

Organic Chemistry 2
First Examination
February 18, 2005
Prof. Malachowski

Name: _____

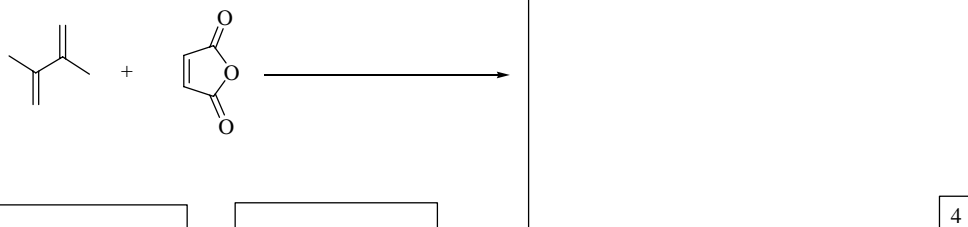
The examination has five questions on four pages. The point values for each question are found with the question. Partial credit where appropriate will be given.

Read each question carefully before answering. Be certain you understand everything the question is requesting. Do the easy questions first. If questions appear confusing or exceedingly complex, then you may need to rethink the question. Keep in mind the intended examination topics.

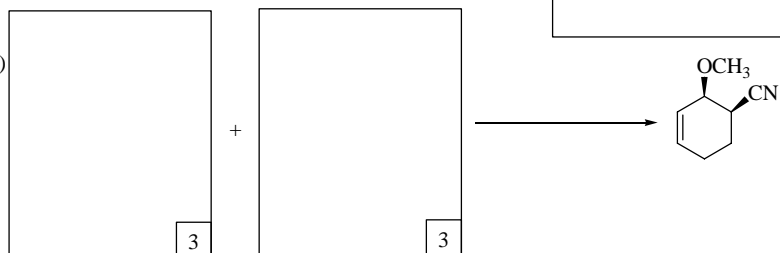
In organic chemistry, hand-drawn pictures convey specific information. Be sure the drawing you have made conveys the essential information required to answer the question. Make certain that three-dimensional pictures display the correct atom arrangements. Don't forget to include lone pairs of electrons and formal charges when appropriate.

1. Complete the following reactions by providing the necessary information: starting material, reagent or major product, unless otherwise instructed. Be sure to include stereochemical information where applicable. (points listed in corner of box)

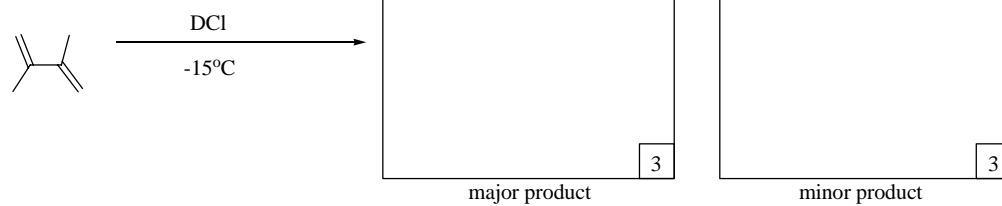
a)



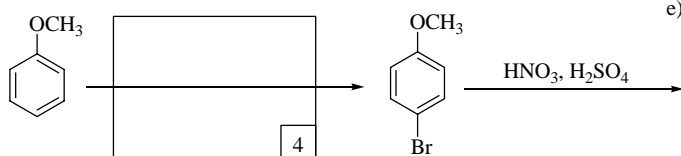
b)



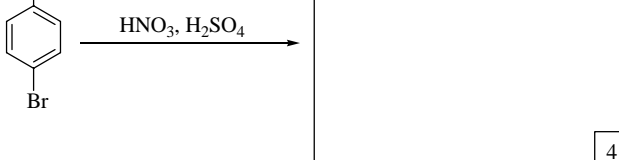
c)



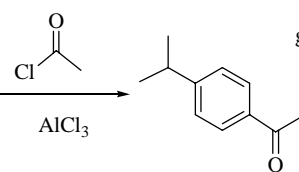
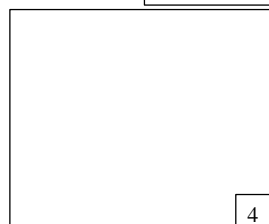
d)



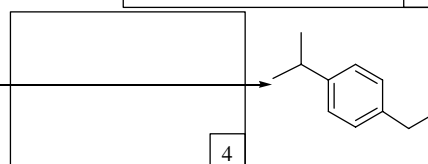
e)



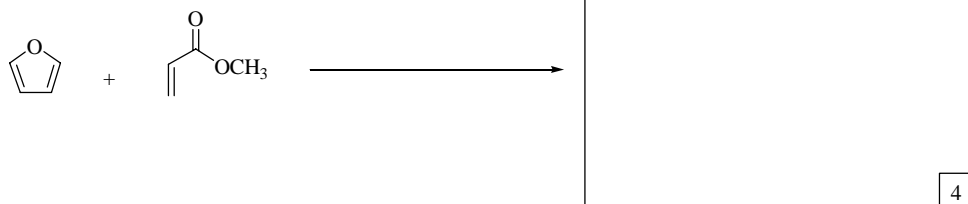
f)



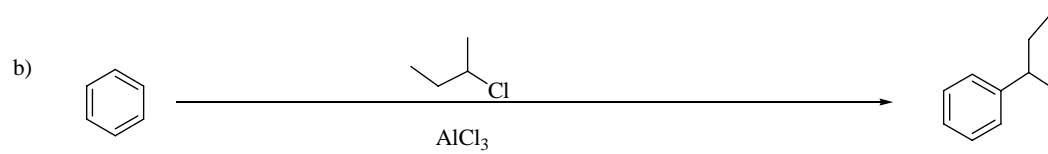
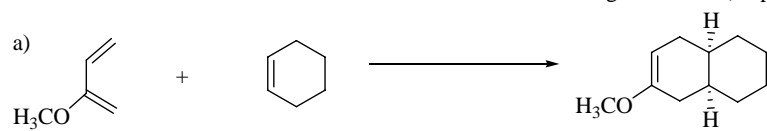
g)



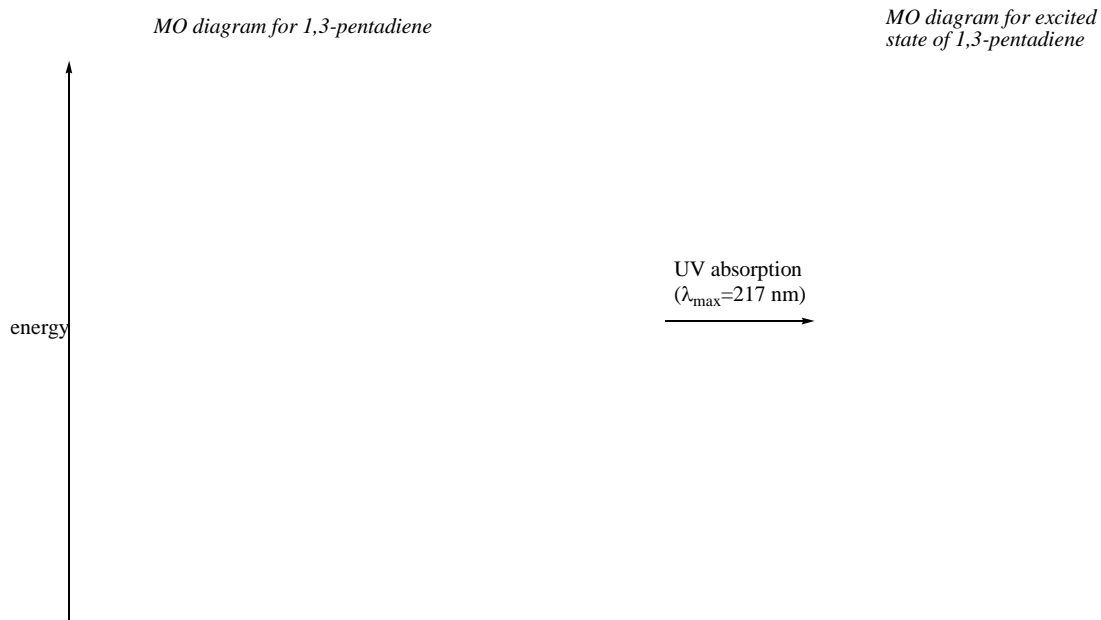
h)



2. Draw the curved arrow electron flow mechanism for the following reactions. (16 pts.)

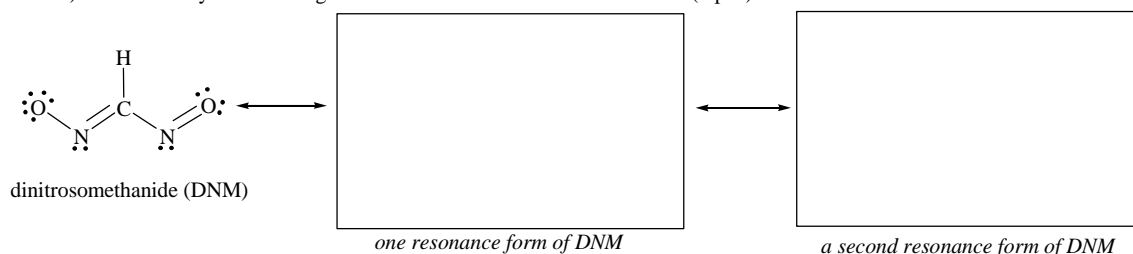


3. a) Draw the molecular orbital diagram for 1,3-pentadiene. Include orbital phase and node information. Label the bonding and antibonding orbitals. (10 pts.)
 b) To the right of your diagram, show the effect of UV absorption at 217 nm. Draw the energy diagram for the excited state of 1,3-pentadiene that results from this absorption. Assume the absorption is a π to π^* transition. You do not need to redraw the molecular orbital pictures with the phases. (4 pts.)



4. A recent report in the chemistry literature described the synthesis, structure and bonding of dinitrosomethanide (DNM). Answer the following questions about this molecule based on related discussions that we had in class.

- a) Add necessary formal charges to the structure of DNM shown below. (2 pts.)



- b) Draw two resonance structures of DNM in the boxes provided. Use curved arrow electron flow conventions to show how you get from one resonance form to another. (8 pts.)

