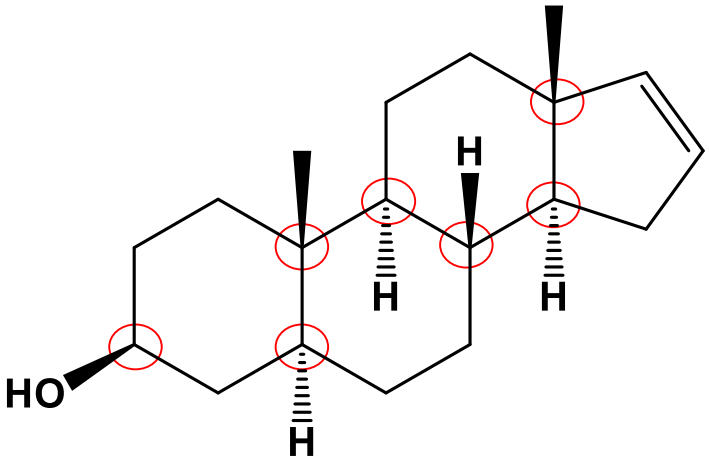
Review: Chirality in natural products.

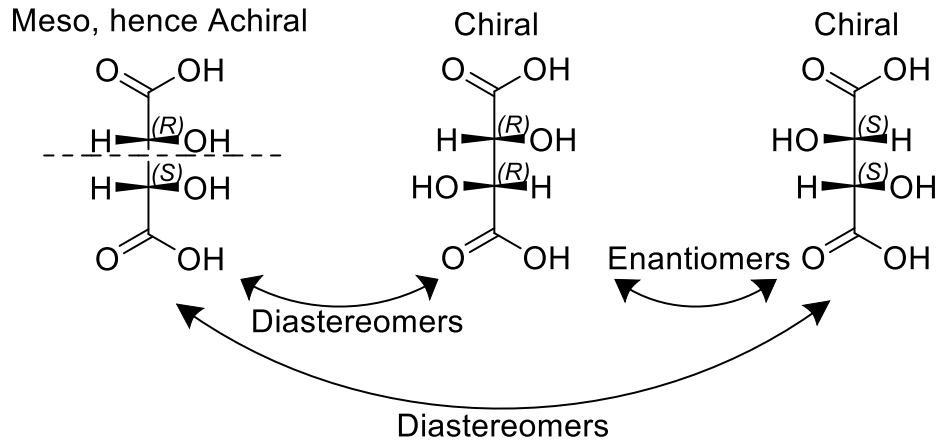
Androstenol (androst-16-ene-ol):

- Male sex pheromone also present in truffles
- ~50% of humans can smell it (genetically determined)
- Seven stereogenic centers labeled in red



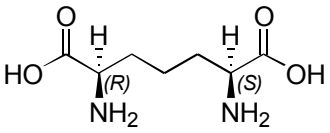
Tartaric Acid:

Fischer Projection – A convention for drawing organic molecules in which horizontal groups are understood to point toward you, and vertical groups backward.



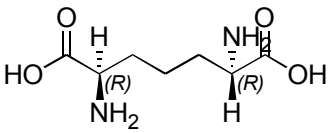
Meso Compounds: Have stereogenic/chiral centers but are achiral. R,S-tartaric acid above has an internal plane of symmetry.

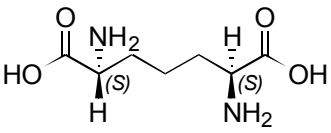
Another example of a meso compound:



All compounds with an internal plane of symmetry are achiral (not chiral).

However if one of the chiral centers were switched:





- A set of enantiomers is generated – each of these is a diastereomer of the meso isomer

Physical Properties of Enantiomers

- Same physical properties with achiral agents or procedures
    - Melting point, boiling point, solubility in achiral solvents
- Enantiomers behave differently with chiral agents
- Diastereomers have different physical properties (m.p, b.p, density, solubility)

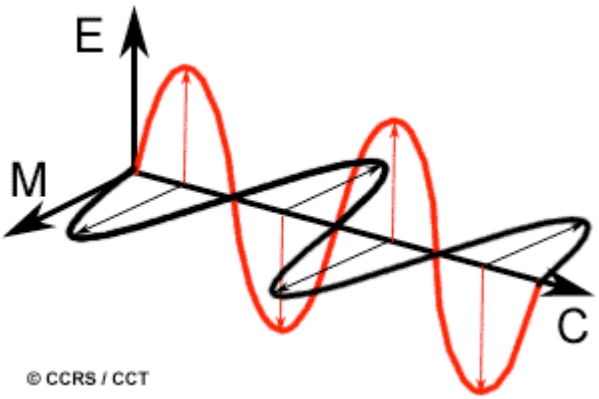
Optical Activity

- Rotation of polarized light
    - Dextrorotatory (right) (+)
    - Levorotatory (left) (-)
- Pure enantiomers show equal but opposite rotation

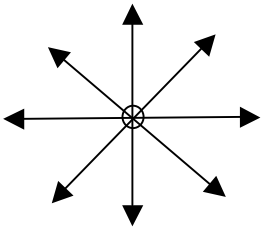
Light: Electromagnetic radiation

Light → $E = h\upsilon = \frac{hc}{\lambda}$

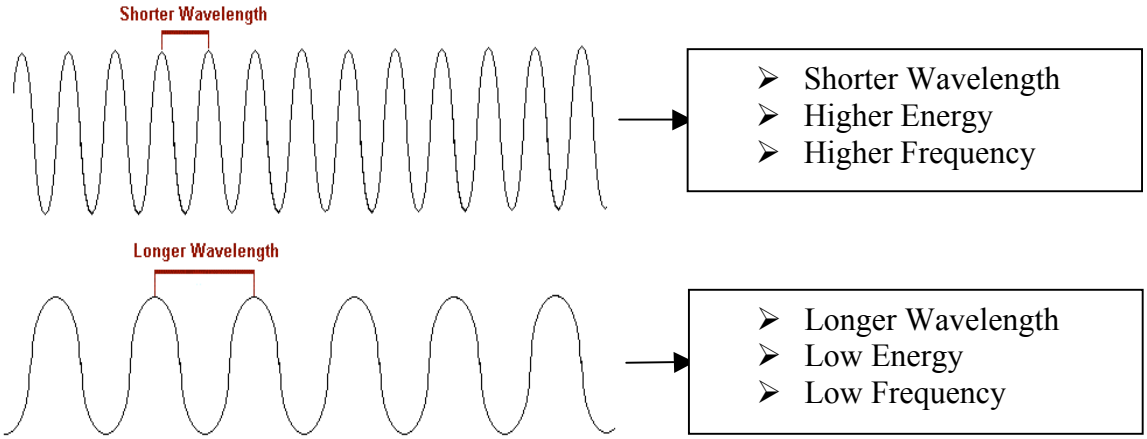
υ = frequency E = energy h = Planck's constant λ = wavelength
c = speed of light

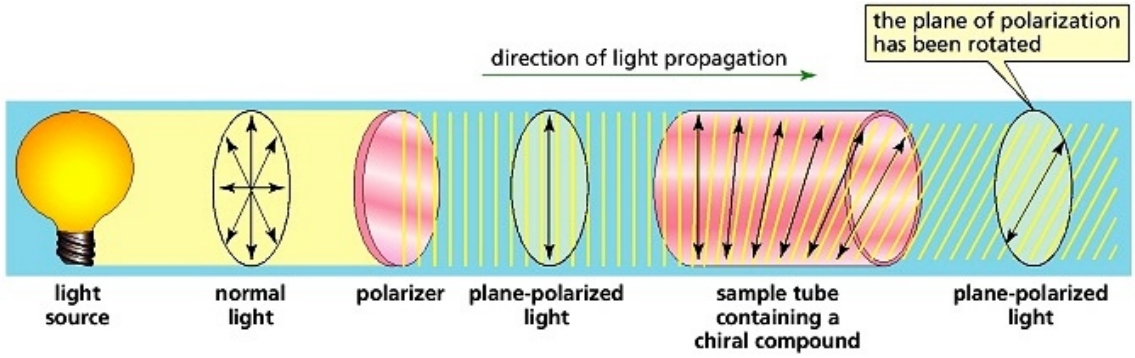


Light has an oscillating electric field (red) combined with a magnetic field (black)



End on view of vector components of normal light. It is possible to polarize light and remove some of those vectors.





Optical Rotation

$[\alpha]_D$ = Absolute rotation at the D line of sodium (589 nm)

$$[\alpha]_D = \frac{\alpha}{c \bullet l}$$

α = measured rotation (°) c = concentration (mol/L) l = path length (cm)
D = D-line of sodium light [α] = absolute rotation

Degrees (°) = + : Clockwise
- : Anticlockwise