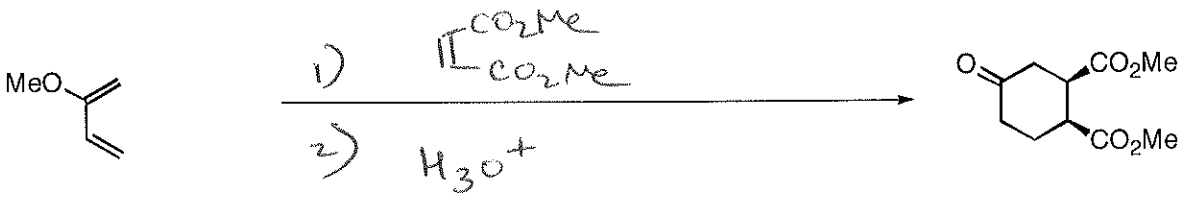
Chem 332
Exam 4
May 21, 2007
Professor Fox

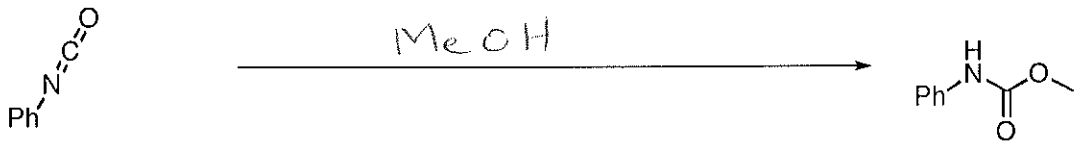
100 points
120 minutes

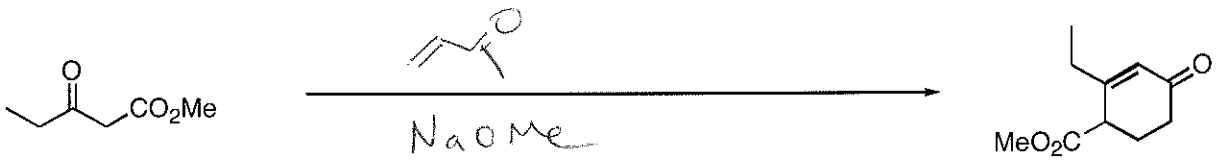
Your Name_____

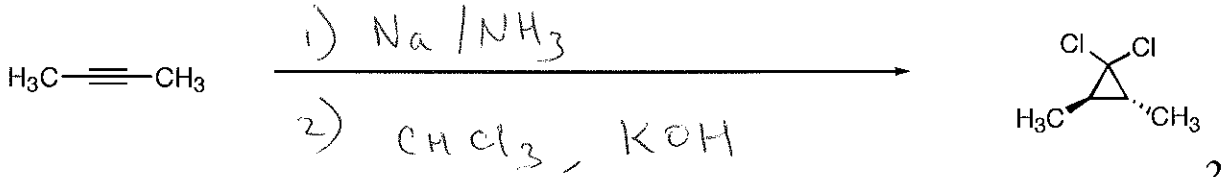
Your Name Key 3 points each

1. Provide reagents. More than one step may be necessary. You do not need to provide mechanisms



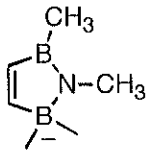


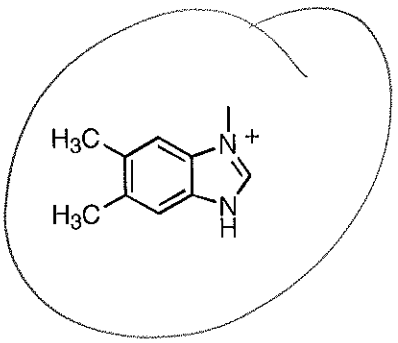


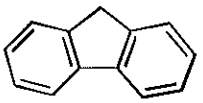


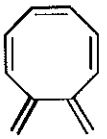
Your Name Key

2. Circle the molecules that are aromatic. 2 points each



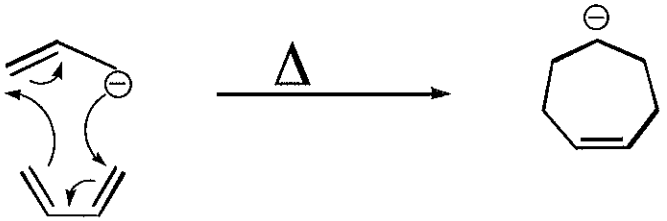






Your Name key

3 Consider the thermal reaction below



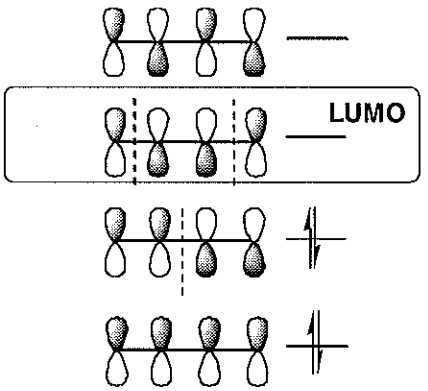
18 points

Would you expect this to be a concerted process under thermal conditions? Explain in detail using an argument based in molecular orbital theory.

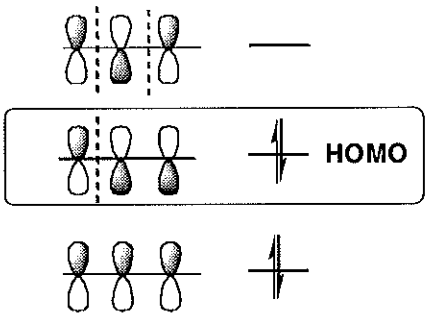
For this to be a concerted process under thermal conditions, the orbital symmetry of the HOMO of one reactant must match the LUMO of the other reactant. For the case here, we will identify the LUMO of the butadiene and the HOMO of the allyl anion. (this analysis still works if we were to choose the LUMO of allyl anion and the HOMO of butadiene).

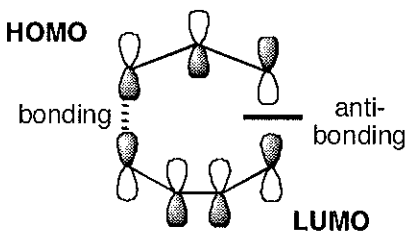
We treat the allyl anion as a four electron, 3-carbon system of pi-orbitals. Like any other system, we remember that the ends of the allyl system have like symmetry for the lowest energy orbital, unlike symmetry for the next orbital, etc. .

Butadiene



allyl cation





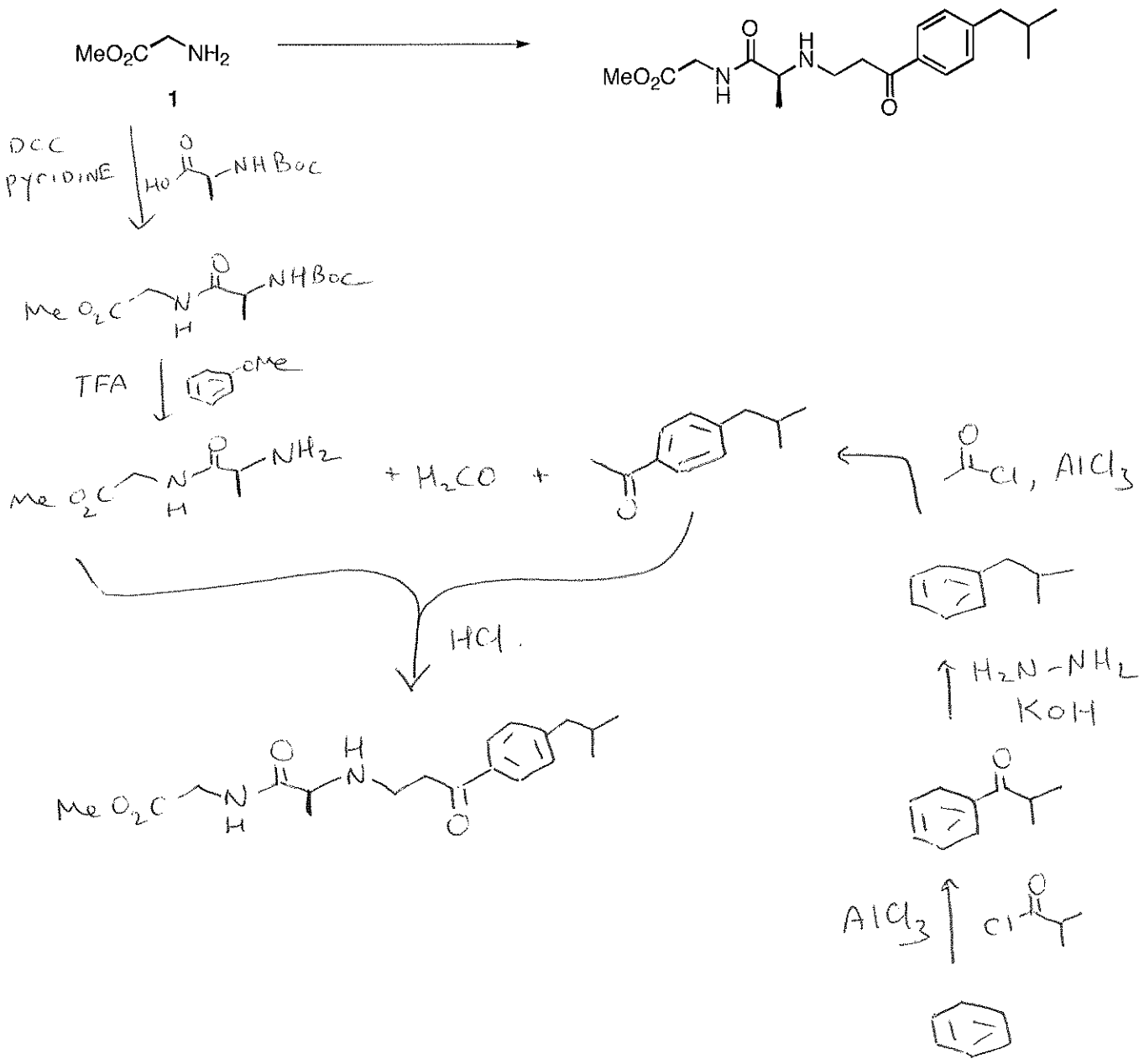
For the reaction to be concerted, we need to have bonding interactions at both termini of the reacting system. This is **NOT** the case for the current reaction.

The thermal reaction cannot take place by a concerted mechanism.

Your Name Key

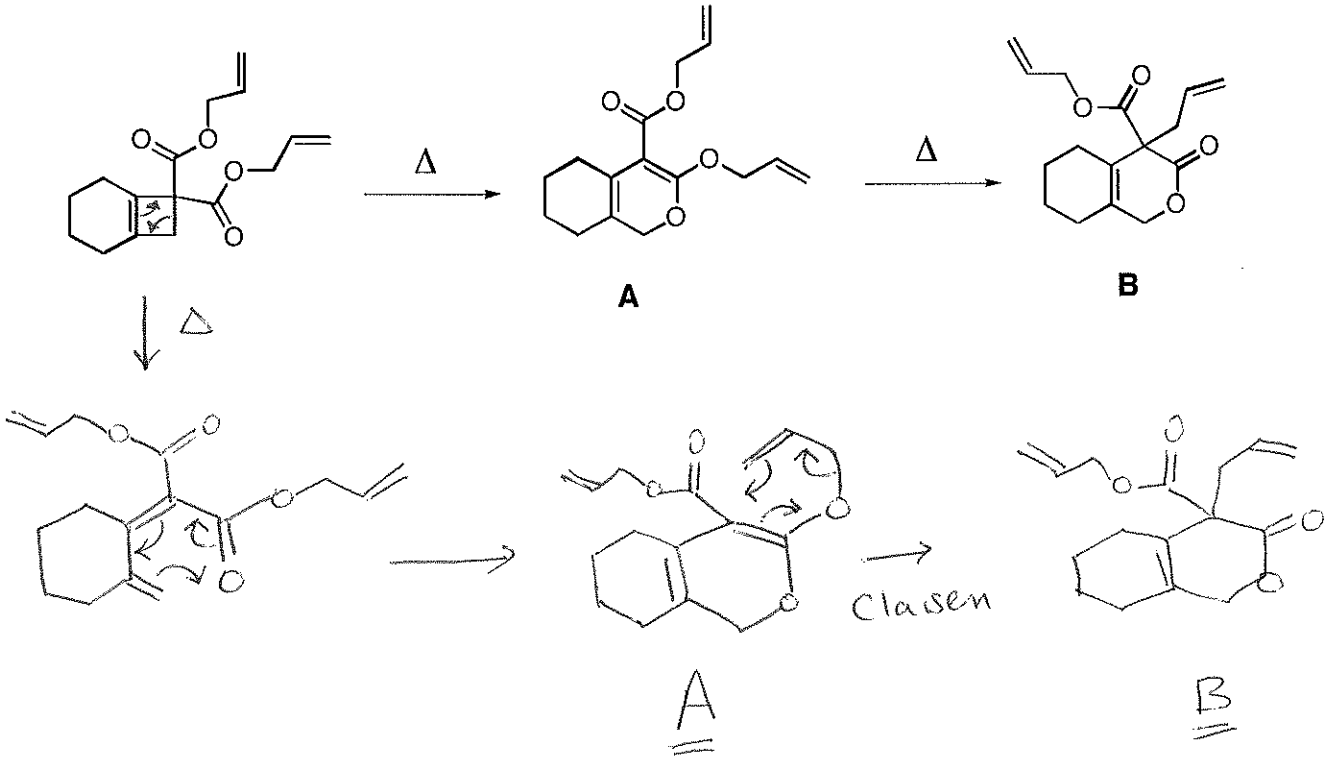
4. Provide a synthesis starting from **1**, benzene and any other materials that contain less than 4 carbons. You may also use BOC-protected amino acids as starting materials.

23 points



Your Name Key

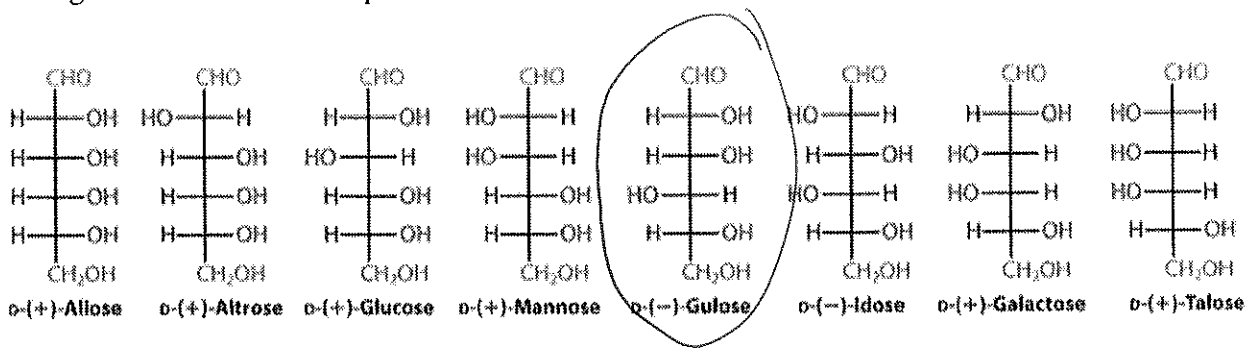
5. Provide a detailed arrow pushing mechanism for the formation of **A** and **B**. 22 points

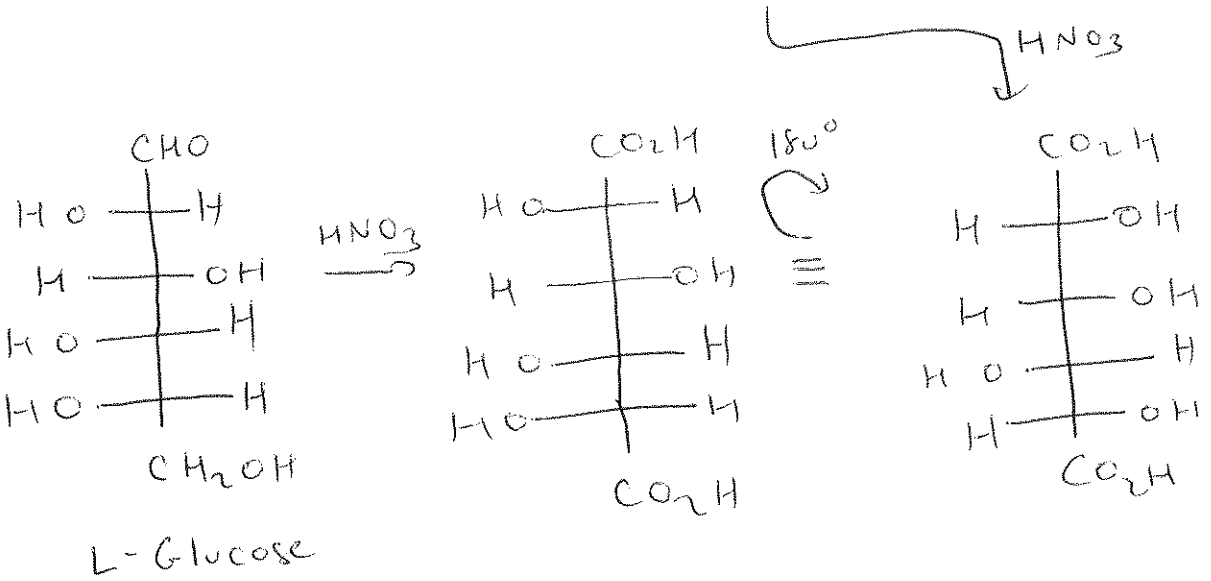


Your Name Key

8 points

6. Non-natural L-(–)-glucose (the enantiomer of D-(+)-glucose) is oxidized by HNO3 to give an optically active diacid .Circle the naturally occuring D-aldohexose that would give that same diacid upon HNO3 oxidation.



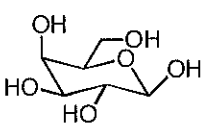


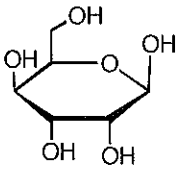
Your Name Key

3 points each

7. Identify each of the following pairs as being idential, meso, enantiomers, anomers, or non-anomeric diasteromers

(a)





identical

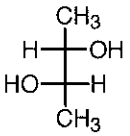
meso

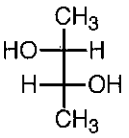
enantiomers

anomers

non-anomeric diastereomers

(b)





identical

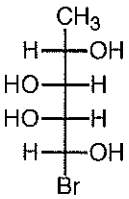
meso

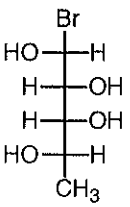
enantiomers

anomers

non-anomeric diastereomers

(c)





identical

meso

enantiomers

anomers

non-anomeric diastereomers

Scratch paper