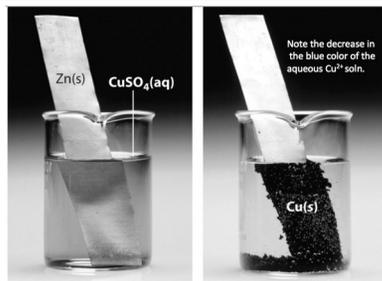


The Chemical Reaction

Process of *breaking* and *reforming* bonds between atoms to produce new chemical compounds and molecules.

In a **chemical reaction reactants** (left side of reaction) yields (makes) new **products** (right side of reaction).

The reaction to the right is a *single replacement reaction*



Zn metal reacts with *blue* liquid copper(II)sulfate to produce Cu metal

2

Chemical Reaction Energy

Chemical reactions occur when bonds (*ionic and covalent*) break and reform. The different parts of the reactions (*metals and non-metals*) determine the type of reaction.

Each chemical reaction will release (*exothermic*) or absorb (*endothermic*) energy based on the bond energy before or after the reaction.



Combustion of CH₄ Gas

Methane [CH₄(g)] burns in an exothermic reaction, releasing heat into the atmosphere

3

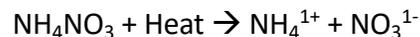
Chemical Reaction Energy

An *exothermic* reaction releases energy during the reaction process



More Heat Less Heat Heat Lost

An *endothermic* reaction absorbs energy during the reaction process



Less Heat Heat Gained More Heat



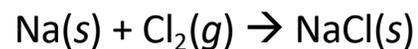
Decomposition of NH₄NO₃
Ammonium Nitrate dissolves in water to make a solution of NH₄¹⁺ and NO₃¹⁻. This reaction is extremely endothermic

4

Parts of a Chemical Reaction

Basic Form of a Chemical Reaction

Reactants yield Products



Reactants – Na (s) and Cl₂ (g)

Yields (→)

Products – NaCl (s)

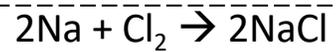


Combination Reaction
Sodium (Na) reacts with Chlorine (Cl) in a very exothermic reaction to produce Sodium Chloride (NaCl)

5

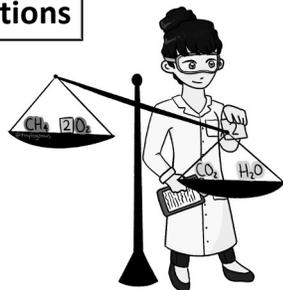
Conservation of Matter in Reactions

In a chemical reaction the atoms in the reactants must equal the atoms in the products (*conservation of matter*)



2 Na reacts with 1 Cl₂ to yield 2 NaCl

The **coefficient** (*large number before atoms*) allows the atoms on one side of the reaction to balance with the other side of the reaction.



Balancing Reactions is a very important part of chemical reactions