Parallel Reactions

$$A + B \rightarrow R$$
$$A + R \rightarrow P$$

Take R as the desired product

$$M_A = M_B = 1$$

$$Da = \frac{\tau_{mix}}{\tau_{rxn}} = \frac{\text{reaction rate}}{\text{mixing rate}}$$

$$S = \frac{Y_R}{Y_R + Y_P}$$

$$\frac{dY_A}{dt} = -Da_1 Y_A Y_B - \frac{1}{2} Da_2 Y_A Y_R$$

$$\frac{dY_B}{dt} = -Da_1 Y_A Y_B$$

$$\frac{dY_R}{dt} = 2 Da_1 Y_A Y_B - Da_2 Y_A Y_R$$

$$\frac{dY_P}{dt} = \frac{3}{2} Da_2 Y_A Y_R$$

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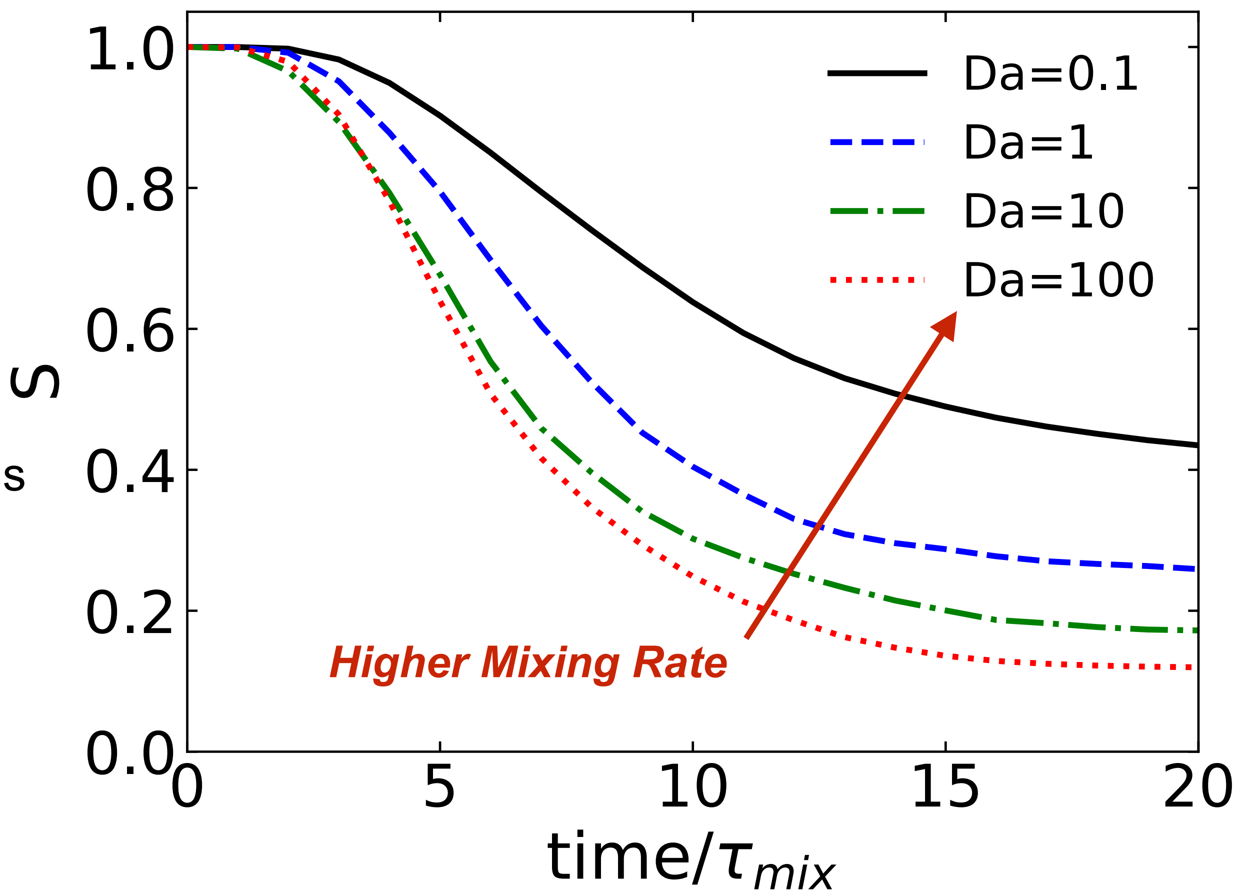
- Initially segregated reactants, 9 levels
- **Re = 1625 (645, 256)**
- Vary τ_{mix} with constant reaction rates
- Higher mixing rate favors desired product R.
  - Mixing dilutes R, reducing its concentration, hence the reaction rate forming P



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