Chemical Equations

How to write and balance chemical equations

* In a chemical equation, we have both reactants and products.
    * Reactants → Products

* Reactants and products are separated by a → or yield.

* More than one reactant or more than one product is separated by a +
    * Reactant + Reactant → Product + Product
    * Example:
        * $NaOH + HCl \rightarrow NaCl + H_2O$

Example

* states of matter are always written in chemical formulas
  * (s) = solid
  * (g) = gas
  * (ℓ) = liquid
  * (aq) = aqueous

Balancing Equations

Law of Conservation of Mass

* The Law of Conservation of Mass: that mass is neither created nor destroyed in any chemical reaction.

Law of Conservation of Mass

* Because of this principle, equations must be BALANCED.
  * Same number of atoms on each side of the equation.

Steps for Balancing Equations

* 1) Write the skeleton equation:
  * $H_{2(g)} + O_{2(g)} \rightarrow H_2O_{(\ell)}$

Steps for Balancing Equations

* 2) Count the number of atoms on each side

* $H_{2(g)} + O_{2(g)} \rightarrow H_2O_{(\ell)}$

H: 2	H: 2
O: 2	O: 1

Steps for Balancing Equations

* 3) Use coefficients to balance the total number of atoms

* NOTE: You can change the coefficients, not the subscripts.

* $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(\ell)}$

Try these. . .

* $Na_{(s)} + Cl_{2(g)} \rightarrow NaCl$

* $Mg_{(s)} + O_{2(g)} \rightarrow MgO_{(s)}$

Try these . . .

* $2Na_{(s)} + Cl_{2(g)} \rightarrow 2NaCl$

* $2Mg_{(s)} + O_{2(g)} \rightarrow 2MgO_{(s)}$

Now try these . . .

* $ZnS + O_2 \rightarrow ZnO + SO_2$
* $FeS_2 + Cl_2 \rightarrow FeCl_3 + S_2Cl_2$
* $FeCl_3 + MgO \rightarrow Fe_2O_3 + MgCl_2$
* BONUS: $C_5H_{11}NH_2 + O_2 \rightarrow CO_2 + H_2O + NO_2$