

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII(NEW) EXAMINATION – SUMMER 2019

Subject Code: 2172602/2172607

Date: 14/05/2019

Subject Name: Polymer Kinetics

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) With suitable example, explain non elementary reaction. 03
 (b) Compare collision theory with transition state theory. 04
 (c) Discuss in detail about the factors affecting rate of reaction. 07

- Q.2 (a) Give the classification of reactor based on it's operation. 03
 (b) Differentiate the molecularity and order of reaction. 04
 (c) For gas phase decomposition of azomethane $(CH_3)_2N_2 \rightarrow C_2H_6 + N_2$. The rate expression is $r_{N_2} = k_1 \cdot C_{AZO} / (1 + k' \cdot C_{AZO})$. Devise mechanism to explain this rate. 07

OR

- Q.2 (c) Decomposition of actone dicarboxylic acid is first order reaction $CO(CH_2COOH)_2 \rightarrow CO(CH_3)_2 + 2CO_2$. Following is data for the same: 07

T, K	273	293	313	333
$K_1 (s)^{-1}$	$2.46 \cdot 10^5$	$47.5 \cdot 10^5$	$576 \cdot 10^5$	$5480 \cdot 10^5$

Find out the energy of activation for this reaction graphically.

- Q.3 (a) Explain the term space time with suitable example. Also give it's unit. 03
 (b) Decomposition of gas is second order reaction. When initial concentration of gas is $5 \cdot 10^{-4}$ mole/liter it is 40% decomposed in 50 minutes. Calculate the value of rate constant. 04
 (c) Derive the performance equation of ideal Continuous Stirred Tank Reactor (CSTR) for first order variable volume system. 07

OR

- Q.3 (a) Derive the integral rate equation for n^{th} reaction. 03
 (b) Explain the term space velocity with suitable example. Also write it's unit. 04
 (c) Derive the performance equation for ideal Plug Flow Reactor (PFR) for first order variable volume system. 07

- Q.4 (a) Explain the term 'chain Modifier'. 03
 (b) Write a note on 'Ceiling Temperature'. 04
 (c) Discuss the kinetics of the cationic polymerization. 07

OR

- Q.4 (a) Define the term 'chain transfer constant'. List the factors affecting it. 03
 (b) What do you mean by 'Mayo Equation'? Give it's application. 04
 (c) Discuss the kinetics of anionic polymerization. 07

- Q.5 (a) Explain the term 'telomerization'. 03
 (b) Which principles are adopted to achieve the narrow composition distribution in case of copolymerization. 04
 (c) Discuss the viscometry method to determine the molecular weight of polymer. 07

OR

- Q.5**
- (a)** What do you mean by kinetic chain length? Give it's relationship with degree of polymerization. **03**
 - (b)** Which conclusions can be drawn regarding to kinetics of free radical polymerization? **04**
 - (c)** Discuss the ultracentrifugation method to determine the molecular weight of polymer. **07**

www.FirstRanker.com