Worksheet: Balancing Equations Name _____KEY_____

I. Fill in the blanks with the most appropriate term:

A _____chemical_____ _____equation_____ tells the story of a chemical reaction. _____Reactants_____ are the starting substances in the reaction while _____products_____ are the new substances that are formed. The large numbers in front of some of the formulas are called _____coefficients_____. These numbers are used to _____balance_____ the equation because chemical reactions must obey the Law of _____Conservation_____ of Matter. The number of atoms of each element on both sides of the equation must be _____equal_____ because matter cannot be _____created_____ or _____destroyed_____. When balancing equations, the only numbers that can be changed are _____coefficients_____; remember that _____formulas / subscripts_____ must never be changed in order to balance an equation.

II. Balance the following equations:

1. $4Al + 3O_2 \rightarrow 2Al_2O_3$

2. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

3. $Al(NO_3)_3 + 3NaOH \rightarrow Al(OH)_3 + 3NaNO_3$

4. $2KNO_3 \rightarrow 2KNO_2 + O_2$

5. $3O_2 + CS_2 \rightarrow CO_2 + 2SO_2$

6. $2KClO_3 \rightarrow 2KCl + 3O_2$

7. $3BaF_2 + 2K_3PO_4 \rightarrow Ba_3(PO_4)_2 + 6KF$

8. $H_2SO_4 + Mg(NO_3)_2 \rightarrow MgSO_4 + 2HNO_3$

9. $2Al + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3H_2$

10. $WO_3 + 3H_2 \rightarrow W + 3H_2O$

Worksheet: More Practice Balancing Equations **Name** *KEY*

Balance the following equations.

1. $Fe + 2HCl \rightarrow FeCl_2 + H_2$

2. $3Ca(OH)_2 + 2H_3PO_4 \rightarrow Ca_3(PO_4)_2 + 6H_2O$

3. $CaBr_2 + H_2SO_4 \rightarrow 2HBr + CaSO_4$

4. $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

5. $3FeCl_2 + 2Na_3PO_4 \rightarrow Fe_3(PO_4)_2 + 6NaCl$

6. $Sb_2O_3 + 2NaOH \rightarrow 2NaSbO_2 + H_2O$

7. $6Na_2O + P_4O_{10} \rightarrow 4Na_3PO_4$

KEY

Worksheet: Word Equations **Name** _____

Substitute symbols and formulas for words, then balance each equation.

1. sodium chloride + lead (II) nitrate → lead (II) chloride + sodium nitrate

$$2\,NaCl + Pb(NO_3)_2 \rightarrow PbCl_2 + 2\,NaNO_3$$

2. iron + chlorine → iron (III) chloride

$$2\,Fe + 3\,Cl_2 \rightarrow 2\,FeCl_3$$

3. barium + water → barium hydroxide + hydrogen

$$Ba + 2\,H_2O \rightarrow Ba(OH)_2 + H_2$$

4. When chlorine gas reacts with methane, carbon tetrachloride and hydrogen chloride are produced.

$$4\,Cl_2 + CH_4 \rightarrow CCl_4 + 4\,HCl$$

5. When sodium oxide is added to water, sodium hydroxide is produced.

$$Na_2O + H_2O \rightarrow 2\,NaOH$$

6. In a blast furnace, iron (III) oxide and carbon monoxide gas produce carbon dioxide gas and iron.

$$Fe_2O_3 + 3\,CO \rightarrow 3\,CO_2 + 2\,Fe$$

7. Iodine crystals react with chlorine gas to produce iodine trichloride.

$$I_2 + 3\,Cl_2 \rightarrow 2\,ICl_3$$

CHEMISTRY - CHAPTER 3: EQUATIONS

KEY

BALANCING EQUATIONS: FORMULAS GIVEN Practice Sheet #1

Balance the following equations:

1. $2Al + N_2 \rightarrow 2AlN$
2. $3Fe + 2O_2 \rightarrow Fe_3O_4$
3. $CaCO_3 \rightarrow CaO + CO_2$
4. $NH_4NO_3 \rightarrow N_2O + 2H_2O$
5. $2KI + Cl_2 \rightarrow 2KCl + I_2$
6. $Pb(NO_3)_2 + 2HCl \rightarrow PbCl_2 + 2HNO_3$
7. $2BaO_2 \rightarrow 2BaO + O_2$
8. $2Al + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3H_2$
9. $CH_4 + 3Cl_2 \rightarrow CHCl_3 + 3HCl$
10. $MgCl_2 + 2NaOH \rightarrow Mg(OH)_2 + 2NaCl$
11. $2AgNO_3 + CuCl_2 \rightarrow 2AgCl + Cu(NO_3)_2$
12. $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$
13. $2Na + 2H_2O \rightarrow H_2 + 2NaOH$
14. $1BaCl_2 + 1(NH_4)_2CO_3 \rightarrow 1BaCO_3 + 2NH_4Cl$
15. $2C_6H_6 + 15O_2 \rightarrow 12CO_2 + 6H_2O$
16. $2Na + 2H_2O \rightarrow 2NaOH + H_2$
17. $Fe + 2FeCl_3 \rightarrow 3FeCl_2$
18. $3Ba(OH)_2 + 2AlCl_3 \rightarrow 2Al(OH)_3 + 3BaCl_2$
19. $H_2C_2O_4 + 2KOH \rightarrow K_2C_2O_4 + 2H_2O$
20. $2C_2H_2Cl_4 + Ca(OH)_2 \rightarrow 2C_2HCl_3 + CaCl_2 + 2H_2O$
21. $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$
22. $Zn_3Sb_2 + 6H_2O \rightarrow 3Zn(OH)_2 + 2SbH_3$
23. $12HClO_4 + P_4O_{10} \rightarrow 4H_3PO_4 + 6Cl_2O_7$
24. $4C_6H_5Cl + SiCl_4 + 8Na \rightarrow (C_6H_5)_4Si + 8NaCl$
25. $Sb_2S_3 + 12HCl \rightarrow 2H_3SbCl_6 + 3H_2S$
26. $3IBr + 4NH_3 \rightarrow NI_3 + 3NH_4Br$
27. $2KrF_2 + 2H_2O \rightarrow 2Kr + O_2 + 4HF$

28. $Na_2CO_3 + 4C + N_2 \rightarrow 2NaCN + 3CO$

29. $K_4Fe(CN)_6 + 6H_2SO_4 + 6H_2O \rightarrow 2K_2SO_4 + FeSO_4 + 3(NH_4)_2SO_4 + 6CO$

BALANCING CHEMICAL EQUATIONS - NAMES GIVEN Practice Sheet #2

1. Potassium reacts with water yielding potassium hydroxide and hydrogen

$2K + 2H_2O \rightarrow 2KOH + H_2$

2. Chlorine reacts with potassium bromide yielding potassium chloride and bromine

$Cl_2 + 2KBr \rightarrow 2KCl + Br_2$

3. Zinc + hydrogen chloride yields zinc chloride and hydrogen

$Zn + 2HCl \rightarrow ZnCl_2 + H_2$

4. iron + water → Fe_3O_4 + hydrogen

$3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

5. zinc sulfide + oxygen → . zinc oxide + sulfur dioxide

$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$

6. $C_{10}H_{16} + Cl_2 \rightarrow C + HCl$

$C_{10}H_{16} + 8Cl_2 \rightarrow 10C + 16HCl$

7. Aluminum + sodium hydroxide → Na_3AlO_3 + hydrogen

$2Al + 6NaOH \rightarrow 2Na_3AlO_3 + 3H_2$

8. $C_2H_2 + O_2 \rightarrow CO_2 + H_2O$

$2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$

9. Ammonia + oxygen → nitrogen monoxide + water

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

10. Phosphorus + iron(III) oxide → tetra-phosphorus decoxide + iron

$12P + 10Fe_2O_3 \rightarrow 3P_4O_{10} + 20Fe$

11. Cupric sulfide + oxygen → copper(I) oxide + sulfur dioxide

EVS

$4CuS + 5O_2 \rightarrow 2Cu_2O + 4SO_2$

12. sodium bicarbonate + hydrogen sulfate → sodium sulfate + water + carbon dioxide

$2NaHCO_3 + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O + 2CO_2$

13. Sodium carbonate + silver nitrate → sodium nitrate + silver carbonate

$Na_2CO_3 + 2AgNO_3 \rightarrow 2NaNO_3 + Ag_2CO_3$

14. Calcium + oxygen → calcium oxide

$2Ca + O_2 \rightarrow 2CaO$

15. Zinc + ferric oxide → zinc oxide + iron

Fe_2O_3

$3Zn + Fe_2O_3 \rightarrow 3ZnO + 2Fe$

CHEMISTRY - CHAPTER 3: EQUATIONS

16. Magnesium bromide + chlorine → magnesium chloride + bromine

$MgBr_2 + Cl_2 \rightarrow MgCl_2 + Br_2$

17. Sodium + water → sodium hydroxide + hydrogen

$2Na + 2H_2O \rightarrow 2NaOH + 1H_2$

18. Potassium nitrate → potassium nitrite + oxygen

$2KNO_3 \rightarrow 2KNO_3 + O_2$

19. Calcium oxide + hydrochloric acid → calcium chloride + water

$CaO + 2HCl \rightarrow CaCl_2 + H_2O$

ERROR 20. ~~Magnesium + oxygen → magnesium oxide~~

~~$2MgO$~~ –

21. Iron + oxygen → iron(II) oxide

$2Fe + O_2 \rightarrow 2FeO$

22. Water + dinitrogen trioxide → nitrous acid

HNO_2

$H_2O + N_2O_3 \rightarrow 2HNO_2$

23. Sodium oxide + water → sodium hydroxide

$Na_2O + H_2O \rightarrow 2NaOH$

24. Iron(III) oxide + carbon monoxide → iron + carbon dioxide

$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

25. Methane (CH_4) + oxygen → carbon dioxide + water

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