CHEM232/BCHM205/ENCH241

Mid-Semester Test

Friday 3 April 2009 12 noon

ANSWER ALL QUESTIONS IN THE SPACES PROVIDED

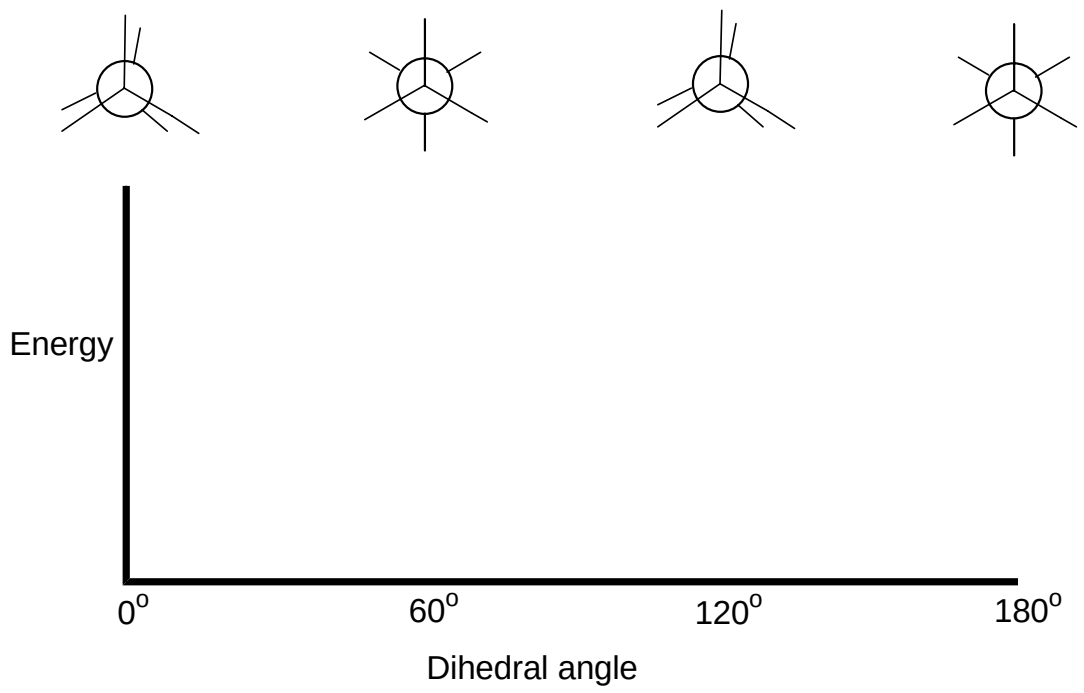
NAME (please print clearly):

Student ID number:

Signature:

Course (circle one): BCHM205 CHEM232 ENCH241

1. (5 marks) In the diagram below **complete the four Newman projections** and show the plot of the relative energies of the conformers for a **180^o** rotation about the **central** bond of **2,3-dimethylbutane**.



2. (3 marks) In the boxes below draw the appropriate Newman projections.

Ethane (eclipsed)

Cyclohexane (chair)

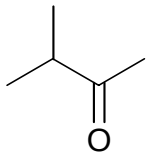
Cyclohexane (boat)

3. (2 marks) List the following conformers of cyclohexane in order of stability starting with the most stable: boat, twist-boat, chair, half-chair.

Ans:

4. (3 marks) Show the interconversion between the two chair conformations of methylcyclohexane and circle the conformation that is more stable.

5. (2 marks) The molecule shown below is in equilibrium with two enol tautomers. Draw them.



6. (5 marks) Draw the structures of:

(i) a meso compound

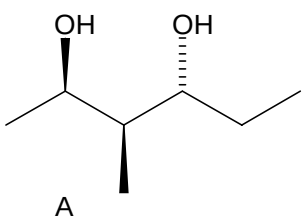
(ii) a chiral allene

(iii) the resonance contributors for the allyl anion,

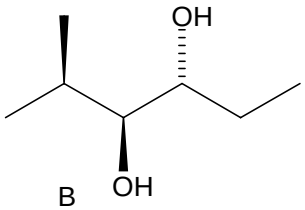
$CH_2=CH-CH_2^-$

(iv) the resonance contributors for the congugate base of nitromethane (CH_3NO_2)

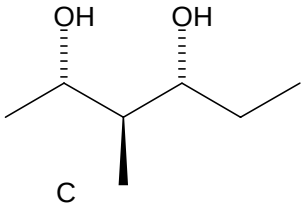
7. (7 marks) Consider the structures A - E below. Assign stereochemical designators (R- or S-) to the stereogenic centres in A.



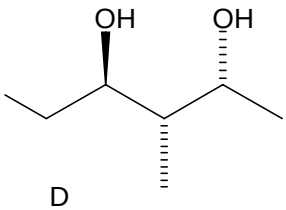
A



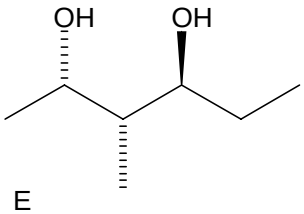
B



C



D



E

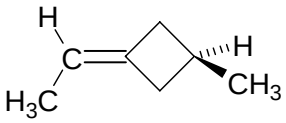
Which of B-E is a constitutional isomer of A? Ans:

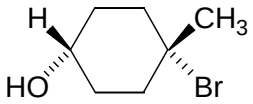
Which of B-E is identical to A? Ans:

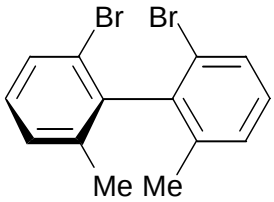
Which of B-E is the enantiomer of A? Ans:

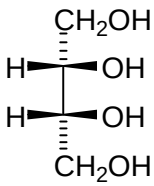
Which of B-E is a diastereoisomer of A? Ans:

8. (4 marks) Indicate (Yes/No) whether each of the following compounds could exist as two different enantiomers.

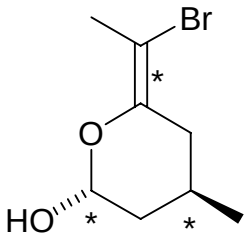




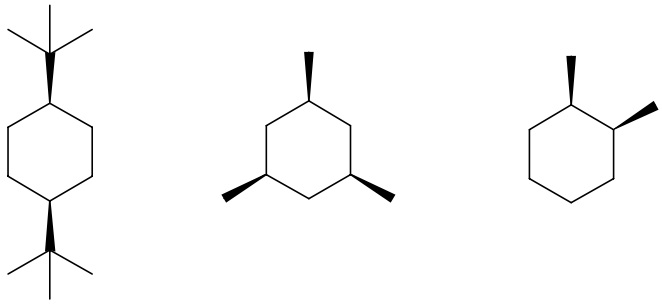




9. (3 marks) Assign appropriate stereochemical designators (R/S/E/Z) to each site labelled with an asterisk (*).



10 (2 marks) Which of these molecules is most likely to be locked in a single chair conformation? Draw that molecule in a chair conformation.



11 (4 marks) For each of the following pairs of compounds circle the one that is the more acidic.