

ROUND 2

Synthesis Reactions occur when two or more reactants combine to form a single product. There are several common types of synthesis reactions.

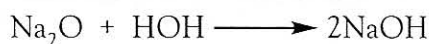
A metal combines with a nonmetal to form a binary salt.

example A piece of lithium metal is dropped into a container of nitrogen gas.

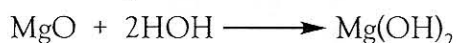


Metallic oxides and water form bases (metallic hydroxides).

example Solid sodium oxide is added to water.



Solid magnesium oxide is added to water.



Nonmetallic oxides and water form acids. The nonmetal retains its oxidation number.

example Carbon dioxide is bubbled into water.

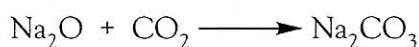


Dinitrogen pentoxide is bubbled into water.

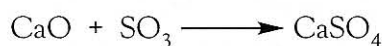


Metallic oxides and nonmetallic oxides form salts.

example Solid sodium oxide is added to carbon dioxide.



Solid calcium oxide is added to sulfur trioxide.



Decomposition Reactions occur when a single reactant is broken down into two or more products.

Metallic carbonates decompose into metallic oxides and carbon dioxide.

example A sample of magnesium carbonate is heated.



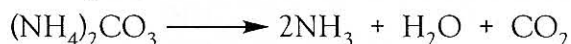
Metallic chlorates decompose into metallic chlorides and oxygen.

example A sample of magnesium chlorate is heated.



Ammonium carbonate decomposes into ammonia, water and carbon dioxide.

example A sample of ammonium carbonate is heated.



Sulfurous acid decomposes into sulfur dioxide and water.

example A sample of sulfurous acid is heated.



Carbonic acid decomposes into carbon dioxide and water.

example A sample of carbonic acid is heated.



A binary compound may break down to produce two elements.

example Molten sodium chloride is electrolyzed.



Hydrogen peroxide decomposes into water and oxygen.

example $2\text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O} + \text{O}_2$

Ammonium hydroxide decomposes into ammonia and water.

example $\text{NH}_4\text{OH} \longrightarrow \text{NH}_3 + \text{HOH}$

Exercise 7–2: Predict and balance the following synthesis and decomposition reactions. Use abbreviations to indicate the phase of reactants and products where possible [i.e., (aq) (s) (l) (g)].

1. A sample of calcium carbonate is heated.
2. Sulfur dioxide gas is bubbled through water.
3. Solid potassium oxide is added to a container of carbon dioxide gas.
4. Liquid hydrogen peroxide is warmed.
5. Solid lithium oxide is added to water.
6. Molten aluminum chloride is electrolyzed.
7. A pea-sized piece of sodium is added to a container of iodine vapor.
8. A sample of carbonic acid is heated.
9. A sample of potassium chlorate is heated.
10. Solid magnesium oxide is added to sulfur trioxide gas.