Dr. Steven Pedersen November 6, 2000

Chemistry 3B

Midterm #2

Students Name_____ _____

Students Signature _____

TA's Name or Section Number Sil Ivan Hajime

Problem 1 25 (27 pts)

Problem 2 30 (36 pts)

Problem 3 18 (18 pts)

Problem 4 42 (45 pts)

Problem 5 15 (45 pts)

Problem 6 45 (54 pts)

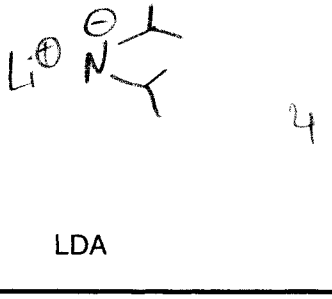
Total Points 175 (225 pts)

PLEASE MAKE SURE YOUR EXAM HAS 11 PAGES

NO CALCULATORS

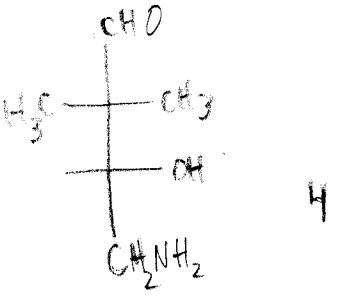
IMPORTANT: BE SURE TO ATTEMPT ALL PARTS OF THE MULTI-PART QUESTIONS SINCE NOT ALL PARTS RELY ON A PREVIOUS PART FOR THE ANSWER

1. A. Unless otherwise stated, provide one real example for each of the following terms or, write a structure for a given chemical name (16 pts).



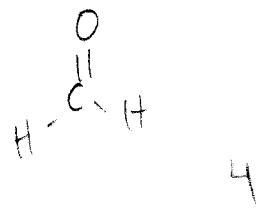
LDA

4



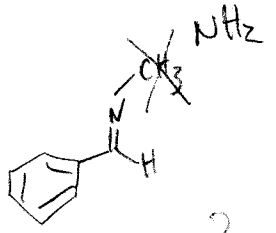
A Fischer projection of
D-4-amino-2,2-dimethyl-3-hydroxybutanal

4



formaldehyde

4



a hydrazone of benzaldehyde

2

B. (11 pts)

*Is this trisacharride a (circle one):

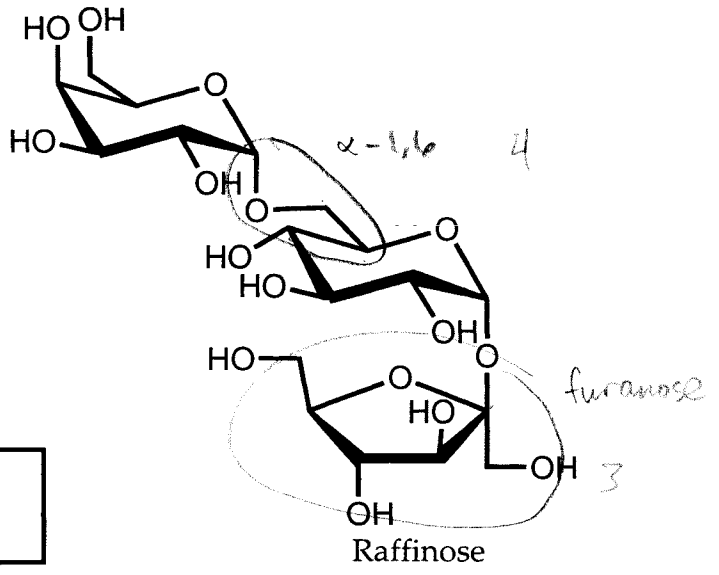
4

reducing sugar non-reducing sugar

triose aldopentose

*Circle a α-1,6 glycosidic linkage and label α-1,6

*Circle a furanose and label furanose



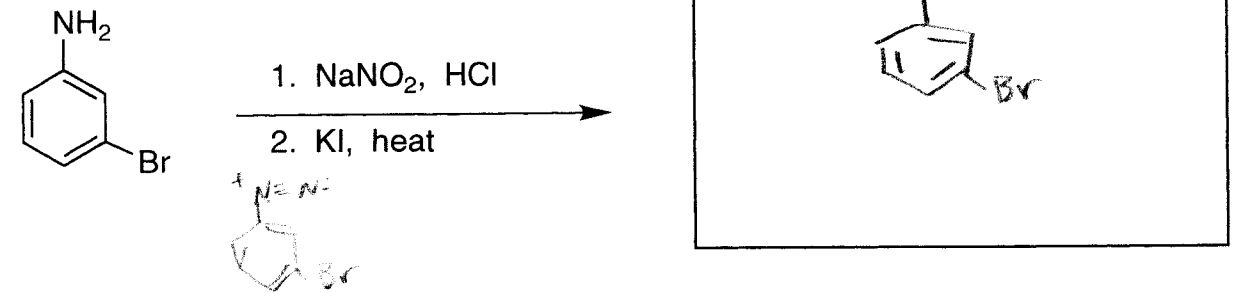
Raffinose

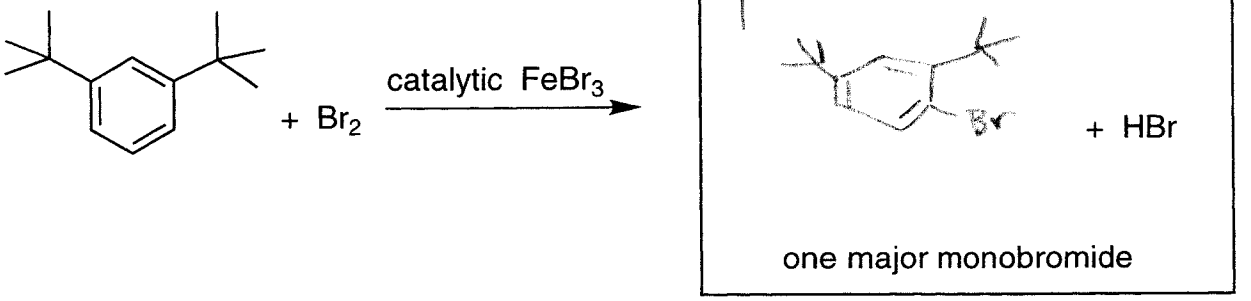
4

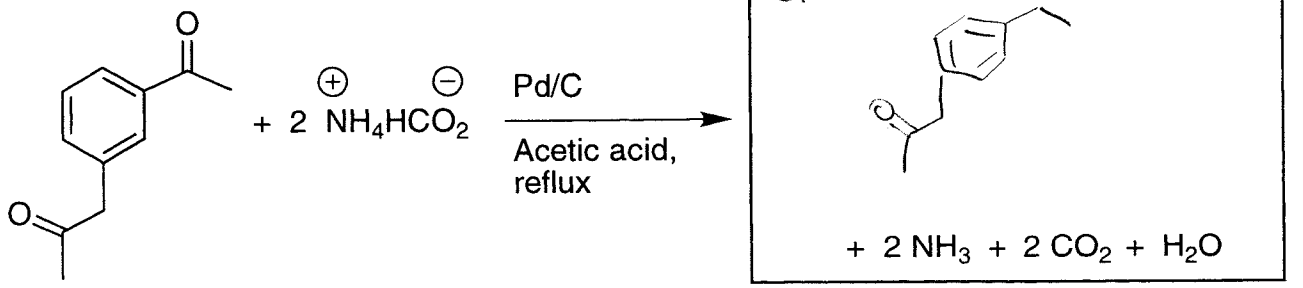
3

25

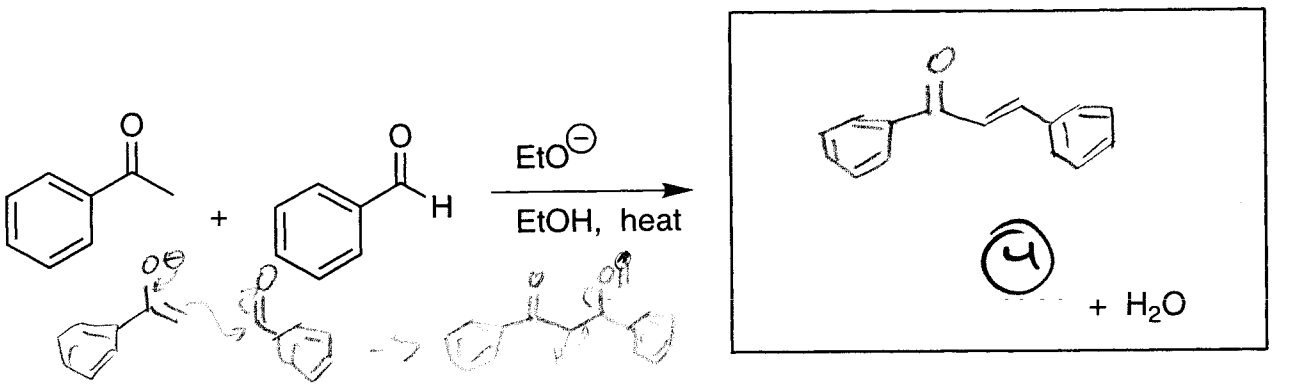
2. Predict the product(s) from the following reactions. (36 pts)

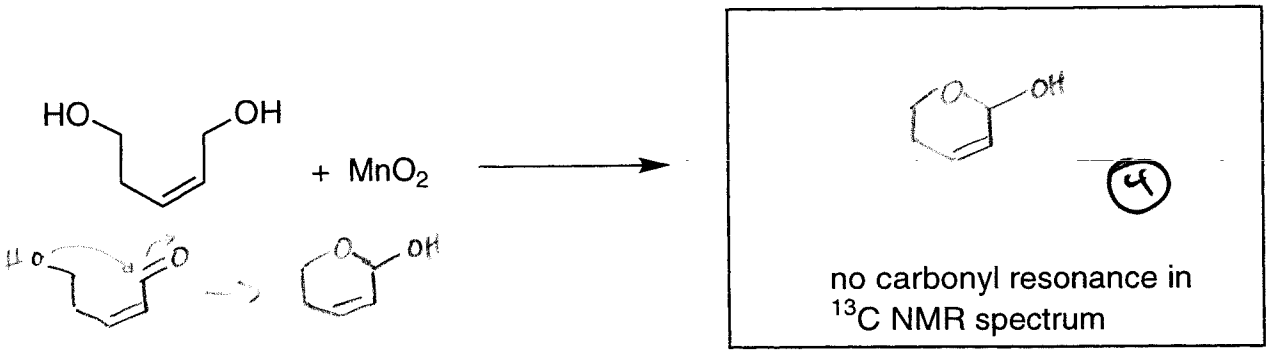


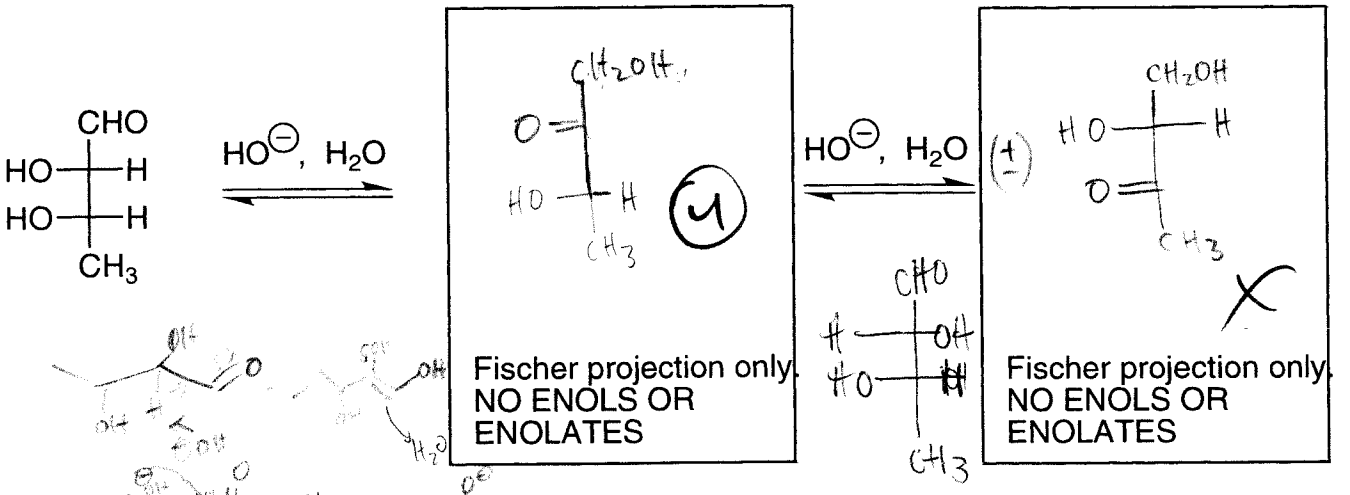


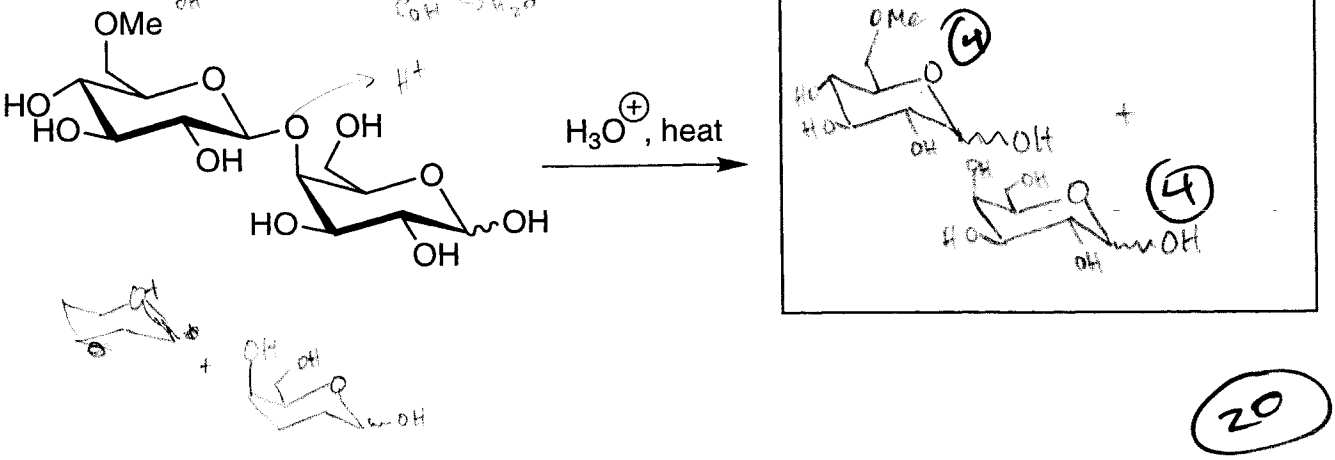


16


EtO⊖
EtOH, heat
+ H2O
4


HO
OH
+ MnO2
4
no carbonyl resonance in
13C NMR spectrum


CHO
HO
HO
CH3
HO⊖, H2O
4
Fischer projection only.
NO ENOLS OR
ENOLATES
HO⊖, H2O
(±)
CHO
CH2OH
X
Fischer projection only.
NO ENOLS OR
ENOLATES


OMe
HO
HO
OH
OH
OH
HO
OH
H3O⊕, heat
4
4

20

3. Match the molecules shown below with the statements (18 pts).

a. When combined with alcohol, this compound will lead to the worst of hangovers. A

b. An enone scavenger that leads to water-soluble adducts. E

c. Protestors beware of this tear-jerker. D

d. Heliconius sara transforms epivolkinin into this harmless derivative. H

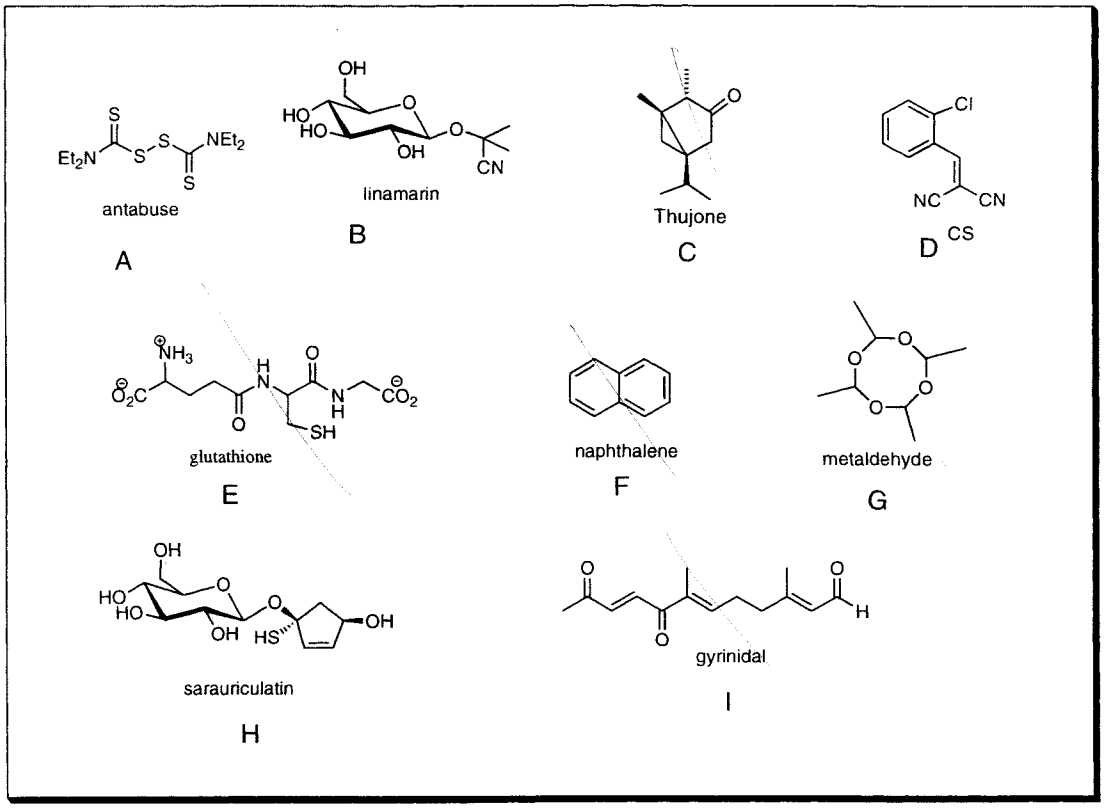
e. Patooey went the bass as it tried to make a snack out of the water beetle. I

f. A compound used by plants to thwart off the appetites of hungry insects and animals. B

g. An advertisement slogan for this compound could be "Snail Stopper". G

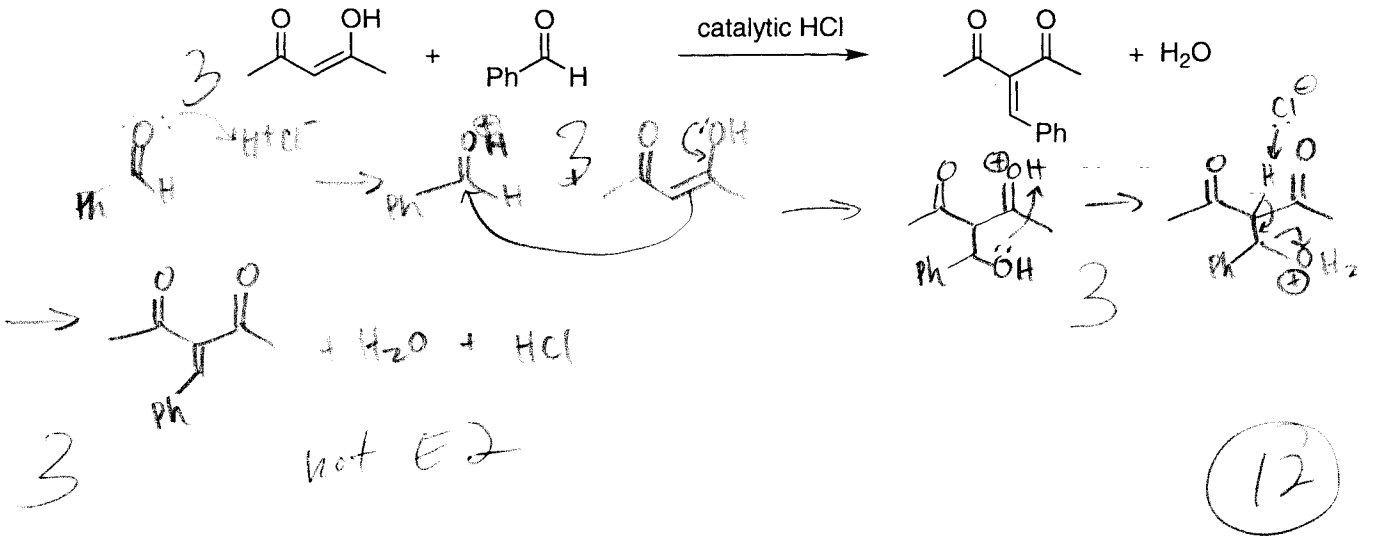
h. Referring to Absinthe, Oscar Wilde said "Finally you see things as they really are and that is the most frightening thing of all." C

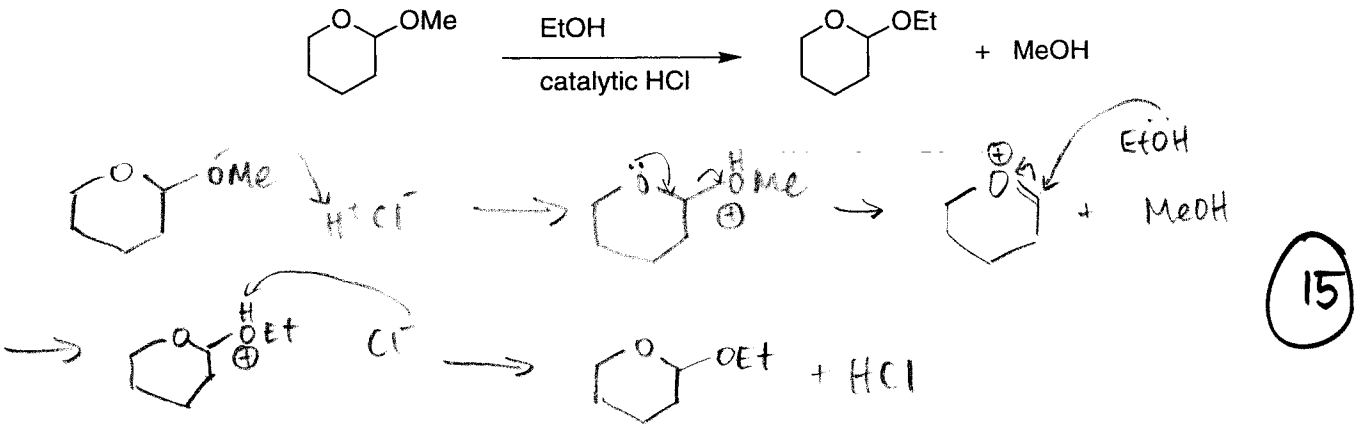
i. The latest taggant. F



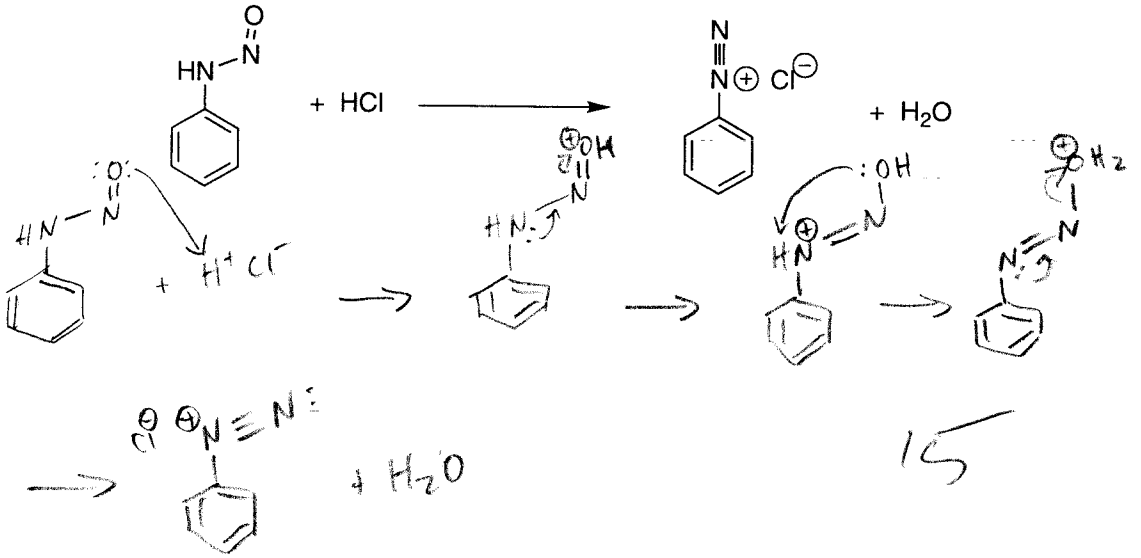
18

4. Provide a rational arrow pushing mechanism for each of the following reactions. (45 pts)



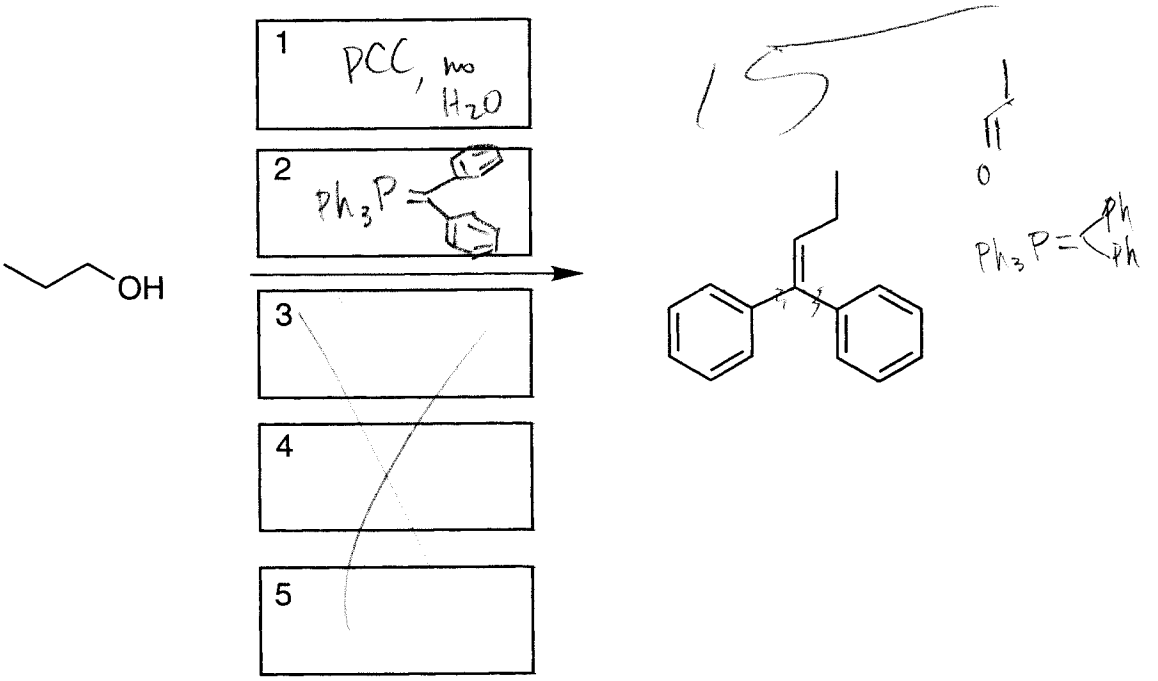


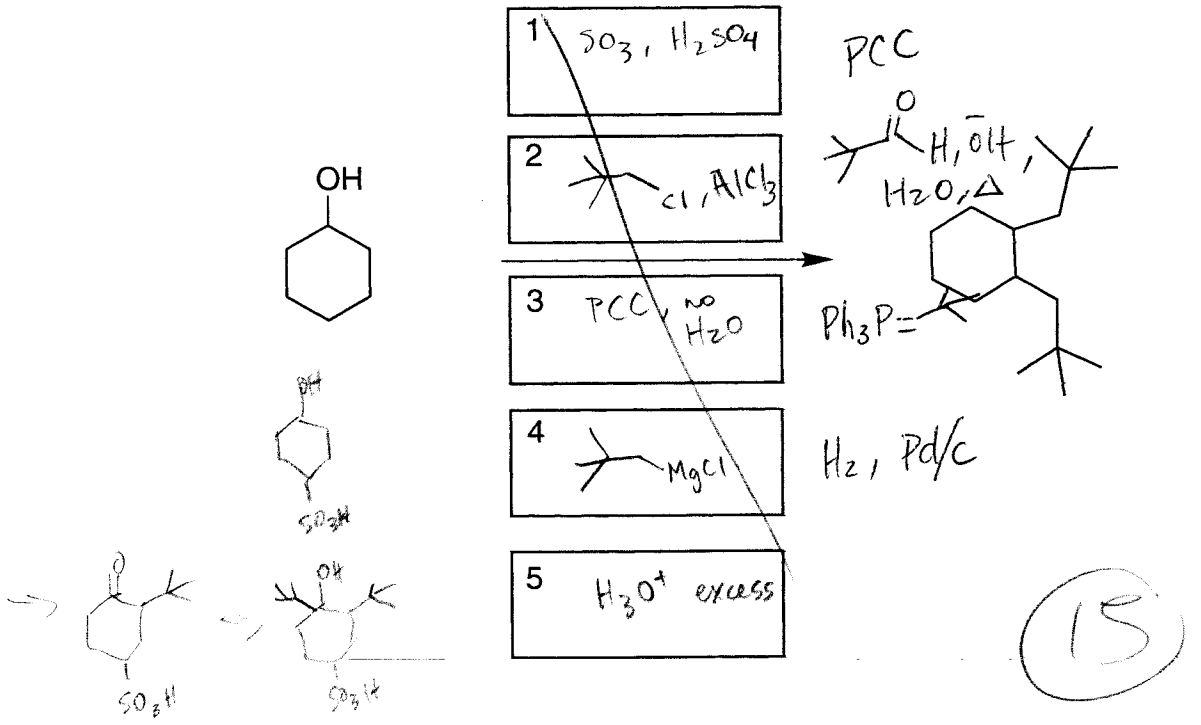
27

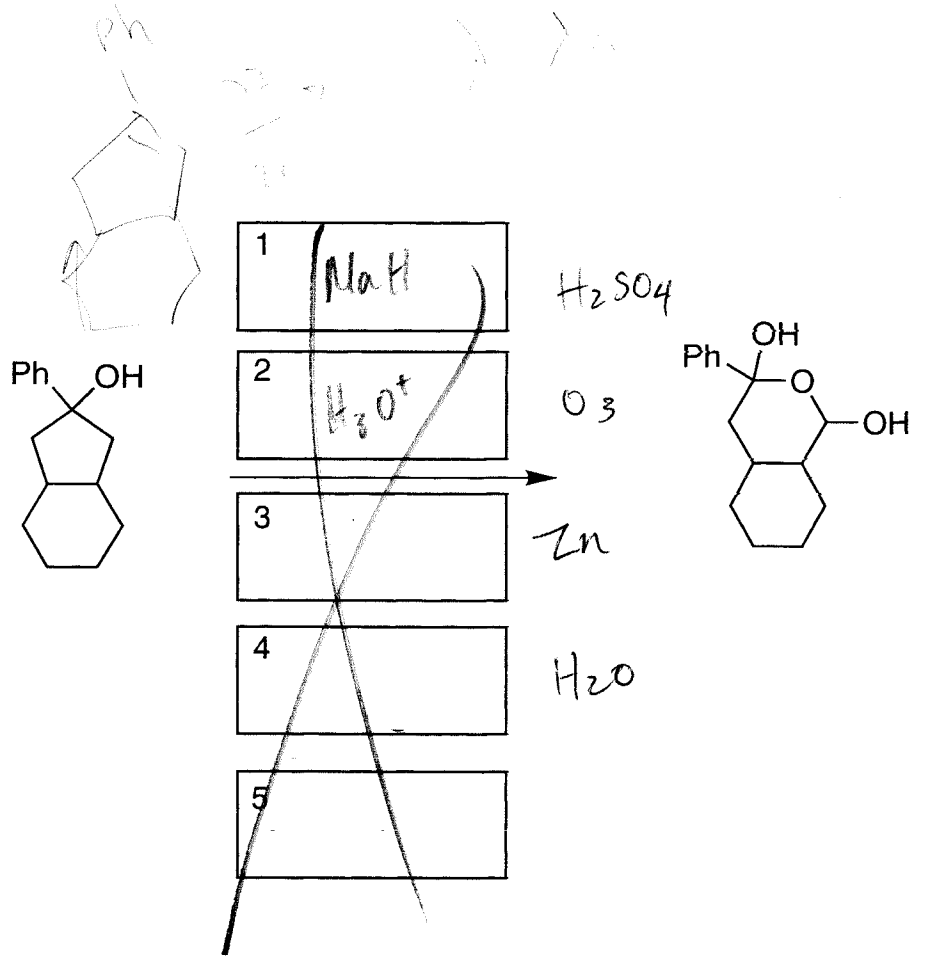


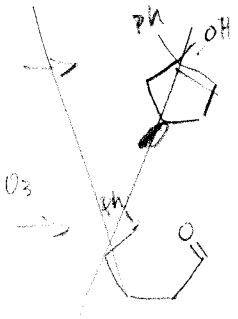
15

5. Provide the reagents (you do not have to make reagents as a separate step) and any other organic compounds necessary to synthesize the indicated product from the starting material shown. For each problem, five boxes are provided in which to place each step of your synthesis. **No synthesis will require more than five steps. However, some or all, may require fewer than five steps.** (45 pts)

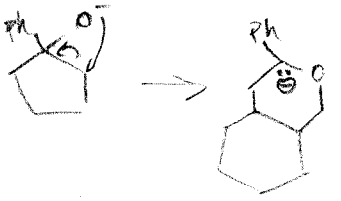






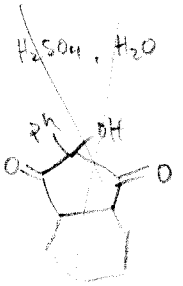


1. NaH

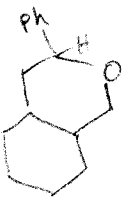


2 1. H_3O^+ 2.

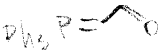
1. CrO_3, H_2SO_4, H_2O



2. H_3O^+

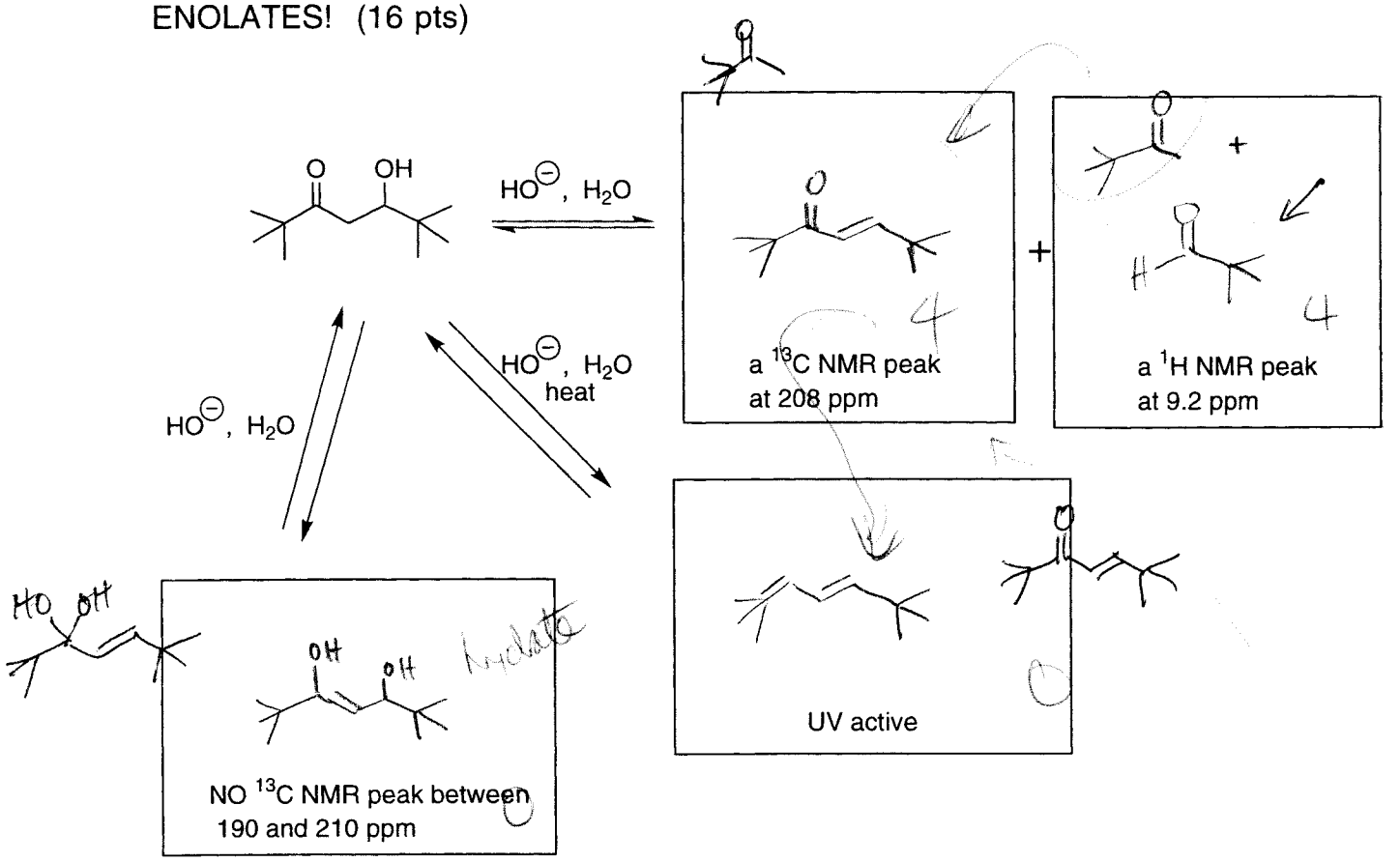


2 H_3O^+

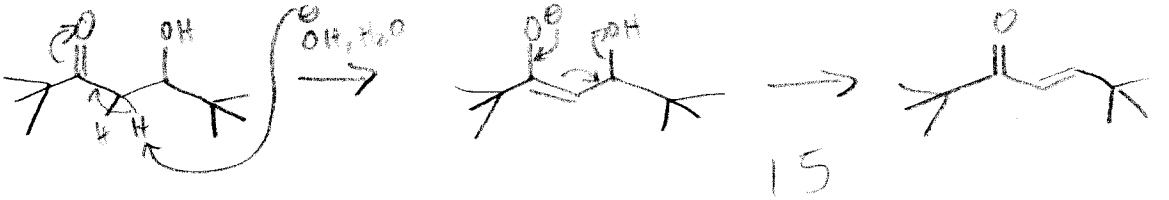


0

6. A. The following aldol product can enter into several different equilibria in the presence of aqueous base. Use the limited spectroscopic data in each box to identify the appropriate products. NONE OF THE PRODUCTS ARE ENOLS OR ENOLATES! (16 pts)



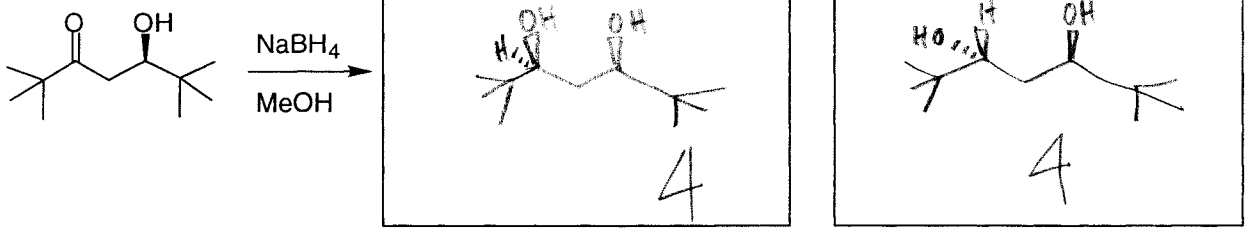
B. Pick any ONE of the above equilibria and write a rational arrow pushing mechanism leading to the product(s) in the box(s). (15 pts)



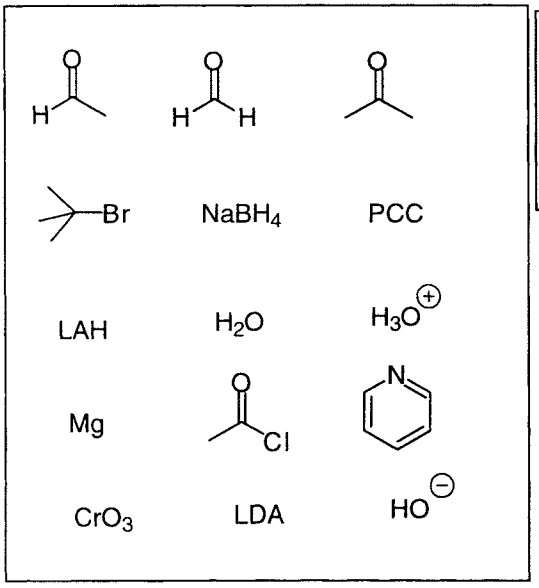
15

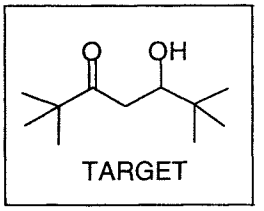
23

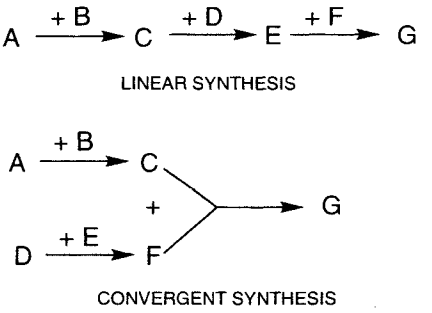
C. Reduction of the optically active ketone shown below with $NaBH_4$ in methanol led to two products. Draw these in the boxes provided. (8 pts)

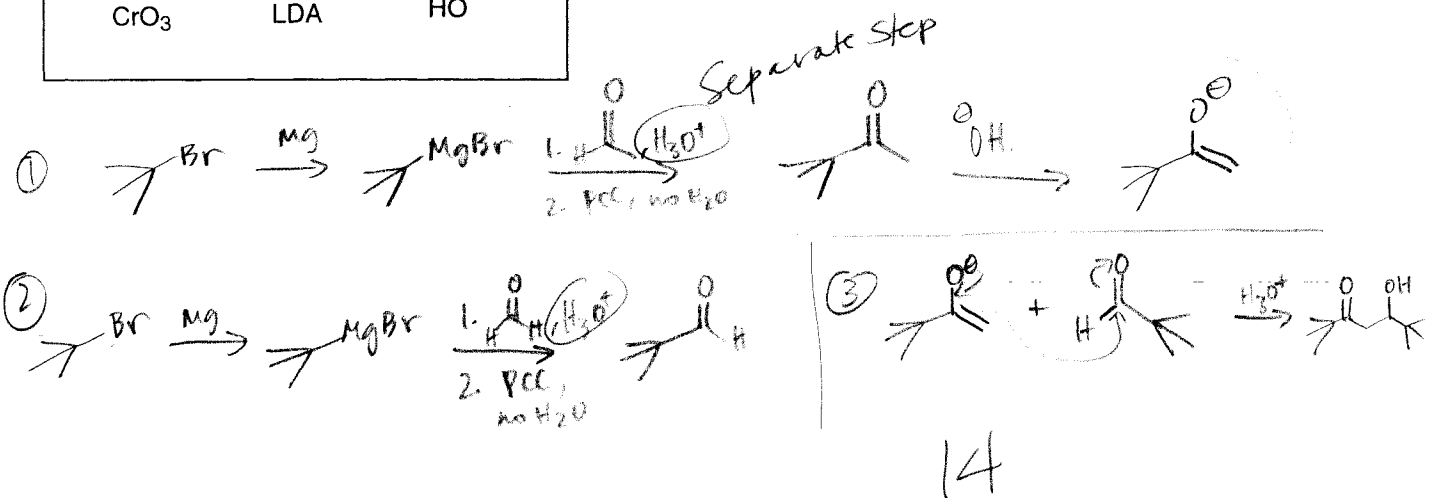


D. Using ONLY (this means ONLY) the reagents and organic compounds shown in the box below propose a synthesis of the aldol product shown in part A. You may use any of these reagents or substrates as many times as you want. Your synthesis can be linear, meaning you perform several sequential steps leading to your product or it can be convergent, meaning you synthesize different fragments in separate steps and then bring them together at the end. These two approaches are illustrated below. (15 pts)









14

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