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7.7 Calculating Equilibrium Concentrations

AP Chemistry

Compare Q with K to find the direction. Set up an ICE table in molarity. Check the small-x shortcut: (x ÷ starting concentration) × 100 should be less than 5%.

1. For $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$, $K_c = 0.0400$. A flask holds 0.200 M PCl_5, 0.100 M PCl_3, and 0.100 M Cl_2. Which way will it shift?

2. 0.300 M CO and 0.300 M H_2O are mixed for $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$, $K_c = 4.00$. Fill in the ICE table and find all equilibrium concentrations.

	CO	**H_2O**	**CO_2**	**H_2**
I				
C				
E				

3. 0.25 M PCl_5 is placed in a flask. $K_c = 1.0 \times 10^{-4}$. Use the small-x shortcut to find $[PCl_3]$ and $[Cl_2]$. Check the shortcut.

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4. A flask starts with only 0.500 M HI for $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, $K_c = 49.0$. Which way does it shift? Find all equilibrium concentrations.

5. 1.00 mol N_2O_4 is placed in a 5.00 L flask. $N_2O_4(g) \rightleftharpoons 2NO_2(g)$, $K_c = 4.6 \times 10^{-3}$. Try the small-x shortcut and check it. If it fails, solve with the quadratic formula.

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