**PHARMACEUTICAL ANALYSIS UNIT -1**

Q1. Define volumetric analysis ?

Ans: It is a technique in which quantitative analysis was achieved by measuring volume of solution . This is also known as titrimetric analysis .

Q2. Define quantitative and qualitative analysis ?

Ans : Chemical analysis can have two aspects i) Qualitative Analysis ii) Quantitative Analysis

Qualitative Analaysis : This aims for identifying constituents of a given system for example presence of different compounds in a mixture or different elements in a compound.

Quantitative analysis : It is concerened with the determination of amount of different constituents present in a system .

Note : Usually the given material is first analysed qualitatively and this is followed by quantitative analysis

Q3. Write steps involved in Quantitative Analysis ?

Ans : Quantitative analysis consist of the following four main steps :

1. Sampling : In this step sample to be analysed is selected for analysis.
2. Conversion : In this the sample is converted into a desired constituents which is suitable for measurement.
3. Measurement : Measurement of some property on which the determination is based for example property like weight is used for gravimentric analysis or prproerty like volume is used for titrimetric analaysis.
4. Calculation and interpretation of result.

Q4. What is standardization ?

Ans : It is the procedure through which the strength or concentration of a solution is known i.e how much amount of substance id added in a known volume of a solvent. There are various ways to present standard solution e.g gm/ltr , Normality , Molarity , Formality , Molality etc.

Q5. What are primary and secondary standard ?

Ans : Primary Standard : The substance whose standard substance is prepared by dissolving primary standard substance of known amount in a definite volume of a solvent or solution is known as primary standard.

Secondary Standard : Those substance which do not fulfill the requirement of primary standard and which cannot be prepared directly by weighing the known amount is called secondary standard.

Q6. What are the requirements of Primary Standard ?

Ans : It should be easily available in pure and dry formand should be stable

2) It should not decompose in the presence of solvent

3) It should not be affected by air and carbon dioxide

4) It should be soluble in water or desire solvent.

5) It should be of high equivalent weight.

6) It should not change on standing .

Example : Sodium carbonate , potassium dichromate , ferrous ammonium sulphate.

Q7. What do you mean by strength of a solution ? Explain with suitable example .

Ans. The amount of any substance present in definite volume of a solution is called the strength of the solution.

The strength of the solution may be expressed in different ways and they are as follows

1. Gram per litre
2. Normality
3. Molarity
4. Molality
5. Formality

Gram / litre : It is the amount of active substance in gram which is dissolved in 1 litre of solvent.

e.g : 6 gm of substance is present in 1000 ml then its strength is 6 gm/ltr

ii) **Normality ( N ) :** It is the number of gram equivalent weight of the solute per litre of the solution is called normality .

N = Number of gram equivalent of solute X 1000

Volume of solution Vol. required

It actually expresses the concentration of a solution in gm equivalent per litre ( geq/ltr )

Normality is a function of temperature and varies with the change in temperature.

iii) **Molarity** ( M) : It is the number of moles of solute present per litre of solution is called molarity.

Number of moles = Weight of substance in gram

Molecular weight

Therefore Molarity = Weight of substance in gram X 1000

Molecular weight Volume required

It expresses the concentration of a solution in mol/ltr.

iv)**Molality (m) :** Number of moles of solute present in per kg of solvent is called molality .

e.g : 5 m solution of HCl means that it has been prepared by dissolving 5 mole of HCl in 1000 gm of solvent.

m = number of moles of solute

mass of solvent ( kg)

m = weight of substance in gm X 1000

molecular weight volume required in kg

It is represented as mole /kg

Molality of solution does not change with temperature.

v)**Formality** ( **F** ) :The number of gram formula weight of solute dissolved in one liter of solution is known as formality.

F = number of gram formula weight of solute

Volume of solution in liter

It is represented as gm /ltr.

Formality of solution changes with temperature.

# RELATIONSHIP BETWEEN NORMALITY & MOLARITY

MOLARITY X MOLECULAR WEIGHT = NORMALITY X EQUIVALENT WEIGHT OF SOLUTE

* **SOME IMPORTANT TERMS :**

**ACCURACY** : Accuracy is defined as the degree of agreement between measured value and the most probable true value.

Practically since no measurement is completely accurate true value is accepted within certain limits therefore accuracy of result is accepted within those limits.

The accurate result are generally obtained by using the instrument of best quality.

# **PRECISION** : ( REPRODUCIBILITY OF THE RESULT )

It is defined as the series of measurement of the same quantity ( reproducibility of the result or measurement ).

Accuracy expresses the correctness of a measurement while precision is the repeatability of the measurement.

Accuracy without precision is impossible but precision does not imply accuracy.

# **PRECISION MEASUREMENT** : Mean OR average or relative mean deviation is a measure of precision .

# **EQUIVALENT WEIGHT** : It is the minimum weight of any chemical species which react completely or liberate 1 gm of hydrogen ( 11.2 ltr) , 8 gm of oxygen ( 5.6 ltr ) , 35.5 gm ( 11.2 ltr ) then the minimum weight taken is called equivalent weight .

The equivalent weight of different substances are determined as

i)E.W of an element = Atomic weight

Valency

ii) E.W of an Acid = Molecular weight

Basicity of a acid

iii) E.W of a Base = Molecular weight

Acidity of a base

Iv ) E.W of Salt = Molecular weight

Total no. of +ve or – ve

valencies of it radical

Q8. Write down the significance of Quantitative analysis in Pharmaceutical industry ?

Ans : Quantitative analysis plays an important role in pharmaceutical industry to ensure the quantity of material used in the production of pharmaceutical product .

e.g purity of raw material , solvent and final product

ii) Examination of raw material is very importantto ensure that there is no unusual substance present which may cause impurity in the final product . This process is also known as Assay of the material.

iii) After manufacturing of final product it is important to perform a quality control analysis to ensure that all the components are present in required amount and should have purity.

iv)After the development of any new product it should undergo quantitative and qualitative analysis to ensure the safety of the product.

v)Quantitative analysis is used to find the potency of raw material and % purity of chemicals used in manufacturing pharmaceutical product.

vi)Quantitative analysis is also used to find out the rate of reaction and concentration of any given chemical or ingredients in a solution and also helps in development of new product.