Chemical Formulas and Equations

Objectives

- **Interpret** and write simple chemical formulas.
- **Write** and balance simple chemical equations.
- **Explain** how a balanced equation shows the law of conservation of mass.

I. Chemical Formulas

A. Writing Formulas for Covalent Compounds If you know the name of the covalent compound, you can often write the chemical formula for that compound. Covalent compounds are usually composed of two nonmetals. The names of many covalent compounds use prefixes. The prefixes tell you how many atoms of each element are in a formula.

Write the chemical formulas.

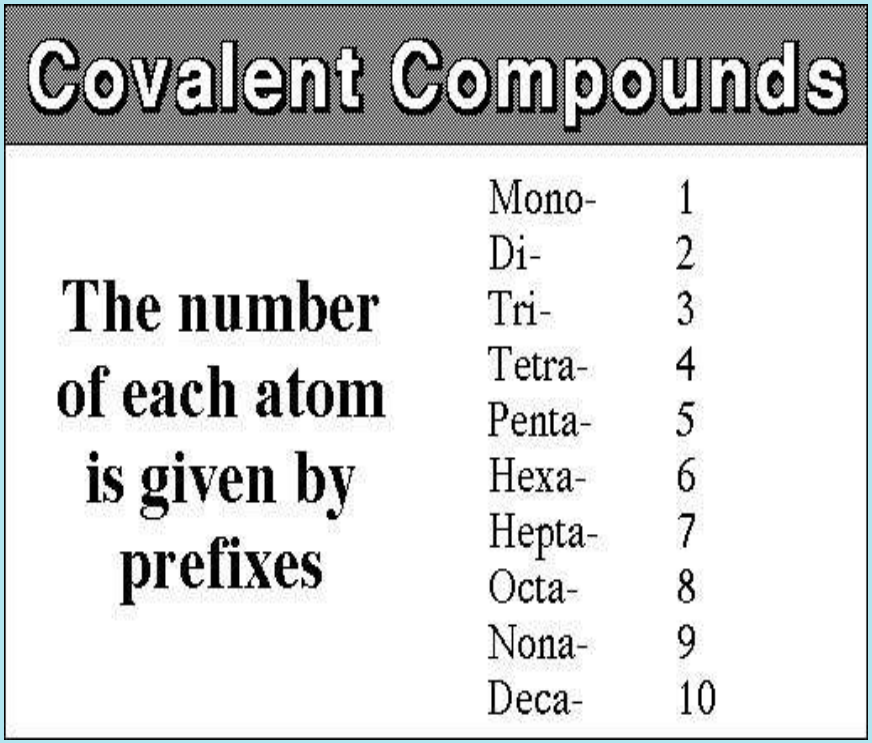
Covalent Compounds

The number of each atom is given by prefixes

Mono-	1
Di-	2
Tri-	3
Tetra-	4
Penta-	5
Hexa-	6
Hepta-	7
Octa-	8
Nona-	9
Deca-	10

- Dinitrogen monoxide
- Carbon tetrachloride
- Oxygen difluoride
- Sulfur trioxide
- Phosphorous pentachloride
- Dinitrogen tetraoxide
- Diphosphorus pentasulfide
- Tetraphosphorus decaoxide
- Sulfur hexafluoride

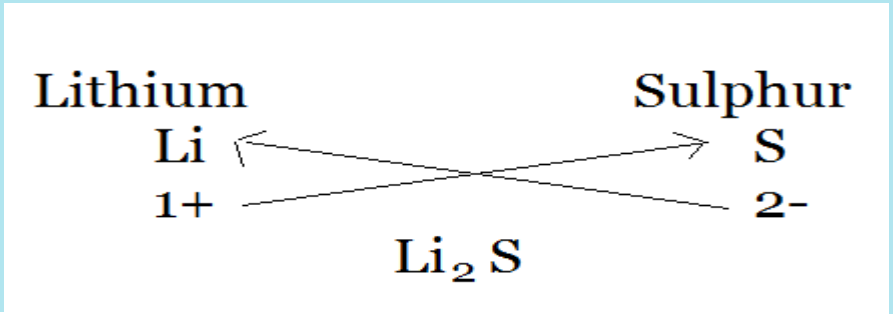
Write the name of the covalent compounds.

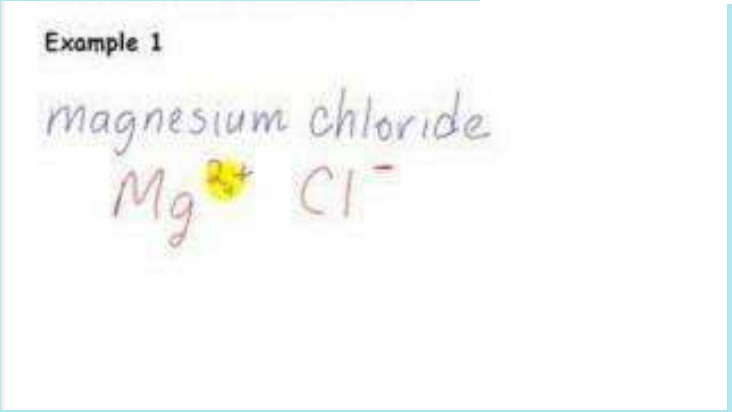


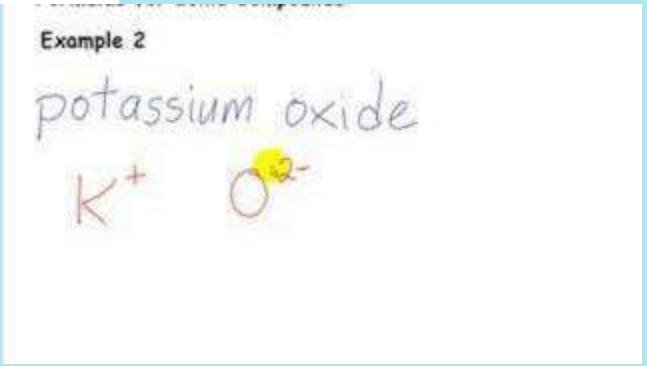
- P_4S_5
- Si_2Br_6
- SCl_4
- B_2Si
- NF_3
- SeF_6

I. Chemical Formulas

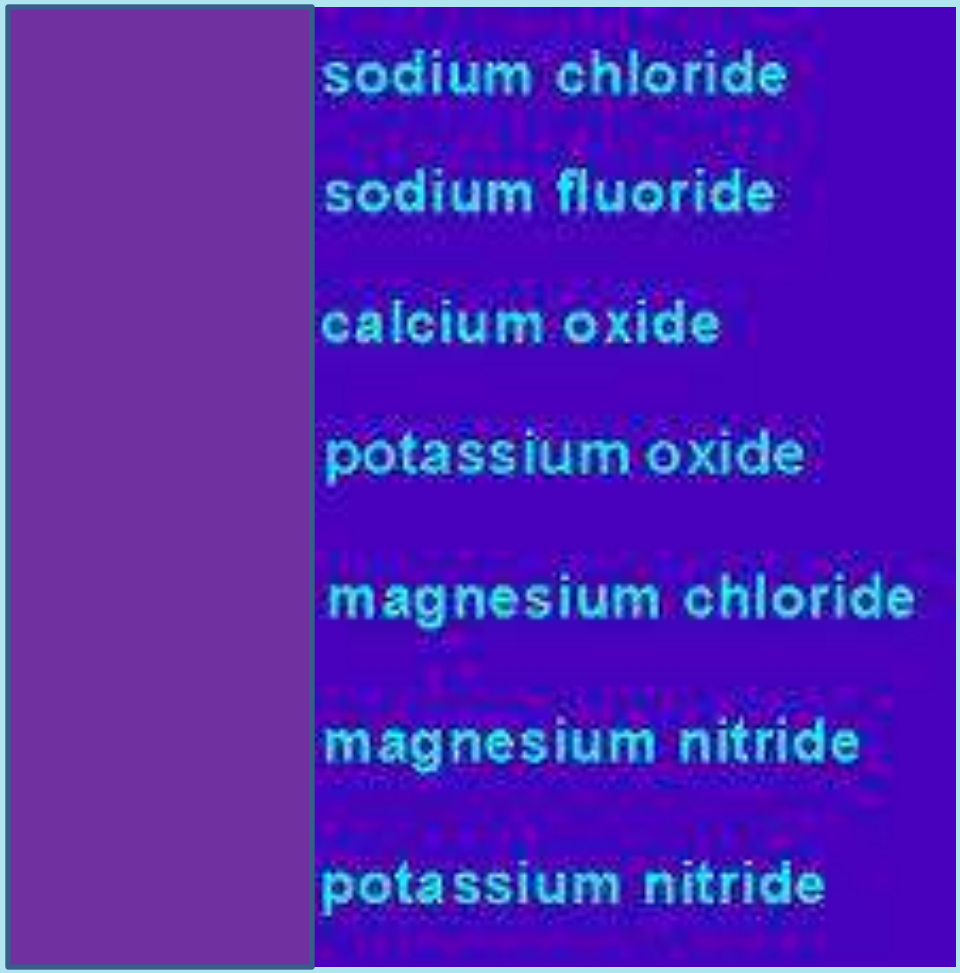
B. **Writing Formulas for Ionic Compounds** If the name of a compound contains the name of a metal and the name of a nonmetal, the compound is ionic. An ionic compound's charge is 0. Therefore, the formula must have subscripts that cause the charges of the ions to cancel out.







Write the formulas for the following ionic compounds.



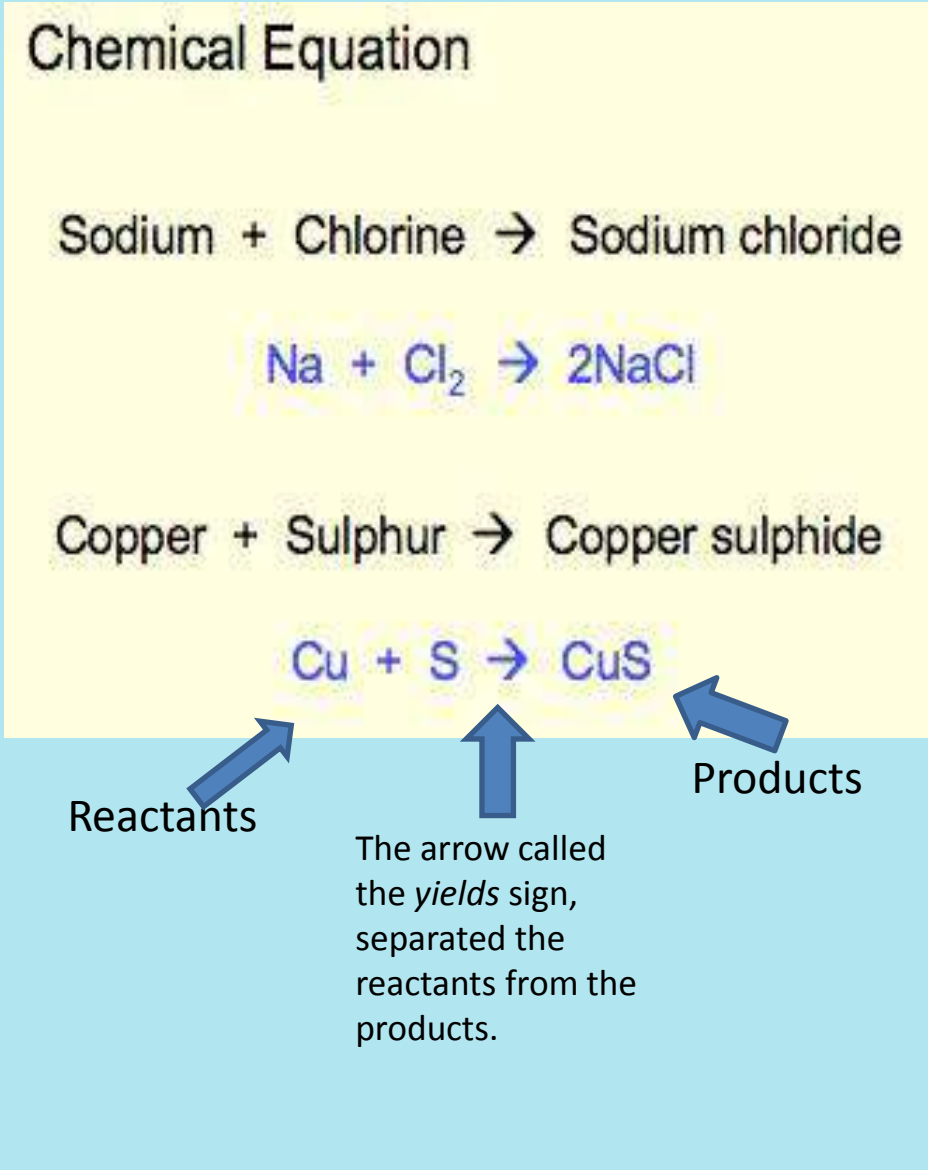
- NaCl
- NaF
- CaO
- K_2O
- $MgCl_2$
- Mg_3N_2
- K_3N

II. Chemical Equations

A. Describing Reactions by Using Equations A chemical equation uses chemical symbols and formulas as a shortcut to describe a chemical reaction.

B. **From Reactants to Products** The starting materials in a chemical reaction are reactants. The substances formed from a reaction are products.

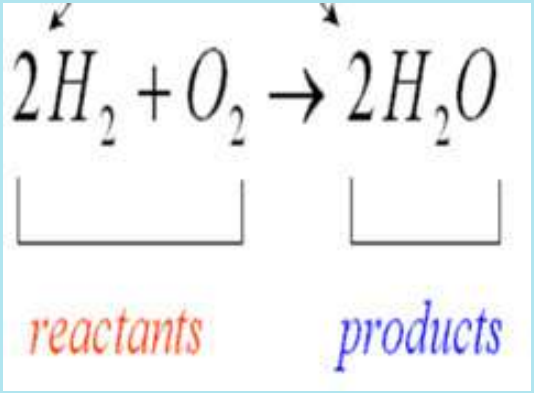
C. **The Importance of Accuracy** An equation that has the wrong chemical symbol or formula will not correctly describe the reaction.



II. Chemical Equations

D. The Reason Equations Must Be Balanced The law of conservation of mass states that mass is neither created nor destroyed in ordinary chemical and physical changes.

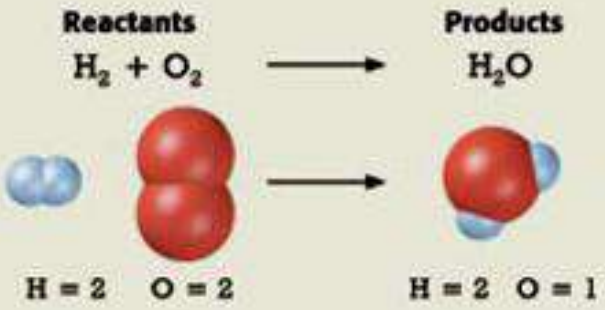
E. **How to Balance an Equation** To balance an equation, you must use coefficients. A coefficient is a number that is placed in front of a chemical symbol or formula.



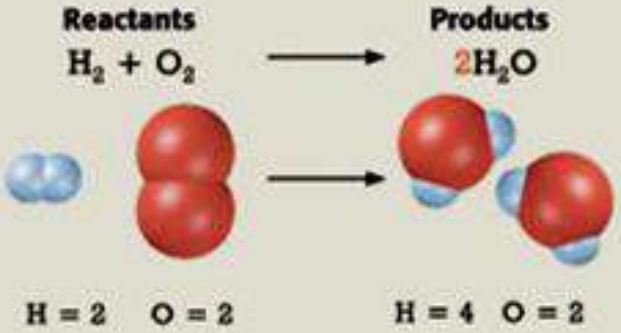
Balancing a Chemical Equation

Follow these steps to write a balanced equation for $H_2 + O_2 \longrightarrow H_2O$.

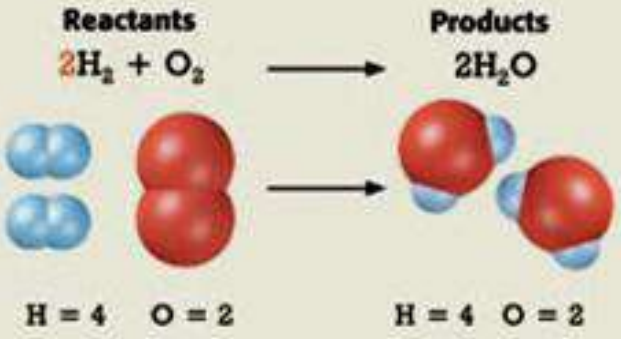
1. **Count the atoms** of each element in the reactants and in the products. You can see that there are fewer oxygen atoms in the product than in the reactants.



2. **To balance the oxygen atoms,** place the coefficient 2 in front of H_2O. Doing so gives you two oxygen atoms in both the reactants and the products. But now there are too few hydrogen atoms in the reactants.



3. **To balance the hydrogen atoms,** place the coefficient 2 in front of H_2. But to be sure that your answer is correct, always double-check your work!



Steps for balancing chemical equations

- Step 1: Balance all atoms other than oxygen and hydrogen.
- Step 2: Balance all oxygen.
- Step 3: Balance hydrogen.

Balancing Chemical Equations Game

- http://funbasedlearning.com/chemistry/chemBalancer/default.htm