

## Chemical Reaction Engineering I

# Self Test 2

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# **QUESTION 1**

(a) The following liquid phase reaction

 $A + B \rightarrow C + D$ 

has the reaction kinetics (initial concentration of A is 0.05 mol dm<sup>-3</sup>), shown in Table 2

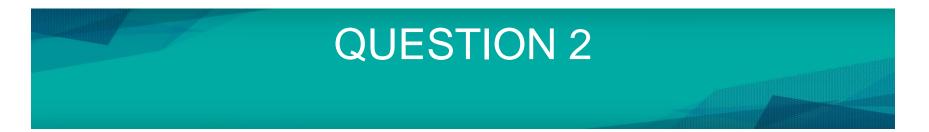
C <sub>A</sub> (mol dm <sup>-3</sup> )	0.05	0.04	0.03	0.02	0.01
-r <sub>A</sub> (mol dm <sup>-3</sup> s <sup>-1</sup> )	0.005	0.0042	0.003	0.0025	0.00125

The same reaction now will be conducted in a 1200 dm<sup>3</sup> CSTR with its exit connected in-series to a PFR with volume of 600 dm<sup>3</sup>. The entering  $C_{A0}$  and  $C_{B0}$  to a CSTR are 0.05 mol dm<sup>-3</sup> and 1 mol dm<sup>-3</sup>, respectively. In addition, the entering total volumetric flowrate is 100 dm<sup>3</sup> s<sup>-1</sup>. The exit conversion from the PFR is 80%.

- (i) Develop the Levenspiel Plot associated with the given data (refers to the table)
- (ii) Determine the intermediate conversions that can be achieved.



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Pure gas A enters the reactor at 830 kPa, having a volumetric flow rate,  $v_0$  of 4 dm<sup>3</sup>/s at 450 K. Find the initial concentration of A, C<sub>A0</sub> and the entering molar flow rate, F<sub>A0</sub>. Assume A is an ideal gas.



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#### **Authors Information**

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