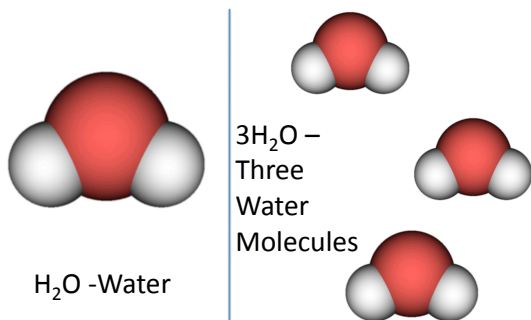


Chemical Formulas and Equations

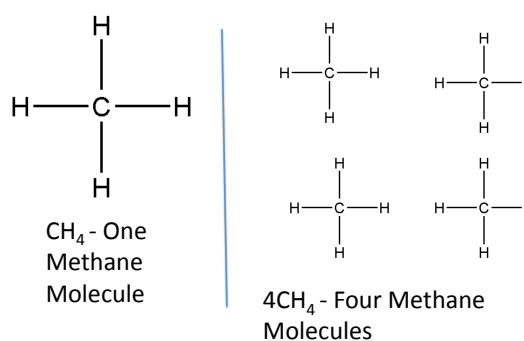
Chemical Formulas

- Chemical Formulas give the ratio of elements in a compound, as well as the number of atoms of each that would be found if one unit of this element or compound were isolated.
- The formula for the elemental form of Sodium is Na. It is found as a metal, and in one unit of this metal there is one sodium atom.
- The formula for the elemental chlorine is Cl_2 . There are 2 chlorine atoms in a single unit of elemental chlorine.

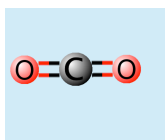
Chemical Formulas- H_2O



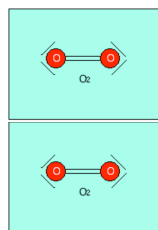
Chemical Formulas- CH_4



Chemical Formula- CO_2 & O_2



CO_2 – One Carbon Dioxide Molecule



2O_2 – 2 Oxygen Molecules

Chemical Formulas

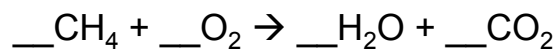
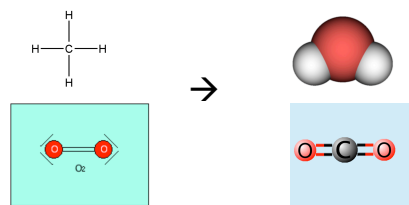
- Formulas use a language of Symbols of the Elements and Subscripts to identify and describe a compound or element.
- They do not tell us about the structure of the molecule. (Are all 4 H connected to the Carbon, or is it H-H-C-H-H ?)
- It does not tell us about the state of the molecule though sometimes a little (g),(s),(l) or (aq) is placed next to one.

Chemical Equations

- Describes a chemical reactions in a minimalist way.
- It tells us what we start with (reactants) and what we end with (products)

$$\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$$
- The reaction is written in terms of the least number of molecules that could possibly react or be produced.

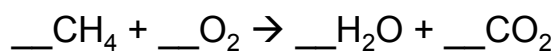
Burning Methane



How many of each kind of molecule must we have?

Balancing this Equation

- We are not creating oxygen atoms
- We are not creating carbon atoms
- We are not creating hydrogen atoms
- And we are not losing any of these either.



What if just 1 methane molecules burned? How many CO₂ would be formed?
How about H₂O? How many O₂ are needed?

Balancing Equations

- The number of atoms of each type of element on the 2 sides must be equal. (Matter can neither be created nor destroyed.)
- The compounds and elements that are reacted and produced cannot change (All subscripts must remain unchanged.)
- All coefficients must be whole numbers greater than 0. (Coefficients are the numbers in front of the formulas.)

Practice with Formulas

- How many of each element are there in these?
- MgO
- MgSO₄
- C₂H₄O₂
- CH₃COOH
- O₂
- S₅

Practice with Equations

- $\underline{\hspace{1cm}} \text{Mg} + \underline{\hspace{1cm}} \text{O}_2 \rightarrow \underline{\hspace{1cm}} \text{MgO}$
- $\underline{\hspace{1cm}} \text{AgNO}_3 + \underline{\hspace{1cm}} \text{NaCl} \rightarrow \underline{\hspace{1cm}} \text{AgCl} + \underline{\hspace{1cm}} \text{NaNO}_3$
- $\underline{\hspace{1cm}} \text{Al} + \text{O}_2 \rightarrow \underline{\hspace{1cm}} \text{Al}_2\text{O}_3$
- $\underline{\hspace{1cm}} \text{Fe}_2\text{O}_3 + \underline{\hspace{1cm}} \text{H}_2\text{SO}_4 \rightarrow \underline{\hspace{1cm}} \text{Fe}_2(\text{SO}_4)_3 + \underline{\hspace{1cm}} \text{H}_2\text{O}$