ACA Part 3 for Extent of a Chemical Reaction
Name(s) with Lab section in Group

Calculating the Equilibrium Concentration of all Species

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1. Below are 1.0 L containers for the initial and equilibrium condition for the reaction,

\[ \text{A}_2(\text{g}) + \text{D}_2(\text{g}) \rightarrow 2\text{AD}(\text{g}) \]

Calculate the magnitude of the equilibrium constant for the reaction.

Container before reaction started

![Container before reaction started]

Container after reaction achieves equilibrium

![Container after reaction achieves equilibrium]

Show work:

2. Setup the ICE table for the following general chemical equation. (Assume the reaction proceeds from left to right to establish equilibrium.)

\[ a\text{A}_g(s) + b\text{B}_g(s) \rightleftharpoons x\text{X}_g(s) + y\text{Y}_g(s) \]
3. The equilibrium constant, $K_p$, for the reaction

$$H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$$

is 0.0202. If the initial partial pressure of $H_2 = I_2 = 0.350$ atm, calculate the equilibrium partial pressures of all species.

4. The equilibrium constant, $K_c$, for the reaction

$$PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$$

is 33.3 at 760 °C. If 0.400 mol of PCl$_5$ are placed in a 2.00 liter container, calculate the equilibrium concentrations of all species.
5. The equilibrium constant, $K_c$, for the reaction

$$\text{PCl}_5(g) \rightleftharpoons \text{PCl}_3(g) + \text{Cl}_2(g)$$

is 33.3 at 760 °C. If 0.400 mol of PCl$_5$ and 1.0 mol of Cl$_2$ are placed in a 2.00 liter container, calculate the equilibrium concentrations of all species.