

Making Predictions Using the Types of Reactions

The 5 general reactions (synthesis, decomposition, single displacement, double displacement, combustion) can occur between elements and compounds. Classify each using the 5 types of reactions.

1) metal + non-metal \longrightarrow ionic compound Synthesis

2) non-metal + non-metal \longrightarrow molecular compound Synthesis

3) ionic compound \longrightarrow metal + non-metal Decomposition

4) molecular compound \longrightarrow non-metal + non-metal Decomposition

5) metal 1 + ionic compound 1 \longrightarrow metal 2 + ionic compound 2
Single displacement

6) ionic compound 1 + non-metal 1 \longrightarrow ionic compound 2 + non-metal 2
Single displacement

7) ionic compound 1 + ionic compound 2 \longrightarrow ionic compound 3 + ionic compound 4
Double displacement

8) hydrocarbon + oxygen \longrightarrow carbon dioxide + water Combustion

9) metal + oxygen \longrightarrow metal oxide Synthesis

Questions:

1. Using the general reaction types:

- Identify the type of reaction using the list above as a guideline.
- Predict the name of the product(s) formed in the reaction.
- Write the balanced chemical equation (BCE) for the reaction.

Single displacement

a) iron + aluminum sulfate \longrightarrow ***No Reaction***

BCE:

b) sodium + iodine \longrightarrow sodium iodide

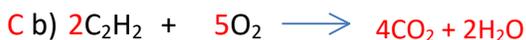
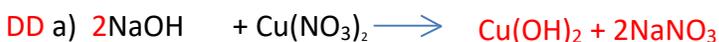
Synthesis

BCE: $2\text{Na}_{(s)} + \text{I}_{2(s)} \longrightarrow 2\text{NaI}_{(s)}$

- c) aluminum chloride \longrightarrow aluminum + chloride
 Decomposition
 BCE: $2\text{AlCl}_3(\text{s}) \longrightarrow 2\text{Al}(\text{s}) + 3\text{Cl}_2(\text{g})$
- d) fluorine + potassium oxide \longrightarrow potassium fluoride + oxygen
 Single displacement
 BCE: $2\text{F}_2 + 2\text{K}_2\text{O} \longrightarrow 4\text{KF} + \text{O}_2$

2. For each of these reactions:

- Identify the type of reaction.
- Complete the skeleton equation. *Hint: use the list to guide you.*
- Balance the equation.



3. In cars, several reactions take place when an airbag inflates in an accident. Using your knowledge of types of reactions, complete balanced equations for each of the 3 reactions.

Reaction 1: Sodium azide (NaN_3) undergoes a decomposition reaction to produce an alkali metal and a common gas.



Reaction 2: The dangerous metal produced in reaction 1 is removed by a single displacement reaction with iron (III) oxide.



Reaction 3: The metal oxide produced in reaction 2 combines with carbon dioxide and water in a synthesis reaction to create sodium bicarbonate.

