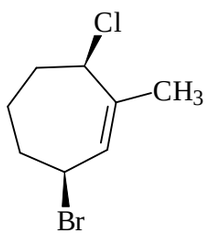
CHEMISTRY 59-135/137

FIRST TEST

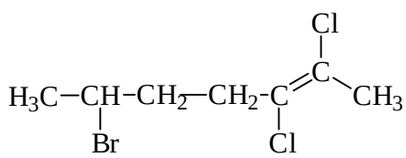
Time 50 Min February 9, 1994

1. Give an acceptable name for each of the following structures. If stereochemistry is important, make sure your name includes this.[20 points]

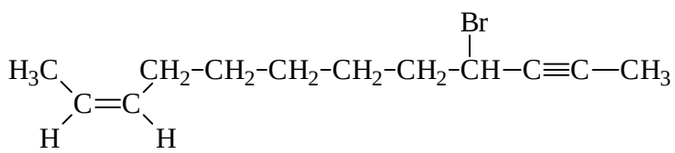
(a)



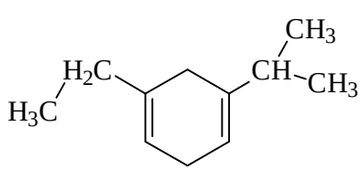
(b)



(c)



(d)



2. Draw the structure, including stereochemistry where required, which corresponds to the following IUPAC names. Structures which show only carbon and other non-hydrogen atoms are sufficient. [15 points]

(a) (E) 4,5-dibromo-8-methyl-2-nonene

(b) (E) 3,6-dichloro-2,4-dimethyl-4-decene

(c) 5,5-dimethyl-1,3-cyclopentadiene

3. (a) Draw the NEWMAN PROJECTION of the more stable chair conformation of the less stable configuration of 1-chloro-3-methylcyclohexane. Label the substituents as axial (a) or equatorial (e). [10 points]

(b) Draw the 3-dimensional drawing (NOT the Newman Projection) of cis-1-methyl-4-isopropylcyclohexane in its more stable chair conformation and label the substituents as axial (a) or equatorial (e). [10 points]

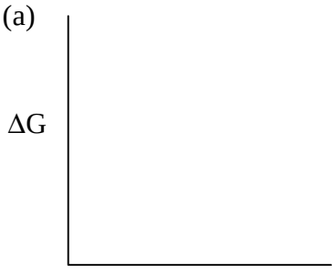
(c) Which isomer, the E or the Z, is more stable in 3-bromomethyl-2-chloro-2,5-dimethyl-3-hexene? {Note - a bromomethyl group is CH_2-Br} [5 points]

(d) Using a Newman Projection, explain why a substituent on cyclohexane in one of the possible orientations (a or e) is more stable than when it is in the other orientation. [10 points]

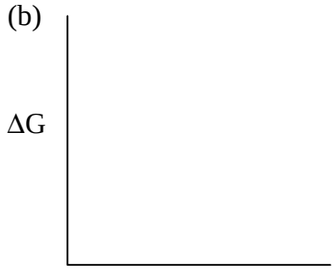
4. On the axes provided, draw the energy profile for a reaction between A and B which has the following characteristics. In parts (b) and (c) show the step in the reaction where each of A and B become involved in the mechanism. [12 points]

a) a reaction which has two steps and the first step is slowest.
b) a reaction which occurs in two steps and whose rate of reaction is dependent on the concentrations of both reactants.
c) a reaction which occurs in three steps, and in which A is involved in the second step, but whose rate does not depend on the concentration of A.

(a)



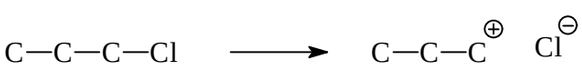
(b)



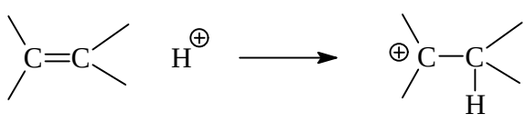
(c)

5. Using the appropriate notation system, show the movement of electrons in the starting material which leads to the indicated process. [6 points]

(a)



(b)



6. Pick the word from the following list (configurational isomers, conformations, neither configurations nor conformations) which describes the relationship between the following pairs of compounds. [12 points]

(a) cis 2-butene and trans 2-butene

(b) 1,2-dimethylcyclohexane where the substituents both have the axial orientation and where one is axial and the other is equatorial.

(c) 4-methyl-trans-2-heptene and 5-methyl-cis-2-heptene