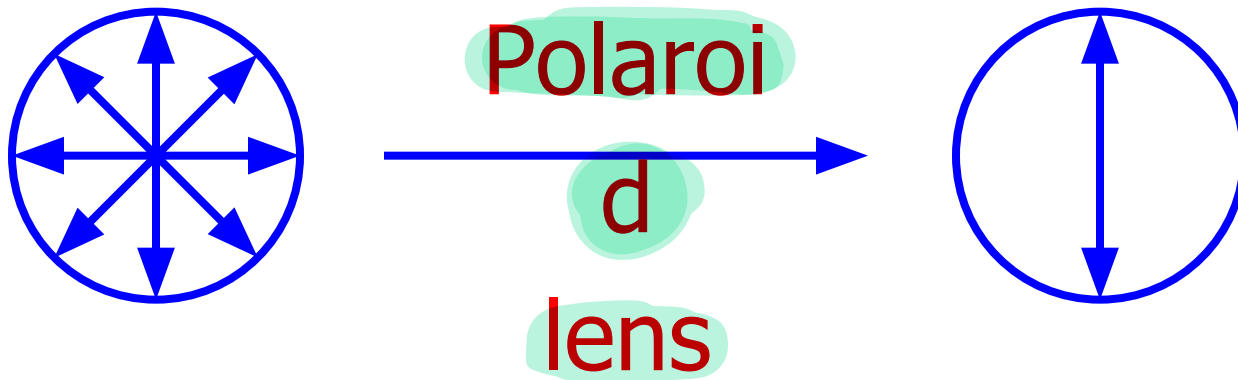


❖ Optical activity

- The property possessed by chiral substances of rotating the plane of polarization of plane-polarized light

7A. Plane-Polarized Light

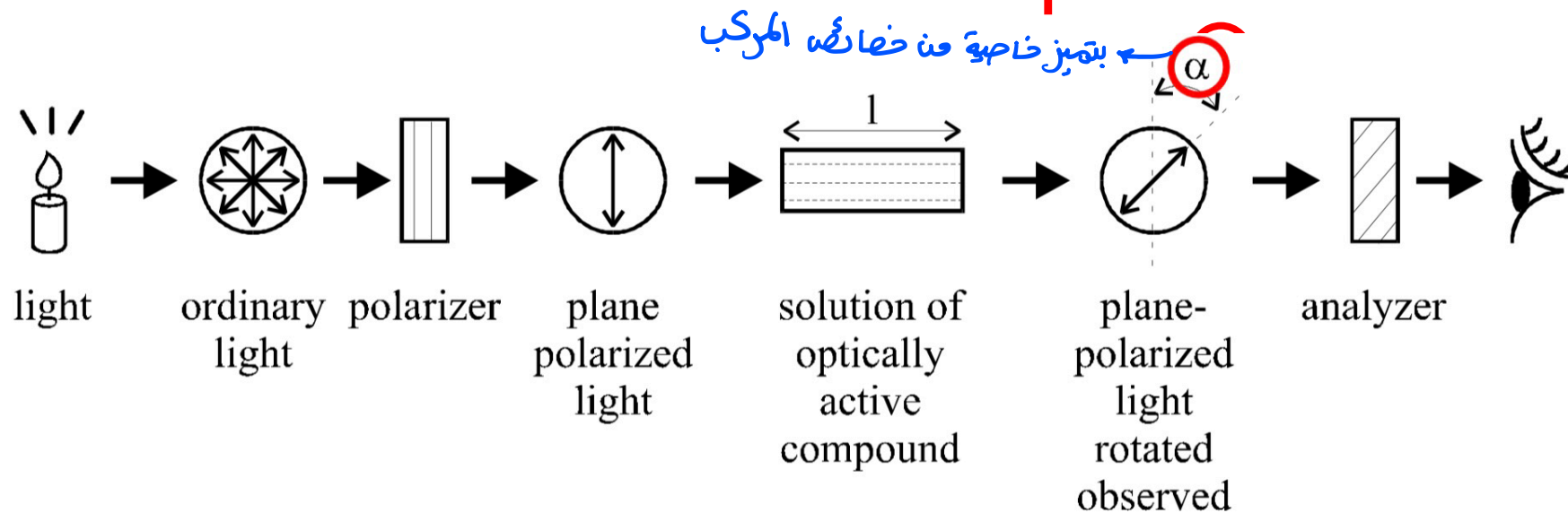
- ❖ The electric field (like the magnetic field) of light is oscillating in all possible planes
- ❖ When this light passes through a polarizer (Polaroid lens), we get plane-polarized light (oscillating in only one plane)



7B. The Polarimeter

- ❖ A device for measuring the optical activity of a chiral compound

α = observed
optical rotation



7C. Specific Rotation

حش وطلوب
طريقة اكل

temperature

$[\alpha]_{\text{D}}^{25}$

observed
rotation

α

=

C

x

ℓ

concentration
of sample
solution
in g/mL

length of cell
in dm

(1 dm = 10 cm)

wavelength
of light
(e.g. D-line
of Na lamp,
 $\lambda = 589.6 \text{ nm}$)

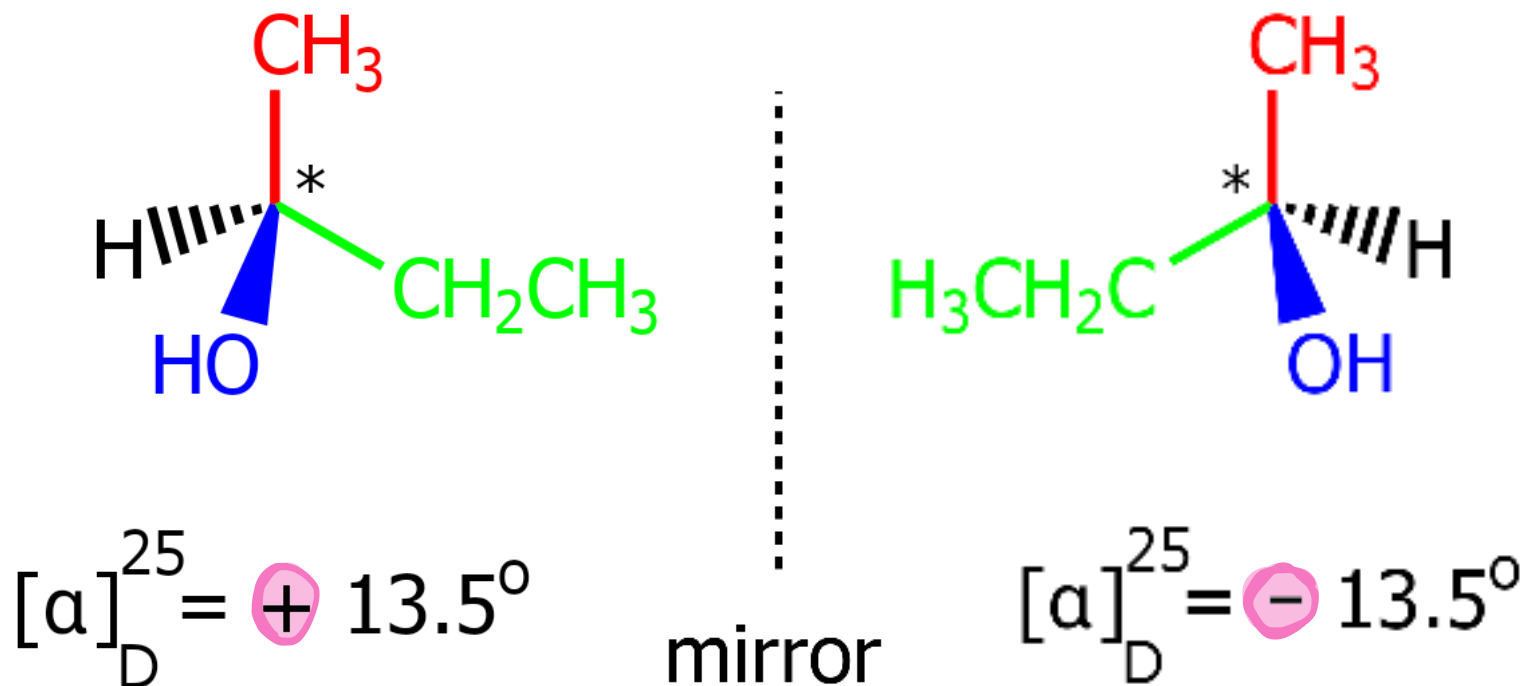
(خاصة لكل enantiomer)

هاي الخاصة بتعقد على تركيز المركبان

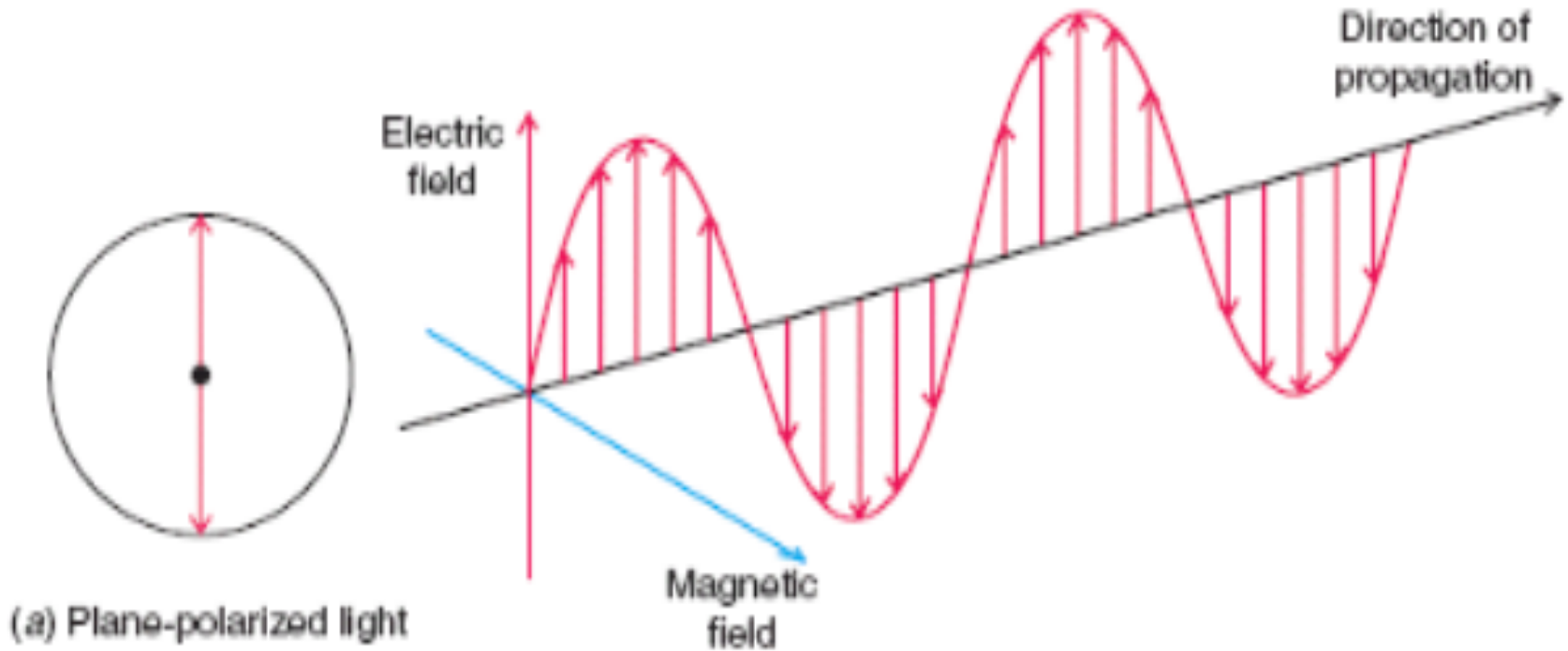
but the specific rotation (قيمة)

- ❖ The value of α depends on the particular experiment (since there are different concentrations with each run)
 - But specific rotation $[\alpha]$ should be the same regardless of the concentration

- ❖ Two enantiomers should have the same value of specific rotation, but the signs are opposite



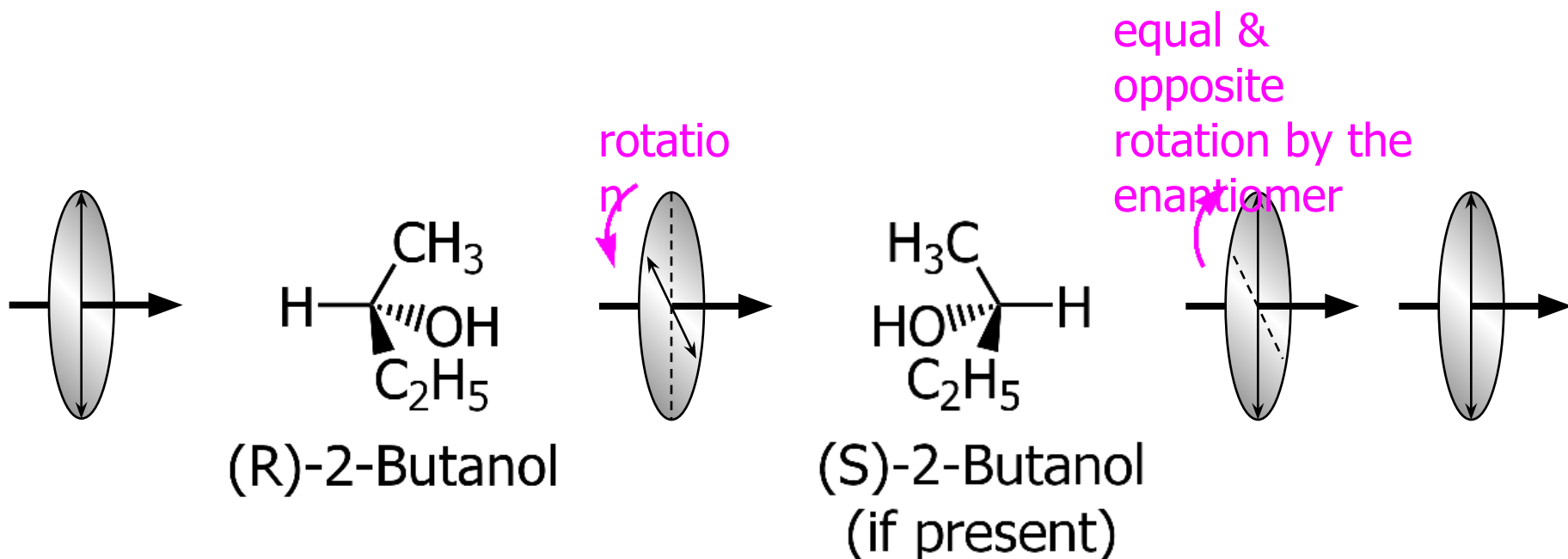
8. The Origin of Optical Activity





8A. Racemic Forms → the compound mix of d and L or R and S

- ❖ An **equimolar mixture** of two **enantiomers** is called a **racemic mixture** (or *racemate* or *racemic form*)
- ❖ A racemic mixture causes no net rotation of plane-polarized light



ex: there is a enantiomer of D and L and
it racemic mixture [المختلطين متساويان]

the light $\rightarrow$ 15 For right
 $\hookleftarrow$ 15 For left [the net result = zero]

8B. Racemic Forms and Enantiomeric Excess

- ❖ A sample of an optically active substance that consists of a single enantiomer is said to be **enantiomerically pure** or to have an **enantiomeric excess** of 100%