

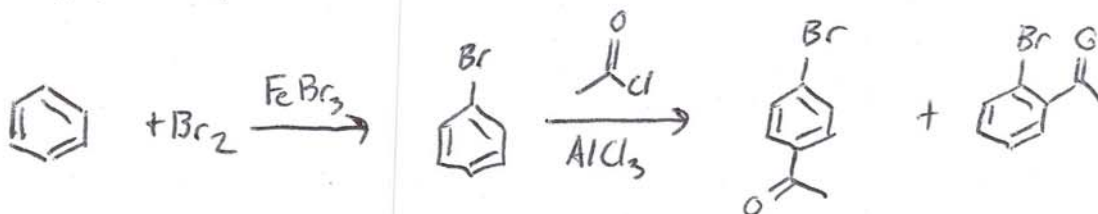
Chemistry 3331-100
Organic Chemistry / Dr. Barney Ellison

Thursday: Sept. 23rd @ 7:00pm → 9:00 / 1st Exam / Hale Science 230-270)

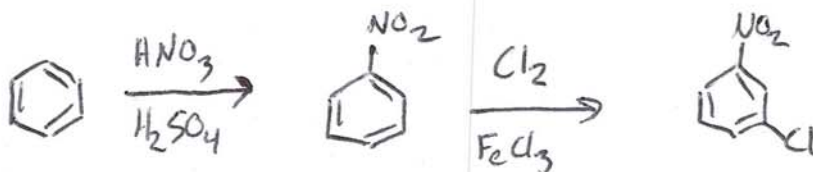
Name: Key (please print)

1. (20 pts) Outline a synthesis of each of the target compound starting with benzene.

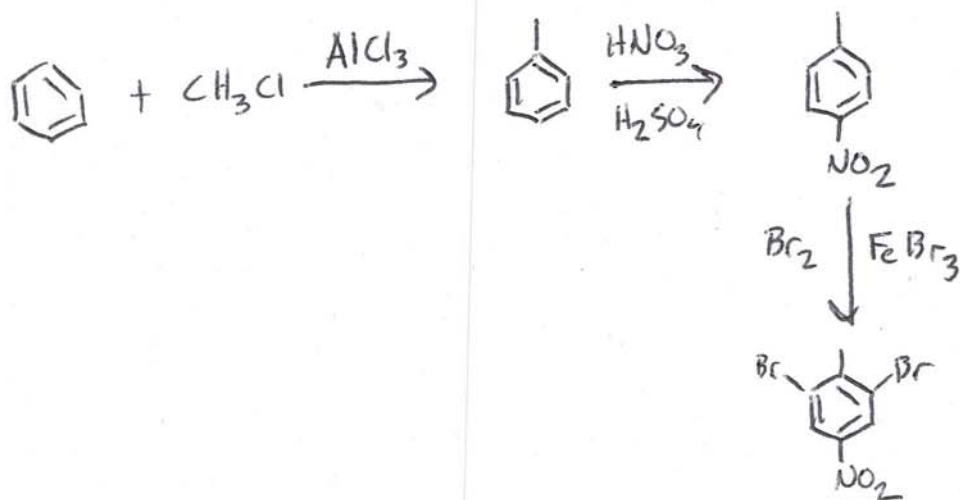
a) $p\text{-Br-C}_6\text{H}_4\text{-CO-CH}_3$



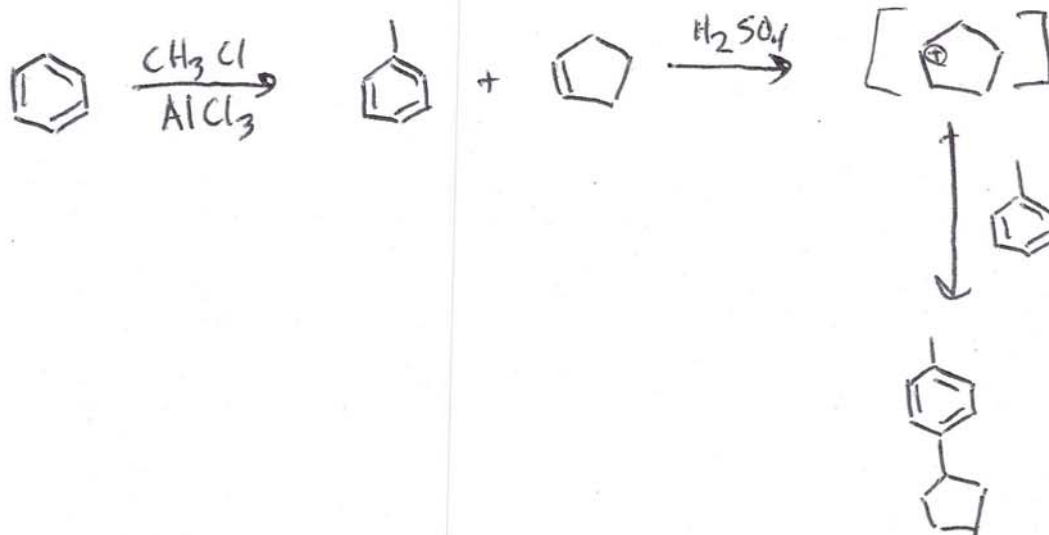
b) $m\text{-chloronitrobenzene}$



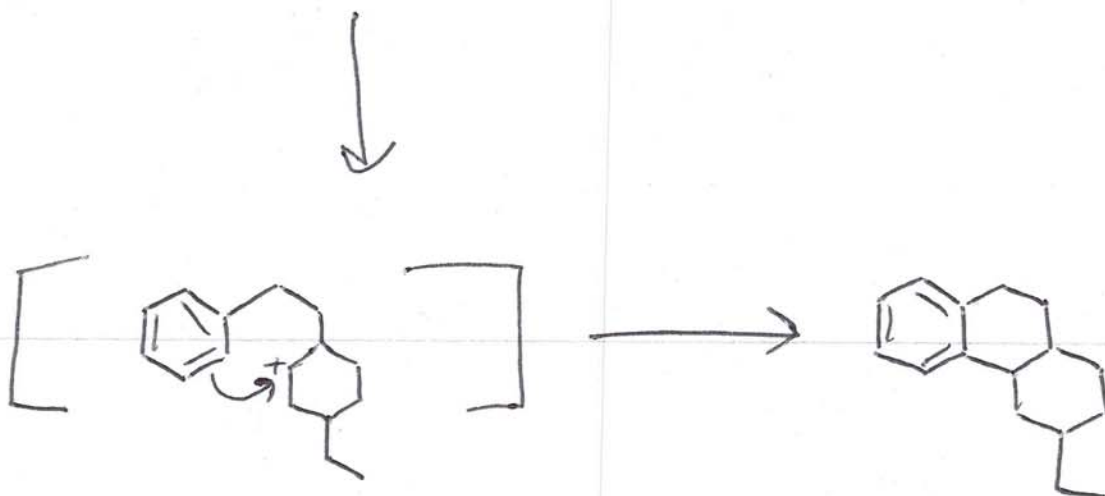
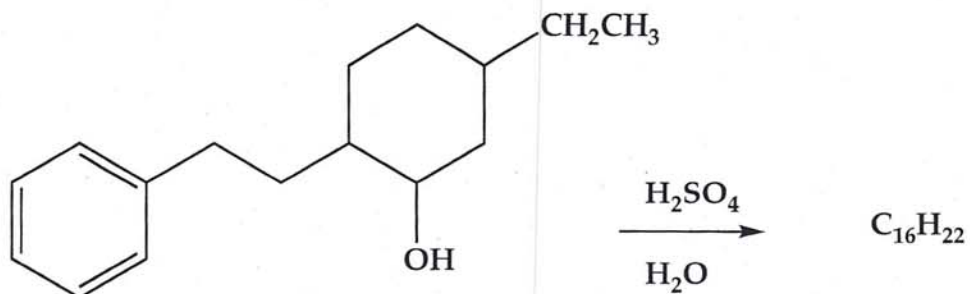
c) 2,6-dibromo-4-nitrotoluene



d) *p*-cyclopentyl-toluene

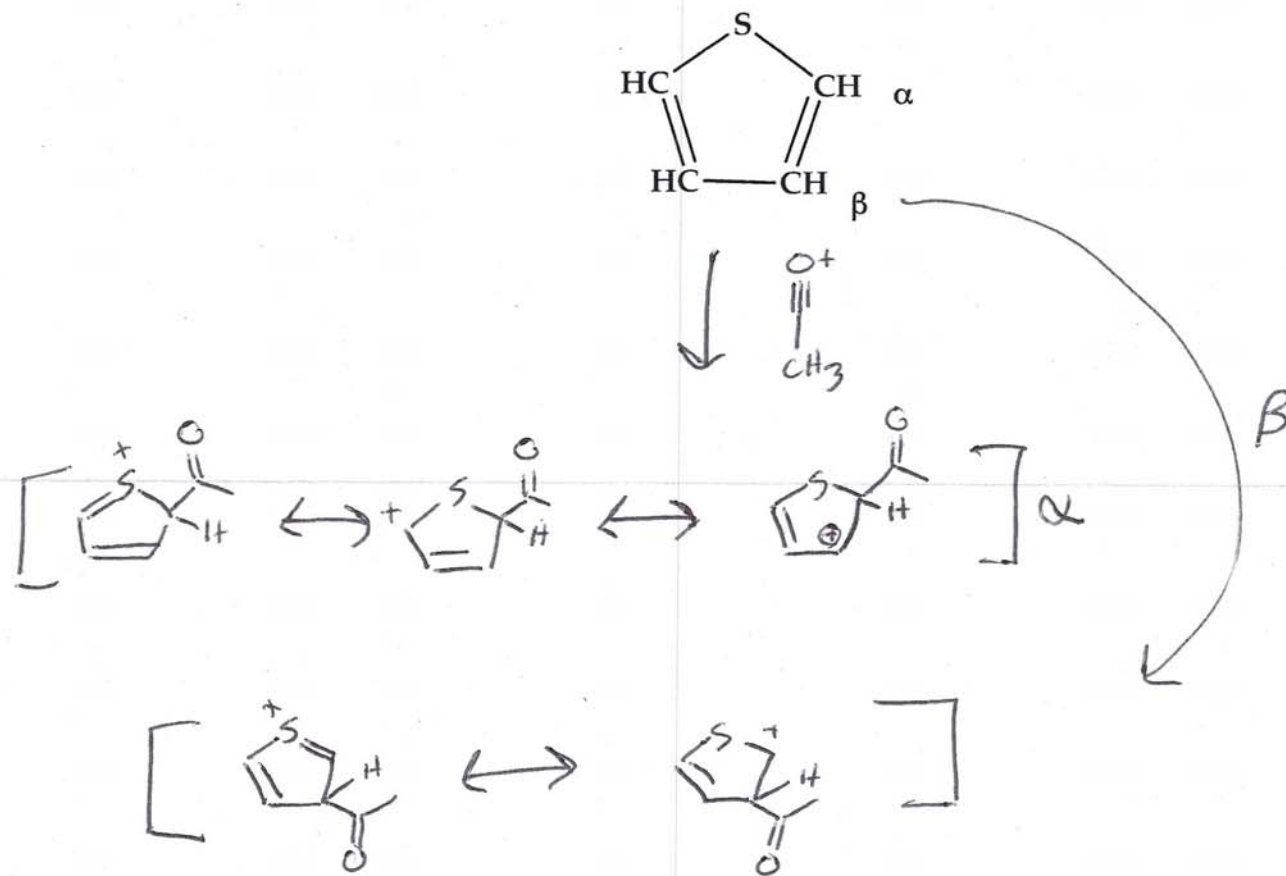


2. (10 pts) What is the product of the reaction? The $C_{16}H_{22}$ product does not react with Br_2 in CCl_4

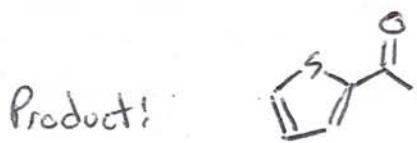


3. (10 pts)

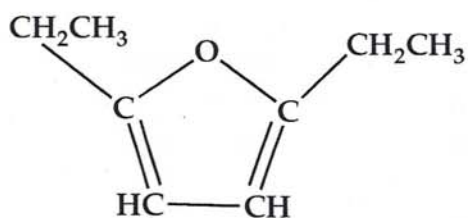
Thiophene is an aromatic heterocyclic compound that undergoes electrophilic aromatic substitution. Consider the Friedel Crafts acylation reaction: $\text{CH}_3\text{COCl} + \text{AlCl}_3$. Will reaction occur at the α position or the β position? Why?



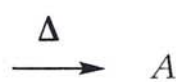
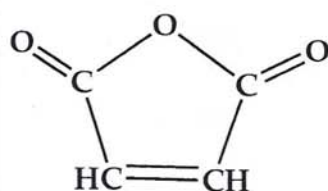
Reaction at α position because of more resonance stabilization



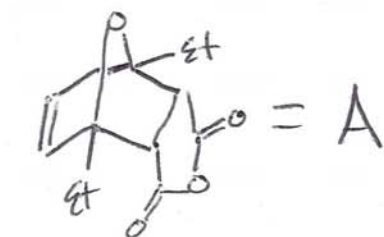
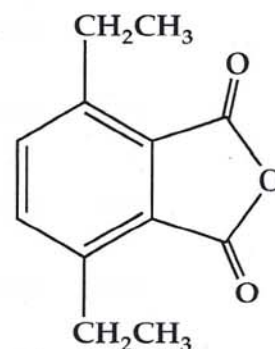
4. (10 pts) A Diels Alder reaction of 2,5-diethylfuran and maleic anhydride gives adduct *A* that undergoes acid-catalyzed dehydration to give 3,6 diethyl-phthalic anhydride. What is the structure of *A*? What is the mechanism of conversion of *A* to 3,6 diethyl-phthalic anhydride?



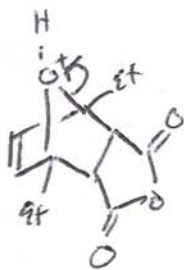
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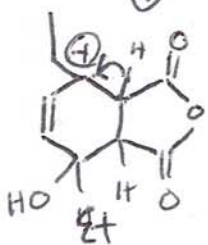
$\xrightarrow{\text{H}_2\text{SO}_4}$



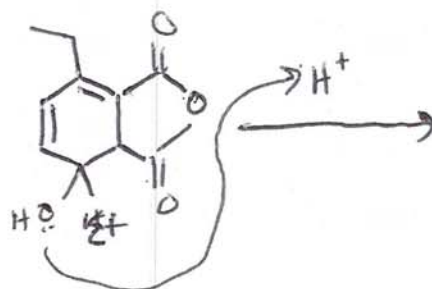
$\xrightarrow{\text{H}^+}$



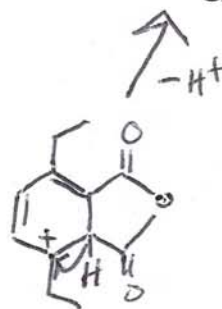
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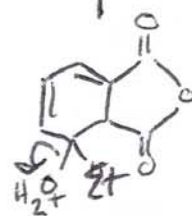
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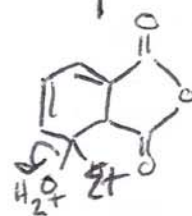
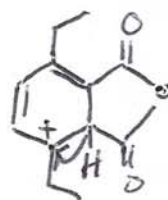
$\xrightarrow{\text{H}^+}$



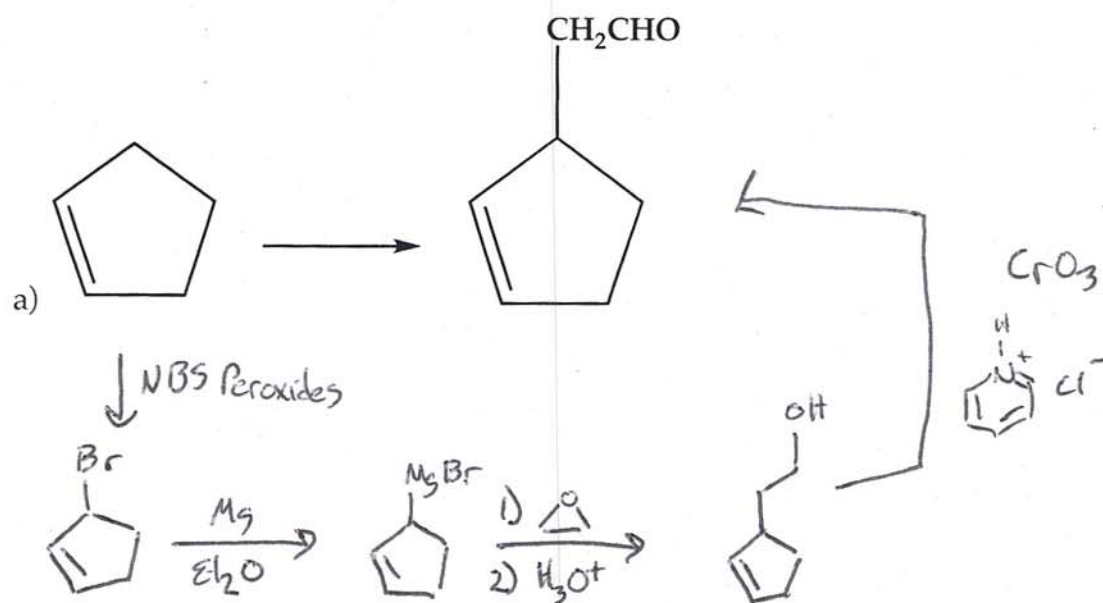
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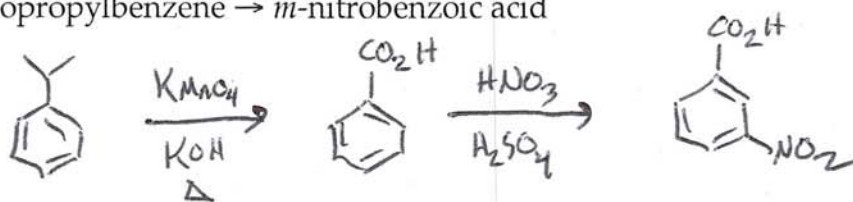
$\xrightarrow{-\text{H}^+}$

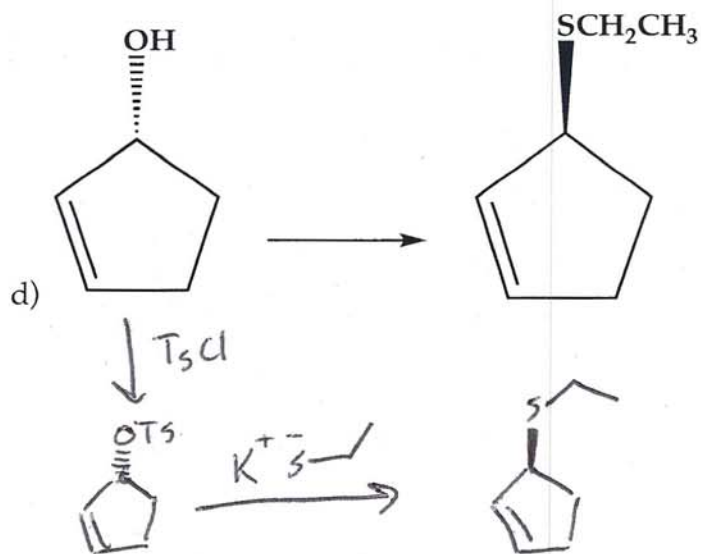
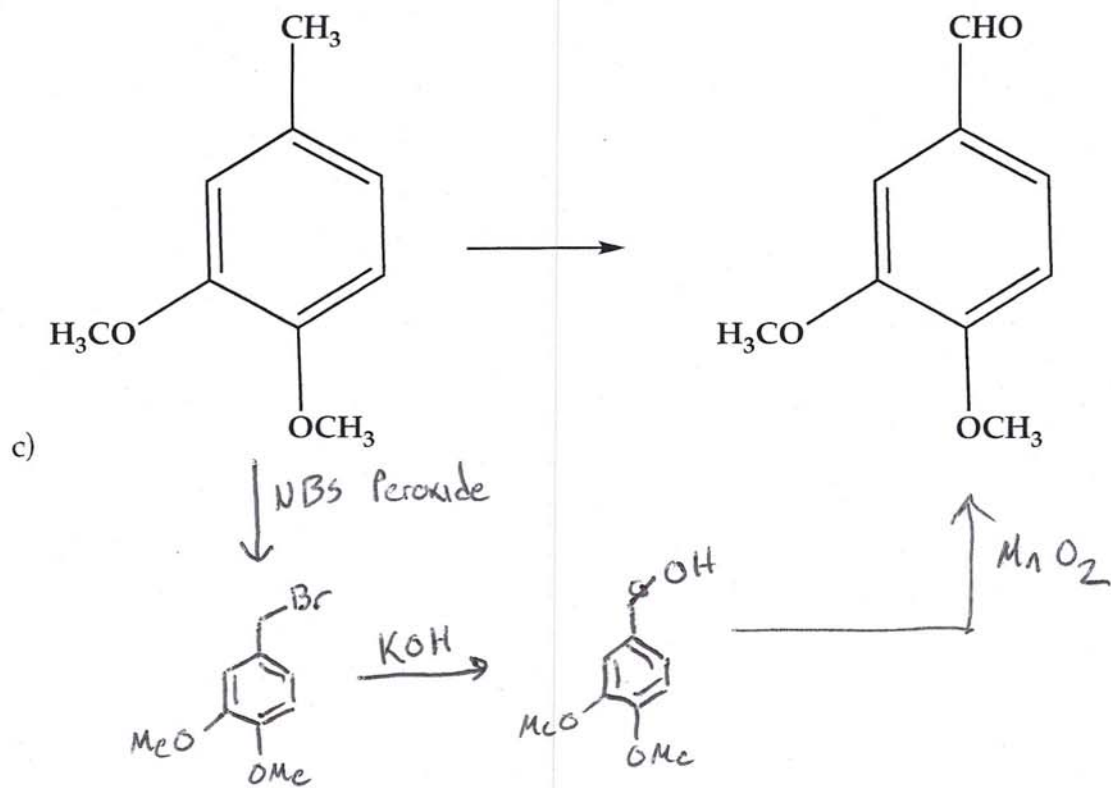


5. (20 pts) Outline a synthesis of each of the following:



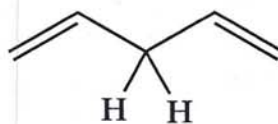
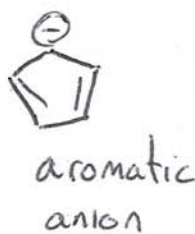
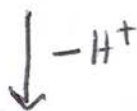
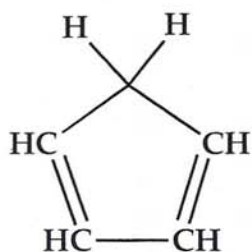
b) isopropylbenzene \rightarrow *m*-nitrobenzoic acid



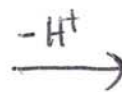


6. (10 pts) Account for the following facts.

a) 1,3-cyclopentadiene is a much stronger acid than 1,4-pentadiene.

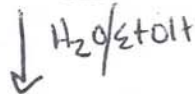
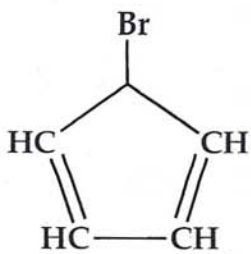


1,4 pentadiene

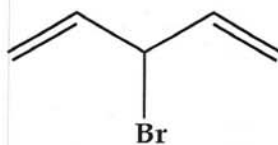


Double allylic anion

b) 3-Bromo-1,4-pentadiene undergoes solvolysis readily in protic solvents but 5-bromo-1,3-cyclopentadiene is virtually inert.



NR



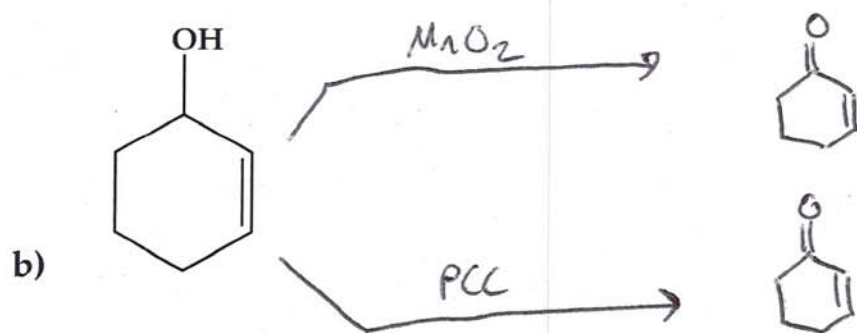
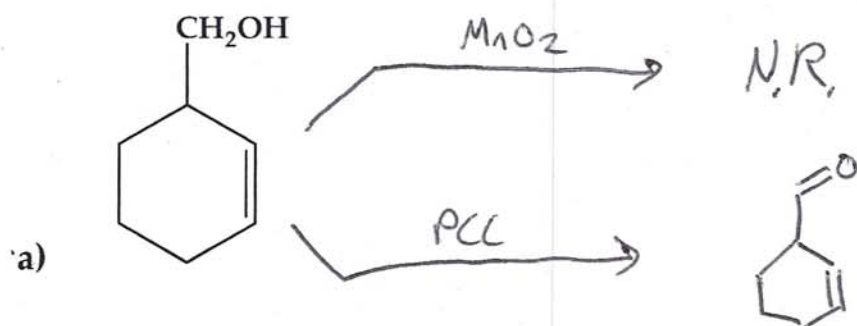
"Double allylic" cation - very stable

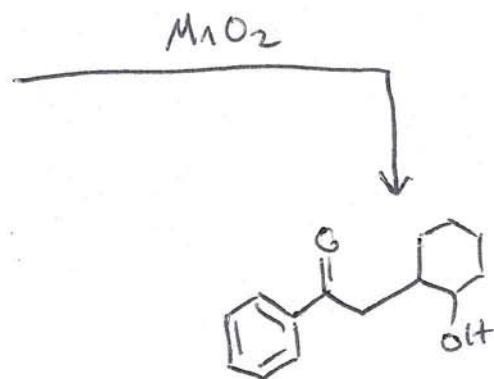
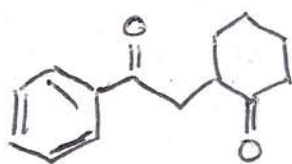
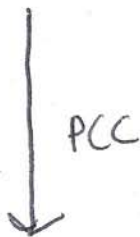
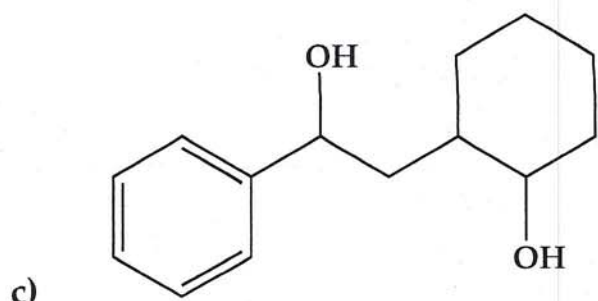
Must form antiaromatic intermediate



7. (10 pts)

In each case, tell whether oxidation with pyridinium chlorochromate ($\text{CrO}_3/\text{pyridinium hydrochloride}$ or PCC) and oxidation by MnO_2 will get the same product, different products, or no reaction.





8. (10 pts) Consider the chemistry in the sequence below. What is the structure of compound A, suggest a structure for MPTP and show how all products are formed.

