

# Chemical Reactions

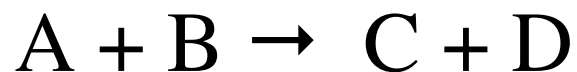
A chemical reaction is a change in the composition of compounds.

A chemical equation is the symbolic story of the chemical reaction.

A chemical equation uses formulas and symbols to describe the change.

**A balanced chemical equation describes the mole ratios of the formulas in the equation.**

# Players in Reactions



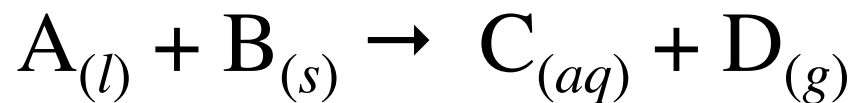
Chemicals on the left side (A & B) of the reaction are reactants.

Chemicals on the right side (C & D) of the reaction are products.

The arrow  $\rightarrow$  indicates the direction of the reaction and separates the reactants and products.

Other symbols tell us additional information about the reaction.

# Symbols in Reactions



$(l)$   $\Rightarrow$  liquid

$(s)$   $\Rightarrow$  solid, sometimes represented by (cr)

$(aq)$   $\Rightarrow$  in water solution

$(g)$   $\Rightarrow$  gas

# Coefficients

Small whole numbers placed in front of the formulas used to balance the reaction are called coefficients.

**The coefficients of a balanced equation are the mole ratios of the substances in the reaction.**



2 moles of solid potassium chlorate decompose to form 2 moles of solid potassium chloride and 3 moles of oxygen gas.

# Balancing Chemical Reactions

Steps to writing balanced chemical reactions:

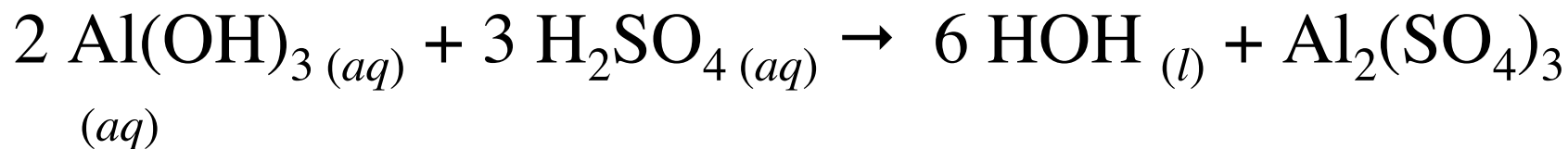
1. Write correct formulas for reactants and products.
2. Do NOT change the formulas.
3. Obey the law of conservation of matter - place coefficients in front of formulas so that the number of each kind of element is the same on the left side as on the right.
4. Do NOT change the formulas.

# Sample Reactions

Aqueous sodium carbonate reacts with aqueous calcium chloride to form aqueous sodium chloride and solid calcium carbonate.

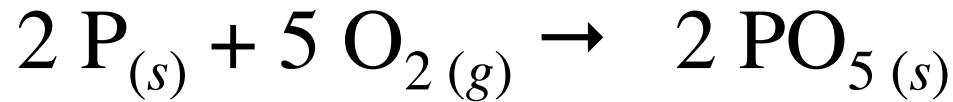


Aqueous aluminum hydroxide reacts with aqueous sulfuric acid (hydrogen sulfate) to produce liquid water and aqueous aluminum sulfate.



# Examples

Solid phosphorous reacts with oxygen to produce solid phosphorous pentoxide.



Zinc metal reacts with sulfuric acid (hydrogen sulfate in water solution) to produce solid zinc sulfate and hydrogen gas.

