

SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

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Total number of pages:[2]

Total number of questions: 09

B.Tech. CHEMICAL ENGG./ 7thSem

Subject POLYMER REACTOR DESIGN

Code BTCH-822

Paper ID :

Batch:2004 onwards/2011onwards/2015 onwards[Tick Relevant]

Time allowed: 3 Hrs

Max Marks:60

Important Instructions:

- Section A is compulsory
- Attempt any four questions from section B
- Attempt any two questions from section C
- Assume any missing data
- Additional instructions, if any

PART A (2×10)

Q.1. Answer in brief:

- (a) What is the difference between extent of polymerization and degree of polymerization.
- (b) Calculate the fractional change in volume for gas phase elementary reaction, $2A \rightarrow 7R$
- (c) Brief out the procedure of analyzing semi batch reactors.
- (d) What is the difference between space time and space velocity?
- (e) In which polymerization autoacceleration is more prominent? What are its adverse effects?
- (f) Define ARB polymerization .Also give example.
- (g) What are micelles?
- (h) Define Polydispersity Index.
- (i) What are block and graft polymers?
- (j) Differentiate between addition and condensation polymerization. Give e.g for each.

PART B (5×4)

- Q.2 Derive an expression for the rate of reaction for the free radical polymerization.
- Q.3 With the help of a neat diagram, explain the working of Wiped Film reactor?
- Q.4 Why the emulsion polymerization is preferably carried out in homogeneous continuous flow tank reactors?
- Q.5 In a homogeneous isothermal liquid polymerization, 20% of the monomer is disappeared in 34 minutes for initial monomer conc. of 0.04 and also for 0.08 mol/l. Find a rate equation to represent disappearance of the monomer?
- Q.6 Explain in detail the important factors to be considered while designing a reactor for any given polymeric reaction.

PART C (10×2)

- Q. 7 (a) Find a relation for Number Average and Weight Average degree of polymerization and Prove that $X_w / X_n \rightarrow 2$ as $p \rightarrow 1$.
(b) How can advance stage of polymerisation be achieved? Discuss in detail the working of Wiped Film Reactor?
- Q. 8 (a) Derive the co-polymer equation. Discuss how different cases of alternating, homo-polymer, block, random and azeotropic co-polymers are formed with change in reactivity ratios in a batch reactor.
(b) Write down the factors which must be considered for the design of an ideal batch reactor for the production of Phenol formaldehyde.
- Q. 9 What are micelles? Using Smith and Ewart theory for State II of emulsion polymerization, prove that rate of polymerization in second stage of emulsion polymerization is given by relation $r_p = k_p [M] N_t / 2$, where r_p is rate of polymerisation.