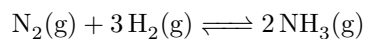


Example #2:

In a 4.0 L flask, the following equilibrium is set up:



This is done by injecting 7.005 g N_2 and 0.808 g H_2 . After equilibrium has been reached, the $[\text{NH}_3]$ is found to be 0.25 mol/L Find k_{eq} for this reaction.

	N_2	+	3H_2	\rightleftharpoons	2NH_3
Initial []	/				
Initial Amount	0.250 mol		0.400 mol		\emptyset
Final Amount	$0.250 - 0.050$ $= 0.200$ mol		$0.400 - 0.150$ $= 0.250$ mol		0.100 mol
Final []	0.0500 mol/L		0.0625 mol/L		0.0250 mol/L

4.0 L flask

$$\textcircled{1} \quad 7.005 \text{ g N}_2 \times \frac{1 \text{ mol N}_2}{28.02 \text{ g N}_2} = 0.250 \text{ mol N}_2$$

$$\textcircled{2} \quad 0.808 \text{ g H}_2 \times \frac{1 \text{ mol H}_2}{2.02 \text{ g H}_2} = 0.400 \text{ mol H}_2$$

$$\textcircled{3} \quad n = CV$$

$$n = 0.0250 \text{ mol/L} \times 4 \text{ L}$$

$$n = 0.100 \text{ mol}$$

$$\textcircled{4} \quad 0.100 \text{ mol NH}_3 \times \frac{1 \text{ mol N}_2}{2 \text{ mol NH}_3} = 0.050 \text{ mol N}_2$$

$$\textcircled{5} \quad 0.100 \text{ mol NH}_3 \times \frac{3 \text{ mol H}_2}{2 \text{ mol NH}_3} = 0.150 \text{ mol H}_2$$

$$\textcircled{6} \quad \text{and} \quad \textcircled{7} \quad C = \frac{n}{V}$$

$$k_{\text{eq}} = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3}$$

$$k_{\text{eq}} = \frac{(0.025)^2}{(0.05)(0.0625)^3}$$

$$k_{\text{eq}} = 51.2$$