Balancing Equations
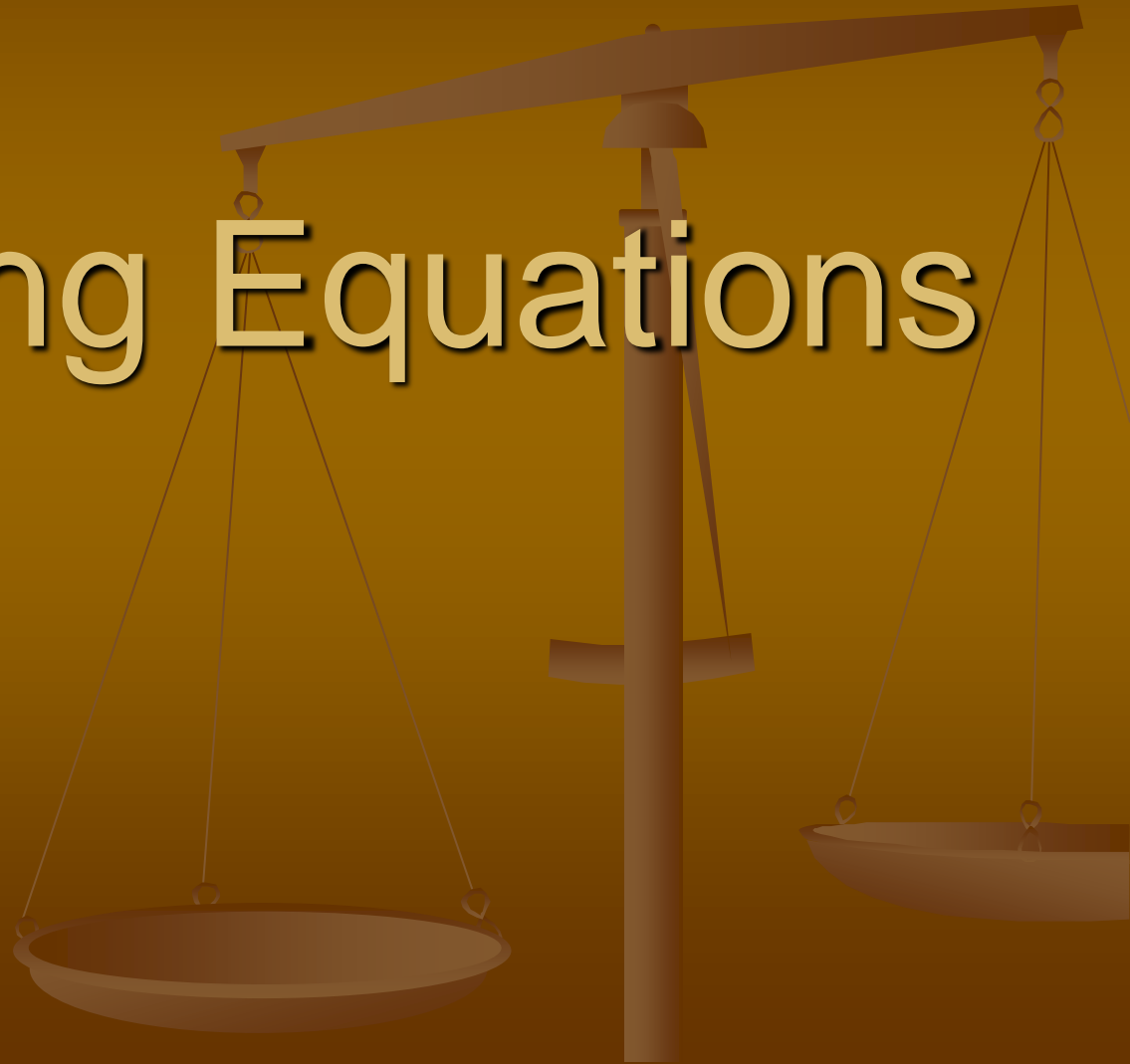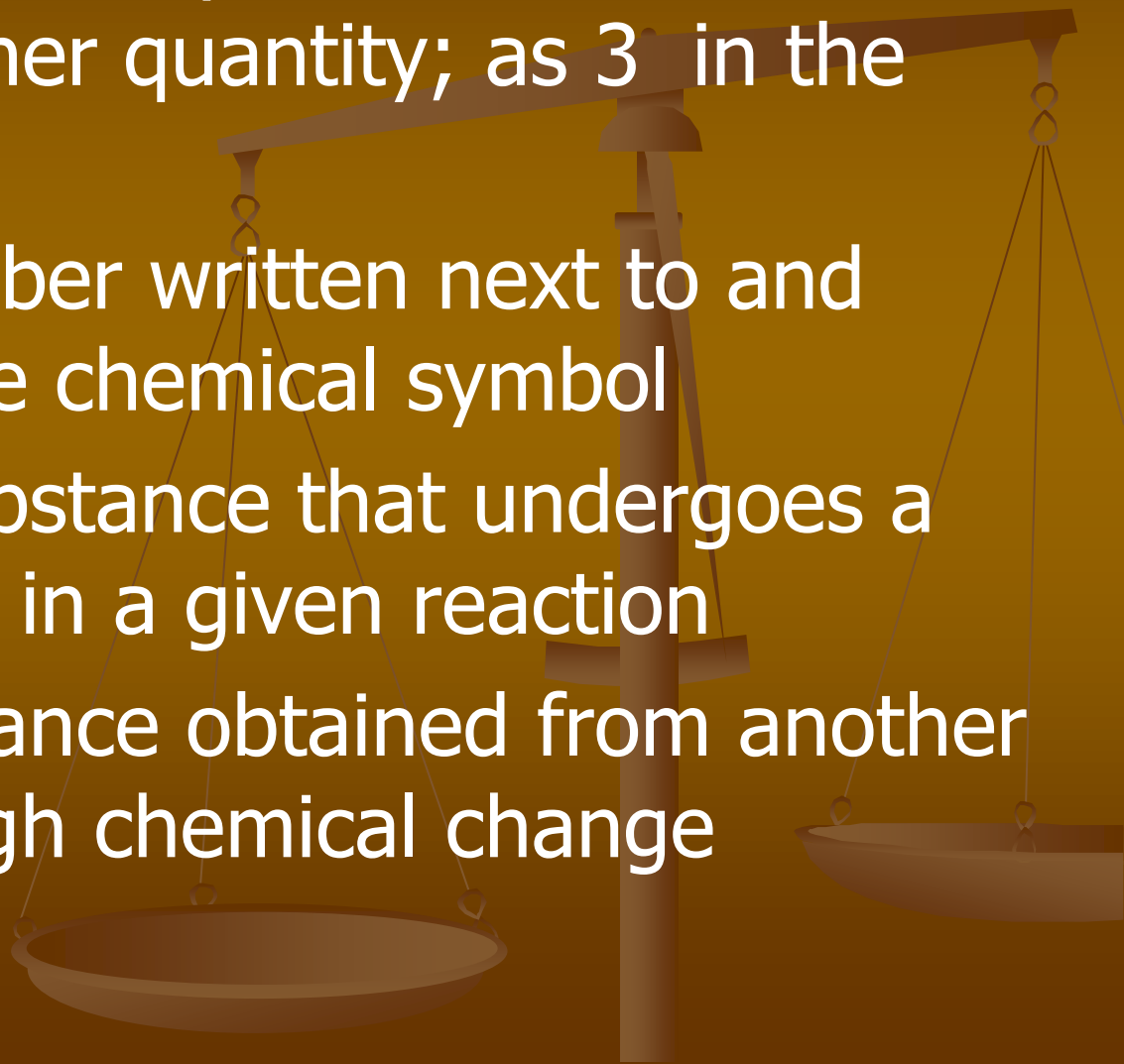
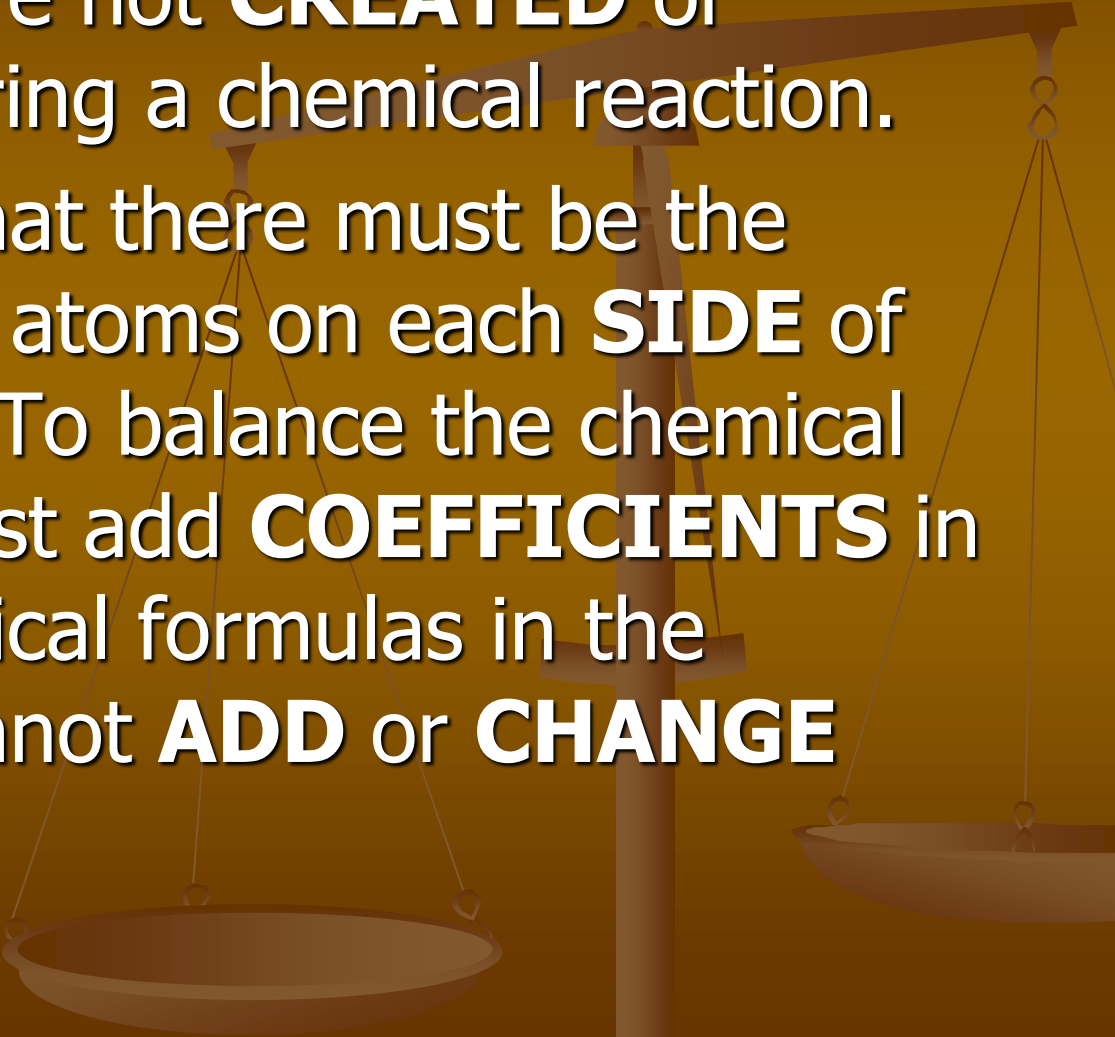# Vocabulary

- coefficient: a number placed before **and** multiplying another quantity; as 3 in the expression 3x

- subscript: a number written next to and slightly below the chemical symbol

- reactant: any substance that undergoes a chemical change in a given reaction

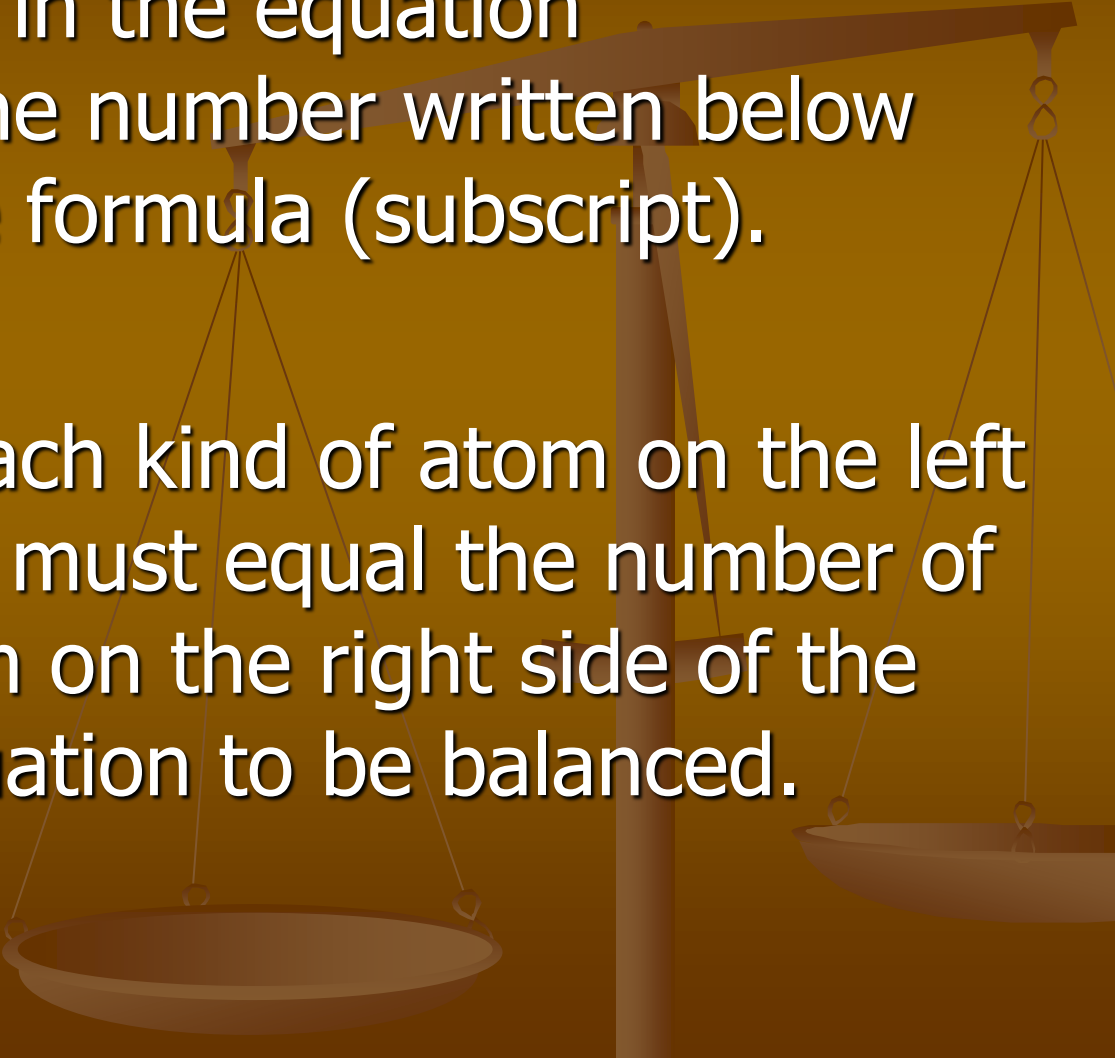- product: a substance obtained from another substance through chemical change

Law of Conservation of Matter

- Atoms (matter) are not **CREATED** or **DESTROYED** during a chemical reaction.

- Scientists know that there must be the **SAME** number of atoms on each **SIDE** of the **EQUATION**. To balance the chemical equation, you must add **COEFFICIENTS** in front of the chemical formulas in the equation. You cannot **ADD** or **CHANGE** subscripts!
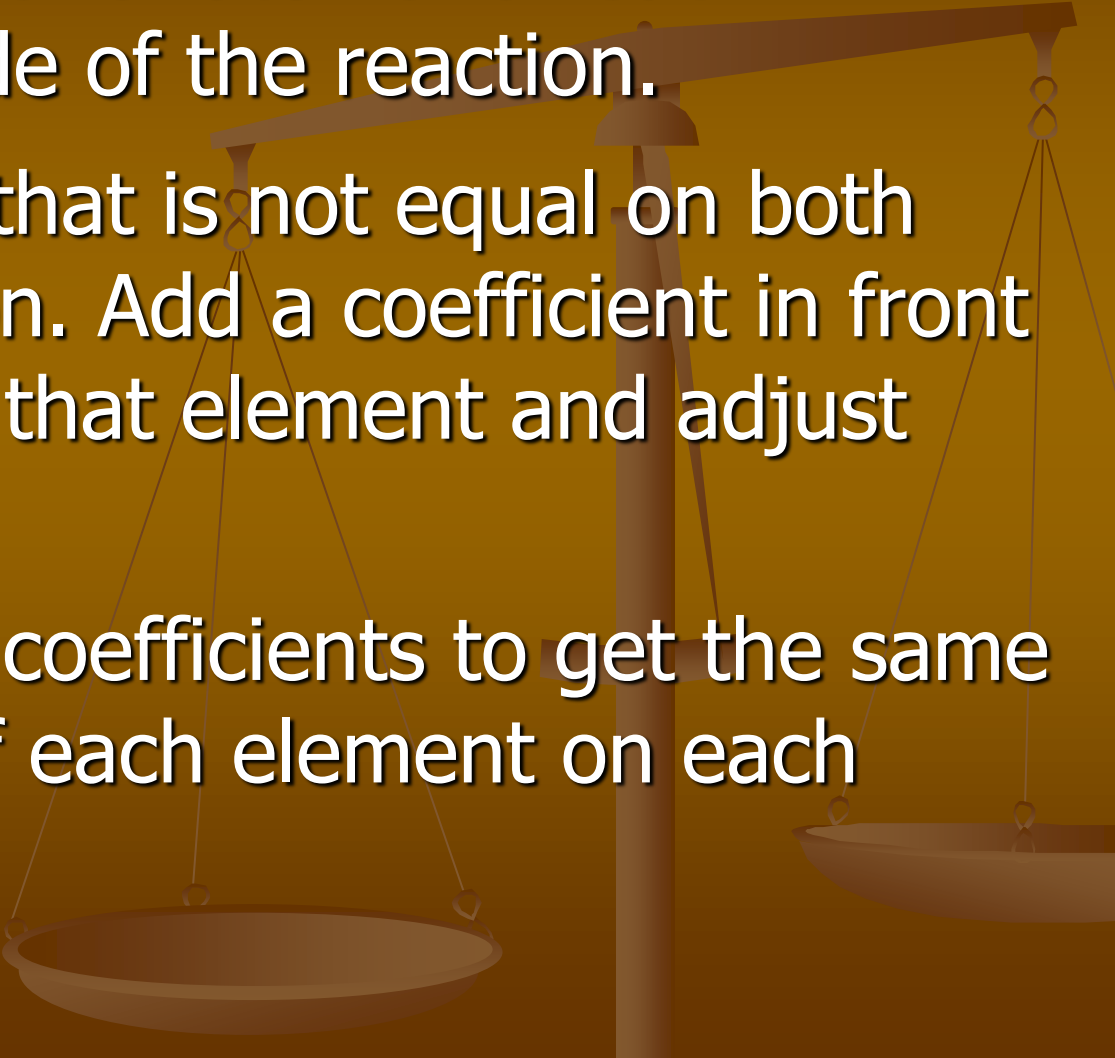
Balanced Chemical Equation

- A balanced chemical equation has the same number of each kind of atom on the reactant side as on the product side.

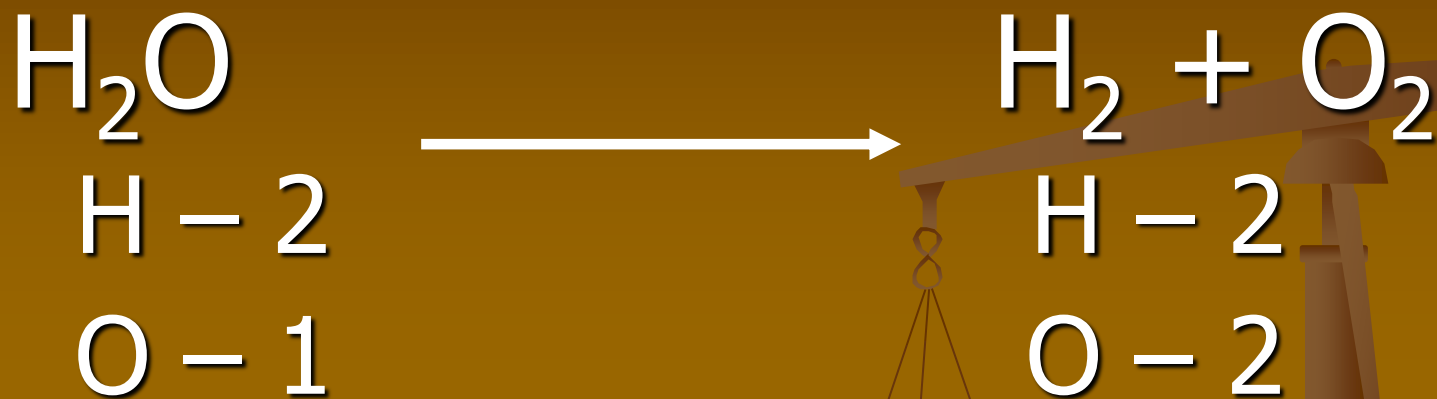- You must look at the subscript and the coefficient to balance an equation.

$$2H_2O \longrightarrow 2H_2 + O_2$$

- In order to determine whether an equation is balanced, multiply the number in front of the chemical formula in the equation (coefficient) by the number written below the symbol in the formula (subscript).

- The number of each kind of atom on the left side of the arrow must equal the number of each kind of atom on the right side of the arrow for the equation to be balanced.

Steps to Balance Equations

1) Determine number of atoms for each element on each side of the reaction.

2) Pick an element that is not equal on both sides of the equation. Add a coefficient in front of the formula with that element and adjust your counts.

3) Continue adding coefficients to get the same number of atoms of each element on each side.

EXAMPLE

Not Balanced:

$H_2O \longrightarrow H_2 + O_2$

H – 2   H – 2

O – 1   O – 2

Balanced:

$2H_2O \longrightarrow 2H_2 + O_2$

H – 4   H – 4

O – 2   O – 2