

## Synthesis and Decomposition Reactions

1. For each of the following word equations, write a balanced chemical equation.

a) magnesium + oxygen gas  $\longrightarrow$  magnesium oxide

b) hydrogen gas + oxygen gas  $\longrightarrow$  water

c) potassium + chlorine gas  $\longrightarrow$  potassium chloride

d) iron + oxygen gas  $\longrightarrow$  iron (III) oxide

e) sodium iodide  $\longrightarrow$  sodium + iodine

f) zinc carbonate  $\longrightarrow$  zinc oxide + carbon dioxide (zinc forms a  $\text{Zn}^{2+}$  ion)

g) iron (II) sulfide  $\longrightarrow$  iron + sulfur

2. For these questions, the product is not given to you.

Complete the word equation by naming the product, and then write a balanced chemical equation.

a) sodium + oxygen gas  $\longrightarrow$

b) aluminum + bromine gas  $\longrightarrow$

c) magnesium chloride  $\longrightarrow$

d) water  $\longrightarrow$

## Single Displacement and Double Displacement Reactions

For questions 1 to 8 write a balanced chemical equation.

1. magnesium + silver nitrate  $\longrightarrow$  silver + magnesium nitrate

2. bromine + calcium iodide  $\longrightarrow$  iodine + calcium bromide

3. copper + silver nitrate  $\longrightarrow$  silver + copper (II) nitrate

4. zinc + hydrogen chloride  $\longrightarrow$  hydrogen + zinc chloride

5. lead (II) nitrate + potassium iodide  $\longrightarrow$  lead (II) iodide + potassium nitrate

6. calcium carbonate + hydrogen chloride  $\longrightarrow$  hydrogen carbonate + calcium chloride

7. aluminum + copper (II) chloride  $\longrightarrow$  copper + aluminum chloride

8. beryllium fluoride + sodium oxide  $\longrightarrow$  beryllium oxide + sodium fluoride

9. For each of the following, predict what the products are and then balance the equation.

a) aluminum reacts with iron (III) oxide

(This is how iron is extracted from iron ore. It is heated at a high temperature with aluminum present. In the reaction, iron is separated from the iron ore producing a new aluminum compound.)

b) sodium reacts with water

(This reaction is dangerous. Dropping a piece of sodium in water can cause a fire.)

c) sodium chloride reacts with hydrogen sulfate (sulfuric acid)

(When this happens in the laboratory, a dangerous gas is produced.)

d) hydrogen sulfate reacts with calcium phosphate

One of the products is hydrogen phosphate. This is a very good plant fertilizer.)

## Hydrocarbon Combustion Reactions

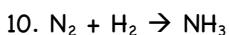
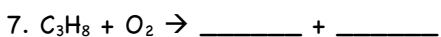
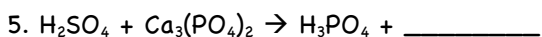
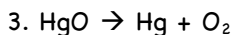
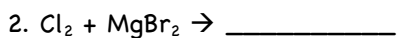
Write balanced chemical equations for the following reactions.

1. The burning of propane ( $C_3H_8$ ) in a barbecue.
2. The combustion of gasoline (mainly octane  $C_8H_{18}$ ) by an automobile engine.
3. The combustion of cyclopropane ( $C_3H_6$ ). This was once used as an anaesthetic.

## Practice: Reaction Types

For questions 1 to 10

- Predict what the products are (if they are not shown)
- Balance the chemical equation
- Write the reaction type



In the next few questions a description of a reaction is given. From this description,

- Write a balanced the chemical equation
- Write the reaction type

11. Methane is burned in a furnace to heat a home.

12. A piece of aluminum foil placed in a solution of copper (II) chloride leads to a neat reaction.

13. One way to produce hydrogen gas is by running an electrical current through water.

14. One way to make table salt, sodium chloride, is to combine it with sodium metal and chlorine molecules.

15. One of the five types of chemical reactions has not been mentioned in questions 11 to 14 above. Name the missing type, and invent your own reaction of this type. Go ahead, be inventive!