



DCCH201

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II Semester B.Sc. (NEP) Degree Examination, October - 2022

CHEMISTRY

Analytical Organic and Physical Chemistry

(CBCS Scheme 2021-22 Onwards)

Paper : II



Time : 2½ Hours

Maximum Marks : 60

Instructions to Candidates:

- i. The question paper has **three** parts. Answer All the parts,
- ii. Write chemical equations and diagrams wherever necessary.

PART - A

Answer any **Five** of the following questions. Each question carries **Two** marks. ($5 \times 2 = 10$)

1. Define the limit of detection (LOD) in Analytical chemistry.
2. Mention the electrophiles involved in nitration and sulphonation of benzene.
3. Define molar refraction.
4. What are the causes of deviation of real gases from ideal behaviour?
5. State the law of constancy of interfacial angles.
6. What are liquid crystals? Give an example.

PART - B

Answer any **Four** of the following questions. Each question carries **Five** marks. ($4 \times 5 = 20$)

7. Describe the determination of temporary hardness of water. (5)
8. a. Explain the factors influencing precipitation. (3+2)
b. Mention any two reagents used in gravimetry.
9. a. Explain S_NAr mechanism with a suitable example. (4+1)
b. Mention the role of chlorine atom in chlorobenzene towards electrophilic aromatic substitution reactions.
10. a. Define (4+1)
i. Collision frequency.
ii. Critical temperature.
b. Give the relationship between most probable velocity and root mean square velocity of gas molecules.

[P.T.O.]



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11. a. 0.62 g of a solute is dissolved in 50 g of CCl_4 , produces an elevation in boiling point of 0.642 K. K_b for CCl_4 is 5.03 K kg mol⁻¹. Calculate the molar mass of the solute. (3+2)
- b. What is meant by depression in freezing point?
12. a. Derive the expression for distribution co-efficient when a solute undergoes dissociation in one of the solvents that are in contact with each other. (3+2)
- b. Give any two applications of distribution law.

PART - C

Answer any Three of the following questions. Each question carries Ten marks.

(3×10=30)

13. a. Explain the Mohr's method of precipitation titrimetry. (3+4+3)
- b. Define co-precipitation. Draw the precipitation titration curve and indicate the equivalence point in the titration.
- c. What is meant by figures of merit? Mention any two types of figures of merit.
14. a. With energy profile diagram explain the mechanism of S_N^1 reaction.
- b. Explain the orienting influence of -OH group in phenol towards electrophilic substitution reactions. (5+5)
15. a. Describe the experiment to determine the critical temperature and critical pressure of a gas.
- b. What is meant by ipso substitution? Give an example.
- c. How is benzene generated? (5+3+2)
16. a. Calculate the Van der Waal's constant for argon, given $T_c = 151K$, $V_c = 7.52 \times 10^{-5} m^3 mol^{-1}$, $R = 8.314 JK^{-1} mol^{-1}$.
- b. Describe the determination of Viscosity of a liquid using Ostwald's viscometer.
- c. Define mean free path of gas molecules. (4+4+2)
17. a. In the distribution of benzoic acid between water and benzene, the following results were obtained.

concentration of benzoic acid in water C_1 (g/L) :	1.5	1.95	2.97
concentration of benzoic acid in benzene, C_2 (g/L) :	24.2	41.2	97.0

Show that benzoic acid exists as a dimer in benzene.

- b. Derive Bragg's equation, $n\lambda = 2d \sin \theta$.
- c. Sketch the lattice plane with the Miller indices (1,1,1). (4+4+2)