Chemical Formulas and Equations Notes

A **chemical formula** is an expression to show how many atoms and molecules there are in a particular substance.

$3H_2O$ ← No subscript? Assume 1

Coefficient: The number of molecules in a chemical formula. (sets) H_2O H_2O H_2O

Subscript: The number of atoms for an element in a chemical formula.

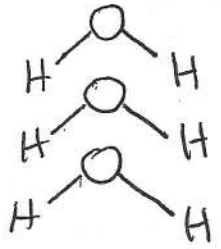
Counting Atoms in $3H_2O$

- Multiply the coefficient by each element's subscript.

H = 3 x 2 = 6

O = 3 x 1 = 3

Drawing $3H_2O$



A **chemical equation** is an expression to show how substances react during a chemical change.

$4Fe + 3O_2 \rightarrow 2Fe_2O_3$

Reactants: starting materials. **Products**: materials you make or end with.

The **Law of Conversation of Matter** states that matter can neither be created nor destroyed.

Unbalanced Equation: an unequal number of atoms for each element on both sides of the equation.
Does not follow the Law of Conservation of Matter (Not Possible!)

Balanced Equation: an equal number of atoms for each element on both sides of the equation.
follows the Law of Conversation of Matter

Example unbalanced: $H_2 + O_2 \rightarrow H_2O$

Step 1: Count the number of atoms for both sides.
Step 2: Add more molecules to the side with less and recount (Until both sides are equal)
Step 3: Count the number of each molecule and add a coefficient in front.

Example balanced: $2H_2 + 1O_2 \rightarrow 2H_2O$

H_2 H_2O

Reactants | Product

$$\_\_ P_4 + \_\_ O_2 \rightarrow \_\_ P_2O_3$$

O_2 + O_2 + O_2 = 6

P_2O_3 + P_2O_3 = 4 6

$$1\,P_4 + 3\,O_2 \rightarrow 2\,P_2O_3$$

$(1 \times 4)\ P = 4$ $(2 \times 2)\ P = 4$

$(3 \times 2)\ O = 6$ $(2 \times 3)\ O = 6$

Reactant | Product

$$CF_4 + \_\_ Br_2 \rightarrow CBr_4 + F_2$$

Br_2 F_2

$$1\,CF_4 + 2\,Br_2 \rightarrow CBr_4 + 2\,F_2$$

1. Divide Equation into Reactant and Product
2. Count Elements and make them equal on both sides to balance them.
3. Double check every element to make sure they are still balanced.
4. Add coefficients to show how many copies you have