

# 國立聯合大學 107 學年度碩士班考試招生

## 化學工程學系碩士班 入學考試試題

科目：化工動力學第1頁共1頁

1. What is the unit of rate constant for a second order reaction? 10 points
2. What are the factors which can affect the reaction rate? 10 points
3. Explain the following terms (a) the reaction in series (b) the reaction in parallel (c) autocatalytic reaction (d) elementary reaction 40 points
4. A chemical reaction is undergone at 340 K for 30 min to get products, but if it is working at 350 K it only needs 15 s for the same result. Find the activation energy of this reaction. 10 points
5. For a reaction  $A \xrightarrow{k_1} R$  with  $k_1 = 2 \text{ hr}^{-1}$ , if A is fed at  $C_{A0} = 2 \text{ mol/liter}$ , and outlet concentration  $C_{Af} = 1 \text{ mol/liter}$ ,  
(a) Find the reaction time in a batch reactor?  
(b) Find the space time for a plug flow reactor?  
(c) Find the space time for a mixed flow reactor? 30 points
6. The kinetic data for a reaction  $A \xrightarrow{k_1} R$  had been investigated.

$t$ (min)	0	1	2.67	6	16
$C_A$ (mol/l)	10	8	6	4	2

If this is a second order reaction, find rate constant. 20 points

7. An elementary and irreversible gaseous reaction  $A \xrightarrow{k_1} 1.6R$  starts with pure A and the volume of the reaction mixture increases by 50% in 4 min. The reaction was undergone at constant pressure 1.2 atm and 25°C. What is the value of  $k_1$ ? 40 points
8. The mechanism of enzyme catalyzed reaction can be described as



Where  $E$  is enzyme,  $S$  is substrate,  $P$  is product, and  $K_m$  is equilibrium constant define as  $K_m = \frac{[E][S]}{[ES]}$ .

Find the rate equation  $r_p$ . 40 points