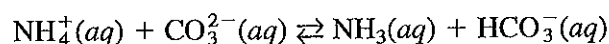


CHAPTER 15 REVIEW*Acids and Bases***SECTION 15-3****SHORT ANSWER** Answer the following questions in the space provided.

1. Answer the following questions according to the Brønsted-Lowry definitions of acids and bases:

- _____ a. What is the conjugate base of H_2SO_3 ?
- _____ b. What is the conjugate base of NH_4^+ ?
- _____ c. What is the conjugate base of H_2O ?
- _____ d. What is the conjugate acid of H_2O ?
- _____ e. What is the conjugate acid of HAsO_4^{2-} ?

2. Consider the following reaction:

a. If NH_4^+ is labeled as *acid 1*, label the other three terms as *acid 2*, *base 1*, and *base 2* to indicate the conjugate acid-base pairs._____ CO_3^{2-} _____ HCO_3^- _____ NH_3

_____ b. A proton has been transferred from acid 1 to base 2 in the above reaction. True or False?

3. Given the following neutralization reaction: $\text{HCO}_3^-(aq) + \text{OH}^-(aq) \rightleftharpoons \text{CO}_3^{2-}(aq) + \text{H}_2\text{O}(l)$

a. Label the conjugate acid-base pairs in this system.

b. Is the forward or reverse reaction favored? Explain your answer.

SECTION 15-3 continued

4. Table 15-6 on page 471 of the text lists several amphoteric species but only one other than water is neutral.

Omit

a. Identify that neutral compound.

b. Write two equations that demonstrate this compound's amphoteric properties.

Acts like both an acid + a base.

5. Write the formula for the salt formed in each of the following neutralization reactions:

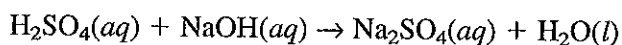
_____ a. potassium hydroxide combined with phosphoric acid

_____ b. calcium hydroxide combined with nitrous acid

_____ c. hydrobromic acid combined with barium hydroxide

_____ d. lithium hydroxide combined with sulfuric acid

6. Given the following unbalanced equation for a neutralization reaction:



a. Balance the equation.

b. In this system there are two spectator ions. Identify them.

c. In order to completely consume all reactants, what should be the mole ratio of acid to base?

7. The gases that produce acid rain are often referred to as NO_x and SO_x .

a. List three specific examples of these gases.

b. Coal- and oil-burning power plants oxidize any sulfur in their fuel as it burns in air to form SO_2 gas. The SO_2 is further oxidized by O_2 in our atmosphere to form SO_3 gas. The SO_3 gas can combine with water to form sulfuric acid. Write balanced molecular equations to illustrate these three reactions.

c. Industrial plants making fertilizers and detergents release NO_x gases into the air. Write a balanced equation for converting $\text{N}_2\text{O}_5(\text{g})$ into nitric acid by reacting it with water.
