

PROBLEM SET FOR ACIDS AND BASES

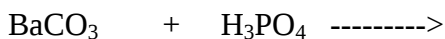
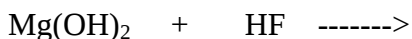
1. From the list of compounds below, determine which compounds are:

- Arrhenius acids
- Bronsted-Lowry bases
- weak bases
- Lewis acids
- salts

NH_3 , KOH , Na_2SO_4 , H_2SO_4 , CaCO_3 , Na_2CO_3 , H_2O , $\text{Ba}(\text{OH})_2$, 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 $\text{Mg}(\text{OH})_2$?

3. Complete and balance the following reactions:



4. A 10.67 g sample of a solution of alanine (a monoprotic amino acid with the formula $\text{CH}_3\text{CH}(\text{NH}_2)\text{COOH}$) 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:

- 3.4×10^{-3} M HCl
- 7.78×10^{-4} M NaOH
- 4.55×10^{-6} M $\text{Mg}(\text{OH})_2$
- 0.000822 M HNO_3

6. Determine the H^+ and OH^- concentrations for solutions that have:

- pH = 4.56
- pOH = 11.90
- pH = 12.78
- pH = 6.6

(Over for Answers)

1.
 - a. H_2SO_4 , HBr
 - b. NH_3 , KOH , CaCO_3 , Na_2CO_3 , $\text{Ba}(\text{OH})_2$, 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.

$$\begin{array}{lcl}
 \text{Mg}(\text{OH})_2 & + & 2 \text{ HF} \quad \text{-----}> \quad \text{MgF}_2 & + & 2 \text{ H}_2\text{O} \\
 3 \text{ BaCO}_3 & + & 2 \text{ H}_3\text{PO}_4 \quad \text{-----}> & \text{Ba}_3(\text{PO}_4)_2 & + & 3 \text{ CO}_2 & + & 3 \text{ H}_2\text{O} \\
 \text{NH}_3 & + & \text{HI} \quad \text{-----}> & \text{NH}_4\text{I}
 \end{array}$$

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}