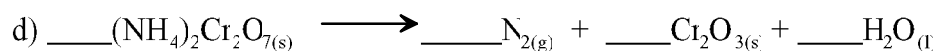
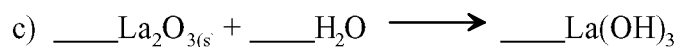
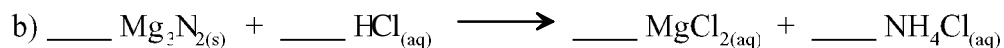
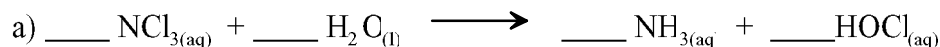


CHEM 130
Problem Set Ch.4

[Key begins on page 3.](#)

1. Balance the following equations.



2. Classify each of the equations in #2 as **combination**, **decomposition**, **single displacement**, or **double displacement (metathesis)**.

a) _____

c) _____

b) _____

d) _____

3. All of the following are **strong acids** in water **except**:

a) HClO_4

b) H_3PO_4

c) H_2SO_4

d) HNO_3

e) HCl

4. List the **formulas only** for the six **strong bases**.

1) _____

4) _____

2) _____

5) _____

3) _____

6) _____

5. When a solution of sodium chloride and ammonium nitrate are mixed: (refer to the solubility table in your text)

a) a precipitate forms

d) an acid and a base are formed

b) a new salt is formed

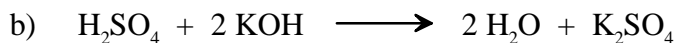
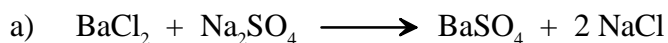
e) no reaction occurs

c) a gas is evolved

6. **Complete** and **balance** the following acid/base neutralization reaction. Then write the **net ionic equation**.



7. Write out the **complete ionic** and **net ionic** equation for the molecular equations given below. (refer to the solubility table in your text)



8. Briefly explain the difference between **strong electrolytes** and **weak electrolytes**.

9. Obtain the oxidation number for the element noted in each of the following.



10. How many moles of NaOH are in 22.0 mL of a 0.150 M NaOH solution?

_____mol

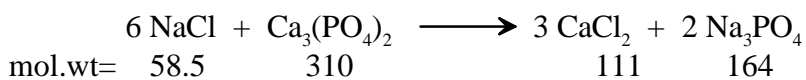
11. Calculate the molarity of a solution that contains 130.0 grams NaNO_3 in 85.0 mL of solution.

_____M

12. In order to dilute 50.0 mL of 0.60 M HCl to 0.20 M, what volume of water must be added?

_____mL

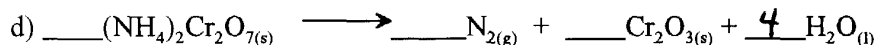
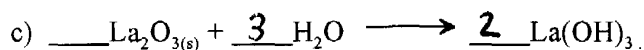
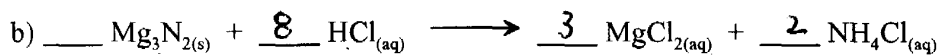
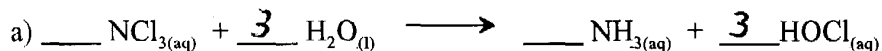
13. In the following reaction, what volume (in mL) of 0.100 M NaCl will react with 100.0 grams $\text{Ca}_3(\text{PO}_4)_2$?



_____mL

CHEM 130
Problem Set Ch.4

1. Balance the following equations.



2. Classify each of the equations in #2 as **combination**, **decomposition**, **single displacement**, or **double displacement (metathesis)**.

a) METATHESIS

c) COMBINATION

b) METATHESIS

d) DECOMPOSITION

3. All of the following are **strong acids** in water **except**:

a) HClO_4

b) H_3PO_4

c) H_2SO_4

d) HNO_3

e) HCl

4. List the **formulas only** for the six **strong bases**.

1) LiOH

4) RbOH

2) NaOH

5) CsOH

3) KOH

6) $\text{Ba}(\text{OH})_2$

5. When a solution of sodium chloride and ammonium nitrate are mixed: (refer to the solubility table in your text)

a) a precipitate forms

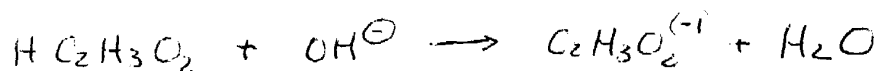
b) a new salt is formed

c) a gas is evolved

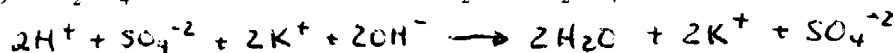
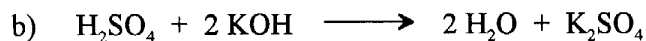
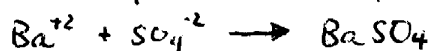
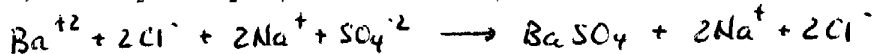
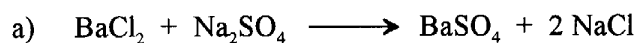
d) an acid and a base are formed

e) no reaction occurs

6. **Complete** and **balance** the following acid/base neutralization reaction. Then write the **net ionic equation**.



7. Write out the **complete ionic** and **net ionic** equation for the molecular equations given below. (refer to the solubility table in your text)

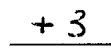
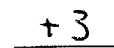
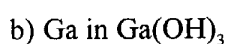
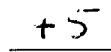
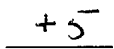
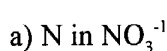


8. Briefly explain the difference between **strong electrolytes** and **weak electrolytes**.

STRONG ELECTROLYTES - DISSOCIATE 100% INTO IONS IN AQUEOUS SOLUTION

WEAK ELECTROLYTES - ONLY PARTIAL DISSOCIATION INTO IONS IN AQ. SOLN.

9. Obtain the oxidation number for the element noted in each of the following.



10. How many moles of NaOH are in 22.0 mL of a 0.150 M NaOH solution?

$(0.150 \frac{\text{mol}}{\text{L}})(0.022 \text{ L}) = 3.3 \times 10^{-3} \text{ mol}$

3.3×10^{-3} mol

11. Calculate the molarity of a solution that contains 130.0 grams NaNO_3 in 85.0 mL of solution.

$130 \text{ g NaNO}_3 \left(\frac{1 \text{ mol}}{85 \text{ g}} \right) = 1.53 \text{ mol NaNO}_3$

$\frac{1.53 \text{ mol NaNO}_3}{0.085 \text{ L}} =$

18.0 M

12. In order to dilute 50.0 mL of 0.60 M HCl to 0.20 M, what volume of water must be added?

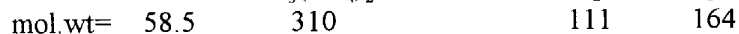
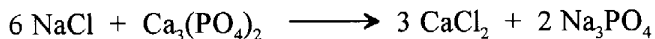
$M_1 V_1 = M_2 V_2$

$V_2 = 150 \text{ mL (FINAL VOLUME)}$

$(0.60 \text{ M})(50 \text{ mL}) = (0.20 \text{ M})(V_2)$

SO 100 mL H₂O ADDED 100 mL

13. In the following reaction, what volume (in mL) of 0.100 M NaCl will react with 100.0 grams $\text{Ca}_3(\text{PO}_4)_2$?



$100 \text{ g Ca}_3(\text{PO}_4)_2 \left(\frac{1 \text{ mol}}{310 \text{ g}} \right) \left(\frac{6 \text{ mol NaCl}}{1 \text{ mol Ca}_3(\text{PO}_4)_2} \right) \left(\frac{1000 \text{ mL soln}}{0.1 \text{ mol NaCl}} \right) =$

~19,400 mL

(19,355 mL)