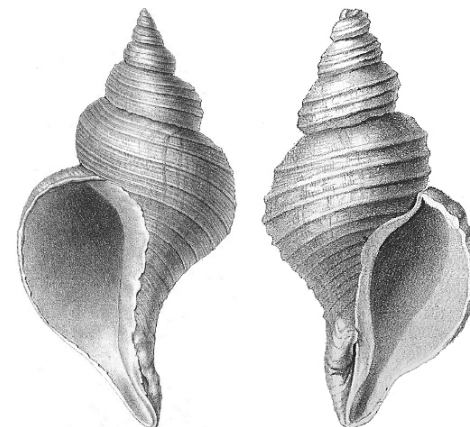
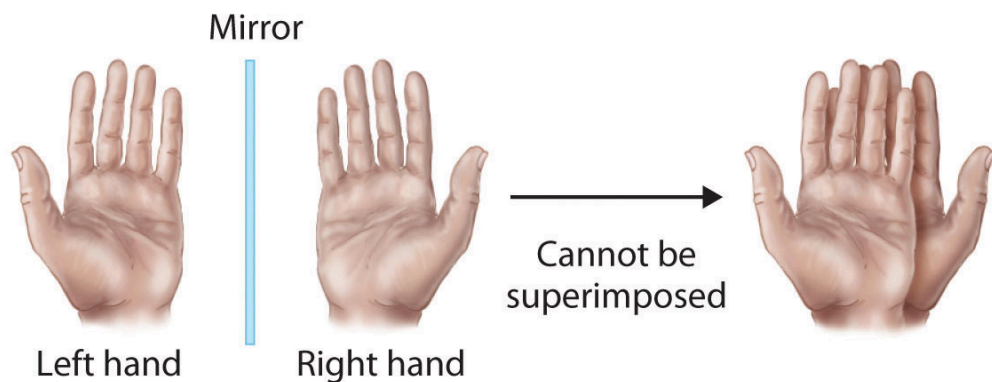


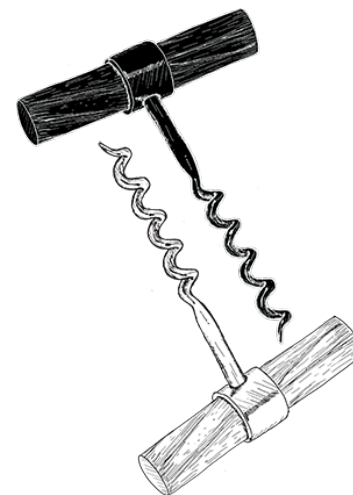
Chirality – An object which is non-superimposable on its mirror image is said to be chiral (derived from the Greek term ‘cheir’ meaning hand).



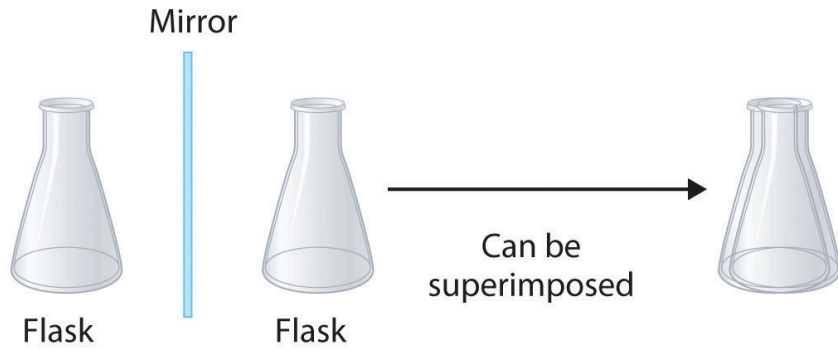
Right-Handed



Left-Handed



Achiral objects



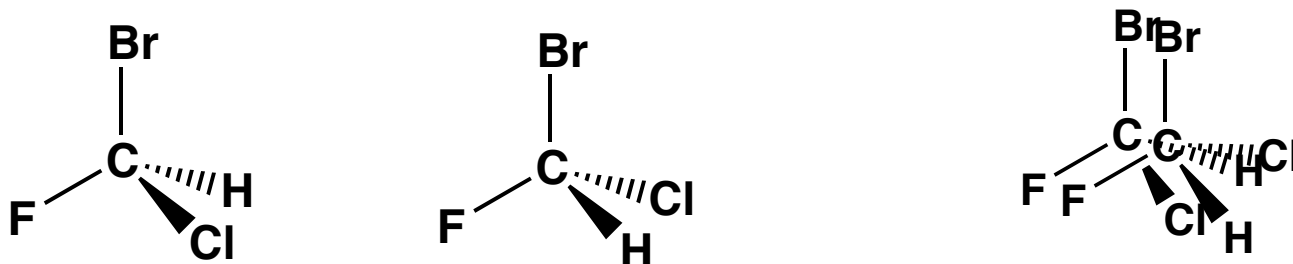
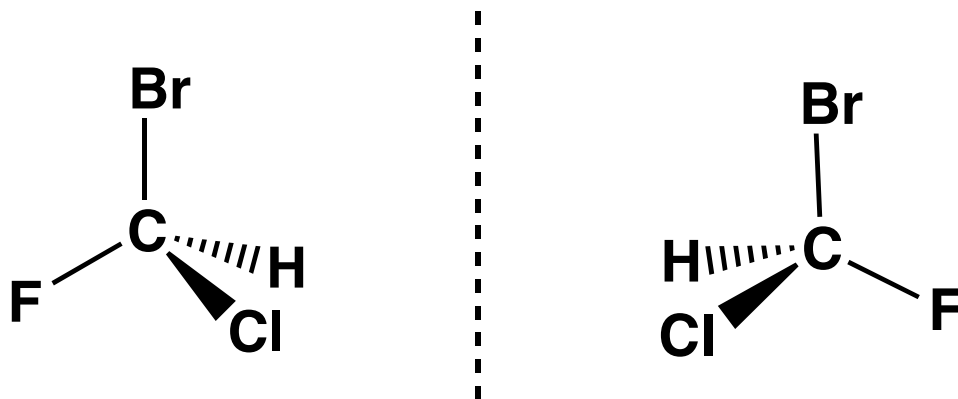
Object



Mirror image



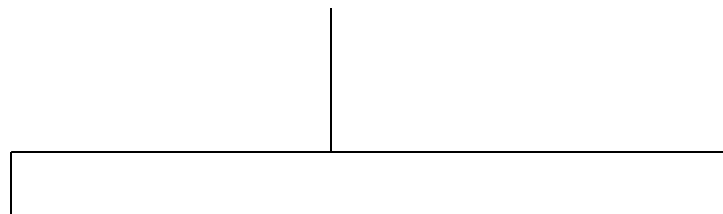
Chiral Molecules: (1) Bromochlorofluoromethane
Contains a tetrahedral carbon with four different
substituents (F, Cl, Br and H)



Molecules which are non-superimposable mirror images
are called 'enantiomers' – Examples of stereoisomers

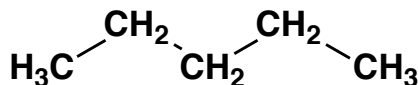
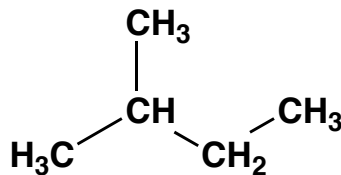
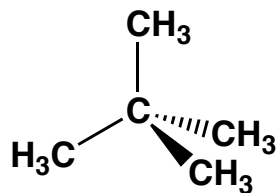
Isomers – Molecules with the same molecular formula but with different structure

Isomers



Constitutional isomers

- different atom to atom connectivity



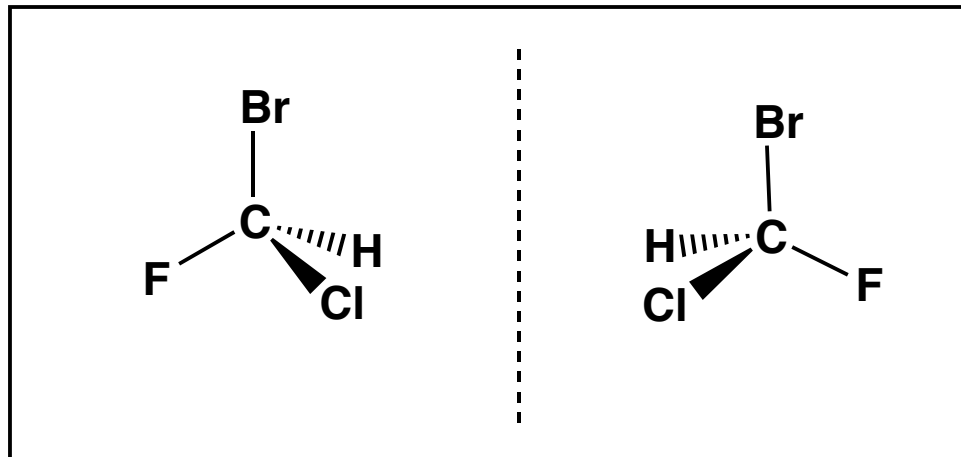
Stereoisomers

- same atom to atom connectivity but the arrangement in space is different

Stereoisomers

Same atom connectivity, but have a different 3-D arrangement of atoms

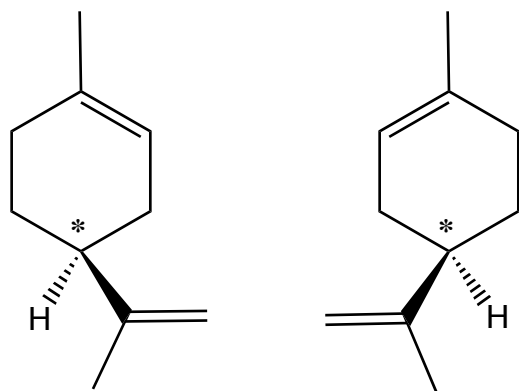
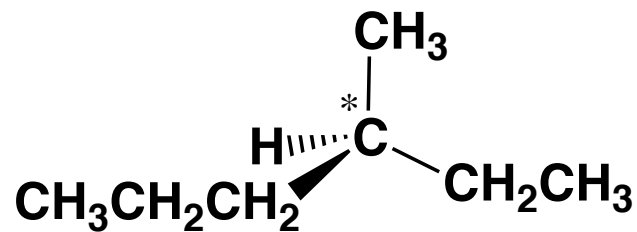
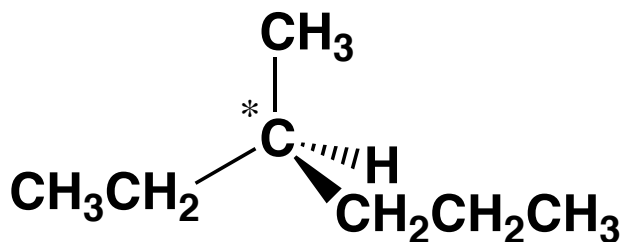
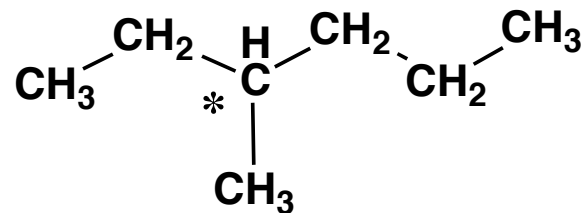
- Enantiomers are stereoisomers which are non superimposable mirror images



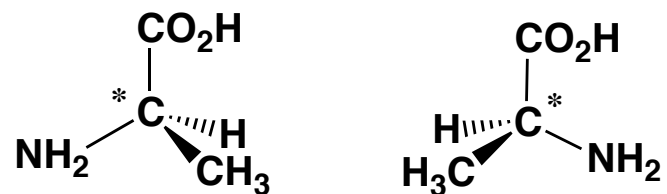
Examples of Chiral molecules

3-Methylhexane

* Denotes asymmetric carbon



Limonene enantiomers



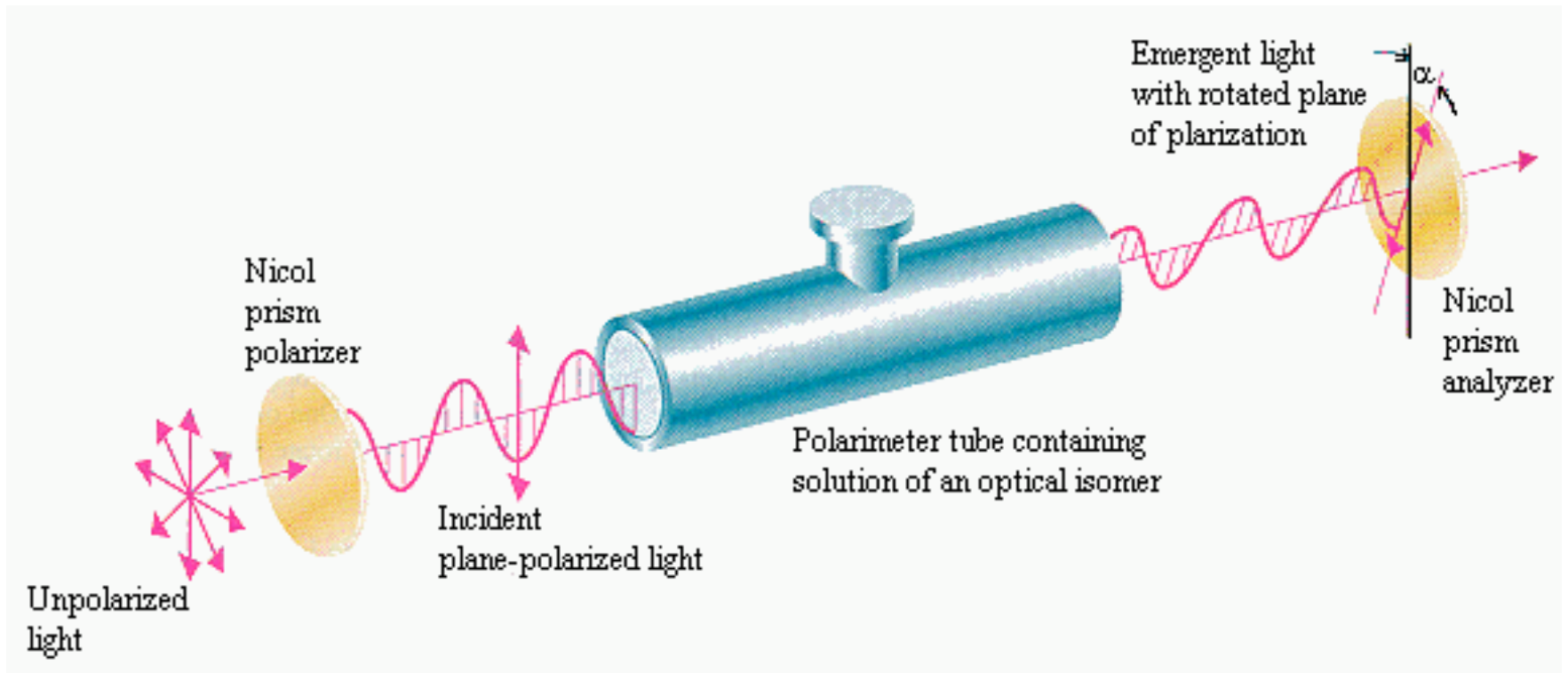
Enantiomers of the amino acid Alanine

How do the chemical and physical properties of enantiomers differ?

Enantiomers have identical physical properties except for the direction of rotation of plane-polarised light (PPL).

They will react in the same way with symmetric molecules but differently with asymmetric (often biological) molecules.

Polarimeter – An instrument for measuring the rotation of the plane of polarised light



Demonstration of optical rotation using the enantiomers of Limonene

Enzymes, which themselves are always chiral, often distinguish between the two enantiomers of a chiral substrate. Chiral objects (glove) have different interactions with the two enantiomers of other chiral objects (left and right hand).
Analogy: A left hand will not fit into a right-handed glove

