

## Definition of Pharmaceutical Analysis:

It is a branch of practical chemistry which deals with the resolution, separation, identification, determination, quantification, purification of a given substance or a sample.

## Scope of Pharmaceutical Analysis:

- (i) Examination of raw material
- (ii) Analysis of various drug samples.
- (iii) Qualitative / Quantitative analysis of samples.
- (iv) Diagnosis of various disease by chemical analysis.
- (v) Determination of radioactive compounds.
- (vi) Determination of different samples of water.

## Different techniques of Analysis:

1. Qualitative analysis
2. Quantitative analysis

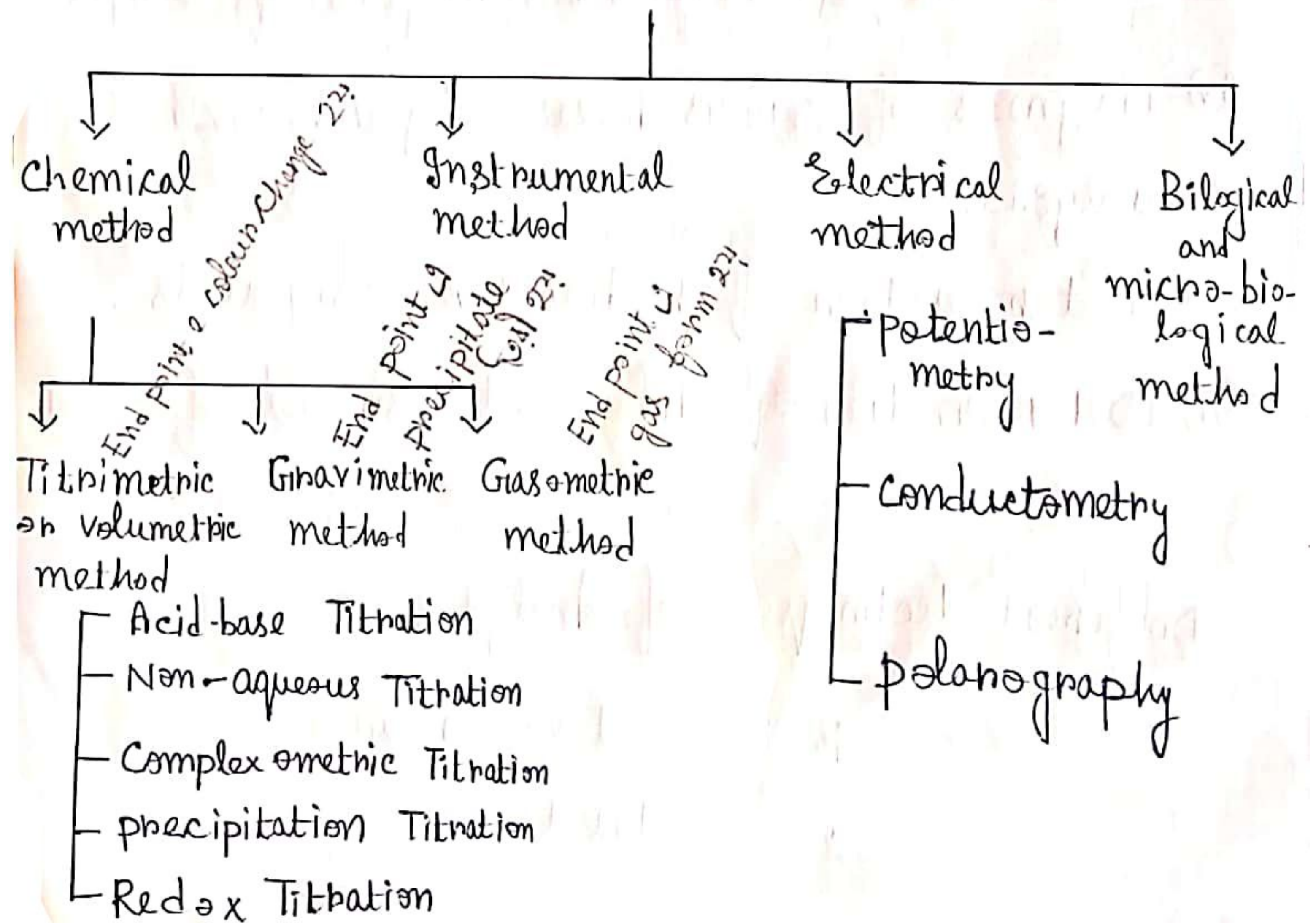
## 1. Qualitative Analysis :

It is always used in comparison with chemical analysis which search information about the identity or form of substance present.

## 2. Quantitative Analysis :

It deals with quantity present in the particular chemical sample means "how much" amount is present in the sample.

### Different Techniques of Analysis



Biological and Microbiological Method:

Biological and Microbiological method are used to check — the activity of drug  
How much reacting  
the action of drug

On the other hand Chemical method (old method),  
Instrumental and Electrical method (modern method)  
are used to identify the drug impurity.

▣ Methods of Expressing concentration:

1. Molarity:

It is defined as the number of moles of the ~~solute~~ solute dissolved in one litre of solution.

It is denoted by 'M'

$$\text{Molarity (M)} = \frac{\text{Moles of Solute}}{\text{Volume of Solution (in litre)}}$$

2. Normality:

It is defined as the number of gram equivalents of the solute dissolved per litre of solution.

It is denoted by 'N'

$$\text{Normality (N)} = \frac{\text{gram equivalents of the solute}}{\text{Volume of solution (in litre)}}$$

### 3. Molality:

It is defined as the number of moles of the solute per kilogram (kg) of the solvent.

It is denoted by 'm'

$$\text{Molality (m)} = \frac{\text{moles of solute}}{\text{Mass of solvent (in kg)}}$$

### 4. Formality:

It is defined as the number of gram formula weight of a solute dissolved in one litre of solution.

It is denoted by 'F'

$$\text{Formality (F)} = \frac{\text{gram formula weight (GFW)}}{\text{Volume ~~litre~~ of solution (in litre)}}$$

It is denoted by 'N'

$$\text{Normality (N)} = \frac{\text{gram equivalents of the solute}}{\text{Volume of solution (in litre)}}$$

### 3. Molality:

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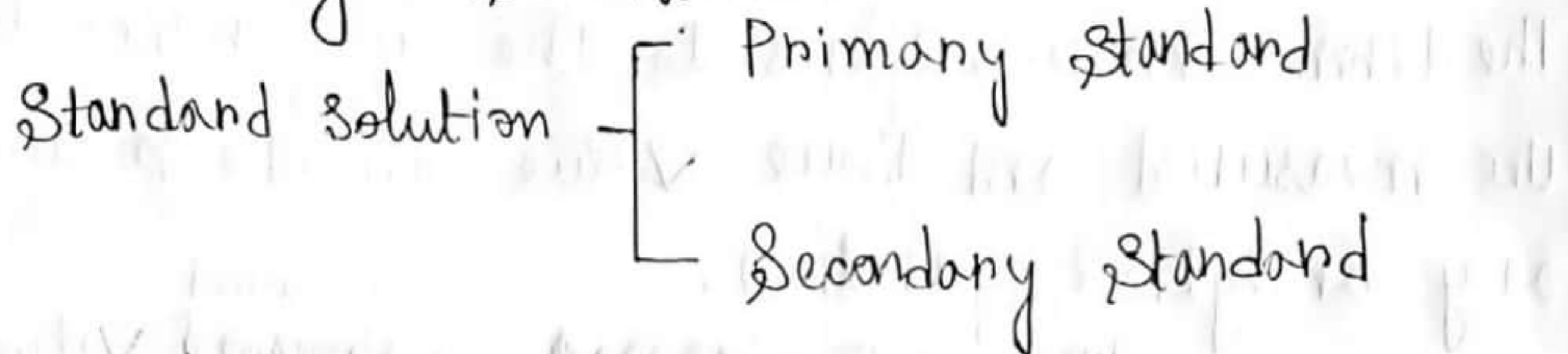
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# Primary and Secondary Standards:

Standard Solution: Standard solution is the solution whose strength is known.



## 1. Primary Standard:

primary standard is solution of known strength made from the substance of high purity.

Properties

- It should be highly pure
- It should be highly stable
- It should be highly soluble
- It should be non-toxic
- It should be easily available

Example: For precipitation titration Ag,  $AgNO_3$

## 2. Secondary Standard:

~~secondary standard~~ is a solution of known strength which is previously standardized by primary standard.

Example: Standard solution of 0.1 M Sulphuric acid

## ■ Error:

The term error refers to the difference between the measured and true value in the results of any analytical operation.

$$\text{Error} = \text{True value} - \text{measured value}$$

## ■ Types of Errors:

Errors are classified into two types —

1. Systematic Error OR determinate Error.
2. Random Error OR Indeterminate Error.

### 1. Systematic Error:

Systematic Errors are those types of errors that we can change properly and that totally in our hand and in our control.

Systemic errors can be classified as follows —

- (a) personal Error
- (b) Instrumental Error
- (c) Reagent Error
- (d) Method Error
- (e) Additive Error
- (f) proportional Error

## Additive Error:

These errors are not dependent of the amount of substances present in sample.

## (f) proportional Error:

These ~~type~~ errors depends on the amount and nature of the sample.

## 2. Random Error:

Random errors are those types of errors that are not in our <sup>control</sup> ~~hand~~ and that we can not change.

## ▣ Sources of Errors:

- glass ware issue
- Chemical issue
- weighing issue
- Burette, conical flask not calibrated.
- Vision problem for burette reading.
- Calculation problem.
- read wrong instruction.

Calibration: System Suitability



## ▣ Methods of minimizing errors:

- Check the glass ware that you used in the titration
- Check the method and use proper method.
- Calibrated instruments use.
- Treat your eye if facing vision problem.
- improve your calculation skill.
- Read the full instruction and then start.

## ▣ Accuracy and Precision:

### Accuracy:

It is defined as nearness to the true value.

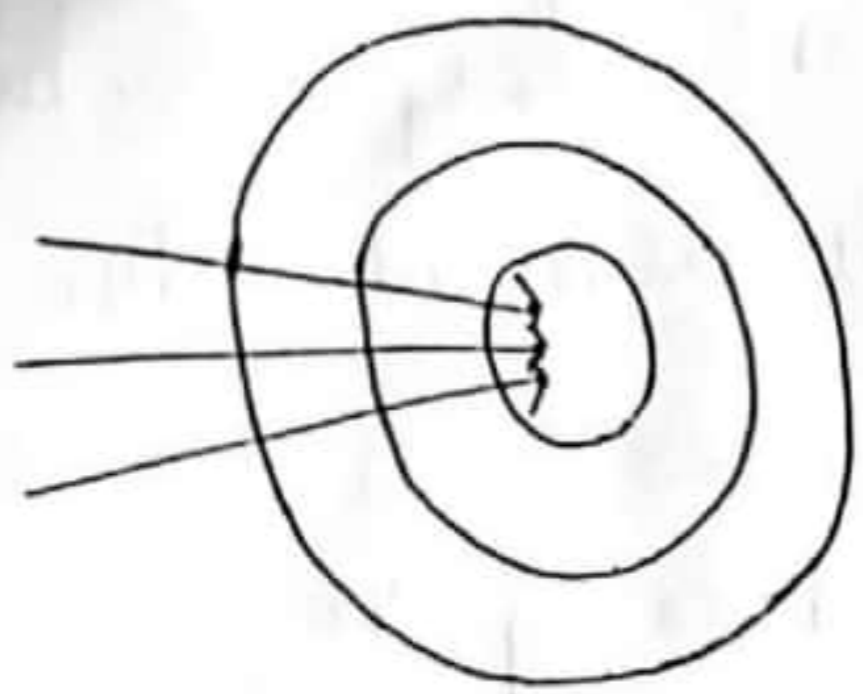
or

closeness of measured value to its true value.

### Precision:

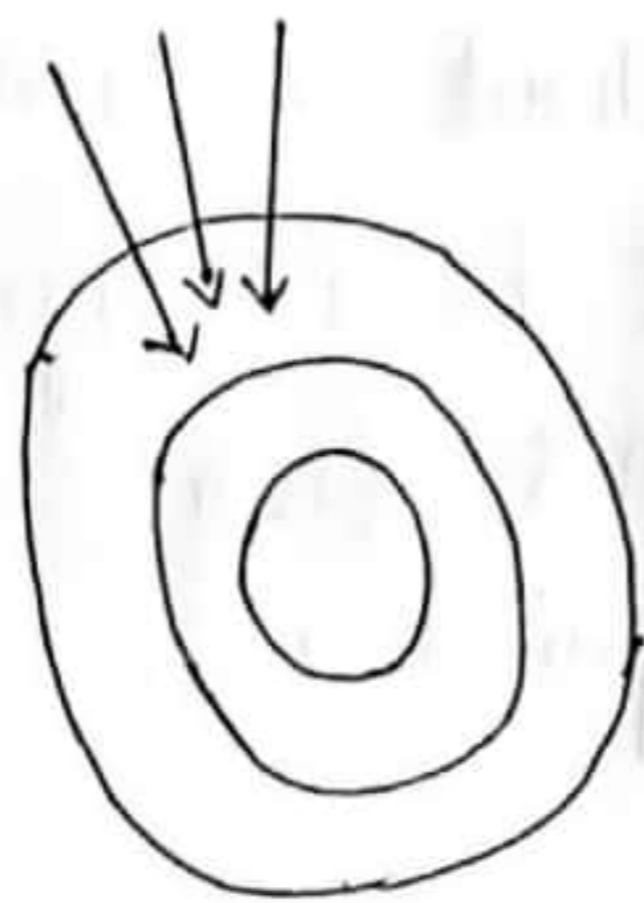
It refers to the closeness of set of values obtained from identical measurements of quantity.

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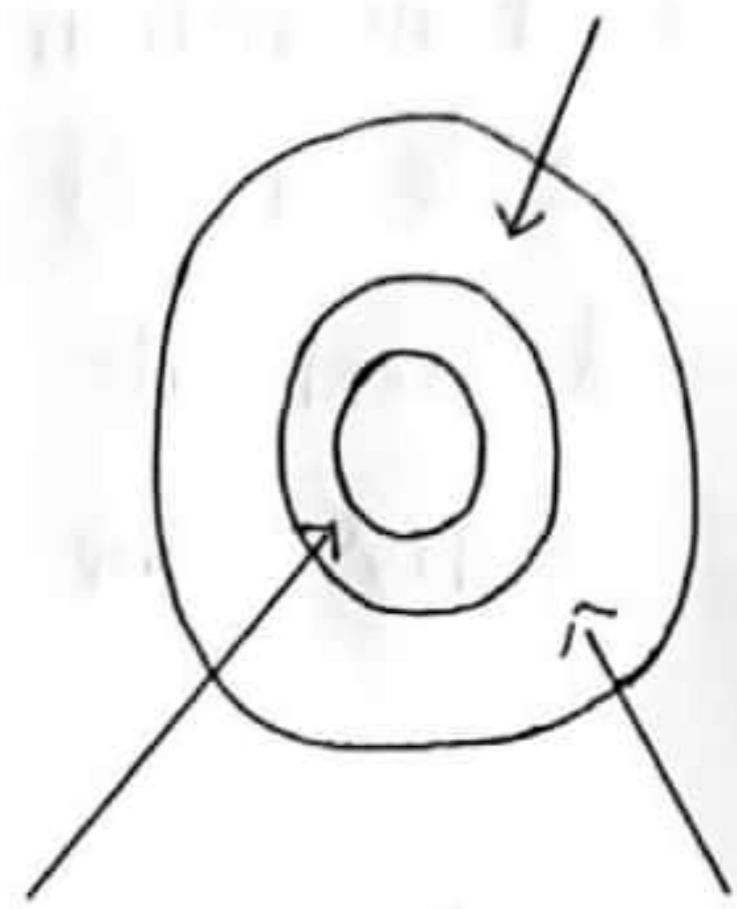
A

Good Accuracy  
Good precision



B

Poor Accuracy  
Good precision



C

Poor Accuracy  
Poor Precision

### ▣ Significant figures:

Most valuable digits in a given number is called significant figures.

### Rules for significant figure:

- all non zero digits are significant figure.
- all zeros between two non zero digits are significant figure.
- all zeros on left of decimal and right of decimal are not significant when number is less than 1. Ex -  $0.00212 \rightarrow 3$
- when number is greater than 1 with decimal then all zeros on right side of decimal and left of decimal will be significant figure  
Ex -  $2.020200 \rightarrow 7$  ;  $2.000 \rightarrow 4$

→ A number without decimal, all zeros on right side will not be a significant figure. but when it comes from measurement then such zeros are significant. Ex - 1000 (1)  
1000 kg (4)

### Examples:

$$2.000 \rightarrow 4$$

$$0.00214 \rightarrow 3$$

$$3.12 \times 10^{12} \rightarrow 3$$

$$2000 \rightarrow 1$$

$$2000 \text{ kg} \rightarrow 4$$

$$1.0200 \rightarrow 5$$

$$2.0102 \times 10^6 \rightarrow 5$$

$$0.102 \rightarrow 3$$

Decimal digits and number

Left side and right side count

Left side and right side

Left + Right = both