Chemical Reaction Engineering I

Quiz 5

by
Sureena Abdullah
Mohd Sabri Mahmud

Faculty of Chemical and Natural Resources Engineering
sureena@ump.edu.my

QUESTION 1

Chemical C can be synthesized via a gaseous reaction at 131°C as follows;

$$A + B \xrightarrow{k'} C + D$$

The reaction follows elementary rate law when using catalyst 1 and catalyst 2. The reaction kinetics and side reaction are a shown below:

Catalyst 1	Catalyst 2
k'_1=20 $L^2 kgcat^{-1} mol^{-1} min^{-1}$	k'_1=73 $L^2 kgat^{-1} mol^{-1} min^{-1}$
E_1= 42.3 $kJmol^{-1}$	E_1= 23 $kJmol^{-1}$
No side reaction	Elementary side reaction
	$2A \xrightarrow{k'_2} E$
	k'_2=150 $L^2 kgat^{-1} mol^{-1} min^{-1}$
	E_2= 23 $kJmol^{-1}$

Estimate the residence time for a constant-volume reactor for each catalyst converting 90% of A at 150°C. Initial concentration of A and B are 1mol/L respectively. (catalyst 1; t=0.25min catalyst 2 = 0.09 min)

Authors Information

Credit to the authors:
Assoc Prof Dr Maksudur Rahman Khan,
Madam Hamidah Abdullah