CLASSIFICATION OF EQUATIONS WORKSHEET

Chemical reactions produce new substances with new properties. The starting materials in a chemical reaction are called **reactants** while the materials that are formed are called **products.** When we write an equation we put an arrow in the middle between the reactants and the products; this arrow is read as **yields.**

Example: $Ba(NO_3)_2 + H_2SO_4 \rightarrow BaSO_4 + 2\,HNO_3$

The names of the reactants are: _____
_____

The names of the products are: _____
_____

Example: $2\,Al + 3\,S \rightarrow Al_2S_3$

The names of the reactants are: _____
_____

The name of the product is: _____

In order to help students recognize patterns and be able to predict the products of chemical reactions we classify most chemical reactions as one of four common types of reaction--composition, decomposition, single replacement and double replacement.

In **composition reactions** elements combine to form a compound; or, in some cases, simple compounds combine to form a more complex compound.

EXAMPLES: $2\,Na + S \rightarrow Na_2S$

The names of the reactants are : _____
_____

The name of the product is: _____

$H_2O + SO_2 \rightarrow H_2SO_3$

The names of the reactants are : _____

The name of the product is: _____

In **<u>decomposition reactions</u>** compounds are broken apart to form elements; or, in some cases, complex compounds are decomposed to form simpler compounds.

EXAMPLES: $2\ Al_2O_3 \rightarrow 4\ Al + 3\ O_2$

The name of the reactant is: _____

The names of the products are: _____
_____

$H_2CO_3 \rightarrow H_2O + CO_2$

The name of the reactant is: _____

The names of the products are: _____
_____

In **<u>single replacement reactions</u>** one element takes the place of a second element in a compound.

EXAMPLES: $Mg + 2\ AgNO_3 \rightarrow Mg(NO_3)_2 + 2\ Ag$

The names of the reactants are: _____
_____

The names of the products are: _____
_____

Which element was replaced? _____
Which element did the replacing? _____

$Cl_2 + CaI_2 \rightarrow CaCl_2 + I_2$

The names of the reactants are: _____
_____

The names of the products are: _____
_____

Which element was replaced? _____
Which element did the replacing? _____

In **double replacement reactions** two compounds react with each other--the positive ion of one compound combines with the negative ion of the second compound and vice versa.

Examples: $MgCl_2 + 2\ AgNO_3 \rightarrow Mg(NO_3)_2 + 2\ AgCl$

The names of the reactants are: _____

_____

The names of the products are: _____

_____

$Al(OH)_3 + 3\ HNO_3 \rightarrow Al(NO_3)_3 + 3\ HOH$

The names of the reactants are: _____

_____

The names of the products are: _____

_____

Classify each of the following reactions as composition, decomposition, single replacement or double replacement.

_____ 1. $Ba + Cl_2 \rightarrow BaCl_2$

_____ 2. $Zn + Cu(NO_3)_2 \rightarrow Zn(NO_3)_2 + Cu$

_____ 3. $2\ Ga + 3\ S \rightarrow Ga_2S_3$

_____ 4. $2\ NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2\ HOH$

_____ 5. $2\ K + 2\ HOH \rightarrow 2\ KOH + H_2$

_____ 6. $2\ H_2O \rightarrow 2\ H_2 + O_2$

_____ 7. $4\ Li + O_2 \rightarrow 2\ Li_2O$

_____ 8. $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$

_____ 9. $Br_2 + 2\ NaI \rightarrow 2\ NaBr + I_2$

_____ 10. $CaCO_3 \rightarrow CaO + CO_2$

(You will notice that several elements had a subscript 2 after them in the above equations. There are seven elements that exist as **diatomic molecules** when they **are not in compounds**. The seven elements are: **hydrogen-H_2, nitrogen-N_2, oxygen-O_2, fluorine-F_2, chlorine-Cl_2, bromine-Br_2, and iodine-I_2.** These elements **DO NOT** have to be in twos in compounds--you continue to write the formulas for compounds just as you always have. **They are in twos only when they are elemental**.)

When a chemical reaction occurs it must obey the **Law of Conservation of Matter--matter is neither created nor destroyed in an ordinary chemical reaction**. That means that for any element in the reaction there must be the same number of atoms on each side of the arrow. These atoms are in different combinations or groupings but you must not create nor destroy atoms. (It is very much like shuffling and dealing cards--you don't create or destroy cards, you just change the combinations.) **A balanced chemical equation obeys the law of conservation of matter--the equation is not true and has no meaning until it is balanced.** We **balance equations by inserting coefficients** in front of the formulas--**DO NOT CHANGE THE FORMULAS!** (We have spent weeks learning to write correct formulas--we don't abandon all of that when we start to balance equations.)

EXAMPLES: $Zn + HCl \rightarrow ZnCl_2 + H_2$ ----not balanced

$Zn + 2\ HCl \rightarrow ZnCl_2 + H_2$ ----balanced

$Sb + O_2 \rightarrow Sb_2O_3$ ----not balanced

$4\ Sb + 3\ O_2 \rightarrow 2\ Sb_2O_3$ ----balanced

Classify each of the following reactions as composition, decomposition, single replacement or double replacement. **Then balance** each of the equations.

(Note: when you have **polyatomic ions they may usually be balanced as a group**; only when the ion is broken apart do you have to look at individual atoms within the group.)

_____ 1. ___ K + ___ S ---> ___ K_2S

_____ 2. ___ Sb + ___ Cl_2 ---> ___ $SbCl_3$

_____ 3. ___ Cd + ___ $AgNO_3$ ---> ___ $Cd(NO_3)_2$ + ___ Ag

_____ 4. ___ Al_2O_3 ---> ___ Al + ___ O_2

_____ 5. ___ Al + ___ F_2 ---> ___ AlF_3

_____ 6. ____ $Mg(OH)_2$ + ____ HNO_3 ---> ____ $Mg(NO_3)_2$ + ____ HOH

_____ 7. ____ Fe + ___ O_2 ---> ____ Fe_2O_3

_____ 8. ____ Li + ____ HOH ---> ____ LiOH + ____ H_2

_____ 9. ____ $MgCO_3$ ---> _____ MgO + _____ CO_2

_____ 10. ____ $CsClO_3$ ---> ____ CsCl + ____ O_2

_____ 11. ____ HgO ---> _____ Hg + _____ O_2

_____ 12. ____ $Hg_2(NO_3)_2$ + ____ NaCl ---> ____ Hg_2Cl_2 + ____ $NaNO_3$

_____ 13. ____ Ga + ____ HCl ---> _____ $GaCl_3$ + _____ H_2

_____ 14. ____ $Ca(OH)_2$ + ____ $(NH_4)_2C_2O_4$ ---> _____ CaC_2O_4 + _____ NH_4OH

_____ 15. ____ $Pb(C_2H_3O_2)_2$ + _____K_2SO_4 ---> ____ $PbSO_4$ + _____ $KC_2H_3O_2$ __

Chemistry Equations – Worksheet #1 **Name _____**

We have learned symbols for elements and to write formulas for compounds. Now we must learn to write equations to represent chemical reactions. Chemical reactions obey the Law of Conservation of Matter: matter is neither created nor destroyed during a chemical reaction. This means that in any chemical reaction we simply rearrange the atoms much like shuffling of cards rearranges the cards but does not change the whole number of each type of card present. Because reactions obey the Law of Conservation of Matter, equations must be balanced: that is, the total number of atoms of each element must be the same on each side of the equation. **You do not have a chemical equation until it is balanced**. Balancing is done by inserting coefficients for the terms in the equation; you **never** balance an equation by changing subscripts..

Many chemical reactions fit into one of four general classes: composition (or synthesis), decomposition (or analysis), single replacement (or simple replacement), and double replacement (or metathetical). If composition, elements combine to make a compound, while in decomposition; a compound is broken apart into its elements or simpler compounds. In single replacement, one element takes the place of another element in a compound, while in double displacement; the elements in two compounds switch partners with each other. Examples of the four types are:

Composition: $2Al + 3S \rightarrow Al_2S_3$
Decomposition: $2H_2O \rightarrow 2H_2 + O_2$ or $H_2CO_3 \rightarrow H_2O + CO_2$
Single Replacement: $Zn + 2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$ or $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$
Double Replacement: $Pb(NO_3)_2 + Na_2So_4 \rightarrow PbSO_4 + 2NaNO_3$

Balance the following by inserting the appropriate coefficient for each term. Also write the type of reaction in the blank to the left.

_____ 1. $Mg + O_2 \rightarrow MgO$

_____ 2. $AgNO_3 + BaCl_2 \rightarrow AgCl + Ba(NO_3)_2$

_____ 3. $N_2 + H_2 \rightarrow NH_3$

_____ 4. $Al + O_2 \rightarrow Al_2O_3$

_____ 5. $Na + HOH \rightarrow NaOH + H_2$

_____ 6. $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + HOH$

_____ 7. $Al_2(SO_4)_3 + Ca(OH)_2 \rightarrow Al(OH)_3 + CaSO_4$

_____ 8. $HgO \xrightarrow{\Delta} Hg + O_2$

_____ 9. $Ba(OH)_2 + HNO_3 \rightarrow Ba(NO_3)_2 + HOH$

_____ 10. $P_4 + O_2 \rightarrow P_4O_{10}$

_____ 11. $Al + CuSO_4 \rightarrow Al_2(SO_4)_3 + Cu$

_____ 12. $Cl_2 + NaI \rightarrow NaCl + I_2$

_____ 13. $Ba(OH)_2 + HNO_3 \rightarrow Ba(NO_3)_2 + HOH$

_____ 14. $Ca(C_2H_3O_2)_2 + K_2C_2O_4 \rightarrow CaC_2O_4 + KC_2H_3O_2$

_____ 15. $NaClO_3 \xrightarrow{\Delta} NaCl + O_2$

Chemistry Equations – Worksheet #2 **Name _____**

Chemical reactions always obey the Law of Conservation of Matter. Equations represent chemical reactions, but the following equations are not yet complete – **they must be balanced before they are truly equations**. Once you insert the correct coefficients the equations are balanced and obey the Law of Conservation of Matter and then they describe chemical reactions. You may only use coefficients to balance the equations; **you never change the subscripts, which are needed to give the correct formulas**.

The materials on the left of the equations are called **reactants**; the materials on the right side of the equation are called **products**. The arrow in the equations is read as **yields**. Notice that many of the equations involve the seven elements that exist as diatomic molecules when they are pure elements: H_2, N_2, O_2, F_2, Cl_2 Br_2, and I_2. They do not exist in multiples of two in compounds – only when alone.

Insert coefficients to balance the following equations and classify the reactions in terms of type.

_____ 1. $AgNO_3 + ZnCl_2 \rightarrow AgCl + Zn(NO_3)_2$

_____ 2. $FeCl_3 + NaOH \rightarrow Fe(OH)_3 + NaCl$

_____ 3. $Al + H_2SO_4 \rightarrow Al_2(SO_4)_3 + H_2$

_____ 4. $P_4 + O_2 \rightarrow P_4O_6$

_____ 5. $K + HOH \rightarrow KOH + H_2$

_____ 6. $Ba(C_2H_3O_2)_2 + (NH_4)_2SO_4 \rightarrow BaSO_4 + NH_4C_2H_3O_2$

_____ 7. $Zn + HCl \rightarrow ZnCl_2 + H_2$

_____ 8. $Sb + O_2 \rightarrow Sb_2O_5$

_____ 9. $KClO_3 \rightarrow KCl + O_2$

_____ 10. $Pb(NO_3)_2 + Na_2CrO_4 \rightarrow PbCrO_4 + NaNO_3$

_____ 11. $Fe_2O_3 + C \xrightarrow{\Delta} Fe + CO_2$

_____ 12. $H_2 + O_2 \rightarrow H_2O$

_____ 13. $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + HOH$

_____ 14. $SO_2 + O_2 \rightarrow SO_3$

_____ 15. $Al_2O_3 \xrightarrow{DC} Al + O_2$

_____ 16. $Fe(ClO_3)_3 + NaSCN \rightarrow Fe(SCN)_3 + NaClO_3$

_____ 17. $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

_____ 18. $KOH + H_3PO_4 \rightarrow K_2HPO_4 + HOH$

_____ 19. $H_2O_2 \rightarrow H_2O + O_2$

_____ 20. $CaCO_3 + HCl \rightarrow CaCl_2 + H_2O + CO_2$

Classroom Worksheet **Name _____**
Vocabulary and Equations

Answer the following questions based upon your notes or upon the information given in the paragraphs found at the top of the equations writing sheets. It is important to be extremely familiar with the terms and information that follow in order to successfully write correct chemical equations.

1. Chemical symbols represent _____.
2. Chemical formulas represent _____.
3. The charges that you use to help you write the correct formulas are called _____.
4. The small numbers that you insert when you write formulas are called _____.
5. The total charge on any compound is _____.
6. Define "polyatomic ions", that is, tell what they are and how they behave.

   _____

   _____
7. Why can't polyatomic ions ever stand-alone? _____.
8. What is true of the oxidation number of all metal ions? _____.
9. Positive ions are called _____.
10. Negative ions are called _____.
11. Compounds that have names that end with the suffix "-ide" are _____.
12. Give the seven common metals that form ions with two different charges and given the two charges of each metal:_____

    _____
13. What ion is common to all acids? _____
14. Binary acids have names that start with the prefix "_____" and end with the suffix "_____"
15. Ternary acids containing an "-ate" polyatomic ion are named with the suffix "_____".
16. Ternary acids containing a "per—ate" polyatomic ion are named with the suffix "_____".
17. Ternary acids containing an "-ite" polyatomic ion are named with the suffix "_____".
18. Ternary acids containing a "hypo—ite" polyatomic ion are named "_____---_____".
19. Give the <u>names and formulas</u> for the six common acids referred to below:
    a. stomach acid or muriatic acid _____ _____
    b. battery acid _____ _____
    c. the acid in vinegar _____ _____
    d. the acid in carbonated beverages _____ _____
    e. the acid flavoring in colas _____ _____
    f. the acid that turns protein yellow _____ _____

1. Write the formulas for:

   Perchloric acid, chloric acid, chlorous acid, hypochlorous acid, and hydrochloric acid

   _____ _____ _____ _____ _____

2. Chemical equations represent _____.
3. The starting materials in an equation are called the _____.
4. The arrow in an equation is read as _____.
5. The ending materials in an equation are called the _____.
6. The numbers we insert to balance an equation are called the _____.
7. A triangle over the arrow in an equation means _____.
8. DC over the arrow in an equation means _____.
9. A word that means to decompose a compound by electricity is _____.
10. The word molten means _____.
11. We must balance equations because "matter is neither created nor destroyed in an ordinary chemical reaction". This statement is known as the _____.
12. Write formulas for the molecules of the seven elements that exist in diatomic molecules:

    _____.
13. Name the four general types of chemical reactions:

    _____.
14. A metathetical reaction is another name for a _____ reaction.
15. An insoluble compound formed during a chemical reaction is called a _____.
16. When carbonic acid forms as a product it decomposes to give _____.
17. Burning means chemical combination with _____ so you must add _____ on the left.
18. Another word that means burning is _____.
19. Our common fuels are called _____ and contain the elements _____ and _____.
20. The complete combustion of a hydrocarbon produces energy plus _____ and _____.
21. The three steps involved in writing chemical equations are:
    1. _____.
    2. _____.
    1. _____.

Chemistry Equations – Worksheet #3 **Name _____**

On the previous worksheets you were given the skeleton equations and simply had to balance them by inserting the correct coefficients. On this page you are given word equations, so for each reaction you must:

1. Write a skeleton equation containing **all of the correct formulas**.
2. Balance the equation by inserting the appropriate coefficients.

Remember to use H_2, N_2, O_2, F_2, Cl_2, Br_2, and I_2 when these elements are not in compounds. Put a triangle over the arrow for heat and DC for electrolysis.

1. When you are writing the formulas simply think of all of the rules you have learned for formula writing and don't worry about the overall equation. When writing the formulas for the products, be sure to just look at the word equation – not the formulas of the compounds on the left of the equation. **DO NOT DRAG SUBSCRIPTS FROM THE LEFT TO THE RIGHT**.

2. After you have all of the correct formulas, insert the coefficients to balance the equation.

USE A SEPARATE SHEET OF PAPER TO WRITE EQUATIONS FOR THE FOLLOWING REACTIONS. ALSO INDICATE THE TYPE OF REACTION FOR EACH REACTION.

1. magnesium plus sulfur yields magnesium sulfide
2. barium plus oxygen yields barium oxide
3. aluminum plus chlorine yields aluminum chloride
4. zinc plus hydrochloric acid yields zinc chloride and hydrogen
5. sodium hydroxide plus sulfuric acid yields sodium sulfate plus water. (Write the water HOH.)
6. potassium chlorate is heated and yields potassium chloride and oxygen
7. lithium plus iodine yields lithium iodide
8. nickel plus copper (II) sulfate yields nickel sulfate plus copper
9. aluminum plus silver nitrate yields aluminum nitrate plus silver
10. calcium carbonate plus hydrochloric acid yields calcium chloride, water (H_2O), and carbon dioxide
11. calcium hydroxide plus acetic acid yields calcium acetate and water (HOH)
12. aluminum plus sulfuric acid yields aluminum sulfate plus hydrogen
13. barium hydroxide plus nitric acid yields barium nitrate plus water (HOH)
14. magnesium hydroxide plus sulfurous acid yields magnesium sulfite plus water (HOH)
15. sodium plus water (HOH) yields sodium hydroxide plus hydrogen
16. iron (III) oxide plus carbon when heated yields iron and carbon monoxide
17. copper plus silver chlorate yields copper (II) chlorate and silver
18. aluminum oxide is decomposed by electricity yielding aluminum and oxygen
19. hydrogen peroxide is exposed to uv light and decomposes to water and oxygen
20. methane burns (reacts with oxygen) giving carbon dioxide and water

Note: When you add an active metal to water or when you react an acid with a base and produce water it makes it easier to balance the equation if you write water as HOH and treat it as hydrogen hydroxide when you balance it. In any other reaction it is easier to write H_2O and count the H's and O's separately.

Chemistry Equations – Worksheet #4 **Name _____**

This page contains twenty word equations to give you practice writing balanced chemical equations. After you have the total reaction (that means that the word equation tells you both the reactants and the products) remember that it is a two-step process to write the balanced equation for the reaction:

1. Write the skeleton equation containing **all of the correct formulas; you cannot start to balance until all of the formulas are correct**.

2. balance the equation by inserting the correct coefficients.

USE A SEPARATE SHEET OF PAPER TO WRITE EQUATIONS FOR THE FOLLOWING REACTIONS. ALSO INDICATE THE TYPE OF REACTION FOR EACH REACTION.

1. silver nitrate plus iron (III) chloride yields silver chloride and iron (III) nitrate
2. magnesium plus acetic acid yields magnesium acetate and hydrogen
3. potassium chloride undergoes electrolysis yielding potassium and chlorine
4. sulfur dioxide plus water (H_2O) yields sulfurous acid
5. heating calcium hydroxide yields calcium oxide and water (H_2O)
6. iron (II) sulfide plus hydrochloric acid yields iron (II) chloride and hydrogen sulfide
7. calcium plus water (HOH) yields calcium hydroxide and hydrogen
8. heating silver oxide yields silver and oxygen
9. aluminum hydroxide plus nitric acid yields aluminum nitrate plus water (HOH)
10. heating potassium chlorate yields potassium chloride and oxygen
11. sodium hydroxide plus phosphoric acid yields sodium hydrogen phosphate and water (HOH)
12. heating sodium bicarbonate produces sodium carbonate and water (H_2O) and carbon dioxide
13. lead (II) acetate plus ammonium chromate yields lead (II) chromate and ammonium acetate
14. tin (II) nitrate plus cesium carbonate yields tin (II) carbonate and cesium nitrate
15. sodium chromate plus silver nitrate yields sodium nitrate plus silver chromate
16. calcium carbonate plus hydrochloric acid yields calcium chloride and water (H_2O) and carbon dioxide
17. ammonium hydroxide plus hydrofluoric acid yields ammonium fluoride and water (HOH)
18. potassium plus water (HOH) yields potassium hydroxide plus hydrogen
19. sodium oxalate plus barium bromide yields sodium bromide plus barium oxalate
20. iron (II) cyanide plus hydrochloric acid yields iron (II) chloride plus hydrogen cyanide

Chemistry Equations – Worksheet #5 **Name _____**

USE A SEPARATE SHEET OF PAPER AND WRITE BALANCED CHEMICAL EQUATIONS FOR EACH OF THE FOLLOWING REACTIONS. AS ON PREVIOUS SHEETS YOU MUST FIRST WRITE THE SKELETON EQUATION OF CORRECT FORMULAS AND THEN BALANCE THE OVERALL EQUATION. By looking at the reactants and knowing what the type of reaction you can determine the most likely products and therefore write the equation. Remember that when you write a formula you always write the positive portion first, then the negative.

Single replacement reactions (simple replacement reactions)

Note: metals replace other metals or hydrogen; nonmetals replace other nonmetals.

1. zinc reacts with silver nitrate
2. aluminum reacts with copper (II) sulfate
3. bromine reacts with lithium iodide
4. magnesium reacts with tin (II) chloride
5. chlorine reacts with potassium bromide

Double displacement reactions (metathetical reactions)

6. silver nitrate reacts with beryllium chloride
7. aluminum nitrate reacts with ammonium hydroxide
8. cesium hydroxide reacts with sulfuric acid
9. calcium hydroxide reacts with potassium phosphate
10. barium acetate reacts with potassium carbonate

Chemistry Equations – Worksheet #6 **Name _____**

Each of the following reactions fits into one of the four general categories. By deciding the category you can predict the product(s) and write the balanced equation. **USE A SEPARATE SHEET OF PAPER TO WRITE BALANCED EQUATIONS FOR THE REACTIONS BELOW**.

1. zinc is added to sulfuric acid
2. calcium chloride is mixed with sodium sulfate
3. zinc is added to copper (II) sulfate
4. magnesium is added to silver nitrate
5. chlorine reacts with zinc iodide
6. nickel reacts with copper (II) chloride
7. aluminum acetate reacts with calcium hydroxide
8. sodium hydroxide reacts with sulfurous acid
9. aluminum reacts with hydrochloric acid
10. barium hydroxide reacts with carbonic acid
11. lead (II) nitrate is mixed with rubidium chromate
12. magnesium reacts with acetic acid
13. iron (III) nitrate reacts with sodium thiocyanate
14. chromium reacts with tin (II) chlorate (assume the Cr^{3+} product)
15. cadmium acetate reacts with potassium chromate
16. lithium reacts with water (HOH)
17. barium bromide with ammonium sulfate
18. gallium reacts with sulfuric acid (gallium is right under aluminum – it forms a +3 ion)
19. lithium hydroxide reacts with carbonic acid
20. calcium chlorate reacts with nickel sulfate
21. cadmium nitrate reacts with sodium sulfide
22. calcium bromide reacts with rubidium oxalate
23. sodium hydroxide reacts with sulfurous acid
24. mercury (II) nitrate reacts with hydrogen sulfide

Chemistry Equations – Worksheet #7 **Name _____**

Each of the following reactions fits into one of the four general categories. By deciding the category you can predict the product(s) and write the balanced equation.

1. magnesium hydroxide reacts with hydrochloric acid
2. tin reacts with hydrochloric acid (assume the Sn^{+2} product)
3. potassium cyanide reacts with hydrobromic acid
4. chlorine is bubbled through a solution of calcium iodide
5. tin (II) carbonate reacts with hydrofluoric acid
6. copper (II) carbonate reacts with nitric acid
7. potassium bicarbonate reacts with acetic acid
8. calcium carbonate reacts with hydrochloric acid
9. sodium reacts with water (HOH)
10. chlorine reacts with magnesium bromide
11. silver nitrate reacts with beryllium iodide
12. potassium reacts with water (HOH)
13. scandium hydroxide reacts with nitric acid
14. calcium chloride reacts with sodium phosphate
15. calcium reacts with water (HOH)
16. zinc reacts with sulfuric acid
17. ammonium hydroxide reacts with sulfurous acid
18. aluminum hydroxide reacts with nitrous acid
19. sodium bicarbonate reacts with hydrochloric acid
20. oxalic acid reacts with calcium hydroxide
21. barium reacts with hot water (HOH)
22. mercury (I) nitrate reacts with lithium chloride
23. bromine reacts with calcium iodide

Chemistry Equations – Worksheet #8 **Name _____**

Each of the following reactions fits into one of the four general categories. By deciding the category you can predict the product(s) and write the balanced equation. **USE A SEPARATE SHEET OF PAPER TO WRITE BALANCED EQUATIONS FOR THE REACTIONS BELOW**.

1. cadmium reacts with tin (II) nitrate
2. bromine reacts with lithium iodide
3. nitric acid reacts with calcium hydroxide
4. lead (II) acetate reacts with potassium dichromate
5. calcium carbonate reacts with hydrochloric acid
6. sodium hydroxide reacts with phosphoric acid
7. calcium phosphate reacts with sulfuric acid
8. iron (III) chloride reacts with barium hydroxide
9. tin (II) nitrate reacts with potassium dichromate
10. calcium bromide reacts with sodium silicate
11. silver chlorate reacts with ammonium sulfide
12. aluminum reacts with hydrochloric acid
13. aluminum hydroxide reacts with sulfuric acid
14. barium peroxide reacts with sulfuric acid
15. zinc chloride reacts with sodium hydroxide
16. calcium hydroxide and aluminum sulfate react
17. calcium nitrate reacts with potassium oxalate
18. milk of magnesia (magnesium hydroxide) reacts with stomach acid (hydrochloric acid)
19. magnesium reacts with battery acid (sulfuric acid)
20. baking soda (sodium bicarbonate) reacts with vinegar (acetic acid)