

- ① R/S DESIGNATION
- ② FISCHER PROJECTIONS
- ③ CIS/TRANS DIASTEREISOMERS

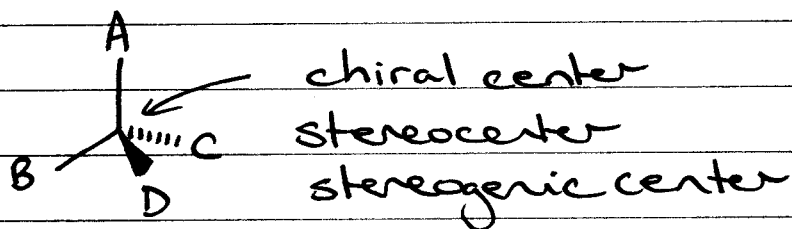
+ WEB PROBLEMS

READ 3.4-3.5, PROBLEMS 3.1-3.8, 3.14-3.33

MIDTERM, WEDS, A-J C576, K-Z C550

- ID, MODEL KITS etc

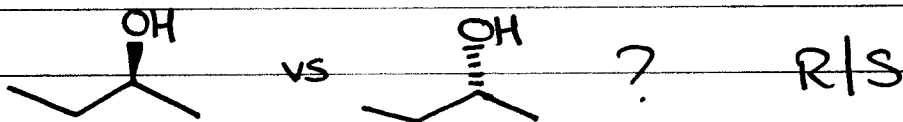
① R/S DESIGNATION



Tetrahedral atom

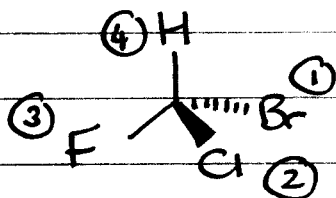
4 Different groups

- DISTINGUISHING ENANTIOMERS

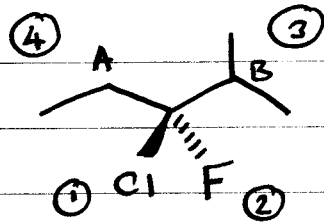


- assign priority

(i) ATOMIC WEIGHT of atoms on STEREOCENTER



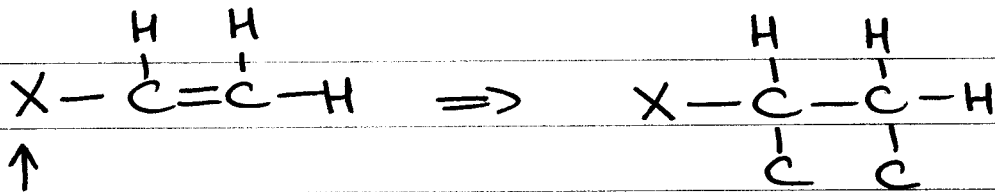
(ii) FIRST POINT OF DIFFERENCE



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

(HOW MANY CHIRAL CENTERS)

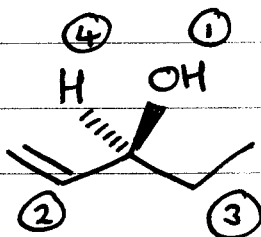
(iii) MULTIPLY BONDED ATOMS - count as the equivalent number of singly bonded atoms



↑
chiral center



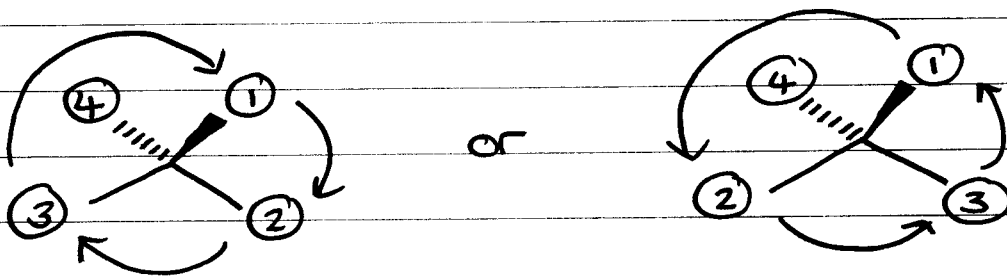
So consider:



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

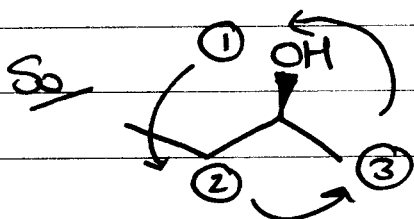
Rotate whole molecule in space to put the lowest priority group (4) in the back.

TWO POSSIBLE ORIENTATIONS

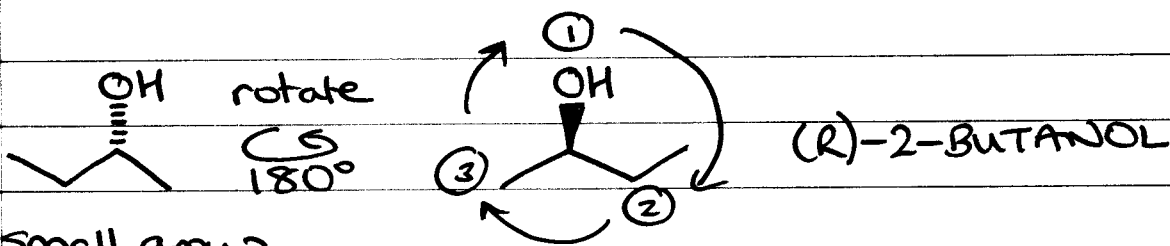


CLOCKWISE (R)

COUNTERCLOCKWISE (S)



(S)-2-BUTANOL



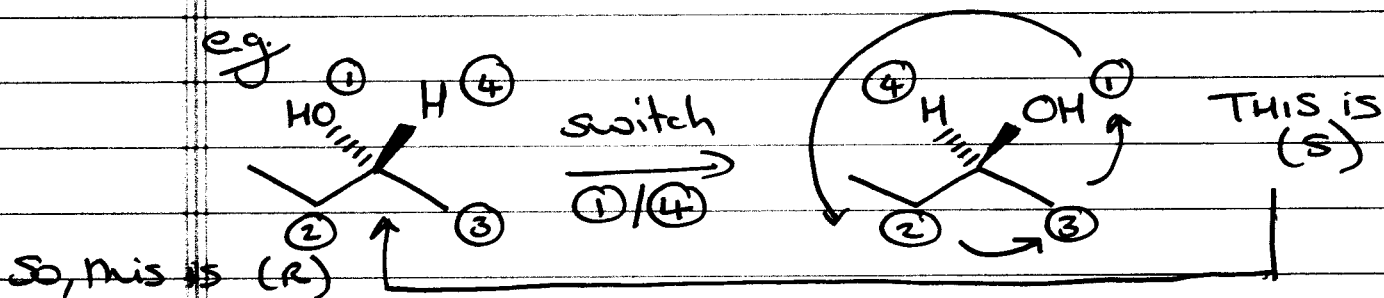
(R)-2-BUTANOL

Small group
NOT in the back

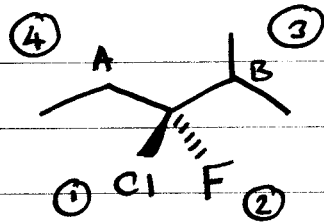
or if you have trouble rotating molecules

TRICK

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



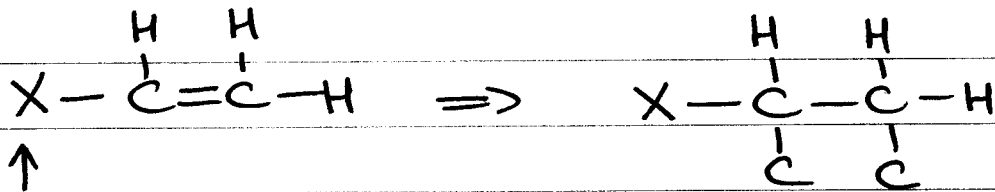
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(HOW MANY CHIRAL CENTERS)

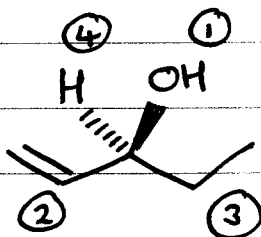
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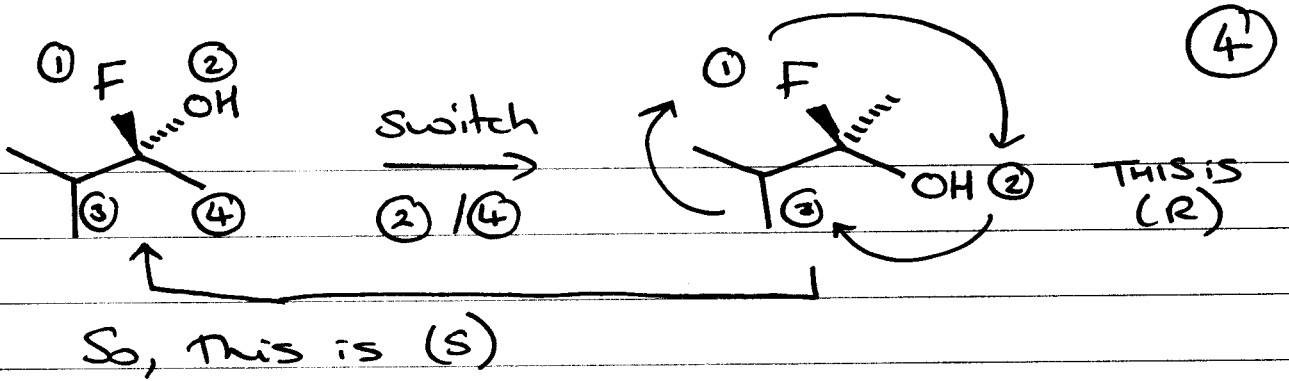


So consider:

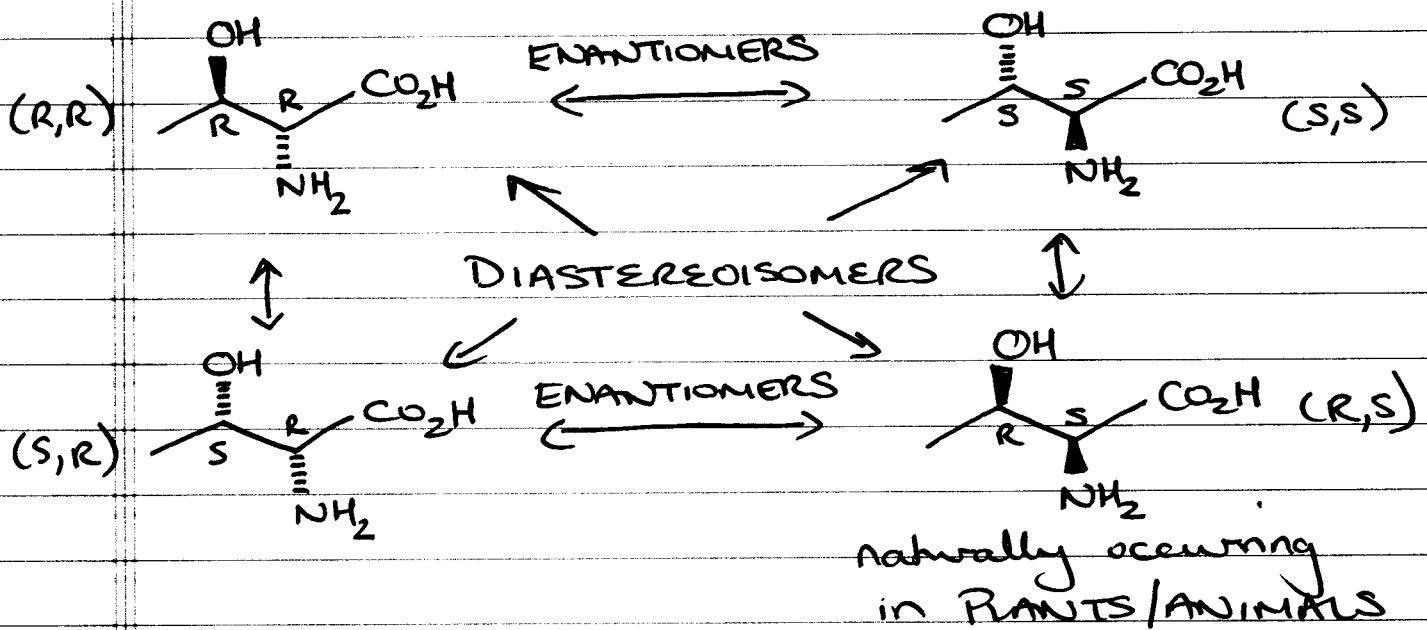
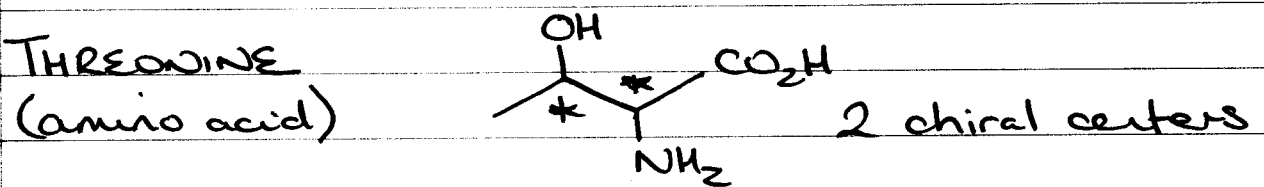


use 1, 2, 3, 4 to set
R/S

Rotate whole molecule in space to put the lowest priority group (4) in the back.

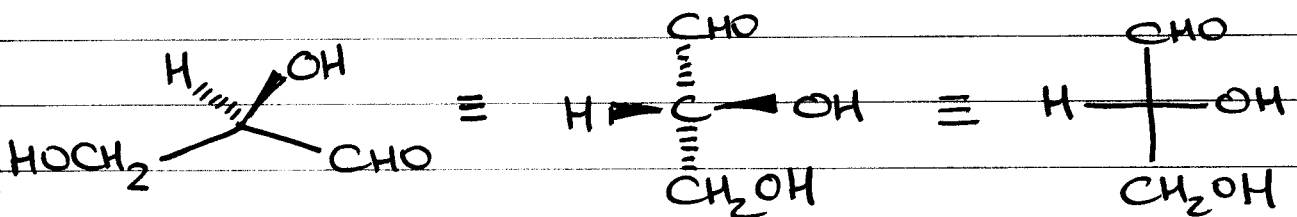


- compounds with more than one STEREOCENTER



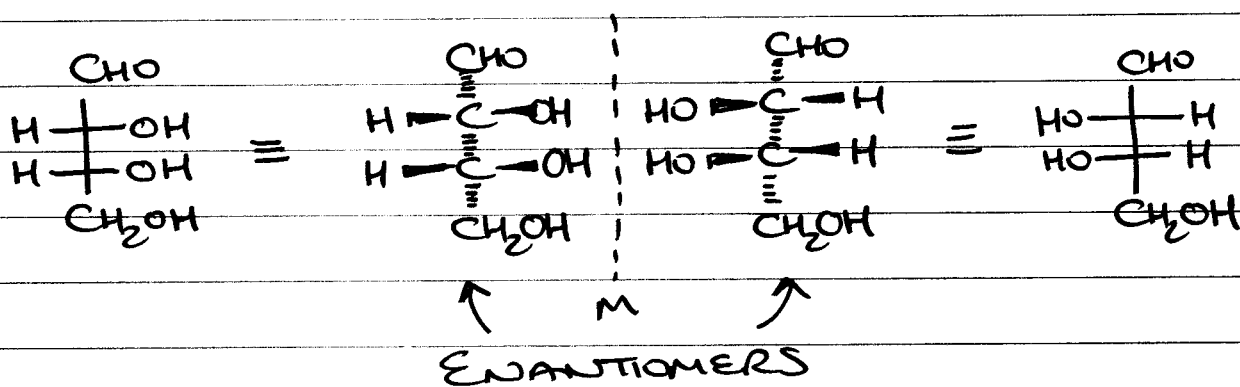
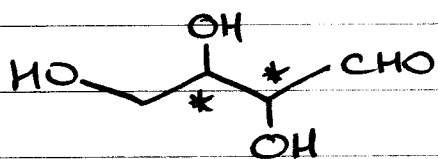
DIASTEREOMERS - non mirror image STEREOISOMERS

② FISCHER PROJECTIONS

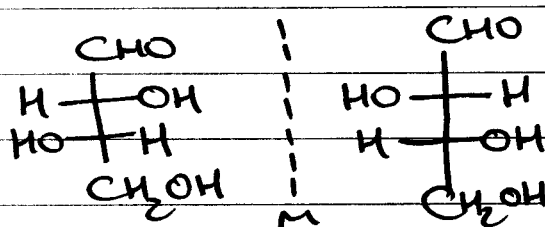


useful for compounds w/ continuous STEREOCENTERS

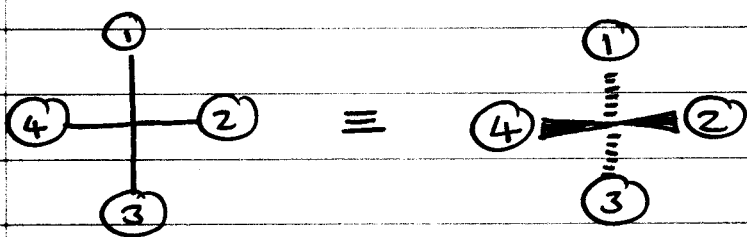
2,3,4-trihydroxybutanal



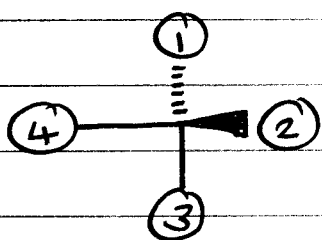
Another pair of ENANTIOMERS



Determining R/S for FISCHER PROJECTIONS



Switch one wedge and one dash for straight lines



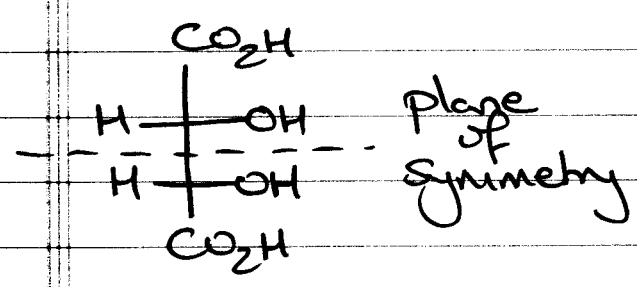
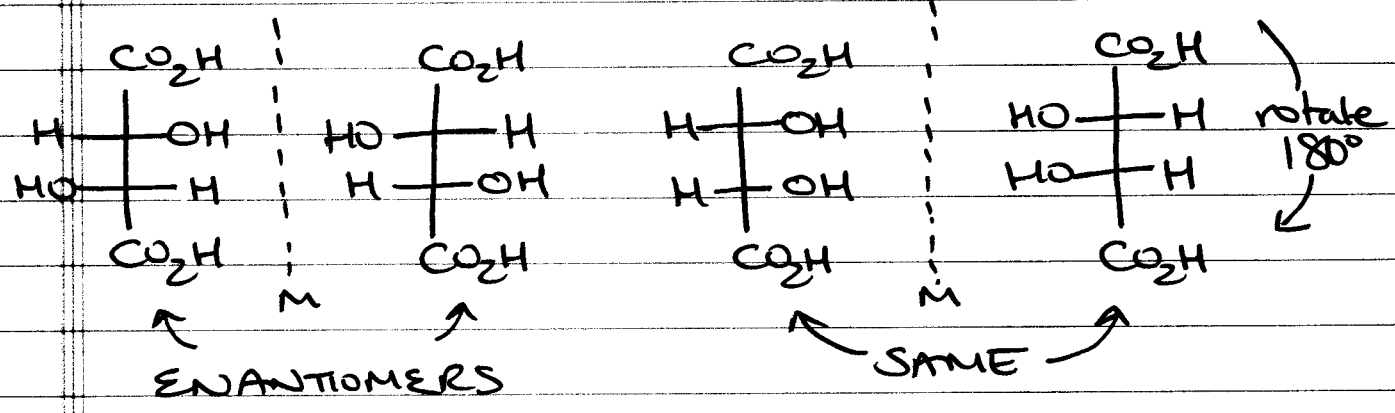
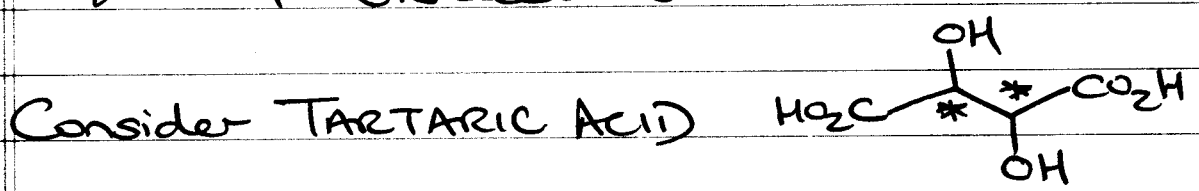
⇐ assign R/S
THIS ONE IS (S)

Go BACK and determine R/S for 2,3,4-trihydroxybutanal

A molecule with n CHIRAL CENTERS can have a maximum number of STEREOISOMERS $= 2^n$

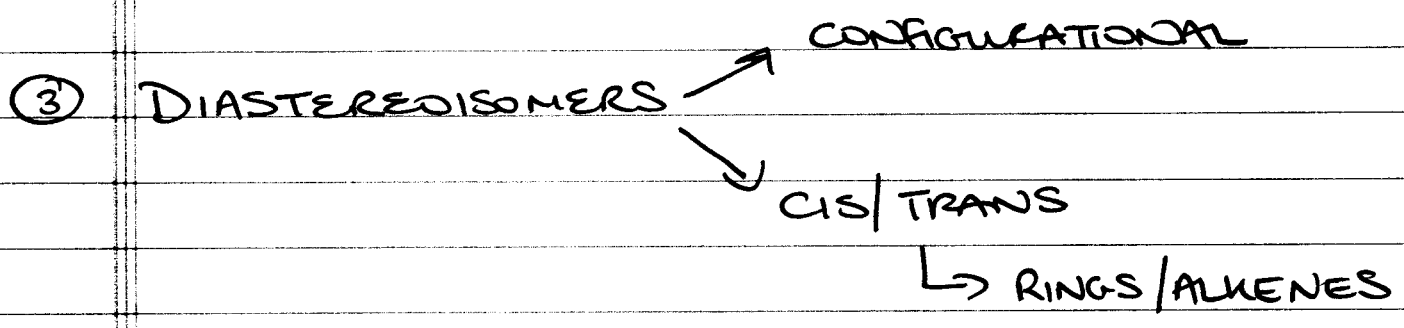
2,3,4 trihydroxybutanal has 2 stereocenters

$2^2 = 4$ stereocenters

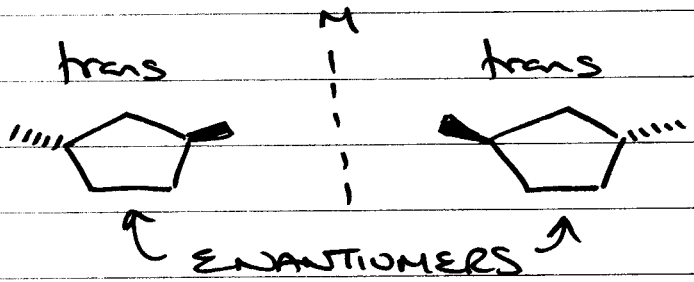
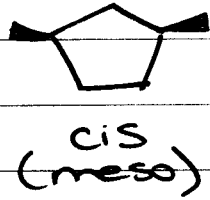


COMPOUND w/ CHIRAL CENTERS, but is ACHIRAL => MESO

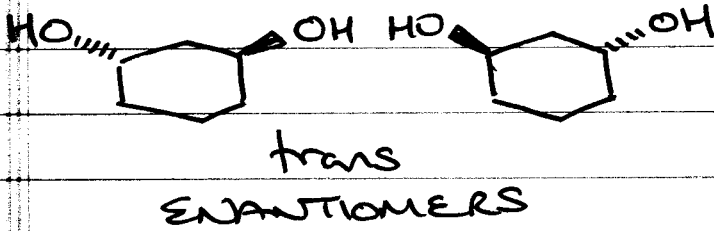
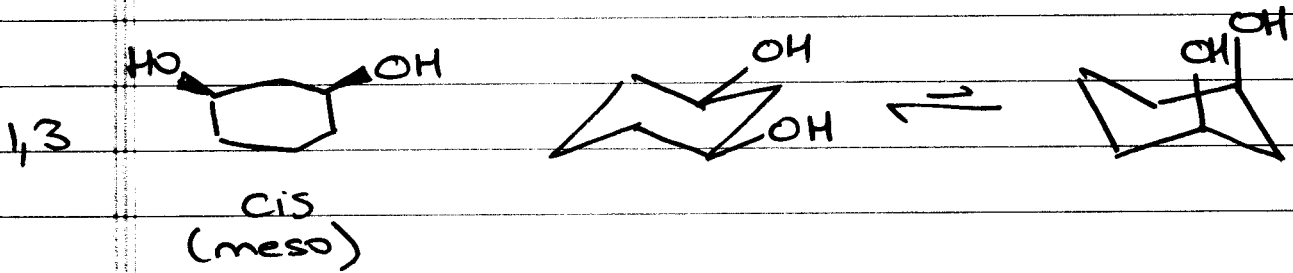
ENANTIOMERS ✓



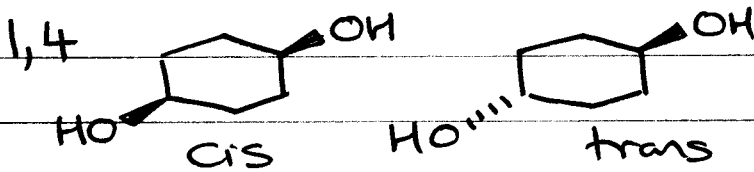
- RINGS



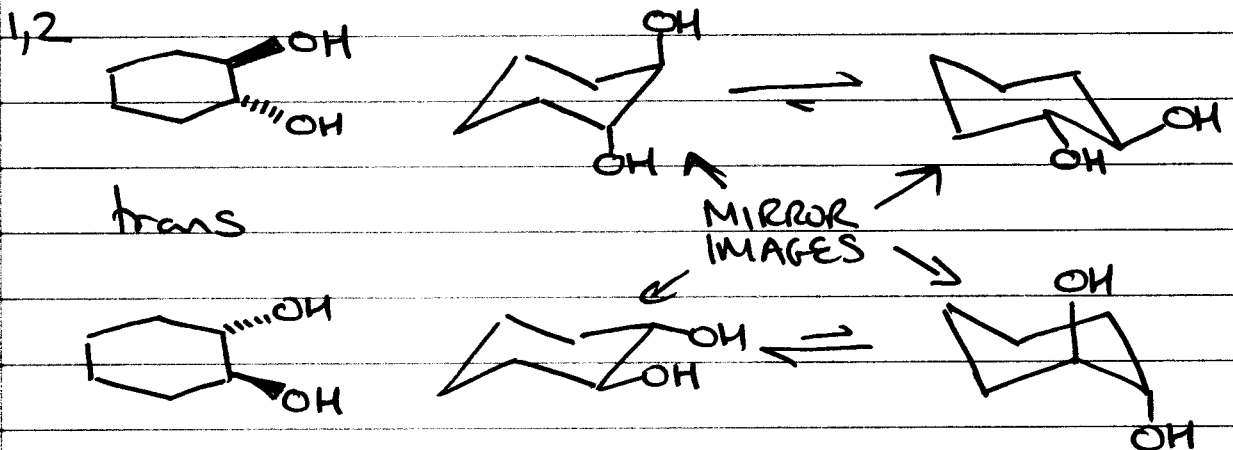
consider CYCLOHEXANES

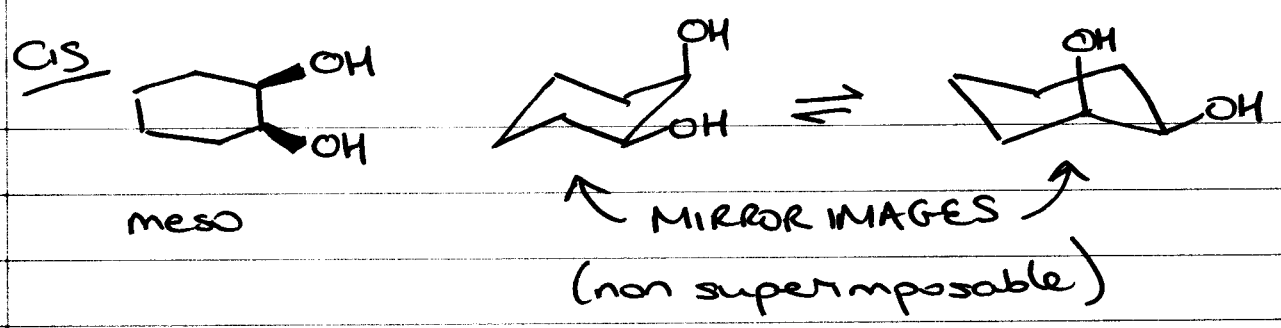


DRAW CHAIR FOR EACH AND DO A RING FLIP FOR EACH ENANTIOMER (in each case, chairs are identical)

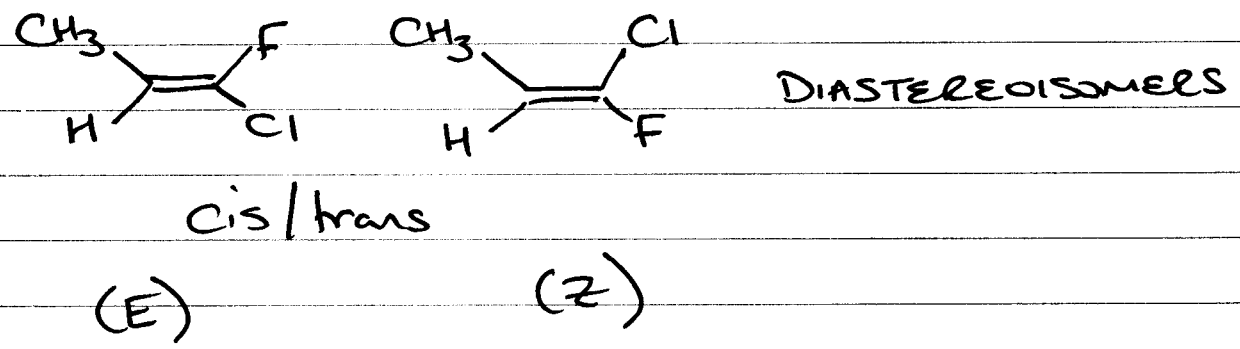
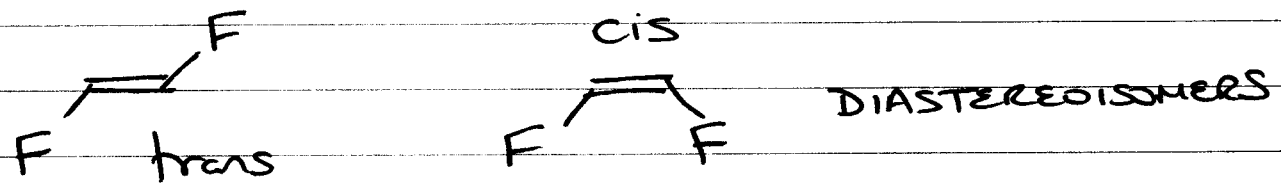


BOTH ACHIRAL





ALKENES



Use same priority rules as for R/S on each C of double bond.

