

Problem Set No. 4 (15.5.2012)

1. a) Draw the structure of 4-methylcyclohexene in its favourable half-chair conformation!

b) Draw (*S*)-*trans*-cyclooctene!
2. Draw (*R*)-2-methylcyclohexanone in its favourable Newman-projection (projection along the C1-C2-bond)!
3. a) The inversion barrier of (*S*)-*N*-methyl-2-ethyl-2-methylaziridine is in the range of 90 kJ/mol. What is the stereochemical relationship of the two isomers obtained by inversion?
What is the topicity of the protons of the CH₂ unit of the ethyl group?
Why is the inversion barrier relatively high?
Why is the barrier of the related *N*-phenyl derivative lower?

4. Give examples of a chiral phosphane and a chiral sulfoxide derivative, respectively, **different** from those presented in the lecture! Why are phosphanes configurationally more stable than the corresponding amines?

5. Give an example of a stereospecific 1,3-dipolar cycloaddition, e. g. of diazomethane to suitable alkenes!

6. The Diels-Alder reaction of 1,1-dimethoxy-1,3-butadiene with dimethyl dicyanomaleate is **not stereospecific** and provides two stereoisomers! Give a mechanistic explanation for this result!

7. The additions of bromine to (*E*)- and (*Z*)-3-hexene are stereospecific! Give the structures of the products and explain the results!