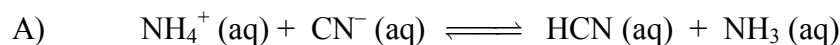


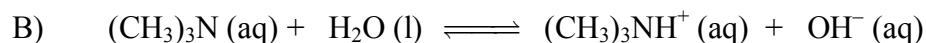
REVIEW QUESTIONS

Chapter 15

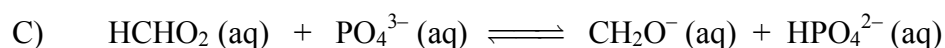
1. For each reaction below, identify the Brønsted-Lowry acid and base and their conjugates:



acid base acid base

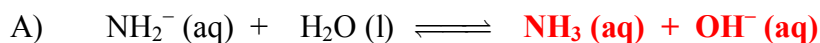


base acid acid base



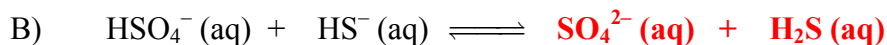
acid base base acid

2. Predict the products of the following acid-base reactions, and use Table 16.2 in your text to determine whether the equilibrium lies to the right or left of the equation:



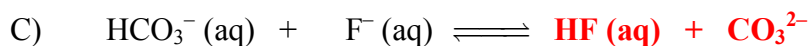
SB **SA** **WA** **WB**

Equilibrium lies to the right



SA **SB** **WB** **WA**

Equilibrium lies to the right



WA **WB** **SA** **SB**

Equilibrium lies to the left

3. Calculate the $[\text{OH}^-]$ for each solution below, and indicate whether each solution is acidic, basic or neutral:

A) $[\text{H}^+] = 6.0 \times 10^{-6} \text{ M}$

$$[\text{OH}^-] = \frac{K_w}{[\text{H}^+]} = \frac{1.0 \times 10^{-14}}{6.0 \times 10^{-6}} = 1.7 \times 10^{-9} \text{ M} \quad \text{Acidic}$$

B) $[\text{H}^+] = 2.5 \times 10^{-8} \text{ M}$

$$[\text{OH}^-] = \frac{K_w}{[\text{H}^+]} = \frac{1.0 \times 10^{-14}}{2.5 \times 10^{-8}} = 4.0 \times 10^{-7} \text{ M} \quad \text{Basic}$$

4. Calculate the $[\text{H}^+]$ and $[\text{OH}^-]$ for each of the following strong acids and bases:

A) $1.8 \times 10^{-4} \text{ M HBr}$

$$[\text{H}^+] = [\text{HBr}] = 1.8 \times 10^{-4} \text{ M}$$

$$[\text{OH}^-] = \frac{K_w}{[\text{H}^+]} = \frac{1.0 \times 10^{-14}}{1.8 \times 10^{-4}} = 5.6 \times 10^{-11} \text{ M}$$

B) $0.025 \text{ M H}_2\text{SO}_4$

$$[\text{H}^+] = 2 \times [\text{H}_2\text{SO}_4] = 5.0 \times 10^{-2} \text{ M}$$

$$[\text{OH}^-] = \frac{K_w}{[\text{H}^+]} = \frac{1.0 \times 10^{-14}}{5.0 \times 10^{-2}} = 2.0 \times 10^{-13} \text{ M}$$

C) $3.2 \times 10^{-3} \text{ M KOH}$

$$[\text{OH}^-] = [\text{KOH}] = 3.2 \times 10^{-3} \text{ M}$$

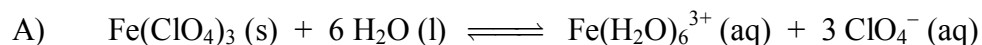
$$[\text{H}^+] = \frac{K_w}{[\text{OH}^-]} = \frac{1.0 \times 10^{-14}}{3.2 \times 10^{-3}} = 3.1 \times 10^{-12} \text{ M}$$

D) $0.0075 \text{ M Ca(OH)}_2$

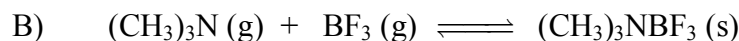
$$[\text{OH}^-] = 2 \times [\text{Ca(OH)}_2] = 1.5 \times 10^{-2} \text{ M}$$

$$[\text{H}^+] = \frac{K_w}{[\text{OH}^-]} = \frac{1.0 \times 10^{-14}}{1.5 \times 10^{-2}} = 6.7 \times 10^{-13} \text{ M}$$

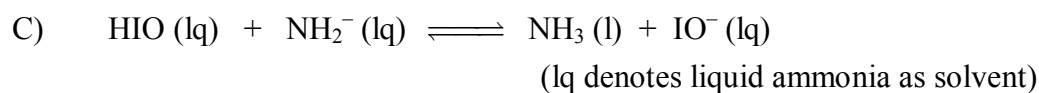
5. Identify the Lewis acid and base in each of the following reactions:



Acid **Base**



Base **Acid**



Acid **Base**

5. For each pair, determine which is the stronger acid, and give a brief explanation:



H_2SO_4 since sulfur is more electronegative than selenium causing the O—H bond to become more polar.



The more electronegative Cl atoms in $\text{CCl}_3\text{CO}_2\text{H}$ cause the O—H bond to become more polar and trichloroacetic acid to have greater acidity.



Acidic hydrogens are easier lost from a less negatively charged species, therefore

**H_2PO_4^- is
more
acidic.**