



**AL-Mustaqbal University College**  
**Radiology Techniques Department**  
**First Class**  
**Practical General Chemistry**  
**Second lecture (1)**  
**(Analytical Chemistry)**

**Asst. Lec. Esraa Rafied Abass**

**Asst. Lec. Alaa Salman AL-Labban**



**2022-2023**

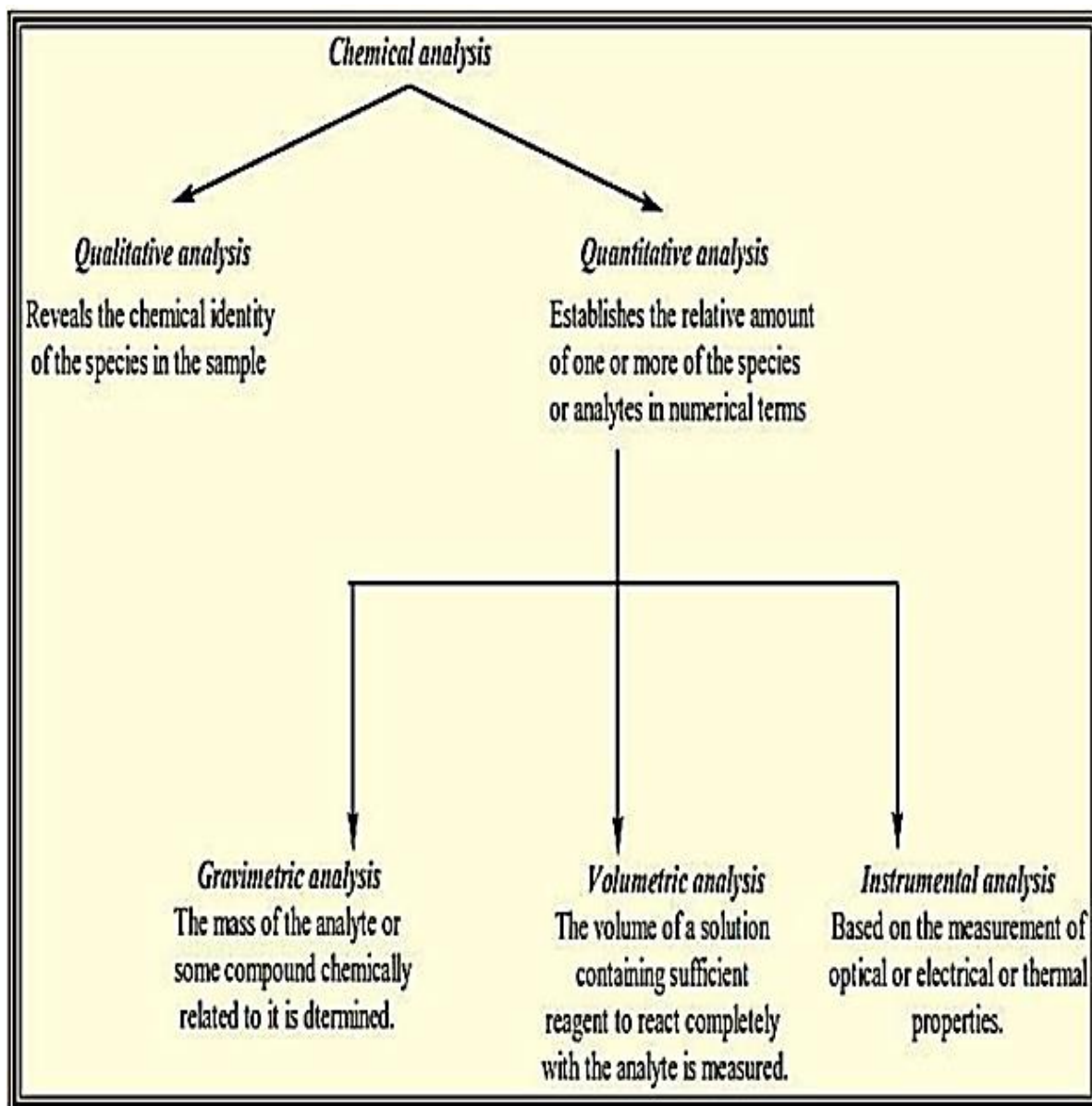
# Analytical chemistry

Is the science of the characterization and measurement of chemicals and also involve separating, identifying and determining the relative amounts of the components in a sample of matter.

Chemical analysis is divided into two types:

Qualitative analysis

Quantitative analysis



## Applications of Analytical Chemistry

Some important applications of this branch of chemistry are listed below.

- The shelf lives of many medicines are determined with the help of analytical chemistry.
- It is used to check for the presence of adulterants in drugs.
- Soil can be tested to check for appropriate concentrations of minerals and nutrients that are necessary for plant growth
- It is employed in the process of chromatography where the blood samples of a person are classified.
- The concentration of the pesticide residues and the contaminants in a given food sample can also be determined via analytical chemistry
- It also has many important applications in medicine, with its use in the testing of cholesterol and glucose levels in a blood sample.
- Analytical chemistry is an integral part of forensic science, clinical analysis, and even environmental analysis.

**What are the basic tools of analytical chemistry ?**

Examples of analytical instruments include mass spectrometers, chromatographs (e.g. GC and HPLC), titrators, spectrometers (e.g. AAS, X-ray, and fluorescence), particle size analyzers, rheometers, elemental analyzers (e.g. salt analyzers, CHN analyzers), thermal analyzers.

## standard solution

Is a highly purified compound that serve as a reference material in all volumetric titrimetric methods. Important requirements for a primary standard are :

- 1-High purify.
- 2-Stability toward air.
- 3-Absence of hydrate water.
- 4-Ready availability at modest cost.
- 5-Reasonable solubility in the titration medium.
- 6-Reasonable large molar mass so that the relative error associated with weighing the standard is minimized.

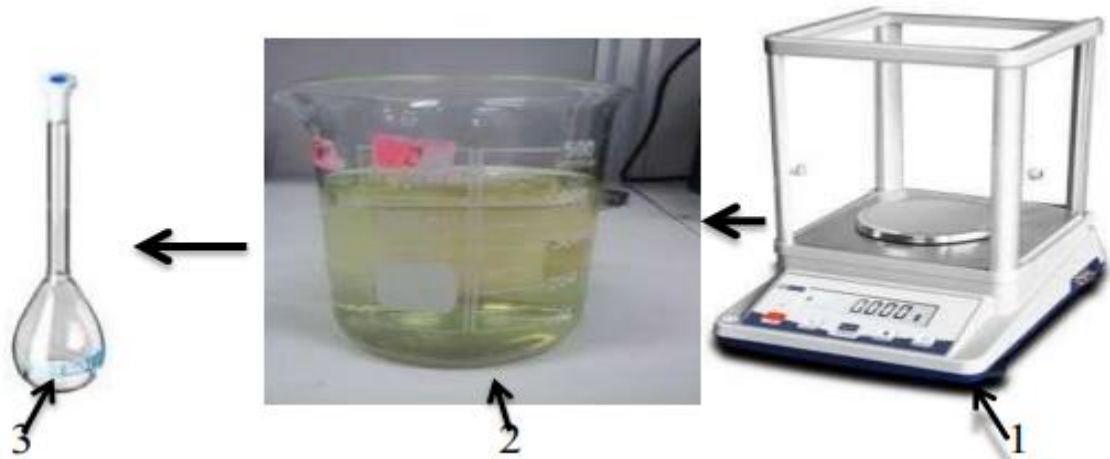
### Prepare a standard solution

There are several ways to prepare it as follows:

#### A-To prepare the weight method

The standard solution can be prepared by following the following steps:

- 1-Calculating and weighing the mass of the solute for which a solution is to be prepared.
- 2-Dissolve the solute in distilled water in a beaker.
- 3-Transfer the solution to a volumetric flask and add distilled water until it reaches the desired volume, then stir it.

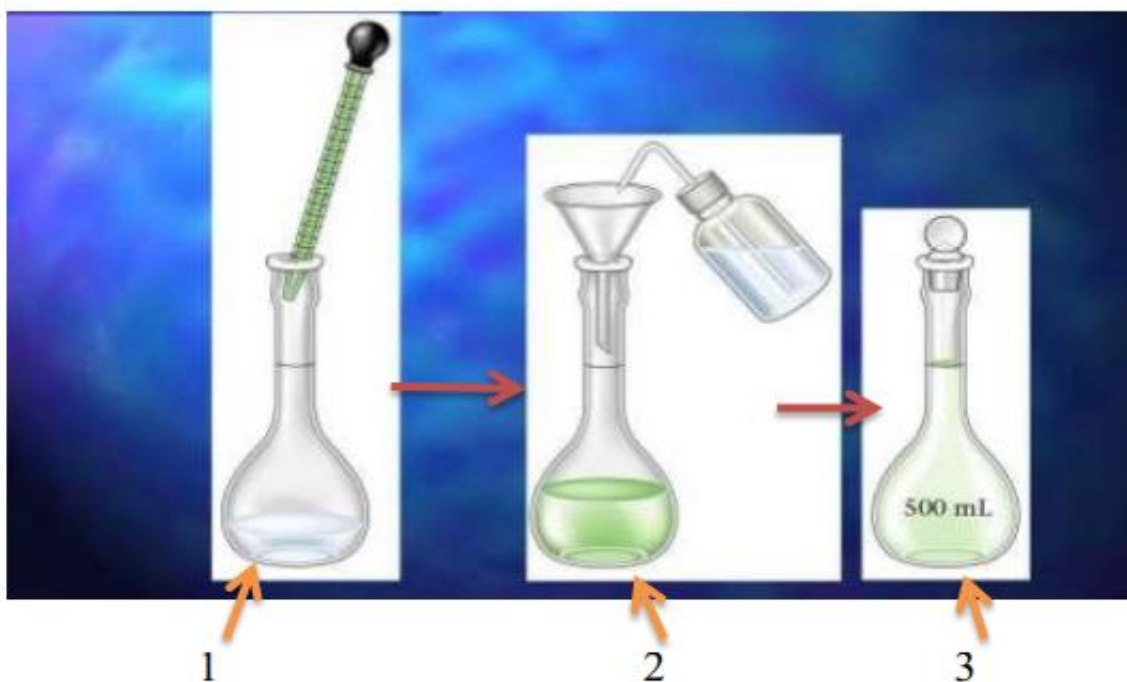


### B-Dilution preparations

Dilution is to add a solvent to the solution to be diluted to prepare a less concentrated solution, by following the following steps:

1-Using a volumetric pipette, to withdraw a specific amount of the solution and place it in a volumetric flask.

2-Dilute the solution with a suitable solvent such as water, until it has reached the desired volume



### C-percentage solution

Is an amount or volume of chemical or compound per 100 mL or 100g of a solution. It is a relative expression of solute to solvent. Percentage solutions are a convenient and easy way to record solution concentrations. An advantage of percentage solutions is that the molecular weight of a compound does not figure into the percentage of the required solution.

There are three types of percentage solutions commonly used:

1. Percentage weight by volume ( $w/v$ )
2. Percentage volume by volume ( $v/v$ )
3. percentage weight by weight ( $w/w$ ).

### Normal Solution

Normality (N) is another way to quantify solution concentration. It is similar to molarity but uses the gram-equivalent weight of a solute in its expression of solute amount in a liter (L) of solution, rather than the gram molecular weight (GMW) expressed in molarity.

A 1N solution contains 1 gram-equivalent weight of solute per liter of solution.

A solution made by dissolving 1 g-equivalent weight of a substance in sufficient distilled water to make 1 L of solution.

The symbol "N" is used for the titration of a solution, meaning "mol / L". The equivalent expression Eq / L is also sometimes used. one of the main differences between the normality and molarity of a solution is that normality describes the amount of gram equivalent of compound present in the solution while molarity describes the number of moles present in the solution.