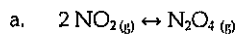


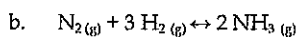
5.2 - Equilibrium Constant - Keq Teacher.notebook

5.2 - Equilibrium Constant - K_{eq} - Worksheet

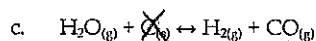
1. Write equilibrium expressions for the following reversible reactions:



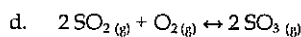
$$K_{eq} = \frac{[\text{N}_2\text{O}_4]}{[\text{NO}_2]^2}$$



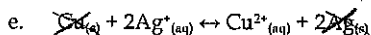
$$K_{eq} = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3}$$



$$K_{eq} = \frac{[\text{H}_2\text{O}]}{[\text{H}_2][\text{CO}]}$$



$$K_{eq} = \frac{[\text{SO}_3]^2}{[\text{SO}_2]^2[\text{O}_2]}$$



$$K_{eq} = \frac{[\text{Cu}^{2+}]}{[\text{Ag}^+]^2}$$

2. For the equilibrium system described by $2 \text{SO}_2(g) + \text{O}_2(g) \leftrightarrow 2 \text{SO}_3(g)$ at a particular temperature the equilibrium concentrations of SO_2 , O_2 and SO_3 were 0.75 M, 0.30 M, and 0.15 M, respectively. At the temperature of the equilibrium mixture, calculate the equilibrium constant, K_{eq} , for the reaction.

$$K_{eq} = \frac{[\text{SO}_3]^2}{[\text{SO}_2]^2[\text{O}_2]} = \frac{[0.15\text{M}]^2}{(0.75\text{M})^2(0.3\text{M})} = \boxed{0.13}$$

5.2 - Equilibrium Constant - Keq Teacher.notebook

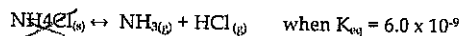
5.2 - Equilibrium Constant - Keq - Worksheet

3. For the equilibrium system described by: $\text{PCl}_5(\text{g}) \leftrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ Keq equals 35 at 487°C . If the concentrations of the PCl_5 and PCl_3 are 0.015 M and 0.78 M, respectively, what is the concentration of the Cl_2 ?

$$K_{eq} = \frac{[\text{PCl}_3][\text{Cl}_2]}{[\text{PCl}_5]} \Rightarrow 35 = \frac{(0.78\text{M})[\text{Cl}_2]}{(0.015\text{M})}$$

$$[\text{Cl}_2] = 0.67\text{M}$$

4. Find the concentration of the products for the following:



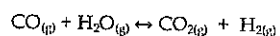
$$K_{eq} = [\text{NH}_3][\text{HCl}]$$

$$6.0 \times 10^{-9} = (x)(x)$$

$$\sqrt{6.0 \times 10^{-9}} = x$$

$$x = 7.7 \times 10^{-5}\text{M} = [\text{NH}_3] = [\text{HCl}]$$

5. For the equilibrium reaction



the K_{eq} value at $690^\circ\text{C} = 10.0$. A reaction mixture is analyzed and found to contain 0.80M CO , 0.050M H_2O , 0.50M CO_2 and 0.40M H_2 . Show that the reaction is not at equilibrium.

$$K_{eq} = \frac{[\text{CO}_2][\text{H}_2]}{[\text{CO}][\text{H}_2\text{O}]} = \frac{(0.5\text{M})(0.4\text{M})}{(0.8\text{M})(0.05\text{M})} = 5$$

Since $K_{eq} \neq 10$, it is not at equilibrium

6. For each of the following reactions, state whether the value of the equilibrium constant favours the formation of reactants or products.

