Recap: finding a rate equation

Derivation the rate equation:

- 1. Find the RDS and (if applicable) the MARI
- 2. Write r=RDS
- 3. Find an eq. or SSA relation to calculate concentrations in the RDS
  - 3.1 If the RDS consumes the MARI, [MARI] is obtained from an eq. relation.
  - 3.2 If both steps are irreversible, use the SSA.

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Recap: finding a rate equation

How do I find a MARI?

- Don't assume you have to! It's an approximation and lots of RX don't have MARIs
- Look for clues:
  - In the rate equation: e.g.: $r = \frac{cst1\ P_{PO} - cst2\ P_{PHOH}/P_{H_2}}{1 + cst3\ P_{H_2}^{0.5}}$
  - In the conditions*: high P, high/low conversion,…

e.g.:

(1) $A + * \underset{}{\overset{K_1}{\rightleftharpoons}} A*$

(2) $A* \xrightarrow{k_2} B*$

(3) $B* \underset{}{\overset{K_3}{\rightleftharpoons}} B + *$

At high or low conversion, or at high P_A or P_B, we can force A* or B* to be the MARI

  - In your chemical intuition (the most risky)

*You choose them so you can force a MARI…

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