**Chemical Reactions**

**What is a chemical reaction?**

* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the process by which the atoms of one or more substances are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ substances.

**Chemical Equations**

* Chemical equations are used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ chemical reactions.

Fe (s) + Cl2 (g) 🡪 FeCl3 (s)

\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

**Symbols Used in Equations**

|  |  |
| --- | --- |
|  | Used to separate two reactants or products |
|  | “Yields” separates reactants from products |
|  | Identifies solid state |
|  | Identifies liquid state |
|  | Identifies gaseous state |
|  | Identifies aqueous state – a substance dissolved in water |

**Balanced equations**

* Chemical equations **MUST** be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to show that the number of atoms in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the same as the number in the \_\_\_\_\_\_\_\_\_\_\_\_\_.

**What goes in MUST \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_!!!**

**How to Balance**

* If you are starting with \_\_\_\_\_\_\_\_\_\_\_, write the equation using \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Example: hydrogen and oxygen gases react to form water. (Hint: diatomics!)

H2 + O2 🡪 H2O

2 hydrogens + 2 oxygens 🡪 2 hydrogens 1 oxygen

Notice that there are two hydrogen atoms on each side however there are two oxygen atoms in the reactants but only one in the products. To balance this we must insert a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

H2 + O2 🡪 \_\_\_\_ H2O

While that evens the number of oxygen atoms – there are now four hydrogen atoms in the products. To balance the hydrogen we go back to the reactants and insert a coefficient.

\_\_\_\_H2 + O2 🡪 2H2O

Now there are equal number of atoms of hydrogen and oxygen on each side of the equation – it is now balanced.

**Types of Reactions**

* There are \_\_\_\_\_\_\_\_\_\_ types of chemical reactions: \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Replacement reactions are sometimes called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ reactions.
* Synthesis reactions are also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ reactions.

Synthesis or Combination

* Synthesis is a reaction in which \_\_\_\_ or \_\_\_\_\_\_ substances react to produce a \_\_\_\_\_\_\_\_\_ product.

A + B 🡪 AB

Na + Cl2 🡪 2NaCl

Decomposition Reactions

* Decomposition reactions occur when a \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ breaks down into \_\_\_\_ or \_\_\_\_\_\_ simpler substances.

AB 🡪 A + B or ABC 🡪 A + BC

2HI 🡪 H2 + I2

2Mg(ClO3)2🡪 2MgCl2 + 3O2

Single-Replacement Reactions

* A reaction in which the atoms of one element \_\_\_\_\_\_\_\_\_ the atoms of another element in a compound.

A + BC 🡪 AC + B

Mg + Zn(NO3)2 🡪 Mg(NO3)2 + Zn

Double-Replacement Reactions

* A reaction involving the \_\_\_\_\_\_\_\_\_\_\_\_ of positive ions between two ionic compounds dissolved in water.

AB + CD 🡪 AD + CB

2NaOH + CuCl2 🡪 2NaCl + Cu(OH)2

Combustion Reactions

* In a combustion reaction, oxygen combines with a substance and releases energy in the form of heat and light.

CH4 + 2O2 🡪 CO2 + 2H2O

\*All hydrocarbons contain carbon and hydrogen and burn in oxygen to yield the same products - CO2 and H2O