

## Predicting products and balancing equations.

Complete the word equation, write the skeletal equation, and then balance the following equations.

1. Lithium oxide reacts with water
2. Iron(III)hydroxide decomposes →
3. Butane(C<sub>4</sub>H<sub>10</sub>) burns in air →
4. Hydrogen gas + bromine liquid →
5. Sodium chlorate decomposes →
6. Liquid mercury reacts with oxygen gas →
7. Calcium metal reacts with hydrofluoric acid →
8. Sulfur trioxide gas decomposes →
9. Carbon reacts with tin(II)oxide →
10. Sulfur trioxide gas reacts with water vapor →
11. Pentane(C<sub>5</sub>H<sub>12</sub>) burns with oxygen gas →
12. Cesium metal reacts with oxygen gas →
13. Sodium metal reacts with water →
14. Water vapor reacts with carbon dioxide gas →
15. Barium hydroxide reacts with calcium chloride →

Answers to the problems using only word equations and skeletal equations (NOTE: these are not balanced yet)

1. Lithium oxide reacts with water → lithium hydroxide  
 $\text{Li}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{LiOH}$
2. Iron(III)hydroxide decomposes → iron(III) oxide and water  
 $\text{Fe}(\text{OH})_3 \rightarrow \text{Fe}_2\text{O}_3 + \text{H}_2\text{O}$
3. Butane( $\text{C}_4\text{H}_{10}$ ) burns in air → carbon dioxide and water  
 $\text{C}_4\text{H}_{10} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
4. Hydrogen gas + bromine liquid → hydrogen bromide  
 $\text{H}_2 + \text{Br}_2 \rightarrow \text{HBr}$
5. Sodium chlorate decomposes → sodium chloride and oxygen gas  
 $\text{NaClO}_3 \rightarrow \text{NaCl} + \text{O}_2$
6. Liquid mercury reacts with oxygen gas → mercury(II)oxide  
 $\text{Hg} + \text{O}_2 \rightarrow \text{HgO}$
7. Calcium metal reacts with hydrofluoric acid → calcium fluoride and hydrogen gas  
 $\text{Ca} + \text{HF} \rightarrow \text{CaF}_2 + \text{H}_2$
8. Sulfur trioxide gas decomposes → sulfur and oxygen gas  
 $\text{SO}_3 \rightarrow \text{S} + \text{O}_2$
9. Carbon reacts with tin(II)oxide → Carbon dioxide gas and tin metal  
 $\text{C} + \text{SnO} \rightarrow \text{CO}_2 + \text{Sn}$
10. Sulfur trioxide gas reacts with water vapor → hydrogen sulfate (sulfuric acid)  
 $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$
11. Pentane( $\text{C}_5\text{H}_{12}$ ) burns with oxygen gas → Carbon dioxide and water vapor  
 $\text{C}_5\text{H}_{12} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
12. Cesium metal reacts with oxygen gas → Cesium oxide  
 $\text{Cs} + \text{O}_2 \rightarrow \text{Cs}_2\text{O}$
13. Sodium metal reacts with water → Sodium hydroxide and hydrogen gas  
 $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$
14. Water vapor reacts with carbon dioxide gas → hydrogen carbonate (carbonic acid)  
 $\text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{H}_2\text{CO}_3$
15. Barium hydroxide reacts with calcium chloride → barium chloride and calcium hydroxide  
 $\text{Ba}(\text{OH})_2 + \text{CaCl}_2 \rightarrow \text{BaCl}_2 + \text{Ca}(\text{OH})_2$

## Answers to the problems with coefficients

1. Lithium oxide reacts with water → lithium hydroxide  
$$\text{Li}_2\text{O} + \text{H}_2\text{O} \rightarrow 2 \text{LiOH}$$
2. Iron (III) hydroxide decomposes → iron(III) oxide and water  
$$2 \text{Fe}(\text{OH})_3 \rightarrow \text{Fe}_2\text{O}_3 + 3 \text{H}_2\text{O}$$
3. Butane ( $\text{C}_4\text{H}_{10}$ ) burns in air → carbon dioxide and water  
$$2 \text{C}_4\text{H}_{10} + 13 \text{O}_2 \rightarrow 8 \text{CO}_2 + 10 \text{H}_2\text{O}$$
4. Hydrogen gas + bromine liquid → hydrogen bromide  
$$\text{H}_2 + \text{Br}_2 \rightarrow 2 \text{HBr}$$
5. Sodium chlorate decomposes → sodium chloride and oxygen gas  
$$2 \text{NaClO}_3 \rightarrow 2 \text{NaCl} + 3 \text{O}_2$$
6. Liquid mercury reacts with oxygen gas → mercury(II)oxide  
$$2 \text{Hg} + \text{O}_2 \rightarrow 2 \text{HgO}$$
7. Calcium metal reacts with hydrofluoric acid → calcium fluoride and hydrogen gas  
$$\text{Ca} + 2 \text{HF} \rightarrow \text{CaF}_2 + \text{H}_2$$
8. Sulfur trioxide gas decomposes → sulfur and oxygen gas  
$$2 \text{SO}_3 \rightarrow 2 \text{S} + 3 \text{O}_2$$
9. Carbon reacts with tin(II)oxide → Carbon dioxide gas and tin metal  
$$\text{C} + 2 \text{SnO} \rightarrow \text{CO}_2 + 2 \text{Sn}$$
10. Sulfur trioxide gas reacts with water vapor → hydrogen sulfate (sulfuric acid)  
$$\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$$
11. Pentane( $\text{C}_5\text{H}_{12}$ ) burns with oxygen gas → Carbon dioxide and water vapor  
$$\text{C}_5\text{H}_{12} + 8 \text{O}_2 \rightarrow 5 \text{CO}_2 + 6 \text{H}_2\text{O}$$
12. Cesium metal reacts with oxygen gas → Cesium oxide  
$$4 \text{Cs} + \text{O}_2 \rightarrow 2 \text{Cs}_2\text{O}$$
13. Sodium metal reacts with water → Sodium hydroxide and hydrogen gas  
$$2 \text{Na} + 2 \text{H}_2\text{O} \rightarrow 2 \text{NaOH} + \text{H}_2$$
14. Water vapor reacts with carbon dioxide gas → hydrogen carbonate (carbonic acid)  
$$\text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{H}_2\text{CO}_3$$
15. Barium hydroxide reacts with calcium chloride → barium chloride and calcium hydroxide  
$$\text{Ba}(\text{OH})_2 + \text{CaCl}_2 \rightarrow \text{BaCl}_2 + \text{Ca}(\text{OH})_2$$