

**Fall Semester Organic Chemistry I
Mid-Term Exam 1**

Name (print):

Name (Sign) :

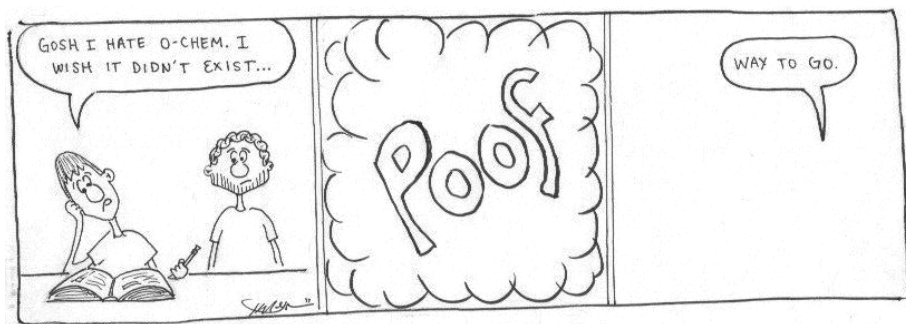
Email Address (1 bonus point):

Instructions

1. Keep the exam closed until you are instructed to begin.
2. The exam consists of 10 questions. The first thing you should do is make sure that no pages are missing. If a page is missing, notify a proctor immediately.
3. You will have 1 hr and 15 minutes to complete the exam, at which time pencils must be put down. Budget your time wisely.
4. Make sure to show all of your work, and make it clear what your thought process was. Answers should fit in the space provided. If you need to use the back the sheet of paper, you must make note of it in the space allotted for credit.

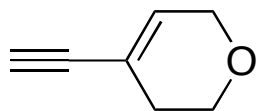
Breakdown

1. ___ / 5
2. ___ / 10
3. ___ / 15
4. ___ / 5
5. ___ / 15
6. ___ / 10
7. ___ / 10
8. ___ / 10
9. ___ / 10
10. ___ / 10
- total ___ / 100**

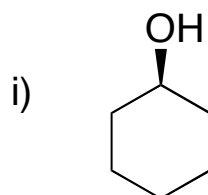


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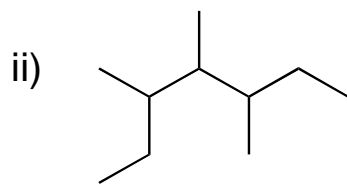
1) Label all sp and sp² hybridized carbons on the following molecules (5 points)



2) Give the IUPAC name of the following molecules (10 points, 5 points each)

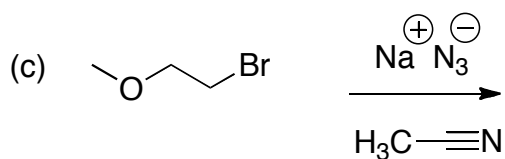
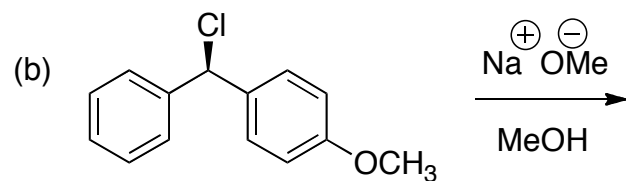
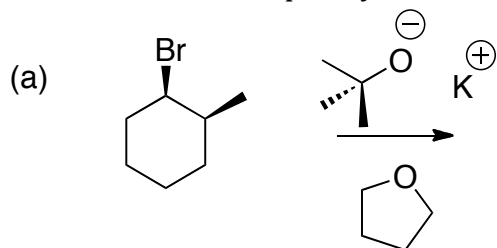


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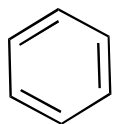


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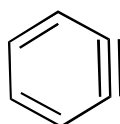
3) Predict the major product(s) of the following reactions. Specify whether the reaction is SN1, SN2, E1 or E2 and explain your answer. (15 points, 5 points each)



4) Benzene is a perfectly stable compound. Benzyne, on the other hand, is highly reactive and has to be made *in situ* where it is then completely consumed. Using what you know about hybridization, explain the differences in stabilities of benzene and benzyne (5 points).



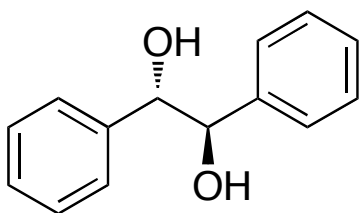
benzene



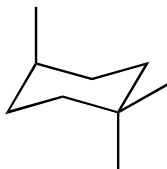
benzyne

5) For each of the following molecules below, (a) circle all stereocenters in the molecule and designate them as (R) or (S), and (b) label the molecule as chiral or achiral. If achiral, specify whether or not it is meso. (15 points, 5 points each)

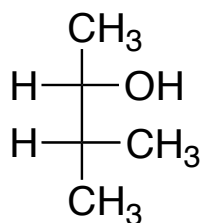
i)



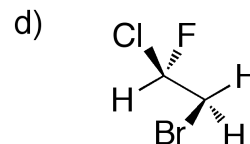
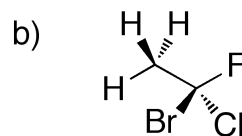
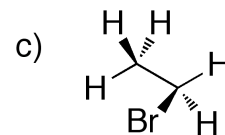
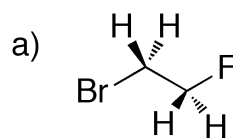
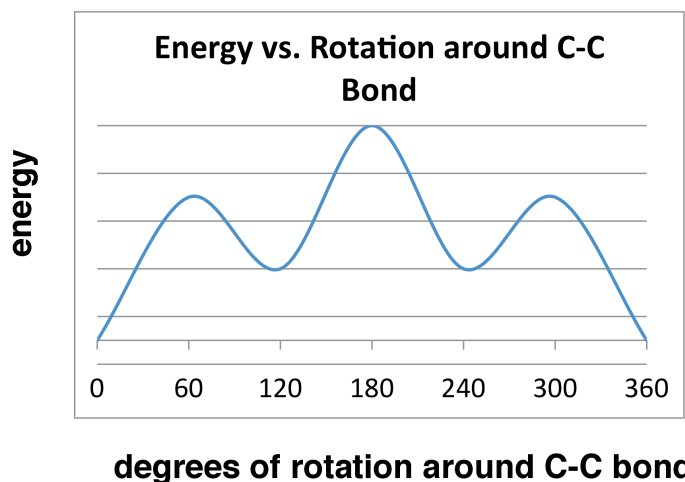
ii)



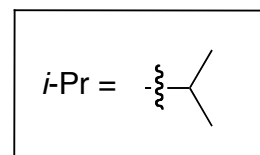
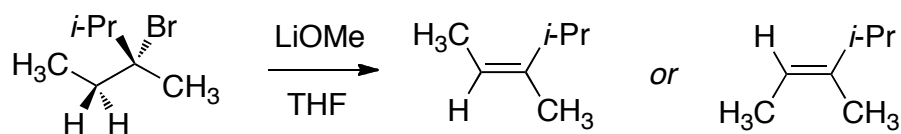
ii)



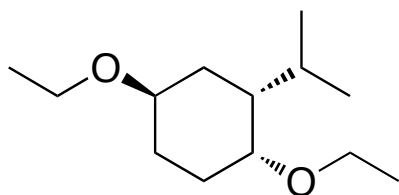
6) Of the four possible molecules, which would have the energy diagram shown? Show the Newman projection of the molecule you have chosen at its highest (180) and lowest (0 and 360) energy levels. (10 points)



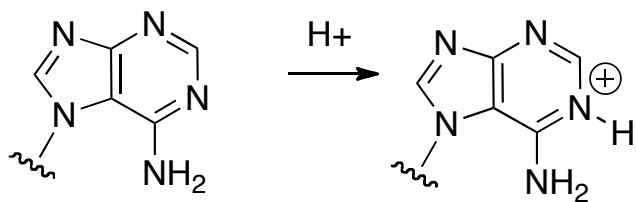
7) The following reaction is an E2 reaction where two possible isomers can be formed. Which product would you expect to form, and explain your answer using structures. (10 points)



8) The A value for an ethyl ether is 0.9 kcal/mol, and for an isopropyl group is 2.1 kcal/mol. Draw both chair conformations of the molecule below, and using the A values given, predict which conformation is lower in energy. (10 points)



9) Draw two resonance forms that demonstrate how the positive charge generated through the protonation of adenine can be delocalized onto two other nitrogen atoms (10 points, 5 points each).



10) Propose a mechanism for the following transformation. (10 points)

