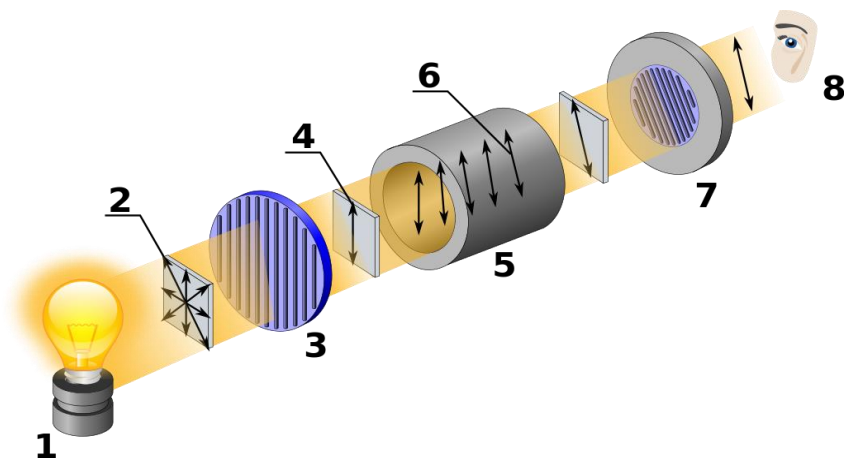


# OPTICAL ROTATION AND ITS APPLICATION

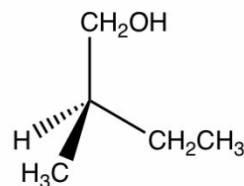
## ❖ INTRODUCTION:

Polarimetry is one of the important instrumental methods employed in analysis. This measure the rotation of the polarized light as it passes through an optically active compound. This technique involves the measurement of change in the direction of vibration of polarize light when interact with an optically active compound. A substance is said to be optically active if it rotates the plane of the polarize light.

## ❖ POLARIMETER DIAGRAM:

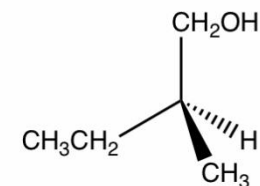


## ❖ EXAMPLES:



(R)-2-methyl-1-butnaol

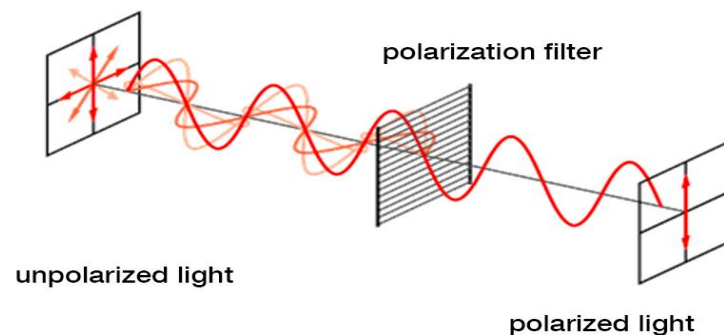
$$[\alpha]_D^{20^\circ C} = +5.75^\circ$$



(S)-2-methyl-1-butnaol

$$[\alpha]_D^{20^\circ C} = -5.75^\circ$$

## ❖ FIGURE:



## ❖ PRINCIPLE

- The optical rotation is the angle through which the plane of polarization is rotated when polarized light passes through layer of liquid.
- Optical rotation is the effect which is determined by the concentration of a chiral molecule and their molecular structure. Optical rotation is a method to tell how pure the chiral structure is.
- A Polari meter is an instrument which measures the angle of rotation by passing polarized light through an optical active substance.
- The angular rotation observed in a Polari meter depends on:

1. The optical activity of compound
2. The concentration of sample
3. The path length of sample

## ❖ OPTICAL ACTIVITY DIAGRAM

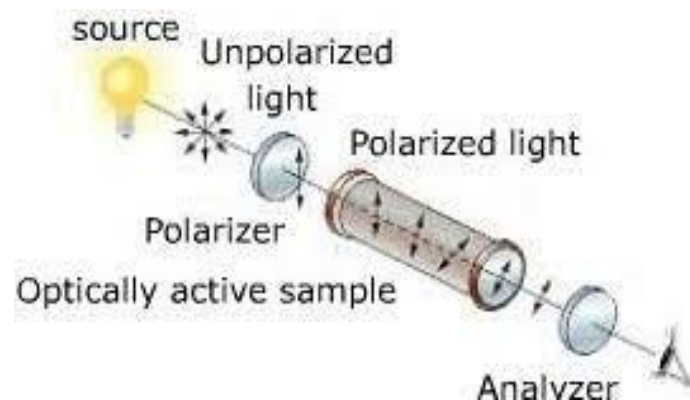


Fig-1

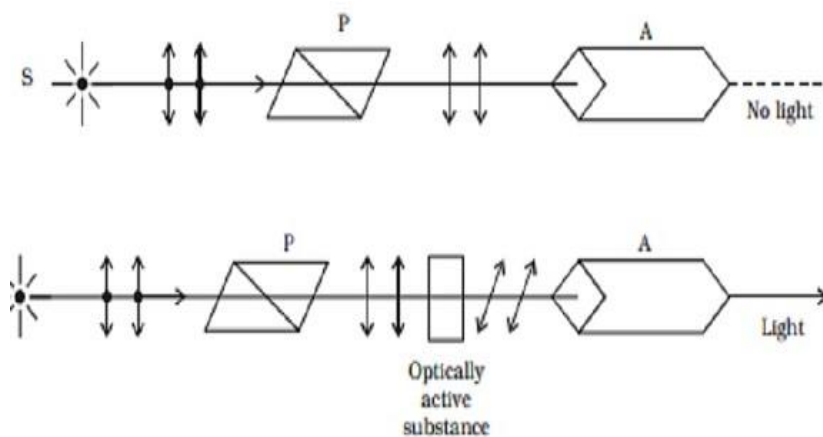
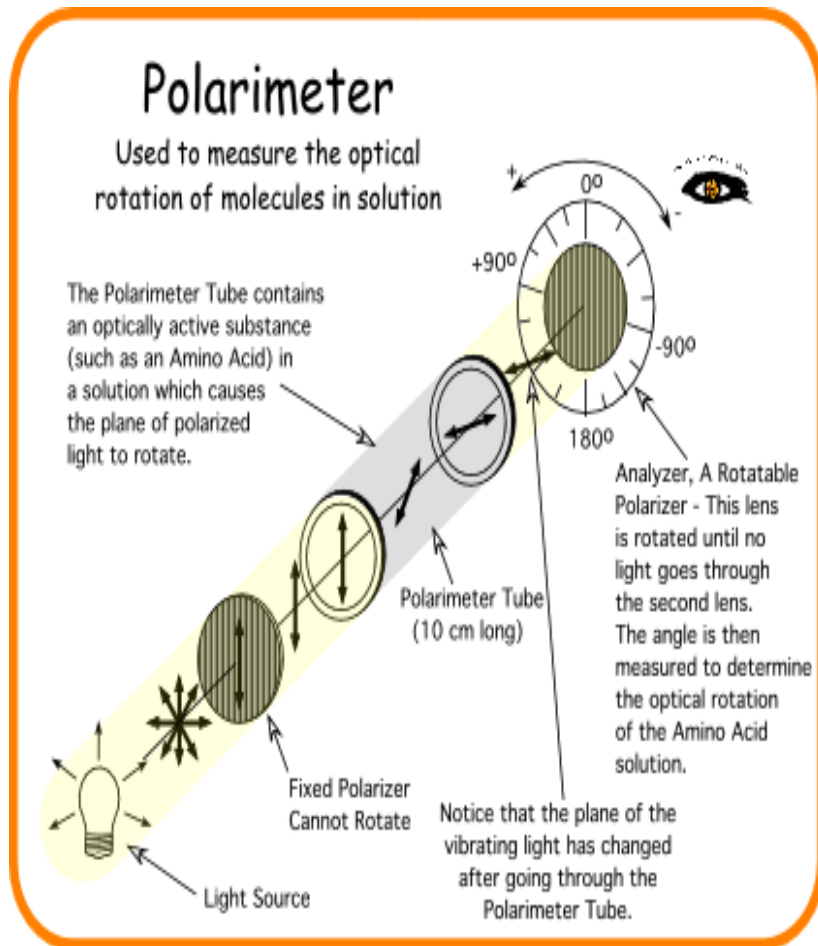


Fig Optical activity

Fig-2

## ❖ **DIAGRAM OF POLARIMETER:**



Optical activity of molecules



Dextro (CLOCKWISE) Laevo (ANTICLOCKWISE)



Ordinary light consist of electromagnetic waves



Oscillating many planes



The light is to be plane polarizes

## ❖ FORMULA:

Formula for Specific Rotation

$$[\alpha] = \frac{\alpha_{\text{observed}}}{c \times l}$$

Observed rotation (units = degrees)

Specific rotation (in degrees\*)

Concentration (units = g/ml)

Path length (units = dm)

\* units are actually  $^{\circ} \text{cm}^2 \text{g}^{-1}$ , but usually just given as degrees

## ❖ APPLICATIONS:

### ✓ QUANTITATIVE APPLICATIONS:

- If the specific rotation of sample is known its concentration in the solution can be estimated.

### ✓ QUALITATIVE APPLICATIONS:

- Optical activity is the only parameter available for distinguishing between D and L isomeric forms.

### ✓ SACCHARIMETRY:

- Important practical application of Polarimetry, Determination of concentration.

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**SUBJECT:** PHYSICAL PHARMACEUTICS-I

**CLASS:** SECOND YEAR B.PHARMACY

**ACADEMIC YEAR:** 2021-22

