CHM 1010 **GAGE**

PROBLEM SET FOR ACIDS AND BASES

1. From the list of compounds below, determine which compounds are:
   a. Arrhenius acids
   b. Bronsted-Lowry bases
   c. weak bases
   d. Lewis acids
   e. salts

   NH_3, KOH, Na_2SO_4, H_2SO_4, $CaCO_3$, Na_2CO_3, H_2O, $Ba(OH)_2$, HBr, $KHCO_3$, KBr, BCl_3

2. How many mL of 0.234 M HCl are required to neutralize 45.0 mL of 0.135 M KOH? 35.0 mL of 0.088M $Mg(OH)_2$?

3. Complete and balance the following reactions:

   $Mg(OH)_2$ + HF ------->

   $BaCO_3$ + H_3PO_4 --------->

   NH_3 + HI ---------->

4. A 10.67 g sample of a solution of alanine (a monoprotic amino acid with the formula $CH_3CH(NH_2)COOH$) requires 42.3 mL of a 0.250 M NaOH solution to be neutralized. What is the w/w% of the acid solution?

5. Determine the pH and pOH of the following solutions:
   a. 3.4×10^{-3} M HCl
   b. 7.78×10^{-4} M NaOH
   c. 4.55×10^{-6} M $Mg(OH)_2$
   d. 0.000822 M HNO_3

6. Determine the H^+ and OH^- concentrations for solutions that have:
   a. pH = 4.56
   b. pOH = 11.90
   c. pH = 12.78
   d. pH = 6.6

(Over for Answers)

1. a. H_2SO_4, HBr
   b. NH_3, KOH, $CaCO_3$, Na_2CO_3, $Ba(OH)_2$, $KHCO_3$
   c. NH_3, $CaCO_3$, Na_2CO_3, $KHCO_3$
   d. H_2SO_4, HBr, BCl_3
   e. Na_2SO_4, KBr

2. 26.0 mL, 26.3 mL

3. $Mg(OH)_2 + 2\ HF \text{ -------> } MgF_2 + 2\ H_2O$
   $3\ BaCO_3 + 2\ H_3PO_4 \text{ ---------> } Ba_3(PO_4)_2 + 3\ CO_2 + 3\ H_2O$
   $NH_3 + HI \text{ ----------> } NH_4I$

4. 8.84%

5.

	pH	pOH
a.	2.47	11.53
b.	10.891	3.109
c.	8.959	5.041
d.	3.085	10.915

6.

	H^+	OH^-
a.	2.8×10^{-5}	3.6×10^{-10}
b.	7.9×10^{-3}	1.3×10^{-12}
c.	1.7×10^{-13}	6.0×10^{-2}
d.	2.5×10^{-7}	4.0×10^{-8}