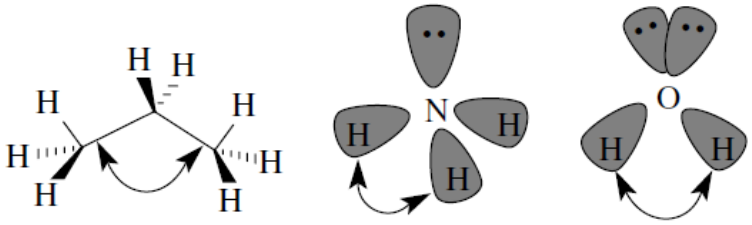
CHM102A
Tutorial 4

Topics covered in lecture 8 & 9 to be discussed in Tutorial 4

- Bonding & geometry of organic compounds.
- Representation of organic molecules: Wedge-dash, Sawhorse, Newman projections
- Origin of various strains in organic molecules: Steric, torsional, angular strain
- Conformational analysis: ethane, propane, butane, Gauche effect, effect of H-bonding.
- Conformations of cyclic alkanes.
- Detailed conformational analysis of cyclohexane: Chair & boat conformations, drawing structures, axial, equatorial bonds, stability in mono and disubstituted cyclohexane and various interactions between substituents.

1. Assign the correct bond angle (as shown in the figure) for propane, ammonia and water from following values: 105°, 107°, 111°.



2. Draw Lewis dot structure, predict hybridization, geometry and bond angles for the Carbon and Oxygen atoms in Acetaldehyde (CH_3CHO).

3. Draw the Sawhorse and Newman projections for 2-chlorobutane.

4. (i) For 1,2-dichloroethane (a) draw Newman projections for all eclipsed conformations formed by rotation from 0^o to 360^o about the C-C bond.

(ii) Which eclipsed conformation(s) has the lowest energy? Which will have the highest energy?

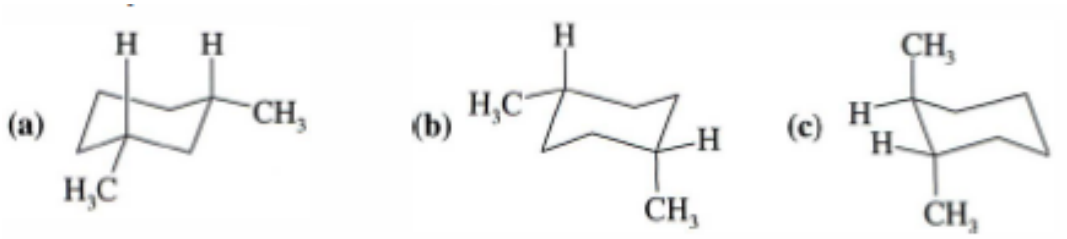
5. Draw the Newman projections for eclipsed, staggered and anti conformations of ethylenediamine.

(i) Which of these conformation will act as chelating ligand for metal ion?

(ii) Comment on the dipole moments of these conformers.

6. Draw chair and boat conformations of cis-1,2-dimethylcyclohexane and trans-1,2-dimethyl cyclohexane. Predict which isomer is more stable.

7. Name the following compounds



8. Draw the most stable conformer for trans-4-methylcyclohexanol.

9. Draw the Newman projection of 1-methyl cyclohexane and point out 1,3-diaxial interactions.