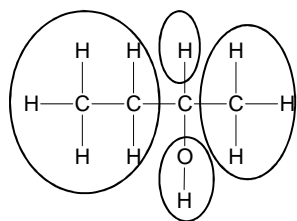


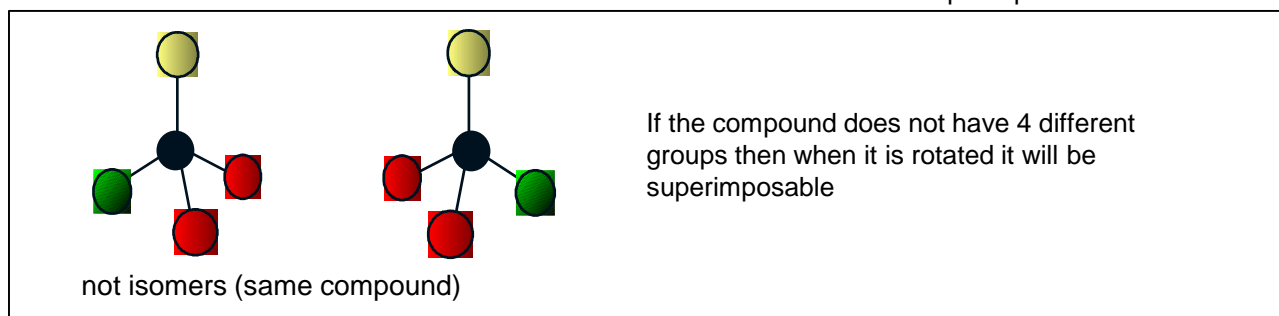
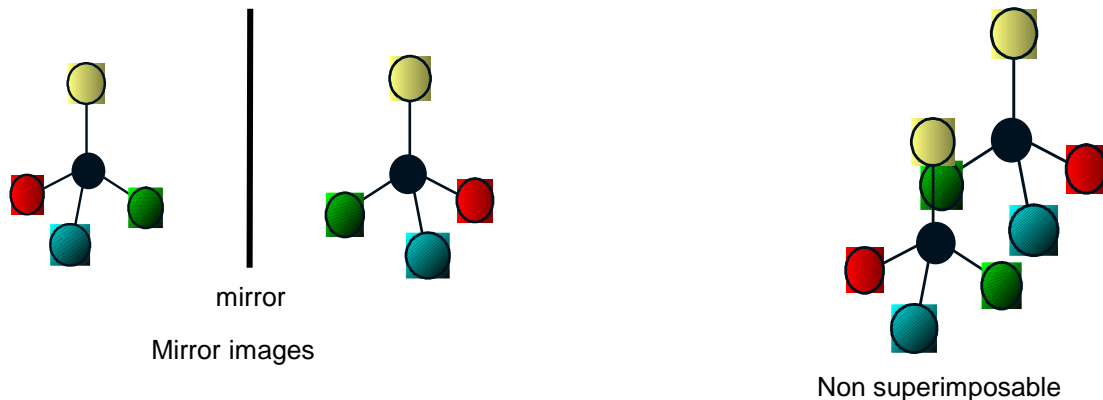
Optical Isomerism

Optical isomerism occurs in carbon compounds with 4 different groups of atoms attached to a carbon (called an **asymmetric carbon**).

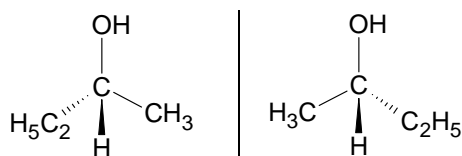


A carbon atom that has four different groups attached is called a **chiral** (asymmetric) carbon atom

This causes two different isomers that are not superimposable to be formed. They are mirror images



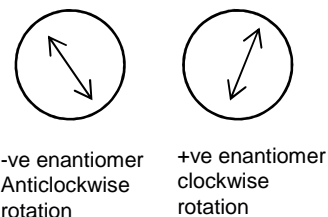
Butan-2-ol has four different groups around a carbon and so forms optical isomers



Two compounds that are optical isomers of each other are called **enantiomers**.

Optical isomers have similar physical and chemical properties, but they rotate plane polarised light in different directions.

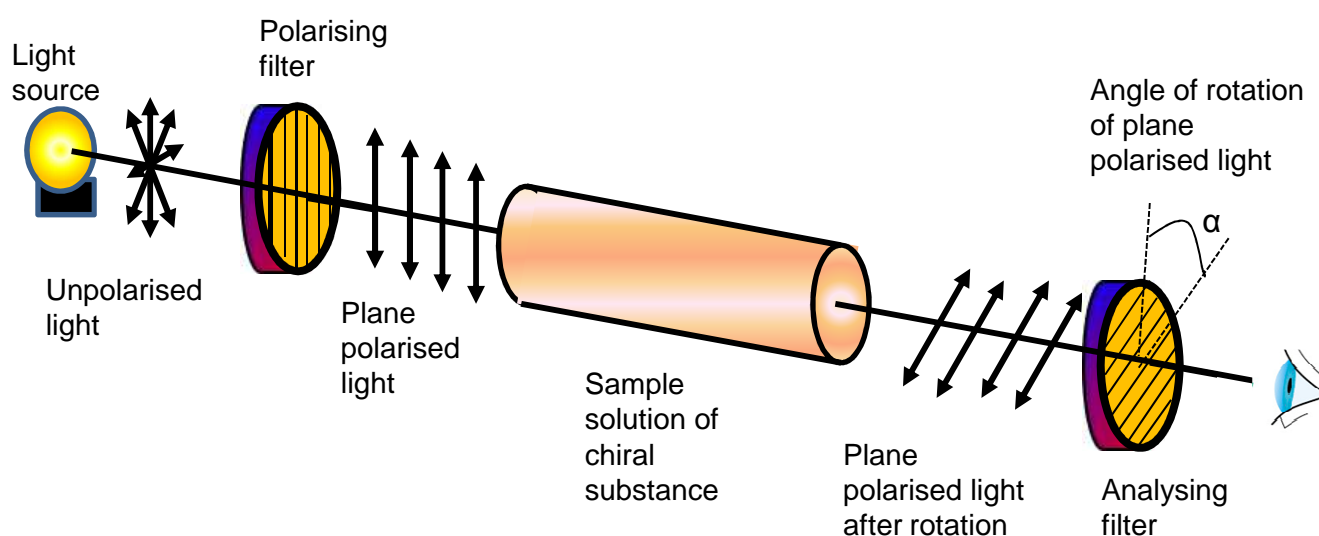
One enantiomer rotates it in one direction and the other enantiomer rotates it by **the same amount in the opposite direction**.



One optical isomer will rotate light clockwise (+)(called dextrorotatory). The other will rotate it anticlockwise(-)(called laevorotatory).

Polarimeter

The rotation of light by a chiral compound can be observed by using a polarimeter. The light source will produce unpolarised light which is light travelling in all planes. If this light is passed through a polarising filter then plane polarised light will be formed, which is light that only travels in one plane. When this passes through the sample of the chiral substance the plane polarised light will rotated in to a different plane.



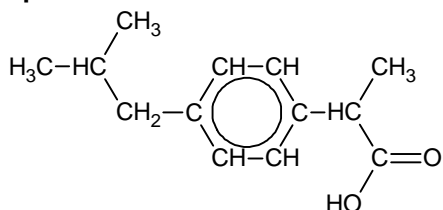
Method for using a polarimeter

- first put water in sample tube and rotate analysing filter to block out light
- replace water with sample. If the sample is chiral light will be seen
- rotate analysing filter again to block out light. The amount the analyser is rotated is the amount the light has been rotated.

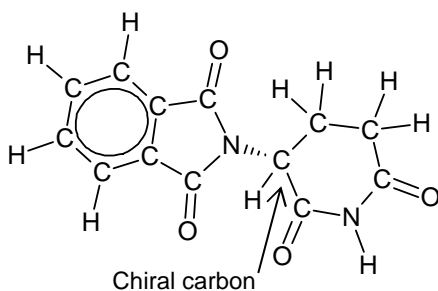
Drug action and optical isomers

Drug action may be determined by the stereochemistry of the molecule.
Different optical isomers may have very different effects

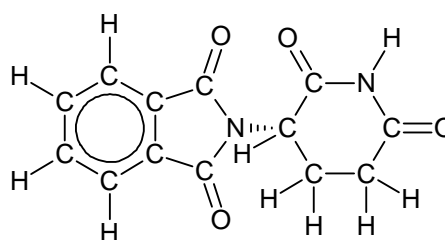
Ibuprofen



Thalidomide



R thalidomide (dangerous drug)



S thalidomide (effective drug)

One enantiomer of thalidomide causes birth defects in unborn children whilst the other had useful sedative properties. It was used as a drug to treat pregnant women with morning sickness. At the time the side effect was not known. Unfortunately it was given in a racemic mixture when first used and many babies were born with birth defects