

# BALANCING CHEMICAL EQUATIONS

Name \_\_\_\_\_

Rewrite and balance the equations below, and identify the type of reaction.

- $N_2 + H_2 \rightarrow NH_3$  \_\_\_\_\_
- $KClO_3 \rightarrow KCl + O_2$  \_\_\_\_\_
- $NaCl + F_2 \rightarrow NaF + Cl_2$  \_\_\_\_\_
- $H_2 + O_2 \rightarrow H_2O$  \_\_\_\_\_
- $AgNO_3 + MgCl_2 \rightarrow AgCl + Mg(NO_3)_2$  \_\_\_\_\_
- $AlBr_3 + K_2SO_4 \rightarrow KBr + Al_2(SO_4)_3$  \_\_\_\_\_
- $CH_4 + O_2 \rightarrow CO_2 + H_2O$  \_\_\_\_\_
- $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$  \_\_\_\_\_
- $C_8H_{18} + O_2 \rightarrow CO_2 + H_2O$  \_\_\_\_\_
- $FeCl_3 + NaOH \rightarrow Fe(OH)_3 + NaCl$  \_\_\_\_\_
- $P + O_2 \rightarrow P_2O_5$  \_\_\_\_\_
- $Na + H_2O \rightarrow NaOH + H_2$  \_\_\_\_\_
- $Ag_2O \rightarrow Ag + O_2$  \_\_\_\_\_
- $S_8 + O_2 \rightarrow SO_3$  \_\_\_\_\_
- $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$  \_\_\_\_\_
- $K + MgBr_2 \rightarrow KBr + Mg$  \_\_\_\_\_
- $HCl + CaCO_3 \rightarrow CaCl_2 + H_2O + CO_2$  \_\_\_\_\_

## Practice Problems

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1. Write the formula equation for the following reaction: Ammonia reacts with hydrogen chloride to form ammonium chloride.
2. When heated, calcium carbonate ( $\text{CaCO}_3$ ) decomposes to form calcium oxide and carbon dioxide. Write an equation for this reaction.
3. Write the formula equation for the following reaction: Barium oxide ( $\text{BaO}$ ) reacts with water to form barium hydroxide.
4. Acetaldehyde ( $\text{CH}_3\text{CHO}$ ) decomposes to form methane ( $\text{CH}_4$ ) and carbon monoxide. Write an equation for this reaction.
5. Write the formula equation for the following reaction: Zinc reacts with copper(II) nitrate ( $\text{Cu}(\text{NO}_3)_2$ ) to form zinc nitrate and copper.
6. When heated, calcium sulfite ( $\text{CaSO}_3$ ) decomposes to form calcium oxide and sulfur dioxide. Write an equation for this reaction.
7. Write the formula equation for the following reaction: Iron reacts with sulfuric acid ( $\text{H}_2\text{SO}_4$ ) to form iron(II) sulfate ( $\text{FeSO}_4$ ) and hydrogen gas.
8. Azomethane ( $\text{C}_2\text{H}_6\text{N}_2$ ) decomposes to form ethane ( $\text{C}_2\text{H}_6$ ) and nitrogen gas at  $297^\circ\text{C}$ . Write an equation for this reaction.
9. Write out the formula equation for the following reaction: Carbon monoxide reacts with chlorine gas to form phosgene ( $\text{COCl}_2$ ).
10. Manganese(II) iodide decomposes when exposed to light to form manganese and iodine. Write an equation for this reaction.

# WORD EQUATIONS

Name \_\_\_\_\_

Write the word equations below as chemical equations and balance.

1. zinc + lead (II) nitrate yield zinc nitrate + lead

2. aluminum bromide + chlorine yield aluminum chloride + bromine

3. sodium phosphate + calcium chloride yield calcium phosphate + sodium chloride

4. potassium chlorate when heated yields potassium chloride + oxygen gas

5. aluminum + hydrochloric acid yield aluminum chloride + hydrogen gas

6. calcium hydroxide + phosphoric acid yield calcium phosphate + water

7. copper + sulfuric acid yield copper (II) sulfate + water + sulfur dioxide

8. hydrogen + nitrogen monoxide yield water + nitrogen

## EQUATIONS

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1. aluminum + hydrochloric acid  $\rightarrow$  aluminum chloride + hydrogen
2. carbon + oxygen  $\rightarrow$  carbon dioxide
3. calcium bicarbonate + calcium hydroxide  $\rightarrow$  calcium carbonate + water
4. hydrogen sulfide + oxygen  $\rightarrow$  water + sulfur
5. sodium hydroxide + calcium nitrate  $\rightarrow$  sodium nitrate + calcium hydroxide
6. potassium iodide + chlorine  $\rightarrow$  potassium chloride + iodine
7. sulfuric acid + potassium hydroxide  $\rightarrow$  potassium sulfate + water
8. carbon dioxide + carbon  $\rightarrow$  carbon monoxide
9. calcium sulfate + sodium carbonate  $\rightarrow$  calcium carbonate + sodium sulfate
10. water + diphosphorus pentoxide  $\rightarrow$  phosphoric acid
11. aluminum + phosphoric acid  $\rightarrow$  hydrogen + aluminum phosphate
12. ammonium chloride + sodium nitrite  $\rightarrow$  sodium chloride + nitrogen + water
13. chlorine + sodium hydroxide  $\rightarrow$  sodium chloride + sodium hypochlorite + water
14. lead (II) nitrate (heated)  $\rightarrow$  lead(II) oxide + nitrogen dioxide + oxygen
15. mercury (I) oxide + oxygen  $\rightarrow$  mercury (II) oxide
16. calcium oxide + magnesium chloride  $\rightarrow$  magnesium oxide + calcium chloride
17. calcium + water  $\rightarrow$  calcium hydroxide + hydrogen

**Practice Problems (continued)**

11. Write a balanced chemical equation for the reaction in which dinitrogen pentoxide ( $\text{N}_2\text{O}_5$ ) reacts with water to produce nitric acid ( $\text{HNO}_3$ ).
12. Magnesium reacts with titanium(IV) chloride ( $\text{TiCl}_4$ ) to produce magnesium chloride ( $\text{MgCl}_2$ ) and titanium. Write the balanced equation for this reaction.
13. Write a balanced chemical equation for the reaction in which carbon reacts with zinc oxide to produce zinc and carbon dioxide.
14. Bromine reacts with sodium iodide to form sodium bromide and iodine. Write the balanced equation for this reaction.
15. Write a balanced chemical equation for the reaction in which phosphorus trichloride ( $\text{PCl}_3$ ) reacts with chlorine gas to produce phosphorus pentachloride ( $\text{PCl}_5$ ).
16. Phosphorus reacts with bromine to produce phosphorus tribromide ( $\text{PBr}_3$ ). Write the balanced equation for this reaction.
17. Calcium hydride ( $\text{CaH}_2$ ) reacts with water to produce calcium hydroxide ( $\text{Ca(OH)}_2$ ) and hydrogen gas. Write the balanced equation for this reaction.
18. Write a balanced chemical equation for the reaction in which sulfuric acid ( $\text{H}_2\text{SO}_4$ ) reacts with potassium hydroxide to produce potassium sulfate ( $\text{K}_2\text{SO}_4$ ) and water.
19. Write a balanced chemical equation for the reaction in which propane ( $\text{C}_3\text{H}_8$ ) reacts with oxygen gas to produce carbon dioxide and water.
20. Benzene ( $\text{C}_6\text{H}_6$ ) reacts with oxygen gas to produce carbon dioxide and water. Write the balanced equation for this reaction.

# PREDICTING PRODUCTS OF CHEMICAL REACTIONS

Name \_\_\_\_\_

Predict the products of the reactions below. Then, write the balanced equation and classify the reaction.

1. magnesium bromide + chlorine

2. aluminum + iron (III) oxide

3. silver nitrate + zinc chloride

4. hydrogen peroxide (catalyzed by manganese dioxide)

5. zinc + hydrochloric acid

6. sulfuric acid + sodium hydroxide

7. sodium + hydrogen

8. acetic acid + copper