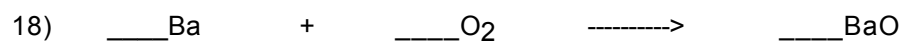
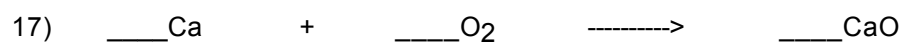
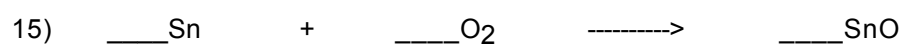
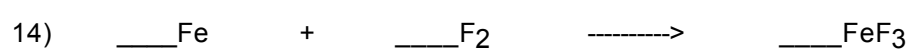
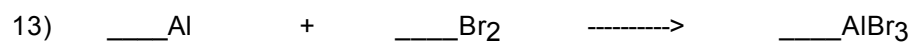
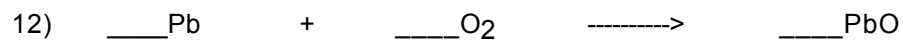
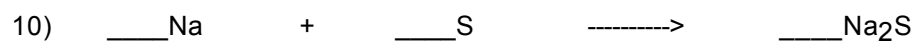
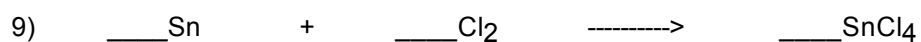
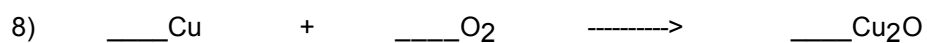
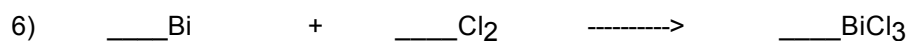
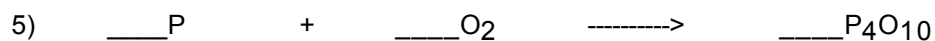
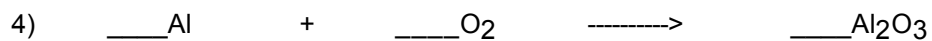
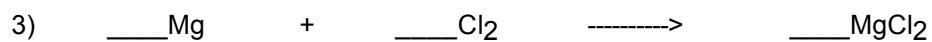
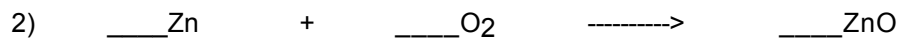
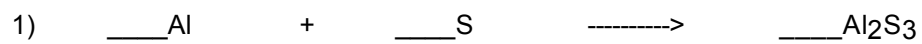


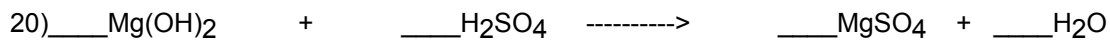
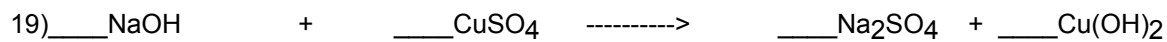
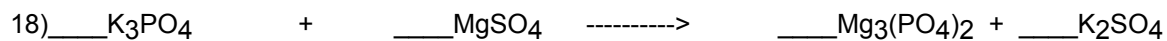
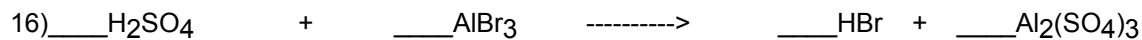
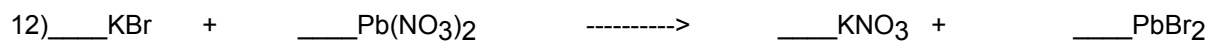
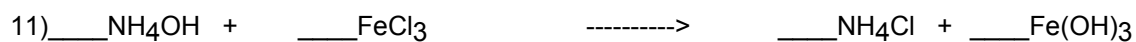
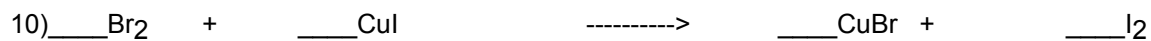
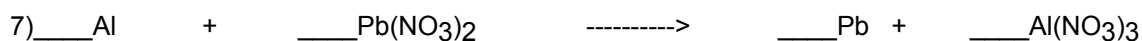
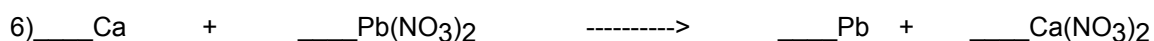
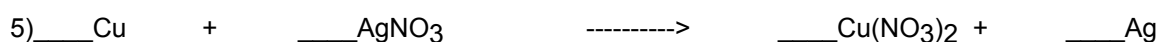
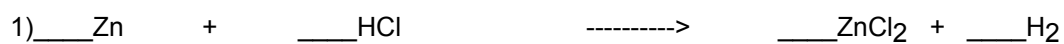
**CHEMISTRY****Balancing Chemical Equations I**

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**CHEMISTRY****BALANCING CHEMICAL EQUATIONS PRACT. II**

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**CHEMISTRY****BALANCING CHEMICAL EQUATIONS PRACTICE III**

- 1)  $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
- 2)  $\text{S}_8 + \text{O}_2 \rightarrow \text{SO}_3$
- 3)  $\text{HgO} \rightarrow \text{Hg} + \text{O}_2$
- 4)  $\text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
- 5)  $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$
- 6)  $\text{C}_{10}\text{H}_{16} + \text{Cl}_2 \rightarrow \text{C} + \text{HCl}$
- 7)  $\text{Si}_2\text{H}_3 + \text{O}_2 \rightarrow \text{SiO}_2 + \text{H}_2\text{O}$
- 8)  $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$
- 9)  $\text{C}_7\text{H}_6\text{O}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 10)  $\text{FeS}_2 + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2$
- 11)  $\text{Fe}_2\text{O}_3 + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O}$
- 12)  $\text{K} + \text{Br}_2 \rightarrow \text{KBr}$
- 13)  $\text{C}_2\text{H}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 14)  $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$
- 15)  $\text{C}_7\text{H}_{16} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 16)  $\text{SiO}_2 + \text{HF} \rightarrow \text{SiF}_4 + \text{H}_2\text{O}$
- 17)  $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$
- 18)  $\text{KClO}_3 \rightarrow \text{KClO}_4 + \text{KCl}$
- 19)  $\text{P}_4\text{O}_{10} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4$
- 20)  $\text{Sb} + \text{O}_2 \rightarrow \text{Sb}_4\text{O}_6$
- 21)  $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 22)  $\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$
- 23)  $\text{PCl}_5 + \text{H}_2\text{O} \rightarrow \text{HCl} + \text{H}_3\text{PO}_4$
- 24)  $\text{H}_2\text{S} + \text{Cl}_2 \rightarrow \text{S}_8 + \text{HCl}$
- 25)  $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$
- 26)  $\text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3$
- 27)  $\text{N}_2 + \text{O}_2 \rightarrow \text{N}_2\text{O}$
- 28)  $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$
- 29)  $\text{SiCl}_4 + \text{H}_2\text{O} \rightarrow \text{H}_4\text{SiO}_4 + \text{HCl}$
- 30)  $\text{H}_3\text{PO}_4 \rightarrow \text{H}_4\text{P}_2\text{O}_7 + \text{H}_2\text{O}$
- 31)  $\text{CO}_2 + \text{NH}_3 \rightarrow \text{OC}(\text{NH}_2)_2 + \text{H}_2\text{O}$
- 32)  $\text{Al}(\text{OH})_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2\text{O}$
- 33)  $\text{Fe}_2(\text{SO}_4)_3 + \text{KOH} \rightarrow \text{K}_2\text{SO}_4 + \text{Fe}(\text{OH})_3$
- 34)  $\text{H}_2\text{SO}_4 + \text{HI} \rightarrow \text{H}_2\text{S} + \text{I}_2 + \text{H}_2\text{O}$
- 35)  $\text{Al} + \text{FeO} \rightarrow \text{Al}_2\text{O}_3 + \text{Fe}$
- 36)  $\text{Na}_2\text{CO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2$
- 37)  $\text{P}_4 + \text{O}_2 \rightarrow \text{P}_2\text{O}_5$
- 38)  $\text{K}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{KOH}$
- 39)  $\text{Al} + \text{O}_2 \rightarrow \text{Al}_2\text{O}_3$
- 40)  $\text{Na}_2\text{O}_2 + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{O}_2$
- 41)  $\text{C} + \text{H}_2\text{O} \rightarrow \text{CO} + \text{H}_2$
- 42)  $\text{H}_3\text{AsO}_4 \rightarrow \text{As}_2\text{O}_5 + \text{H}_2\text{O}$
- 43)  $\text{Al}_2(\text{SO}_4)_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Al}(\text{OH})_3 + \text{CaSO}_4$
- 44)  $\text{FeCl}_3 + \text{NH}_4\text{OH} \rightarrow \text{Fe}(\text{OH})_3 + \text{NH}_4\text{Cl}$
- 45)  $\text{Ca}_3(\text{PO}_4)_2 + \text{SiO}_2 \rightarrow \text{P}_4\text{O}_{10} + \text{CaSiO}_3$
- 46)  $\text{N}_2\text{O}_5 + \text{H}_2\text{O} \rightarrow \text{HNO}_3$
- 47)  $\text{Al} + \text{HCl} \rightarrow \text{AlCl}_3 + \text{H}_2$
- 48)  $\text{H}_3\text{BO}_3 \rightarrow \text{H}_4\text{B}_6\text{O}_{11} + \text{H}_2\text{O}$
- 49)  $\text{Mg} + \text{N}_2 \rightarrow \text{Mg}_3\text{N}_2$
- 50)  $\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{NaClO} + \text{H}_2\text{O}$

- 51)  $\text{Li}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{LiOH}$
- 52)  $\text{CaC}_2 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_2 + \text{Ca(OH)}_2$
- 53)  $\text{Fe(OH)}_3 \rightarrow \text{Fe}_2\text{O}_3 + \text{H}_2\text{O}$
- 54)  $\text{Pb(NO}_3)_2 \rightarrow \text{PbO} + \text{NO}_2 + \text{O}_2$
- 55)  $\text{BaO} + \text{H}_2\text{O} \rightarrow \text{Ba(OH)}_2$
- 56)  $\text{Ca} + \text{AlCl}_3 \rightarrow \text{CaCl}_2 + \text{Al}$
- 57)  $\text{NH}_3 + \text{NO} \rightarrow \text{N}_2 + \text{H}_2\text{O}$
- 58)  $\text{H}_3\text{PO}_3 \rightarrow \text{H}_3\text{PO}_4 + \text{PH}_3$
- 59)  $\text{Fe}_2\text{O}_3 + \text{C} \rightarrow \text{CO} + \text{Fe}$
- 60)  $\text{FeS} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2$
- 61)  $\text{NH}_3 + \text{O}_2 \rightarrow \text{NO} + \text{H}_2\text{O}$
- 62)  $\text{Si} + \text{S}_8 \rightarrow \text{Si}_2\text{S}_4$
- 63)  $\text{Hg}_2\text{CO}_3 \rightarrow \text{Hg} + \text{HgO} + \text{CO}_2$
- 64)  $\text{SiC} + \text{Cl}_2 \rightarrow \text{SiCl}_4 + \text{C}$
- 65)  $\text{Al}_4\text{C}_3 + \text{H}_2\text{O} \rightarrow \text{CH}_4 + \text{Al(OH)}_3$
- 66)  $\text{V}_2\text{O}_5 + \text{HCl} \rightarrow \text{VOCl}_3 + \text{H}_2\text{O}$
- 67)  $\text{Ag}_2\text{S} + \text{KCN} \rightarrow \text{KAg(CN)}_2 + \text{K}_2\text{S}$
- 68)  $\text{Au}_2\text{S}_3 + \text{H}_2 \rightarrow \text{Au} + \text{H}_2\text{S}$
- 69)  $\text{ClO}_2 + \text{H}_2\text{O} \rightarrow \text{HClO}_2 + \text{HClO}_3$
- 70)  $\text{KO}_2 + \text{CO}_2 \rightarrow \text{K}_2\text{CO}_3 + \text{O}_2$
- 71)  $\text{MgNH}_4\text{PO}_4 \rightarrow \text{Mg}_2\text{P}_2\text{O}_7 + \text{NH}_3 + \text{H}_2\text{O}$
- 72)  $\text{MnO}_2 + \text{HCl} \rightarrow \text{MnCl}_2 + \text{H}_2\text{O} + \text{Cl}_2$
- 73)  $\text{Pb} + \text{Na} + \text{C}_2\text{H}_5\text{Cl} \rightarrow \text{Pb(C}_2\text{H}_5)_4 + \text{NaCl}$
- 74)  $\text{Ca(OH)}_2 + \text{H}_3\text{PO}_4 \rightarrow \text{CaHPO}_4 + \text{H}_2\text{O}$
- 75)  $\text{Zn} + \text{NaOH} + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{Zn(OH)}_4 + \text{H}_2$
- 76)  $\text{SrBr}_2 + (\text{NH}_4)_2\text{CO}_3 \rightarrow \text{SrCO}_3 + \text{NH}_4\text{Br}$
- 77)  $\text{Hg(OH)}_2 + \text{H}_3\text{PO}_4 \rightarrow \text{Hg}_3(\text{PO}_4)_2 + \text{H}_2\text{O}$
- 78)  $\text{Ca}_3(\text{PO}_4)_2 + \text{SiO}_2 + \text{C} \rightarrow \text{CaSiO}_3 + \text{P}_4 + \text{CO}$
- 79)  $\text{I}_4\text{O}_9 \rightarrow \text{I}_2\text{O}_6 + \text{I}_2 + \text{O}_2$
- 80)  $\text{C}_2\text{H}_3\text{Cl} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{HCl}$
- 81)  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \rightarrow \text{NH}_3 + \text{H}_2\text{O} + \text{Cr}_2\text{O}_3 + \text{O}_2$
- 82)  $\text{Al} + \text{NaOH} + \text{H}_2\text{O} \rightarrow \text{NaAl(OH)}_4 + \text{H}_2$
- 83)  $\text{NH}_4\text{Cl} + \text{Ca(OH)}_2 \rightarrow \text{CaCl}_2 + \text{NH}_3 + \text{H}_2\text{O}$
- 84)  $\text{Al} + \text{NH}_4\text{ClO}_4 \rightarrow \text{Al}_2\text{O}_3 + \text{AlCl}_3 + \text{NO} + \text{H}_2\text{O}$
- 85)  $\text{H}_2\text{SO}_4 + \text{NaHCO}_3 \rightarrow \text{Na}_2\text{SO}_4 + \text{CO}_2 + \text{H}_2\text{O}$
- 86)  $\text{Ca}_{10}\text{F}_2(\text{PO}_4)_6 + \text{H}_2\text{SO}_4 \rightarrow \text{Ca(H}_2\text{PO}_4)_2 + \text{CaSO}_4 + \text{HF}$
- 87)  $\text{Ca}_3(\text{PO}_4)_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{Ca(H}_2\text{PO}_4)_2$
- 88)  $\text{As} + \text{NaOH} \rightarrow \text{Na}_3\text{AsO}_3 + \text{H}_2$
- 89)  $\text{C}_4\text{H}_{10} + \text{Cl}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{CCl}_4 + \text{H}_2\text{O}$
- 90)  $\text{C}_7\text{H}_{10}\text{N} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{NO}_2$
- 91)  $\text{H}_3\text{PO}_4 + \text{HCl} \rightarrow \text{PCl}_5 + \text{H}_2\text{O}$
- 92)  $\text{HCl} + \text{K}_2\text{CO}_3 \rightarrow \text{KCl} + \text{H}_2\text{O} + \text{CO}_2$
- 93)  $\text{Ca(ClO}_3)_2 \rightarrow \text{CaCl}_2 + \text{O}_2$
- 94)  $\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \rightarrow \text{CO} + \text{H}_2\text{O}$
- 95)  $\text{Xe} + \text{F}_2 \rightarrow \text{XeF}_6$
- 96)  $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + \text{H}_2\text{O}$
- 97)  $\text{Au}_2\text{O}_3 \rightarrow \text{Au} + \text{O}_2$
- 98)  $\text{C}_4\text{H}_{10} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 99)  $\text{Fe}_3\text{O}_4 + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O}$
- 100)  $\text{O}_2 \rightarrow \text{O}_3$

# CHEMISTRY CHEMICAL EQUATIONS FROM WORD EQUATIONS PRACTICE I

## Chemical Equations from Word Equations

So far we have learned to balance and identify several types of chemical reactions. In all instances a skeleton chemical equation was given to us containing correct symbols and formulas for the reactants and products. Now let's see how we can write a balanced chemical equation from a descriptive or word reaction.

### Some Rules:

1. From the description determine the reactants and products of the equation.
2. Elements are represented by just their symbol except for seven (7) that exist in the diatomic form. These seven (7) can be remembered using the name

### HOFBrINCl

#### pronounced (hoffbrinkel)

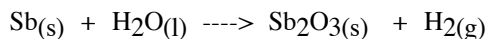
H	=	Hydrogen	=	H <sub>2</sub>
O	=	Oxygen	=	O <sub>2</sub>
F	=	Fluorine	=	F <sub>2</sub>
Br	=	Bromine	=	Br <sub>2</sub>
I	=	Iodine	=	I <sub>2</sub>
N	=	Nitrogen	=	N <sub>2</sub>
Cl	=	Chlorine	=	Cl <sub>2</sub>

3. Using your table of common ions write correct chemical formulas for the reactants and products.
4. Indicate states of the substance if given.
5. Balance the equation

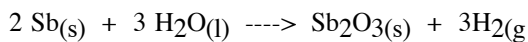
### Example:

Antimony + water → antimony oxide + hydrogen gas

Skeleton Equation:



Balanced Equation:



## PRACTICE PROBLEMS

Substitute symbols for names and then balance the equation:

1. iron III oxide + carbon → iron + carbon dioxide
2. aluminum chloride + sulfuric acid → aluminum sulfate + hydrogen chloride
3. zinc + cupric sulfate → zinc sulfate + copper
4. ammonium nitrate decomposes to nitrogen gas and water
5. nitric acid + magnesium carbonate → Magnesium nitrate + carbon dioxide + water

**CHEMISTRY****Balancing Chemical Word Equations II**

Write a balanced chemical equation in the box below the following word equations:

1. potassium chloride + silver nitrate -----> potassium nitrate + silver chloride

2. aluminum hydroxide + sodium nitrate -----> aluminum nitrate + sodium hydroxide

3. iron metal + copper II sulfate -----> iron II sulfate + copper metal

4. aluminum metal + cupric chloride -----> aluminum chloride + copper metal

5. sodium chlorate -----> sodium chloride + oxygen gas

6. calcium carbonate -----> calcium oxide + carbon dioxide gas

7. zinc metal + oxygen gas -----> zinc oxide

8. chlorine gas + sodium metal -----> sodium chloride

9. aluminum sulfate + barium chloride -----> aluminum chloride + barium sulfate

10. sodium hydrogen carbonate -----> sodium carbonate + carbon dioxide gas + water

**CHEMISTRY****Balancing Chemical Word Equations III**

Write a balanced chemical equation in the box below the following word equations:

1. aluminum permanganate + ammonium acetate -----> ammonium permanganate + aluminum acetate

2. sodium + water -----> sodium hydroxide + hydrogen

3. nitric acid + magnesium carbonate -----> magnesium nitrate + carbon dioxide + water

4. potassium oxalate + tin IV phosphate -----> potassium phosphate + tin IV oxalate

5. barium chloride + fluorine -----> barium fluoride + chlorine

6. zinc + phosphoric acid -----> zinc phosphate + hydrogen

7. lead IV sulfide + oxygen -----> lead IV oxide + sulfur dioxide

8. ferric iodide + cuprous hydrogen carbonate -----> ferric hydrogen carbonate + cuprous iodide

9. ammonium phosphate + calcium hydroxide -----> calcium phosphate + ammonia + water

10. chromium III bromide + chlorine -----> chromium III chloride + bromine

**CHEMISTRY****Balancing Chemical Word Equations IV**

Write a balanced chemical equation in the box below the following word equations:

1. zinc chromate + iron III carbonate -----> zinc carbonate + iron III chromate

2. barium hypochlorite + iron III carbonate -----> iron III hypochlorite + barium carbonate

3. cobalt II chlorate -----> cobalt II chloride + oxygen

4. copper I hydroxide + nickel II sulfate -----> nickel II hydroxide + cuprous sulfate

5. sulfuric acid + strontium fluoride -----> strontium sulfate + hydrogen fluoride

6. sodium tartrate + mercury II nitrate -----> sodium nitrate + mercury II tartrate

7. cadmium + tin IV sulfite -----> tin + cadmium sulfite

8. hydrogen + nitrogen -----> ammonia

9. lead IV carbonate -----> lead IV oxide + carbon dioxide

10. chromium III hydroxide -----> chromium III oxide + water



Write balanced chemical equations for the reactions described below:

1. Solid mercury (II) oxide is heated to produce liquid mercury and oxygen gas.
2. Water decomposes with electricity to produce both hydrogen and oxygen gases.
3. Solid tetraphosphorus decoxide reacts with water to produce phosphoric acid.
4. Sodium hydroxide reacts with nitric acid in solution to produce sodium nitrate and water.
5. When metallic iron is mixed with hydrochloric acid, aqueous iron III chloride and hydrogen gas are produced.
6. Silver oxide can be heated to give silver metal and oxygen gas as products.
7. When sodium metal is dropped into water, and aqueous solution of sodium hydroxide, and hydrogen are produced.
8. Heating aqueous sulfuric acid produces water, and oxygen and sulfur dioxide gases.
9. Sodium hydrogen carbonate reacts with acetic acid to produce sodium acetate , water, and carbon dioxide.
10. When a mixture of aluminum and iron II oxide is heated, metallic iron and aluminum oxide are produced.

## Writing Chemical Equations

State the type of each reaction; write all formulas properly; balance the number of atoms on each side of the equation. Include any extra information you know such as phase, precipitate, heating, etc.

1. When fluorine gas is bubbled through a solution of sodium bromide the products are free bromine liquid and sodium fluoride in solution.
2. Manganese (IV) oxide powder can be broken down into solid  $\text{Mn}_3\text{O}_4$  and free oxygen gas by heating.
3. Phosphoric acid. ( $\text{H}_3\text{PO}_4$ ) is produced when diphosphorus pentoxide gas dissolves in water.
4. A few drops of silver nitrate solution added to a solution of iron (II) chloride produces a white precipitate.
5. The action of sulfuric acid on iron metal releases hydrogen gas and leaves a solution of iron (III) sulfate.
6. If hydrochloric acid comes in contact with zinc sulfide crystals, a solution of zinc chloride and hydrogen sulfide gas are produced.
7. When diphosphorus pentoxide gas reacts with lime (calcium oxide), the product is calcium phosphate.
8. Heating tin (IV) oxide yields tin (II) oxide and oxygen gas.
9. Mixing solutions of aluminum sulfate and calcium hydroxide gives a precipitate of aluminum hydroxide and a solution of calcium sulfate.
10. Adding water to solid sodium peroxide releases oxygen and leaves sodium hydroxide.
11. Burning sulfur in oxygen produces sulfur trioxide.
12. Metallic zinc placed in a cupric nitrate solution gives a zinc nitrate solution and free copper.
13. Heating ammonium carbonate yields ammonia gas ( $\text{NH}_3$ ), water and carbon dioxide.
14. The reaction of barium hydroxide solution with sulfuric acid gives a white precipitate and water.
15. Hydrogen sulfide gas is burned in oxygen to make water and sulfur dioxide.
16. If a nonmetal replacement occurs when chlorine gas is bubbled into a solution of potassium iodide, write the equation.
17. Chlorine gas passed over copper metal produces copper (I) chloride.
18. The burning of lithium phosphide in oxygen gives lithium oxide and diphosphorus pentoxide.
19. Butane gas ( $\text{C}_4\text{H}_{10}$ ) burns in oxygen to form the expected products.
20. Green plants produce sugar, ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) and oxygen gas from carbon dioxide and water in the photosynthesis process.
- 21. Challenger!!! Free bromine reacts with sodium hydroxide to yield sodium bromate, water, and sodium bromide.**