

Chemistry 117 Sec. A (8:00-8:50)
Exam No. 1
“MS, IR, and Reactions of Benzene”
February 12, 2001

Instructions: You have until 8:55 a.m. to complete the exam. At that time, I will request that all remaining test takers cease writing, turn their exams over, and pass them to their rightmost isle. If you finish before 8:50 a.m. you may turn in the exam at the front of the room prior to leaving. If you finish within the final 5 min. of class, please turn your exam over and remain seated until I call for the remaining exams to be turned in. *In fairness to all, anyone still working on the exam after “time” is called will receive a grade of zero!*

Be sure to read the instructions for each question. It may be helpful to skim the entire exam and solve the easier questions first.

Exam Agreement: I, _____, have read and agree to

(Please print)

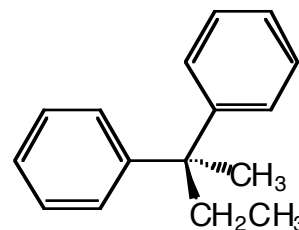
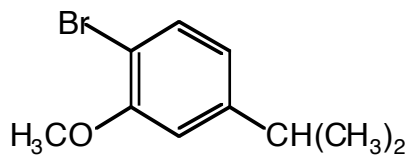
abide by the instructions above. On my honor, I have neither given nor accepted any help during this exam.

Signature: _____

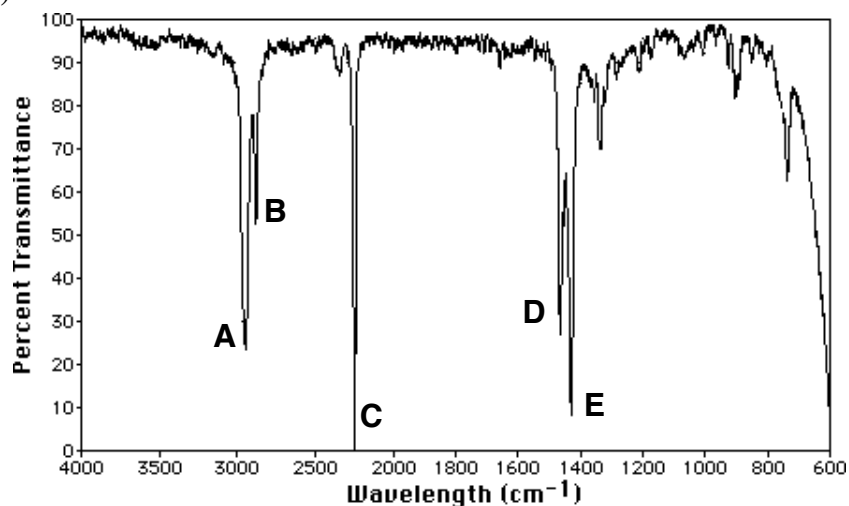
College: _____

**DO NOT OPEN THIS EXAM UNTIL
INSTRUCTED TO DO SO**

1. Provide an unambiguous name (IUPAC or common) for each of the following molecules. (8 points)



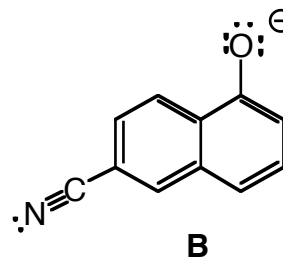
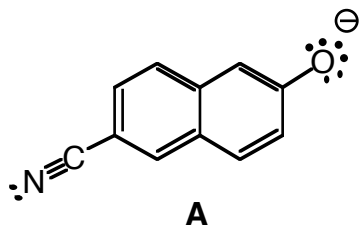
2. The following statements refer to the spectrum below. Place a check next to those that are *positively* true. (26 points)



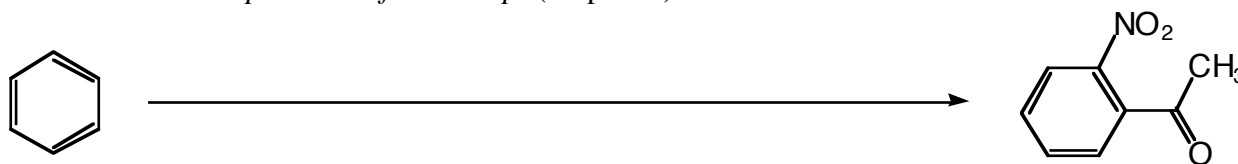
- The molecule that produced this IR spectrum *must* contain an alkene.
- The molecule that produced this IR spectrum *must* contain a terminal alkyne.
- The molecule that produced this IR spectrum *must* contain an internal alkyne.
- It is probable that an ether is present in this molecule.
- It is probable that an aldehyde is present in this molecule.
- Peak **A** is due to a bending vibration.
- Peak **E** is due to a stretching vibration.
- Peak **D** absorbs higher *frequency* light than peak **E**.
- Peak **C** indicates that no light is passing through the sample at that wavelength.
- The functional group of peak **B** absorbs more light than the functional group of peak **D**.

- ___ The spectrum shows that peak **A** is more polar than peak **E**.
- ___ The position of peak **A** on the x-axis is dependent on the number of C-H bonds in the molecule.
- ___ The intensity of peak **A** is dependent on the number of C-H bonds in the molecule.

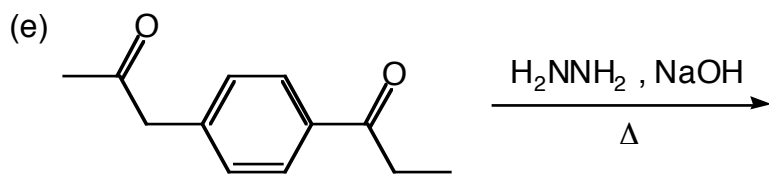
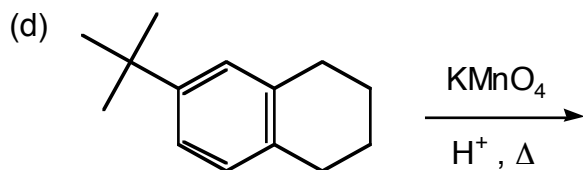
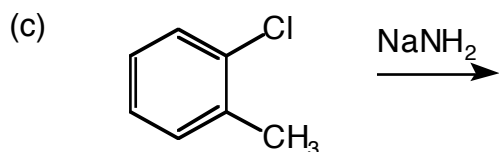
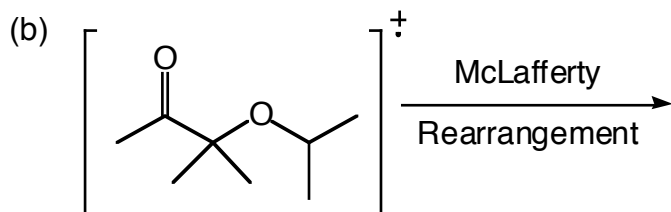
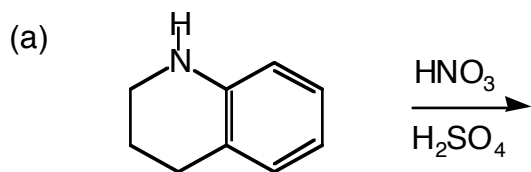
3. Indicate which of the following two bases is strongest by circling it. Provide a thorough rationale for your decision using pictures *and* words. (10 points)



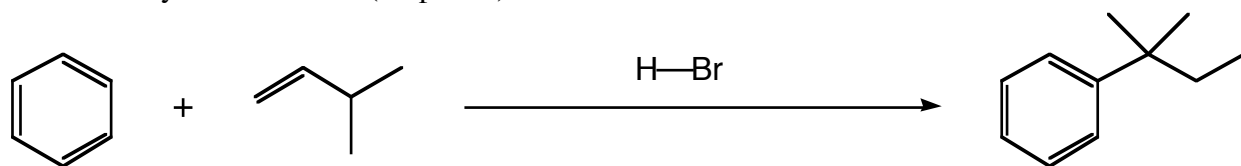
4. Propose a synthesis (sequence of reactions) that will accomplish the following transformation. *Be sure to include the products of each step.* (12 points)



5. Draw the **major product** of each of the following reactions. Circle your answer(s). (20 points)



6. Provide a mechanism for the following reaction. Be sure to show all charges and lone pairs of electrons in your structures. (10 points)



7. An unknown molecule (A), yields the IR and mass spectra shown below. One mole of A can be titrated with two moles of NaNH_2 , but only with one mole of NaOH . Provide a structure for A in the box below. Assign peaks as appropriate and show your work for full and partial credit. (14 points)

