Honors Chemistry

Chapter 14 Study Questions

1. Fill in the following table:

$[H^+]$	$[OH^-]$	pH	pOH	acid, base or neutral?
1.0×10^{-4} M				
	1.0×10^{-7} M			
		12.0		
			14.0	
		3.5		
4.6×10^{-3} M				
	8.2×10^{-12} M			

2. For each of the following: classify as acid or base, strong or weak, or amphoteric, and then write a balanced equation for its ionization in water:
   a) HNO_3 b) HF c) F^- d) HSO_3^- e) KOH

3. Find the pH of the following solutions:
   a) 0.010 moles HCl in 10.0 liters water.
   b) 6.0 g NaOH dissolved in 15.0 liters water.
   c) 5.0 ml 0.40 M HBr diluted to 20.0 liters with water.
   d) 0.10 M solution of benzoic acid.
   e) 0.20 M NaClO.
   f) 0.20 moles HCl plus 0.10 moles KOH dissolved in 1.0 liter water.

4. The pH of a 0.10 M solution of H_2CO_3, carbonic acid, is 3.68.
   a) Write an expression for the ionization of the first proton from carbonic acid.
   b) Write an expression for K_a for carbonic acid.
   c) Find the K_a of carbonic acid.
   d) What is K_b for HCO_3^-?

5. a) Why is the acetate ion, CH_3COO^-, a base according to the Bronsted-Lowry model?
   b) What is the conjugate acid of CH_3COO^-?
   c) Write a balanced equation in which CH_3COO^- acts as a base.

6. Write a balanced *net ionic* equation for the reaction between solutions of HNO_2 and KOH. Which 2 species are acting as acids? as bases?

7. List the following acids in order of increasing strength: HCl, $HC_2H_3O_2$, HCN, HF. List the following bases in order of increasing strength: Cl^-, $C_2H_3O_2^-$, CN^-, F^-.

8. For each of the following solutions, indicate whether it is acidic, basic or neutral:
   a) 0.10 M NaOH b) 0.10 M NH_4NO_3 c) 0.10 M KCl d) 0.10 M NaF

Summary of Chapter 14: Acids and Bases

properties of acids and bases
Bronsted-Lowry model
conjugate acid/base pairs
amphoteric substances
K_w: relationship between $[H^+]$ and $[OH^-]$
definitions of pH and pOH
defining acids and bases in terms of pH, $[H^+]$, pOH, and $[OH^-]$
find pH from $[H^+]$ and $[OH^-]$
strong and weak acids and bases
ionization equations
K_a and K_b
- expressions for K_a and K_b
- relationship to strength of acid or base
- relationship between K_a and K_b

calculation of K_a or K_b from pH and concentration
calculation of pH from K_a or K_b and concentration
percent dissociation
acid-base properties of salt solutions