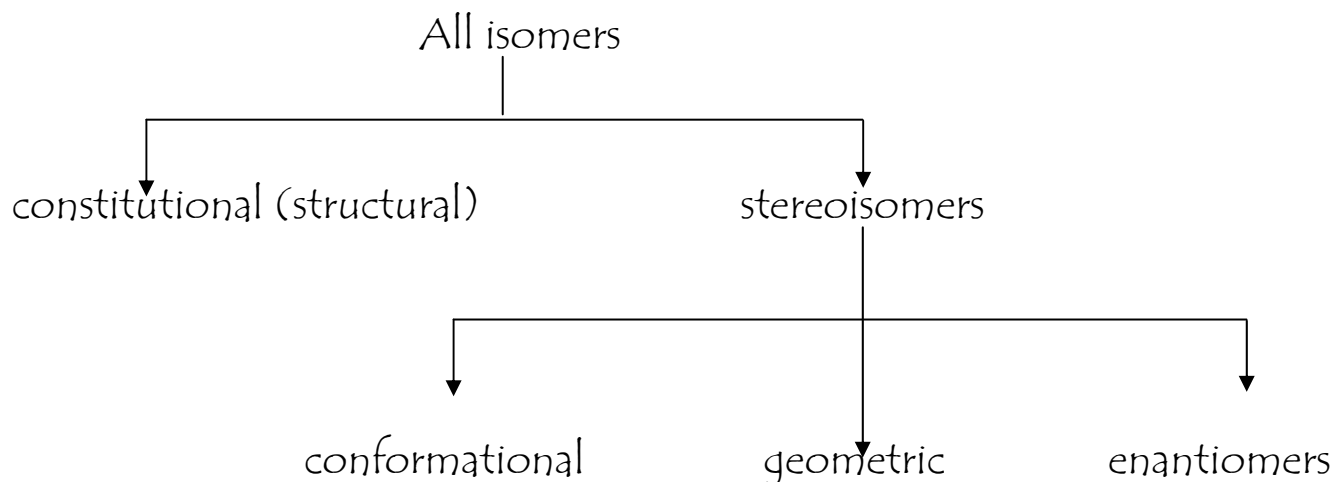


# Chirality: an Introduction



## Stereoisomers

chiral carbon = chirality center = stereocenter = asymmetric carbon

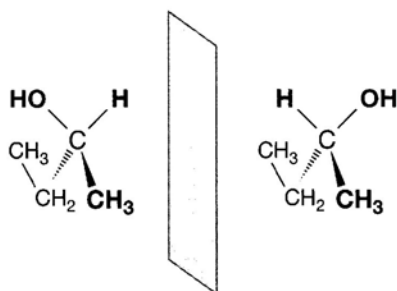
chiral carbon:

2-butanol is a chiral compound, because carbon-2 is bonded to four different groups. 2-propanol is achiral.

# Enantiomers

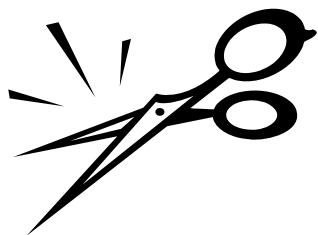
## chiral compounds

Compounds with one chiral carbon exist as a "pair of enantiomers".

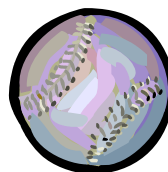


There are chiral objects in everyday life. They tend to occur in pairs or are described as "right" or "left".

Classify the following objects as chiral or achiral.



a) \_\_\_\_\_



b) \_\_\_\_\_

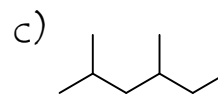
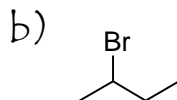
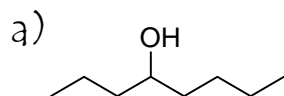


c) \_\_\_\_\_



d) \_\_\_\_\_

Star the chiral carbons



Draw the skeletal-line structure for 3-ethyl-4-methylhexane and star any chiral carbons.

One of the following molecules is chiral, but the other two are not. Draw the skeletal-line structure for each compound. Circle the chiral compound and star its chiral carbon.

a) 2-methylheptane

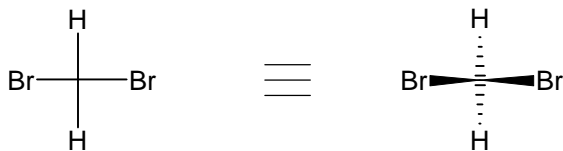
b) 3-methylheptane

c) 4-methylheptane

## Drawing Enantiomers

Let's start simple – an achiral molecule

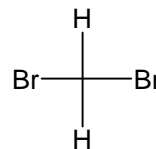
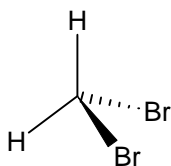
### Fischer Projections



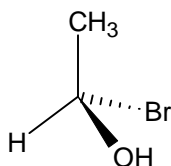
Perspective formula



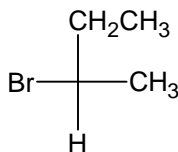
Fischer Projections



Draw the Fischer Projection for the following compound.



Draw the perspective formula for the following compound.



## Optical Rotation of Polarized Light

Enantiomers share many properties

bp, mp, density, refractive index & solubilities

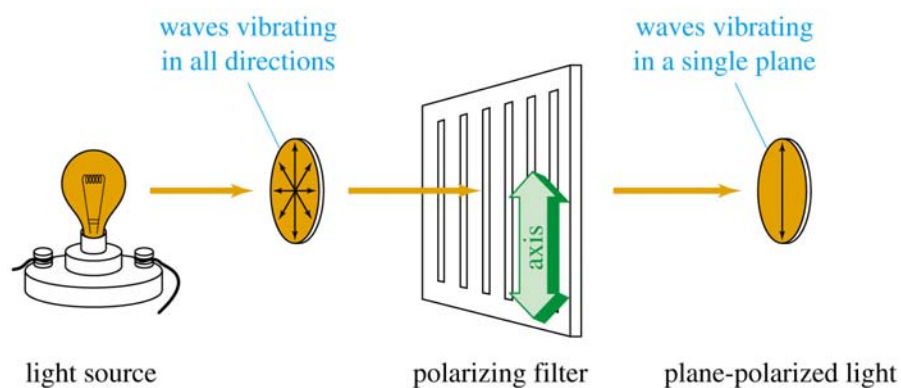
However, they interact differently with polarized light.

Enantiomers rotate polarized light in equal & opposite directions, so they are also called optical isomers.

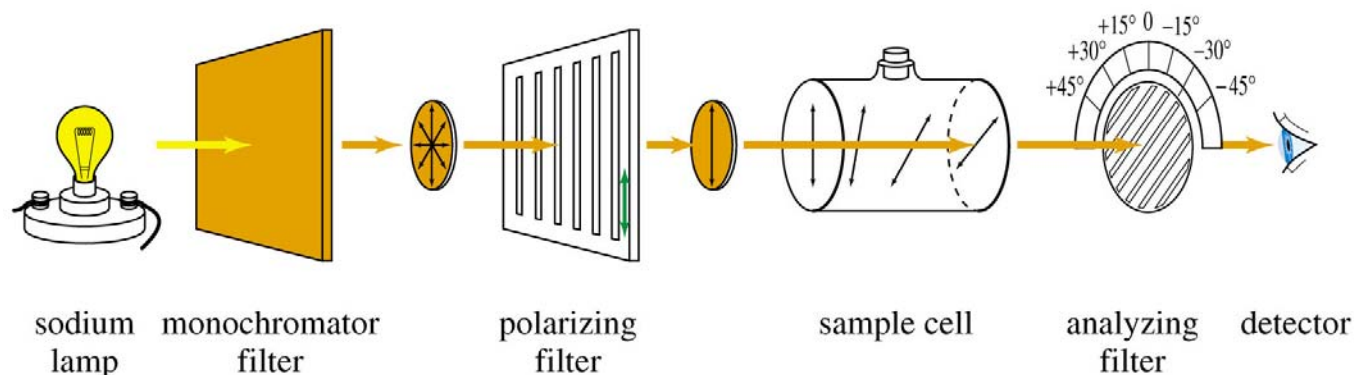
Optical activity = capable of rotating the plane of polarized light

### Polarized Light

The waves of plane polarized light vibrate in a single plane.



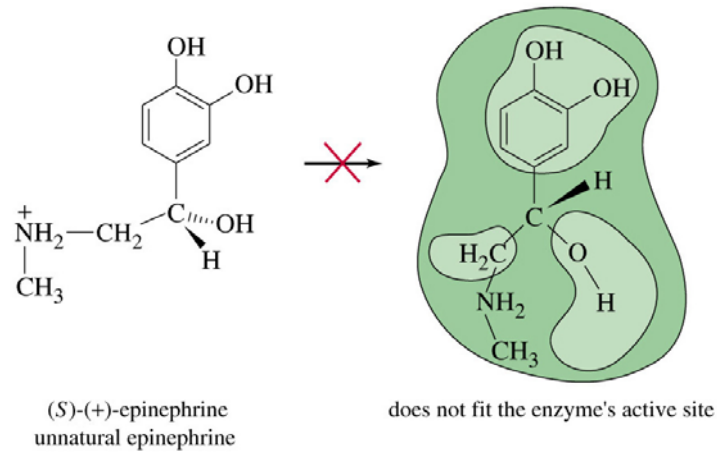
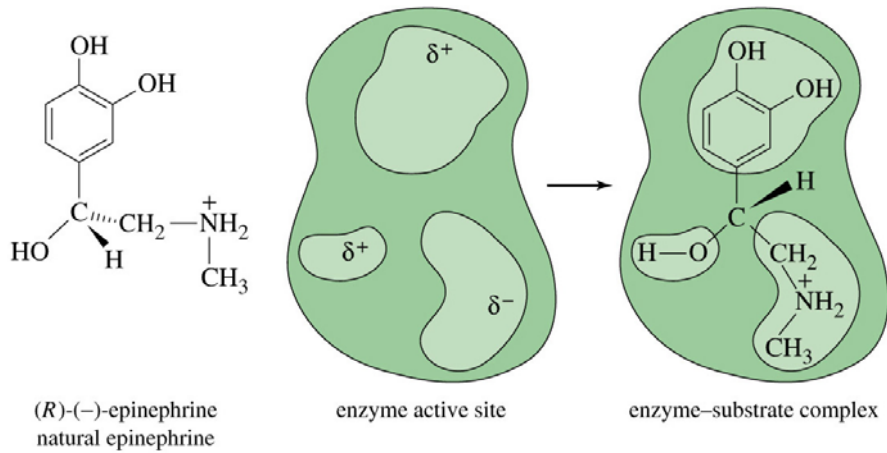
An enantiomer rotates the plane of the polarized light.



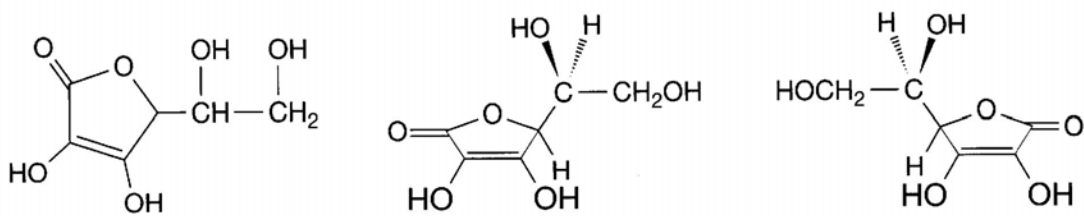
The pair of enantiomers are distinguished by the direction they rotate polarized light:  $d$  = dextrorotatory = (+) for clockwise rotation and  $l$  = levorotatory = (-) for counter-clockwise rotation.

# Biological Discrimination of Enantiomers

epinephrine (adrenalin)



vitamin C (ascorbic acid)



thalidomide

