

LEC ⑨

CHEM 30A

①
Oct 19th

① CYCLOHEXANES

READ 3-3.5

② PROPERTIES OF ALKANES

③ REACTIONS / SOURCES / IMPORTANCE

- CH₃

④ STEREOCHEMISTRY

⑤ CHIRALITY / CHIRAL CENTERS

①-③ Lec 8 notes

④ STEREOCHEMISTRY

ISOMERS - different compounds with the same molecular formula.

CONSTITUTIONAL ISOMERS

or

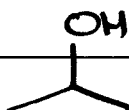
STEREISOMERS
(configurational isomers)



Different connectivity

Same connectivity of atoms, BUT different geometries in 3D space

eg:



more categories

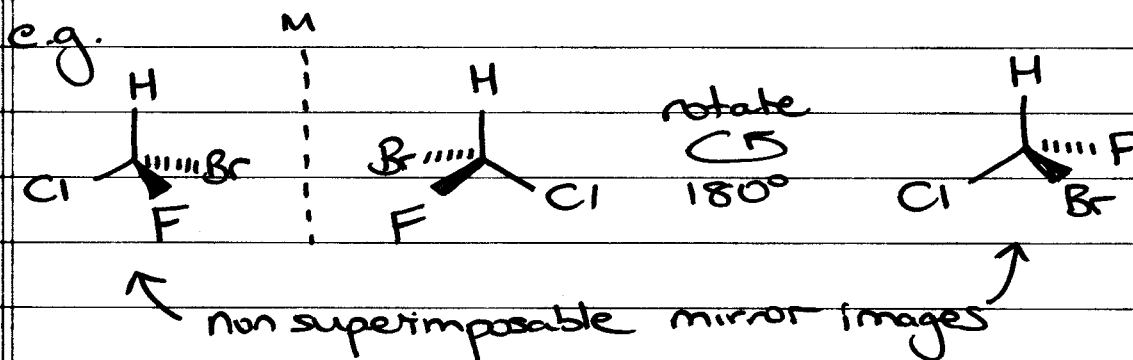
STEREISOMERS → ENANTIOMERS
 (non superimposable mirror images)

DIASTEREOISOMERS (non mirror image stereoisomers) → Configurational diastereoisomers
 → cis/trans diastereoisomers

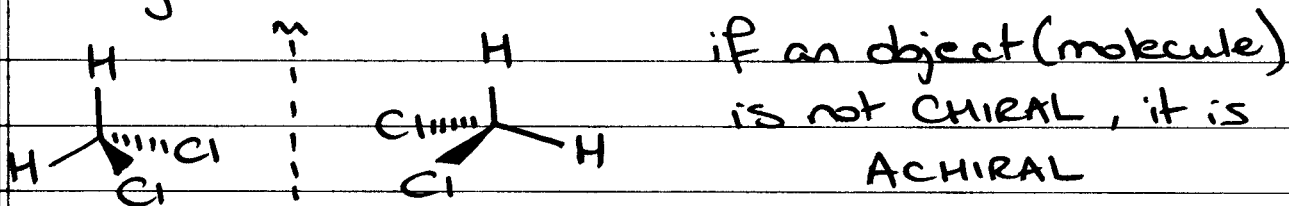
A MAJOR part of STEREOCHEMISTRY is being able to recognise mirror images.

(5) CHIRALITY

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



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

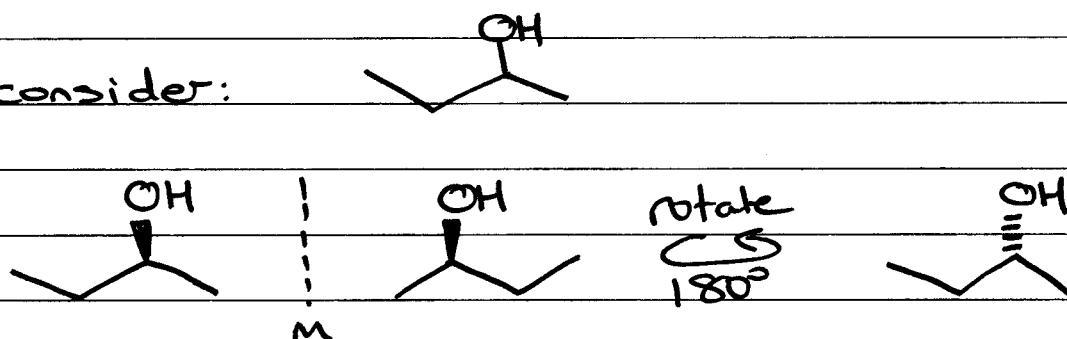


3

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"

consider:



ENANTIOMERS COME IN PAIRS

- Identifying CHIRAL objects

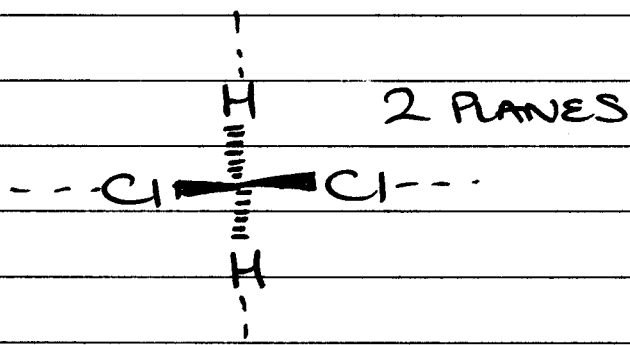
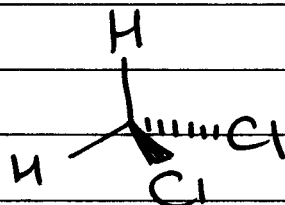
If a molecule can be drawn with:

- (i) a PLANE OF SYMMETRY or
- (ii) an INVERSION CENTER

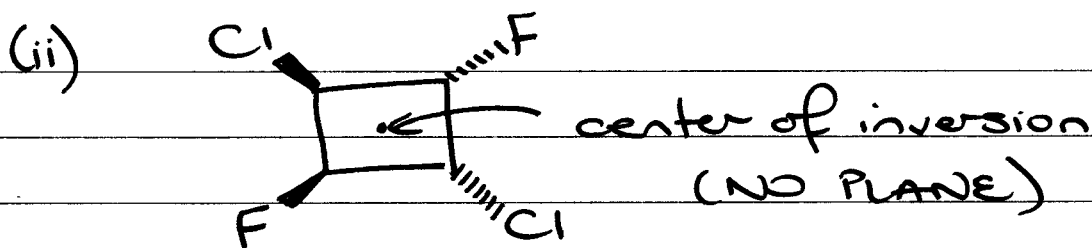
it is ACHIRAL

e.g.

(i)

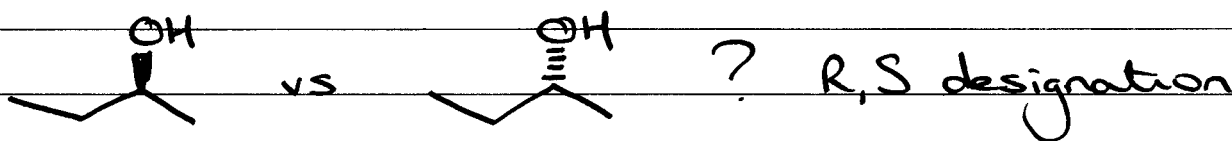


you will see this more often than:



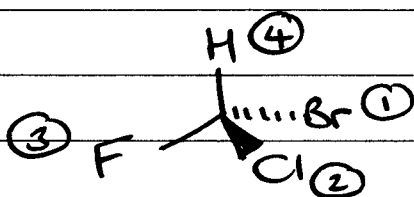
centre of inversion \Rightarrow identical groups lie equidistant of a point, on opposite sides of that point.

- DISTINGUISHING ENANTIOMERS

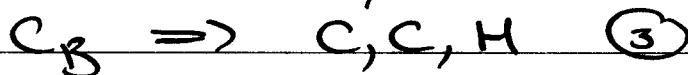
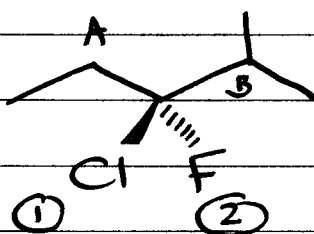


- assign priority to 4 groups

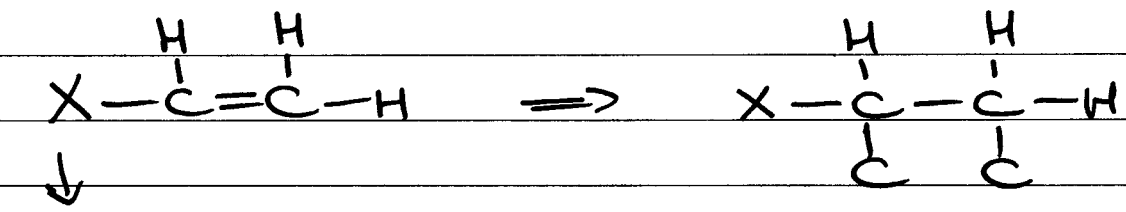
(i) ATOMIC WEIGHT



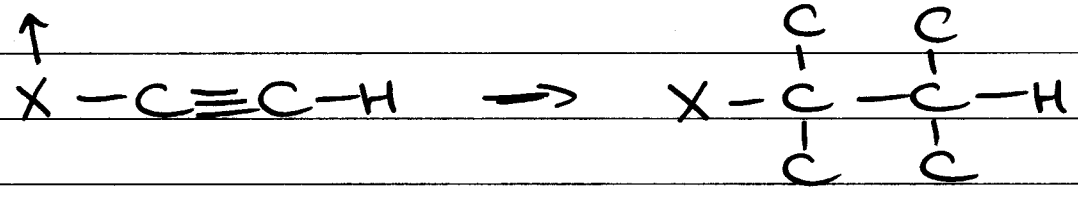
(ii) FIRST POINT OF DIFFERENCE



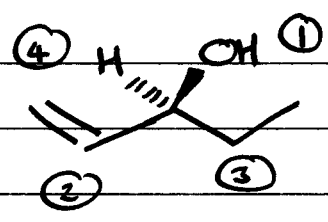
(iii) MULTIPLY BONDED ATOMS - count as the equivalent number of singly bonded atoms



↓
chiral center



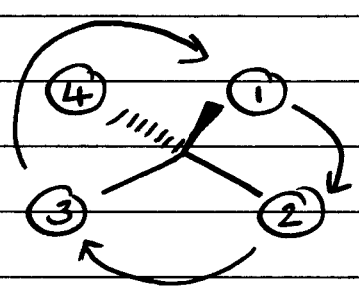
So, consider



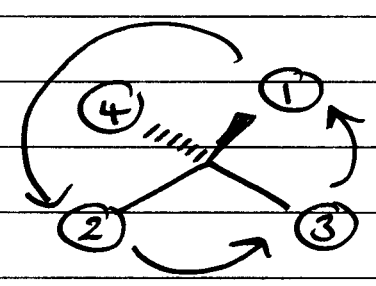
use 1, 2, 3, 4 to set R/S

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

TWO POSSIBLE ORIENTATIONS



OR



CLOCKWISE (R)

COUNTERCLOCKWISE (S)