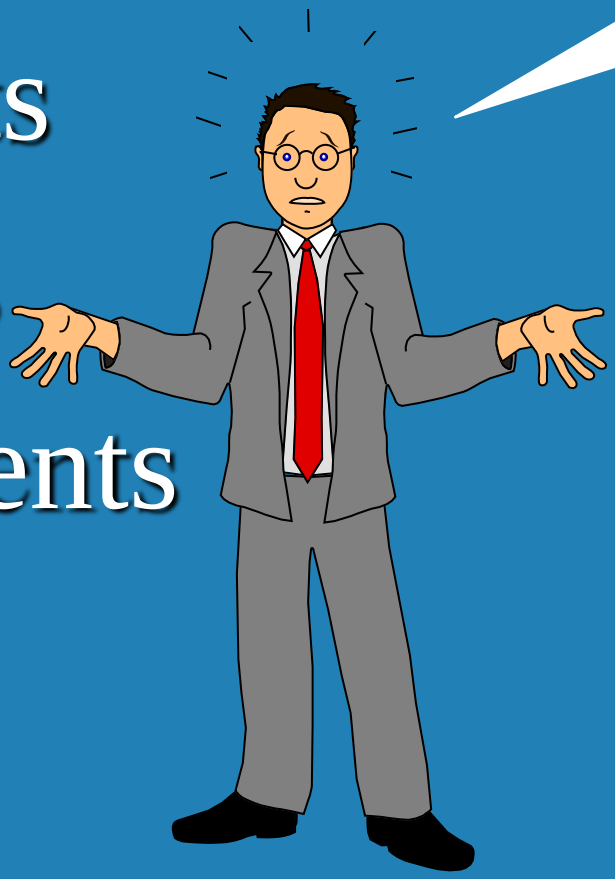
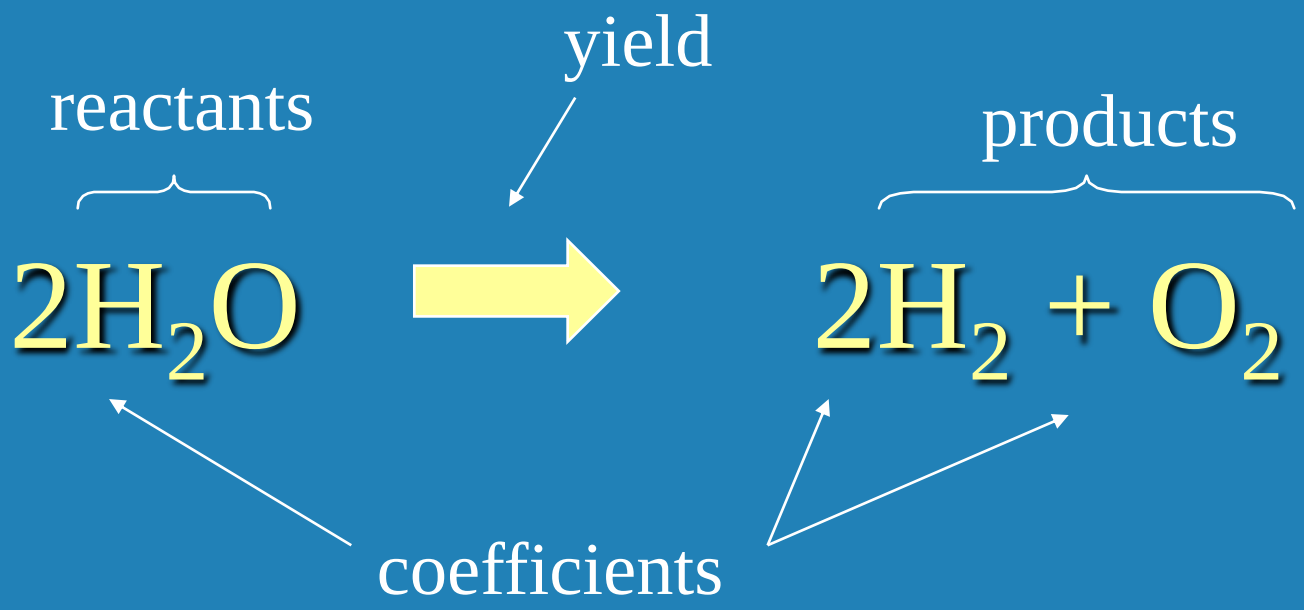
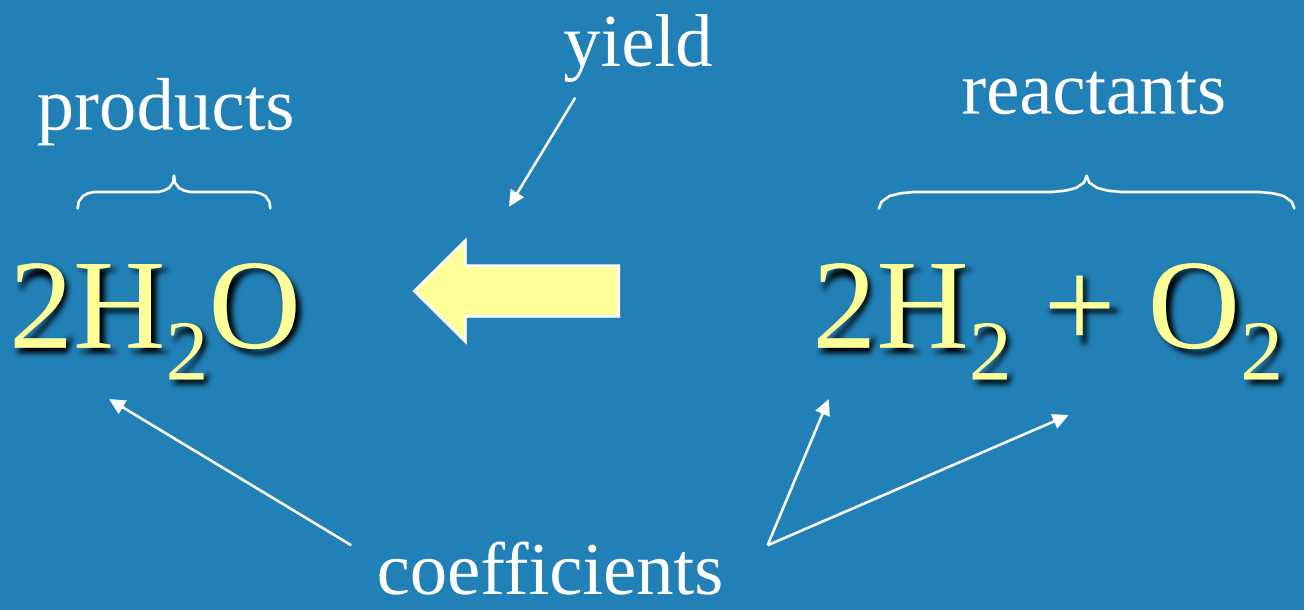
CHEMICAL EQUATIONS

Chemical Equations

- Reactants
- Products
- Coefficients




reactants
yield
products
2H2O
2H2 + O2
coefficients


products
yield
reactants
2H2O
2H2 + O2
coefficients

Balanced Chemical Equations

Law of Conservation of Matter


Na2S + 2HCl → 2NaCl + H2S

CLASSIFICATION OF CHEMICAL COMPOUNDS

- Salts
- Acids & Bases
- Electrolytes
- Polymers

Salts

- Contains a metallic ion
- Contains a nonmetallic or polyatomic ion

Acids & Bases

- Bronsted Acid
  - A species which donates protons
- Bronsted Base
  - A proton accepting species
- Lewis Acid
  - An electron pair accepting species
- Lewis Base
  - A species which donates an electron pair

Electrolytes & Nonelectrolytes

- compounds which conduct an electric current in solution
  - Strong electrolytes
  - Weak electrolytes
  - Nonelectrolytes

}

POLYMERS

- Very large molecules
- Composed of many small units
  - monomers

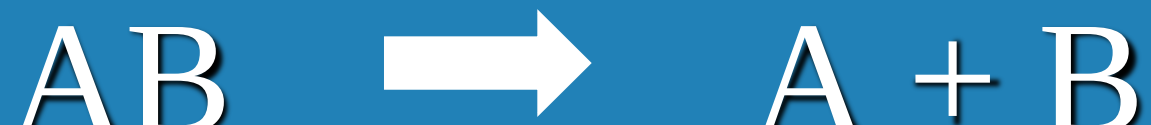
CLASSIFICATION OF CHEMICAL REACTIONS

Types of Reactions

- Composition
- Decomposition
- Metathesis
- Replacement

Composition Reactions

Decomposition Reactions



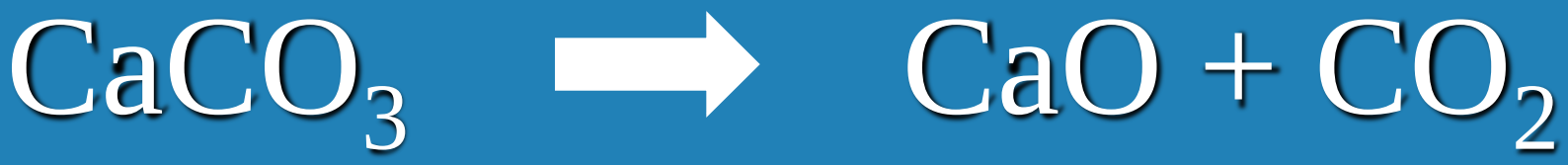
(a) Binary Compounds

Decompose into their component elements


2HgO
2Hg + O2(g)

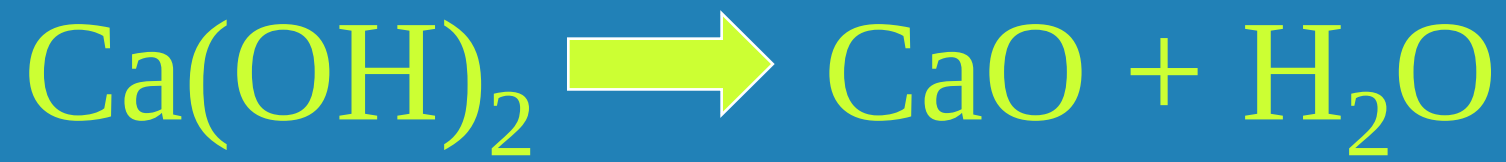
(b) Metallic Carbonates

Decompose into metallic oxides and carbon dioxide


$CaCO_3$
$CaO + CO_2$

(c) Metallic Hydroxides

Decompose into metallic oxides and water


Ca(OH)2
CaO + H2O

(d) Metallic Chlorates

Decompose into metallic chlorides and oxygen


2KClO3
2KCl + 3O2

(e) Acids

Decompose into nonmetallic oxides and water


H_2CO_3
$CO_2(g) + H_2O$

Metathesis Reactions

One product of a metathesis reaction will be:

- **Percipitates**
- **Gases**
- **Electrolytes**

Replacement Reactions

- More active halogens replace less active halogens
  - activity decreases down the family
- More active metals replace less active metals
  - activity increases down the family

Redox Reactions

Oxidation-Reduction Reactions

or

Combustion Reactions


2Na + Cl2 2NaCl

- Na is the reducing agent
- Cl is the oxidizing agent

Acid-Base Neutralization

- A special case of metathesis reaction
- The products are a salt and water


HCl + NaOH
NaCl + H2O

$$2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$$

Reversible Reactions

- Occur in both directions simultaneously
- Establish equilibrium
- Dependent on the concentration of all substances


$PCl_5 \Longleftrightarrow PCl_3 + Cl_2$


STOP