

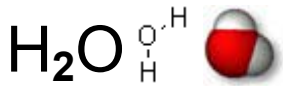
Chemical Equation:

a way to represent chemical reactions on paper.

Equations must be balanced because: Law of Conservation of Matter: Atoms can be neither created nor destroyed in an ordinary chemical reaction, so there must be the same number of atoms on both sides of the equation. **The mass of all the reactants (the substances going into a reaction) must equal the mass of the products (the substances produced by the reaction).**

These numbers are found in a chemical equation:

- **Subscripts**



The small numbers to the lower right of chemical symbols. Subscripts represent the number of atoms of each element in the molecule.

- **Coefficients** $2 \text{C}_2\text{H}_6(\text{g}) + 7 \text{O}_2(\text{g}) \rightarrow 4 \text{CO}_2(\text{g}) + 6 \text{H}_2\text{O}(\text{g})$

The large numbers in front of chemical formulas. Coefficients represent the number of molecules of the substance in the reaction.

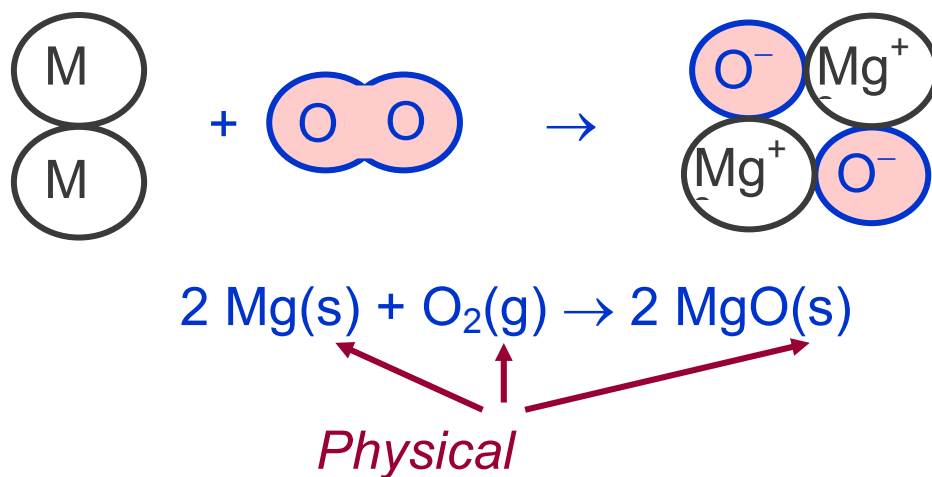
Balancing TIPS:

- ✓ **1. Check for Diatomic Molecules - H_2 - N_2 - O_2 - F_2 - Cl_2 - Br_2 - I_2**
 - If these elements appear **by themselves** in an equation, they **must** be written with the subscript $_2$
- ✓ **2. Balance atoms other than Hydrogen and Oxygen**
- ✓ **3. Balance Hydrogen**
- ✓ **5. Balance Oxygen**
- ✓ **6. Recount All Atoms**
- ✓ Balance equations by changing **coefficients never** by changing **subscripts**
 - If the atoms are not balanced at this point, there is a problem somewhere. Work your way back up the steps, **from bottom to top**, until you find the problem, and correct it.
- ✓ **7. If every coefficient will reduce, rewrite in the simplest whole-number ratio.**

An equation is not properly balanced if the coefficients are not written in their lowest whole-number ratio.

Balancing Equations

A balanced chemical equation has the same type and number of atoms in the reactants as in the products.



1. $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
2. $\text{CO} + \text{O}_2 \rightarrow \text{CO}_2$
3. $\text{H}_2 + \text{Br}_2 \rightarrow \text{HBr}$
4. $\text{K} + \text{H}_2\text{O} \rightarrow \text{KOH} + \text{H}_2$
5. $\text{Zn} + \text{AgCl} \rightarrow \text{ZnCl}_2 + \text{Ag}$
6. $\text{S}_8 + \text{O}_2 \rightarrow \text{SO}_2$
7. $\text{KOH} + \text{H}_3\text{PO}_4 \rightarrow \text{K}_3\text{PO}_4 + \text{H}_2\text{O}$
8. $\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$
9. $\text{Eu} + \text{HF} \rightarrow \text{EuF}_3 + \text{H}_2$
10. $\text{Al}(\text{OH})_3 + \text{HCl} \rightarrow \text{H}_2\text{O} + \text{AlCl}_3$

