

Name: _____
Last First MI

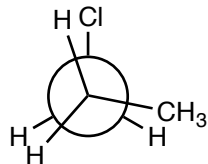
Grading Page (Exam 2):

Page	Points Possible	Points Earned
Multiple Choice (3-5)	36	
6	26	
7	18	
8	20	
TOTAL	100	

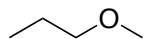
Multiple Choice

Choose the one best answer for each of the following questions. Using a pencil, record this answer on the provided Scantron sheet. (2 points each)

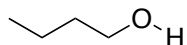
1. The total relative energy of the conformation shown below is 4.1 kcal/mol. What is the energy cost associated with the H/Cl eclipse?



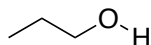
- a. 2.4 kcal/mol
b. 0.5 kcal/mol
c. 1.7 kcal/mol
d. 1.0 kcal/mol
e. 1.4 kcal/mol
2. Arrange the compounds shown below in order of increasing boiling point.



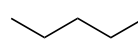
I



II

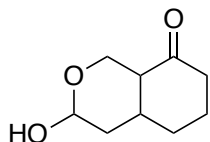


III

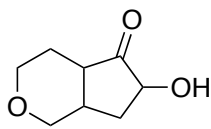


IV

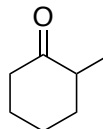
- a. IV < I < II < III
b. IV < I < III < II
c. III < IV < I < II
d. III < II < IV < I
e. None of the above are correct
3. Which one of the following molecules would you expect to be the most soluble in water?



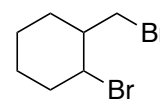
a



b

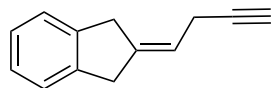


c



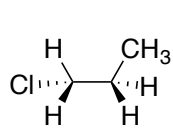
d

4. How many unsaturations are present in the molecule shown below?

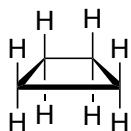


- a. 2
b. 6
c. 7
d. 8
e. 9

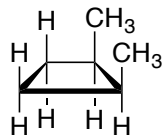
5. Which molecule shown below contains ring strain, torsional strain, and steric strain?



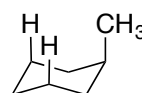
a



b

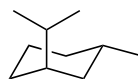
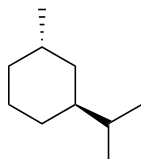


c

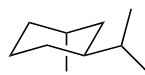


d

6. Which of the following is the least stable chair conformation for the compound shown below?



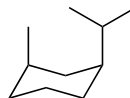
a



b



c

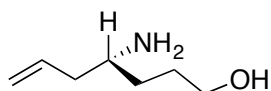


d

7. A racemic mixture:

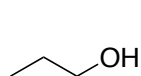
- a. is optically inactive.
- b. contains a 1:1 mixture of enantiomers.
- c. contains a 1:1 mixture of diastereomers.
- d. both a and b
- e. both a and c

8. What is the configuration at the chiral center in the molecule below?

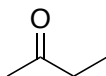


- a. *R*-configuration
- b. *S*-configuration

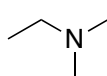
9. Which of the following molecules can hydrogen bond with water?



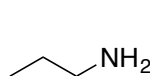
I



II



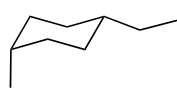
III



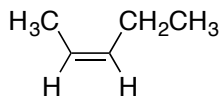
IV

- a. I and IV
- b. II and III
- c. I, III, and IV
- d. All of these can H-bond with water

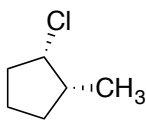
10. Which of the following contain *cis* substituents?



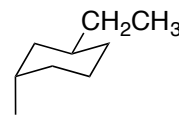
I



II



III



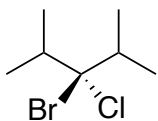
IV

- II only
- II and III
- I, II, and III
- I and II
- I, II, III, and IV

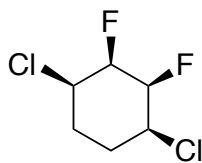
For questions 11-14, determine whether each molecule is:

(a) Chiral, (b) Achiral, or (c) Meso-Achiral

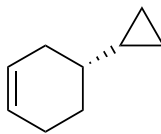
Bubble these answers in on your Scantron sheet for credit!



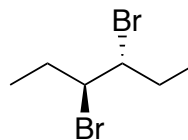
11.



12.



13.

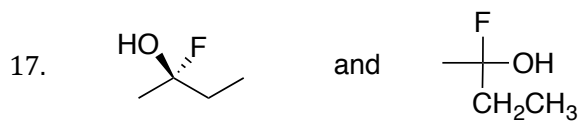
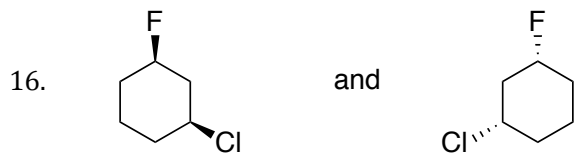
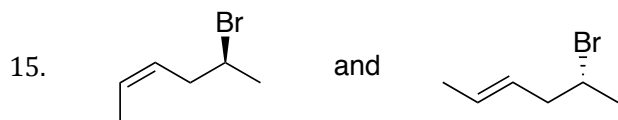


14.

For questions 15-18, determine whether each pair of molecules represent:

(a) Identical Compounds, (b) Constitutional Isomers, (c) Enantiomers, or (d) Diastereomers

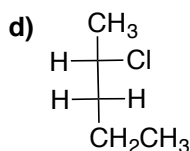
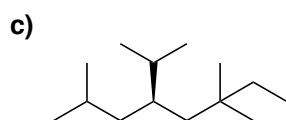
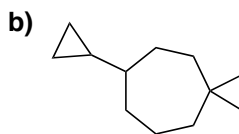
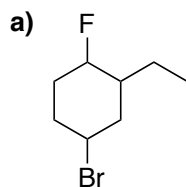
Bubble these answers in on your Scantron sheet for credit!



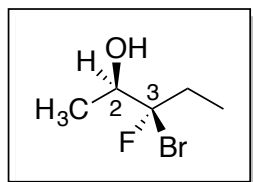
Completion Section

Answer the remaining questions in the spaces provided. Show all work and provide complete explanations.

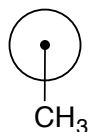
19. Provide IUPAC systematic names for each compound shown below. Include *R/S* for molecules c and d. (3 points each)



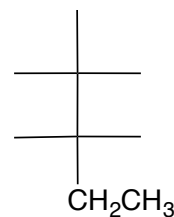
20. Convert the structure shown below to **a)** a Newman projection viewing along the C2-C3 bond and **b)** a Fischer projection. Use the templates provided. (3 points each)



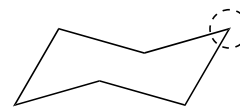
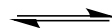
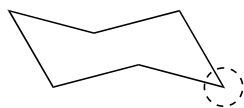
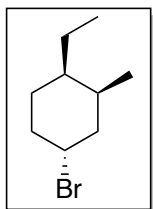
a)



b)

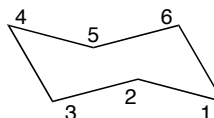


21. Draw both chair conformations for the compound shown below using the templates provided. Put the -CH_3 on the carbon indicated with the circle and orient your other groups based on that reference point. Circle the chair conformation that is lowest in energy. (5 points)

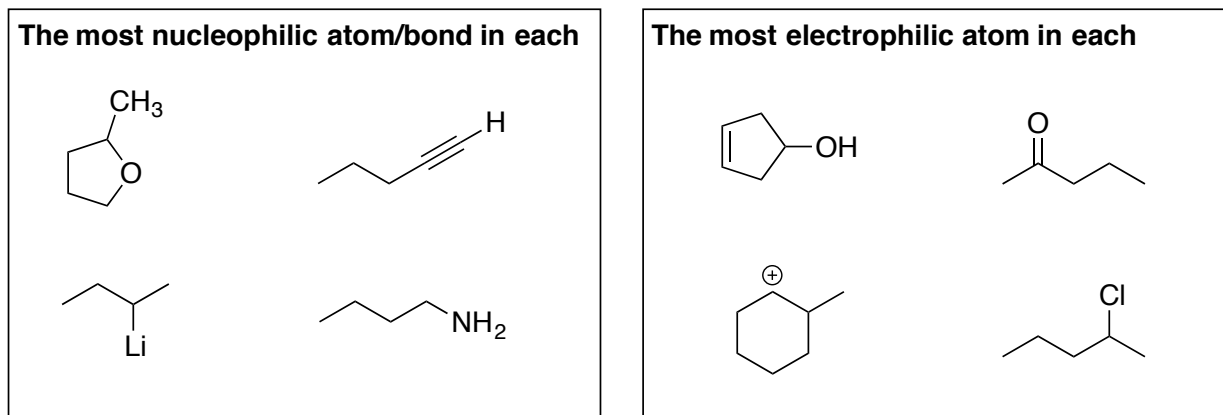


22. Draw a chair cyclohexane that meets the following criteria: (3 points)

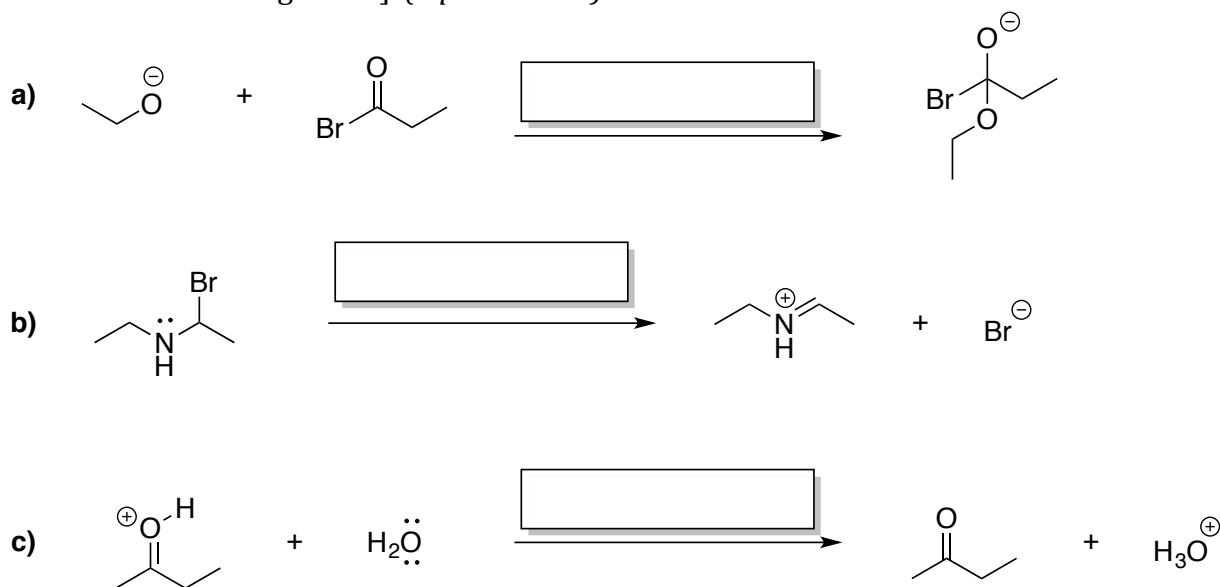
- Axial -CH_3 at C2
- OH with *R*-configuration at C1
- Br at C4 that is *trans* to OH



23. In each molecule shown below, circle: (4 points)



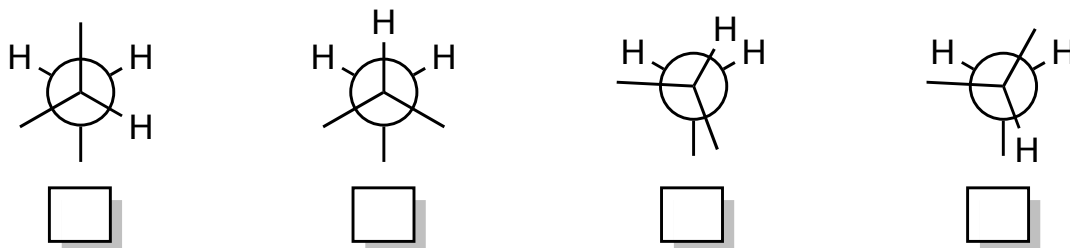
24. For each mechanistic step shown below, **a)** add curved arrows to show electron flow, and **b)** indicate the pattern of electron flow [Nu attack, loss of leaving group, proton transfer, or carbocation rearrangement]. (3 points each)



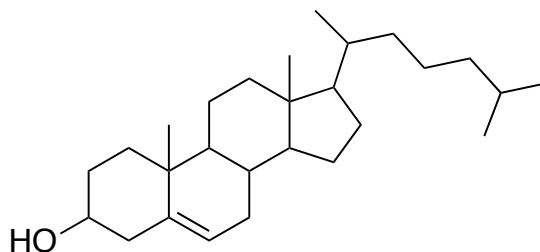
25. Show the carbocation rearrangement product for each. (1 point each)



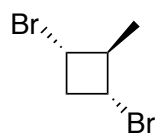
26. Rank the following conformations from most stable/lowest energy (1) to least stable/highest energy (4). (3 points)



27. Identify every chiral center in cholesterol (below) with an asterisk (*). (3 points)



28. Answer the following questions regarding each molecule shown below. (4 points each)



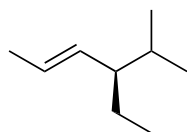
Number of chiral centers _____

Number of stereocenters _____

Max possible # of stereoisomers _____

chiral achiral achiral(meso)

circle one



Number of chiral centers _____

Number of stereocenters _____

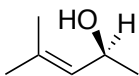
Max possible # of stereoisomers _____

chiral achiral achiral(meso)

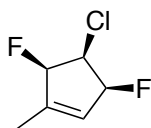
circle one

29. Draw each of the following (2 points each)

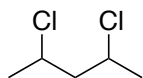
a. The enantiomer of:



b. A diastereomer of:



c. An achiral stereoisomer of:



30. Tartaric acid is a chiral molecule that can be obtained as the (+) or the (-) enantiomer. If you have a solution that contains a mixture of 10 g of the (+)-enantiomer and 5 g of the (-)-enantiomer, will this solution be optically active? Explain why or why not. (3 points)