**Chemical Reactions Notes**

Chemical Reaction (chemical change) - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of atoms to form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Evidence of a chemical reaction:

|  |  |
| --- | --- |
|  |  |

Chemical Reaction vs. physical change

* To prove a chemical change took place, you have to do a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Properties of a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** must **\_\_\_\_\_\_\_\_\_** from the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

REMEMBER… All changes of state: Solid🡪 Liquid 🡪 Gas Are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Reaction and Energy Changes

* Chemical Reactions either **\_\_\_\_\_\_\_\_\_\_\_\_** or **\_\_\_\_\_\_\_\_\_\_\_\_\_** energy.

Release example:

Absorb example:

**Chemical Equations**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_** are used to represent **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* + Reactants **– \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
  + Products **– \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Arrow always points to the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Word Equations – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Example:

Formula Equations – **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* Example:

Common Symbols in Equations

* → :
* + :
* (s) :
* (l) :
* (g) :
* (aq) : aqueous -
* \_\_\_\_\_\_\_ Reversible
* \_\_\_\_\_\_\_\_\_\_\_\_\_ The element symbol above the arrow indicates a catalyst.
* A catalyst is something that **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** the reaction but is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** during the reaction, so it goes above the arrow.

Law of Conservation of Mass - In chemical changes, mass is neither created nor destroyed

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Reactions Rearrange Atoms

* Product and reactant of reaction are made up of the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and **\_\_\_\_\_\_\_\_\_** of atoms
* The atoms are just **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and connected differently
* To show a reaction satisfies the Law of Conservation of mass, its equation must be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Balancing Chemical Equations**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** – whole numbers written **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of a reactant or product that **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** in that formula

* + Example: H₂O =

2H₂O =

Balancing Chemical Equations Steps







Example: \_\_\_\_Fe2O3 + \_\_\_\_ H2 🡪 \_\_\_\_ Fe + \_\_\_\_H20

Never Change Subscripts to Balance an Equation

What is the Difference between the following equations:

1. H₂ + O₂ 🡪 H₂O 2. H₂ + O₂ 🡪 H₂O₂

* + If you change the subscripts you no longer have the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + The first equation can be balanced by adding \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Never put a coefficient in the \_\_\_\_\_\_\_\_\_\_\_ of a formula. They must go only in \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_ is okay but \_\_\_\_\_\_\_\_\_\_\_\_ is not

Odd—Even Technique - multiplying an odd number by **\_\_\_\_\_** always results in an **\_\_\_\_\_\_\_\_\_\_\_** number

Polyatomic Ions Can Be Balanced as a \_\_\_\_\_\_\_\_ NO₃ SO₄

* Polyatomic Ions appear in \_\_\_\_\_\_\_\_\_ reactants and products \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Polyatomic Ions can be counted as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that appear on both sides of the equation

Classifying Chemical Reactions

Why classify reactions? \_\_\_\_\_\_\_\_\_\_\_

Five main types: synthesis, decomposition, single displacement, double displacement, and combustion,

* + - 1. reaction - two or more substances \_\_\_\_\_\_\_\_\_\_\_\_\_ to form another substance
         1. Generic formula:
         2. Picture:
         3. Example:
         4. 2 or more \_\_\_\_\_\_\_\_\_\_\_\_\_ substances 🡪 one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ substance
         5. When forming a compound, be sure to pay attention to:   
            1)Covalent- the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must be correct  
            2) Ionic- you must get the correct \_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_ each other out
      2. - one substance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into 2 or more other substances
         1. Generic formula:
         2. Picture:
         3. Example:
         4. One \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 2 or more \_\_\_\_\_\_\_\_\_\_\_\_\_ substances
         5. Predicting products:   
            1 ) If made of \_\_\_\_\_\_\_\_\_\_\_\_ compounds, it separates down into each \_\_\_\_\_\_\_\_\_\_\_\_\_  
            2) If made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ compounds, you’ll be given one of the products. The other product comes from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      3. displacement reaction- one element \_\_\_\_\_\_\_\_\_\_\_\_\_\_ another element in a compound
         1. Generic formula:
         2. Picture:
         3. Example
         4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 new element + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         5. Metals will replace other \_\_\_\_\_\_\_\_\_\_\_\_ (and they can also replace \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* K + AlN →
  + - * 1. Think of water as: \_\_\_\_\_\_\_\_\_\_\_\_
* Metals replace the \_\_\_\_\_\_\_\_\_\_\_\_, and then combines with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Na + HOH →
  + - * 1. Predicting products:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - a list of metals from most active to least active

(write these on the back of your periodic table)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or higher on list replaces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or lower on list

* + - 1. displacement reaction - positive \_\_\_\_\_\_ of one compound \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the positive \_\_\_\_\_\_\_of the other
         1. Generic Formula:
         2. Picture:
         3. Example: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         4. 2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪2 new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         5. All Double Replacement Reactions produce either:

Precipitate –

* + - * 1. How do I figure out the identity of the new compounds?

1) \_\_\_\_\_\_\_\_\_\_\_\_\_ the compounds into their \_\_\_\_\_\_\_\_\_\_

2) Switch the places of the \_\_\_\_\_\_\_\_\_\_\_.

3) Match up \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to correctly write the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How to recognize which type?

* Look at the **reactants**:

E + E =

C =

E + C =

C + C =

5. - reaction of a substance with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Generic Formula:
2. Example:
3. If it is combustion of a hydrocarbon, you always get \_\_\_\_\_

* Hydrocarbon -

1. Combustion reactions are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_