

## Equilibrium problems

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1. At a certain temperature a mixture of  $\text{H}_2$  and  $\text{I}_2$  was used to prepare HI by placing a 0.100 mol of  $\text{H}_2$  and 0.100 mol of  $\text{I}_2$  into a 1.0 L liter flask. After a period of time the equilibrium was achieved for the reaction  $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \leftrightarrow 2\text{HI}(\text{g})$ . When the system attained equilibrium the concentration of  $\text{I}_2$  dropped to 0.020 mol/L. What is the value of  $K_c$  for this reaction?

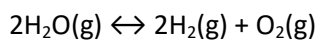
Ans.  $K_c = 64$

2. The reversible reaction  $\text{CH}_4(\text{g}) + \text{H}_2\text{O}(\text{g}) \leftrightarrow \text{CO}(\text{g}) + 3\text{H}_2(\text{g})$ . Equilibrium concentrations of  $[\text{CO}] = 0.300\text{M}$ ,  $[\text{H}_2] = 0.800\text{M}$ , and  $[\text{CH}_4] = 0.400\text{M}$  at  $1500^\circ\text{C}$ .  $K_c$  for the reaction is 5.67 for this reaction. What is the equilibrium concentration of  $\text{H}_2\text{O}$  in this mixture? Ans.  $[\text{H}_2\text{O}(\text{g})] = 0.0678\text{M}$

*SCH4U Equilibrium*

3. The reaction  $\text{CO(g)} + \text{H}_2\text{O(g)} \leftrightarrow \text{CO}_2\text{(g)} + \text{H}_2\text{(g)}$  Has a  $K_c = 4.06$  at  $500\text{ }^\circ\text{C}$ . If  $0.100\text{ mol}$  of  $\text{CO(g)}$  and  $0.100\text{ mol}$  of  $\text{H}_2\text{O(g)}$  are placed in a  $1\text{ liter}$  reaction vessel at this temperature, what are the concentrations of the reactants and products when the system attain equilibrium Ans:  $x = 0.0668\text{ M}$

4. Decomposition of water at  $1000\text{ }^\circ\text{C}$  has a  $K_c$  value for the reaction which is  $7.3 \times 10^{-18}$



If  $0.100\text{ M}$  is the initial concentration of water, what will the  $\text{H}_2$  concentration be at equilibrium. Ans:  
 $x = 5.26 \times 10^{-7}$

