**18th May, 2020 JESUS AND MARY SCHOOL AND COLLEGE Module – 2**

**CLASS – 9**

**CHEMISTRY**

**CHAPTER – LANGUAGE OF CHEMISTRY**

**NAMING COMPOUNDS FROM THEIR FORMULA:**

1. **Naming simple compounds formed by a metal and a non-metal:**

In such compounds the name of the compounds is obtained by first writing the name of the basic radical (cation) followed by the name of the acidic radical (anion). The table below shows the names of some simple compounds formed by metals and non-metals:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **FORMULA** | **RADICALS** | | **NAME OF THE RADICALS** | | **NAME OF COMPOUND** |
| **Basic Radical** | **Acidic Radical** | **Basic Radical** | **Acidic Radical** |
| KCl | K+ | Cl- | Potassium | Chloride | Potassium chloride |
| Na2CO3 | Na+ | CO32- | Sodium | Carbonate | Sodium carbonate |
| Ca(HCO3)2 | Ca2+ | HCO3- | Calcium | Bicarbonate | Calcium bicarbonate |
| MgO | Mg2+ | O2- | Magnesium | Oxide | Magnesium oxide |

When the metal forming the compound shows variable valencies, the valency of the metal is written in Roman numerals in brackets beside the metal name. This type of representation is called Stock Notation. Example: CuCl2 – Copper (II) chloride or cupric chloride. II written in the bracket indicates the valency of copper in CuCl2.

SnCl4 – Tin (IV) chloride or stannic chloride. IV written in the bracket indicated the valency of tin in SnCl4.

1. **Naming the compounds formed by two non-metals:**

In such cases suffixes di, tri, tetra, penta, hexa etc. are added before the names of the non-metals. Example:**N2O5 *– There are two nitrogen atom in the compound, thus di will be added before nitrogen. The number of oxygen atoms is 5, thus penta will be written before oxygen atom. Therefore the name is the given compound N2O5 is Dinitrogenpentoxide.***

***CCl4 – In the compound one carbon atom combines with four chlorine atoms. Thus, tetra will be added before chloride. Thus the name of the given compound will be carbon tetrachloride.***

The table given below shows the names of the some compounds formed by two non-metals:

|  |  |
| --- | --- |
| FORMULA | NAME |
| SF6 | Sulphur hexafluoride |
| PCl5 | Phosphorus pentachloride |
| PCl3 | Phosphorus trichloride |
| CO2 | Carbon dioxide |

1. **Naming of Acids:**
2. **Naming of halogen acids:**

Prefix ‘hydro’ is used before the halogen atom and suffix ‘ic acid’ after the halogen atom while naming the halogen acids. Halogen acids contain fluorine, chlorine, bromine and iodine atoms in them. Example: ***HF – Here fluorine is the halogen atom, therefore its name will be Hydrofluoric acid.***

***HCl – Hydrochloric acid***

***HBr – Hydrobromic acid***

***HI – Hydroiodic acid***

1. **Naming of polyatomic acids:**

The acids containing polyatomic acidic radicals are named on the basis of the second element present in them. Example: ***H2CO3 – The second element in H2CO3 is carbon, therefore the compound will be named as Carbonic acid.***

***HNO3 – The second element in the compound is nitrogen, therefore the name of the compound is nitric acid.***

**DETERMINATION OF VALENCY FROM A FORMULA:**

If the formula of the compound is known the following steps are involved in determining the valency of elements in it:

1. Write the formula of the compound.
2. Interchange the subscripts in the formula and write them at the top of the symbols of the radicals i.e. superscripts.
3. Always remember the valency of H, O and Cl are 1, 2 and 1 respectively.

**Example 1:**Suppose we have to determine the valency of calcium in calcium chloride.

1. The formula of calcium chloride is CaCl2, it can be also written as Ca1Cl2.
2. The subscript for Ca is 1 and subscript for Cl is 2.
3. Thus by interchanging the subscripts and writing them as superscripts we get Ca2Cl1

Hence the valency of Calcium (Ca) is 2.

**Example 2:**Suppose we have to determine the valency of carbon in carbon dioxide

1. The formula of carbon dioxide is CO2, it can be also written as C1O2.
2. The subscript for C is 1 and subscript for O is 2.
3. Thus by interchanging the subscripts and writing them as superscripts we get C2O1
4. The valency of oxygen is 2. Therefore by multiplying both subscripts by 2 we get: C4O2

Hence the valency of carbon (C) is 4.

**BALANCING OF A CHEMICAL REACTION BY HIT AND TRIAL METHOD:**

The following procedures should be followed while balancing a chemical reaction by hit and trial method:

**Procedure 1:**

1. Firstly write the skeleton equation of the given chemical reaction.
2. If any elementary gas such as hydrogen, oxygen, nitrogen etc. in the skeleton equation change is into atomic form. Example: change H2 to H, N2 to N.
3. Select the formula containing maximum number of atoms and equalize the number of atoms of each of its constituent elements on both sides of the chemical equation by suitable multiplications.
4. Now change the elementary gas in its original form.

**Example:**

1. Suppose the skeleton reaction is:

**C6H6 + O2  CO2 + H2O**

1. Oxygen is an elementary gas, thus we will change it into atomic form:

**C6H6 + O CO2 + H2O**

1. The formula **C6H6** has the maximum number of atoms, thus we will select it to start balancing the atoms on the both sides. It contains 6 carbon atoms and 6 hydrogen atoms. There is only one carbon atoms present on the right hand side of the chemical equation, thus carbon can be balanced by multiplying CO2 by 6. There are two hydrogen atoms present on the right hand side of the chemical equation, we can balance hydrogen by multiplying H2O by 3 making the number of hydrogen equal on both the sides (6).

**C6H6 + O 6CO2 + 3H2O**

1. Now, oxygen atoms are still unbalanced. There are total 15 oxygen atoms on the right hand side of the reaction, but on the left hand side we have only 1 oxygen atom therefore it should be multiplied by 15.

**C6H6 + 15O 6CO2 + 3H2O**

1. Now, all the atoms in the chemical reaction are balanced. But, originally oxygen was given in the molecular form, therefore we will have to change the oxygen atoms back to molecular form. 15 is odd number and oxygen is diatomic, thus it will not give a whole number of molecules by dividing 15 by 2. In this case we will multiply the whole chemical reaction by 2 in order to get a whole number.

**(C6H6 + 15O 6CO2 + 3H2O) x2**

**2C6H6 + 30O 12CO2 + 6H2O**

1. 30 is an even number. Now we can easily convert oxygen atoms into its molecular form.

**C6H6 + 15O2  6CO2 + 3H2O**

**Procedure 2:**

1. Write the chemical reaction in its skeleton form.
2. Changes the elementary gas (if present) into its atomic form.
3. Count the number of times elements occur on both the sides (frequency of occurrence of each element).
4. First balance the element which has lowest frequency.
5. If two elements have same frequency, balance the metallic element first.
6. At last balance the element having highest frequency.
7. After balancing all the atoms, change the elementary gas back to its molecular form.

**Example:**

1. Suppose the skeleton reaction is:

**Mg3N2 + H2O Mg(OH)2 + NH3**

1. Find the frequency of occurrence of each element present in the chemical reaction. Magnesium occurs 2 times, Nitrogen occurs 2 times, oxygen occurs 2 times and hydrogen occurs 3 times.

Now magnesium, oxygen and nitrogen have same frequency of occurrence i.e. 2. But, magnesium is a metal, therefor it should be balanced first. Nitrogen and oxygen also have same frequency, but nitrogen will be balanced first (remember oxygen and hydrogen are always balanced at last). Thus the order of balancing is Mg, N, O and H.

The number of Mg atoms on the left side is 3, while on the right side is 1. Therefore Mg can be balanced by multiplying Mg(OH)2by 3.

**Mg3N2 + H2O 3Mg(OH)2 + NH3**

1. The number of nitrogen atoms can be balanced by multiplying NH3 on the product side by 2.

**Mg3N2 + H2O 3Mg(OH)2 + 2NH3**

1. Now count the number of oxygen atoms on both sides of the chemical reaction. We have 6 oxygen atoms on the right hand side and 1 oxygen atom on left hand side. Hence, oxygen can be balanced by multiplying H2O in the reactant side by 2.

**Mg3N2 + 6H2O 3Mg(OH)2 + 2NH3**

1. Now count the number of hydrogen atoms and balance them. In this reaction there are 12 atoms on both sides of the reaction. Hence there is no need to make any changes in the chemical reaction. Hence the balanced equation is:

**Mg3N2 + 6H2O 3Mg(OH)2 + 2NH3**

***NOTE: While balancing equation subscripts should never be changed i.e. we should not write 2O3 in place of 3O2. This is because it will change the identity of the molecules as O2 is different from O3 (Ozone).***

**WORKESHEET 2**

1. **Write the names of the following chemical compounds:**
2. K2SO4
3. NaHCO3
4. SF4
5. IF7
6. NaCl
7. AlN
8. Ca3N2
9. K2Cr2O7
10. NH4OH
11. NaOH
12. **Write the formulae of the following:**
13. Sulphuric acid
14. Potassium zincate
15. Ferric hydroxide
16. Ammonium dichromate
17. Sodium phosphate
18. **Balance the following reactions using hit and trial method:**
19. Al + Cl2 AlCl3
20. NH4OH + H2SO4 (NH4)2SO4 + H2O
21. NaHCO3 + H2SO4 Na2SO4+ H2O + CO2
22. ZnS + O2 ZnO + SO2
23. Ca + H2O Ca(OH)2+ H2
24. **The formula for the chloride of a metal M is MCl3. Determine the valency of M and predict the formula of its:**
25. Sulphate
26. Hydroxide
27. Dichromate
28. Carbonate
29. Silicate

**NOTE:**

**Please do these works in your old copies which will be check when the school re-open. Please consider this important.**