

## Law of Conservation of Matter

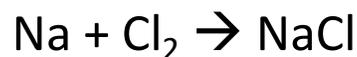
In a **chemical reaction** the number of atoms on both sides of a reaction must be the same (*balanced*). Atoms can neither be created or destroyed in a reaction process.

### Balancing Chemical Reactions

The process of adding *coefficients*, a whole number that multiplies the number of atoms on the reactant, product, or both sides of a chemical reaction to make atoms numbers equal

#### Reaction Balancing Example

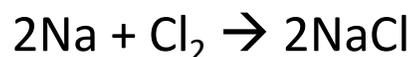
*Unbalanced Reaction*



$$\text{Na} = 1 \qquad \text{Na} = 1$$

$$\text{Cl} = 2 \qquad \text{Cl} = 1$$

*Balanced Reaction*



$$\text{Na} = 2 \times 1 = 2 \qquad \text{Na} = 2 \times 1 = 2$$

$$\text{Cl} = 2 \qquad \text{Cl} = 2 \times 1 = 2$$

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## Reaction Balancing Ratios

Balancing chemical reactions relies on ratios of atoms, modified by *coefficients* in front of an atom, compound, or molecule.

### Balancing Ratio Coefficient Chart

Ratio	Coeff								
1:1	1-1	1:2	2-1	2:4	2-1	4:3	3-4	3:6	2-1
2:2	1-1	2:1	1-2	4:2	1-2	3:4	4:3	6:3	1-2
3:3	1-1	1:3	3-1	2:3	3-2	2:6	3-1		
4:4	1-1	3:1	1-3	3:2	2-3	6:2	1-3		

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