

Section 6.1.

Types of Chemical Reactions.

Textbook pages 256 to 271.

Before You Read.

Many chemical reactions occur in daily life. Describe one chemical reaction you have observed.

How are chemical reactions classified?

Chemical reactions can be classified as one of six main types: synthesis, decomposition, single replacement, double replacement, neutralization (acid-base), or combustion. You can identify each type of reaction by examining the reactants. This makes it possible to classify a reaction and then predict the identity of the products.

What is a synthesis (combination) reaction?

In a **synthesis** (combination) reaction, two or more reactants (A and B) combine to produce a single product (A.B.).

element plus element yields compound
A plus B yields A.B.
(The letters A and B represent elements.)
hydrogen plus oxygen yields water

What is a decomposition reaction?

In a **decomposition** reaction a compound is broken down into smaller compounds or separate elements. A decomposition reaction is the reverse of a synthesis reaction.

compound yields element plus element
A.B yields A plus B
calcium chlorate yields calcium chloride plus oxygen

Next page.

What is a single replacement reaction?

In a **single replacement** reaction, a reactive element (a metal or a non-metal) and a compound react to produce another element and another compound. In other words, one of the elements in the compound is replaced by another element. The element that is replaced could be a metal or a non-metal.

element plus compound yields element plus compound
A plus B.C. yields B plus A.C. where A is a metal OR
A plus B.C. yields C plus B.A. where A is a non-metal
aluminum plus lead(II) nitrate yields aluminum nitrate plus lead

What is a double replacement reaction?

A **double replacement** reaction usually involves two ionic solutions that react to produce two other ionic compounds. One of the compounds forms a **precipitate**, which is an insoluble solid that forms from a solution. The precipitate floats in the solution, then settles and sinks to the bottom. The other compound may also form a precipitate, or it may remain dissolved in solution.

ionic solution plus ionic solution yields ionic solution plus ionic solid
A.B.(aqueous) plus C.D. yields A.D.(aqueous) plus C.B.(s)
iron(II) chloride plus lithium phosphate
yields iron(II) phosphate plus lithium chloride

What is a neutralization (acid-base) reaction?

When an acid and a base are combined, they will neutralize each other. In a neutralization (acid-base) reaction, an acid and a base react to form a salt and water.

acid plus base yields salt plus water
H.X. plus M.O.H. yields M.X. plus H₂O.

(X represents a negative ion. M represents a positive ion.)

sulphuric acid plus sodium hydroxide
yields sodium sulphate plus water

Next page.

What is a combustion reaction?

Combustion is the rapid reaction of a compound or element with oxygen to form an oxide and produce heat. For example, organic compounds, such as methane, combust with oxygen to form carbon dioxide (the oxide of carbon) and water (the oxide of hydrogen).

hydrocarbon plus oxygen yields carbon dioxide plus water
C_XH_Y plus O₂ yields CO₂ plus H₂O.

(The subscripts X and Y represent integers.)
C₂H₆O₃ plus O₂ yields CO₂ plus H₂O.

This text is copyrighted and has been developed for the educational use of students using McGraw-Hill BC Science 10.