CHEM 3331, Professor Zhang, Spring 2016
Second hour exam, Mar 8, 2016

Printed Name: Key Student ID: _____

Recitation TA Name: _____ Recitation day and time: _____

Scores:

1)

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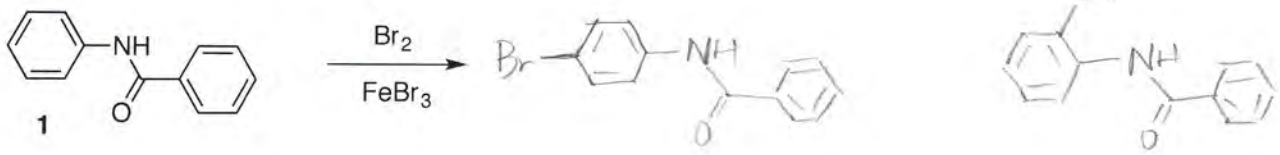
CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

This is a closed-book exam. The use of notes, models, calculators, scratch paper will not be allowed during the exam. Please put all your answers on the test. Use the backs of the pages for scratch.

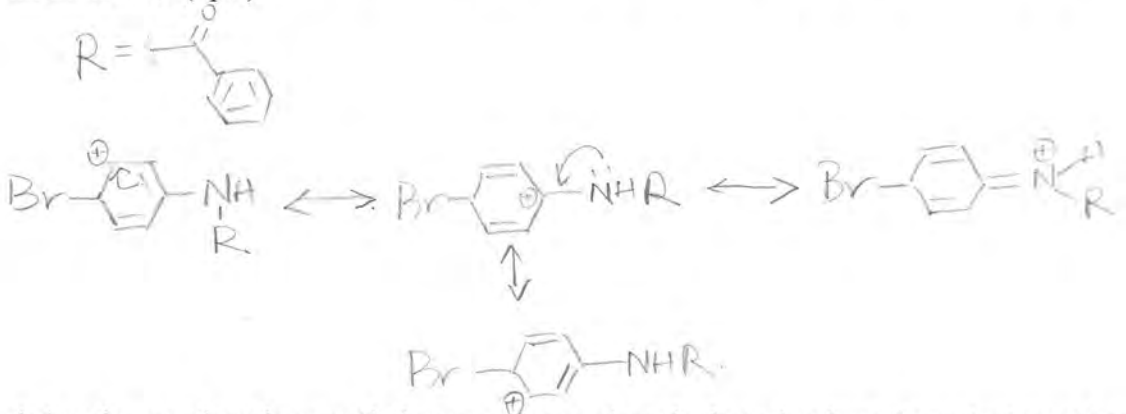
Partial Periodic Table

1A							8A
1 H	2A	3A	4A	5A	6A	7A	2 He
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
						35 Br	
						53 I	

1) (24pts) a) Reaction of benzanilide (**1**) with bromine yields a mixture of two monobromo derivatives. Draw the structures for these two isomers. (4pts)



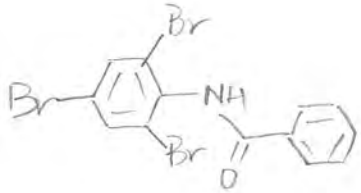
b) The reaction above involves formation of reactive intermediate cations. Pick up one of the products and draw all the important resonance contributors to the structure of the cation intermediate. (4pts)



c) Are the reactions in part 1b faster or slower than the bromination of unsubstituted benzene. (2pts).

Faster

d) When excess bromine is used, a tri-bromo derivative (containing 3 Br groups) is formed. Draw the structure of this product (2pts).



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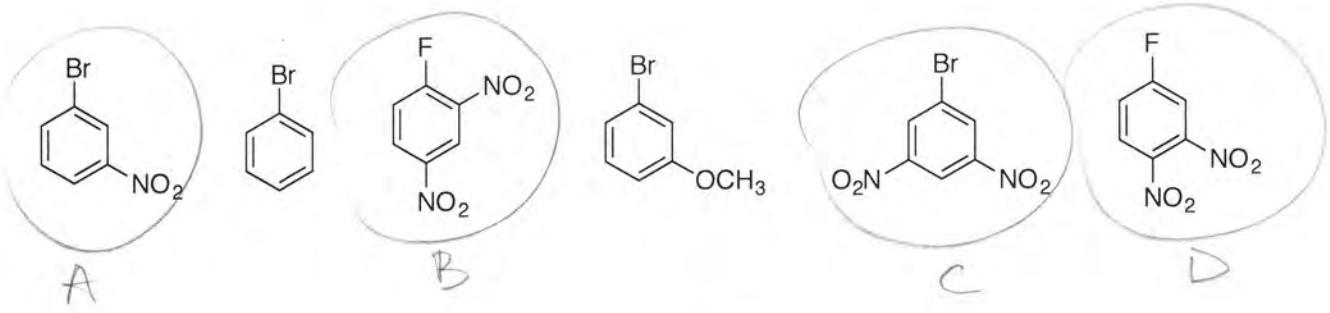
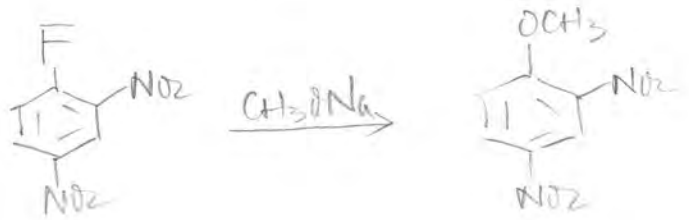
e) Some of the following compounds can react with sodium methoxide. Circle those reactive compounds and use one of them to illustrate what reaction can occur (only showing the product structure is good enough). (6pts)





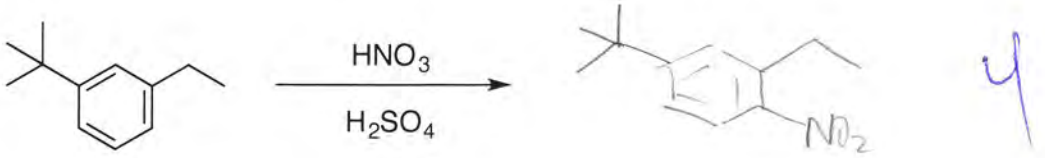
f) For those reactive aromatic halides in 1e, rank them in increasing order of reactivity. **Briefly** explain the high activity of the MOST reactive compound in your ranking. (6pts)

A < C < D < B

Reaction of B generates the largest number of resonance structures, including the follow two most favored ones:

Total points for this page

2) (20 pts) Give the single major product of each of the following reactions, carefully showing stereochemistry if appropriate. If a racemate is formed, show only one enantiomer, and label it "rac". All reactions have an appropriate aqueous work up. (4 pts each)

a) 

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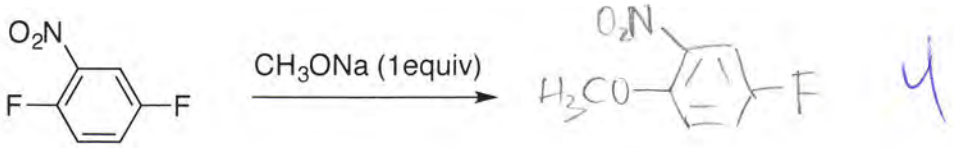
b) 

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c) 

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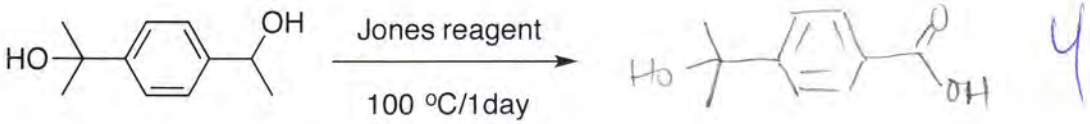
d) 

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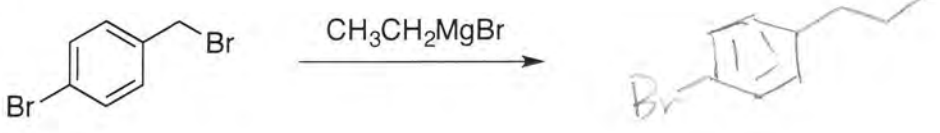
e) 

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ch boy ☺

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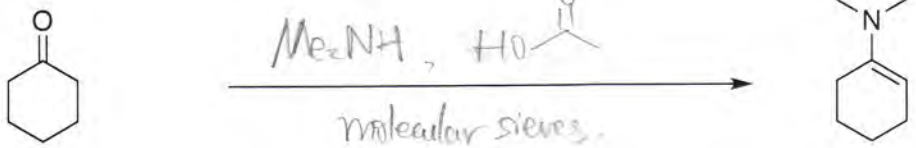
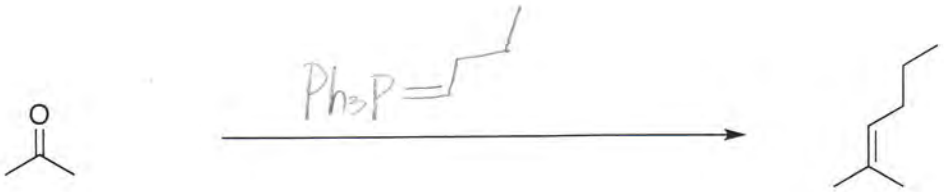
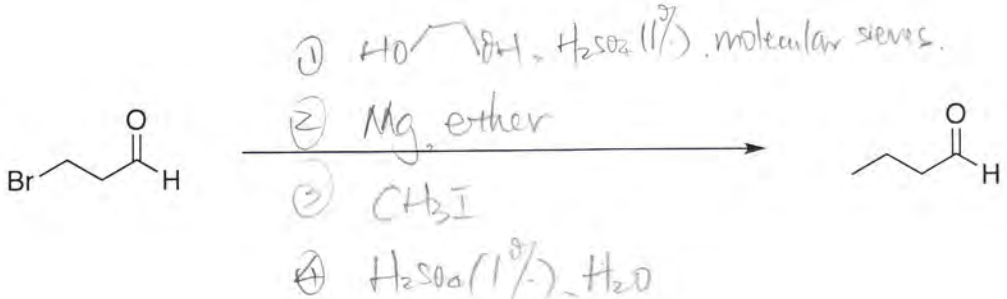
3) (20 pts) Propose reagents for accomplishing the following transformations. NOTE: more than one step may be required! Try to make your synthesis efficient (i.e. the desired product should be the major product, and generally a shorter synthesis is better than a longer one). You must use the starting material given; you may use any other reagents you need.

a) 

b) 

c) 

d) 

e) 

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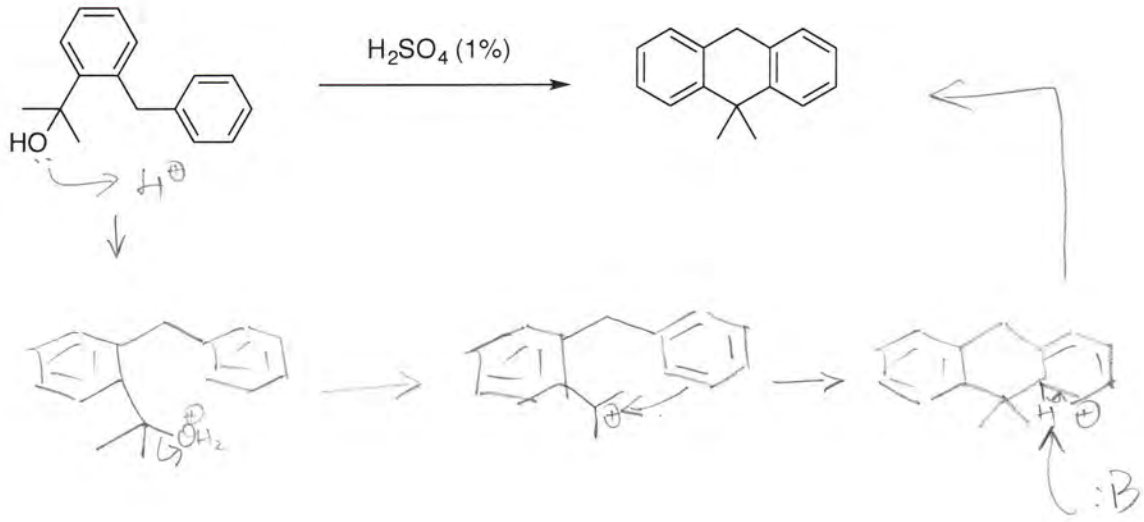
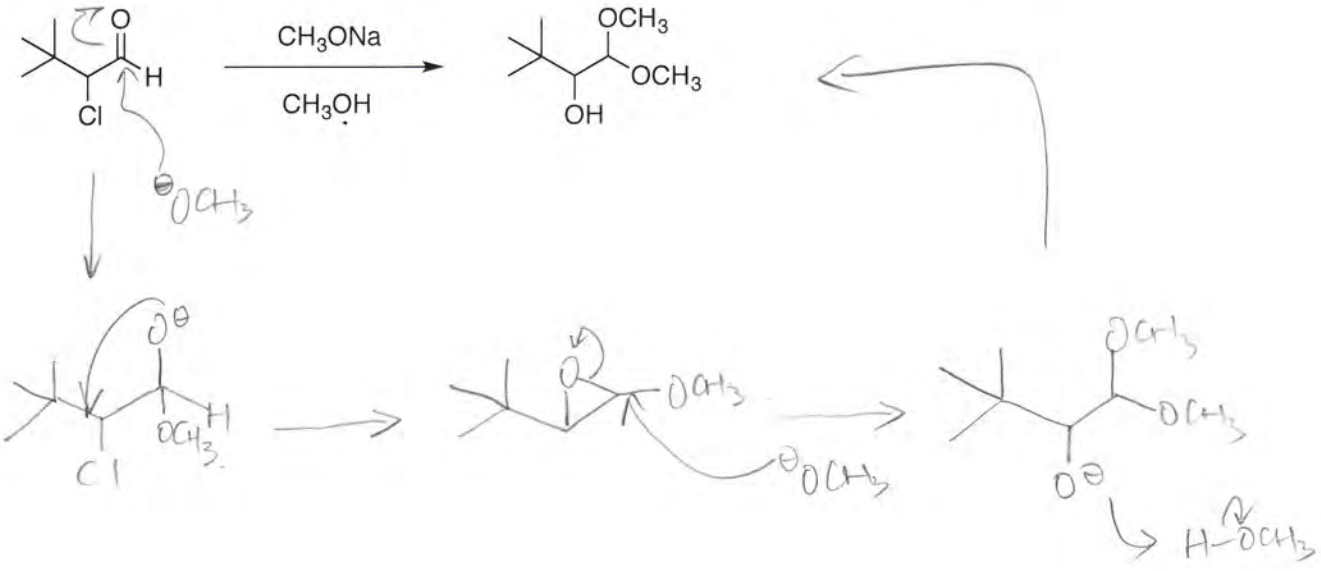
4) (12 pts) Propose arrow-pushing mechanism for the following reactions. (6pts each)

a)



b)



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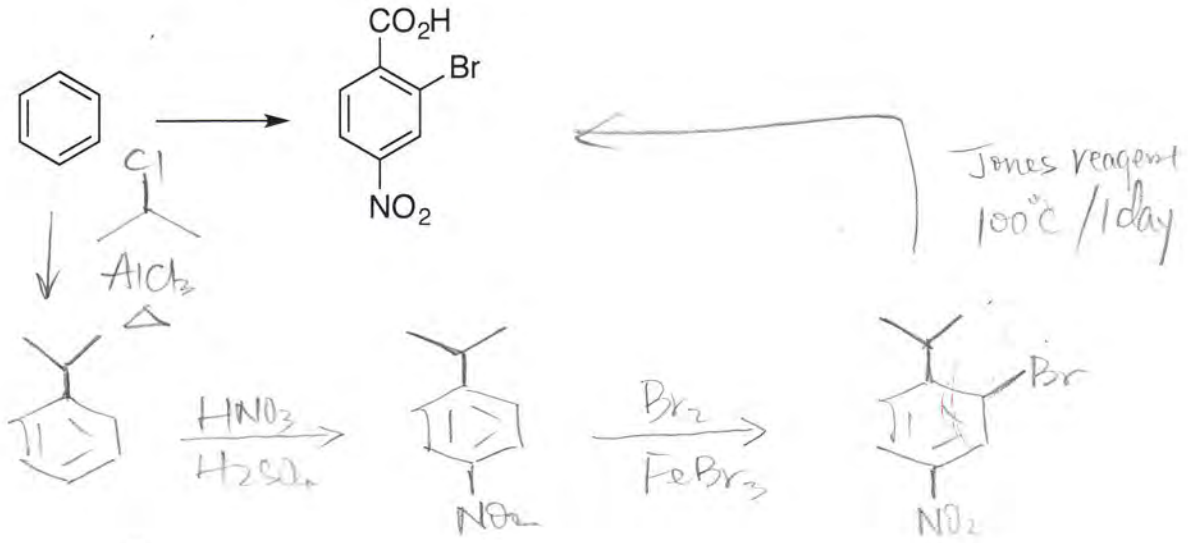
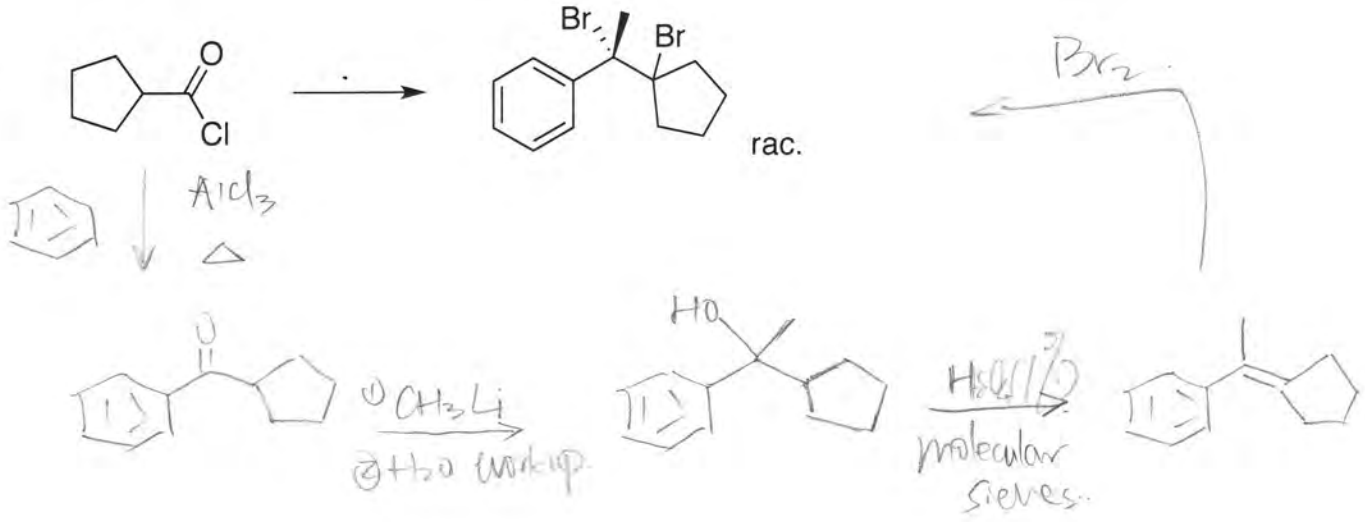
5) (24pts) Propose a synthesis of each of the following **three (3)** targets from the starting materials provided. Allowed other starting materials include benzene, triphenylphosphine, and/or any other organic molecules containing **five (5)** carbons or less. You may use any necessary inorganic reagents. Try to make your synthesis efficient (i.e. the desired product should be the major product, and generally a shorter synthesis is better than a longer one). More than one step may be required.

a)



b)



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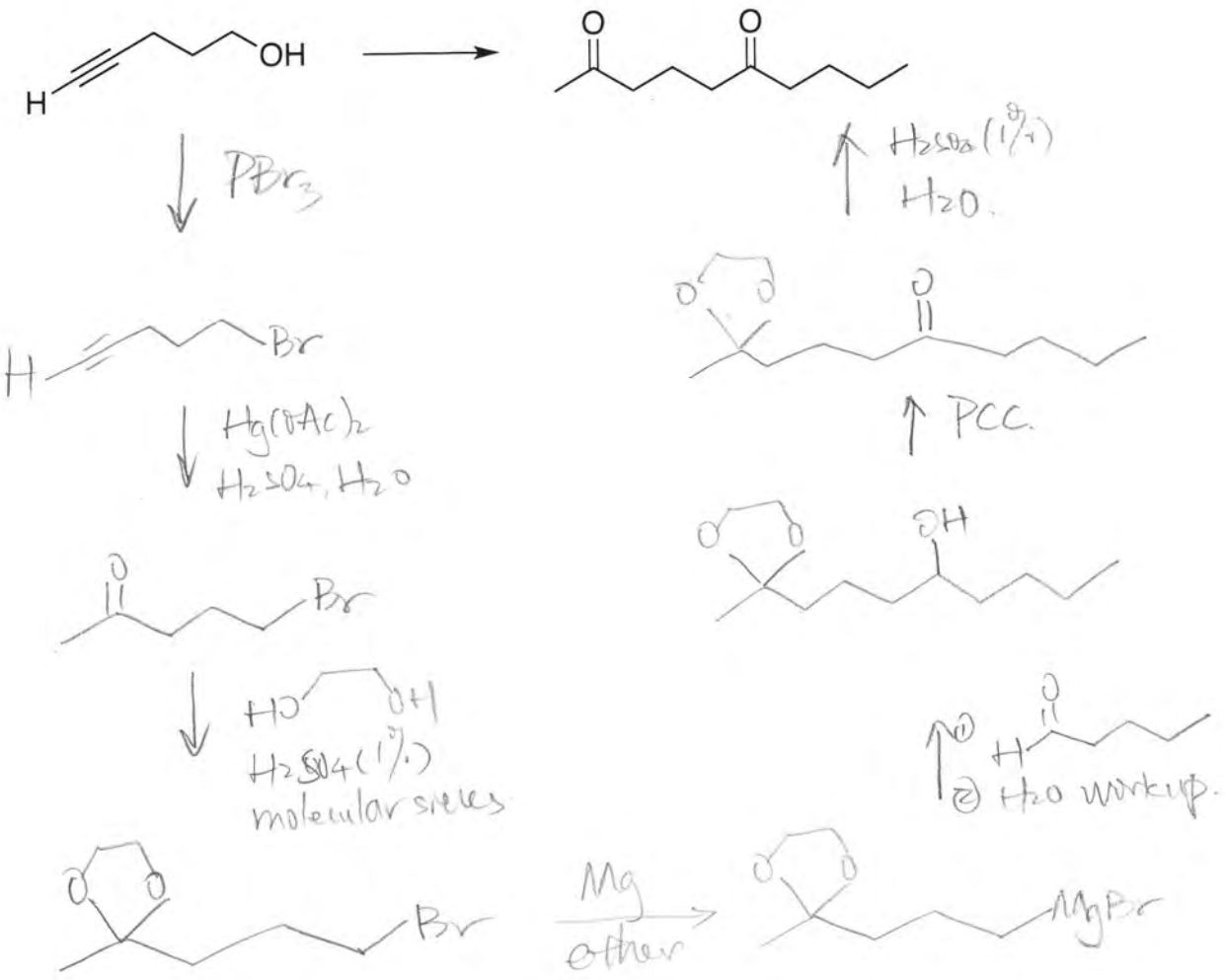
c)



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