

- ① PROPERTIES OF ALKANES
- ② REACTIONS / SOURCES / IMPORTANCE

### CH3 ③ STEREOCHEMISTRY

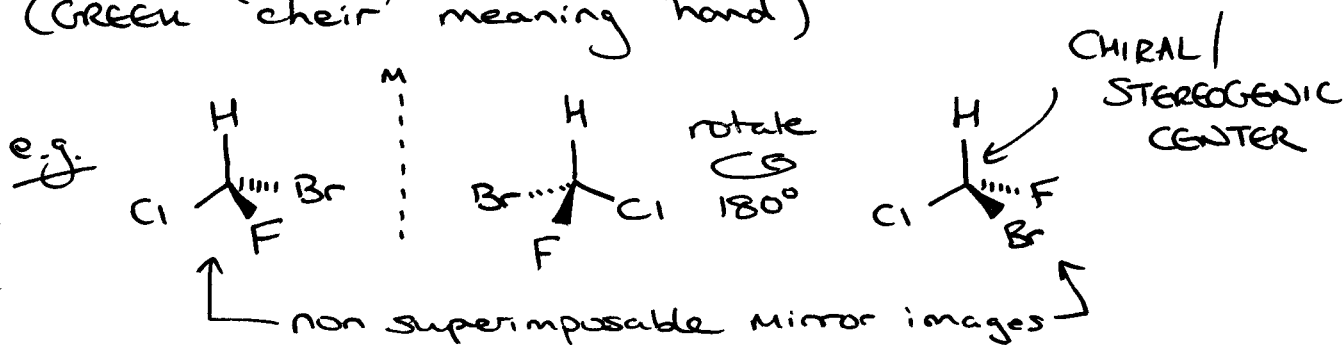
- ④ CHIRALITY / CHIRAL CENTERS
- ⑤ R/S DESIGNATION

#### ①-③ Lec 9 notes

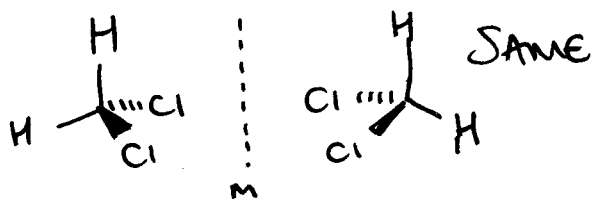
A major part of STEREOCHEMISTRY is being able to recognise mirror images

#### ④ CHIRALITY

An object (molecule) that is NOT superimposable on its mirror image is said to be chiral (Greek 'cheir' meaning 'hand')



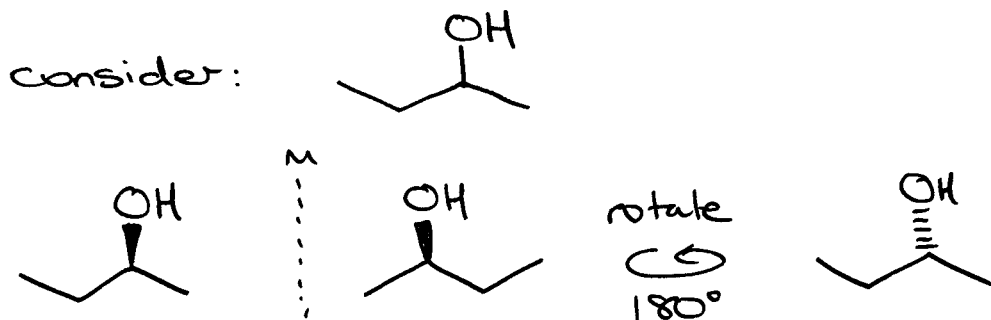
So each of these molecules is CHIRAL, and they are ENANTIOMERS



If an object (molecule) is not CHIRAL, it is ACHIRAL

One of the most common causes of chirality in organic molecules is a TETRAHEDRAL ATOM (usually C) bonded to four different groups

\* THIS DOES NOT DEFINE "CHIRAL"



ENANTIOMERS COME IN PAIRS.

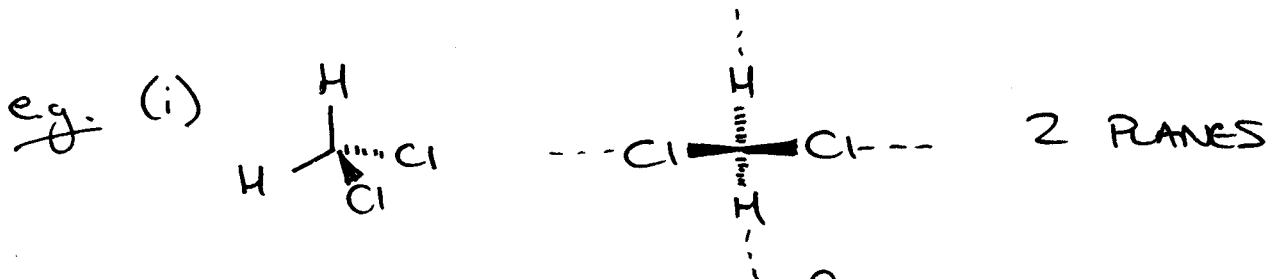
- IDENTIFYING CHIRAL OBJECTS

If a molecule can be drawn with:

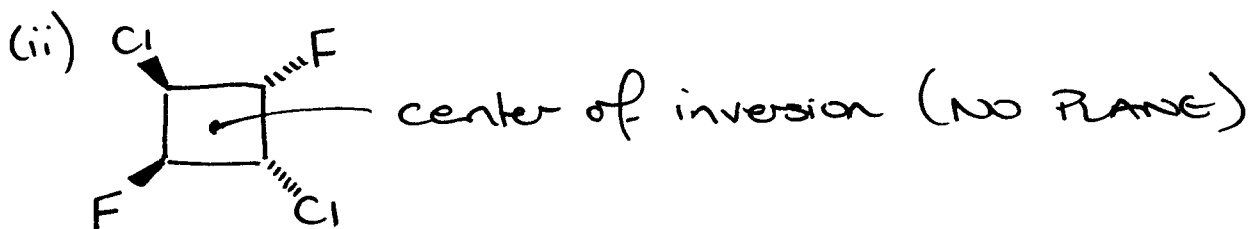
(i) a PLANE of SYMMETRY or

(ii) an INVERSION CENTER

⇒ IT IS ACHIRAL



you will see this more often than:



3

centre of inversion  $\Rightarrow$  identical groups lie equidistant of a point on opposite sides of that point

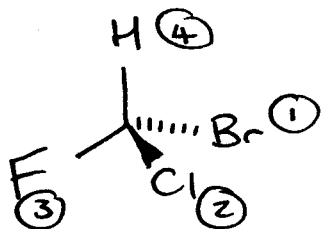
- DISTINGUISHING ENANTIOMERS



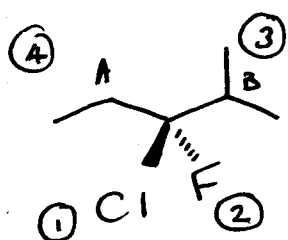
R,S designation

- assign priority

(i) ATOMIC WEIGHT of atoms on a Stereocenter



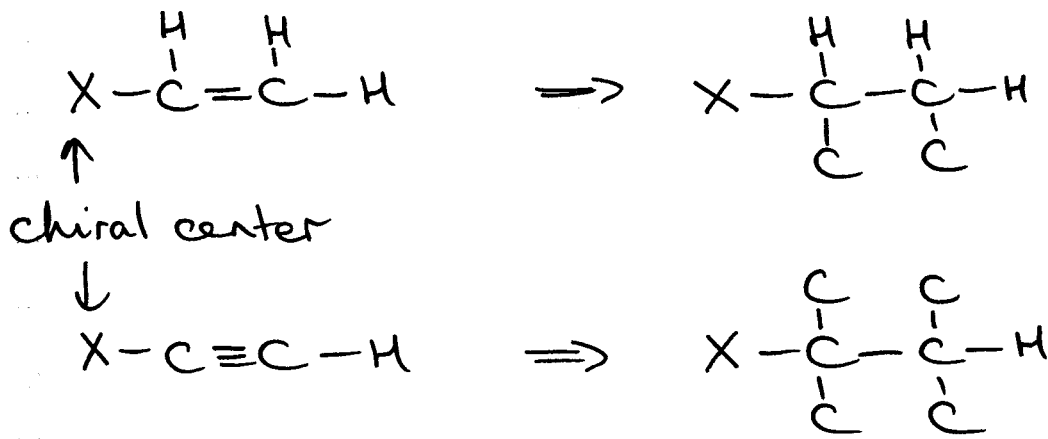
(ii) FIRST POINT OF DIFFERENCE



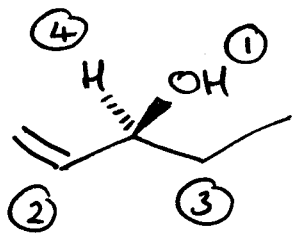
$C_A$  attached to C, H, H (4)  
 $C_B$  attached to C, C, H (3)

(HOW MANY CHIRAL CENTERS)

(iii) MULTIPLY BONDED ATOMS - count as the equivalent number of singly bonded atoms



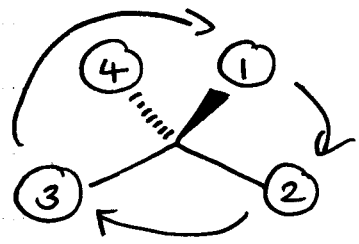
So, consider:



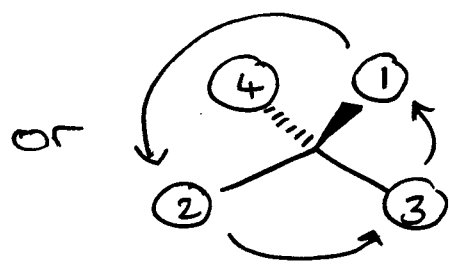
use 1,2,3,4 to set R/S

Rotate whole molecule in space to put the lowest priority group in the back =>

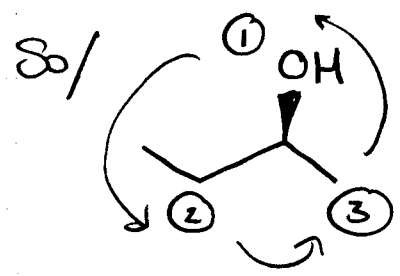
Two POSSIBLE ORIENTATIONS:



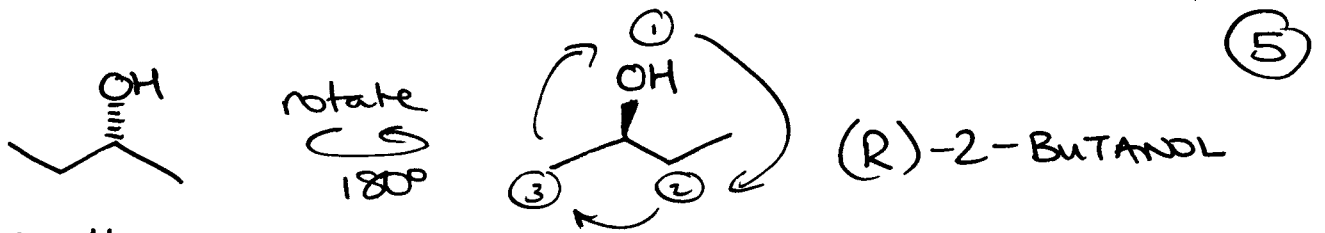
CLOCKWISE (R)



COUNTERCLOCKWISE (S)



(S)-2-BUTANOL

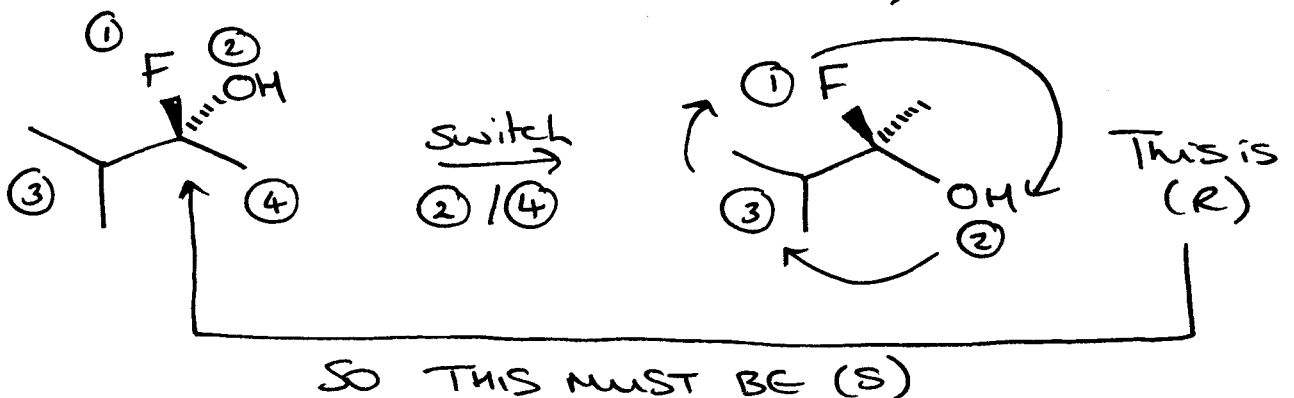
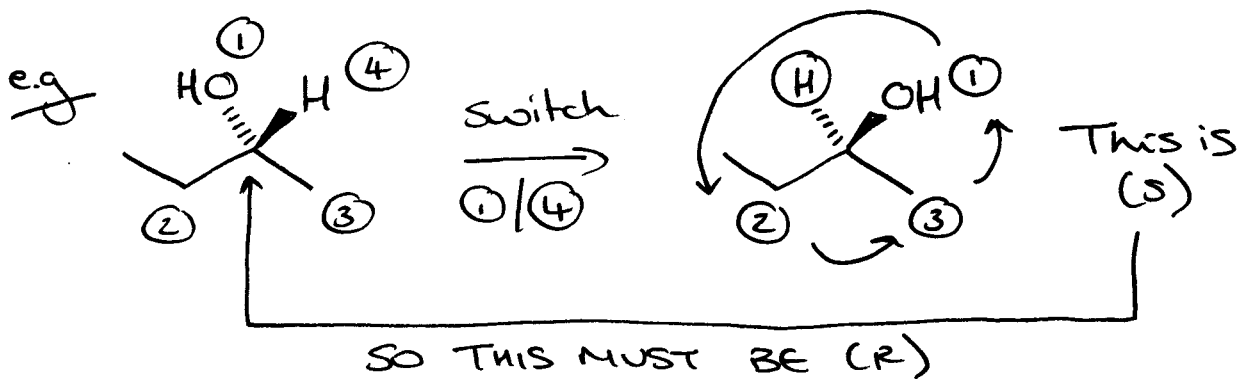


Small group is NOT in the back

or if you have trouble rotating molecules

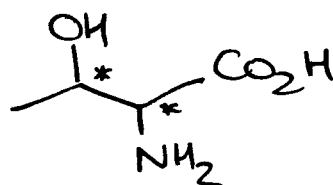
TRICK

- switch lowest priority group (4) with the group that is in the back
- assign R/S, and switch

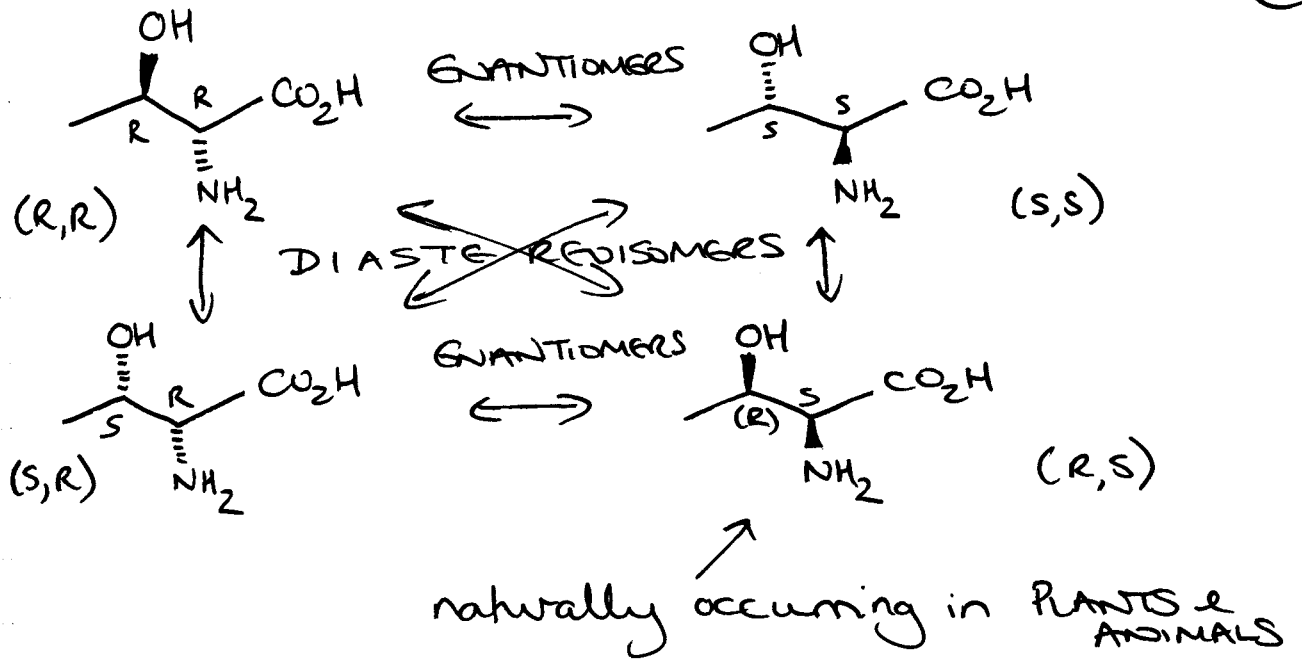


- compounds w/ more than one stereocenter

THREONINE  
(amino acid)



2 CHIRAL CENTERS



DIASTEREOMERS — NON MIRROR IMAGE STEREOMERS.