IV Semester M.Sc. Degree Examination, June 2016
CHEMISTRY (NS)
C-402 PC : Physical Chemistry of Macromolecules

Time : 3 Hours   Max. Marks : 80

Instruction : *Answer Question No.* **1** *and* **any five** *of the remaining.*

1. Answer **any ten** of the following :   **(10×2=20)**

   a) How do you separate the DNA molecules containing ^{14}N and ^{15}N isotopes in a macro molecule ?

   b) Define the term "isoelectric point" by taking the example of glycine.

   c) Calculate the value of second virial coefficient when the molar volume of the pure solvent is 1000 CC and the value of the molecular weight of the macromolecule is 25000.

   d) Give the relevant expression for "excluded volume" and "second virial coefficient" of a marcomolecule possessing rod-like conformation.

   e) Define the term Rayleigh scattering.

   f) What is meant by cotton effect ?

   g) Give the factors influencing Tg.

   h) What are the alternating and graft copolymers ? Give example.

   i) What are inhibitors ? Give examples.

   j) Give the importance of Ziegler-Natta catalyst in polymerisation process.

   k) Describe the technique of transient testing and impact testing of a polymer.

   l) Define the terms 'reduced viscosity' and 'specific viscosity'.

2. a) What is meant by Zimmplot and how do you obtain the molecular weight, second virial coefficient and the size factor R_G from this plot ?

   b) How is IR spectroscopy useful in determining the structure of a polymer ? Define the term IR dichroism.   **(8+4=12)**

3. a) Justify the statement 'the relationship between CD and ORD is analogous to the relationship between absorption and refraction of unpolarized light'.

   b) How do you degrade a polymer by ultrasonic waves and thermal methods ?

                                                                              (8+4=12)

4. a) What is meant by osmotic pressure and how do you obtain molecular weight of a macromolecule from this method ? What is meant by Donnan effect and how do you minimise it ?

   b) Describe the isoelectric focussing technique. **(8+4=12)**

5. a) Explain the effect of temperature, crystallinity and molecular weight on mechanical behaviour of polymer.

   b) Describe the linear, branched and cross linked polymers with suitable examples. **(6+6=12)**

6. a) Write a note on evaluation of T_g, T_m and T_f in accordance with crystalline and amorphous polymers.

   b) Describe the following methods of testing the polymer (i) stress-strain curves (ii) static testing – Poisson's ratio. **(6+6=12)**

7. Describe the following polymerization process :

   a) Free radical polymerization

   b) Metathetical polymerization

   c) Ring opening polymerization. **(4+4+4=12)**

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