



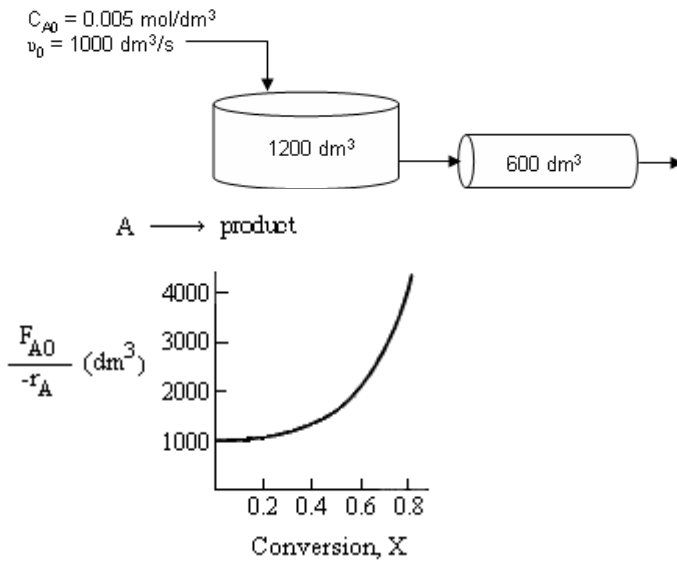
Sardar Beant Singh State University, Gurdaspur
Department of Chemical Engineering & Bio Technology

Assignment No.3

Subject: Chemical Reaction Engineering-I

Topic: Sizing of reactor and series arrangement of reactors

Q1. Pure A is fed at a volumetric flow rate of $1000 \text{ dm}^3/\text{h}$ and at a concentration of 0.005 mol/dm^3 to an existing CSTR, which is connected in series to an existing tubular reactor.



If the volume of the CSTR is 1200 dm^3 and the tubular reactor volume is 600 dm^3 , what are the intermediate and final conversions that can be achieved with the existing system? The reciprocal rate is plotted in the figure below as a function of conversion for the conditions at which the reaction is to be carried out.

Q2. Using either the data in Table, calculate the reactor volumes V_1 , V_2 , and V_3 for the CSTR/PFR/CSTR reactors in series sequence shown in Figure along with the corresponding conversion.

X	0	0.2	0.4	0.6	0.8
$-r_A \text{ (mol/dm}^3\text{.s)}$	0.010	0.0091	0.008	0.005	0.002
$-1/r_A \text{ (dm}^3\text{.s/mol)}$	100	110	125	200	500
$F_{A0}/-r_A \text{ (dm}^3\text{)}$	200	220	250	400	1000

