

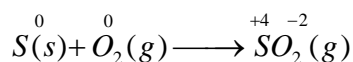
Common Redox Reactions

Most common oxidation-reduction (redox) reactions are combination, decomposition, displacement, and combustion reactions that are listed below.

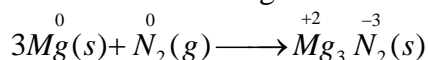
Combination Reactions

A combination reaction is a reaction in which two or more substances chemically combine to form a single bigger aggregate. For example,

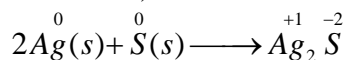
- Formation of sulfur dioxide when the sulfur is burned in the air.



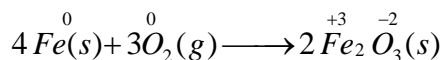
- Combination of Magnesium metal with nitrogen gas to form magnesium nitride.



- Reaction of silver with sulfur forming silver sulfide, a black substance (tarnishing silverware).



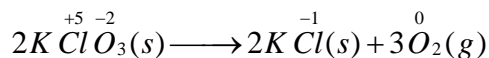
- Formation of iron oxide (rust) when iron nail is exposed to air in presence of moisture (this is a simplified reaction).



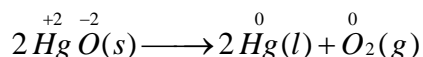
Decomposition Reactions

The decomposition reaction is just opposite of combination reaction. In this reaction, the bigger substance is broken up into smaller substances. For example

- Preparation of oxygen gas in the laboratory by heating potassium chlorate.



- Mercury (II) oxide decomposes into mercury and oxygen gas upon heating.

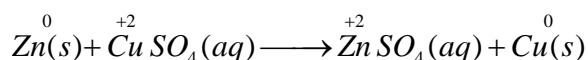


Displacement reactions

In a displacement reaction, an atom or an ion in a compound is replaced by another atom or an ion of another element. This kind is generally known as a single displacement reaction. Some of the displacement reactions include metal, hydrogen, and halogen displacement reaction that are given below.

a. Metal Displacement

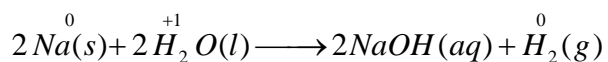
In this type of reaction, a metal ion in a compound is replaced by another metal. For example, the formation of copper when zinc metal is placed in a copper sulfate solution:



Here the zinc metal displaces the copper(II) ion from copper sulfate solution liberating free copper metal.

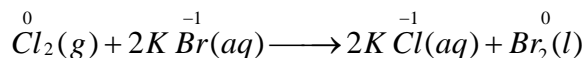
b. Hydrogen Displacement

All Group IA elements (alkali metals) and some Group IIA elements (alkaline earth metals), which are the most reactive elements of all the metallic elements produce hydrogen gas when reacted with water. For example, the reaction between sodium metal and water:



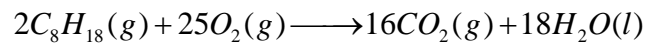
c. Halogen Displacement

Halogens are the group of elements belongs to VIIA Group. One halogen can replace another halogen from a solution. For example, displacement of bromine ion (Br⁻) from potassium bromide (KBr) solution by chlorine gas (Cl₂(g)).



Combustion Reactions

A combustion reaction is quite different from the ordinary reaction. In combustion reaction, a substance reacts with oxygen rapidly with release of heat and light or fame. The reactions between magnesium and sulfur with oxygen mentioned earlier are considered to be combustion reactions. Another example would be the burning of gasoline in your car engine. The octane is the main component of gasoline that burns according to the following equation:



Here the carbon atoms are oxidized when they combine with oxygen to form carbon dioxide. At the same time, molecular oxygen, $O_2(g)$, is reduced by the hydrogen atoms to form water. The heat produced can be used to perform mechanical work to drive the car.
