Code No. 34

Total No. of Questions : 39] [Total No. of Printed Pages : 16

March, 2009

CHEMISTRY

Instructions : i) The question paper has *four* Parts.

ii) **Parts A, B, C** and **D** are common to all the candidates.

iii) **Part A** carries 10 marks. Each question carries *one* mark.
Part B carries 20 marks. Each question carries *two* marks.
Part C carries 40 marks. Each question carries *five* marks.
In **Part D** – D_1 carries 10 marks and D_2 carries 10 marks. Each question of D_2 carries *five* marks.

iv) Write balanced chemical equations and draw diagrams wherever necessary.

PART – A

Note : i) Answer all the 10 questions.

ii) Questions have to be answered in *one* word or in *one* sentence each. Each question carries *one* mark.

$10 \times 1 = 10$

1. What is the role of limestone in the extraction of iron from haematite ?
2. Hydrogen sulphide gas cannot be dried using conc. H_2SO_4. Give reason.
3. Which one among Cu^{+1} and Cu^{2+} salts is coloured ?
4. What is the limiting value of degree of dissociation of an electrolyte at infinite dilution ?
5. Sea-water freezes below 273 K. Why ?
6. Define electrophoresis.

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7. The coordination number of a crystal is 6. What is the geometry of the crystal ?

8. Name the gas liberated when bromoethane is heated with alcoholic potash.

9. Phenol does not react with sodium bicarbonate. Why ?

10. Name the protein present in hair.

PART - B

Note : i) Answer any *ten* questions.

ii) Each question carries *two* marks. $10 \times 2 = 20$

11. Draw Ellingham diagram for the formation of oxides of aluminium and magnesium. Which one of these metals acts as better reducing agent above 1500°C ?

12. How does potassium dichromate solution react with potassium hydroxide ?

13. Calculate the EAN value of the central metal ion in tetraamine copper (II) sulphate.

14. Sketch the shapes of bonding and antibonding molecular orbitals formed when two S orbitals undergo LCAO.

15. A first order reaction is 50% completed in 80 min. Calculate the rate constant of the reaction.

16. Mention any two characteristics of an ideal solution.

17. pH value of a sample of mango juice is 4·54. Calculate the $[H^+]$.

18. Identify *A*, *B*, *C* and *D* in the following equation :

$$CH_3 - CH_2 - Cl \xrightarrow{A} CH_3 - CH_2 - OH \xrightarrow{B} CH_3 - COOH \xrightarrow{NaOH} C \xrightarrow[heat]{NaOH + CaO} D .$$

19. What is Wurtz-Fittig reaction ? Write the general equation.

20. Write the equations for the following reactions :

i) Dry distillation of calcium acetate

ii) Reaction of phosphorous pentachloride with acetic acid.

21. Write the Haworth structure of $\alpha - D -$ maltose.

22. What happens when tristearin is heated with potassium hydroxide solution ? Give the equation.

PART – C

I. Answer any *two* of the following questions : $2 \times 5 = 10$

23. a) Describe the manufacture of ammonia by Haber's process. 3

b) Sketch the shapes of nickel tetracarbonyl. Which type of hybridisation is involved in the formation of this compound ? 2

24. a) How is a mixture of noble gases separated by Dewar's charcoal method ? 3

b) Write the electronic configuration of lithium molecule. Comment on its magnetic property with reason. 2

[Turn over

25. a) State any three postulates of Werner's theory of co-ordination compounds. 3

b) On the basis of electron gas theory, explain bright lustre of metals. 2

II. Answer any *three* of the following questions : $3 \times 5 = 15$

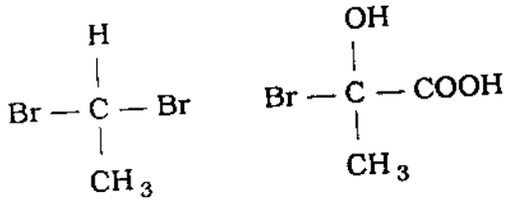
26. a) What is mesomeric effect ? What type of mesomeric effect is shown by – CHO group in benzaldehyde ? 2

b) Explain the mechanism of nitration of benzene. 3

27. a) How is phenol isolated from coal tar ? 3

b) What is a dipeptide ? How many peptide linkages are present in a tetrapeptide ? 2

28. a) What is optical activity ? Which one of the following compounds shows optical isomerism ? 2



b) How is ethyl bromide converted into ethyl isocyanide ? Write th equation.

c) Give a chemical reaction to show that a molecule of gluco contains a carbonyl group.

29. a) Calculate angle strain in cyclobutane. 2

b) Explain carbylamine reaction for a primary amine. Write general equation. 2

c) One mole of a given amine consumes two moles of methyl iodide for exhaustive methylation. What type of amine is this ? 1

III. Answer any *three* of the following questions : $3 \times 5 = 15$

30. a) Derive an expression for rate constant of a first order reaction. 4

b) State Schultz-Hardy rule. 1

31. a) Explain buffer action in acidic buffer containing mixture of acetic acid and sodium acetate. 3

b) When the same amount of electricity passed through solutions of copper sulphate and hydrochloric acid, 64 mg of copper is deposited on the cathode in the first case. Calculate the volume of hydrogen obtained in the second case at S.T.P.

(Equivalent weight of Cu = 32). 2

32. a) Mention two limitations of standard hydrogen electrode. 2

b) Write Nernst equation for single electrode potential. Explain any two terms in the equation. 2

c) Mention the dispersed phase and dispersion medium in a gel. 1

33. a) Define entropy. What happens to entropy when a liquid vaporises ? 2

b) What is Brownian movement ? How is it caused ? 2

c) Define unit cell. 1

34. a) Calculate the change in free energy for the cell

$Mg \mid Mg^{2+}_{(1\,m)} \mid\mid Ag^{+}_{(1\,m)} \mid Ag$

if E° Ag = 0·8 V and E° Mg = − 2·37 V. 2

b) State any three postulates of Arrhenius theory of electrolytic dissociation. 3

PART – D

D_1

IV. Answer any *one* of the following : $1 \times 10 = 10$

35. a) Describe Parke's process for the desilverisation of Argentiferrous lead. 3

b) Why are transition elements and their compounds good catalysts ? Explain. 2

c) For a reaction, the graph of rate of the reaction against molar concentration of the reactant is a straight line parallel to the concentration axis. What is the order of this reaction ? Give an example for such a reaction. 2

d) The value of standard free energy of formation of ammonia at 298 K is $-16{\cdot}6$ kJ mol^{-1}. Calculate the equilibrium constant K_p for the reaction. 2

e) What is Iodine value ? 1

36. a) Give the mechanism of Cannizzaro's reaction. 3

b) A current of dry air was passed through a solution containing 5·4 g of an aromatic compound in 61·2 g of diethyl ether and then through the solvent. The loss in mass of solution bulb was 0·708 g and that in the solvent bulb was 0·035 g. Calculate the molecular weight of the aromatic compound.

(Given molecular weight of diethyl ether = 74) 2

c) When NH_4Cl and NH_4OH are added to a solution containing Al^{3+} and Zn^{2+} ions, only $Al(OH)_3$ precipitates. Give reason. 2

d) i) Write the IUPAC name of

$$CH_3 - \underset{\displaystyle Cl}{\underset{|}{CH}} - CH_2 - COOH$$

ii) Out of

$$CH_3 - \underset{\displaystyle Cl}{\underset{|}{CH}} - CH_2 - COOH$$

and

$$CH_3 - CH_2 - \underset{\displaystyle Cl}{\underset{|}{CH}} - COOH$$

which one has higher pKa value ? 2

e) How many Lattice points are present in a unit cell of CsCl ? 1

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V. Answer any *two* of the following : $2 \times 5 = 10$

37. a) How is *m*-nitrobenzene prepared in the laboratory from nitrobenzene ? Write the equation. 3

b) Mention a general test for

i) Protein

ii) Carbohydrate. 2

38. Describe an experiment to show that acid hydrolysis of methyl acetate follows first order kinetics. 5

39. For the estimation of potassium permanganate ($KMnO_4$) using standard ferrous ammonium sulphate —

i) Write the chemical equation for the reaction involved.

ii) Give the equivalent weight of potassium permanganate.

iii) Name the indicator used.

iv) What is the colour change at the end point ?

v) Write the equation for calculating mass / dm^3 of potassium permanganate in a given solution from its normality. 5