**Unit IV**

**Chemistry 11**

**Reactions**

Lesson Day     Date                Assignment

[1.](http://iannonechem.com/Sc/notes/unit4/1.syndecomp.ppt)                                             1                     [Synthesis and Decomposition Reactions](http://iannonechem.com/Sc/workbookanswers/5.answers.htm#b1)

[2.](http://iannonechem.com/Sc/notes/unit4/2.singlereplacement.ppt)                                             2                      [Single Replacement Reactions](http://iannonechem.com/Sc/workbookanswers/5.answers.htm#b2)

[3.](http://iannonechem.com/Sc/notes/unit4/Single%20Replacement%20Reactions%20Lab.doc)                                             Lab Report      [Single Replacement Reactions Lab](http://iannonechem.com/Sc/notes/unit4/Single%20Replacement%20Reactions%20Lab.doc)

[4.](http://iannonechem.com/Sc/notes/unit4/4.doublereplacement.ppt)                                             3                      [Double Replacement Reactions](http://iannonechem.com/Sc/workbookanswers/5.answers.htm#b3)

[5.](http://iannonechem.com/Sc/notes/unit4/Double%20Replacement%20Reactions%20Lab.doc)                                             Lab Report      [Double Replacement Reactions Lab](http://iannonechem.com/Sc/notes/unit4/Double%20Replacement%20Reactions%20Lab.doc)

[6.](http://iannonechem.com/Sc/notes/unit4/5.combustionreview.ppt)                                             4                      [CombustionReview](http://iannonechem.com/Sc/workbookanswers/5.answers.htm#b4)

[7.](http://iannonechem.com/Sc/notes/unit4/6.formulacompletenetcarbonate.ppt)                                             5                      [Formula and Ionic Equations](http://iannonechem.com/Sc/workbookanswers/5.answers.htm#b5)

[8.](http://iannonechem.com/Sc/notes/unit4/Reaction%20Lab.doc)                                             6                      [Lab Report      Reactions Lab Day 1](http://iannonechem.com/Sc/notes/unit4/Reaction%20Lab.doc)

[9.](http://iannonechem.com/Sc/notes/unit4/Reaction%20Lab.doc)                                             6                      Lab Report      Reactions Lab Day 2       [Reactions Practice Test 1](http://iannonechem.com/Sc/workbookanswers/b1)

[10.](http://iannonechem.com/Sc/notes/unit4/8.challenge%20question.ppt)                                           7                      [Reactions PracticeTest 2](http://iannonechem.com/Sc/workbookanswers/5.answers.htm#b7)

11.                                           8                      [Reactions Practice Test 3](http://iannonechem.com/Sc/workbookanswers/5.answers.htm#b8)

12.                                                                   Test

**Worksheet #1                 Synthesis and Decomposition Reactions**

Predict and balance the following synthesis and decomposition reactions. Assume that all reactions will occur. Use abbreviations to indicate the phase of reactants and products: (aq) (s) (l) (g).

1.       A sample of mercury II oxide is heated.

          **2HgO(s)       →      2Hg(l)    +    O2(g)**

2.       Sulfur dioxide SO2 gas is heated.

          **8SO2(g)                   →      S8(s)  +   8O2(g)**

3.       Aluminum is reacted with iodine.

**2Al(s)    +   3I2(s)    →     2AlI3(s)**

 4.      Liquid hydrogen peroxide composes to water and another common gas..

          2**H2O2(l)       →      2H2O(l)   +    O2(g)**

5.       Solid lithium reacts with sulphur.

          **16Li(s)    +    S8(s)    →     8Li2S(s)**

 6.      Molten aluminum chloride is electrolyzed.

          **2AlCl3(l)→      2Al(s)      +     3Cl2(g)**

7.       Sodium is added to a container of iodine vapor.

          **2Na(s)     +     I2(g)    →     2NaI(s)**

8.       Molten calcium chloride is electrolyzed.

          **CaCl2(l)         →     Ca(s)   +      Cl2(g)**

9.         Ibuprofen has a chemical formula of C13H18O2.  A very small sample of ibuprofen has 85 atoms of carbon.  How many atoms of hydrogen does this sample contain?

**85 at C     x     1 molecule     x     18 at H           =      1.2 x 102 at H   or    120 at      2 sig figs!**                        **13 at C                  1 molecule**

10.  A volume of a gas called methyl mercaptan,  a chemical that makes human flatulence smell bad, weighs 0.5963 g.  An equal volume of H2 weighs 0.02477 g.  Calculate the molecular mass of the gas.  Assuming that this gas is an element, what is the chemical formula of the gas? Hint: Google is your friend.

**Gas x      =     0.5963        x       2.02 g/mol          =      48.6      2 sig figs!       CH4S** **H2                  0.02477**

11.  Psilocybin is a psychedelic chemical found in magic mushrooms and is 50.40 % C, 6.545 % H, 9.450 % N, 22.40 % O and 10.85 % P. Determine the empirical formula for psilocybin.

**C24H37N4O8P2**

**Worksheet #2                 Single Replacement Reactions**

Using the activity series, predict and balance the following single replacement reactions. Use abbreviations to indicate the appropriate phase of reactants and products. For those that do not react, write no reaction.

1.       A piece of copper is dropped into a container of water.

          **Cu(s)   +   HOH(l)   →      No Reaction.        H is more active than Cu.**

2.       Liquid bromine is added to a container of sodium iodide crystals.

          **Br2(l)    +    2NaI(s)    →     I2(s)    +     2NaBr(s)**

3.       An aluminum strip is immersed in a solution of silver nitrate.

**Al(s)   +    3AgNO3(aq)   →   3Ag(s)   +   Al(NO3)3(aq)**

4.       Zinc pellets are added to a sulfuric acid solution.

          **Zn(s)   +   H2SO4(aq)   →   H2(g)    +    ZnSO4(aq)**

5.       Fluorine gas is bubbled into a solution of aluminum chloride.

          **3F2(g)   +    2AlCl3(aq)    →    3Cl2(g)   +    2AlF3(aq)**

6.       Magnesium turnings are added to a solution of lead (II) acetate.

          **Mg(s)    +    Pb(CH3COO)2(aq)   →   Pb(s)   +   Mg(CH3COO)2(aq)**

7.       Iodine crystals are added to a solution of sodium chloride.

          **I2(s)   +   NaCl(aq)  →  No Reaction.              Cl2 is more active than I2.**

8.       Calcium metal is added to a solution of nitric acid.

          **Ca(s)  +   2HNO3(aq)   →   H2(g)    +   Ca(NO3)2(aq)**

9.       A pea-sized piece of lithium is added to water.

**2Li(s)  +   2HOH(l)   →   H2(g)   +   2LiOH(aq)**

10.     A solution of iron (III) chloride is poured over a piece of platinum wire.

          **Pt(s)   +   FeCl3(aq)  →      No Reaction.        Fe is more active than Pt.**

11.        Monosodium glutamate (MSG), a food-flavor enhancer, has been blamed for   “Chinese restaurant syndrome,” the symptoms of which are headaches and chest pains. MSG has the following composition by mass: 35.51 % C, 4.77 % H, 37.85 % O, 8.29 % N, and 13.60 % Na.

**NaC5H8NO4**

13.     Chocolate contains phenylethylamine - the same chemical that is released in your brain when you fall in love. It is also believed that phenylethylamine in turn causes the brain to release mesolimbic dopamine in the pleasure centers of the brain, another chemical that is produced during more intimate love. If the formula for this compound is C8H11N, calculate its percentage composition to 3 sig figs.

**79.3 % C**

**9.17 % H**

**11.6 % N**

**Worksheet #3                           Double Replacement Reactions**

Predict and balance the following Double Replacement reactions. Include all phase symbols. Use your solubility table to predict.

1.       Silver nitrate + Potassium sulphate

          **2AgNO3(aq)   +   K2SO4(aq)         →      Ag2SO4(s)   +   2KNO3(aq)**

2.       Ammonium chloride + Cobalt (II) sulfate

          **NH4Cl(aq)    +    CoSO4(aq)   →     No Reaction as both possible products are high solubility.**

3.       Lead II nitrate + Sodium chloride

          **Pb(NO3)2(aq)   +  2NaCl(aq)   →    PbCl2(s)+   2NaNO3(aq)**

4.       Zinc bromide + Cesium hydroxide

          **ZnBr2(aq)   +    2CsOH(aq)   →   Zn(OH)2(s)    +   2CsBr(aq)**

5.       Ammonium sulfide + Lead II nitrate

          **(NH4)2S(aq)  +  Pb(NO3)2(aq)   →   PbS(s)   +   2NH4NO3(aq)**

6.       Iron III sulfate + Barium iodide

**Fe2(SO4)3(aq)    +    3BaI2(aq)    →**    3**BaSO4(s)    +   2FeI3(aq)**

7.       Chromium III bromide + Sodium nitrate

**CrBr3(aq)+   NaNO3(aq)→  No Reaction, both products are soluble.**

8.       Rubidium phosphate + Titanium IV nitrate

          **4Rb3PO4(aq)   +   3Ti(NO3)4(aq)   →     Ti3(PO4)4(s)   +    12RbNO3(aq)**

9.       Ammonium carbonate + Nickel II chloride

**(NH4)2CO3(aq)  +   NiCl2(aq)   →   NiCO3(s)   +   2NH4Cl**

10.     Tin IV nitrate + Potassium sulfite

          **Sn(NO3)4(aq)   +   2K2SO3(aq)   →    Sn(SO3)2(s)    +    4KNO3(aq)**

11.     Ammonium sulfate and Potassium hydroxide

          **No Reaction as both possible products has high solubility.**

12.     Cobalt II chloride is combined with Silver nitrate

          **CoCl2(aq)   +   2AgNO3(aq)   →    2AgCl(s)    +    Co(NO3)2(aq)**

**Complete the following combustion reactions. Include all phase symbols.**

13.     **2C4H10(g)     +        13O2(g)         →      8CO2(g)    +   10H2O(l)**

14.     **C6H12(l)        +        9O2(g)**          **→      6CO2(g)    +   6H2O(l)**

15.     **C22H42(l)       +        32.5O2(g)      →      22CO2(g)    +   21H2O(l)**

16.     **C6H12O6(s)   +        6O2(g)**          **→      6CO2(g)    +   6H2O(l)**

17.     **2C12H24O11(s)        +        25O2(g)         →      24CO2(g)    +   24H2O(l)**

**Complete the following acid carbonate reactions. Include all phase symbols.**

18.     **2**H**Cl(aq)        +    CaCO3(s)   →**  **CO2(g)   +   CaCl2aq)   +   H20(l)**

19.     **H2SO4(aq)    +    BaCO3(s)   →  CO2(g)   +   BaSO4(s)   +   H20(l)**

20.**2H3PO4(aq)    +    3Na2CO3(s)   →**3**CO2(g)   +   2Na3PO4(s)   +   3H20(l)**

**Worksheet 4                   Reactions**

1.       Zinc is reacted with phosphorus.

          **6Zn(s)   +   P4(s)   →   2Zn3P2(s)**

2.       A solution of cobalt (II) nitrate is reacted with a solution of sodium carbonate.

**Co(NO3)2(aq)   +   Na2CO3(aq)   →   CoCO3(s)   +   2NaNO3(aq)**

3.       Magnesium metal is placed in a solution of zinc chloride.

          **Mg(s)   +   ZnCl2(aq)   →  Zn(s)   +   MgCl2(aq)**

4.       Iron (III) oxide is decomposed.

          **2Fe2O3(s)   →   4Fe(s)   +   3O2(g)**

5.       Octane, C8H18, is burned as a fuel in cars.

          **2C8H18(l)      +        25O2(g)         →      16CO2(g)    +   18H2O(l)**

6.       Lithium reacts with water.

          **2Li(s)   +  2H2O(l)   →   H2(g)   +   2LiOH(aq)**

7.       Sodium hydroxide solution is reacted with sulphuric acid.

          **2NaOH(aq)   +   H2SO4(aq)   →   Na2SO4(aq)+   2H2O(l)**

**Note that acid base reactions do not require a low solubility product!**

8.       Phosphoric acid reacts with barium hydroxide.

          **2H3PO4(aq)    +    3Ba(OH)2(s)     →   Ba3(PO4)2(s)   +   6HOH(l)**

9.       Hydrochloric acid reacts with barium carbonate.

          **2HCl(aq)   +   BaCO3(s)     →     CO2(g)   +    BaCl2(aq)+   H2O(l)         Remember this one from the lab!**

10.     The decomposition of sodium sulphide using electrolysis.

          **8Na2S(s)    →      16Na(s)    +    S8(s)**

11.     Calcium reacts with water.

          **Ca(s)   +   2HOH(l)   →    H2(g)    +    Ca(OH)2(s)**

12.     Barium reacts with phosphoric acid.

          **3Ba(s)     +     2H3PO4(aq)   →     3H2(g)    +   Ba3(PO4)2(s)**

13.     Barium nitrate and Aluminum sulphate react in solution.

          **3Ba(NO3)2(aq)   +    Al2(SO4)3(aq)    →    3BaSO4(s)     +    2Al(NO3)3(aq)**

**Worksheet 5                   Formula and Ionic Equations**

Write dissociation Equations for the following.

1.       Na3PO4(s)**→      3Na+(aq)    +    PO4-3(aq)**

2.       Mg(OH)2(s)**→        Mg+2(aq)    +    2 OH-(aq)**

3.       (NH4)2Cr2O7(s)**→   2NH4 +(aq)    +    Cr2O7-2(aq)**

4.       H3PO4(s)**→   3H+(aq)    +    PO4-3(aq)**

5.       CaC2O4(s)**→ Ca+2(aq)    +    C2O4-2(aq)**

6.       Ga(SCN)3(s)**→       Ga+3(aq)    +    3SCN-(aq)**

7.       Ba(HCO3)2(s)**→      Ba+2(aq)    +    2HCO3-(aq)**

8.       (NH4)2SO4(s)**→      2NH4 +(aq)    +    SO4-2(aq)**

9.       Al2(CO3)3(s)**→       2Al+3(aq)    +    3CO3-2(aq)**

10.     Sr(ClO)2(s)**→         Sr+2(aq)    +    2ClO-(aq)**

          Complete the formula equation, complete ionic equation, and net ionic equation:

**1.       2AgNO3(aq)    +    Na2SO4(aq)    →       Ag2SO4(s)   +   2NaNO3(aq)**

**2Ag+(aq)   +   2NO3-(aq)   +   2Na+(aq)    +   SO42-(aq)     →    Ag2SO4(s)   +   2Na+(aq)    +   2NO3-(aq)**

**2Ag+(aq)   +   SO42-(aq)     →    Ag2SO4(s)**

**2.       2H3PO4(aq)    +    3Sr(OH)2(aq)     →    Sr3(PO4)2(s)   +   6HOH(l)**

**6H+(aq)   +   2PO43-(aq)    +    3Sr2+  +    6OH-(aq)     →      Sr3(PO4)2(s)            +       6HOH(l)**

**6H+(aq)   +   2PO43-(aq)    +    3Sr2+  +    6OH-(aq)     →      Sr3(PO4)2(s)            +       6HOH(l)**

**3.       2Fe(NO3)3(aq)    +    3Zn(s)     →          2Fe(s)           +   3Zn(NO3)2(aq)**

**2Fe3+(aq)    +   6NO3-(aq)    +    3Zn(s)     →     2Fe(s)           +   3Zn2+(aq)    +   6NO3-(aq)**

**2Fe3+(aq)    +    3Zn(s)     →        2Fe(s)           +   3Zn2+(aq)**

4.       **H2SO4(aq)    +        2NaOH(aq)             →      Na2SO4(aq)  +   2HOH(l)**

**2H+(aq)   +   SO42-(aq)   +   2Na+(aq)   +   2OH-(aq)    →    2Na+(aq)   +   SO42-(aq)   +   2HOH(l)**

**H+(aq)   +   OH-(aq)    →    HOH(l)**

5.       **H3PO4(aq)   +        3KOH(aq)     →**      **K3PO4(aq)  +   3HOH(l)**

**3H+(aq)   +   PO43-(aq)   +   3K+(aq)   +   3OH-(aq)    →    3K+     + PO43-(aq)  +     3HOH(l)**

**H+(aq)        +   OH-(aq)    →    HOH(l)**

6.       **3Ca(NO3)2(aq)        +        2Na3PO4(aq) →      Ca3(PO4)2(s)  +   6NaNO3(aq)**

          **3Ca2+(aq)   +   6NO3-(aq)    +      6Na+(aq)   +   2PO43-(aq)   →   Ca3(PO4)2(s)+ 6Na+(aq)   +   6NO3-(aq)**

          **3Ca2+(aq)      +        2PO43-(aq)     →                Ca3(PO4)2(s)**

7.       **Zn(s)           +        2HCl(aq)       →      H2(g)             +     ZnCl2(aq)**

          **Zn(s)           +        2H+(aq)    +   2Cl-(aq)          →      H2(g)             +     Zn2+(aq)   +     2Cl-(aq)**

          **Zn(s)           +        2H+(aq)         →      H2(g)             +     Zn2+(aq)**

8.       **Sr(OH)2 (aq)           +        ZnSO4 (aq)    →      Zn(OH)2 (s)            +         SrSO4 (s)**

**Sr2+(aq)   +  2OH-(aq)    +   Zn2+(aq)  +   SO42-(aq)    →**    **Zn(OH)2 (s)        +           SrSO4 (s)**

**Sr2+(aq)   +  2OH-(aq)    +   Zn2+(aq)  +   SO42-(aq)    →**    **Zn(OH)2 (s)        +           SrSO4 (s)**

9.       **Ca(s)   +   2HOH(l)   →    H2(g)    +    Ca(OH)2(s)**

          **Ca(s)   +   2HOH(l)   →    H2(g)    +    Ca(OH)2(s)**

**Ca(s)   +   2HOH(l)   →    H2(g)    +    Ca(OH)2(s)**

**Note: only aqueous ionic compounds are broken into ions.**

10.     **AlCl3(aq)   +    Zn(s)           →      No Reaction**

11.**SrCl2(aq)    +    CaS(aq)    →        No Reaction**

**Worksheet 6           Reactions Practice Test 1**

**Simplify each and round off to the correct number of significant digits**.

1.       19.239  +  5.37                                                                                       **24.61**

2.       2.6699   -    1.27                                                                                     **1.40**

3.         156.3   x   277.3  x  45.3   x  0.0445687                                                 **2.08**

            0.82569   x   19.235   x   2654

4.       9.66  x  10  24    x         5.37894    x   10-15     x     4.532   x  1015            **3.98  x 1041**

           2.059 x 10 -20             5.343250    x   1015           5.37894  x  10-12

**Convert using unit analysis**

5.       627 g to mg

**627 g       x      1 x  103 mg      =          6.27  x  105 g**

                        **1g**

6.       4.05  x  106 um to m

**4.05  x  106 μm  x            1 m               =          4.05 m**

                                    **1  x  106 μm**

7.       8.148 ML to mL

**8.148 ML  x    1  x  106 L       x          1  x  103 mL                =          8.148  x  109 mL**

**1ML                            1L**

8.       235.2 mg to Kg

**235.2 mg         x          1g                    x          1Kg                 =          2.352  x  10-4 Kg**

**1  x  103 mg                 1  x  103 g**

9.       6.55  x 1014  mL  to ML

**6.55  x 1014  mL          x          1 L                  x          1 ML               =          6.55  x  105 ML**

                                                **1  x  103 mL                1  x  106 L**

**Complete, include all phase symbols, and balance each equation**. **Write formula, complete, and net ionic equations.**

10.     **Ca(s)  +   2HOH(l)   →   H2(g)   +   Ca(OH)2(s)**

          **Ca(s)  +   2HOH(l)   →   H2(g)   +   Ca(OH)2(s)**

          **Ca(s)  +   2HOH(l)   →   H2(g)   +   Ca(OH)2(s)                 Solids, liquids, and gases are not broken up.**

11.     **3ZnCl2(aq)    +    2Al(s)     →       3Zn(s)           +   2AlCl3(aq)**

**3Zn2+(aq)    +   6Cl-(aq)    +    2Al(s)→      3Zn(s)           +   2Al3+(aq)    +   6Cl-(aq)**

**3Zn2+(aq)    +   2Al(s)→      3Zn(s)           +   2Al3+(aq)**

12.     **SrCl2(aq)    +    BaS(aq)    →        No Reaction, both possible products are high solubility.**

13.     **2H3PO4(aq)   +        3Ca(OH)2(aq)         →**      **Ca3(PO4)2(s)          +            6HOH(l)**

**6H+(aq)   +   2PO43-(aq)   +   3Ca2+(aq)   +   6OH-(aq)    →    Ca3(PO4)2(s) +    6HOH(l)**

**6H+(aq)   +   2PO43-(aq)   +   3Ca2+(aq)   +   6OH-(aq)    →    Ca3(PO4)2(s) +    6HOH(l)**

14.     **3Ba(NO3)2(aq)        +        2Na3PO4(aq) →      Ba3(PO4)2(s)  +   6NaNO3(aq)**

          **3Ba2+(aq)   +   6NO3-(aq)    +      6Na+(aq)   +   2PO43-(aq)   →   Ba3(PO4)2(s)+ 6Na+(aq)   +   6NO3-**

          **3Ba2+(aq)      +        2PO43-(aq)     →                Ba3(PO4)2(s)**

15.     **2AgNO3(aq)  +        Na2SO4(aq)   →      Ag2SO4(s)  +   2NaNO3(aq)**

          **2Ag+(aq)   +   2NO3-(aq)     +      2Na+(aq)   +   SO42-(aq)   →    Ag2SO4(s)  +  2Na+(aq)   +   2NO3-**

          **2Ag+(aq)   +   SO42-(aq)   →    Ag2SO4(s)**

16.     **2Fe(NO3)3(aq)    +    3Zn(s)     →          2Fe(s)           +   3Zn(NO3)2(aq)**

**2Fe3+(aq)    +   6NO3-(aq)    +    3Zn(s)     →     2Fe(s)           +   3Zn2+(aq)    +   6NO3-(aq)**

**2Fe3+(aq)    +    3Zn(s)     →        2Fe(s)           +   3Zn2+(aq)**

17.     **2HCl(aq)   +   CaCO3(s)     →     CO2(g)   +    CaCl2(aq)+   H2O(l)**

          **2H+(aq)    +   2Cl-(aq)   +   CaCO3(s)     →     CO2(g)   +    Ca2+(aq)     +    2Cl-(aq)+   H2O(l)**

**2H+(aq)    +   CaCO3(s)     →     CO2(g)   +    Ca2+(aq)     +   H2O(l)**

**Remember this one from the lab!**

18.     H2SO4(aq)      +    BaCO3(s)   →

**H2SO4(aq)   +   BaCO3(s)     →     CO2(g)   +    BaSO4(s)+   H2O(l)**

          **2H+(aq)    +   SO42-(aq)+   BaCO3(s)     →     CO2(g)   +    BaSO4(s)+   H2O(l)**

**2H+(aq)   +   SO42-(aq) +   BaCO3(s)     →     CO2(g)   +    BaSO4(s)+    H2O(l)**

**Remember this one from the lab!**

**Complete each formula equation only.**

19.     **2C10H22(l)     +        31O2(g)         →      20CO2(g)   +   22H2O(l)**

20.     **2C24H46(l)     +        71O2(g)         →      48CO2(g)   +   46H2O(l)**

21.     **C12H22O11(s) +        12O2(g)         →      12CO2(g)   +   11H2O(l)**

22.     Chlorine gas is bubbled into a solution of aluminum iodide.

**3Cl2(g)    +    2AlI3(aq)    →     3I2(g)    +     2AlCl3(aq)**

23.     Magnesium turnings are added to a solution of lead (II) chloride.

**Mg(s)    +    PbCl2(aq)   →   Pb(s)   +   MgCl2(aq)**

24.     Barium metal is added to a solution of nitric acid.

          **Ba(s)  +   2HNO3(aq)   →   H2(g)    +   Ba(NO3)2(aq)**

25.     Lead II nitrate and Sodium chloride are mixed both in solution.

          **Pb(NO3)2(aq)   +  2NaCl(aq)   →    PbCl2(s)+   2NaNO3(aq)**

26.     Zinc bromide and Cesium hydroxide are mixed in solution.

          **ZnBr2(aq)   +    2CsOH(aq)   →   Zn(OH)2(s)    +   2CsBr(aq)**

27.     Zinc is reacted with phosphorus.

          **6Zn(s)   +   P4(s)   →   2Zn3P2(s)**

28.     Iron (II) oxide liquid is decomposed by electrolysis.

**2FeO(l)   →   2Fe(s)   +   O2(g)**

29.     Octane, C8H18, is burned as a fuel in cars.

          **2C8H18(l)      +        25a2(g)          →      16CO2(g)    +   18H2O(l)**

30.       A solid hydrocarbon that is 60.71 % C, 8.941 % H, and 30.35 % O undergoes a   reaction with a gas

            that reignites a glowing splint to produce a gas that turns limewater cloudy and a liquid that can cause

            rehydration. Write a balanced equation for this reaction.

          **C8H14O3(s)   +        10O2(g)         →      8CO2(g)    +   7H2O(l)**

**Worksheet # 7                       Reactions Practice 2**

Complete each reaction by writing a balanced equation. Include all phase symbols and balance all equations.  Name each reaction type in questions 1 – 7. Put in your workbook.

1.         **4**Ga(s)     +         **3**O2(g)    **→**        **2Ga2O3 (s)**

Reaction Type                                     **synthesis**

 Δ

2.         **2**Ca3P2(s)         **→**        **6Ca(s)  +  P4 (s)**

Reaction Type                                     **decomposition**

3.         K2CO3(s)          +          **2**HNO3(aq)       **→**        **2KNO3 (aq)    +    H2O (l)    +    CO2  (g)**

Reaction Type                                     **acid-carbonate**

4.         **2**C12H26(l)         +          **37**O2(g   )**→**        **24 CO2 (g)  +      26 H2O(l)**

Reaction Type                                     **combustion**

5.         CaCl2(aq)          +          BaS(aq)**→**        **CaS (aq)    + BaCl2 (aq)**

Reaction Type                                     **no reaction**

6.         **2**Na(s)     +          CaCl2(aq)         **→**        **Ca(s)    +   2NaCl(aq)**

Reaction Type

7.         BaS(aq)             +          ZnSO4(aq)        **→**      **BaSO4 (s)     +       ZnS(s)**

Reaction Type                                     **double replacement**

8.         Write an equation to show what how Al2(SO4)3(s) dissociates in water into ions.

            **Al2(SO4)3 (s)    +    2Al3+(aq)    +    3SO42-(aq)**

9.

Formula:         **3**Pb(NO3)2(aq)            +          **2**AlBr3(aq)       **→**        **3PbBr2 (s)+ 2Al(NO3)3 (aq)**

Complete:       **3Pb2+(aq)  + 6NO3-(aq) + 2Al3+(aq)+ 6Br–(aq) +3PbBr2 (s)+ 2Al3+(aq) + 6NO3-(aq)**

Net:                 **Pb2+(aq)  +   2Br–(aq)   →   PbBr2 (s)**

10.

Formula:         **2**Al(s)            +          **3**Cu(NO3)2(aq) **→**        **2Al(NO3)3 (aq) + 3Cu (s)**

Complete:       **2Al(s)+ 3Cu2+(aq) + 6NO3-(aq)→      2Al3+ (aq) + 6NO3- (aq) + 3Cu(s)**

Net:                 **2Al(s)+ 3Cu2+(aq)→    2Al3+ (aq) +  3Cu(s)**

11.

Formula:         **3**Sr(OH)2(aq)+     Al2(SO4)3(aq)   **→**            **2Al(OH)3 (s) + 3SrSO4 (s)**

Complete:       **3Sr2+ (aq)  + 6OH- (aq)  + 2Al3+ (aq) + 3SO42- (aq)   →    2Al(OH)3 (s) + 3SrSO4 (s)**

Net:                 **3Sr2+ (aq)  + 6OH- (aq)  + 2Al3+ (aq) + 3SO42- (aq)   →    2Al(OH)3 (s) + 3SrSO4 (s)**

12.

Formula:         **2**Na(s)            +          **2**H2O(l) **→**    **2NaOH (aq)+     H2 (g)**

Complete:       **2Na(s)            +          2H2O(l)              →   2Na+ (aq)   +  2OH- (aq)+ H2 (g)**

Net:                 **2Na(s)            +          2H2O(l)              →   2Na+ (aq)   +  2OH- (aq)+ H2 (g)**

13.

Formula:         **3**Sr(OH)2(aq)+     **2**H3PO4(aq)   **→**    **6HOH (l)   +   Sr3(PO4)2 (s)**

Complete:       **3Sr2+ (aq)  + 6OH- (aq)  +  6H+ (aq) + 2PO43- (aq) →   6HOH (l)   +   Sr3(PO4)2 (s)**

Net:                 **3Sr2+ (aq)  + 6OH- (aq)  +  6H+ (aq) + 2PO43- (aq) →   6HOH (l)   +   Sr3(PO4)2 (s)**

14.

Formula:         **2**HCl(aq)      +     Na2CO3(s)   **→**   **2NaCl (aq)  +  HOH (l)  + CO2 (g)**

Complete:       **2H+(aq)  + 2Cl-(aq) + Na2CO3(s)    →   2Na+ (aq) +  2Cl- (aq)  +  HOH (l)  + CO2 (g)**

Net:                 **2H+(aq)   + Na2CO3(s)    →   2Na+ (aq)  +  HOH (l)  + CO2 (g)**

15.

Formula:         **2**H3PO4(aq)      +     **3**MgCO3(s)   **→**  **Mg3(PO4)2 (s)+  3HOH (l)  + 3CO2 (g)**

Complete:       **6H+ (aq)  + 2PO43- (aq)  +    3MgCO3(s)    →  Mg3(PO4)2 (s)+  3HOH (l)  + 3CO2 (g)**

Net:                 **6H+ (aq)  + 2PO43- (aq)  +    3MgCO3(s)    →  Mg3(PO4)2 (s)+  3HOH (l)  + 3CO2 (g)**

16.       **2**C12H26(l)    +    **37**O2(g)   **→**    **24CO2 (g)+    26H20 (g)**

17.       C26H52(l)    +    **39**O2(g)   **→** **26CO2 (g)+    26H20 (g)**

18.       A container of copper (II) oxide has been accidentally contaminated with copper (I) oxide.

            The total mass of both oxides is 9.55 g. Through a single replacement reaction with Zn, the copper

            was able to be purified and was found to have a mass of 8.42 g. What was the original masses of

            the copper (II) and copper (I) oxides before they were mixed?

 **A g Cu2O   x    1mol     x   2 mol Cu      x    63.5 g     =     0.8881 A g Cu**

**143.0 g      1 mol Cu2O       1 mole**

**(9.55 – A)g CuO    x   1mol    x   1 mol Cu   x   63.5 g    =    7.628  -  0.7987 A g Cu**

**79.5 g       1 mol CuO     1 mole**

**0.8881 A g Cu   +    7.628    -    0.7987 A g Cu         =   total grams Cu**

**0.0894 A  +     7.628     =   total grams Cu**

**Grams Cu                   =          Grams Cu**

**0.0894 A  + 7.628       =          8.42**

**0.0894 A                     =          0.792**

**A         =          8.869**

**A         =          mass**Cu2O **=          8.86 g**

**9.55 –  A       =          mass**CuO **=          0.69 g**

**Worksheet # 8                       Reactions Practice Test 3**

Complete each reaction by writing a balanced equation. Include all phase symbols and balance all equations.  Name each reaction type in questions 1 – 7. Put in your workbook.

1.         **4 Al(s)   +          P4(g)     →        4 AlP(s)**

Reaction Type **Synthesis**

 Δ

2.         **4 Ga3S2(s)        →        12 Ga(s)   +    S8(s)**

Reaction Type   **Decomposition**

3.         **CaCO3(s)         +          2 HCl(aq)                      →    CO2    +    CaCl2(aq)+     H2O(l)**

Reaction Type   **Acid Carbonate**

4.         **C14H30(l)          +          21.5 O2(g)        →    14 CO2(g)      +   15 H2O(l)**

Reaction Type **Combustion**

5.         **SrCl2(aq)           +          BaS(aq)→        No Reaction**

Reaction Type **No Reaction**

6.         **2K(s)     +          CaCl2(aq)          →    2KCl(aq)+    Ca(s)**

Reaction Type **Single Replacement**

7.         **BaS(aq)           +          ZnSO4(aq)        →   BaSO4(s)   +   ZnS(s)**

Reaction Type **Double Replacement**

8.         Write an equation to show what how Ga2(CO3)3(s) dissociates in water into ions.

**Ga2(CO3)3(s)→   2Ga3+(aq)+   3CO32-(aq)**

9.

Formula:         **3Pb(NO3)2(aq)            +          2GaCl3(aq)       →        3PbCl2(s)+    2Ga(NO3)3(aq)**

Complete:       **3Pb2+(aq)+ 6NO3-(aq)+ 2Ga3+(aq)+ 6Cl-(aq)→  3PbCl2(s)+  2Ga2+(aq)+ 6NO3-(aq)**

Net:                 **3Pb2+(aq)   +   6Cl-(aq)  →      3PbCl2(s)**

10.

Formula:         **Zn(s)            +          Cu(NO3)2(aq)   →   Zn(NO3)2(aq)+    Cu(s)**

Complete:       **Zn(s)+ Cu2+(aq)+  2NO3-(aq)→   Zn2+(aq)+ 2NO3-(aq)    +   Cu(s)**

Net:                 **Zn(s)+ Cu2+(aq)→   Zn2+(aq)+   Cu(s)**

11.

Formula:         **3Sr(OH)2(aq)+     Al2(SO4)3(aq)    →              3SrSO4(s)+   2Al(OH)3(s)**

Complete:       **3Sr2+(aq)+    6OH-(aq)+    Al3+(aq)   3SO42-(aq) →     3SrSO4(s)+   2Al(OH)3(s)**

Net:                 **3Sr2+(aq)+    6OH-(aq)+    Al3+(aq)   3SO42-(aq) →     3SrSO4(s)+   2Al(OH)3(s)**

12.

Formula:         **Ca(s)            +          2 H2O(l)  →   Ca(OH)2(s)+H2(g)**

Complete:       **Ca(s)            +         2 H2O(l)  →  Ca(OH)2(s)+  H2(g)**

Net:                 **Ca(s)            +         2 H2O(l)  →  Ca(OH)2(s)+ H2(g)**

13.

Formula:         **3Ba(OH)2(aq)+     2H3PO4(aq)    →   Ba3(PO4)2(s)+  6H2O(l)**

Complete:       **3Ba2+(aq)+  6OH-(aq)+ 6H+(aq)+   2PO43-(aq)→  Ba3(PO4)2(s)+  6H2O(l)**

Net:                 **3Ba2+(aq)+  6OH-(aq)+ 6H+(aq)+   2PO43-(aq)→  Ba3(PO4)2(s)+  6H2O(l)**

14.

Formula:         **H2SO4(aq)      +     Na2CO3(s)    →  Na2SO4(aq)+ H2O(l)+  CO2(g)**

Complete:       **2H+(aq)+   SO42-(aq)+   Na2CO3(s)    →  2Na+(aq)+  SO42-(aq)+ H2O(l)+  CO2(g)**

Net:                 **2H+(aq)+  Na2CO3(s)    →  2Na+(aq)+  H2O(l)+  CO2(g)**

15.       9.000 g of a mixture of Fe3S2 and FeS are reduced to 5.1252 g of pure Fe.

What is are masses of the Fe3S2 and FeS in the original mixture?

**A g Fe2S3   x    1mol     x    2 mol Fe      x    55.8 g     =     0.53679 A g Fe**

**207.9 g      1 mol Fe2S3       1 mole**

**(9.000 – A)g FeS    x   1mol    x   1 mol Fe   x   55.8 g    =    5.71331  -  0.63481 A g Fe**

**87.9 g       1 mol FeS      1 mole**

**0.53679 A g Fe +    5.71331  -  0.63481 A g Fe**                    **=          total grams Fe**

**-0.09802 A  +     5.71331                                           =          total grams Fe**

**Grams Fe                   =          Grams Fe**

**-0.09802 A  +     5.71331                   =          5.1252**

**-0.09802 A     =          -0.58811**

**A         =          6.00**

**A         =          mass Fe2S3** **=          6.00 g**

**9.000 –  A       =          mass**Fe **=          3.00 g**