

系別：化學工程與材料工程學系

科目：化學反應工程

准帶項目請打「V」	
✓	簡單型計算機

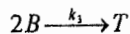
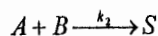
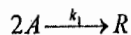
本試題共 / 頁，5 大題

1. A CSTR is used to decompose a dilute solution of A. The decomposition is irreversible and first order, with reaction rate constant of 3.45 h^{-1} . The reactor volume is 10 m^3 . What flow rate of feed solution be treated by this reactor if 95% decomposition is required? (15 分)
2. The elementary gas-phase reaction $A \rightarrow B + 2C$ is carried out isothermally in a flow reactor with no pressure drop. The specific reaction rate at 50°C is 10^{-4} min^{-1} and the activation energy is 85 kJ/mol . Pure A enters the reactor at 10 atm and 127°C and a molar flow rate of 2.5 mol/min . Calculate the reactor volume and space time to achieve 90% conversion in a PFR. (20 分)
3. The liquid-phase irreversible reaction $A \rightarrow B + C$ is carried out in a CSTR. To learn the rate law the volumetric flow rate, v_0 , is varied and the effluent concentrations of species A recorded as a function of the space time τ . Pure A enters the reactor at a concentration of 2 mol/dm^3 . Steady-state conditions exist when the measurements are recorded.

Run	1	2	3	4	5
τ (min)	15	38	100	300	1200
C_A (mol/dm ³)	1.5	1.25	1.0	0.75	0.5

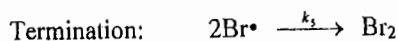
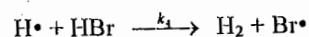
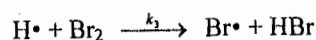
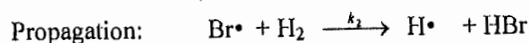
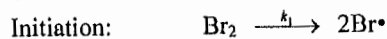
Determine the reaction order and specific reaction rate. (20分)

4. A and B react with each others as following elementary reactions: (20 分)



Find what ratio of A to B should be in a CSTR so as to maximize the fractional yield of desired product S.

5. The mechanism of a homogeneous gas phase reaction $\text{H}_2 + \text{Br}_2 \rightleftharpoons 2\text{HBr}$ is suggested as follows:



Determine the overall rate expression for the rate of formation of HBr. (25 分)