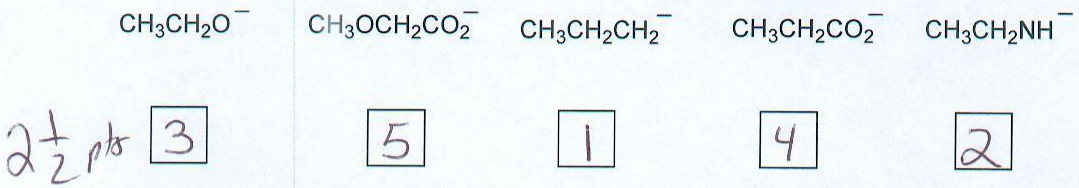
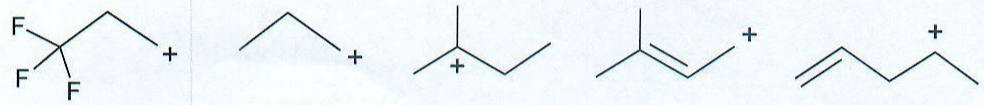
CHEM 260 2011 ANSWERS
MIDTERM

1. a) Rank the structures below from the most basic (#1) to the least basic (#5). Put your assignments in the boxes below the structures.



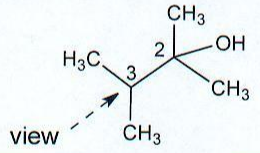
2½ pts [3] [5] [1] [4] [2]

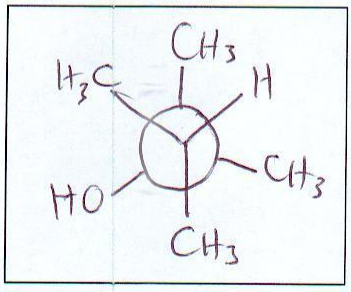
b) Rank the carbocations below from the most stable (#1) to the least stable (#5). Put your assignments in the boxes below the structures.



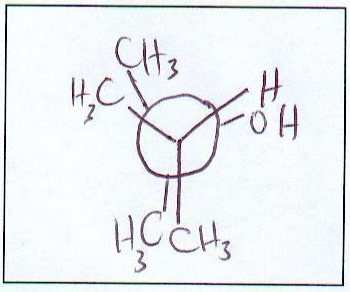
2½ pts [5] [4] [2] [1] [3]

c) Consider the conformations about the C3-C2 bond of the molecule shown below (view as indicated by the arrow). Draw Newman projections to indicate the most and least stable conformations of this molecule.



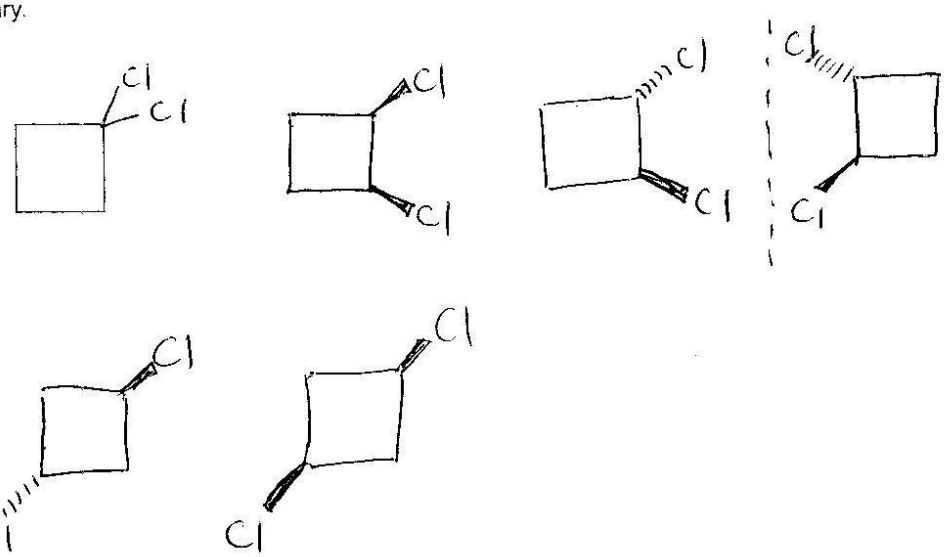


most stable



least stable

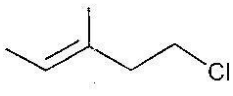
d) Draw all possible isomers of dichlorocyclobutane (including ALL stereoisomers). Do not draw any isomer more than once. Use the template below and redraw as often as necessary.



6pts

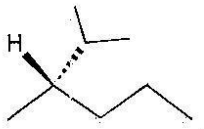
2). Name the following compounds using IUPAC nomenclature, including as necessary designation of stereochemistry.

i)



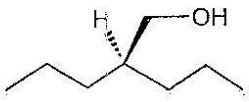
(E)-5-chloro-3-methyl-2-pentene

6pts ii)



(S)-2,3-dimethylhexane

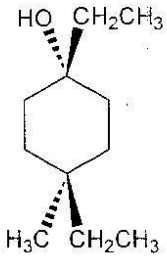
iii)



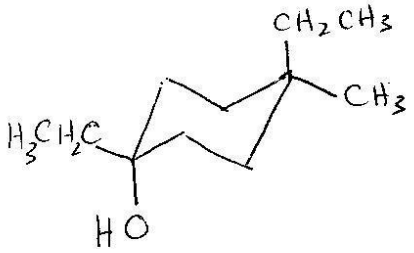
2-propyl-1-pentanol

3a) Redraw compound **1**, clearly showing it in its most stable conformation. If more than one structure is drawn please circle your final answer.

4pts

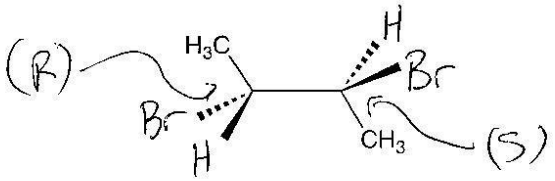


compound **1**



b) Draw the meso form of 2,3-dibromobutane using the template below. Indicate the absolute configuration at each stereogenic center as being either (*R*) or (*S*).

3pts

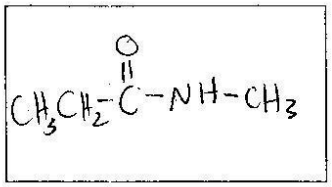


c) Complete the structures of diazomethane (CH_2N_2) below to show the two most prominent resonance structures. Add all appropriate π-bonds, lone pairs, and formal charges.

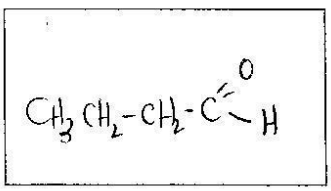
3pts

d) Draw a single example of a simple molecule that contains only four carbons in total as well as the functional group listed below the box (note: there are more than one correct answer for each question):

4pts.

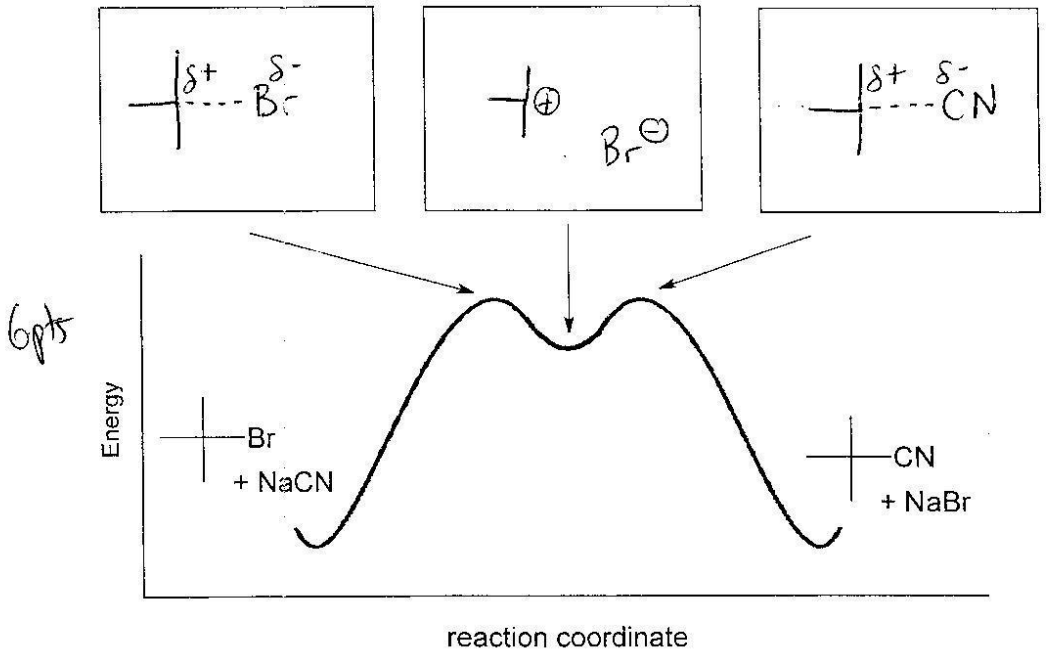


amide



aldehyde

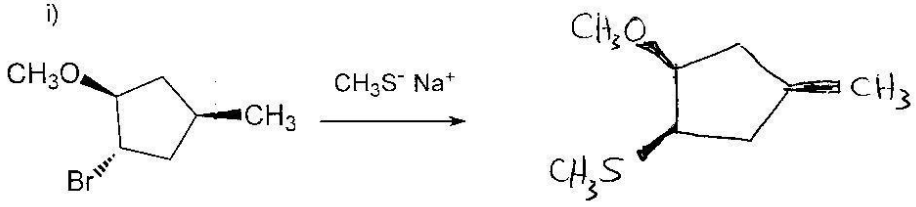
4. a) In the boxes below, draw the structures that exist along the points of the reaction energy diagram as indicated by the arrows. Include partial and full charges as necessary.



6pts

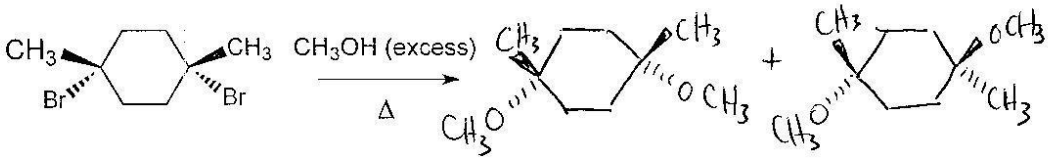
b) Draw all of the expected products (including stereoisomers) formed in the reactions shown below. Clearly show stereochemistry where appropriate.

i)

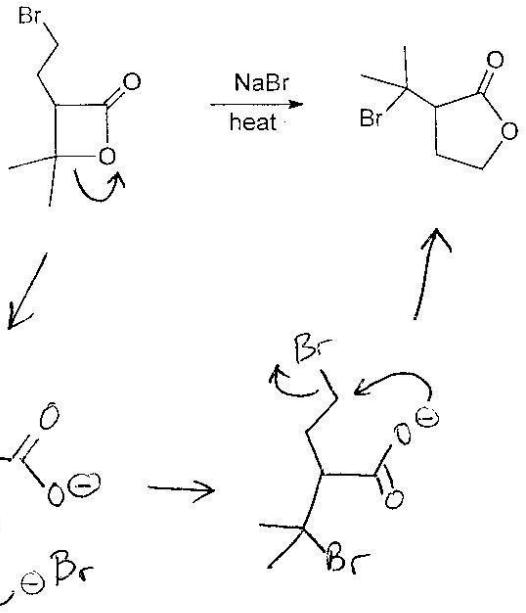


4pts

ii)



ci) Draw a detailed mechanism for the reaction shown below. It is not necessary to show any transition states.



3pt

ii) What is the thermodynamic driving force that makes the reaction proceed to the rght as shown?

A strained four-membered ring is converted into a less-strained five-membeed ring.

1pt

iii) If the starting material were optically pure would the product have the same absolute configuration, have undergone an inversion of configuration, or be produced as a racemic mixture? (Hint: do not assign R/S nomenclature to answer this question).

1pt. It would have the same absolute configuration since no bonds were broken at the stereogenic center.

The end