• For solids, the symbol is “(s)”.
• For liquids, it is “(l)”.
• For gases, it is “(g)”.
• For aqueous solutions, it is “(aq)”.
• For gas produced in the reaction, it is represented by “(↑)”.
• For precipitate formed in the reaction, it is represented by “(↓)”.

Balancing of Chemical Reactions

Law of Conservation of mass

According to the law of conservation of mass, no atoms can be created or destroyed in a chemical reaction, so the number of atoms for each element in the reactants side has to balance the number of atoms that are present in the products side.
In other words, the total mass of the products formed in a chemical reaction is equal to the total mass of the reactants participated in a chemical reaction.

Balanced chemical equation

The chemical equation in which the number of atoms of each element in the reactants side is equal to that of the products side is called a balanced chemical equation.

Steps for balancing chemical equations

The changes that occur during a chemical reaction are represented by a chemical equation.

Reactants → Products.

The equilibrium of all chemical equations must be maintained. This means that on both sides of the arrow, the number of each sort of atom must be the same.

Chemical equations are balanced using coefficients. A coefficient is a numerical value that is added to the front of a chemical symbol or formula. It indicates the number of atoms or molecules of the material involved in the process.

Place coefficients in front of symbols or formulas as needed to balance a chemical equation so that the same number of each type of atom appears in both reactants and products.

For example,

$Zn + HCl \rightarrow ZnCl_2 + H_2$

Balanced Equation is

$Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Hit and trial method: While balancing the equation, change the coefficients (the numbers in front of the compound or molecule) so that the number of atoms of each element is same on each side of the chemical equation.

Shout-cut technique for balancing a chemical equations

Example :

$a CaCO_3 + b H_3PO_4 \rightarrow c Ca_3(PO_4)_2 + d H_2CO_3$

Set up a series of simultaneous equations, one for each element.