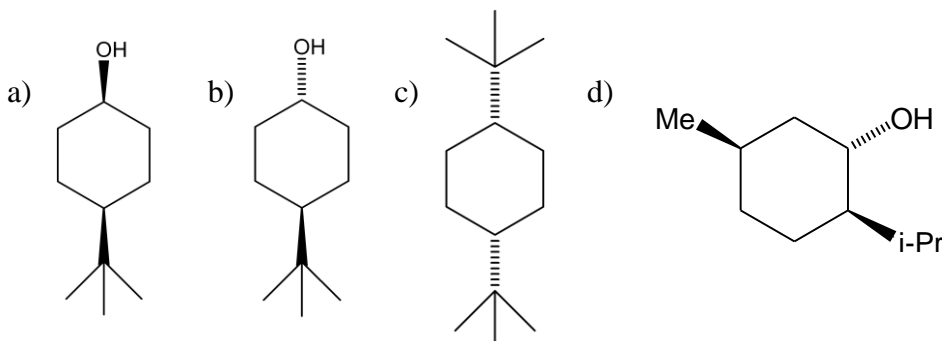
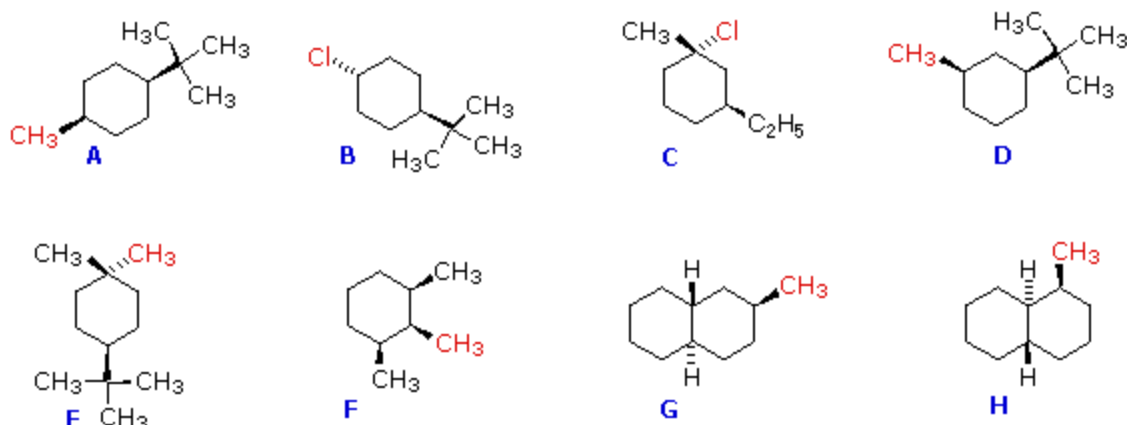


## First Year, Organic Tutorial -2

1) Write stable conformations of the following molecules

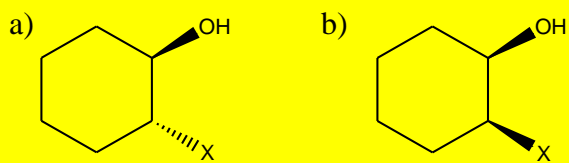


2. Examine the following structures and predict whether the red colored group is axial or equatorial. Assume all six-membered rings are in the most stable conformation.



Ans: A-ax; B- eq; C – ax; D – eq; E – eq; F – ax; G – ax; H –ax

3. Which one of the following molecules forms epoxide?



4. Draw the configurational and conformational isomers of 1,2-dimethyl cyclohexane and comment on their relative stability and chirality.

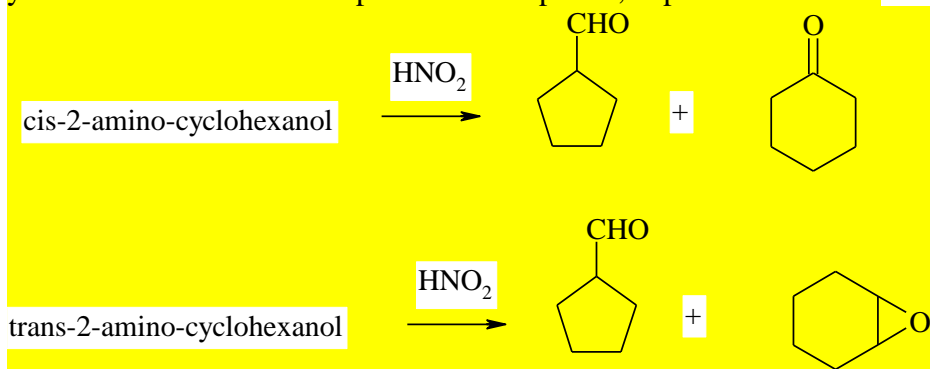
Hint: cis exists (a,e & e,a) in two forms and chiral but they are non resolvable cause the flipped structure leads to superimposable mirror image of the parent structure as the potential energy barrier is too low for flipping. Trans is optically active.

5. Draw the configurational and conformational isomers of 1,3-dimethyl cyclohexane and comment on their relative stability and chirality.

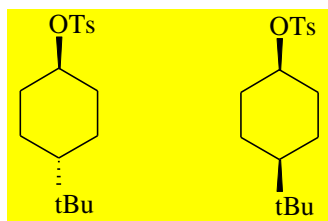
Hint: The *cis* isomers are meso(achiral) due to the presence of plane of symmetry. The *trans* form (e,a & a,e ) are chiral.

6. “Both *cis*- and *trans*- isomers of 1-bromo-2-chloro-cyclohexane are chiral and resolvable” explain?

7. Deamination of *cis*-2-amino-cyclohexanol and *trans*-2-amino-cyclohexanol with  $\text{HNO}_2$  yields two different sets of products as depicted, explain the results?

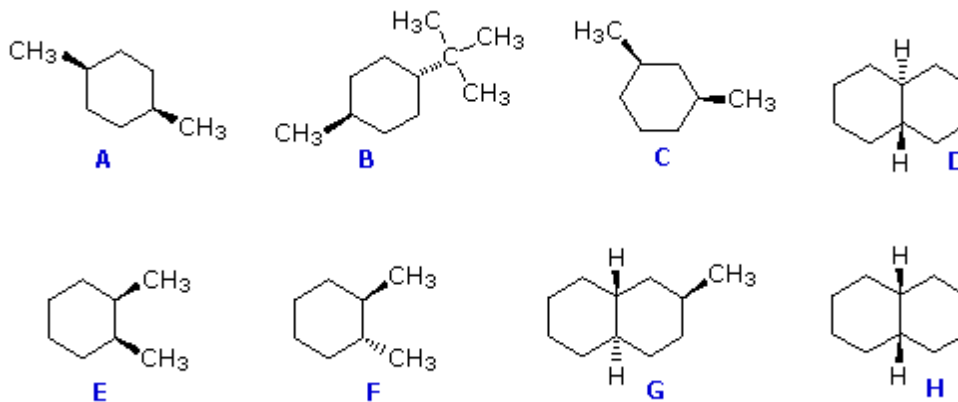


8. Which of the following substrates will undergo base catalyzed elimination readily and why?



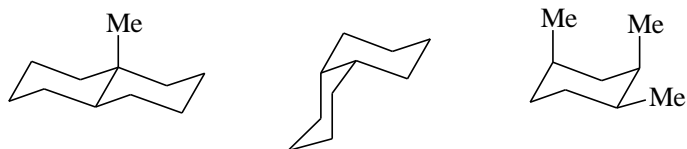
9. Reactions with sodium thiophenoxide ( $\text{PhS}^-\text{Na}^+$ ) in aq. EtOH, *cis*-4-*t*-butylcyclohexyl bromide reacts about 60 times faster than the corresponding *trans* isomer, suggest a proper reason for the phenomena?

10. For each of the compounds **A** through **H** indicate the number of **gauche butane interactions** present in the most stable chair conformation.

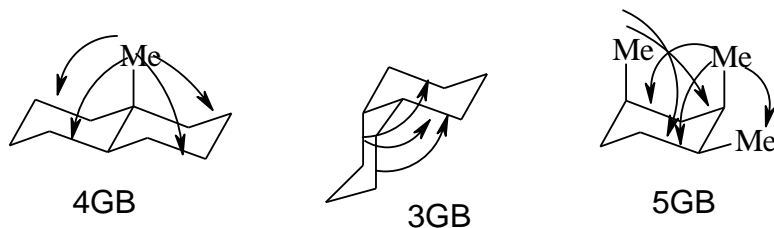


ans: A-0; B-2; C-0; D-0; E – 3; F – 1; G -2; H-3

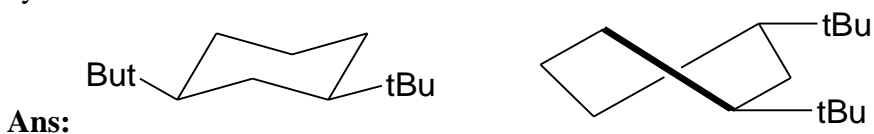
11. How many Gauche-Butane interactions are there in the following molecules and show the connectivity.



**Ans:** Molecule 1 = 4GB (one axial substitution counts for 2); Molecule 2 = 3GB;  
Molecule: 3 = 5GB



12. Predict the structure of most stable conformer for cis and trans 1,3-ditertbutyl cyclohexane?



13. Cis-1,3-cyclohexane-diol is more acidic than trans-1,3-cyclohexanediol. Suggest a conformational argument to account for this observation.

Hint: Acidity is related to conformation and energetics of the conjugate base. The more stable the conjugate base more acidic the compound is. In case of the cis-isomer the conjugate base is stabilized by intramolecular H-bonding which is not possible for trans isomer.

