Unit 3 Sample Test

The test will be similar in format to the Unit 1 test but there will be no matching section. Instead, from this test until the end of the year you will have a choice of two out of four reactions to complete and write as balanced net-ionic equations. You will also need to identify the type of reaction. As with the Unit 2 Test, the Activity series will be provided along with the remaining solubility rules (you need to know #1 and #2)

The following are representative of typical multiple choice questions but do not necessarily indicate topics to be addressed on your actual test.

_____1. What is the concentration of nitrate ions in a 0.50 M $Ca(NO_3)_2$ solution?
    a. 0.50 M
    b. 1.0 M
    c. 0.25 M
    d. 0.125 M

_____2. Which **one** of the following processes would be used to obtain the elements A and B from the compound AB?
    a. combustion   b. distillation   c. precipitation   d. decomposition

_____3. A redox reaction takes place when
    a. copper is added to $FeSO_4$ solution
    b. silver is added to $Zn(NO_3)_2$ solution
    c. iron is added to $AgNO_3$ solution
    d. zinc is added to $Mg(NO_3)_2$ solution
    e. lead is added to $Al_2(SO_4)_3$ solution

_____4. Which object below is an erlenmeyer flask?
    a.   b.   c.   d.

_____5. Which reaction below could be followed by using an acid/base indicator?
    a. $N_2 + 3 H_2 \rightarrow 2 NH_3$
    b. $2 KOH + H_2SO_4 \rightarrow K_2SO_4 + 2 H_2O$
    c. $S + O_2 \rightarrow SO_2$
    d. $Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4$
    e. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

The next section consists of representative problems which might be found in the required section. All students are expected to work on both of the required problems.

6. Magnesium metal, like most metals, reacts vigorously with mineral acids such as hydrochloric acid in a redox displacement reaction.

a. Write a balanced molecular equation for this reaction:

_____

b. How many grams of magnesium metal will be consumed by 48 g of hydrochloric acid, assuming an excess of magnesium?

c. How many grams of hydrogen would be expected to form in the reaction if 48 g of hydrochloric acid is combined with 8.0 g of magnesium? What is the limiting reagent?

7. Some of the substances commonly used in over-the-counter preparations for neutralizing excess stomach acid include $Mg(OH)_2$ and $Al(OH)_3$.

a. Write a balanced molecular reaction for the neutralization of each by hydrochloric acid.

_____

_____

b. When 0.25 g of **ONE** of the compounds above is titrated with 0.10 M HCl, 96.2 mL are required to reach the endpoint. Which substance is it?

The next section consists of representative problems such as might be found in the "options" section. Each student is expected to select one problem from this section to work on. Note that the test will include solubility rules 3-7 along with the usual periodic table and the activity series.

8. A 100.0 mL sample of 0.200 M potassium hydroxide solution is mixed with 100 mL of 0.200 M magnesium nitrate solution.

a. Write a balanced *molecular* equation for the reaction which occurs:

_____

b. What is the precipitate that forms?_____

c. How many grams of the precipitate would be formed?

9. A 10.00 mL sample of sulfuric acid from an automobile battery requires 32.47 mL of 2.15 M sodium hydroxide solution for complete neutralization. What is the Molarity of the sulfuric acid? (*hint:* it might be helpful to write out the reaction first)

*The next section consists of representative reactions to complete and write balanced net-ionic equations for. Note that some reactions do not occur in aqueous solution and thus molecular equations are all that would be needed. Each student is expected to choose two from this section. In addition to a periodic table, solubility rules 3-6 and a copy of the activity series will be included with the test. Mixtures which result in no net change need not be completed. Simply write "NO REACTION". Non-trivial redox reactions are indicated with * and only the balanced net-ionic equation is required.*

10. For each of the following, complete the word equation, write a balanced net-ionic reaction and tell what type of reaction it is (precipitation, acid/base, acid/metal oxide, acid/carbonate, redox, etc.). *Unless otherwise noted, all reactions occur in aqueous solution.*

a. lead(II) nitrate + sodium iodide → _____

_____

_____

type:_____

b. copper(II) carbonate + hydrochloric acid → _____

_____

_____

type:_____

c. silver metal + copper(II) nitrate →_____

_____

_____

type:_____

*d. an acidic solution is prepared containing chromate ions and iron(II) ions; among the products after reaction are iron(III) ions and chromium(III) ions

_____

_____

The final section of the test will consist of one essay question selected from the following topics:

              technique involving balances
              technique involving filtering
              lab equipment (glassware, etc.)
              use of the activity series

Answers