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2703N1124

Candidate's Seat No :_____

M.Sc. Sem.-3 Examination

503

Chemistry (P)

March-2025

Time : 2-30 Hours] **[Max. Marks : 70**

Instruction: Attempt all questions:

Q-1 **Answer the following:**

(a) Name the various methods used to determine the molecular weight of a polymer. Explain the osmometry method to determine the molecular weight of polymers. (7)

OR

(a) Explain in brief the molecular weight of polymers. Write note on the practical significance of molecular weight of polymer. (7)

(b) Explain the molecular weight distribution curve for a polymer system. Name the steps on which the mapping of a molecular weight distribution of a polymer can be done. (7)

OR

(b) Explain the viscosity method to determine the molecular weight of polymers (7)

Q-2 **Answer the following:**

(a) Explain how the molecular weight and cross linking influence the glass transition temperature. Explain the factors affecting glass transition temperature. (7)

OR

(a) Discuss crystal structure of a polymer and explain the effect of chain branching on crystaline melting point and glass transition temperature. (7)

(b) Explain the effect of crystalline structure of polymer on mechanical properties of polymers. (7)

OR

(b) Discuss the micro structure of polymer molecule based on chemical and geometrical structure. (7)

Q-3 **Answer the following:**

(a) Write brief note on fibre spinning. (7)

OR

(a) Explain the thermoset moulding and blow moulding processes. (7)

(b) Explain briefly about extrusion, coextrusion and film extrusion processes. (7)

OR

(b) Which type of material is used for injection moulding process? Explain briefly the injection moulding prosess. (7)

Q-4 **Answer the following:**

(a) Explain the process of polymer dissolution. (7)

OR

(a) Explain briefly the nature of polymer molecules in solution. (7)

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(b) Explain the thermodynamics of polymer dissolution process. (7)

OR

(b) Explain briefly the size and shapes of the polymer molecule in solution. (7)

Q-5 **Answer the following: (Any Seven-Two marks each)** (14)

(i) What are the uses of extrusion process?

(ii) What is polymer processing? Classify polymers on the basis of their applications.

(iii) Calculate M_n for a polymer consisting of three fractions with molecular weights $1x10^5$, $2x10^5$ and $3x10^5$. The mole fractions of each of these fractions are found to be 0.1, 0.5 and 0.4 respectively.

(iv) What is meant by reduced and intrinsic viscosity of polymer.

(v) A polymer contains 20% by mass of polymer with N_0m_1 = 5000 g mol^{-1} and 80% by mass of polymer with N_0m_2 = 30,000 g mol^{-1}. Calculate the number average molecular weight of the polymer.

(vi) Explain in brief the property which control the major properties of polymers.

(vii) Why polymers solutions are non-ideal?

(viii) What is the entropy of dissolution?

(ix) Explain briefly the polydispersity index.

(x) Explain briefly the fibre spinning process.