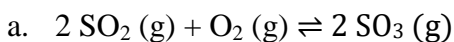


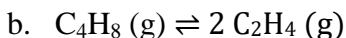
Name: _____

Equilibrium Calculations

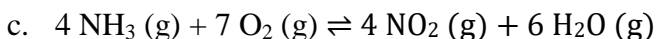
1. Complete the expressions for changes in concentrations for each of the following reactions.



$$x = \Delta[\text{O}_2] \quad \Delta[\text{SO}_2] = \underline{\hspace{2cm}} \quad \Delta[\text{SO}_3] = \underline{\hspace{2cm}}$$



$$-2x = \Delta[\text{C}_2\text{H}_4] \quad \Delta[\text{C}_4\text{H}_8] = \underline{\hspace{2cm}}$$



$$\Delta[\text{NH}_3] = \underline{\hspace{2cm}} \quad \Delta[\text{O}_2] = \underline{\hspace{2cm}} \quad \Delta[\text{NO}_2] = \underline{\hspace{2cm}} \quad \Delta[\text{H}_2\text{O}] = \underline{\hspace{2cm}}$$

2. When 1.00 mole of each of ethanol $\text{C}_2\text{H}_5\text{OH}$ and acetic acid $\text{CH}_3\text{CO}_2\text{H}$ react in 1.00 L of solution with acid catalysis in the solvent dioxane, they combine to produce ethyl acetate $\text{CH}_3\text{CO}_2\text{C}_2\text{H}_5$ and water. Equilibrium is reached when 1/3 mol of each of the reactants remains. Use an ICE table to calculate the equilibrium constant for the reaction. (Water is a solute in this reaction, not a solvent.)

| | $\text{C}_2\text{H}_5\text{OH}$ | $\text{CH}_3\text{CO}_2\text{H}$ | $\text{CH}_3\text{CO}_2\text{C}_2\text{H}_5$ | H_2O |
|-------------|---|--|--|--|
| Initial | | | | |
| Change | | | | |
| Equilibrium | | | | |

What is the equilibrium constant?

EQUILIBRIUM CALCULATIONS

3. Under certain conditions, the equilibrium constant K for the decomposition of PCl_5 (g) into PCl_3 (g) and Cl_2 (g) is 0.0211. What are the equilibrium concentrations of PCl_5 , PCl_3 , and Cl_2 in a mixture that initially contained only PCl_5 at a concentration of 1.00 M?