

[This question paper contains 4 printed pages.]

4408

Your Roll No.

Subsidiary for B.Sc. Honours/II AS

Paper IV – CHEMISTRY

Organic and Physical Chemistry

Time : 3 Hours

Maximum Marks : 50

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt Section A and Section B on
separate answer sheets.*

SECTION A

(Organic Chemistry)

(Marks : 33)

Attempt any Four questions.

Question No. 1 carries nine marks.

SECTION B

(Physical Chemistry)

(Marks : 17)

Answer any Two questions.

P.T.O.

SECTION A

Answer any four questions.

1. An aromatic compound A(C_6H_6O) on distillation with zinc dust gives compound B. B on being heated with conc. HNO_3 and conc. H_2SO_4 at $60^\circ C$ gives compound C($C_6H_5O_2N$). C reacts with Br_2 to give D($C_6H_4O_2NBr$). D is reduced with H_2/Pt to E(C_6H_6NBr) which reacts with $NaNO_2/HCl$ below $5^\circ C$ to give a product which on treatment with acid gives compound F(C_6H_5OBr). Identify A to F. (9)

2. (a) A freshly prepared aqueous solution of glucose has a specific rotation of $+112.5^\circ$. On standing at room temperature the rotation gradually changes to $+52.5^\circ$ and no further, explain.

(b) Write a reaction which established the presence of five hydroxyl groups in the open chain structure of glucose.

(c) How are carbohydrates classified? (4,2,2)

3. How will you convert :
 - (a) Aniline into chlorobenzene
 - (b) Aniline into p-bromoaniline
 - (c) Benzoic acid into Aniline
 - (d) m-Dinitrobenzene into m-nitroaniline (2×4)

4. Explain the following reactions with suitable examples :
- (a) Perkin Reaction
 - (b) Carbylamine Reaction
 - (c) Haloform Reaction
 - (d) Hoesch Reaction (2×4)
5. (a) How was the structure of naphthalene determined ?
- (b) Why was Baeyer's Strain Theory inadequate ?
How was it modified by Sachse-Mohr ? (4×2)
6. Write short notes on any two of the following :
- (a) Aromatic nature of Pyridine
 - (b) Ring structure of glucose
 - (c) Coupling reaction of Diazonium salts (4×2)

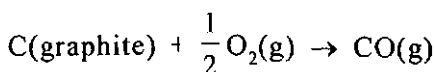
SECTION B

Attempt any two questions.

1. (a) Show that

$$\Delta H = \Delta U + \Delta n_g RT \quad (2)$$

- (b) The heat of the reaction



at 25°C and 1 atm pressure is -110.5 kJ. What is the value of heat of reaction at constant volume ?

$$(R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}). \quad (4)$$

P.T.O.

- (c) Write a short note on photoelectric cell. (2½)
2. (a) What is a galvanic cell? How does it differ from an electrolytic cell? (2½)
- (b) Describe a glass electrode. How can it be used for determining the pH of a solution? (3)
- (c) A certain photochemical reaction requires an activation energy of 126 kJ mol^{-1} . To what value does this correspond to in the following units:
- (i) Wavelength, (ii) wave number, and
(iii) Frequency of light?
($h = 6.626 \times 10^{-34} \text{ Js}$) (3)
3. (a) Explain giving reasons any **three** of the following:
- (i) Enthalpy of neutralization of a strong monobasic acid by a strong base is always equal to $-57.32 \text{ kJ mol}^{-1}$.
- (ii) All the spontaneous processes lead to a state of minimum energy and maximum entropy.
- (iii) A gas shows cooling effect in adiabatic expansion.
- (iv) Entropy of a substance is maximum in gaseous state. (6)
- (b) Write a short note on Hess's law of constant heat summation. (2½)