



IV Semester M.Sc. Degree Examination, June 2017
(NS 2010 – 11 Scheme) (Repeaters)
CHEMISTRY
C-402-PC : Physical Chemistry of Macromolecules

Time : 3 Hours

Max. Marks : 80

Instruction : Answer question 1 and any five of the remaining.

1. Answer **any ten** of the following. **(10×2=20)**
- a) If molecular weight of polyethylene is 2×10^5 , what is its degree of polymerization ?
 - b) Distinguish between block and graft copolymerization.
 - c) What is meant by Poisson's ratio ?
 - d) Distinguish between homopolymer and copolymer with an example each.
 - e) The molecular weight of the addition polymer is a simple multiple of the molecular weight of the monomer, but it is not so in the case of condensation polymers give reasons.
 - f) Distinguish between weight-average and number-average molecular weight of a polymer.
 - g) What is meant by glass-transition temperature of a polymer ?
 - h) The number average molecular weight and weight average molecular weight of a polymer are 30,000 and 40,000 respectively. Calculate the polydispersity index of the polymer.
 - i) What is meant by chainlength of a polymer ?
 - j) Distinguish between specific viscosity and inherent viscosity of a polymer.
 - k) Write the monomer structure of the following polymers
 - i) Polymethyl methacrylate
 - ii) Polyisoprene
 - iii) Polystyrene
 - iv) Polyvinyl fluoride.
 - l) What differences observed for a spherical and rod shaped polymer molecules in sedimentation velocity method ?



2. a) Explain ring opening polymerization.
b) Discuss the photo degradation of a polymer and its principle.
c) What is Donnan membrane equilibrium ? Explain its significance. **(4+4+4=12)**
3. a) Describe the determination of molecular weight of a polymer by eight scattering method.
b) Explain ORD method for the elucidation of structure of macromolecules.
c) In a viscosity method, the value of constants for polymer and solvent are 4.5×10^{-3} and 0.9 respectively. If its \bar{M} is 5×10^8 , calculate its intrinsic viscosity in μ/g . **(5+4+3=12)**
4. a) Discuss Gibbs-Duhem equation for a polymer solution.
b) Explain free radical polymerization.
c) Write a note on chemical potential of macromolecules in solution. **(4+5+3=12)**
5. a) Explain the experimental determination of T_g by thermomechanical method.
b) Discuss effect of temperature on crystallinity and molecular weight of a polymer.
c) For a symmetrical polymer $T_g = 105^\circ\text{C}$, calculate T_m of the polymer and if the polymer is unsymmetrical, what is the value of T_m for same T_g ? **(4+4+4=12)**
6. a) Derive the expression for the relationship between osmotic pressure and molecular weight of a polymer.
b) Distinguish between anionic and cationic polymerization.
c) Write a note on group transfer polymerization. **(5+4+3=12)**
7. a) What is meant by ceiling temperature in polymer reaction ?
b) Explain radiation effect on properties of a polymer.
c) In end group analysis experiment, if 0.8888 g of the sample has consumed 0.88 ml of 0.1818 N alcoholic potassium hydroxide solution, calculate \bar{M}_n of the polymer. (Assume functionality as 2). **(4+4+4=12)**
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