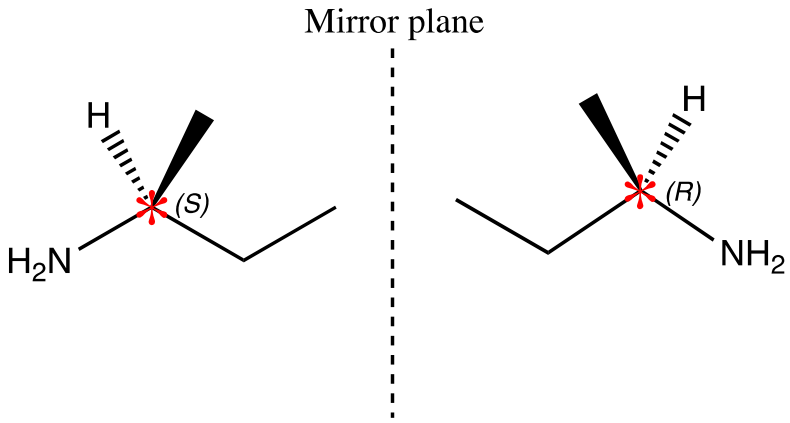
Part A – Enantiomers and Diastereomers

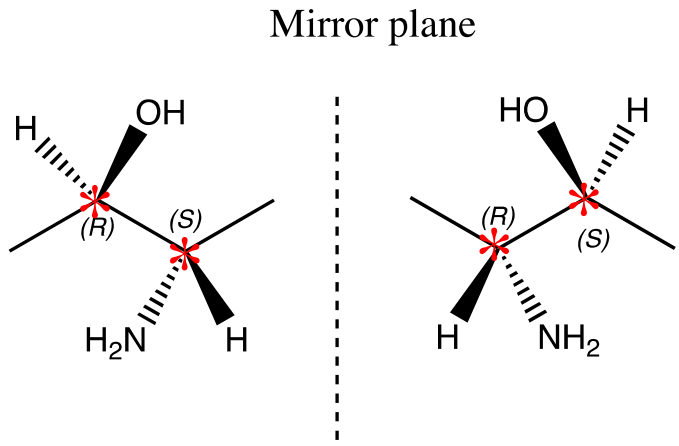
Legend
* = Stereogenic centre
Diast. = Diasteromer Enan. = Enantiomer

I. H2NCH(CH_3)CH_2CH_3



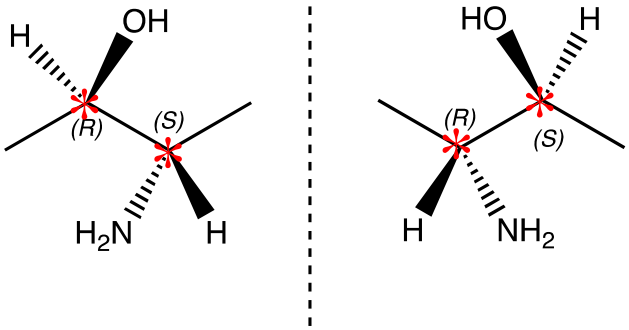
❖ Enantiomer

II. CH3CH(OH)CH(NH_2)CH_3



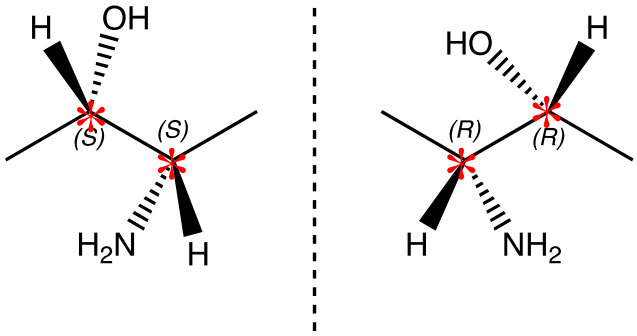
❖ Enantiomer

Mirror plane



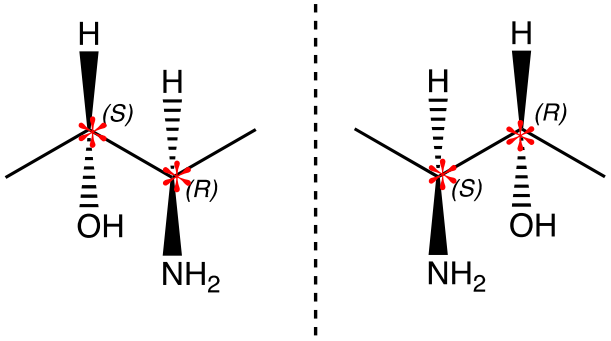
❖ Enantiomer

Mirror plane



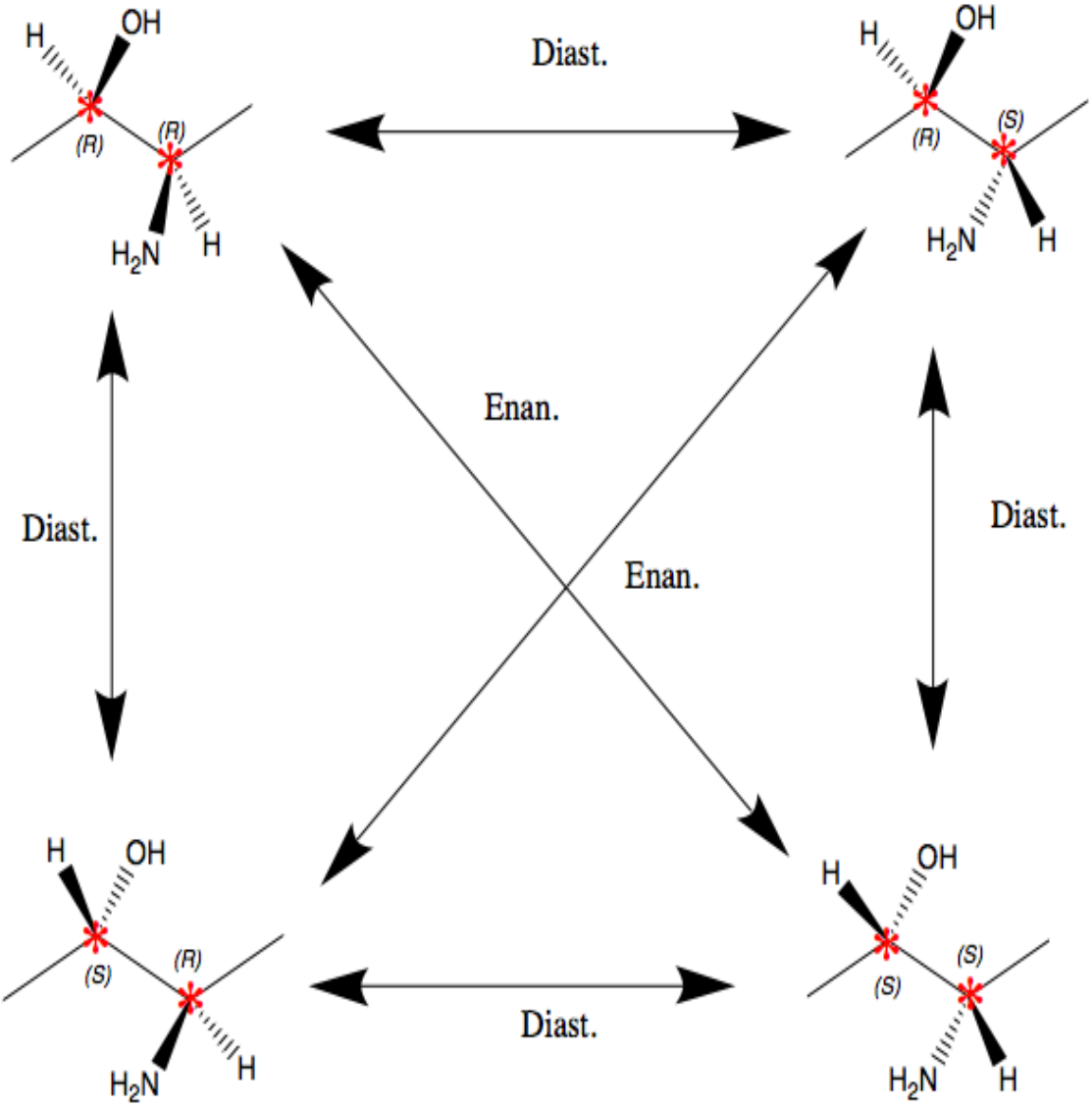
❖ Enantiomer

Mirror plane

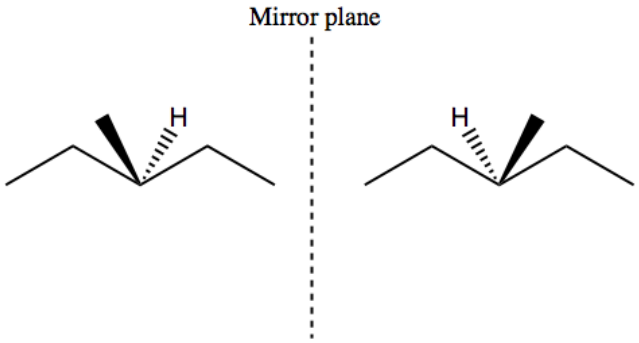


❖ Enantiomer

All possible stereoisomers for compound #2

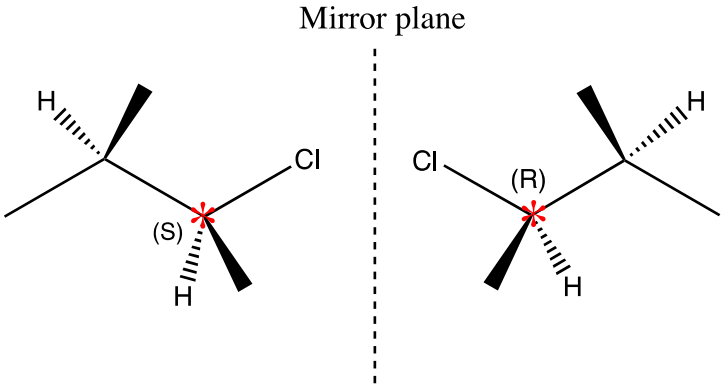


III. $CH_3CH_2CH(CH3)CH2CH3$



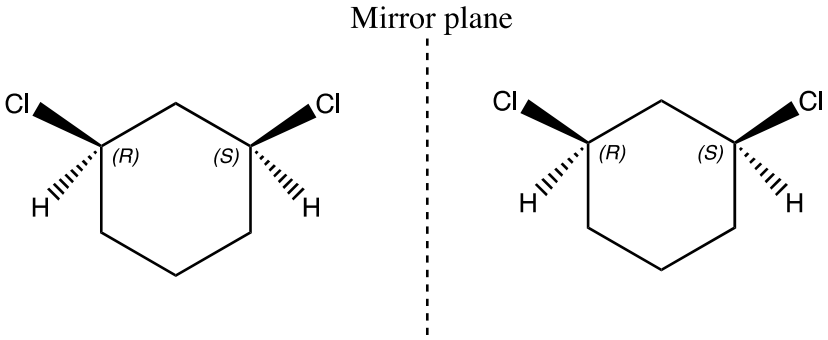
- No stereogenic centres. Therefore, not Enantiomer or Diastomer but the same molecule.

IV. $CH_3CH(CH_3)CH(CH_3)Cl$



- Enantiomer

V. 1,3-dichlorocyclohexane



- Symmetrical, therefore achiral and neither enantiomer or Diastomer, but the same molecule

Part B

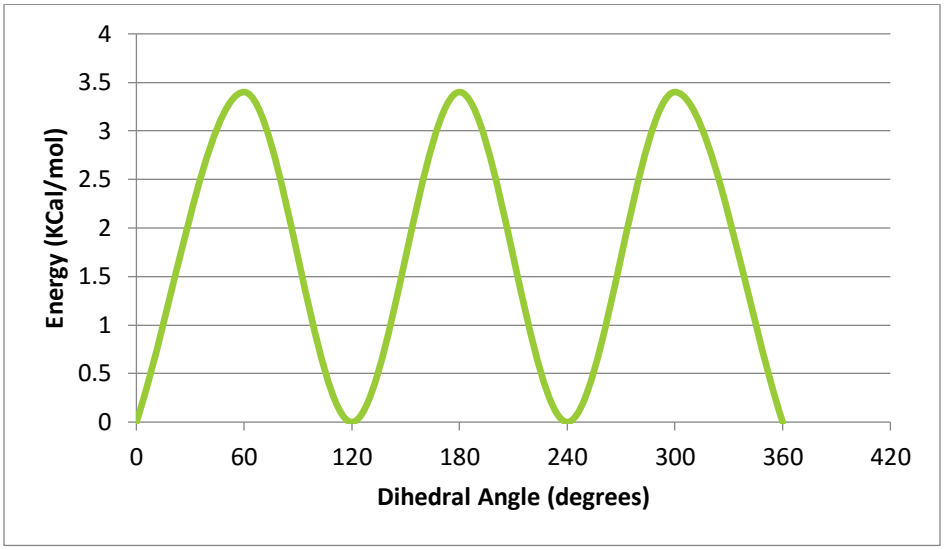
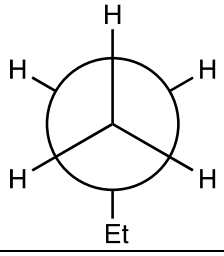
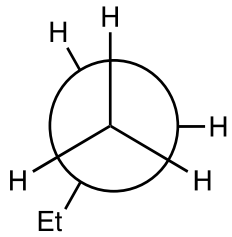
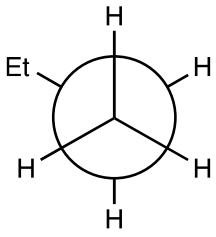
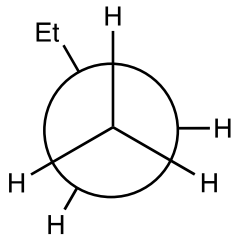
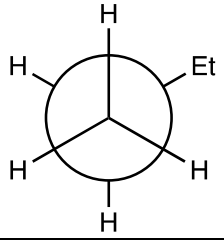
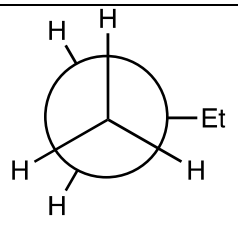
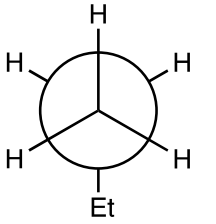


Figure 1: Energy Diagram showing the energy variation in the free energy of n-butane as the dihedral angle changes by 60°

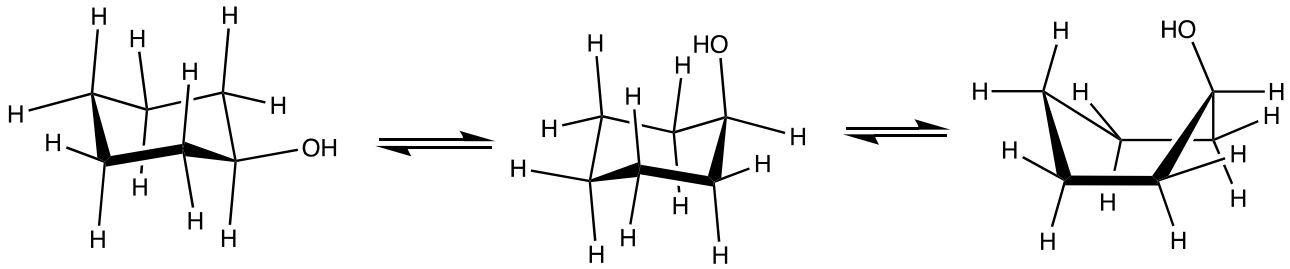
Newman Projections:

Dihedral angle (°)	0	60	120	180
Newman Projection Image				
Dihedral angle (°)	240	300	360	
Newman Projection Image				

What is the energy difference between the two most stable conformations?

The difference between the two most stable conformations is 0Kcal/mol.

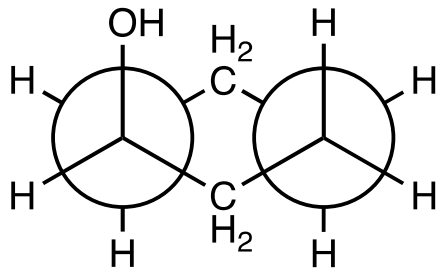
Part C



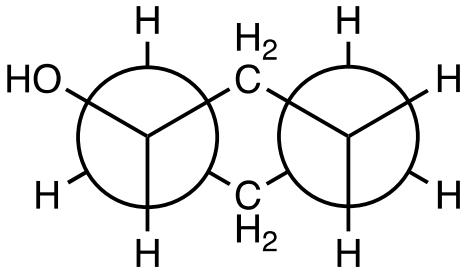
Can the model be converted to other boat forms?

Yes, the boat can be twisted horizontally or vertically which will make other boats, 3 more to be exactly).

Newman projection of chair formation of Cyclohexanol



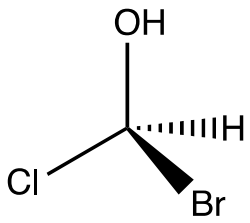
Newman projection of flipped chair formation of Cyclohexanol



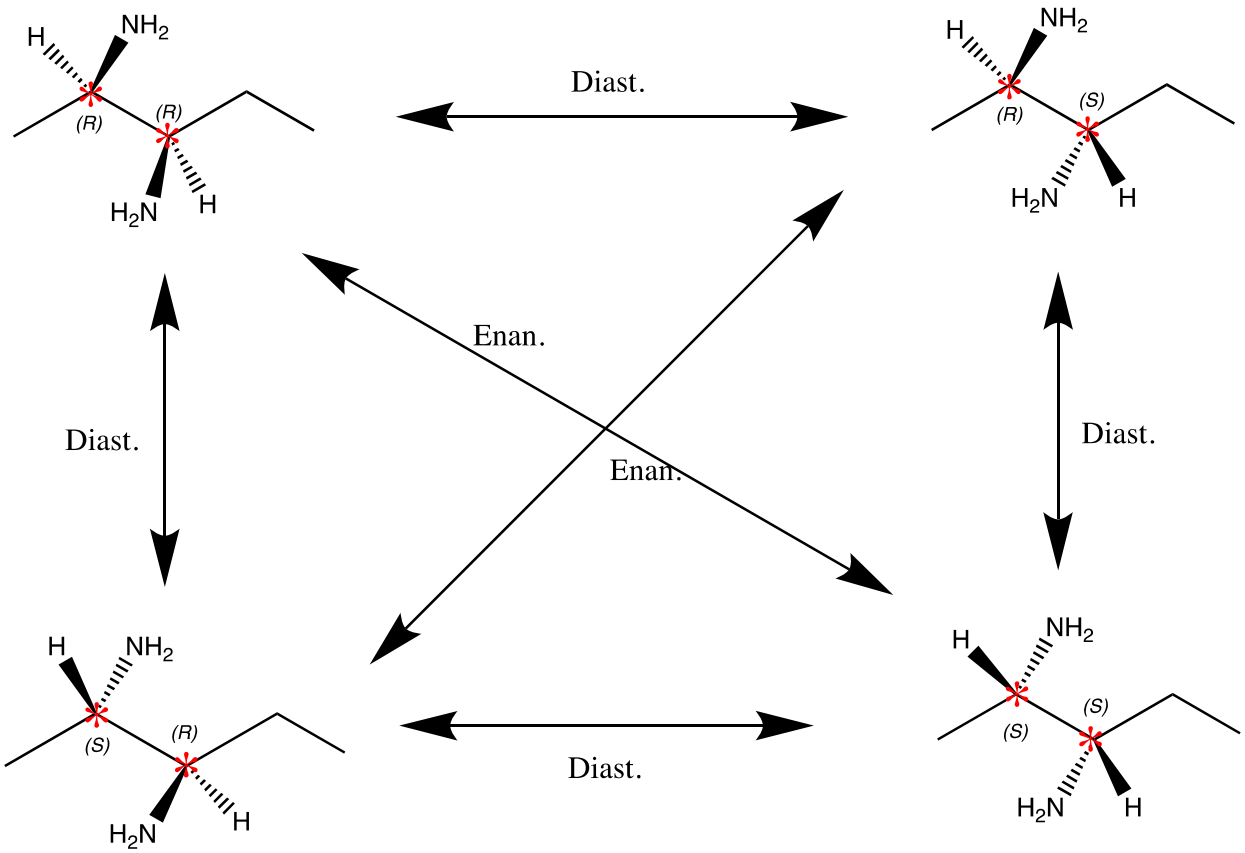
The change between the two projections is the position of the –OH, instead of being at the top, the –OH passed to be at the front as if a 120° formation would have taken place for the front carbon.

Questions:

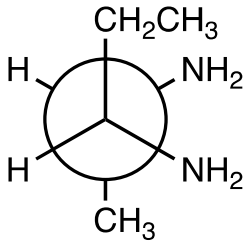
#1 R isomer of CH(OH)ClBr.



#2 2,3-diaminopentane has 2 chiral centres which means it will have 4 stereoisomers ($2^{n=2}=4$)

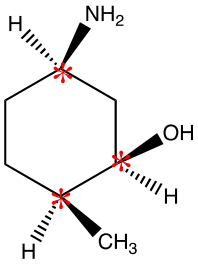


Newman projection along the C2-C3 bond of the major conformers of each isomer.

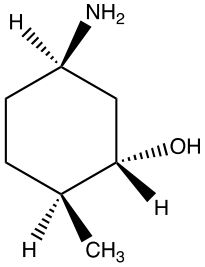


#3 8 stereoisomers are possible ($2^{n=3}$=8) for the following compound

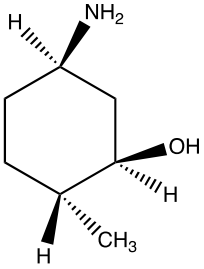
#1



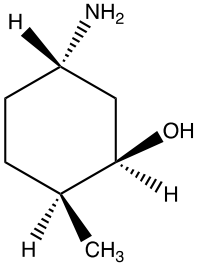
#2



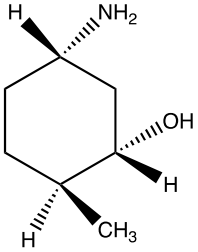
#3



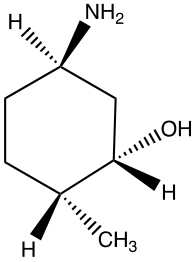
#4



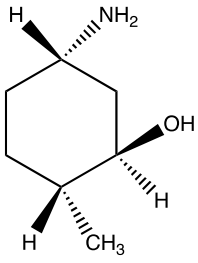
#5



#6



#7



#8