

Balancing Chemical Equations

Learn to balance chemical equations.

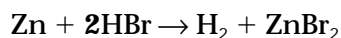
A **chemical equation** is an easy way to represent a chemical reaction—it shows you which elements react together and what the resulting products will be. In the equation, the reactants are on the left side of the arrow, and the products are on the right side of the arrow. A balanced chemical equation has an equal number of atoms of each element in the reactants and the products.

PROCEDURE: To balance a chemical reaction, count the number of atoms of each element in both the reactants and the products. Then determine the numbers that, when multiplied by the number of atoms in the reactants or products, will make the number of atoms on either side of the arrow equal. These numbers are known as *coefficients*. Next check the equation by counting the number of atoms in the reactants and the products. If the equation is balanced, the number of atoms on each side will be the same.

SAMPLE PROBLEM: $\text{Zn} + \text{HBr} \rightarrow \text{H}_2 + \text{ZnBr}_2$

Step 1: Count the number of atoms of each element in the reactants and in the products.

Step 2: Determine the number that, when multiplied by the one or more atoms in the reactants or products, will make the number of atoms on either side of the arrow equal. Because we have two H atoms and two Br atoms in the product, we can multiply the reactant HBr by a coefficient of 2, as follows:



Step 3: Check the equation by counting the number of atoms of each element on each side of the equation. Because there are the same number of atoms of each element in the reactants and the products, you know the equation is balanced.

Step 1

Reactants	Products
1 Zn	1 Zn
1 H	2 H
1 Br	2 Br

Step 3

Reactants	Products
1 Zn	1 Zn
2 H	2 H
2 Br	2 Br

A Balancing Act

Balance the following chemical equations:

- $\text{Na} + \text{Cl}_2 \rightarrow \text{NaCl}$ _____
- $\text{Ca} + \text{Cl}_2 \rightarrow \text{CaCl}_2$ _____
- $\text{H}_2\text{O} \rightarrow \text{H}_2 + \text{O}_2$ _____
- $\text{Cu} + \text{AgCl} \rightarrow \text{Ag} + \text{CuCl}_2$ _____
- $\text{FeCl}_2 + \text{K}_2\text{S} \rightarrow \text{FeS} + \text{KCl}$ _____