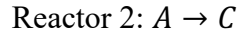
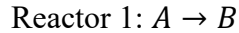


Name: _____

Problem 1a: Residence time in a PFR (6 points)

You have two PFR reactors with the following reactions:



Both are isothermal, isobaric, and irreversible gas-phase reactions. Assume that the rates of reaction for both are identical ($-r_A = k_A C_A$) with the same value of the rate constants. Temperature and pressure are kept constant and identical in both reactors. The inlet molar flowrate of A (F_{A0}) and the inlet volumetric flowrate (v_0) are identical. Both reactors have the same total volume (V). Only A is fed into both reactors.

Will the outlet molar flowrate (F_A) from reactor 1 be larger, equal, or smaller than that of reactor 2? Justify your answer in 1-2 sentences. Response without justification will not receive credit.

Hint: Recall that inside a PFR, the residence time can be expressed as $\tau = \frac{V}{v_0}$ for constant volumetric flow rate and $\tau = \int_0^V \frac{dV}{v}$ for varying volumetric flow rate.