

Chemistry 172Q
February 5, 2004

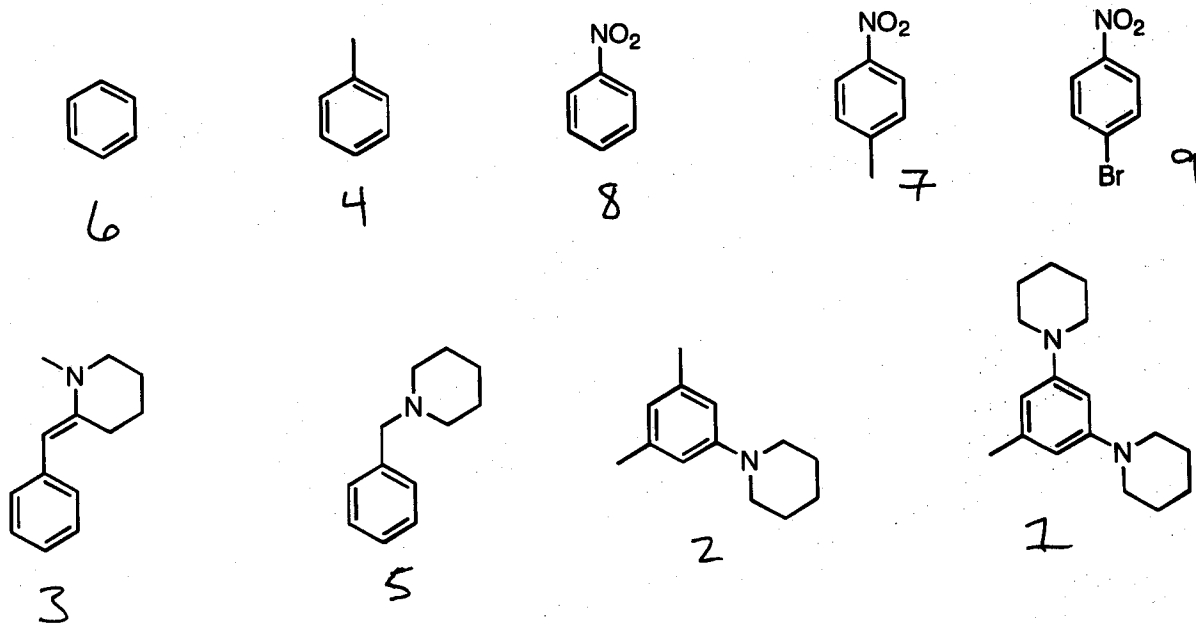
Exam 1

1 _____/30
2 _____/20
3 _____/25
4 _____/25
5 _____/25
Total _____/125

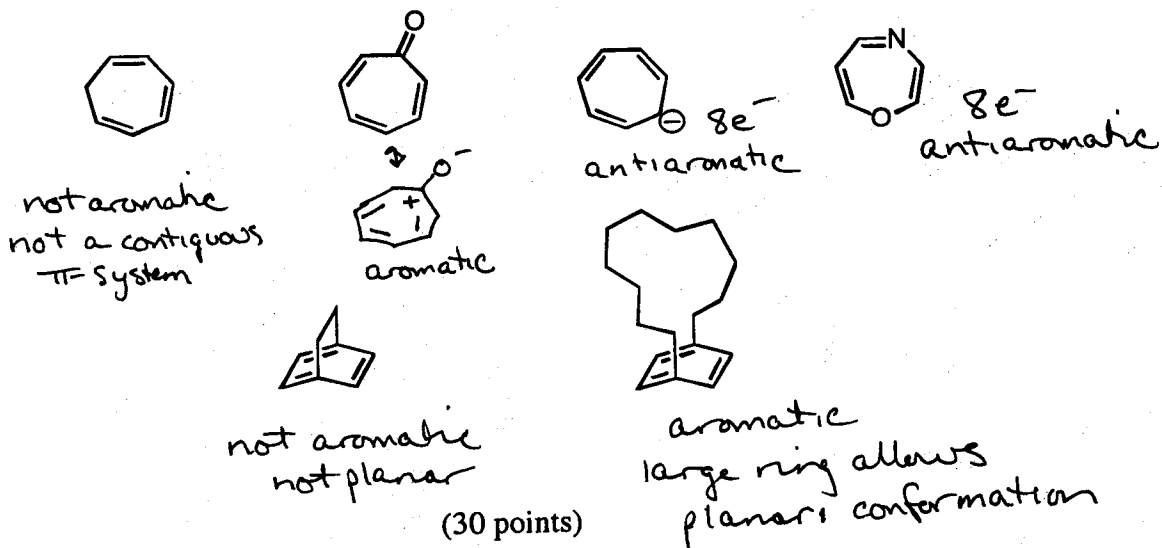
NAME

Answer Key

1. Rank the following compounds in order of reactivity (1 is most reactive) in electrophilic aromatic substitution.

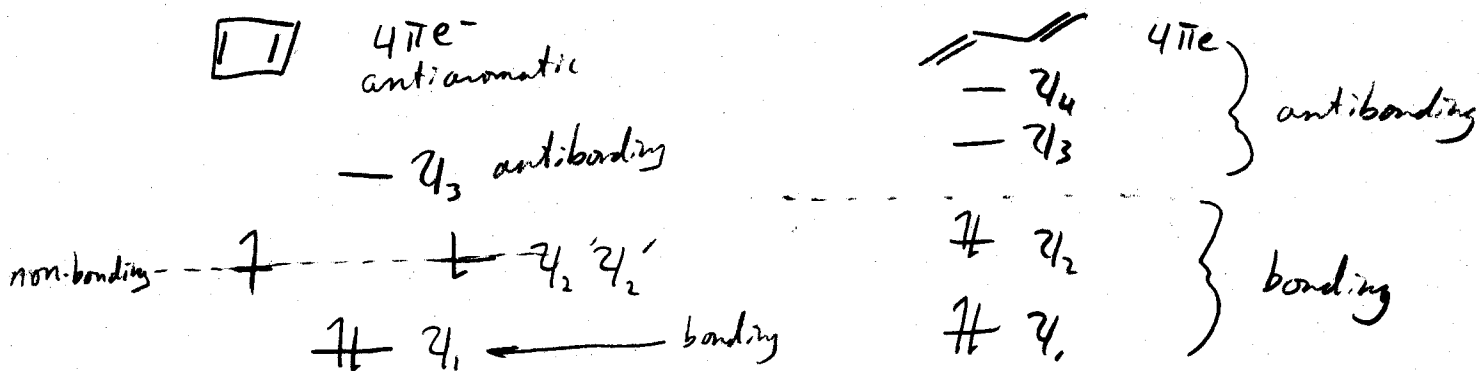


Will the following compounds be aromatic, nonaromatic, or antiaromatic?
If necessary, rationalize your decision.



Is cyclobutadiene aromatic or antiaromatic?

Explain, with the help of an electronic diagram comparing cyclobutene to 1,3 butadiene.



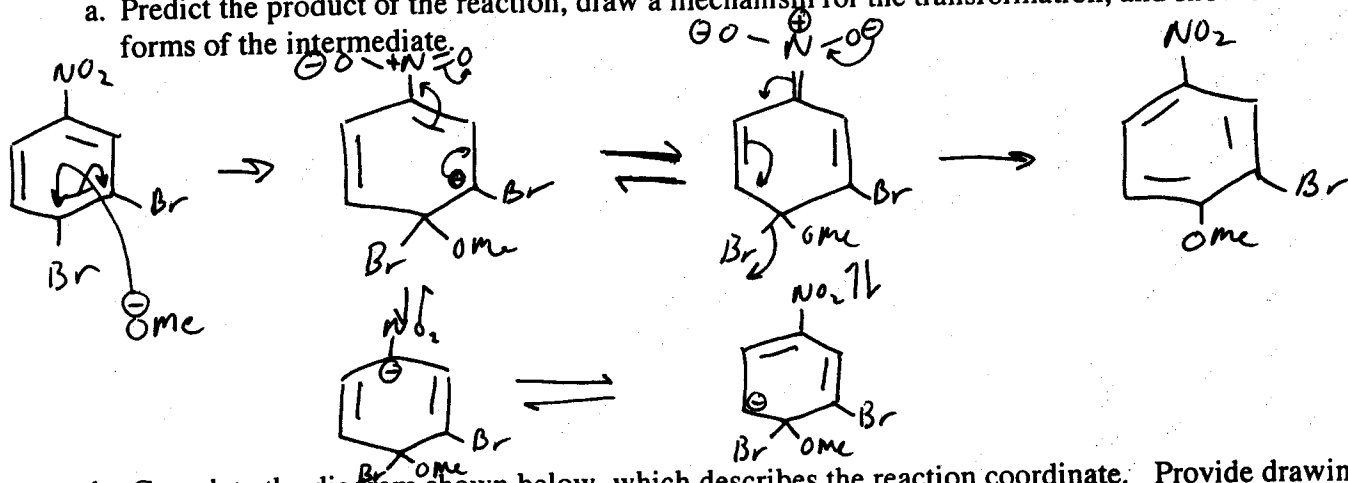
in cyclobutadiene
 2 e^- are put
 into non-bonding
 orbitals
 destabilization
 caused by loss of
 spin pairing

in 1,3 butadiene all 4 e^-
 are in bonding orbitals

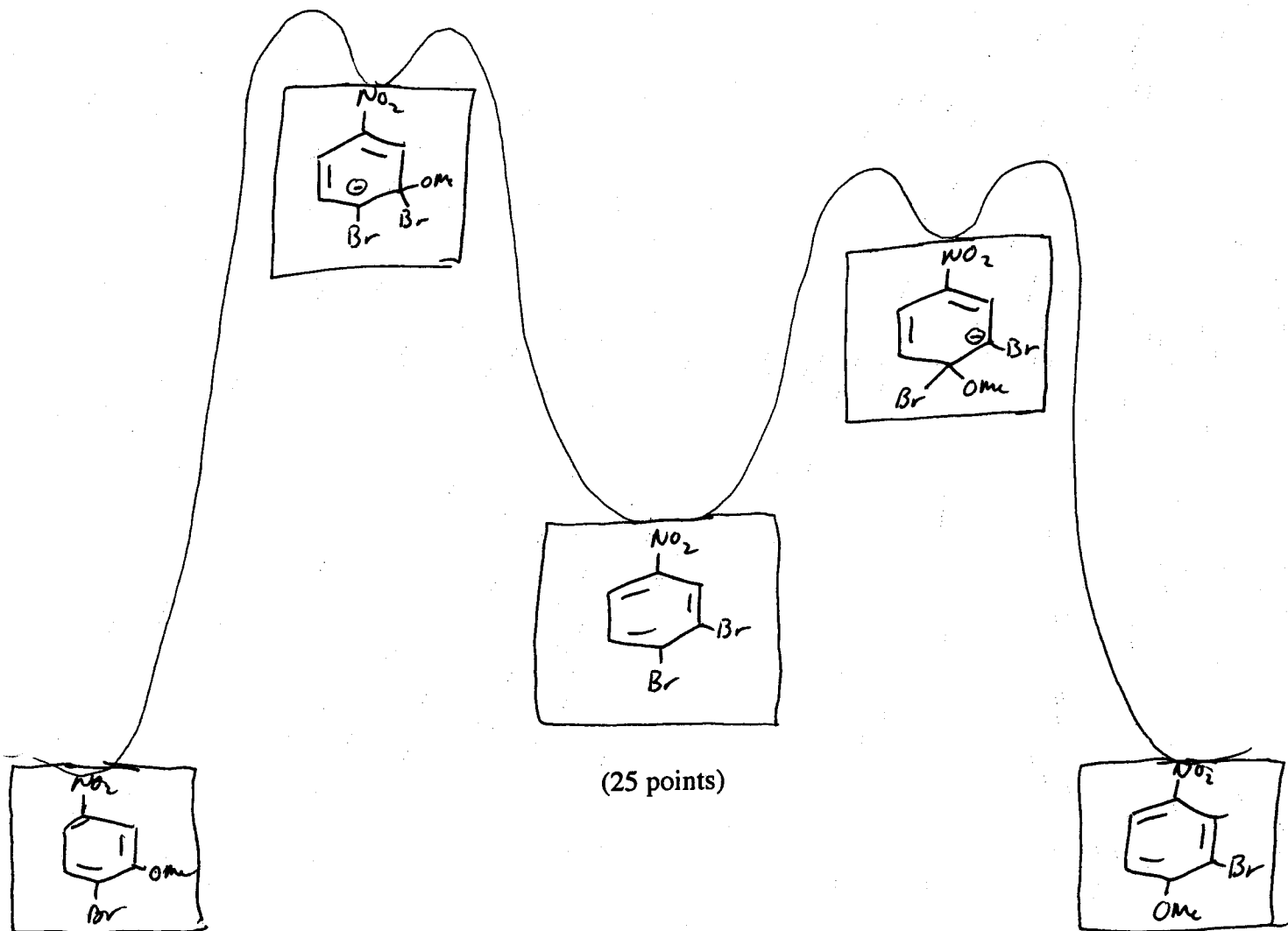
(20 points)

5. Consider the nucleophilic aromatic substitution of 3,4-dibromo nitrobenzene with methoxide.

a. Predict the product of the reaction, draw a mechanism for the transformation, and show all resonance forms of the intermediate.

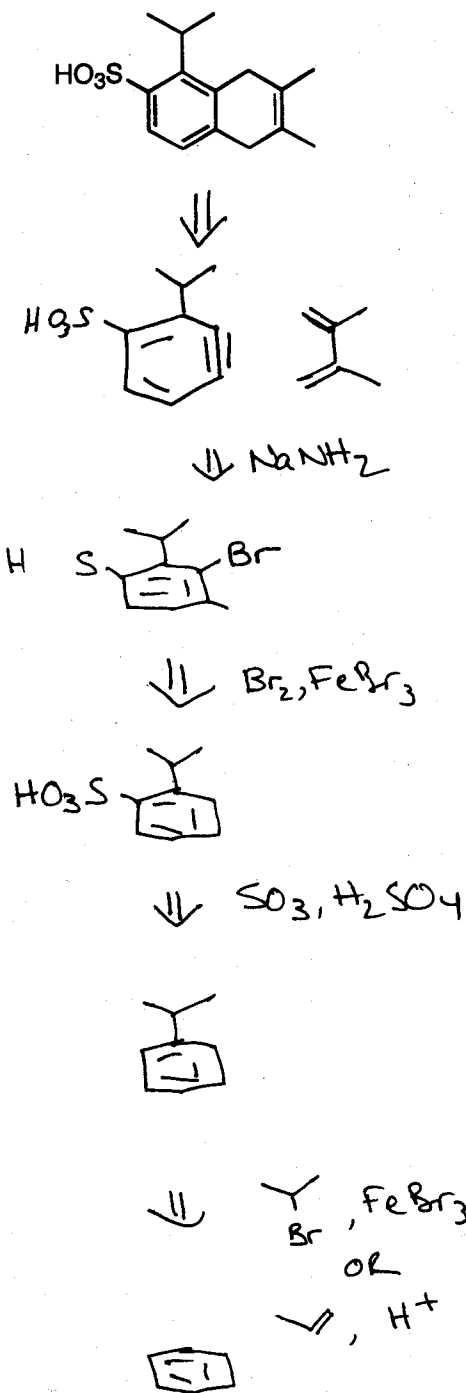


b. Complete the diagram shown below, which describes the reaction coordinate. Provide drawings of the missing reactive intermediates and the products expected from each possible substitution, and use the diagram to explain the observed selectivity.

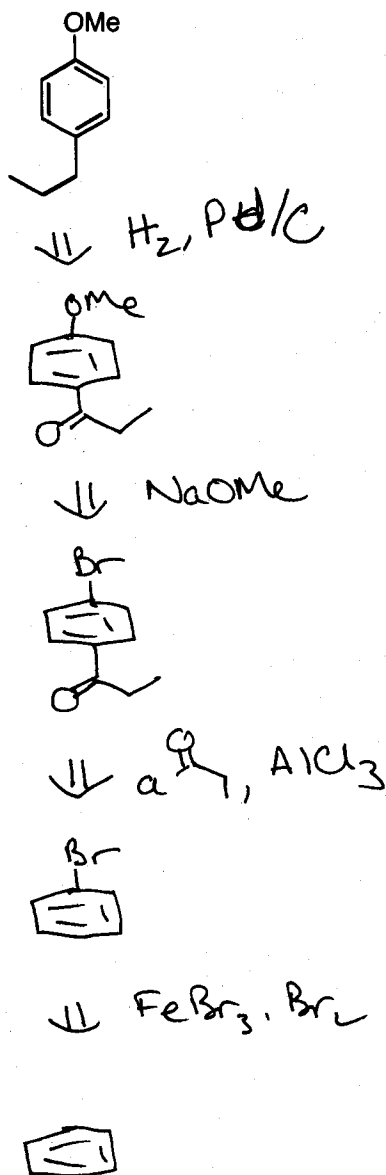


Suggest a synthesis of the following molecules. Start with benzene, and add any other reagent, as long as it has six carbons or less. Be sure to specify all the reagents you will need for each step. Assume you can separate the isomer you need from a mixture.

a.

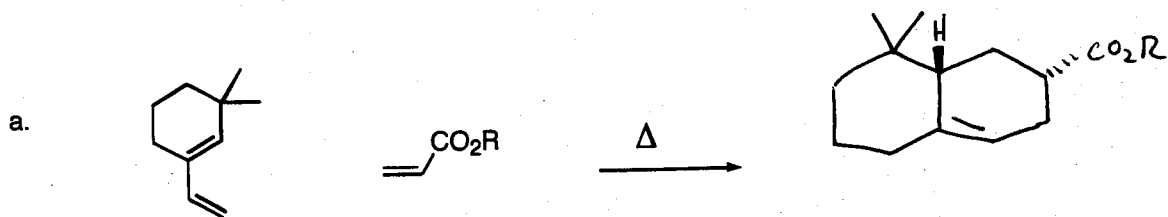


b.

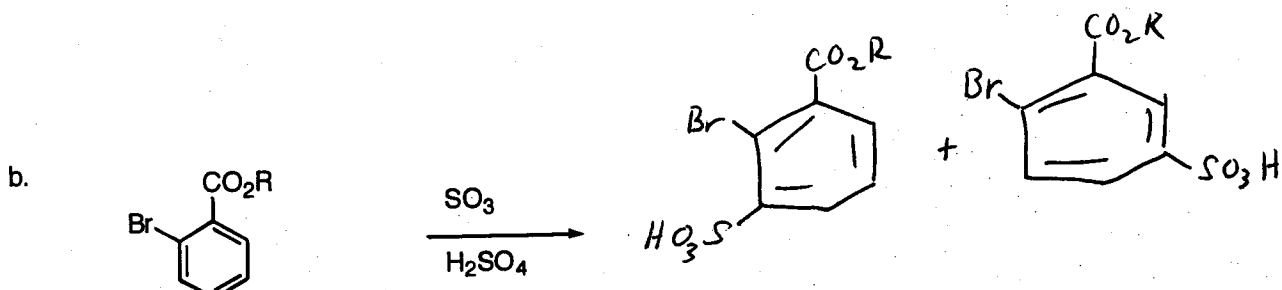


(25 points)

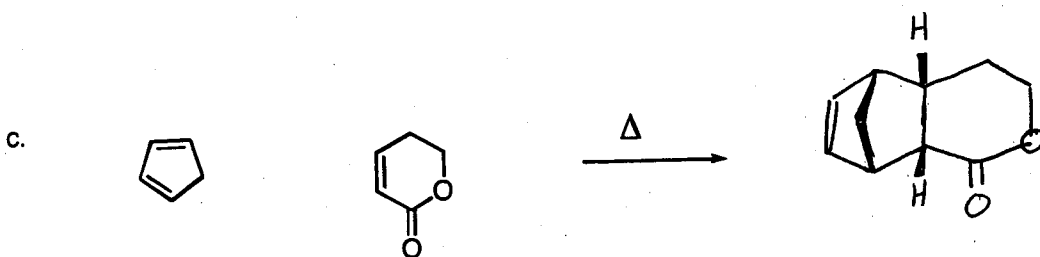
5. Predict the product for each of the following transformations. Be sure to specify stereochemistry if necessary.



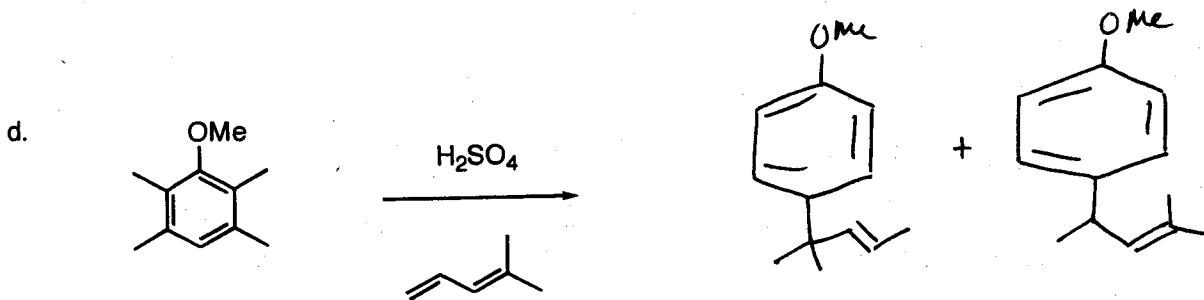
a single product is expected



two products are expected



a single product is expected



two products are expected

(25 points)