

國立高雄大學 112 學年度研究所碩士班招生考試試題

科目：化工動力學
 考試時間：100 分鐘

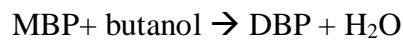
系所：化學工程及材料工程學系
 (無組別)
 本科原始成績：100 分

是否使用計算機：是

1. Gaseous reactant A decomposes as follows: $A \rightarrow 3R$, $-r_A = (0.6 \text{ min}^{-1})C_A$

Find the conversion of A in a 60% A-40% inert feed ($v_0 = 100$ liters/min, $C_{A0} = 1$ mol/liter) to a 1 m^3 continuous stirred tank reactor (CSTR). (24%)

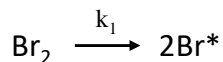
2. Dibutyl phthalate (DBP) is produced from mono-n-butyl phthalate (MBP) with butanol in liquid phase and catalyzed with H_2SO_4 in a continuous stirred tank reactor (CSTR), according to the following reaction:



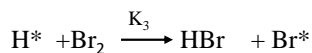
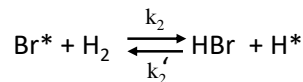
It is assumed as elementary reaction. The reactants are in separate tanks, with 4 mol/liter of NMP and 2 mol/liter butanol, and they are fed at a rate of 20 and 60 liters/h, respectively. Both are mixed before entering the reactor. The specific rate is equal to 4.4×10^{-2} liter/(mol.h). Calculate the volume and space time (τ) of the reactor to a conversion of 60% of limiting reactant. (26%)

3. Determine the rate of formation of Hydrogen bromide (HBr) considering the mechanism of chain reaction: (25%)

(a) Initiation:

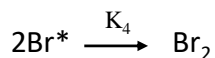


(b) Propagation of the chain:

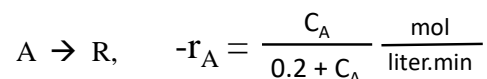


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(c) Termination:



4. We wish to treat 10 liters/min of liquid feed containing 1 mol A/liter to 99% conversion. The stoichiometry and kinetics of the reaction are given by



Suggest a good arrangement or method for doing this using two continuous stirred tank reactors (CSTR), and find the size of the two reactors needed. (25%)