Class-IX

# ATOMS AND MOLECULES

## DETERMINATION OF MOLECULAR FORMULA

### Determination of Molecular formula:

To find out the molecular formula of a compound, the first is to determine its empirical formula from the percentage composition. The empirical formula of a compound may be defined as the formula which gives the simplest whole number ratio of atoms of the various elements present in the molecule of the compound.

**For example:** The empirical formula of the compound glucose ( $C_6H_{12}O_6$ ) is  $CH_2O$  which shows that C, H and O are present in the simplest ratio of 1:2:1.

Molecular formula is whole number multiple of empirical formula thus,

Molecular formula = Empirical formula  $\times$  n

Molecular formula

n = -

Empirical formula

Where n = 1, 2, 3....

Molecular formula

Empirical formula

#### ✤ Steps for writing an empirical formula:

The percentage of the element in the compound is determined by suitable methods and from the data collected, the empirical formula is determined by the following steps-

n =

- Divide the percentage of each element by its atomic mass. This gives the relative number of moles of various elements present in the compound.
- Divide the quotients obtained in the above step by the smallest of them so as to get a simple ratio of moles of various elements.

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- Multiply the figures, so obtained by a suitable integer, if necessary, in order to obtain whole number ratio.
- Finally write down the symbols of the various elements side by side and put the above number as the subscripts to the lower right-hand corner of each symbol. This will represent the empirical formula of the compound.

#### Steps for writing the molecular formula:

- > Calculate the empirical formula as describe above.
- Find out the empirical formula mass by adding the atomic masses of all the atoms present in the empirical formula of the compound.
- Divide the molecular mass (determined experimentally by some suitable method) by the empirical formula mass and find out the value of "n"
- Multiply the empirical formula of the compound with n so as to find out the molecula formula of the compound.