

Chemistry 12th Public Exam Question Paper 2013

MARCH – 2013
CHEMISTRY

PART - I

30 x 1 = 30

Note: Answer ALL the questions.
Choose and write the correct answer:

1. Thermodynamic condition for irreversible spontaneous process at constant 'T' and 'P'
(a) $\Delta G < 0$ (b) $\Delta G = 0$ (c) $\Delta G > 0$ (d) both (b) and (c)
2. The total number of atoms per unit cell in fcc is
(a) 1 (b) 2 (c) 3 (d) 4
3. Dual character of an electron was explained by
(a) Bohr (b) Heisenberg (c) DeBroglie (d) Pauli
4. Which one of the following is a simple ether?
(a) $\text{CH}_3 - \text{O} - \text{C}_2\text{H}_5$ (b) $\text{C}_6\text{H}_5 - \text{O} - \text{CH}_3$ (c) $\text{C}_2\text{H}_5 - \text{O} - \text{C}_2\text{H}_5$ (d) $\text{C}_3\text{H}_7 - \text{O} - \text{C}_2\text{H}_5$
5. $[\text{FeF}_6]^{4-}$ is paramagnetic because
(a) F^- is a weaker ligand (b) F^- is a stronger ligand
(c) F^- is a flexidinate ligand (d) F^- is a chelating ligand
6. In the manufacture of ammonia by Haber's process, the maximum yield of ammonia will be obtained with the process having :
(a) Low pressure and high temperature (b) Low pressure and low temperature
(c) high pressure and high temperature (d) high pressure and low temperature
7. The phenomenon of Tyndall's effect is not observed in
(a) emulsion (b) colloidal solution
(c) true solution (d) gel

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8. The aminoacid without Chiral carbon is
(a) Glycine (b) Alanine (c) Proline (d) Tyrosine
9. In nitroalkanes – NO_2 group is converted to – NH_2 group by using the reagent
(a) Sn/HCl (b) Zn dust (c) $\text{Zn}/\text{NH}_4\text{Cl}$ (d) Zn/NaOH
10. The metals present in Nichrome alloy
(a) Cr, Ni, Fe (b) Cr, Co, Ni (c) Cr, Fe (d) Cr, Fe, Cu
11. Which of the following does not result in an increase in entropy?
(a) Rusting of iron (b) Conversion of ice to water
(c) Crystallisation of sucrose from solution (d) sublimation of camphor
12. The compound that does not undergo Cannizaro reaction is:
(a) formaldehyde (b) benzaldehyde
(c) acetaldehyde (d) trimethyl acetaldehyde

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13. $2\text{H}_2\text{O}_{(g)} + 2\text{Cl}_{2(g)} \rightleftharpoons 4\text{HCl}_{(g)} + \text{O}_{2(g)}$
 The relationship between K_p and K_c for the equilibrium is :
 (a) $K_p = K_c$ (b) $K_p = K_c (RT)^2$ (c) $K_p = K_c (RT)^1$ (d) $K_p = K_c (RT)^{-2}$
14. Strong mineral acidsthe ethereal oxygen forming oxonium salts.
 (a) electronate (b) protonate (c) deprotonate (d) dehydrate
15. Emulsifying agent is used for
 (a) precipitation of an emulsion (b) denaturation of an emulsion
 (c) stabilization of an emulsion (d) oxidation of an emulsion
16. The reducing sugar is
 (a) sucrose (b) Cellulose (c) Starch (d) Glucose
17. form oxocations
 (a) Lanthanides (b) Actinides (c) Noble gases (d) Alkali metals
18. PCl_5 hybridisation in PCl_5 molecule is
 (a) sp^3 (b) sp^3d^2 (c) sp^3d (d) sp^2

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19. Maximum oxidation state exhibited by lanthanides is
 (a) +1 (b) +2 (c) +3 (d) +4
20. The noble gases are unreactive because they
 (a) have same number of electrons (b) have an atomicity of one
 (c) are gases with low density (d) have stable electronic configuration
21. When pH of a solution is 2, the hydrogen ion concentration in moles litre⁻¹ will be
 (a) 1×10^{-12} (b) 1×10^{-4} (c) 1×10^{-7} (d) 1×10^{-2}
22. Ethylene diamine is converted to ethylene glycol using
 (a) Na_2CO_3 solution (b) Nitrous acid (c) NaHCO_3 solution (d) Baeyer's reagent
23. Paramagnetism is the property of :
 (a) paired electrons (b) completely filled electronic sub-shells
 (c) unpaired electrons (d) completely vacant electronic sub-shells
24. Among the following the strongest acid is
 (a) CH_3COOH (b) HCOOH (c) ClCH_2COOH (d) $\text{CH}_3\text{CH}_2\text{COOH}$
25. Silica gel is utilised for the of the number of gases.
 (a) adsorption (b) absorption (c) desorption (d) all of these
26. Conversion of benzene diazonium chloride to chlorobenzene is
 (a) Sandmeyer's reaction (b) Stephen's reaction
 (c) Gomberg reaction (d) Schotten – Baumann reaction
27. The organic compound that undergoes carbylamine reaction is
 (a) $(\text{C}_2\text{H}_5)_2\text{NH}$ (b) $\text{C}_2\text{H}_5\text{NH}_2$ (c) $(\text{C}_2\text{H}_5)_3\text{N}$ (d) $(\text{C}_2\text{H}_5)_4\text{N}^+\text{I}^-$

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28. On moving down a group, the radius of an ion.
(a) decreases (b) increases
(c) first increases and then decreases (d) remains constant
29. ${}_{92}\text{U}^{235}$ nucleus absorbs a neutron and disintegrates into ${}_{54}\text{Xe}^{139}$, ${}_{38}\text{Sr}^{94}$ and X. What is X?
(a) 3 neutrons (b) 2 neutrons (c) α - particle (d) β - particle
30. For a reaction $E_a = 0$ and $K = 4.2 \times 10^5 \text{ sec}^{-1}$ at 300K, the value of K at 310 K will be.
(a) $4.2 \times 10^5 \text{ sec}^{-1}$ (b) $8.4 \times 10^5 \text{ sec}^{-1}$ (c) $8.4 \times 10^{-5} \text{ sec}^{-1}$ (d) $4.2 \times 10^{-5} \text{ sec}^{-1}$

PART – II

15 x 3 = 45

Note: i) Answer any FIFTEEN questions.
ii) Each answer should be in one or two sentences.

31. State Heisenberg's uncertainty principle.
32. Why electron affinity of fluorine is less than that of chlorine?
33. Write a note on plumbosolvency.
34. H_3PO_4 is triprotic. Prove.
35. Why do d-block elements exhibit variable oxidation states?
36. What is "spitting of silver"? How is it prevented?

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37. Determine the average life of U^{238} having $t_{1/2} = 140$ days.
38. What are super conductors?
39. Calculate the entropy change for the following process possessing $\Delta H_{(\text{transition})} = 2090 \text{ J mol}^{-1}$. 1 mole $\text{S}_n(\alpha, 13^\circ\text{C}) \rightleftharpoons 1 \text{ mole } \text{S}_n(\beta, 13^\circ\text{C})$
40. State Le Chatelier's principle.
41. Give three examples for opposing reactions.
42. Write Arrhenius equation and explain the terms.
43. What is electrophoresis?
44. State Faraday's second law of electrolysis.
45. Mesotartaric acid is an optically inactive compound with a symmetric carbon atoms. Justify your answer.
46. What is 'Glycerose'? How is it prepared from glycerol?
47. How will you convert phenol to phenolphthalein?

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48. Give the IUPAC names of the following.
(a) Crotonaldehyde (b) Methyl n-propyl ketone (c) Benzaldehyde
49. Give any two tests to identify carboxylic acids.
50. An organic compound (A) of molecular formula C_2H_5NO reacts with $Br_2 / NaOH$ to give compound (B) of molecular formula CH_3N (A) is reduced by $LiAlH_4$ to give compound (C) of formula C_2H_7N . Identify (A), (B) and (C).
51. What are antipyretics? Give an example.

PART – III

7 x 5 = 35

Note: i) Answer any seven questions choosing at least two question from each Section.

Section - A

52. Explain the formation of O_2 molecule using molecular orbital theory.
53. Explain how silver is extracted from its chief ore.
54. Describe the consequences of lanthanide contraction.
55. Explain the type of hybridization, magnetic property and geometry for $[Ni(CN)_4]^{2-}$ and $[Ni(NH_3)_4]^{2+}$ using VB theory.

Section - B

56. State the various statements of second law of thermodynamics.
57. Derive the expressions for K_c and K_p for the decomposition of PCl_5 .
58. Discuss the characteristics of a order of reaction.
59. Determine the standard emf of the cell and standard free energy change of the cell reaction.
 $Zn / Zn^{2+} || Ni^{2+} / Ni$
 $E^\circ_{Zn^{2+}/Zn} = -0.76V$ $E^\circ_{Ni^{2+}/Ni} = -0.25V$

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Section - C

60. Give any three methods of preparation of diethyl ether.
61. Write the difference between acetaldehyde and benzaldehyde.
62. Give the mechanism involved in the esterification of a carboxylic acid with alcohol.
63. How are Buna-S and nylon-66 prepared? Give their uses.

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PART – IV

4 x 10 = 40

Note: i) Answer four questions in all.

ii) Question No. 70 is compulsory and answer any three from the remaining questions.

64. (a) Explain the Pauling's scale for the determination of electronegativity. Give the disadvantages of Pauling scale?
(b) How does Fluorine differ from other halogens?
65. (a) Explain the co-ordination isomerism and ionisation isomerism with example.
(b) Explain Radio-Carbon dating.
66. (a) Explain Schottky defect and Frenkel defect.
(b) Write briefly the adsorption theory of catalysis.
67. (a) Explain Quinonoid theory of indicators
(b) Write notes on IUPAC conventions of representation of a cell.
68. (a) Discuss cis-trans isomerism with a suitable example. (Organic compounds).
(b) Account for the reducing nature of formic acid.

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69. (a) Distinguish between primary, secondary and tertiary amines
(b) Explain the structure of fructose.

70. a) Compound (A) with molecular formula C_6H_6O gives violet colour with neutral $FeCl_3$. (A) reacts with $CHCl_3$ and $NaOH$ gives two isomers (B) and (C) with molecular formula $C_6H_6O_2$. Compound (A) reacts with ammonia at 473K in the presence of $ZnCl_2$ gives compound (D) with molecular formula C_6H_7N . Compound (D) undergoes carbylamine test. Identify (A), (B), (C) and (D) and explain the reactions.

b) (A) is a reddish brown metal. It belongs to group 11 and period 4 of the periodic table. When heated below 1370K, (A) gives a black compound (B). When heated above 1370 K (A) gives a red compound (C). With concentrated nitric acid, (A) liberates NO_2 gas and compound (D). Identify (A), (B), (C) and (D). Explain the reactions.

(OR)

c) Compound A of molecular formula C_2H_4O reduce Tollen's reagent. (A) on treatment with HCN gives compound (B). Compound (B) on hydrolysis with an acid gives compound (C) with molecular formula $C_3H_6O_3$ which is an optically active compound. Compound (A) on reduction with N_2H_4/C_2H_5ONa gives a hydrocarbon (D) of molecular formula C_2H_6 . Identify (A), (B), (C) and (D) and explain the reactions.

d) Ionic conductance at infinite dilution of Al^{3+} and SO_4^{2-} are $189 \text{ ohm}^{-1}\text{cm}^2 \text{ gm equiv}^{-1}$ and $160 \text{ ohm}^{-1}\text{cm}^2 \text{ gm equiv}^{-1}$. Calculate equivalent and molar conductance of the electrolyte at infinite dilution.