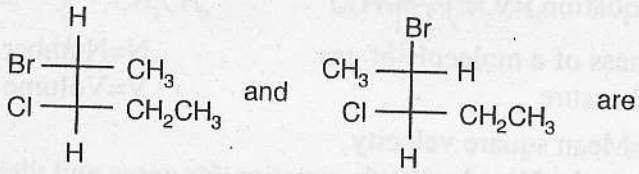
Eastern University, Sri Lanka
Department of Chemistry
First Examination in Science 2003-2004 (Repeat)
Second Semester-(June/July) 2005
CH 103 Stereochemistry and Kinetic Molecular Theory

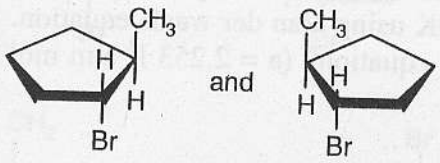
1. (i)Draw the structure of the following molecules
   a. (2S, 3R)- 2-bromo-3-chloropentane
   b. (S)- 2-chlorohexane

(ii) Label each pair of structures as one of the following: constitutional isomers, enantiomers, diastereomers, or identical (includes conformers). Justify your answer.

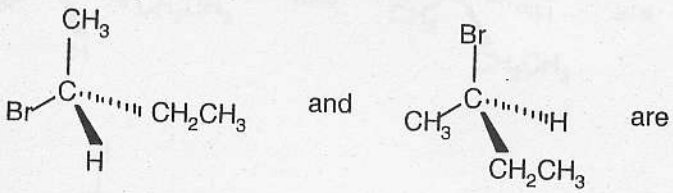
a.



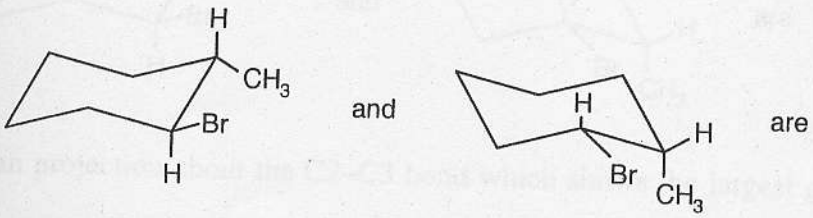
b.



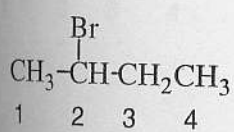
c.



d.

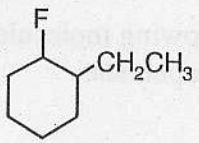


(iii) a. Draw a Newman projection about the C2–C3 bond which shows the largest groups *anti* to each other.



b. Draw a Newman projection about the C2-C3 bond for a staggered conformer that is higher in energy than the conformer you drew in part a.

2. (i) a. Draw the lower energy conformer of the *cis* geometric isomer of this compound. F the purposes of this problem, assume that F has a smaller size than CH_2CH_3.



b. Draw the lower energy conformer of the *trans* geometric isomer in part a.

(ii) a. Write down the assumptions made in deriving the kinetic molecular theory of gas.

b. Derive the equation $PV = \frac{1}{3} mN\overline{C^2}$

Where m=mass of a molecule of gas
N=Number of molecules of the gas
P=Pressure
V=Volume
$\overline{C^2}$ =Mean square velocity

c. (i) Write down the Van der Waals equation for gases and identify all the terms in it.

(ii) Calculate the pressure exerted by 1.00 mole of methane (CH_4) in a 250 container at 300K using Van der waals equation. What pressure will be predic by the ideal gas equation? (a = 2.253 l^2 atm mol^{-2}, b=0.0428 l mol^{-1}, R = 0.0 atm l mol^{-1} K^{-1})

(iii)