**K_p for Systems**

- So far only considered one “reaction” relationship
  - e.g., \( A + B \leftrightarrow C \)
- What if we had a system of such relations (more than one “reaction”)
  - e.g., \( A + B \leftrightarrow C \) (r1)
  - \( A + C \leftrightarrow D + E \) (r2)
- We could also write this as a single expression
  - i.e., \( 2A + B \leftrightarrow D + E \) (r3) = (r1) + (r2)
- Are \( K_p \)'s for these reactions related?

\[
K_{p_1} = \frac{P_C}{P_A P_B} \quad K_{p_2} = \frac{P_D P_E}{P_A P_C} \quad K_{p_1} K_{p_2} = \frac{P_C P_D P_E}{P_A P_B P_C} = K_p
\]

overall \( K_p = \text{product of individual step} K_p \)

\[K_p = \prod_j K_{p_j}\]