

**Exercise 16**

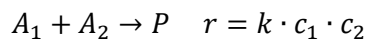
It is planned to carry out a second order reaction in a circular microchannel at a Reynolds number of 200 in order to benefit from accelerated mixing by stretching and engulfment. The two reactants are fed separately and contacted in a T-mixer.

**Physical properties and geometric factors**

Kinematic viscosity:  $\nu = 10^{-6} \text{ m}^2 \cdot \text{s}^{-1}$

Density:  $\rho = 1000 \text{ kg} \cdot \text{m}^{-3}$

Characteristic reaction time:  $t_r = 1 \text{ s}$



Equal inlet molar flowrates of the two reactants

**Questions**

1. Calculate the diameter and length of a single channel circular micro-reactor to carry out this reaction at  $Re = 200$  with 96% conversion in the absence of segregation. Assume plug flow behavior of the micro-channel.
2. What flowrate can be processed in this reactor?
3. What is the pressure drop?