Name: Date:

CHEMICAL EQUILIBRIUM REACTIONS

Calculate the equilibrium constant, K_c, for the following reactions. Use the given concentrations of reactants and products at equilibrium.

For the reaction:

$$A(g) + B(g) \rightleftharpoons C(g) + D(g)$$

At equilibrium, the concentrations are:

$[A] = 0.25\ M, \quad [B] = 0.40\ M, \quad [C] = 0.15\ M, \quad [D] = 0.30\ M$

Calculate K_c!

Solution:

The equilibrium constant expression is: $K_c = \dfrac{[C][D]}{[A][B]}$

Substitute the values:

$$K_c = \frac{(0.15)(0.30)}{(0.25)(0.40)} = \frac{0.045}{0.10} = 0.45$$

For the reaction:

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

At equilibrium, the concentrations are:

$[PCl_5] = 0.10\ M, \quad [PCl_3] = 0.30\ M, \quad [Cl_2] = 0.20\ M$

Calculate K_c!

Solution:

The equilibrium constant expression is: $K_c = \dfrac{[PCl_3][Cl_2]}{[PCl_5]}$

Substitute the values:

$$K_c = \frac{(0.30)(0.20)}{(0.10)} = \frac{0.06}{0.10} = 0.460$$