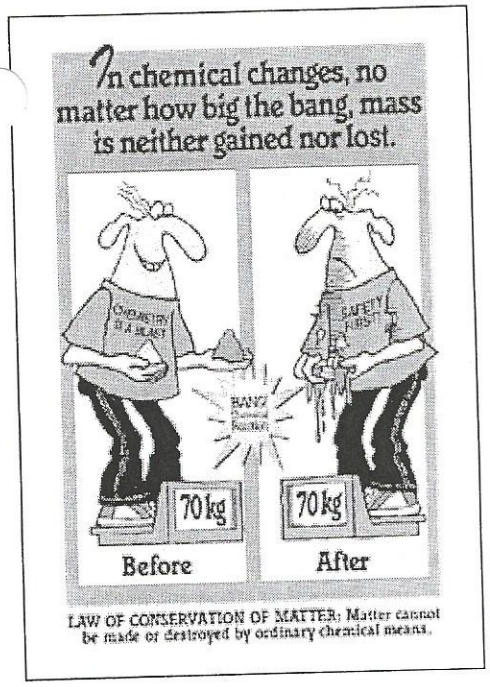
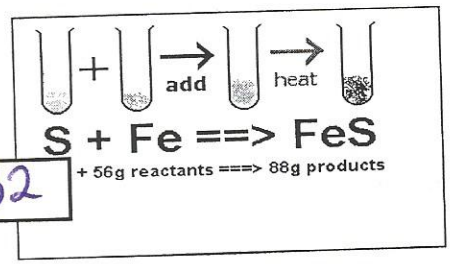
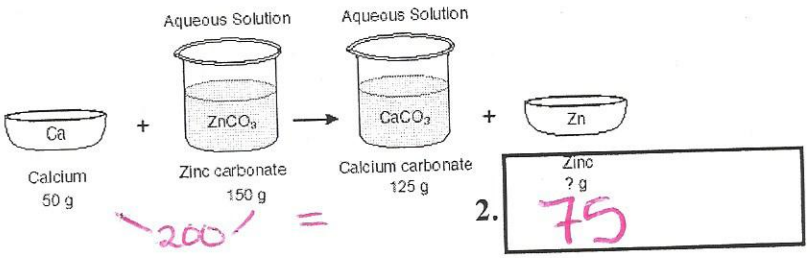
Law of Conservation of Mass Word Problems Name J. Hansen KEY Period _



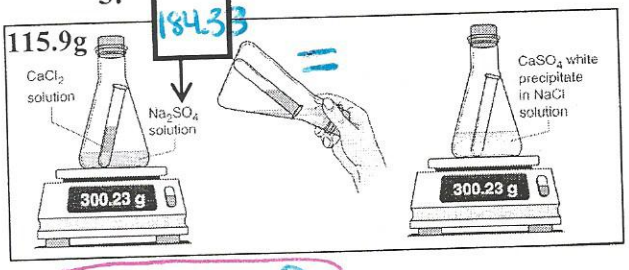


88 − 56 = 32



200 − 125 = 75

3. 184.33



300.23 − 115.9 = 184.33

4. Calculate the mass of the product of 6.40 g of magnesium with 1.32 g of oxygen.

$Mg + O_2$

6.40 + 1.32 = 7.72g

5. Calculate the mass of the zinc that reacts with 4.11 g of hydrochloric acid to form 9.1 g of zinc chloride and 3.97 g of hydrogen gas.

$HCl + Zn \rightarrow ZnCl_2 + H_2$

4.11 + ? = 9.1 + 3.97

8.96g

6. During the combustion of 5.00 g of Butane in the presence of oxygen, 4.01 g of carbon dioxide and 3.55 g of water is given off. How much oxygen was needed to totally combust the butane?

Butane + $O_2 \rightarrow CO_2 + H_2O$

5 + ? = 4.01 + 3.55

2.56g

7. Iron combines with 4.00 g of Copper (11) nitrate to form 6.01 g of Iron (I) nitrate and 0.400 g copper metal. How much iron did it take to convert the $Cu(NO_3)_2$?

$Fe + Cu(NO_3)_2 \rightarrow FeNO_3 + Cu$

? + 4g = 6.01g + .4g

2.41g

Sample Assessment Questions

8. Consider the following decomposition reaction: 2 H2O2 ---> 2 H2O + O2

If 72 grams of water and 64 grams of oxygen are produced, what mass of H2O2 decomposed?

a. 72 grams
b. 136 grams
c. 64 grams
d. Not enough information given

72 + 64 = 136

. Consider the following chemical reaction: 2 NaCl + Ca(OH)2 ---> CaCl2 + 2 NaOH

191 + 74 = ? + 80

If the mass of 191 grams NaCl reacted with 74 grams of calcium hydroxide and 80 grams of sodium hydroxide is produced, what mass of calcium chloride is produced?

a. 52.5 grams
b. 111 grams
c. 91 grams
d. 185 gram

Versatile Activity
Conservation of Mass
TAKS Objective 4-8C
(*Pattern # 5)*

72.9g + 28g = 100.9g
$Mg + N_2 \rightarrow Mg_3N_2$

1 D	When 72.9 g of magnesium is reacted with 28.0 g of nitrogen gas, no magnesium or nitrogen is left over. How much magnesium nitride is produced? 100.9g	7 H	Is the Law of Conservation of Mass being followed in this equation? NO coefficient should be 4. $2Al_2O_3 \rightarrow 2Al + 3O_2$
2 F	$Mg_{(s)} + ZnCl_{2\,(aq)} \rightarrow MgCl_{2\,(aq)} + Zn_{(s)}$ 45.0 g + 297.6 g = 176.5 g + ? g 166.1g	8 L	$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$? g = 80.0 g = 66.0 g + 36.0 g 22g
3 A	Reactant → Product $KClO_3 \rightarrow KCl + O_2$ 125 = + If 125 g of $KClO_3$ are heated, what is the total mass of the products? 125g	9 B	$2H_2 + 1O_2 \rightarrow 2H_2O$ x4 ↓x4 = 8 Molec H_2O How many molecules of oxygen would be required to produce 8 molecules of water? 4 molecule O_2
4 C	Does this equation support the Law of Conservation of mass? Yes-Equation Balanced $1Pb(NO_3)_2 + 2KI \rightarrow 1PbI_2 + 2KNO_3$	10 J	If a cake recipe calls for 25.0 g of sugar, how much sugar will the baked cake contain? 25g Sugar matter is not created or destroyed
5 G	What is the coefficient of for O_2 when this equation is balanced? (7) 2 7 4 6 $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$ 4+3=7	11 H	x3 6 6 ↘x3 = $2Al(OH)_3 \rightarrow Al_2O_3 + 3H_2O$ How many molecules of water would be produced from 6 molecules of aluminum hydroxide? 9molecule of H_2O
6 E	If all the reactants in a chemical reaction are used, what is true about the mass of the products? product mass = Reactant mass	12 K	What might be true when measuring the mass of the products in this reaction? $Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2\,(aq)} + H_{2\,(g)}$ Gas leaves reaction

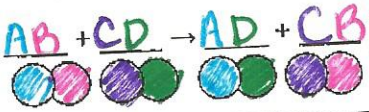
A 125 g	B 4	C yes	D 100.9 g	E same mass	F 166.1 g
G 7	H 9	I no	J 25.0 g	K different mass	L 22.0 g

D	F	A	C	G	E
H	L	B	J	H	K

Guided Practice

Chemical Reactions

Name _____

Type of Reaction	Definition	★ Equation
Synthesis	2 Reactants combine to form 1 product	A + B → AB 
Decomposition	1 Reactant falls apart to form 2 products	AB → A + B 
Single Replacement	Both product and reactant side contain a compound and a single element.	AB + C → AC + B 
Double Replacement	Both product and reactant side contain two compounds	AB + CD → AD + CB 

Colors: A = Red, B = Blue, C = Green, D = Yellow

2. Use colored pencils to circle the common atoms or compounds in each equation to help you determine the type of reaction it illustrates. Use the code below to classify each reaction.

S = Synthesis **D = Decomposition** **SR = Single Replacement** **DR = Double Replacement**

S $P + O_2 \rightarrow P_4O_{10}$

D $HgO \rightarrow Hg + O_2$

SR $Cl_2 + NaBr \rightarrow NaCl + Br_2$

S $Na + Br_2 \rightarrow NaBr$

SR $HgO + Cl_2 \rightarrow HgCl + O_2$

D $KClO_3 \rightarrow KCl + O_2$

DR $BaCl_2 + Na_2SO_4 \rightarrow NaCl + BaSO_4$

S $Mg + O_2 \rightarrow MgO$

D $Al_2O_3 \rightarrow Al + O_2$

S $H_2 + N_2 \rightarrow NH_3$

DR $CuCl_2 + H_2S \rightarrow CuS + HCl$

S $C + H_2 \rightarrow CH_4$

S $S_8 + F_2 \rightarrow SF_6$

CLASSIFICATION OF CHEMICAL REACTIONS – Already Balanced!

Name _____

Classify the reactions below as synthesis, decomposition, single replacement (cationic or anionic) or double replacement.

1. $2H_2 + O_2 \rightarrow 2H_2O$ — Synthesis

2. $2H_2O \rightarrow 2H_2 + O_2$ — decomposition

3. $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ — Single Replacement

4. $2CO + O_2 \rightarrow 2CO_2$ — Synthesis

5. $2HgO \rightarrow 2Hg + O_2$ — Decomposition

6. $2KBr + Cl_2 \rightarrow 2KCl + Br_2$ — Single Replacement

7. $CaO + \overset{H(OH)}{H_2O} \rightarrow Ca(OH)_2$ — Synthesis

8. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ — Double Replacement

9. $2H_2O_2 \rightarrow 2H_2O + O_2$ — Decomposition

10. $Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + \overset{H(OH)}{2H_2O}$ — Double Replacement

Balancing Act

Name _____

Atoms are not created or destroyed during a chemical reaction. Scientists know that there must be the same number of atoms on each side of the equation. To balance the chemical equation, you must add coefficients in front of the chemical formulas in the equation. You cannot add or delete subscripts!

1) Determine number of atoms for each element.

2) Pick an element that is not equal on both sides of the equation.

3) Add a coefficient in front of the formula with that element and adjust your counts.

4) Continue adding coefficients to get the same number of atoms of each element on each side.

$\boxed{2}\ Mg + \boxed{1}\ O_2 \rightarrow \boxed{2}\ MgO$

Mg = Mg =

O = O =

Try these:

$\boxed{2}\ Ca + \boxed{1}\ O_2 \rightarrow \boxed{2}\ CaO$

Ca = Ca =

O = O =

$\boxed{1}\ N_2 + \boxed{3}\ H_2 \rightarrow \boxed{2}\ NH_3$

N = N =

H = H =

$\boxed{2}\ Cu_2O + \boxed{1}\ C \rightarrow \boxed{4}\ Cu + \boxed{1}\ CO_2$

Cu = Cu =

O = O =

C = C =

$\boxed{2}\ H_2O_2 \rightarrow \boxed{2}\ H_2O + \boxed{1}\ O_2$

make oxygen even #

2+2=4

H = H =

O = O =

Balancing Act Practice Name _____

Balance each equation. ~~Be sure to show your lists!~~ Remember you cannot add subscripts or place coefficients in the middle of a chemical formula.

1. 2 Na + 1 MgF_2 → 2 NaF + 1 Mg

2. 1 Mg + 2 HCl → 1 $MgCl_2$ + 1 H_2

3. 1 Cl_2 + 2 KI → 2 KCl + 1 I_2

4. 2 NaCl → 2 Na + 1 Cl_2

5. ~~2~~ 4 Na + 1 O_2 → 2 Na_2O

6. 2 Na + 2 HCl → 1 H_2 + 2 NaCl

7. 2 K + 1 Cl_2 → 2 KCl

Challenge: This one is tough!

~~2~~ 1 C_2H_6 + ~~7~~ 3.5 O_2 → ~~2~~ 4 CO_2 + ~~3~~ 6 H_2O

4+3 = 7 oxygen

DOUBLE TO GET RID OF DECIMAL!

Types of Reactions Worksheet

Balance the following equations and indicate the type of reaction taking place:

1) 3 NaBr + 1 H_3PO_4 → 1 Na_3PO_4 + 3 HBr

Type of reaction: Double

2) 3 $Ca(OH)_2$ + 1 $Al_2(SO_4)_3$ → 3 $CaSO_4$ + 2 $Al(OH)_3$

Type of reaction: Double

3) 3 Mg + 1 Fe_2O_3 → 2 Fe + 3 MgO

Type of reaction: Single Replacement

4) 1 C_2H_4 + 3 O_2 → 2 CO_2 + 2 H_2O

4 + 2 = 6

Type of reaction: Combustion

5) 2 $PbSO_4$ → 2 $PbSO_3$ + 1 O_2

Get rid of odd # 6 + (?) = 8

Type of reaction: Decomposition

6) 2 NH_3 + 3 I_2 → 1 N_2I_6 + 3 H_2

Type of reaction: Single Replacement

7) 1 H_2O + 1 SO_3 → 1 H_2SO_4 Already Balanced

1 + 3 = 4

Type of reaction: Synthesis

8) 1 H_2SO_4 + 2 NH_4OH → 2 H(OH) ~~H_2O~~ + 1 $(NH_4)_2SO_4$

Rewrite!

Type of reaction: Double Replacement

Chemistry:

Worksheet: Balancing & Classifying Reactions /45 Name _____ Period _____

Balance the following chemical equations. Use the following definitions to classify the reactions as synthesis, decomposition, single replacement or double replacement.

Synthesis-a reaction in which two or more substance combine to form a new compound.

Decomposition- A reaction in which a single compound produces two or more simpler substances.

Single Replacement- A reaction in which one element replaces a similar element in a compound.

Double Replacement- A reaction in which the ions of two compounds exchange places in an aqueous solution to form two new compounds.

Combustion Reaction- A reaction in which a hydrocarbon combines with oxygen, forming carbon dioxide and water.

1. $1\ CH_4 + 2\ O_2 \rightarrow 1\ CO_2 + 2\ H_2O$ Combustion (2+2=4)
2. $2\ Na + 1\ I_2 \rightarrow 2\ NaI$ Synthesis
3. $2\ N_2 + 1\ O_2 \rightarrow 2\ N_2O$ Synthesis
4. $1\ N_2 + 3\ H_2 \rightarrow 2\ NH_3$ Synthesis
5. $2\ KI + 1\ Cl_2 \rightarrow 2\ KCl + 1\ I_2$ Single Replacement
6. $2\ HCl + 1\ Ca(OH)_2 \rightarrow 1\ CaCl_2 + 2\ H(OH)$ Double Replacement
7. $2\ KClO_3 \rightarrow 2\ KCl + 3\ O_2$ Decomposition
8. $1\ K_3(PO_4) + 3\ HCl \rightarrow 3\ KCl + 1\ H_3(PO_4)$ Double Replacement
9. $2\ S + 3\ O_2 \rightarrow 2\ SO_3$ Synthesis
10. $2\ KI + 1\ Pb(NO_3)_2 \rightarrow 2\ KNO_3 + 1\ PbI_2$ Double Replacement
11. $3\ CaSO_4 + 2\ AlBr_3 \rightarrow 3\ CaBr_2 + 1\ Al_2(SO_4)_3$ Double Replacement
12. $2\ H_2O_2 \rightarrow 2\ H_2O + 1\ O_2$ Decomposition
13. $2\ Na + 2\ H(OH) \rightarrow 2\ NaOH + 1\ H_2$ (make even 2+2=4) Single Replacement
14. $1\ C_2H_6 + 3.5\ O_2 \rightarrow 2\ CO_2 + 3\ H_2O$ Combustion
15. $3\ Mg(NO_3)_2 + 2\ K_3(PO_4) \rightarrow 1\ Mg_3(PO_4)_2 + 6\ KNO_3$ Double Replacement

Name: _____ Date: _____

Balancing Equations

Balance the following chemical equations.

Single 1. 2 Fe + 3 H_2SO_4 → 1 $Fe_2(SO_4)_3$ + 3 H_2

Combustion 2. 2 1 C_2H_6 + 7 3.5 O_2 → 6 3 H_2O + 4 2 CO_2 (3 + 4 = 7)

Double 3. 3 KOH + 1 H_3PO_4 → 1 K_3PO_4 + 3 H(OH) ~~H_2O~~

Single 4. 1 SnO_2 + 2 H_2 → 1 Sn + 2 H_2O

Does not fit a typical Reaction Type 5. 1 NH_3 + 2 O_2 → 1 NO + 3 H_2O (1 + 3 = 4) oxygen split for save for last step!

Double 6. 2 KNO_3 + 1 H_2CO_3 → 1 K_2CO_3 + 2 HNO_3

Double 7. 1 B_2Br_6 + 6 HNO_3 → 2 $B(NO_3)_3$ + 6 HBr

Double 8. 2 BF_3 + 3 Li_2SO_3 → 1 $B_2(SO_3)_3$ + 6 12 LiF

Double 9. 4 $(NH_4)_3PO_4$ + 3 $Pb(NO_3)_4$ → _____ $Pb_3(PO_4)_4$ + ~~3~~ NH_4NO_3

Single 10. 1 $SeCl_6$ + 1 O_2 → 1 SeO_2 + 3 Cl_2

Name _____ Period ____ Date _____

Diatomic Molecules = $Br_2 I_2 N_2 Cl_2 H_2 O_2 F_2$

A **synthesis** reaction occurs when two or more reactants form one product.
A **decomposition** reaction occurs when one reactant forms two or more products.
A **single displacement** reaction occurs when one element tries to replace another element in a compound.
A **double displacement** reaction occurs when two compounds switch ions.

Classify each equation below as:

S = synthesis
D = decomposition
SD = single displacement
DD = double displacement

	Type	Equation
1.	S, D, SD, DD	magnesium oxide ---> magnesium + oxygen $2\,MgO \rightarrow 2\,Mg + 1\,O_2$
2.	S, D, SD, DD	lithium + copper II sulfate ---> copper + lithium sulfate $2\,Li + 1\,CuSO_4 \rightarrow 1\,Cu + 1\,Li_2SO_4$
3.	S, D, SD, DD	barium nitride + aluminum oxide --> barium oxide + aluminum nitride $1\,Ba_3N_2 + 1\,Al_2O_3 \rightarrow 3\,BaO + 2\,AlN$
4.	S, D, SD, DD	carbonic acid ---> water + carbon dioxide $1\,H_2CO_3 \rightarrow 1\,H_2O + 1\,CO_2$ Already Balanced :)
5.	S, D, SD, DD	iron + oxygen ---> iron III oxide $4\,Fe + 3\,O_2 \rightarrow 2\,Fe_2O_3$
6.	S, D, SD, DD	copper II sulfate + potassium bromide ---> copper II bromide + potassium sulfate $1\,CuSO_4 + 2\,KBr \rightarrow 1\,CuBr_2 + 1\,K_2SO_4$
7.	S, D, SD, DD	magnesium + hydrochloric acid ---> hydrogen + magnesium chloride $1\,Mg + 2\,HCl \rightarrow 1\,H_2 + 1\,MgCl_2$
8.	S, D, SD, DD	lead IV nitrate + silver phosphate ---> lead IV phosphate + silver nitrate $3\,Pb(NO_3)_4 + 4\,Ag_3PO_4 \rightarrow 1\,Pb_3(PO_4)_4 + 12\,AgNO_3$
9.	S, D, SD, DD	barium chloride + potassium ---> barium + potassium chloride $1\,BaCl_2 + 2\,K \rightarrow 1\,Ba + 2\,KCl$
10.	S, D, SD, DD	aluminum + nitrogen ---> aluminum nitride $2\,Al + 1\,N_2 \rightarrow 2\,AlN$

(over)

Writing Formula Equations from Word Equations **Name** _____

A) Write formula equations that represent the reactions described in the following word equations.
B) Balance the equation that you wrote. NOTE: If a formula is wrong, the equation may not balance.

1.	Barium reacts with nitrogen to produce barium nitride	3:1:1

Synthesis: $3Ba + 1N_2 \rightarrow 1Ba_3N_2$ (Ba: +2, N: −3)

2.	Magnesium phosphide is broken down into phosphorus and magnesium	1:2:3

Decomposition: $1Mg_3P_2 \rightarrow 2P + 3Mg$ (Mg: +2, P: −3; Mg: +1, P: −1)

3.	Strontium iodide reacts with lithium to produce strontium and lithium iodide.	1:2:1:2

Single Replacement: $1SrI_2 + 2Li \rightarrow 1Sr + 2LiI$ (Sr: +2, I: −1; Li: +1, I: −1; Sr: 0; Li: 0)

4.	Cesium oxide is mixed with aluminum chloride to produce aluminum oxide and cesium chloride.	3:6:1:6

Double Replacement: $3Cs_2O + 2AlCl_3 \rightarrow 1Al_2O_3 + 6CsCl$ (Cs: +1, O: −2; Al: +3, Cl: −1; Al: +3, O: −2; Cs: +1, Cl: −1)

5.	Hexane (C_6H_{14}) is burned with sufficient oxygen to produce carbon dioxide and water.	~~1:6:6:6~~ * Double

Combustion: $2C_6H_{14} + 19O_2 \rightarrow 12CO_2 + 14H_2O$ (C: +4, H: +1; O: 0; C: +4, O: −2; H: +1, O: −2)

12 + 7 = 19

6.	Iron III chloride reacts with sodium sulfide to make iron III sulfide and sodium chloride.	2:3:1:6

Double: $2FeCl_3 + 3Na_2S \rightarrow 1Fe_2S_3 + 6NaCl$ (Fe: +3, Cl: −1; Na: +1, S: −2; Fe: +3, S: −2; Na: +1, Cl: −1)

7.	Beryllium oxide decomposes when heated into oxygen gas and beryllium.	2:1:2

Decomposition: $2BeO \rightarrow 1O_2 + 2Be$ (Be: +2, O: −2; O: 0; Be: 0)

8.	Copper I nitrate is poured into a container with barium wire to make barium nitrate and copper.	2:1:1:2

Single Replacement: $2Cu(NO_3) + 1Ba \rightarrow 1Ba(NO_3)_2 + 2Cu$ (Cu: +1, NO_3: −1; Ba: 0; Ba: +2, NO_3: −1; Cu: 0)

9.	Hot strontium reacted with fluorine gas to make strontium fluoride	1:1:1

Synthesis: $1Sr + 1F_2 \rightarrow 1SrF_2$ (Sr: +2, F: −1)

* Already Balanced

10.	Butene (C_4H_8) is burned in an oxygen rich environment and makes carbon dioxide and water.	1:6:4:4

Combustion: $1C_4H_8 + 6O_2 \rightarrow 4CO_2 + 4H_2O$ (C: −8, H: +1; O: 0; C: +4, O: −2; H: +1, O: −2)

8 + 4 = 12

Diatomic $Br_2\ I_2\ N_2\ Cl_2\ H_2\ O_2\ F_2$

Worksheet #2: Synthesis Reactions

In synthesis reactions, two or more reactants come together to form one compound.

A + B → AB

Complete the following word equations, and write and balance the formula equation.

1. calcium + oxygen → Calcium oxide

$2Ca + 1O_2 \rightarrow 2CaO$

2. copper + sulfur → copper(II) sulfide

$1Cu + 1S \rightarrow 1CuS$

3. calcium oxide + water → calcium hydroxide

$1CaO + 1H_2O \rightarrow 1Ca(OH)_2$

4. hydrogen + nitrogen → HydroNitric Acid

$3H_2 + 1N_2 \rightarrow 2H_3N$

5. hydrogen + chlorine → Hydrochloric Acid

$1H_2 + 1Cl_2 \rightarrow 2HCl$

6. silver + sulfur → Silver Sulfide

$2Ag + 1S \rightarrow 1Ag_2S$

7. chromium + oxygen → Chromium Oxide

$2Cr + 1O_2 \rightarrow 2CrO$

8. aluminum + bromine → Aluminum bromide

$2Al + 3Br_2 \rightarrow 2AlBr_3$

9. sodium + iodine → Sodium iodide

$2Na + 1I_2 \rightarrow 2NaI$

10. hydrogen + oxygen → water

$2H_2 + 1O_2 \rightarrow 2H_2O$

11. aluminum + oxygen → Aluminum oxide

$4Al + 3O_2 \rightarrow 2Al_2O_3$

Worksheet #6: Combustion Reactions

We will focus on the combustion of hydrocarbons. Hydrocarbons react with oxygen to form carbon dioxide and water.

1. methane (CH_4) + oxygen → carbon dioxide + water

$1\,CH_4 + 2\,O_2 \rightarrow 1\,CO_2 + 2\,H_2O$

2. ethane (C_2H_6) + oxygen → carbon dioxide + water

$2\,C_2H_6 + 7\,O_2 \rightarrow 4\,CO_2 + 6\,H_2O$ (4 + 3 = 7)

3. propane (C_3H_8) + oxygen → carbon dioxide + water

$1\,C_3H_8 + 5\,O_2 \rightarrow 3\,CO_2 + 4\,H_2O$ (6 + 4 = 10)

4. butane (C_4H_{10}) + oxygen → carbon dioxide + water

$2\,C_4H_{10} + 13\,O_2 \rightarrow 8\,CO_2 + 10\,H_2O$ (8 + 5 = 13)

5. pentane (C_5H_{12}) + oxygen → carbon dioxide + water

$1\,C_5H_{12} + 8\,O_2 \rightarrow 5\,CO_2 + 6\,H_2O$ (10 + 6 = 16)

6. hexane (C_6H_{14}) + oxygen → carbon dioxide + water

$2\,C_6H_{14} + 19\,O_2 \rightarrow 12\,CO_2 + 14\,H_2O$ (12 + 7 = 19)

7. ethene (C_2H_4) + oxygen → carbon dioxide + water

$1\,C_2H_4 + 3\,O_2 \rightarrow 2\,CO_2 + 2\,H_2O$

8. ethyne (C_2H_2) + oxygen → carbon dioxide + water

$2\,C_2H_2 + 5\,O_2 \rightarrow 4\,CO_2 + 2\,H_2O$ (4 + 1 = 5)

9. benzene (C_6H_6) + oxygen → carbon dioxide + water

$2\,C_6H_6 + 15\,O_2 \rightarrow 12\,CO_2 + 6\,H_2O$

12 + 3 = 15

*Use Activity Series

HCl
HNO_3
H_2SO_4

Worksheet #4: Single-Replacement Reactions

Step 1 - Write the formulas of the reactants on the left of the yield sign
Step 2 - Look at the Activity Series on page 333 to determine if the replacement can happen
Step 3 - If the replacement can occur, complete the reaction and balance it. If the reaction cannot happen, write N.R. (no rxn) on the product side.

1. lead + zinc acetate → No Reaction

2. iron + aluminum oxide → No reaction

3. silver nitrate + nickel → Nickel Nitrate + Silver
$1\,AgNO_3 + 1\,Ni \rightarrow 1\,NiNO_3 + 1\,Ag$
*Already balanced if Nickel I

4. sodium bromide + iodine → No Reaction
~~$NaBr + I_2 \rightarrow NaI + Br_2$~~

5. aluminum bromide + chlorine → Aluminum chloride + Bromine
$2\,AlBr_3 + 3\,Cl_2 \rightarrow 2\,AlCl_3 + 3\,Br_2$

6. sodium iodide + bromine → Sodium bromide + iodine
$2\,NaI + 1\,Br_2 \rightarrow 2\,NaBr + 1\,I_2$

7. calcium + hydrochloric acid → No Reaction

8. magnesium + nitric acid (H) → Magnesium Nitrate + Hydrogen
$1\,Mg + 2\,HNO_3 \rightarrow 1\,Mg(NO_3)_2 + 1\,H_2$

9. silver + sulfuric acid (H) → No Reaction

10. potassium + water (H(OH)) → potassium Hydroxide + Hydrogen
$2\,K + 2\,H(OH) \rightarrow 2\,K(OH) + 1\,H_2$

11. sodium + water (H(OH)) → Sodium Hydroxide + Hydrogen
$2\,Na + 2\,H(OH) \rightarrow 2\,Na(OH) + 1\,H_2$

HCl
H_3PO_4
HC_2O_2H

Worksheet #5: Double-Replacement Reactions

In these reactions, all you do is look at the names of the reactants, and "switch partners". Just be sure that the new pairs come out with the positive ion named first, and paired with a negative ion.

1. aluminum iodide + mercury(II) chloride → Aluminum Chloride + Mercury II Iodide

$2AlI_3 + 3HgCl_2 \rightarrow 2AlCl_3 + 3HgI_2$

2. silver nitrate + potassium phosphate → Silver phosphate + potassium Nitrate

$3AgNO_3 + 1K_3PO_4 \rightarrow 1Ag_3PO_4 + 3KNO_3$

3. copper(II) bromide + aluminum chloride → Copper II Chloride + Aluminum Bromide

$3CuBr_2 + 2AlCl_3 \rightarrow 3CuCl_2 + 2AlBr_3$

4. calcium acetate + sodium carbonate → Calcium carbonate + sodium acetate

$1Ca(C_2H_3O_2)_2 + 1Na_2CO_3 \rightarrow 1CaCO_3 + 2NaC_2H_3O_2$

5. ammonium chloride + mercury(I) acetate → Ammonium Acetate + mercury I Chloride

$1NH_4Cl + 1HgC_2H_3O_2 \rightarrow 1NH_4C_2H_3O_2 + 1HgCl$

6. calcium nitrate + hydrochloric acid → Calcium Chloride + Nitric Acid

$1Ca(NO_3)_2 + 2HCl \rightarrow 1CaCl_2 + 2HNO_3$

7. iron(II) sulfide + hydrochloric acid → Iron II Chloride + Hydrosulfuric Acid

$1FeS + 2HCl \rightarrow 1FeCl_2 + 1H_2S$

8. copper(II) hydroxide + acetic acid → Copper II acetate + water

$1Cu(OH)_2 + 2H(C_2H_3O_2) \rightarrow 1Cu(C_2H_3O_2)_2 + 2H(OH)$

9. calcium hydroxide + phosphoric acid → Calcium phosphate + water

$3Ca(OH)_2 + 2H_3PO_4 \rightarrow 1Ca_3(PO_4)_2 + 6H(OH)$

10. calcium bromide + potassium hydroxide → Calcium Hydroxide + Potassium Bromide

$1CaBr_2 + 2KOH \rightarrow 1Ca(OH)_2 + 2KBr$

Examine the products of the reactions on this page, and determine in each whether a gas, water, or a precipitate is formed. Use solubility Table B.9 on page R54 at the back of your textbook to determine the solubilities of the reaction products. If there is no gas, water, or precipitate produced, put an "X" through the yield sign, because no reaction occurs.

Name_____ Date_____ Period_____

Predicting Products of Chemical Reactions Worksheet

Directions:

1. Write the reactants for the chemical equations below in the boxes on the Predicting Products of Chemical Reactions template. (The template has space to do three reactions at a time)
2. Then build the reactants using the ions cards provided.
3. Then predict the products of the chemical reactions by rearranging the ions cards and placing them in the products boxes.
4. Make sure that the chemical formulas of the products are correct. Do this by using the subscript cards (small cards) provided.
5. Also make sure to balance the chemical reactions using the coefficient cards (large cards)
6. Fill in the blank spaces below with your final answer.

~~Pre-Lab~~ Questions:

1. What is used to predict the products of a single replacement reaction? Activity series
2. What are the products of a combustion reaction? Carbon dioxide + water ($CO_2 + H_2O$)
3. Can two positive ions form a compound? NO Can two negative ions form a compound? Not ionic

1. 3 Na + 1 $AlCl_3$ → 3 NaCl + 1 Al
2. 1 K + 1 $Ag(NO_3)$ → 1 KNO_3 + 1 Ag
3. 1 Mg + 2 HCl → 1 $MgCl_2$ + 1 H_2
4. 1 $BaCl_2$ + 2 NaOH → 1 $Ba(OH)_2$ + 2 NaCl
5. 3 $AgNO_3$ + 1 Na_3PO_4 → 1 $Ag_3(PO_4)$ + 3 $NaNO_3$
6. 1 KOH + 1 HCl → 1 KCl + 1 H(OH)
7. 1 CH_4 + 2 O_2 → 1 CO_2 + 2 H_2O (2+2=4)
8. 1 C_3H_8 + 5 O_2 → 3 CO_2 + 4 H_2O (6+4=10)
9. 1 C_5H_{12} + 8 O_2 → 5 CO_2 + 6 H_2O (10+6=16)

16

Questions: M

r each of the following reactions identify if it is a single replacement, double replacement, or combustion, predict the products and balance the equation. The correct chemical formulas for the products that are compounds are in the box below.

Ag_2SO_4	$FeBr_3$	H_2O (H-OH)	KCl
H_2O	CO_2	NaBr	CO_2,
$Zn(MnO_4)_2$	H_2O	$Pb(NO_3)_2$	Na_2SO_4

Single 1. 3 Na + 1 $FeBr_3$ → 3 NaBr + 1 Fe

Double 2. 2 NaOH + 1 H_2SO_4 → 1 Na_2SO_4 + 2 H(OH)

Combustion 3. 1 $C_2H_4O_2$ + 2 O_2 → 2 CO_2 + 2 H_2O

Double 4. 1 $PbSO_4$ + 2 $AgNO_3$ → 1 $Pb(NO_3)_2$ + 1 Ag_2SO_4

Single 5. 6 HBr + 2 Fe → 2 $FeBr_3$ + 3 H_2

Double 6. 2 $KMnO_4$ + 1 $ZnCl_2$ → 2 KCl + 1 $Zn(MnO_4)_2$

Combustion 7. 7 O_2 + 1 $C_5H_{12}O_2$ → 5 CO_2 + 6 H_2O

↑ 10 + 6 = 16