Balancing Equations Practice Worksheet

Balance the following equations:

1) ___ $NaNO_3$ + ___ PbO → ___ $Pb(NO_3)_2$ + ___ Na_2O

2) ___ AgI + ___ $Fe_2(CO_3)_3$ → ___ FeI_3 + ___ Ag_2CO_3

3) ___ $C_2H_4O_2$ + ___ O_2 → ___ CO_2 + ___ H_2O

4) ___ $ZnSO_4$ + ___ Li_2CO_3 → ___ $ZnCO_3$ + ___ Li_2SO_4

5) ___ V_2O_5 + ___ CaS → ___ CaO + ___ V_2S_5

6) ___ $Mn(NO_2)_2$ + ___ $BeCl_2$ → ___ $Be(NO_2)_2$ + ___ $MnCl_2$

7) ___ $AgBr$ + ___ $GaPO_4$ → ___ Ag_3PO_4 + ___ $GaBr_3$

8) ___ H_2SO_4 + ___ $B(OH)_3$ → __ $B_2(SO_4)_3$ + ___ H_2O

9) ___ S_8 + ___ O_2 → ___ SO_2

10) ___ Fe + ___ $AgNO_3$ → ___ $Fe(NO_3)_2$ + ___ Ag

Solutions for the Balancing Equations Practice Worksheet

1) $2\ NaNO_3 + PbO \rightarrow Pb(NO_3)_2 + Na_2O$

2) $6\ AgI + Fe_2(CO_3)_3 \rightarrow 2\ FeI_3 + 3\ Ag_2CO_3$

3) $C_2H_4O_2 + 2\ O_2 \rightarrow 2\ CO_2 + 2\ H_2O$

4) $ZnSO_4 + Li_2CO_3 \rightarrow ZnCO_3 + Li_2SO_4$

5) $V_2O_5 + 5\ CaS \rightarrow 5\ CaO + V_2S_5$

6) $Mn(NO_2)_2 + BeCl_2 \rightarrow Be(NO_2)_2 + MnCl_2$

7) $3\ AgBr + GaPO_4 \rightarrow Ag_3PO_4 + GaBr_3$

8) $3\ H_2SO_4 + 2\ B(OH)_3 \rightarrow B_2(SO_4)_3 + 6\ H_2O$

9) $S_8 + 8\ O_2 \rightarrow 8\ SO_2$

10) $Fe + 2\ AgNO_3 \rightarrow Fe(NO_3)_2 + 2\ Ag$

Chapter 7 Worksheet #1

Balancing Chemical Equations

Balance the equations below:

1) ____ N_2 + ____ H_2 → ____ NH_3

2) ____ $KClO_3$ → ____ KCl + ____ O_2

3) ____ NaCl + ____ F_2 → ____ NaF + ____ Cl_2

4) ____ H_2 + ____ O_2 → ____ H_2O

5) ____ $Pb(OH)_2$ + ____ HCl → ____ H_2O + ____ $PbCl_2$

6) ____ $AlBr_3$ + ____ K_2SO_4 → ____ KBr + ____ $Al_2(SO_4)_3$

7) ____ CH_4 + ____ O_2 → ____ CO_2 + ____ H_2O

8) ____ C_3H_8 + ____ O_2 → ____ CO_2 + ____ H_2O

9) ____ C_8H_{18} + ____ O_2 → ____ CO_2 + ____ H_2O

10) ____ $FeCl_3$ + ____ NaOH → ____ $Fe(OH)_3$ + ____NaCl

11) ____ P + ____O_2 → ____P_2O_5

12) ____ Na + ____ H_2O → ____ NaOH + ____H_2

13) ____ Ag_2O → ____ Ag + ____O_2

14) ____ S_8 + ____O_2 → ____ SO_3

15) ____ CO_2 + ____ H_2O → ____ $C_6H_{12}O_6$ + ____O_2

16) ____ K + ____ $MgBr_2$ → ____ KBr + ____ Mg

17) ____ HCl + ____ $CaCO_3$ → ____ $CaCl_2$ + ____H_2O + ____ CO_2

18) ____ HNO_3 + ____ $NaHCO_3$ → ____ $NaNO_3$ + ____ H_2O + ____ CO_2

19) ____ H_2O + ____ O_2 → ____ H_2O_2

20) ____ NaBr + ____ CaF_2 → ____ NaF + ____ $CaBr_2$

21) ____ H_2SO_4 + ____ $NaNO_2$ → ____ HNO_2 + ____ Na_2SO_4

Balancing Chemical Equations - Answer Key

Balance the equations below:

1) $1\ N_2 + 3\ H_2 \rightarrow 2\ NH_3$

2) $2\ KClO_3 \rightarrow 2\ KCl + 3\ O_2$

3) $2\ NaCl + 1\ F_2 \rightarrow 2\ NaF + 1\ Cl_2$

4) $2\ H_2 + 1\ O_2 \rightarrow 2\ H_2O$

5) $1\ Pb(OH)_2 + 2\ HCl \rightarrow 2\ H_2O + 1\ PbCl_2$

6) $2\ AlBr_3 + 3\ K_2SO_4 \rightarrow 6\ KBr + 1\ Al_2(SO_4)_3$

7) $1\ CH_4 + 2\ O_2 \rightarrow 1\ CO_2 + 2\ H_2O$

8) $1\ C_3H_8 + 5\ O_2 \rightarrow 3\ CO_2 + 4\ H_2O$

9) $2\ C_8H_{18} + 25\ O_2 \rightarrow 16\ CO_2 + 18\ H_2O$

10) $1\ FeCl_3 + 3\ NaOH \rightarrow 1\ Fe(OH)_3 + 3\ NaCl$

11) $4\ P + 5\ O_2 \rightarrow 2\ P_2O_5$

12) $2\ Na + 2\ H_2O \rightarrow 2\ NaOH + 1\ H_2$

13) $2\ Ag_2O \rightarrow 4\ Ag + 1\ O_2$

14) $1\ S_8 + 12\ O_2 \rightarrow 8\ SO_3$

15) $6\ CO_2 + 6\ H_2O \rightarrow 1\ C_6H_{12}O_6 + 6\ O_2$

16) $2\ K + 1\ MgBr_2 \rightarrow 2\ KBr + 1\ Mg$

17) $2\ HCl + 1\ CaCO_3 \rightarrow 1\ CaCl_2 + 1\ H_2O + 1\ CO_2$

18) $1\ HNO_3 + 1\ NaHCO_3 \rightarrow 1\ NaNO_3 + 1\ H_2O + 1\ CO_2$

19) $2\ H_2O + 1\ O_2 \rightarrow 2\ H_2O_2$

20) $2\ NaBr + 1\ CaF_2 \rightarrow 2\ NaF + 1\ CaBr_2$

21) $1\ H_2SO_4 + 2\ NaNO_2 \rightarrow 2\ HNO_2 + 1\ Na_2SO_4$

Word Equations

Write the word equations below as chemical equations and balance:

1) Zinc and lead (II) nitrate react to form zinc nitrate and lead.

2) Aluminum bromide and chlorine gas react to form aluminum chloride and bromine gas.

3) Sodium phosphate and calcium chloride react to form calcium phosphate and sodium chloride.

4) Potassium metal and chlorine gas combine to form potassium chloride.

5) Aluminum and hydrochloric acid react to form aluminum chloride and hydrogen gas.

6) Calcium hydroxide and phosphoric acid react to form calcium phosphate and water.

7) Copper and sulfuric acid react to form copper (II) sulfate and water and sulfur dioxide.

8) Hydrogen gas and nitrogen monoxide react to form water and nitrogen gas.

Word Equations – Answer Key

1) Zinc and lead (II) nitrate react to form zinc nitrate and lead.

$$Zn + Pb(NO_3)_2 \rightarrow Zn(NO_3)_2 + Pb$$

---

2) Aluminum bromide and chlorine gas react to form aluminum chloride and bromine gas.

$$2\ AlBr_3 + 3\ Cl_2 \rightarrow 2\ AlCl_3 + 3\ Br_2$$

---

3) Sodium phosphate and calcium chloride react to form calcium phosphate and sodium chloride.

$$2\ Na_3PO_4 + 3\ CaCl_2 \rightarrow 6\ NaCl + Ca_3(PO_4)_2$$

---

4) Potassium metal and chlorine gas combine to form potassium chloride.

$$2\ K + Cl_2 \rightarrow 2\ KCl$$

---

5) Aluminum and hydrochloric acid react to form aluminum chloride and hydrogen gas.

$$2\ Al + 6\ HCl \rightarrow 3\ H_2 + 2\ AlCl_3$$

---

6) Calcium hydroxide and phosphoric acid react to form calcium phosphate and water.

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

---

7) Copper and sulfuric acid react to form copper (II) sulfate and water and sulfur dioxide.

$$Cu + 2\ H_2SO_4 \rightarrow CuSO_4 + 2\ H_2O + SO_2$$

---

8) Hydrogen gas and nitrogen monoxide react to form water and nitrogen gas.

$$2\ H_2 + 2\ NO \rightarrow 2\ H_2O + N_2$$

Worksheet: Writing and Balancing Chemical Reactions

1. Balance the following equations and indicate the type of reaction as formation, decomposition, single replacement, double replacement, hydrocarbon combustion, or other.

a. ____ $Cu_{(s)}$ + ____ $O_{2\,(g)} \rightarrow$ ____ $CuO_{(s)}$
b. ____ $H_2O_{(l)} \rightarrow$ ____ $H_{2\,(g)}$ + ____ $O_{2\,(g)}$
c. ____ $Fe_{(s)}$ + ____ $H_2O_{(g)} \rightarrow$ ____ $H_{2\,(g)}$ + ____ $Fe_3O_{4\,(s)}$
d. ____ $AsCl_{3\,(aq)}$ + ____ $H_2S_{(aq)} \rightarrow$ ____ $As_2S_{3\,(s)}$ + ____ $HCl_{(aq)}$
e. ____ $CuSO_4 \bullet 5\,H_2O_{(s)} \rightarrow$ ____ $CuSO_{4\,(s)}$ + ____ $H_2O_{(g)}$
f. ____ $Fe_2O_{3\,(s)}$ + ____ $H_{2\,(g)} \rightarrow$ ____ $Fe_{(s)}$ + ____ $H_2O_{(l)}$
g. ____ $CaCO_{3\,(s)} \rightarrow$ ____ $CaO_{(s)}$ + ____ $CO_{2\,(g)}$
h. ____ $Fe_{(s)}$ + ____ $S_{8\,(s)} \rightarrow$ ____ $FeS_{(s)}$
i. ____ $H_2S_{(aq)}$ + ____ $KOH_{(aq)} \rightarrow$ ____ $H_2O_{(l)}$ + ____ $K_2S_{(aq)}$
j. ____ $NaCl_{(l)} \rightarrow$ ____ $Na_{(l)}$ + ____ $Cl_{2\,(g)}$
k. ____ $Al_{(s)}$ + ____ $H_2SO_{4\,(aq)} \rightarrow$ ____ $H_{2\,(g)}$ + ____ $Al_2(SO_4)_{3\,(aq)}$
l. ____ $H_3PO_{4\,(aq)}$ + ____ $NH_4OH_{(aq)} \rightarrow$ ____ $H_2O_{(l)}$ + ____ $(NH_4)_3PO_{4\,(aq)}$
m. ____ $C_3H_{8\,(g)}$ + ____ $O_{2\,(g)} \rightarrow$ ____ $CO_{2\,(g)}$ + ____ $H_2O_{(l)}$
n. ____ $Al_{(s)}$ + ____ $O_{2\,(g)} \rightarrow$ ____ $Al_2O_{3\,(s)}$
o. ____ $CH_{4\,(g)}$ + ____ $O_{2\,(g)} \rightarrow$ ____ $CO_{2\,(g)}$ + ____ $H_2O_{(l)}$
p. ____ $K_2SO_{4\,(aq)}$ + ____ $BaCl_{2\,(aq)} \rightarrow$ ____ $KCl_{(aq)}$ + ____ $BaSO_{4\,(s)}$
q. ____ $C_5H_{12\,(l)}$ + ____ $O_{2\,(g)} \rightarrow$ ____ $CO_{2\,(g)}$ + ____ $H_2O_{(g)}$
r. ____ $Ca(OH)_{2\,(aq)}$ + ____ $NH_4Cl_{(aq)} \rightarrow$ ____ $NH_4OH_{(aq)}$ + ____ $CaCl_{2\,(aq)}$
s. ____ $V_2O_{5\,(s)}$ + ____ $Ca_{(s)} \rightarrow$ ____ $CaO_{(s)}$ + ____ $V_{(s)}$
t. ____ $Na_{(s)}$ + ____ $ZnI_{2\,(aq)} \rightarrow$ ____ $NaI_{(aq)}$ + ____ $Zn_{(s)}$
u. ____ $C_7H_6O_{3\,(l)}$ + ____ $O_{2\,(g)} \rightarrow$ ____ $CO_{2\,(g)}$ + ____ $H_2O_{(l)}$
v. ____ $Ca_{(s)}$ + ____ $N_{2\,(g)} \rightarrow$ ____ $Ca_3N_{2\,(s)}$
w. ____ $Fe_2O_{3\,(s)}$ + ____ $H_{2\,(g)} \rightarrow$ ____ $Fe_{(s)}$ + ____ $H_2O_{(l)}$
x. ____ $C_{15}H_{30\,(l)}$ + ____ $O_{2\,(g)} \rightarrow$ ____ $CO_{2\,(g)}$ + ____ $H_2O_{(g)}$
y. ____ $BN_{(s)}$ + ____ $F_{2\,(g)} \rightarrow$ ____ $BF_{3\,(s)}$ + ____ $N_{2\,(g)}$
z. ____ $C_{12}H_{26\,(l)}$ + ____ $O_{2\,(g)} \rightarrow$ ____ $CO_{2\,(g)}$ + ____ $H_2O_{(g)}$

2. Predict the product(s) along with the states, indicate the type of reaction, and balance the following chemical reactions.

a. A solution of lead (II) nitrate is mixed with a solution of sodium iodide.
b. Solid zinc sulfide reacts with oxygen in the air.
c. Liquid butane ($C_4H_{10\,(l)}$) is used as a fuel to ignite a lighter.
d. Barium hydroxide solution is neutralized by adding hydrochloric acid ($HCl_{(aq)}$).
e. Copper metal is placed in a solution of silver nitrate.
f. Sulfur burns in oxygen to make sulfur dioxide gas.
g. A solution of aluminum sulfate is mixed with a solution of calcium hydroxide.
h. Zinc metal is placed in sulfuric acid ($H_2SO_{4\,(aq)}$).
i. Aluminum powder is placed in a container filled with chlorine gas.
j. Sucrose undergoes cellular respiration.

Answers

Question 1

a. $2\ Cu_{(s)} + O_{2\ (g)} \rightarrow 2\ CuO_{(s)}$ **(formation)**

b. $2\ H_2O_{(l)} \rightarrow 2\ H_{2\ (g)} + O_{2\ (g)}$ **(decomposition)**

c. $3\ Fe_{(s)} + 4\ H_2O_{(g)} \rightarrow 4\ H_{2\ (g)} + Fe_3O_{4\ (s)}$ **(single replacement)**

d. $2\ AsCl_{3\ (aq)} + 3\ H_2S_{(aq)} \rightarrow As_2S_{3\ (s)} + 6\ HCl_{(aq)}$ **(double replacement)**

e. $CuSO_4 \bullet 5\ H_2O_{(s)} \rightarrow CuSO_{4\ (s)} + 5\ H_2O_{(g)}$ **(other – dehydration or decomposition)**

f. $Fe_2O_{3\ (s)} + 3\ H_{2\ (g)} \rightarrow 2\ Fe_{(s)} + 3\ H_2O_{(l)}$ **(single replacement)**

g. $CaCO_{3\ (s)} \rightarrow CaO_{(s)} + CO_{2\ (g)}$ **(other or decomposition)**

h. $8\ Fe_{(s)} + S_{8\ (s)} \rightarrow 8\ FeS_{(s)}$ **(formation)**

i. $H_2S_{(aq)} + 2\ KOH_{(aq)} \rightarrow 2\ H_2O_{(l)} + K_2S_{(aq)}$ **(double replacement)**

j. $2\ NaCl_{(l)} \rightarrow 2\ Na_{(l)} + Cl_{2\ (g)}$ **(decomposition)**

k. $2\ Al_{(s)} + 3\ H_2SO_{4\ (aq)} \rightarrow 3\ H_{2\ (g)} + Al_2(SO_4)_{3\ (aq)}$ **(single replacement)**

l. $H_3PO_{4\ (aq)} + 3\ NH_4OH_{(aq)} \rightarrow 3\ H_2O_{(l)} + (NH_4)_3PO_{4\ (aq)}$ **(double replacement)**

m. $C_3H_{8\ (g)} + 5\ O_{2\ (g)} \rightarrow 3\ CO_{2\ (g)} + 4\ H_2O_{(l)}$ **(hydrocarbon combustion)**

n. $4\ Al_{(s)} + 3\ O_{2\ (g)} \rightarrow 2\ Al_2O_{3\ (s)}$ **(formation)**

o. $CH_{4\ (g)} + 2\ O_{2\ (g)} \rightarrow CO_{2\ (g)} + 2\ H_2O_{(l)}$ **(hydrocarbon combustion)**

p. $K_2SO_{4\ (aq)} + BaCl_{2\ (aq)} \rightarrow 2\ KCl_{(aq)} + BaSO_{4\ (s)}$ **(double replacement)**

q. $C_5H_{12\ (l)} + 8\ O_{2\ (g)} \rightarrow 5\ CO_{2\ (g)} + 6\ H_2O_{(g)}$ **(hydrocarbon combustion)**

r. $Ca(OH)_{2\ (aq)} + 2\ NH_4Cl_{(aq)} \rightarrow 2\ NH_4OH_{(aq)} + CaCl_{2\ (aq)}$ **(double replacement)**

s. $V_2O_{5\ (s)} + 5\ Ca_{(s)} \rightarrow 5\ CaO_{(s)} + 2\ V_{(s)}$ **(single replacement)**

t. $2\ Na_{(s)} + ZnI_{2\ (aq)} \rightarrow 2\ NaI_{(aq)} + Zn_{(s)}$ **(single replacement)**

u. $C_7H_6O_{3\ (l)} + 7\ O_{2\ (g)} \rightarrow 7\ CO_{2\ (g)} + 3\ H_2O_{(l)}$ **(hydrocarbon combustion)**

v. $3\ Ca_{(s)} + N_{2\ (g)} \rightarrow Ca_3N_{2\ (s)}$ **(formation)**

w. $Fe_2O_{3\ (s)} + 3\ H_{2\ (g)} \rightarrow 2\ Fe_{(s)} + 3\ H_2O_{(l)}$ **(single replacement)**

x. $2\ C_{15}H_{30\ (l)} + 45\ O_{2\ (g)} \rightarrow 30\ CO_{2\ (g)} + 30\ H_2O_{(g)}$ **(hydrocarbon combustion)**

y. $2\ BN_{(s)} + 3\ F_{2\ (g)} \rightarrow 2\ BF_{3\ (s)} + N_{2\ (g)}$ **(single replacement)**

z. $2\ C_{12}H_{26\ (l)} + 37\ O_{2\ (g)} \rightarrow 24\ CO_{2\ (g)} + 26\ H_2O_{(g)}$ **(hydrocarbon combustion)**

Question 2

a. $Pb(NO_3)_{2\ (aq)} + 2\ NaI_{(aq)} \rightarrow PbI_{2\ (s)} + 2\ NaNO_{3\ (aq)}$ **(double replacement)**

b. $8\ ZnS_{(s)} + 4\ O_{2\ (g)} \rightarrow 8\ ZnO_{(s)} + S_{8\ (s)}$ **(single replacement)**

c. $2\ C_4H_{10\ (l)} + 13\ O_{2\ (g)} \rightarrow 8\ CO_{2\ (g)} + 10\ H_2O_{(g)}$ **(hydrocarbon combustion)**

d. $Ba(OH)_{2\ (aq)} + 2\ HCl_{(aq)} \rightarrow BaCl_{2\ (aq)} + 2\ H_2O_{(l)}$ **(double replacement)**

e. $Cu_{(s)} + 2\ AgNO_{3\ (aq)} \rightarrow Cu(NO_3)_{2\ (aq)} + 2\ Ag_{(s)}$ **(single replacement)**

f. $S_{8\ (s)} + 8\ O_{2\ (g)} \rightarrow 8\ SO_{2\ (g)}$ **(formation)**

g. $Al_2(SO_4)_{3\ (aq)} + 3\ Ca(OH)_{2\ (aq)} \rightarrow 2\ Al(OH)_{3\ (s)} + 3\ CaSO_{4\ (s)}$ **(double replacement)**

h. $Zn_{(s)} + H_2SO_{4\ (aq)} \rightarrow ZnSO_{4\ (aq)} + H_{2\ (g)}$ **(single replacement)**

i. $2\ Al_{(s)} + 3\ Cl_{2\ (g)} \rightarrow 2\ AlCl_{3\ (s)}$ **(formation)**

j. $C_{12}H_{22}O_{11\ (s)} + 12\ O_{2\ (g)} \rightarrow 12\ CO_{2\ (g)} + 11\ H_2O_{(l)}$ **(hydrocarbon combustion)**

Worksheet #1: Writing and Balancing Formula Equations

Step 1: Write each formula and balance each formula using SUBSCRIPTS.
Step 2: Balance the overall equation using coefficients.

1. sulfur + oxygen → sulfur dioxide

2. zinc + sulfuric acid → zinc sulfate + hydrogen

3. hydrogen + nitrogen → ammonia

4. hydrogen + chlorine → hydrogen chloride

5. carbon + water → carbon monoxide + hydrogen

6. calcium oxide + water → calcium hydroxide

7. phosphorus + oxygen → diphosphorus pentoxide

8. hydrochloric acid + sodium hydroxide → sodium chloride + water

9. barium chloride + sulfuric acid → barium sulfate + hydrochloric acid

10. aluminum sulfate + calcium hydroxide → aluminum hydroxide + calcium sulfate

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

12. aluminum oxide → aluminum + oxygen

Worksheet #1: Writing and Balancing Formula Equations

1. sulfur + oxygen → sulfur dioxide

   $S_8 + 8O_2 \rightarrow 8SO_2$

2. zinc + sulfuric acid → zinc sulfate + hydrogen

   $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

3. hydrogen + nitrogen → ammonia

   $3H_2 + N_2 \rightarrow 2NH_3$

4. hydrogen + chlorine → hydrogen chloride

   $H_2 + Cl_2 \rightarrow 2HCl$

5. carbon + water → carbon monoxide + hydrogen

   $C + H_2O \rightarrow CO + H_2$

6. calcium oxide + water → calcium hydroxide

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

7. phosphorus + oxygen → diphosphorus pentoxide

   $P_4 + 5O_2 \rightarrow 2P_2O_5$

8. hydrochloric acid + sodium hydroxide → sodium chloride + water

   $HCl + NaOH \rightarrow NaCl\ H_2O$

9. barium chloride + sulfuric acid → barium sulfate + hydrochloric acid

   $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

10. aluminum sulfate + calcium hydroxide → aluminum hydroxide + calcium sulfate

    $Al_2(SO_4)_3 + 3Ca(OH)_2 \rightarrow 2Al(OH)_3 + 3CaSO_4$

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

    $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

12. aluminum oxide → aluminum + oxygen

    $2Al_2O_3 \rightarrow 4Al + 3O_2$

Balancing Reactions Worksheet

Balance the following reactions and identify the type of reaction each represents.

1) $PbO_2 \rightarrow PbO + O_2$

2) $Al + HCl \rightarrow AlCl_3 + H_2$

3) $Fe_2(SO4)_3 + Ba(OH)_2 \rightarrow BaSO_4 + Fe(OH)_3$

4) $Al + CuSO_4 \rightarrow Al_2(SO_4)_3 + Cu$

5) $KClO_3 \rightarrow KCl + O_2$

6) $Mg + N_2 \rightarrow Mg_3N_2$

7) $FeCl_2 + Na_3PO_4 \rightarrow Fe_3(PO_4)_2 + NaCl$

8) $HgO \rightarrow Hg + O_2$

9) $CaSO_4 \cdot 2H_2O \rightarrow CaSO_4 + H_2O$

10) $Bi(NO_3)_3 + NaOH \rightarrow Bi(OH)_3 + NaNO_3$

11) $FeS + HBr \rightarrow FeBr_2 + H_2S$

12) $Zn(OH)_2 + H_2SO_4 \rightarrow ZnSO_4 + H_2O$

13) $P_2O_5 + H_2O \rightarrow H_3PO_4$

14) $CaI_2 + H_2SO_4 \rightarrow HI + CaSO_4$

15) $Al + Cl_2 \rightarrow AlCl_3$

Solutions

1)	$2PbO_2 \rightarrow 2PbO + O_2$	Decomposition
2)	$2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$	Single Replacement
3)	$Fe_2(SO4)_3 + 3Ba(OH)_2 \rightarrow 3BaSO_4 + 2Fe(OH)_3$	Double Replacement
4)	$2Al + 3CuSO_4 \rightarrow Al_2(SO_4)_3 + 3Cu$	Single Replacement
5)	$2KClO_3 \rightarrow 2KCl + 3O_2$	Decomposition
6)	$3Mg + N_2 \rightarrow Mg_3N_2$	Synthesis
7)	$3FeCl_2 + 2Na_3PO_4 \rightarrow Fe_3(PO_4)_2 + 6NaCl$	Double Replacement
8)	$2HgO \rightarrow 2Hg + O_2$	Decomposition
9)	$CaSO_4 \cdot 2H_2O \rightarrow CaSO_4 + 2H_2O$	Decomposition
10)	$Bi(NO_3)_3 + 3NaOH \rightarrow Bi(OH)_3 + 3NaNO_3$	Double Replacement
11)	$FeS + 2HBr \rightarrow FeBr_2 + H_2S$	Double Replacement
12)	$Zn(OH)_2 + H_2SO_4 \rightarrow ZnSO_4 + 2H_2O$	Double Replacement
13)	$P_2O_5 + 3H_2O \rightarrow 2H_3PO_4$	Synthesis
14)	$CaI_2 + H_2SO_4 \rightarrow 2HI + CaSO_4$	Double Replacement
15)	$2Al + 3Cl_2 \rightarrow 2AlCl_3$	Synthesis

Reaction Products Worksheet

For each of the following reactions, determine what the products of each reaction will be. When you have predicted the products, balance the equation and use a table of solubility products to determine which of the products (if any) will precipitate. Assume all reactions take place in water.

1) ____ $Ca(OH)_2$ + ____ HF →

2) ____ $Pb(NO_3)_2$ + ____ K_2CrO_4 →

3) ____ $NaC_2H_3O_2$ + ____ H_2SO_4 →

4) ____ $Cu(OH)_2$ + ____ H_3PO_4 →

5) ____ $AgNO_3$ + ____ Na_2CO_3 →

6) ____ Zn + ____ H_2CO_3 →

7) ____ $Pb(OH)_2$ + ____ Hg_2S →

Reaction Products Worksheet - Key

For each of the following reactions, determine what the products of each reaction will be. When you have predicted the products, balance the equation and use a table of solubility products to determine which of the products (if any) will precipitate. Assume all reactions take place in water.

1) $\underline{1}\ Ca(OH)_2 + \underline{2}\ HF \rightarrow$ **$2\ H_2O + CaF_2$ (CaF_2 precipitates)**

2) $\underline{1}\ Pb(NO_3)_2 + \underline{1}\ K_2CrO_4 \rightarrow$ **$2\ KNO_3 + PbCrO_4$ ($PbCrO_4$ precipitates)**

3) $\underline{2}\ NaC_2H_3O_2 + \underline{1}\ H_2SO_4 \rightarrow$ **$Na_2SO_4 + 2\ CH_3COOH$ (no precipitate)**

4) $\underline{3}\ Cu(OH)_2 + \underline{2}\ H_3PO_4 \rightarrow$ **$6\ H_2O + Cu_3(PO_4)_2$**

copper (II) phosphate precipitates

5) $\underline{2}\ AgNO_3 + \underline{1}\ Na_2CO_3 \rightarrow$ **$Ag_2CO_3 + 2\ NaNO_3$ (Ag_2CO_3 precipitates)**

6) $\underline{1}\ Zn + \underline{2}\ H_2CO_3 \rightarrow$ **$ZnCO_3 + H_2$ ($ZnCO_3$ precipitates)**

7) $Pb(OH)_2 + Hg_2S \rightarrow$ **no reaction; neither reagent is soluble in water**

Balancing Chemical Equations

Balance the equations below:

1) ____ N_2 + ____ H_2 → ____ NH_3

2) ____ $KClO_3$ → ____ KCl + ____ O_2

3) ____ NaCl + ____ F_2 → ____ NaF + ____ Cl_2

4) ____ H_2 + ____ O_2 → ____ H_2O

5) ____ $Pb(OH)_2$ + ____ HCl → ____ H_2O + ____ $PbCl_2$

6) ____ $AlBr_3$ + ____ K_2SO_4 → ____ KBr + ____ $Al_2(SO_4)_3$

7) ____ CH_4 + ____ O_2 → ____ CO_2 + ____ H_2O

8) ____ C_3H_8 + ____ O_2 → ____ CO_2 + ____ H_2O

9) ____ C_8H_{18} + ____ O_2 → ____ CO_2 + ____ H_2O

10) ____ $FeCl_3$ + ____ NaOH → ____ $Fe(OH)_3$ + ____NaCl

11) ____ P + ____O_2 → ____P_2O_5

12) ____ Na + ____ H_2O → ____ NaOH + ____H_2

13) ____ Ag_2O → ____ Ag + ____O_2

14) ____ S_8 + ____O_2 → ____ SO_3

15) ____ CO_2 + ____ H_2O → ____ $C_6H_{12}O_6$ + ____O_2

16) ____ K + ____ MgBr → ____ KBr + ____ Mg

17) ____ HCl + ____ $CaCO_3$ → ____ $CaCl_2$ + ____H_2O + ____ CO_2

18) ____ HNO_3 + ____ $NaHCO_3$ → ____ $NaNO_3$ + ____ H_2O + ____ CO_2

19) ____ H_2O + ____ O_2 → ____ H_2O_2

20) ____ NaBr + ____ CaF_2 → ____ NaF + ____ $CaBr_2$

21) ____ H_2SO_4 + ____ $NaNO_2$ → ____ HNO_2 + ____ Na_2SO_4

Balancing Chemical Equations – Answer Key

Balance the equations below:

1) **1** N_2 + **3** H_2 → **2** NH_3

2) **2** $KClO_3$ → **2** KCl + **3** O_2

3) **2** NaCl + **1** F_2 → **2** NaF + **1** Cl_2

4) **2** H_2 + **1** O_2 → **2** H_2O

5) **1** $Pb(OH)_2$ + **2** HCl → **2** H_2O + **1** $PbCl_2$

6) **2** $AlBr_3$ + **3** K_2SO_4 → **6** KBr + **1** $Al_2(SO_4)_3$

7) **1** CH_4 + **2** O_2 → **1** CO_2 + **2** H_2O

8) **1** C_3H_8 + **5** O_2 → **3** CO_2 + **4** H_2O

9) **2** C_8H_{18} + **25** O_2 → **16** CO_2 + **18** H_2O

10) **1** $FeCl_3$ + **3** NaOH → **1** $Fe(OH)_3$ + **3** NaCl

11) **4** P + **5** O_2 → **2** P_2O_5

12) **2** Na + **2** H_2O → **2** NaOH + **1** H_2

13) **2** Ag_2O → **4** Ag + **1** O_2

14) **1** S_8 + **12** O_2 → **8** SO_3

15) **6** CO_2 + **6** H_2O → **1** $C_6H_{12}O_6$ + **6** O_2

16) **1** K + **1** MgBr → **1** KBr + **1** Mg

17) **2** HCl + **1** $CaCO_3$ → **1** $CaCl_2$ + **1** H_2O + **1** CO_2

18) **1** HNO_3 + **1** $NaHCO_3$ → **1** $NaNO_3$ + **1** H_2O + **1** CO_2

19) **2** H_2O + **1** O_2 → **2** H_2O_2

20) **2** NaBr + **1** CaF_2 → **2** NaF + **1** $CaBr_2$

21) **1** H_2SO_4 + **2** $NaNO_2$ → **2** HNO_2 + **1** Na_2SO_4