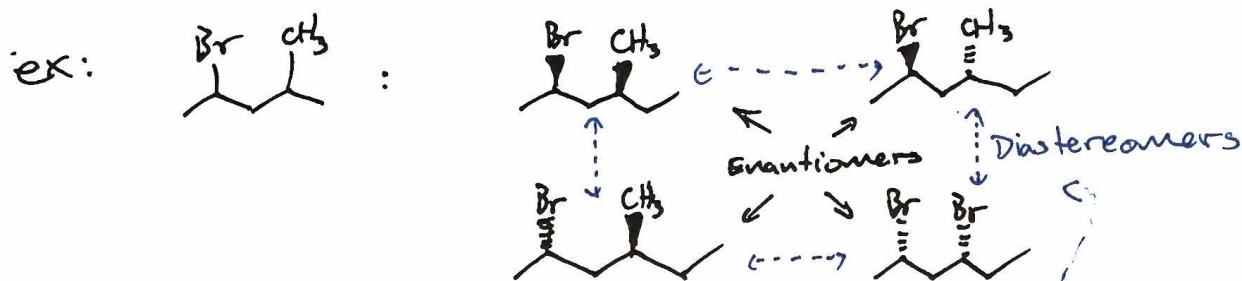


* Let them spend more time on Wow

stereochemistry II

For n chiral centers $\Rightarrow 2^n$ maximum # of stereoisomers



Enantiomers \Rightarrow mirror image stereoisomers

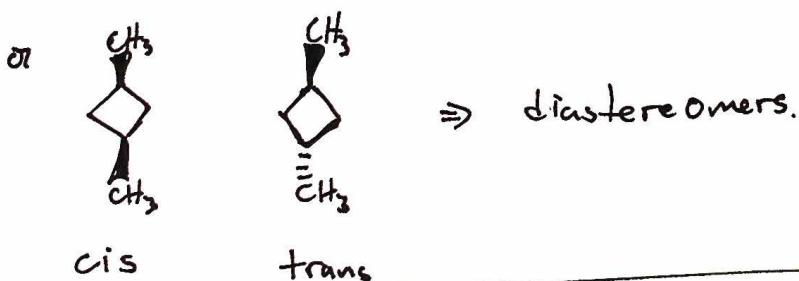
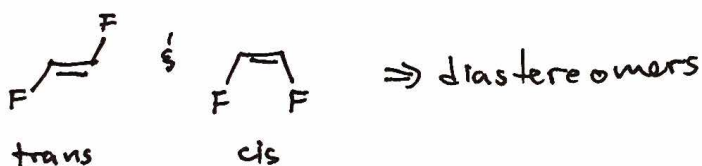
(all have same physical & chemical properties)

Diastereomers \Rightarrow non-mirror image stereoisomers

(all have different physical & chemical properties)


\hookrightarrow these can be configurational
or cis/trans isomers.

ex.



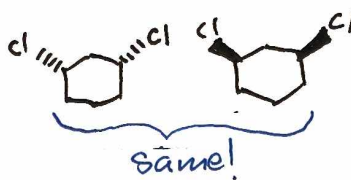
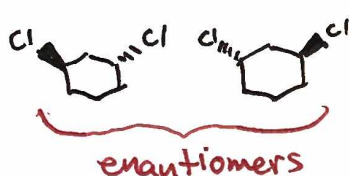
* Are all molecules with a chiral center **chiral**?
(stereogenic center)

No! consider: 

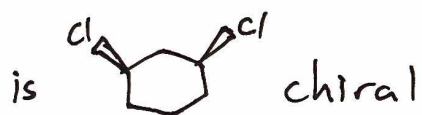
how many chiral centers? **2** 

how many diff molecs do you expect? $2^n = 2^2 = \underline{\underline{4}}$

draw them:



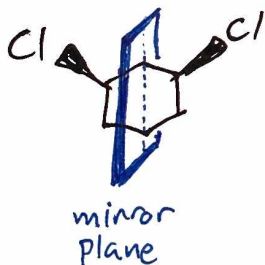
\therefore only 3 different ones.



or achiral?

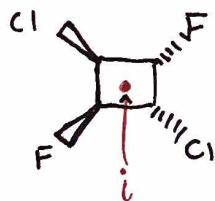
\rightarrow molecule that contains a chiral center, but is not chiral.

Molecules that contain a plane of symmetry or **center of inversion** (i)
are achiral molecules called MESO COMPOUNDS.



mirror plane? \checkmark

~~center~~ i ? \times



mirror plane? \times

i ? \checkmark

$i \Rightarrow$ for any atom in the molecule, an identical atom exists diametrically equidistant opposite of i .

Let's recap:

Q1: Is it a chiral center?

Yes, if bonded to 4 different groups.

No, if at least two groups are identical.

If it is a chiral center - assign R or S! sanity check: if you can't assign R or S because there aren't 4 different groups, it wasn't a chiral center!

Q2: Is the molecule chiral?

Yes, if there is no mirror plane or center of inversion.

No, if there is.

- Was there a chiral center?

Yes - molecule is meso

No - molecule is achiral.

*chirality is a property of a substance

Isomerism

Flow-chart

Same Molec Formula? $\xrightarrow{\text{NO}}$ Not Isomers

\downarrow yes
Isomers

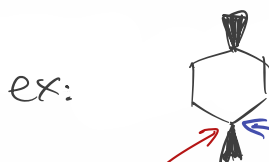
\downarrow
Same connectivity? $\xrightarrow{\text{NO}}$ Constitutional Isomers

\downarrow yes
Stereoisomers

\downarrow
Superimposable mirror image of each other? $\xrightarrow{\text{NO}}$ (achiral)
Diastereomers
(including cis/trans)
& configuration @ stereogenic centers

\downarrow yes
Enantiomers
(chiral)

Note: All chiral centers are stereogenic centers, but not all stereogenic centers are chiral.



stereogenic center
(gives rise to cis/trans isomerism)