ferrimagnetism. Give one example.

Q2 For the following gaseous reaction



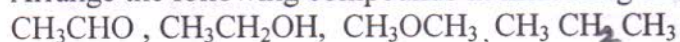
Write the expression for the rate of the reaction.

Q3 Write IUPAC name of the following compound.



Q4 Define molar conductivity of solution. What are the units of molar conductivity?

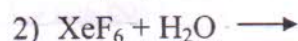
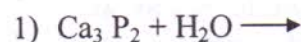
Q5 Arrange the following compounds in increasing order of their boiling points.



Q6 Calculate the mass of non-volatile solute X (Molar mass = 40 g/mol) that should be dissolved in 114g of octane (C_8H_{18}) so as to reduce its vapour pressure to 80%.

Q7 An organic compound with molecular formula $\text{C}_9\text{H}_{10}\text{O}$ forms 2,4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro reaction. On vigorous oxidation it gives 1,4-benzene dicarboxylic acid. Identify the compound. Write the chemical reaction involved.

Q8 Complete and balance the following reactions: -



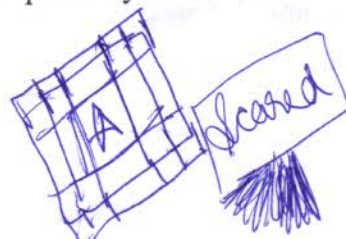
Q9 Differentiate between the non-ideal solutions showing positive and negative deviation from Raoult's Law

Q10 Explain the variation of molar conductivity with concentration for a weak electrolyte.

Q11 What is F-centre? What type of solids show this type of defect? Explain.

Q12 Give reasons: -

- i) pK_b of aniline is more than that of methylamine.
- ii) Aniline does not undergo Friedel Crafts reaction
- iii) Methylamine in water reacts with ferric chloride to precipitate hydrated ferric oxide.



Q13 Calculate the boiling point of a solution containing 0.61g of benzoic acid in 5g of CS₂ assuming 84% dimerisation of acid. The boiling point and k_b of CS₂ are 46.2° C and 2.3 K kg/mol respectively.

Q14 When Conc H₂SO₄ is added to an unknown salt present in test tube and MnO₂ is also added, greenish yellow gas 'X' comes out. To the unknown salt solution in water, when AgNO₃(aq) is added, white ppt is formed which is soluble in excess of NH₄OH. 'X' displaces a brown gas from an aqueous solution of KBr. Identify 'X' and write the chemical reactions involved.

Q15 How will you convert the following: -

- i) Methanamine to ethanamine.
- ii) Aniline to benzoic acid
- iii) Methanol to ethanoic acid

Q16 Describe the preparation of potassium dichromate from chromite ore. Write chemical reactions involved.

Q17 The following data were obtained during the first order thermal decomposition of SO₂Cl₂ at a constant volume



Experiment	Time / sec	Total Pressure / atm
1	0	0.4
2	100	0.7

Calculate the rate constant.

Q18 Give reasons: -

- i) Reactivity of Nitrogen differs from phosphorus
- ii) H₂O is a liquid and H₂S is a gas.
- iii) PCl₃ fumes in moisture.

Q19 Give chemical reactions of the following:

- i) Conc HNO₃ with phenol.
- ii) Treating phenol with CO₂ in the presence of NaOH.
- iii) Phenol is treated with bromine water.

Q20 Niobium crystallizes in body centred cubic structure. Its density is 8.55 g/cm³. Calculate atomic radius of Niobium. Atomic mass of Niobium is 92.91g.

Q21 Give two reactions to show the acidic nature of phenol. Compare acidity of phenol with that of ethanol.

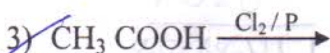
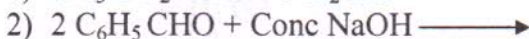
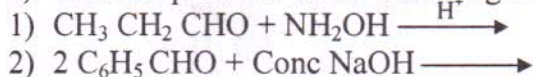
Q22 The rate of a chemical reaction doubles for an increase of 10K in temperature from 298K. Calculate activation energy.

Q23 Mr. Naresh is habitual of drinking alcohol. His father was also addicted to alcohol and died due to damage of liver. His friend Ramesh advised him to leave drinking and start healthy living habits. He was taken to de-addiction centre and now his habit is under his control.

After reading the passage answer the following questions:-

- What values are associated with Ramesh?
- Which alcohol is present in alcoholic drinks?
- Which alcohol is most acidic in nature and why?
- Why are alcohols soluble in water?

Q24 a) Write the products of the following reaction and write IUPAC names of products formed



b) Give simple chemical tests to distinguish between the following pairs of compounds:-

- Propanal and Propanone
- Phenol and Benzoic acid

OR

a) Account for the following: -

- CH_3CHO is more reactive than CH_3COCH_3 towards reaction with HCN.
- Carboxylic acid is a stronger acid than phenol.

b) Write the chemical equations to illustrate the following name reactions.

- Wolff-Kishner reduction
- Aldol condensation
- Cannizzaro reaction

Q25 a) What are the advantages of fuel cells over other cells? Write electrode reactions taking place in fuel cells.

b) Calculate the emf of the cell in which the following reaction takes place



Give that $E^\circ_{\text{cell}} = 1.05\text{V}$

Q26 Account for the following:-

- Transition elements show highest oxidation state in their oxides than fluorides.
- Cu has positive electrode potential in the first transition series.
- Zr and Hf have similar atomic radii.
- Potassium dichromate is a good oxidizing agent in acidic medium.
- Actinides show more number of oxidation states than lanthanides.

OR

a) Explain the following: -

- Transition metals form complexes
- Transition metals form interstitial compounds.

b) Give balanced chemical reaction for the following observations: -

- Potassium permanganate is a good oxidizing agent in basic medium.
- Inter convertibility of chromate ion and dichromate ion in aqueous solution depends upon pH of the solution.
- Potassium permanganate is thermally unstable at 513K.