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Part III — CHEMISTRY

(English Version)

Time Allowed : 3 Hours]

[Maximum Marks : 150

Note : Draw diagrams and write equations wherever necessary.

PART - I

Note : Answer all the questions.

30 × 1 = 30

Choose and write the correct answer :

- A compound that undergoes bromination easily is
 - benzoic acid
 - benzene
 - phenol
 - toluene.
- Ether is formed when alkyl halide is treated with sodium alkoxide. The method is known as
 - Hoffmann's reaction
 - Williamson's synthesis
 - Wurtz reaction
 - Kolbe's reaction.
- When ether is exposed to air for some time, an explosive substance produced is
 - peroxide
 - TNT
 - superoxide
 - gun cotton.
- Hydrogenation of benzoyl chloride in the presence of Pd and BaSO₄ gives
 - phenol
 - benzoic acid
 - benzyl alcohol
 - benzaldehyde.

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44. What is common ion effect ? Give one example.
45. What is racemic mixture ? Give an example.
46. Alcohols cannot be used as a solvent for Grignard reagents. Why ?
47. How is ethylene glycol converted into dioxan ?
48. What is urotropine ? Give its use.
49. What is the reaction of lactic acid with dil. H_2SO_4 ?
50. When benzamide is treated with bromine and alkali gives compound A. Also when benzamide is reduced by $LiAlH_4$, compound B is formed. Find A and B. Write the equations.
51. Why are iodoform and phenolic solutions called antiseptic ?

PART - III

Note : Answer any seven questions choosing at least two questions from each Section. 7 × 5 = 35

SECTION - A

52. Give any five postulates of molecular orbital theory.
53. How is gold extracted ?
54. Discuss the position of lanthanides in the periodic table.
55. How is chlorophyll important in environmental chemistry ? Mention its function.

SECTION - B

56. State the various statements of Second law of thermodynamics.
57. Apply Le Chatelier's principle for the formation of NH_3 by Haber's process.
58. Write notes on (i) consecutive reactions, (ii) parallel reactions and (iii) opposing reactions.
59. Determine the standard e.m.f. of the cell and standard free energy change of the cell reaction $Zn, Zn^{2+} || Ni^{2+}, Ni$. The standard reduction potentials of Zn^{2+} , Zn and Ni^{2+} , Ni half cells are - 0.76 V and - 0.25 V respectively.

SECTION - C

60. Give any three methods of preparation of ethers.
61. Write the differences between acetaldehyde and acetone.
62. Give the mechanism involved in the esterification of a carboxylic acid with alcohol.
63. How are Buna-S and Nylon-66 prepared ?

PART - IV

Note : Question No. 70 is compulsory and answer any *three* from the remaining questions. 4 × 10 = 40

64. a) Explain the Pauling scale for the determination of electronegativity. Give the disadvantage 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 Bragg's spectrometer method.
- b) How are colloids prepared by using (i) mechanical dispersion method, (ii) electro dispersion method ?
67. a) Derive Henderson equation.
- b) How is e.m.f. of a half cell determined ?
68. a) Distinguish between enantiomers and diastereomers.
- b) How are the following conversions take place ?
- i) Salicylic acid → Methyl salicylate
- ii) Lactic acid → Pyruvic acid
- iii) Methyl cyanide → Acetamide.
69. a) How are (i) phenol, (ii) chlorobenzene, (iii) biphenyl prepared by using benzene diazonium chloride ?
- b) Outline the classification of carbohydrates giving example for each.

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70. a) Compound A with molecular formula C_3H_6 is obtained from petroleum. When A is treated with chlorine at 773 K compound B of molecular formula C_3H_5Cl is obtained. When B is treated with Na_2CO_3 solution at 773 K/12 atm. it gives the compound C with molecular formula C_3H_6O . C on treatment with HOCl followed by hydrolysis with NaOH gives D having molecular formula $C_3H_8O_3$. Find A, B, C and D. Explain the reaction.
- b) The metal B is extracted from the ore A. On treatment with dil. nitric acid metal B gives a compound C, which is also known as Lunar Caustics. The compound C on treatment with KI gives a yellow precipitate D. Find A, B, C and D. Explain the reactions of the formation of C and D.

OR

- c) Compound A with molecular formula C_7H_6O reduces Tollen's reagent and also gives Cannizzaro reaction. A on oxidation gives the compound B with molecular formula $C_7H_6O_2$. Calcium salt of B on dry distillation gives the compound C with molecular formula $C_{13}H_{10}O$. Find A, B and C. Explain the reaction.
- d) An electric current is passed through three cells in series containing respectively the solutions of copper sulphate, silver nitrate and potassium iodide. What weights of silver and iodine will be liberated while 1.25 gm of copper is being deposited ?