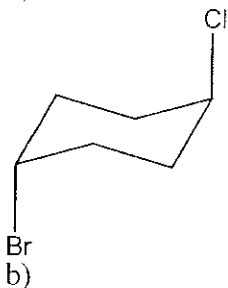


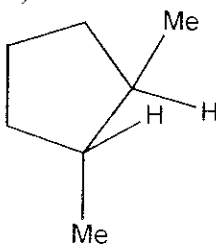
Chem 141  
 Problem-Set  
 Wednesday 18th October 2006.

1. Name the following compounds. Including R/S (or *cis/trans*) where appropriate.

a)

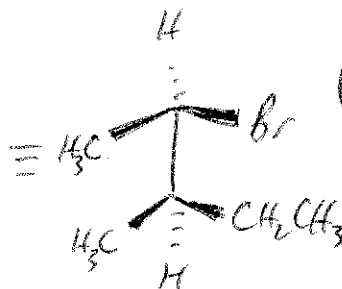
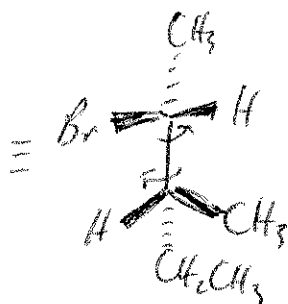
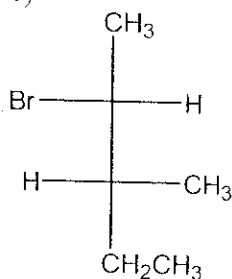


*trans*-1-bromo-4-chlorocyclohexane



(1R)-(2R)-1,2-dimethylcyclopentane

c)



(2R,3R)-2-bromo-3-methylpentane

2. Define a *meso* compound in a couple of brief sentences and show an illustration of a *meso* compound.

A *meso* compound has a mirror plane between two stereocenters



3.a) Define the letters and numbers associated with the abbreviation  $S_N1$  and  $S_N2$ .

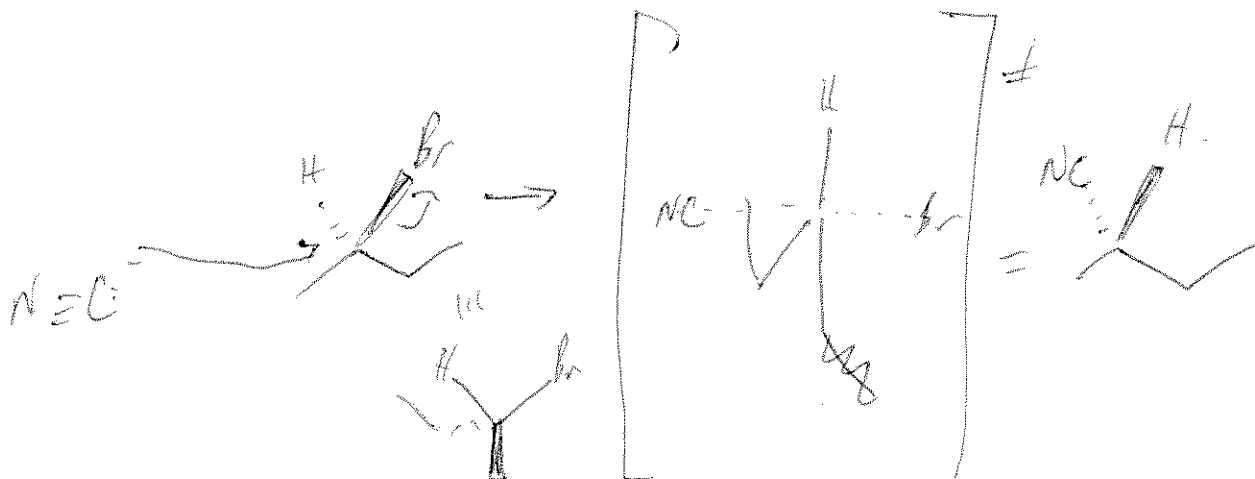
S = substitution N = nucleophilic

1 = unimolecular (rate dependent of formation of carbocation)  
 2 = bimolecular (rate dependent on both nucleophile and substrate concentration)

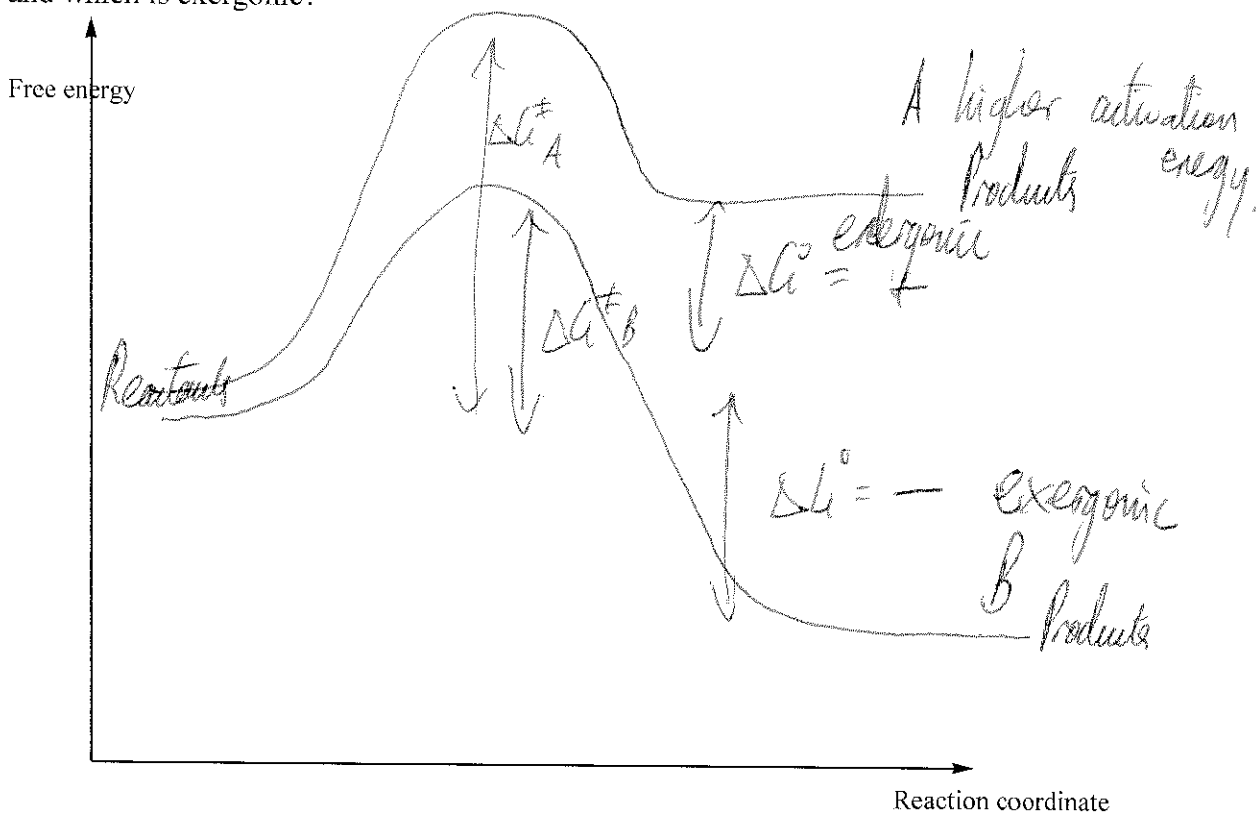
b) Which mechanism is concerted;  $S_N1$  and  $S_N2$ ? Circle

c) Which mechanism is stepwise,  $S_N1$  and  $S_N2$ ? Circle

4) Draw a mechanism for the  $S_N2$  reaction of cyanide ( $\text{:C}\equiv\text{N}$ ) on (2R)-2-bromobutane. Include a transition state.



5) Which of the following reactions progresses with the higher activation energy (label the portion of the graph relating to the activation energy). Which reaction is endergonic and which is exergonic?



6) Suggest molecules that could act in the following roles for nucleophilic substitution reactions.

a) Nucleophile OH

b) Substrate CH<sub>3</sub>-I

c) Leaving group I<sup>-</sup>