

Five Year Integrated M. Sc. Examination 2023
Semester-VII
Course: CH-4-7-5 (2016)
(Chemistry)

Time: Three Hours

Full Marks: 40

Questions are of value as indicated in the margin

Group-A

(Answer *any five* questions)

1. (a) What is the semi-synthetic polymer? Discuss with suitable example.
(b) Classify polymers based on their thermal response. Give at least one example in each case.
(c) Define number average and weight average molecular weight of a polymer.
(d) Why does the T_g of a polymer increase in the presence of filler?
(e) What is elastic elongation?
(f) Discuss the differences in the structures of graft, and block copolymers. 2 x 5 = 10

Group-B

(Answer *any six* questions)

2. (a) What is tacticity? Classify the sequences depending on the tacticity on the asymmetric carbon atom present in the polymer chain.
(b) Discuss with a proper diagram about a method by which the glass transition temperature (T_g) and crystalline melting temperature (T_m) of a polymer can be measured. 2+3
3. (a) Write down the expression of the Mark-Houwink-Sakurada (MHS) equation of intrinsic viscosity of a polymeric solution.
(b) Explain the classical method of determination of the MHS constant and the exponent. What kind of molecular weight you may expect from this method? 1+(3+1)
4. (a) What is “degree of polymerization”? How is it related to the molecular mass of the polymer?
(b) Derive the expression of the rate of polymerization (R_p) in presence of light as $R_p = K_p(f\epsilon_0 I_0 / K_t)^{1/2} [M]^{3/2}$, where symbols have their usual meaning. (1+1+3)
5. (a) Define the addition polymerization and condensation polymerization with a suitable example.
(b) Describe the differences in the properties and uses of plastics, fibers and Rubbers. (2+3)
6. (a) What are plasticizers? Why do they add during the synthesis of commercial polymers?
(b) Discuss about an important plasticizer, its important uses and drawbacks. (1+1+3)
7. Write notes on (any two)
(a) Epoxy resin
(b) Polysiloxanes
(c) Nafion[®] 117 2 x 2.5
8. (a) Write the method of synthesis of polyaniline in HCl medium. What is the role of HCl here?
(b) Write the molecular structure of polyaniline in its different forms and mention the form that is electrically conducting. (1+1+3)