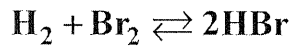


國立聯合大學 102 學年度碩士班考試招生

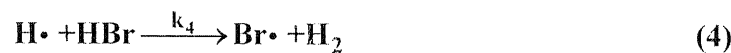
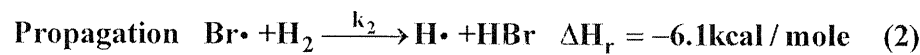
化學工程學系 入學考試試題

科目：化工動力學第1頁共1頁

1. The mechanism of the reaction



was proposed as the following steps



Prove that the reaction rate can be fitted as

$$\frac{d[\text{HBr}]}{dt} = \frac{k[\text{H}_2][\text{Br}_2]^{1/2}}{1 + k'[\text{HBr}]/[\text{Br}_2]} \quad (15\%)$$

2. For the decomposition $A \rightarrow R$, $C_{A0} = 1$ mol/liter, in a batch reactor conversion is 75% after 1 hour, and is just complete after 2 hours. The rate equation can be expressed as $-r_A = kC_A^n$, find k and n . (15%)
3. Consider an isothermal single-phase flow reactor operating at steady-state and constant pressure. Given a gaseous feed, $C_{A0} = 200$, $C_{B0} = 100$, $A + B \rightarrow R$, $C_B = 50$. Find the conversion X_A , X_B and the concentration C_A . (15%)
4. Reaction $A \rightarrow R$, second-order kinetics and $C_{A0} = 1$ mol/liter, we get 50% conversion after 1 hour in a plug flow reactor. What will be the conversion and concentration of A after 1 hour if $C_{A0} = 10$ mol/liter? (15%)
5. In an aqueous feed stream (25 liter/min) with reactant A ($C_{A0} = 2$ mol/liter) the kinetics of the fermentation at a given enzyme concentration is given by
- $$A \xrightarrow{\text{enzyme}} R, \quad -r_A = \frac{0.1C_A}{1 + 0.5C_A} \quad (\text{mol/liter-min})$$
- Find the conversion of A in the exit stream of a 500 liter mixed flow reactor. (15%)
6. Reactant A ($A \rightarrow R$, $C_{A0} = 10$ mol/liter, $-r_A = 0.5 C_A$ mol/liter-min) passes through 2 equal-sized mixed flow reactors in series. When steady state is achieved C_A is found to be 1 mol/l, what must be the space time τ for each mixed flow reactor? (15%)
7. For a reaction $A \rightarrow R$ with $-r_A = k C_A$ is proceeded in N equal-sized mixed flow reactors, when $N \rightarrow \infty$ prove that $N\tau_i = \frac{1}{k} \ln \frac{C_0}{C}$, where τ_i is the space time for each single mixed flow reactor, C_0 is the initial concentration of A and C is the final concentration of A. (10%)