Language of Chemistry

1. **What is Symbol?**
   Ans. The short form or the abbreviation used to denote and element is called symbol.
   It represents
   a. One atom of an element
   b. Its atomic weight.

2. **How can we represent Symbol?**
   Ans. We can represent symbol in the following ways
   a. Each element is denoted by, symbol which is usually the first letter of its name in English or Latin (Written in Capital).
      Ex: Oxygen is an element. It is denoted by the symbol "O".
   b. When the first letter of more than one element is the same, the symbol is denoted by two letters. The first letter is written in capital while the second is written in small letter.
      Carbon, cobalt, are the elements whose first letter is 'C'.
      Carbon is denoted by the symbol 'C'.
      Cobalt is denoted by two letters 'Co'.
   c. These symbols represent an atom of that element.
      Ex: 'C' represents the element carbon as well as one atom of carbon.
   d. Some symbols have been taken from the names of elements in Latin, German or Greek.
      Ex. The symbol of iron is Fe from its Latin name Ferrum.

3. **What is Valency?**
   Ans. Valency is the combining capacity of an element.

4. **How can we determine the valency of metal?**
   Ans. Valency of a metal is the number of electrons lost by an atom of it during the formation of a compound.
   Ex: Valency of Potassium is +1

5. **How can we determine valency of non-metal?**
   Ans. Valency of non-metal is the number of electrons gained by an atom of it during the formation of a compound.
   Ex. Valency of Chlorine is -1

6. **What is Variable Valency?**
   Ans. Certain elements exhibits more than one valency in different compounds. These elements are said to possess variable valency.
   A suffix 'Ous' is added at the end of the name of the metal showing lower valency and 'ic' is added at the end of the name of the metal showing higher valency.
   Ex: Iron (Fe)
   Valency: 2 (Ferrous)
   3 (Ferric)

7. **What is Radical?**
   Ans. Radical is an atom or group of atoms of different elements that behaves as a single unit with a positive or negative charge.
   Radicals are two types:
   a. Acid Radical
   b. Base Radical

8. **What is Acid Radical?**
   Ans. The negative charged radicals are called Acid Radicals or Anions.
   Non-metallic atoms with a negative charge are acid-radical.
   Ex: Cl^{-1}, OH^{-1}

9. **What is Base Radical?**
   Ans. The positive charged radicals are called basic radicals or Cations.
   All the metallic cations and some groups of Non-metallic atoms are Base Radical.
   Ex: Na^{+1}, Mg^{+2}

10. **What is molecular formula of a compound?**
    Ans. A molecular formula of a compound is the symbolic representation of its (one) molecule. It shows the number of atoms of each element present in it. These atoms combine in whole numbers to form the molecule.
    Ex: A molecule of sulphur dioxide gas is represented as SO_2. It indicates t hat one molecule of $S0_2$ is formed by one atom of element sulphur and two atoms of Oxygen.

11. **What is Chemical Formula?**
    Ans. Chemical formula is the representation of a compound by the symbols of its constituent elements with their number of atoms present in it.

12. **What is the significance of a Chemical Formula?**
    Ans. The significance of a Chemical Formula are
    a. It represents one molecule of a compound.
    b. The number of each kind of atoms present, i.e. what atoms are present in one molecule of a compound and in what ratio.
    c. The mass of one molecule of the compound can be calculated if the atomic mass of each atom present in the molecule is known. Molecular mass is the algebraic sum of the masses of all the atoms present in a given molecule.

13. **What is the process to write chemical formula?**
    Ans. The steps which are involved to write the chemical formula of a compound are:
    Step 1: Write the symbols of the elements
    Step 2: Write the valences of these elements
    Step 3: Now criss-cross or interchange the valences of these positive and negative ions but ignore their (+) and (-) sign.
    Step 4: Write the interchanged valency but ignore base number 1.

14. Write the Chemical Formula of Aluminium Carbonate.

Ans. The steps to write Chemical Formula of Aluminium Carbonate are

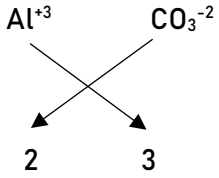
1. Write the symbols

   Al (Positive Ion) CO_3 (Negative Ion)

2. Write the valency of ions

   Al^{+3} CO_3^{-2}

3. Now interchange the valences of these ions but ignore their signs.



4. There is no common faction between two valences 2 and 3, then write the chemical formula as follows

   $Al_2(CO_3)_3$

15. What is Chemical Equation?

Ans. A chemical equation is the symbolic representation of a chemical reaction using symbols and formulae of the substances involved in the reaction.

16. What are Reactants and Products?

Ans. The substances that are used as the starting material and which react with one another are called reactants and
The substances which are formed as a result of the reaction are called products.
Ex: Burning of coal in air is a chemical reaction in which a new substance, carbon dioxide is formed.

17. Which information we receive from a chemical reaction?

Ans. A chemical equation gives the essential information about a chemical reaction, specifically:

- The nature of the reactants (chemicals reacting together) and products (chemicals produced)
- The quantities of reactants and products
- The physical state of the reactants and products (E.g. solid, liquid, gas, aqueous).

18. What is the process to write any chemical reaction?

Ans. The following steps are needed to write chemical reaction

- In a chemical equation, the reactants are written on the left, and the products are written on the right.
- The coefficients next to the symbols of entities indicate the number of moles of a substance produced or used in the chemical reaction.
- The reactants and products are separated by an arrow, usually read aloud as "yields."
- Chemical equations should contain information about the state properties of products and reactants, whether aqueous (dissolved in water — aq), solid (s), liquid (l), or gas (g).

19. Write an example of Conversion of Word Equation to Chemical Equation

Ans. In a precipitation reaction, sodium hydroxide solution is mixed with iron(ll) chloride solution. Sodium chloride solution and Insoluble Iron(ll) hydroxide arc produced.

Write a chemical equation including the state symbols.

Solution:

Step I: Identify reactant s and products and place them in a word equation,

Sodium Hydroxide + Iron (II) chloride ⟶ Sodium chloride+ Iron(ll) hydroxide

Step 2: Convert the chemical names into chemical formulas. Place chem based on the chemical equation and write the state symbols.

Step 3: Write the chemical equation.

$NaOH(aq) + FeCl_2(aq) \longrightarrow NaCl(aq) + Fe(OH)_2(s)$

This equation is not a balanced equation,

20. Write the steps for balancing a chemical equation.

Ans. The steps for balancing a chemical equation are

a. Write the unbalanced equation
b. Balance the Equation
c. Indicate the states of matter of the Reactants and Products.

21. What is Balanced Chemical Reaction?

Ans. A balanced chemical reaction is the one in which the number of atoms of each element on the reactant side is equal to the number of atoms of that element on the product side.

22. What is the significance of balanced chemical reactions?

Ans. The significance of balanced chemical reactions are

a. It shows which substances are taking part in a chemical reaction and what product are obtained as a result of it (Qualitative).
b. It shows both the number of molecules and the number of atoms of each type involving in the reaction.
c. It enables us to calculate the actual amount (mas) of reactants and products involving in the formula in the reaction if the atomic mass of each of the elements involved in the reaction is known.
d. It makes the study of chemistry universally standardised.

23. What are the limitations of Chemical Equation?

Ans. The chemical equations suffer from a number of limitations and have few drawbacks.

They do not tell us about

a. The physical states of the reactants and product.
b. The conditions such as temperature, pressure, or catalyst which affect the reaction.
c. The concentration of reactions and product
d. The speed of the reaction
e. The heat changes during the reaction
f. The completion of the reaction.

24. How can a chemical equation be made more informative?

Ans. A chemical equation can give more information in the following ways:

a. The physical state of the reactants and products can be indicated by putting (s) for solid, (l) for liquid and (g) for gas and (aq) for aqueous state beside the symbols for the reactants and products.
b. Evolution or absorption of heat during the reaction can be denoted by adding or subtracting a heat term of product side.
c. Temperature, pressure and catalyst can be indicated above the arrow (⟶) separating the reactants and products·
d. Concentration of reactants and products are indicated by adding the words (dil.) for dilute and (cone.) for concentrated before their formulae.
e. By the sign (⟶) or (⇔)information about irreversible and reversible reactions can be depicted.