

Equilibrium

Part 2

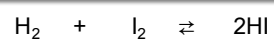
Calculating k_{eq}

- If you don't know all of the [equilibrium], you must make an ICE table
- Fill in what you know & solve for all unknowns

Calculating k_{eq}

- A mixture of 5.00×10^{-3} mol of H_2 and 1.000×10^{-2} mol of I_2 are placed into a 5.000 L container at $448^\circ C$ and allowed to come to equilibrium. Analysis of the equilibrium showed that $[HI]$ was 1.87×10^{-3} M. Calculate k_c at $448^\circ C$.

Calculating k_{eq}



I			
C			
E			

Calculating k_{eq}

- $2\text{SO}_3 \rightleftharpoons 2\text{SO}_2 + \text{O}_2$
- $[\text{SO}_3]_{\text{initial}} = 6.09 \times 10^{-3} \text{ M}$
- $[\text{SO}_3]_{\text{eq}} = 2.44 \times 10^{-3} \text{ M}$
- Calculate K_c

Calculating k_{eq}

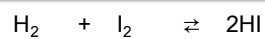


I			
C			
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Calculating k_{eq}

- 1.000 mol of H_2 and 2.000 mol I_2 are placed in a 1.000 L container. The k_c for this reaction is 50.5. Calculate the equilibrium concentrations for H_2 , I_2 , and HI

Calculating k_{eq}



I			
C			
E			

Calculating k_{eq}

- $PCl_5 \rightleftharpoons PCl_3 + Cl_2$
- $K_p = 0.497$
- $(P_{PCl_3})_{initial} = 1.66 \text{ atm}$
- Calculate all equilibrium partial pressures

Calculating k_{eq}



I			
C			
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LeChâtelier's Principle

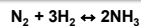
- Le Châtelier's principle states that if a system at equilibrium is subjected to a stress, the equilibrium is shifted in the direction that tends to relieve the stress.
- Stresses include: _____, _____, _____ & _____
- Stresses DO NOT include: adding a _____ & increasing _____

Concentration



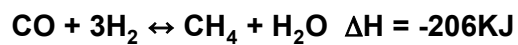
- Which way does the equilibrium shift if $[CO]$ is increased
- Which way does the equilibrium shift if $[CH_4]$ is increased
- Which way does the equilibrium shift if $[H_2]$ is increased
- Which way does the equilibrium shift if $[H_2O]$ is increased

Concentration



- Add N_2
- Add H_2
- Add NH_3
- Remove N_2
- Remove H_2
- Remove NH_3

Temperature



- Increase the temperature

- Decrease the temperature

Volume & Pressure

- When doing volume & Pressure...you look at the number of moles
- $\text{CO} + 3\text{H}_2 \leftrightarrow \text{CH}_4 + \text{H}_2\text{O}$

Volume & Pressure

- $\text{CO} + 3\text{H}_2 \leftrightarrow \text{CH}_4 + \text{H}_2\text{O}$
- Increase the pressure

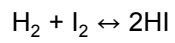
- Increase the volume

- Decrease the volume

- Decrease the pressure

- Added He to the system

Volume & Pressure



Increase Volume & pressure → no change