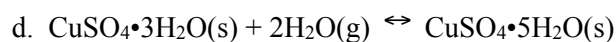
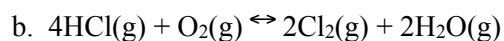
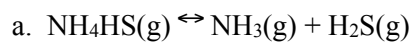


Equilibrium Constant Practice Problems

1. Write equilibrium expressions for the following reactions.



2. At 793 K, the equilibrium constant for the reaction $\text{NCl}_3(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons \text{NCl}_5(\text{g})$ is 39.3.

a. Do products or reactants dominate in this equilibrium?

b. If the equilibrium constant for this reaction were less than 1, would the reactants or products be dominant?

3. At 773 K, the reaction $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$ produces the following concentrations:
 $[\text{NO}] = 3.49 \times 10^{-4} \text{M}$; $[\text{O}_2] = 0.80 \text{M}$; $[\text{NO}_2] = 0.25 \text{M}$.

a. What is the equilibrium constant expression for the reaction?

b. What is the equilibrium constant for the reaction?

4. If you wished to maximize the products of the following reactions, which concentrations would you lower or raise?

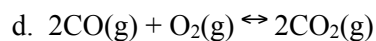
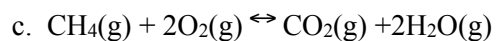
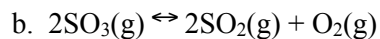
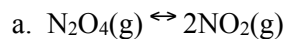
a. $\text{H}_2(\text{g}) + \text{Br}_2(\text{g}) \rightleftharpoons 2\text{HBr}(\text{g})$

b. $\text{CO}_2(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g})$

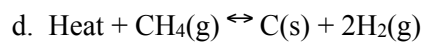
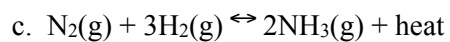
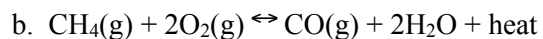
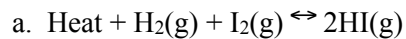
c. $\text{SO}_2(\text{g}) + \text{NO}_2(\text{g}) \rightleftharpoons \text{SO}_3(\text{g}) + \text{NO}(\text{g})$

d. $\text{C}(\text{s}) + \text{CO}_2(\text{g}) \rightleftharpoons 2\text{CO}(\text{g})$

5. For each reaction, state whether increasing or decreasing the volume of the reaction vessel would yield more product at equilibrium. Give the reason for your choice.



6. What effect would an increase in temperature have on these reactions at equilibrium? Why?



7. Phosphorous pentachloride decomposes to phosphorous trichloride according to this equation:
 $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$. At equilibrium, $[\text{PCl}_5] = 1.00\text{M}$ and $[\text{Cl}_2] = 3.16 \times 10^{-2}\text{M}$.

a. Write the expression for determining the concentration of PCl_3 .

b. What is the equilibrium concentration of PCl_3 ? Use: $K_{\text{eq}} = 1.00 \times 10^{-3}$.

8. The solubility product constant (K_{sp}) of Ag_2SO_4 is 1.2×10^{-5} .

a. How would you estimate the molar solubility of SO_4^{2-} without actually calculating it?

b. What is the calculated molar solubility of SO_4^{2-} ?