Chemistry

Chapter 16 Study Questions

1. Fill in the following table:

	$[H^+]$	$[OH^-]$	pH	acid, base or neutral?
a)	1.0×10^{-4} M			
b)		1.0×10^{-7} M		
c)			12.0	
d)		1.0×10^{-11} M		

2. For each of the following, classify as strong acid, weak acid, strong base, weak base, or neutral salt, and then write a balanced equation for its ionization in water:
   a) HNO_3 b) HF c) F^- d) $NaNO_3$ e) KOH

3. Find the pH of the following solutions:
   a) 0.010 moles HCl in 10.0 liters water.
   b) 6.00 g NaOH dissolved in 15.0 liters water.
   c) 5.0 ml 0.40 M HBr diluted to 20 liters with water.

4. a) Why is the CH_3COO^- ion 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.

5. Write balanced *net ionic* equations for the following reactions. (Leave out spectator ions.)
   a) HCl and KOH b) HNO_2 and KOH c) HCl and HCO_3^-

6. Which 2 species in equation *5b* are acting as acids? as bases?

7. How many ml of 2.0 M NaOH would be required to neutralize 12.5 ml of 0.080 M HBr?

8. List the following acids in order of increasing strength: HCl, CH_3COOH, HCN, HF. (Use the Table of K_a's handed out in class to help you.)

9. A sample containing 1.26 g of baking soda ($NaHCO_3$) is titrated with an HCl solution and the data below were collected. Assume the baking soda reacts with HCl in a 1:1 ratio

mass of baking soda titrated	1.26 g
initial level of HCl	2.1 mL
final level of HCl	26.1 mL

   a) How many moles of baking soda were used in the titration?
   b) How many moles of HCl were needed to neutralize the baking soda?
   c) What volume of the HCl solution was needed to neutralize the baking soda?
   d) What is the molarity of the HCl solution?

Summary of Chapter 16: Acids and Bases

properties of acids and bases
Arrhenius definition of acids and bases
Bronsted-Lowry model of acids and bases
    conjugate acid/base pairs
strong and weak acids
the acid dissociation constant, K_a
    definition
    relationship to acid strength
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 $[OH^-]$
ionization (dissociation) equations for acids
acid-base equations
buffers