

CHEM 51C LEC A (40620)

Midterm 2 (Spring Quarter 2019) - LETTER SIZE



9076 (4343)

ver. A

Assigned Seat #: \_\_\_\_\_

Instructions to Instructor

Do not alter this coversheet in ANY way. Substantial delays and additional fees may apply.

Instructions to Student

1. Clearly print your Last Name, First Name and the Date
2. Clearly print your Student ID number in the boxes provided. Use large, dark numbers. These numbers are captured automatically during the scanning process.
3. Bubble in each number of your Student ID completely. The bubbles are used only if your written ID number is not captured.
4. Write your Name and Student ID number in the upper right corner of all following pages of your exam.

Last Name, First Name: \_\_\_\_\_

KEY

Date: \_\_\_/\_\_\_/\_\_\_

STUDENT ID:

*For Access UCI student, leave first column blank then enter your 7-digit Student ID number.*

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----- (This space for Instructor/TA use only) -----

Question Score	1	2	3	4	5	6	Total
	20	15	33	7	8	9	92

Do not open your exams until instructed to do so. Your answers must be neat and legible.

Practice midterm WS6#2

1 point each box

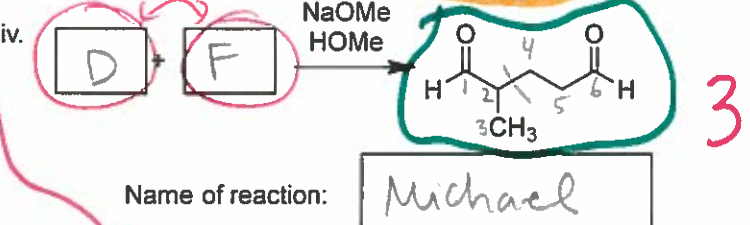
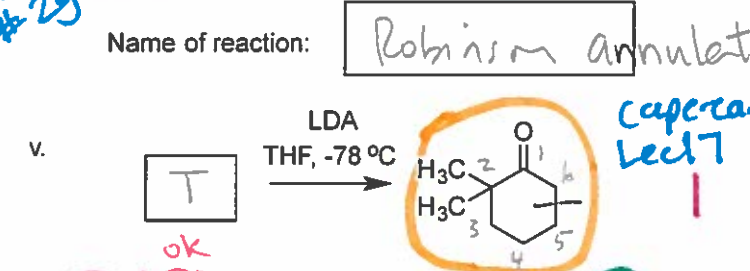
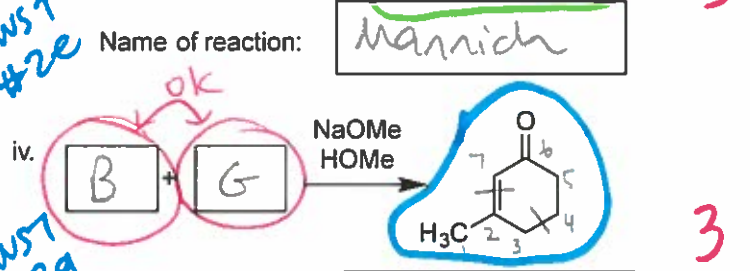
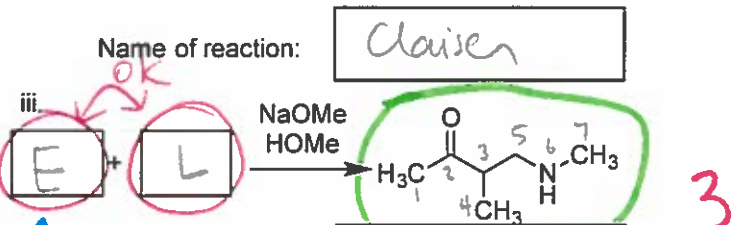
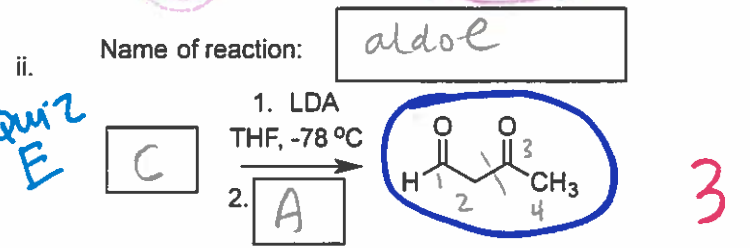
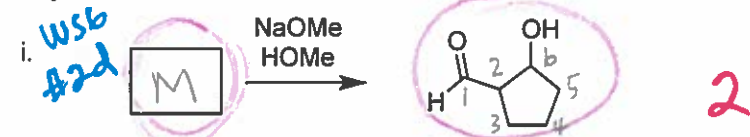
Midterm 2, Chem 51C, Jarvo, Spring 19

Initials: A

1 (29 points)

a. Fill in the correct compounds from the table to complete the syntheses. You can use the same compound more than once.

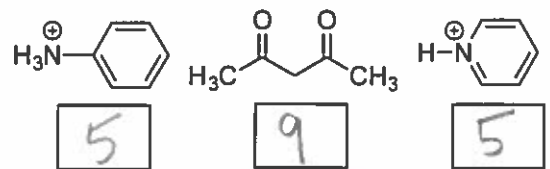
Starting materials

Name of reaction: Michael  
*Capera Lect 9*

b. Provide pKa's for any 2 of the following compounds (if you do them all, we will count your best 2).

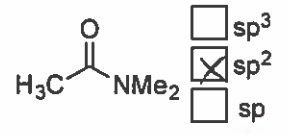
NS7 #1c



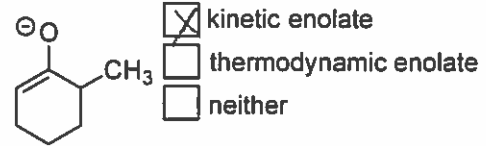
2 max

c. Check the appropriate box or boxes.

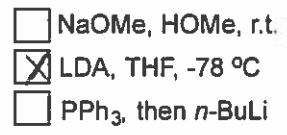
i. Hybridization of the nitrogen:



ii. Is this the:



iii. A kinetic enolate is formed with:



m2S18 1e

mas18 1e

25

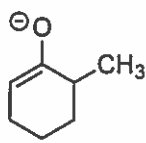
2. (19 points)

Initials: B

a. Check the appropriate box or boxes.

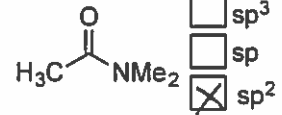
i. A kinetic enolate is formed with: ii. Is this the:

- PPh<sub>3</sub>, then *n*-BuLi  
 NaOMe, HOMe, r.t.  
 LDA, THF, -78 °C



- kinetic enolate  
 thermodynamic enolate  
 neither

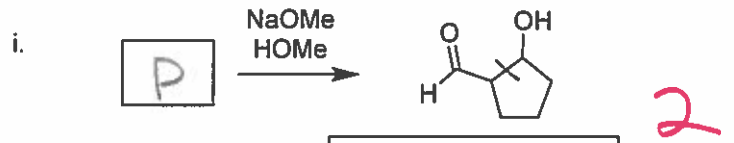
ii. Hybridization of the nitrogen:



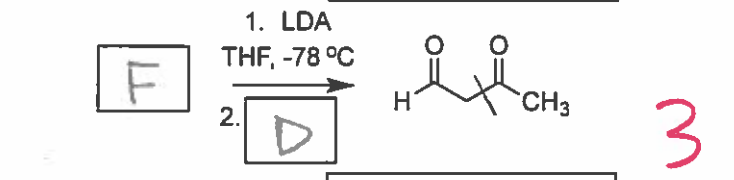
3

b. Fill in the correct compounds from the table to complete the syntheses. You can use the same compound more than once.

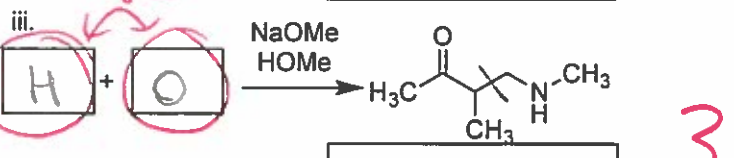
Starting materials			
<chem>CC(=O)OC</chem> D	<chem>CC(=O)C</chem> E	<chem>CC=O</chem> F	<chem>CCC=O</chem> G
<chem>CCC(=O)C</chem> H	<chem>C=CC=O</chem> J	<chem>CC(=O)C=C</chem> K	
<chem>CN=C</chem> H	<chem>CNC=O</chem> M	<chem>CNC=O</chem> N	<chem>CNC=O</chem> O
<chem>O=C1CCCCC=O</chem> P	<chem>O=C1CCCCC(OC)C1=O</chem> R		
<chem>O=C1CCCCC=O</chem> S	<chem>O=C1CCCCC(OC)C1=O</chem> T		
<chem>CC(C)C(=O)CCCCBr</chem> W	<chem>CC(C)C(=O)C(C)C(C)Br</chem> X		
<chem>CC(C)C(=O)CCCCBr</chem> Y	<chem>CC1=CCCCC1=O</chem> Z		



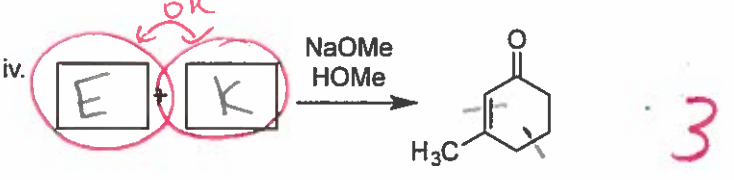
Name of reaction:  2



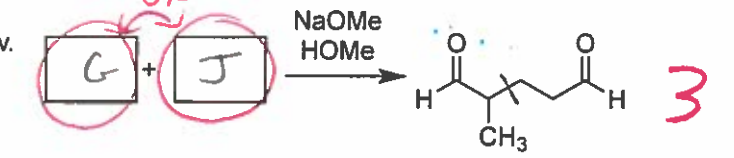
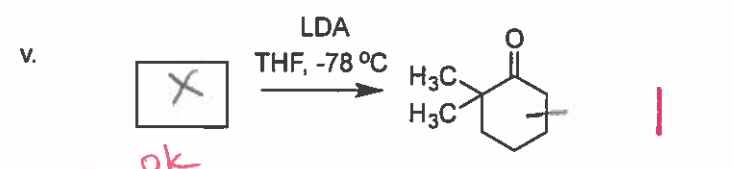
Name of reaction:  3



Name of reaction:  3



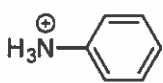
Name of reaction:  3



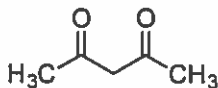
Name of reaction:  3

c. Provide pKa's for any 2 of the following compounds (if you do them all, we will count your best 2).

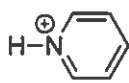
2



6-4



11-8

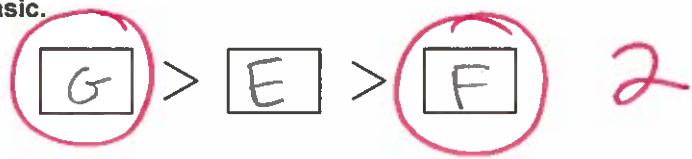
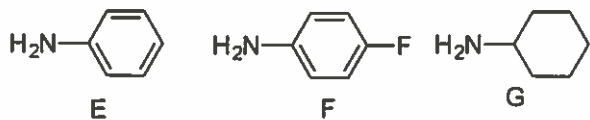


6-4

20

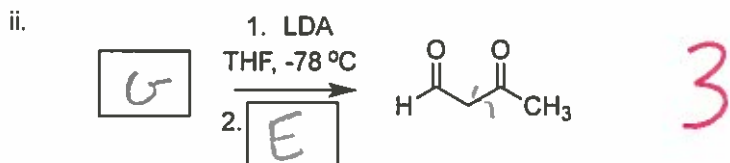
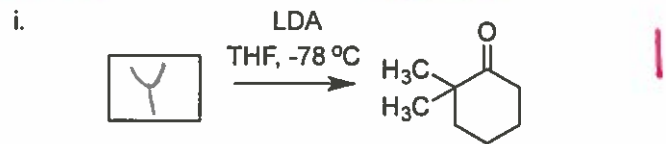
1 (19 points)

b. Rank the following compounds from most to least basic.

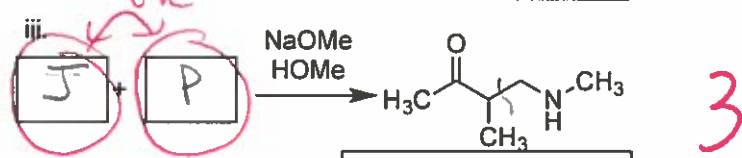


a. Fill in the correct compounds from the table to complete the syntheses. You can use the same compound more than once.

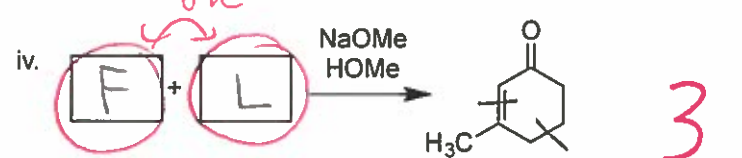
Starting materials			
<chem>CC(=O)OC</chem> (E)	<chem>CC(=O)C</chem> (F)	<chem>CC=O</chem> (G)	<chem>CCC=O</chem> (H)
<chem>CC(=O)CC</chem> (J)	<chem>C=CC=O</chem> (K)	<chem>CC(=O)C=C</chem> (L)	
<chem>CN=C</chem> (M)	<chem>C=CN</chem> (N)	<chem>C=O</chem> (O)	<chem>CN=C</chem> (P)
<chem>O=C(C)CCCCC=O</chem> (R)	<chem>O=C(C)CCCCC(=O)OC</chem> (S)		
<chem>O=C(C)CCCCC=O</chem> (T)	<chem>O=C(C)CCCC(=O)OC</chem> (W)		
<chem>CC(C)C(=O)CCCCCBr</chem> (X)	<chem>BrCCCC(C)(C)C(=O)C</chem> (Y)		
<chem>CC(C)C(=O)CCCCCBr</chem> (Z)	<chem>CC1=CCCCC1</chem> (A)		



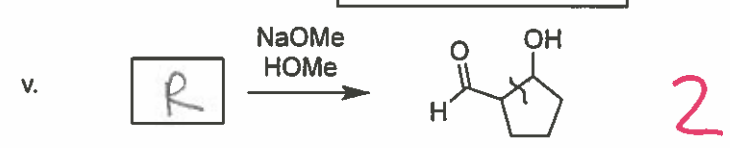
Name of reaction: **Claisen**



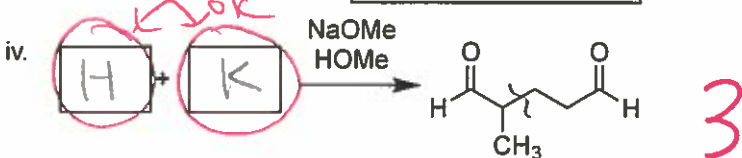
Name of reaction: **Mannich**



Name of reaction: **Robinson**



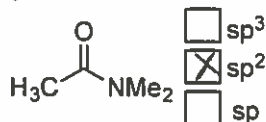
Name of reaction: **aldol**



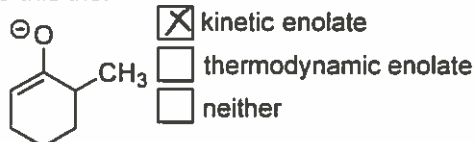
Name of reaction: **Michael**

c. Check the appropriate box or boxes.

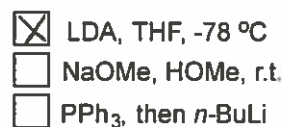
i. Hybridization of the nitrogen:



ii. Is this the:



iii. A kinetic enolate is formed with:



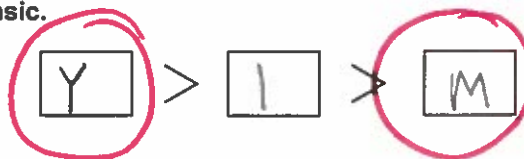
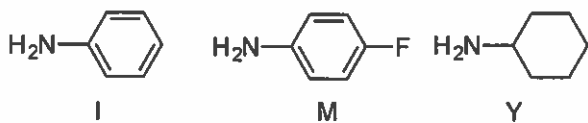
3

20

2. (18 points)

Initials: D

a. Rank the following compounds from most to least basic.



2

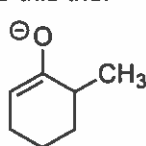
b. Check the appropriate box or boxes.

i. A kinetic enolate is formed with:    ii. Is this the:

NaOMe, H<sub>2</sub>O, r.t.

PPh<sub>3</sub>, then *n*-BuLi

LDA, THF, -78 °C

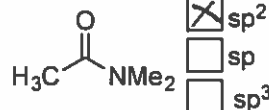


thermodynamic enolate

kinetic enolate

neither

ii. Hybridization of the nitrogen:



sp<sup>2</sup>

sp

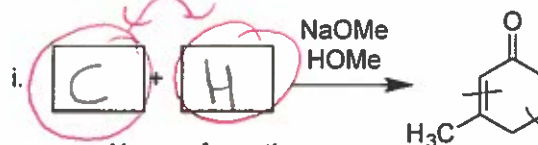
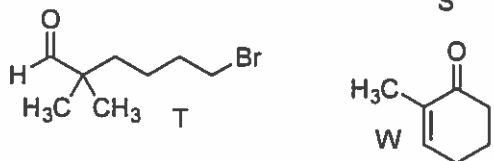
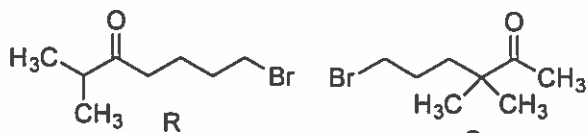
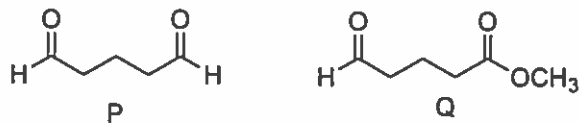
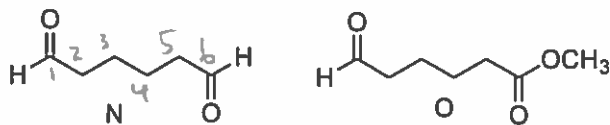
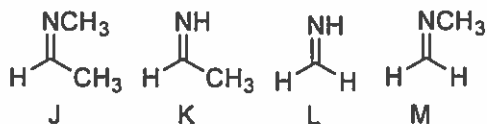
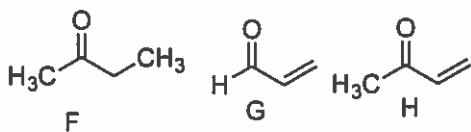
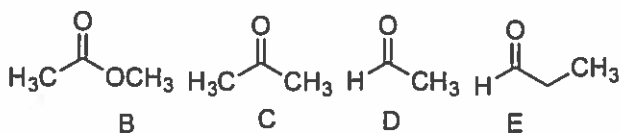
sp<sup>3</sup>

3

c. Fill in the correct compounds from the table to complete the syntheses.

You can use the same compound more than once.

Starting materials



Name of reaction:

Robinson

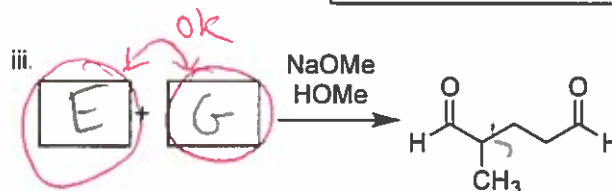
3



Name of reaction:

Claisen

3



Name of reaction:

Michael

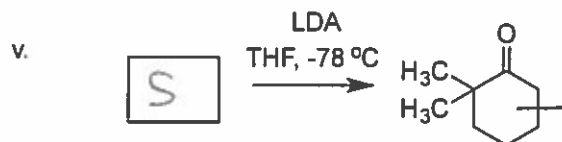
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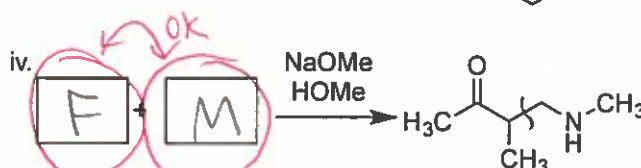
Name of reaction:

aldol

2



1



Name of reaction:

Mannich

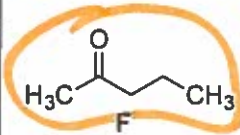
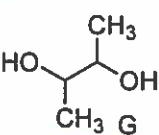
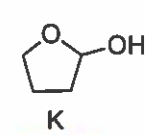
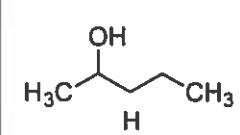
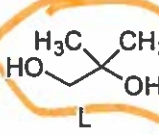
3

15

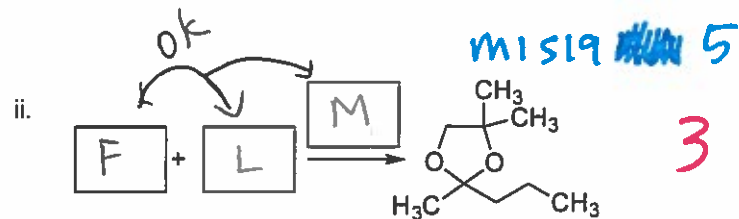
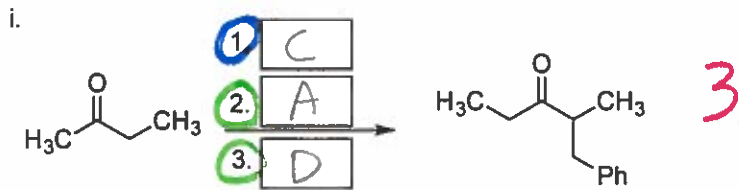
2. (17 points)

Initials: A

a. Fill in the compounds from the table to complete the synthesis. You can use the same compound more than once.

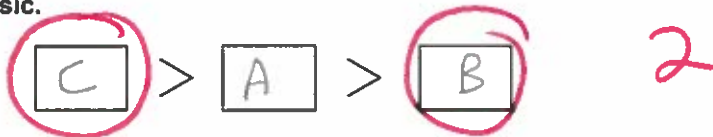
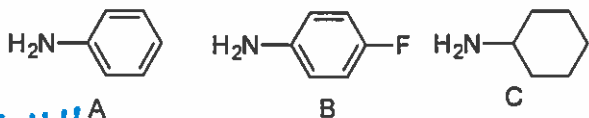
LDA, THF, -78 °C A	NaOMe, HOMe, H <sub>3</sub> C-I B
NaOMe, HOMe, Ph-CH <sub>2</sub> -I C	H <sub>3</sub> C-I D
 F	Ph-CH <sub>2</sub> -I E
 G	 K
 H	 L
	pTsOH M
	H <sub>2</sub> O N

Capcard lecture 18; MAS18 #1d



capcard lec 21

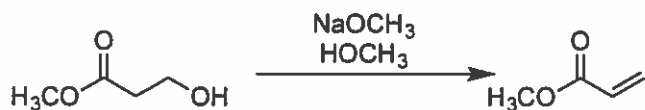
b. Rank the following compounds from most to least basic.



WS7 #1  
MAS18 #16

c. Provide an arrow-pushing mechanism

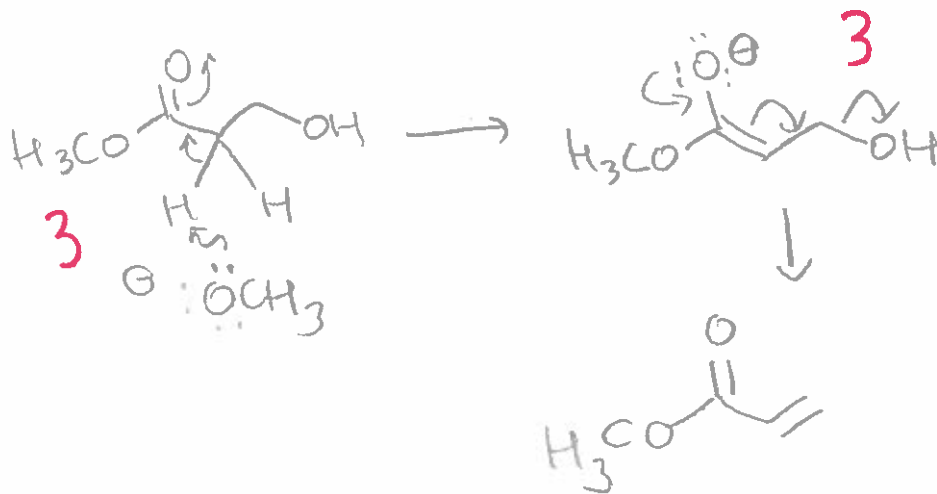
WS6 #3c  
MAS18 #3a



What is the name of this mechanism?

E1cb

Mechanism:

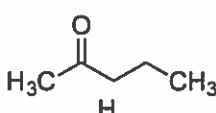
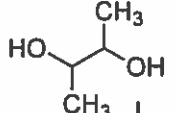
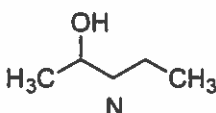
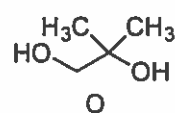
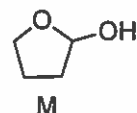


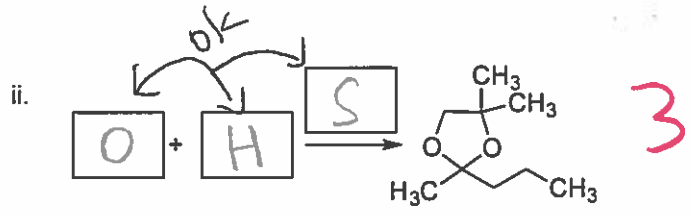
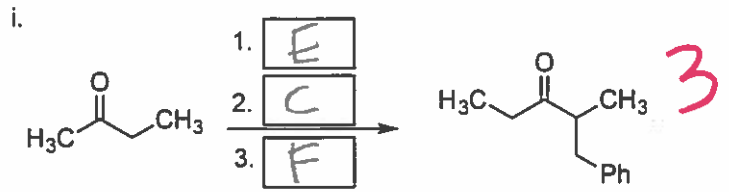
1 point per arrow error -0.5

15

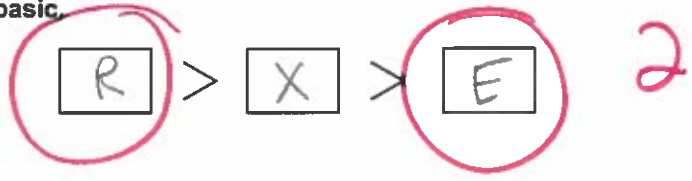
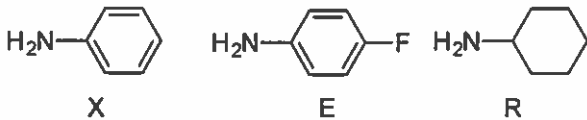
1. (17 points)

a. Fill in the compounds from the table to complete the synthesis. You can use the same compound more than once.

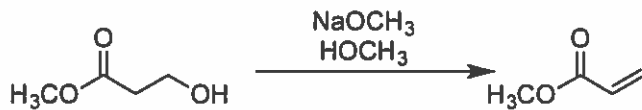
LDA, THF, -78 °C C	NaOMe, HOMe, H <sub>3</sub> C-I D
NaOMe, HOMe, Ph-CH <sub>2</sub> -I E	H <sub>3</sub> C-I F
	
	
	pTsOH S
	H <sub>2</sub> O T



b. Rank the following compounds from most to least basic.



c. Provide an arrow-pushing mechanism



What is the name of this mechanism?

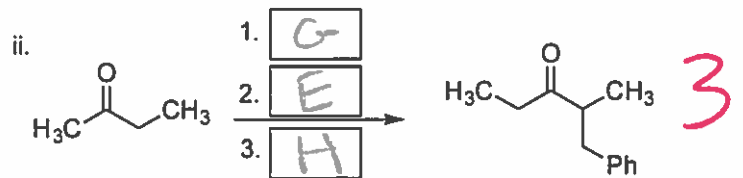
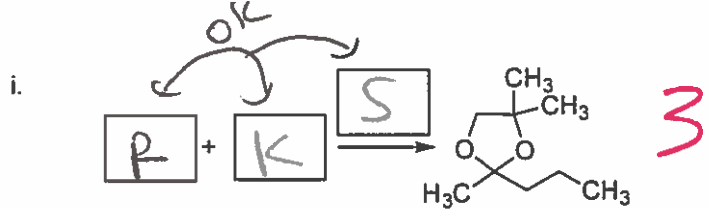
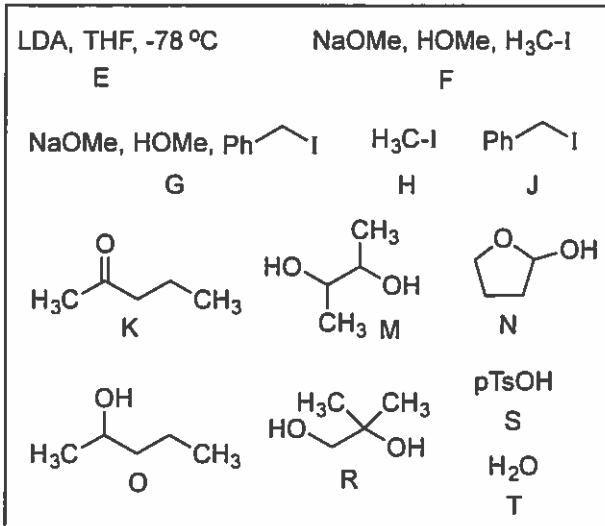
Mechanism:

See A

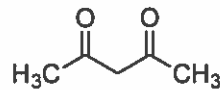
2. (17 points)

Initials: C

a. Fill in the compounds from the table to complete the synthesis. You can use the same compound more than once.

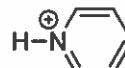


a. Provide pKa's for any 2 of the following compounds (if you do them all, we will count your best 2).



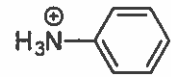
9

10-8



5

6-4



5

6-4

max 2

c. Provide an arrow-pushing mechanism



What is the name of this mechanism?

Mechanism:

see A

7

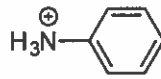


15

Initials: D

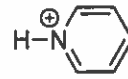
1. (17 points)

a. Provide pKa's for any 2 of the following compounds (if you do them all, we will count your best 2).



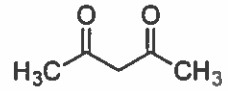
5

6-4



5

6-4



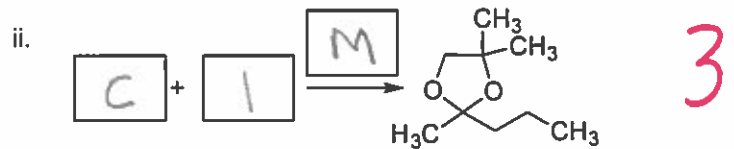
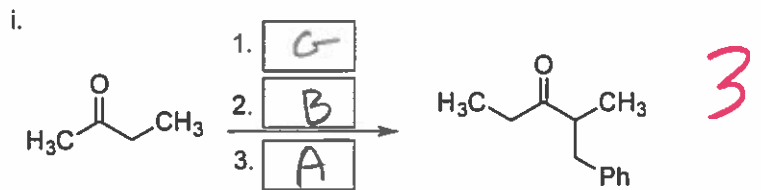
9

11-8

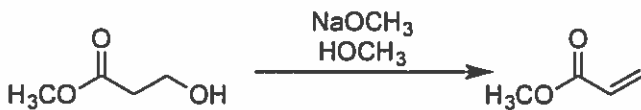
2  
may

b. Fill in the compounds from the table to complete the synthesis. You can use the same compound more than once.

LDA, THF, -78 °C B	NaOMe, HOMe, H <sub>3</sub> C-I T
NaOMe, HOMe, Ph-CH <sub>2</sub> -I G	H <sub>3</sub> C-I A
<chem>CC(=O)CC</chem> C	<chem>CC(O)C(O)C</chem> E
<chem>CC(O)CC</chem> H	<chem>CC(C)(O)C</chem> I
<chem>CC1OC1</chem> W	pTsOH M
	H <sub>2</sub> O Y
	Ph-CH <sub>2</sub> -I S



c. Provide an arrow-pushing mechanism



What is the name of this mechanism?

Mechanism:

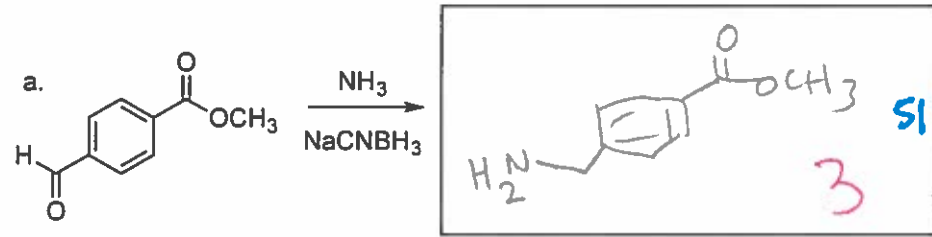
see A

7

m2518 #4  
m2518 #2a

3. Fill in the boxes with the appropriate starting material, reagent or major product (33 points).  
Show stereochemistry where appropriate (you must DRAW the enantiomers/diastereomers)

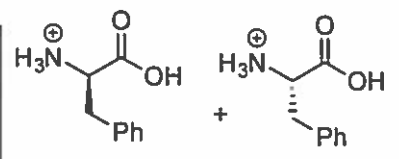
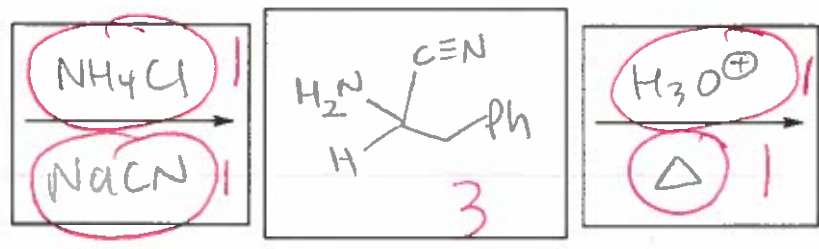
A



Capercard  
Lecture 20  
519 midterm 1 3c

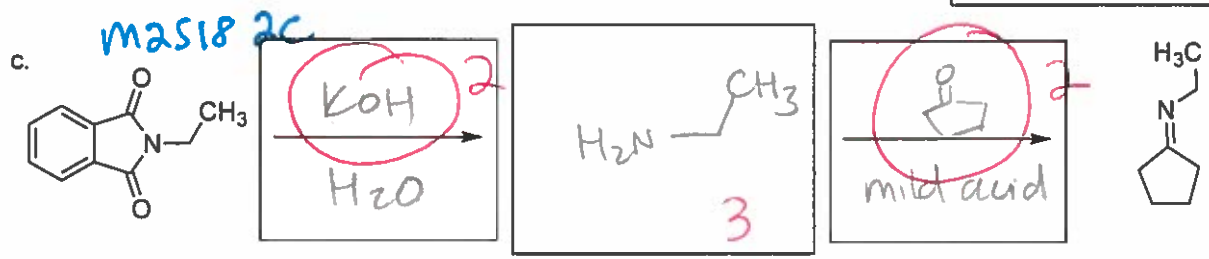
Name of this reaction:  
reductive amination

Capercard  
Lecture 22  
NS7 #2C

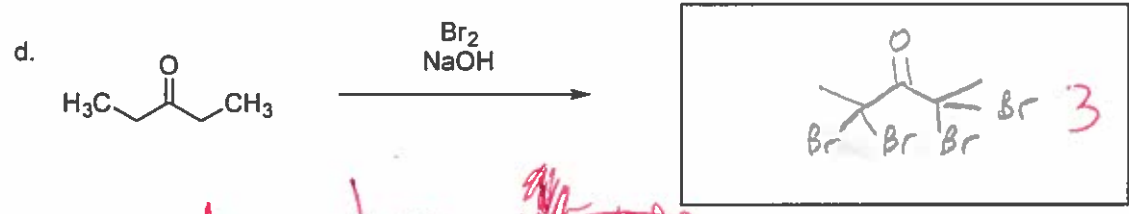


Name of this reaction:  
Strecker synthesis

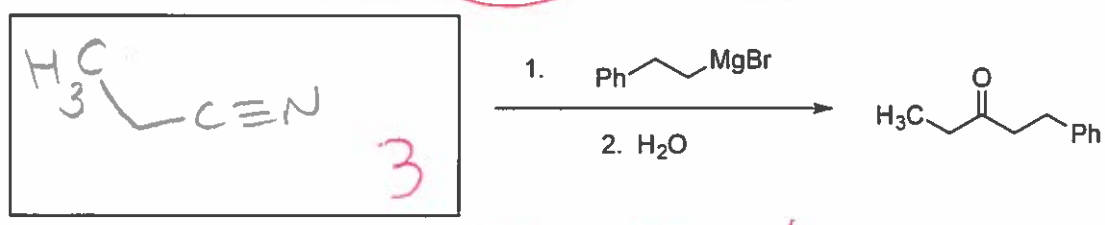
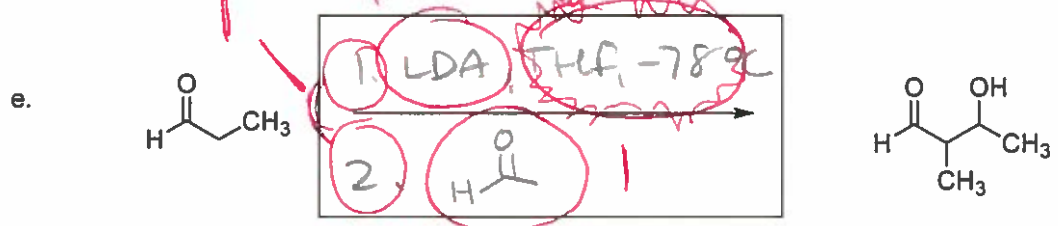
NS7 #26  
NS7 #3a



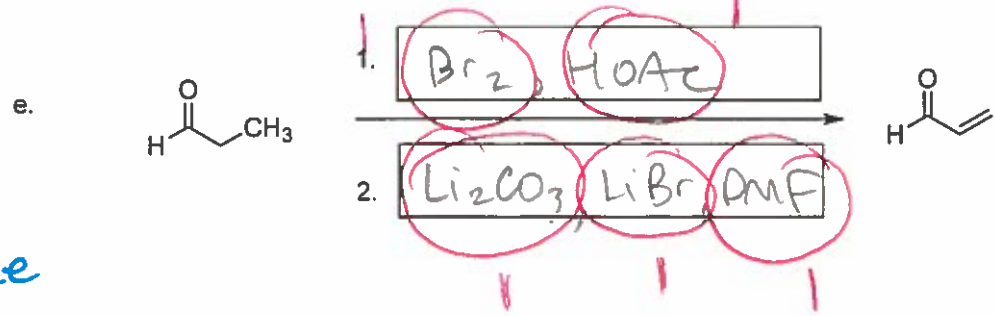
Capercard  
Lecture 23



NS5 2diii  
DMLP  
NS6 #target 5a



NS6 target 5d  
m2518 #2e

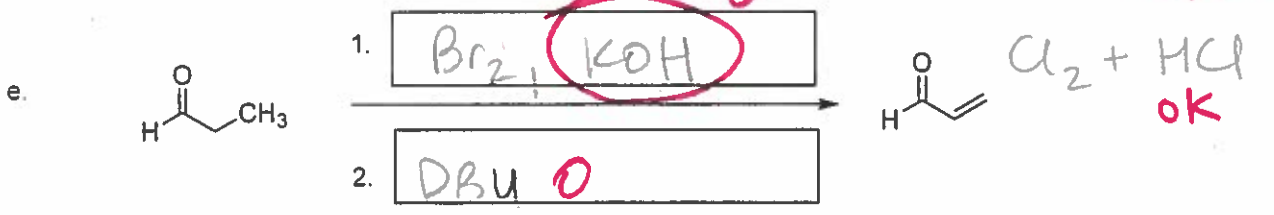
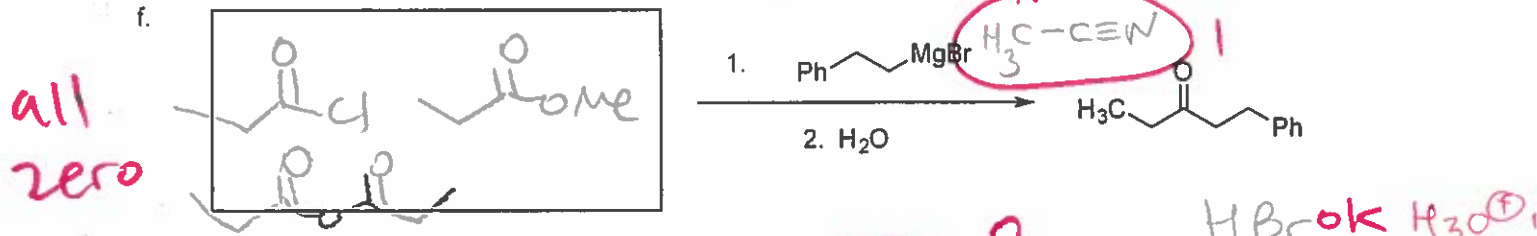
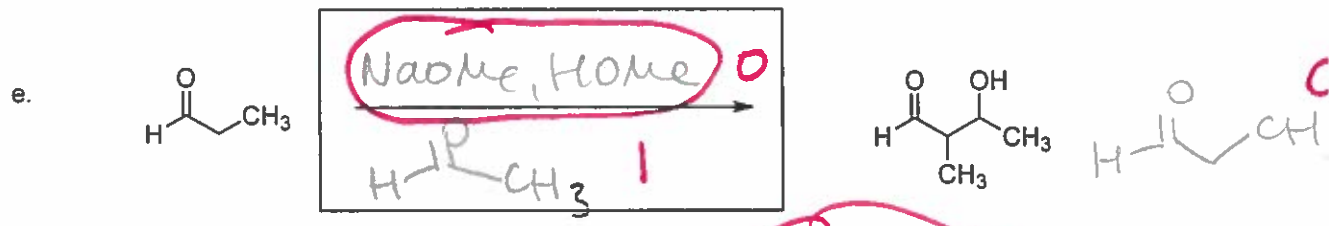
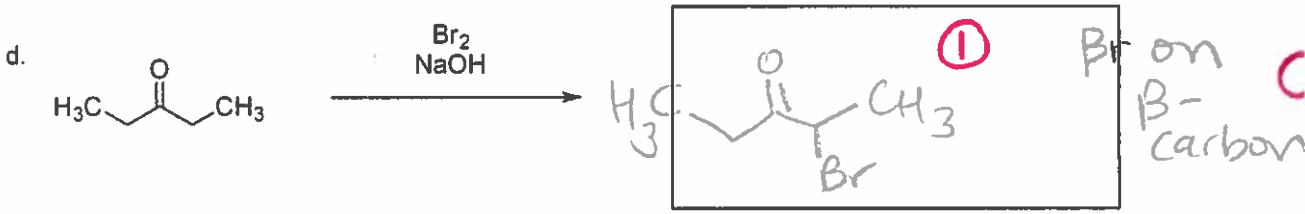
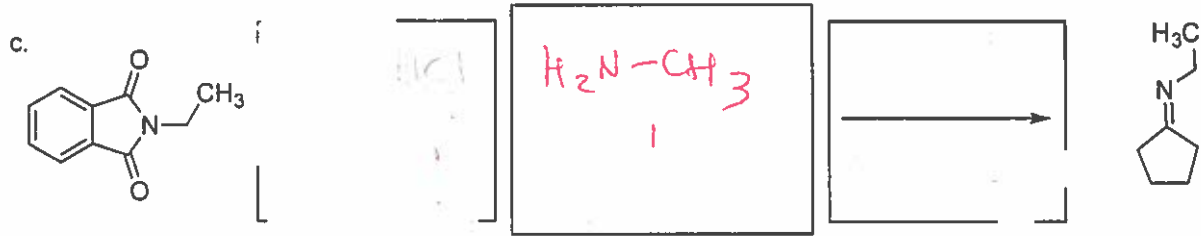
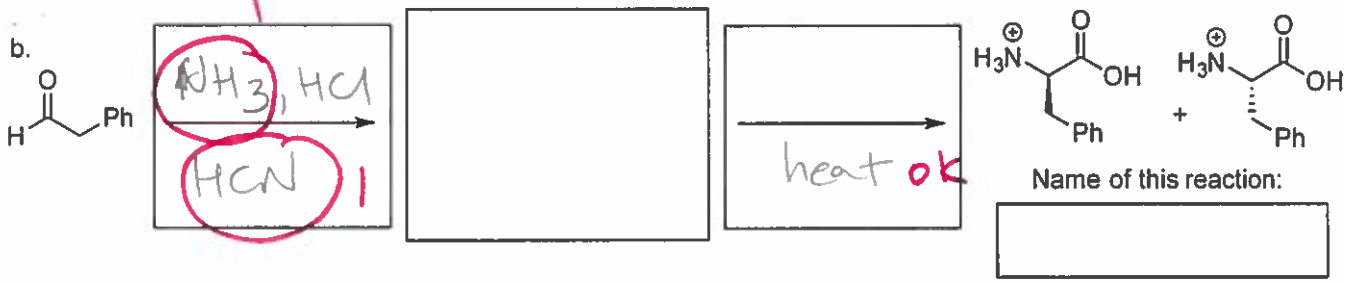
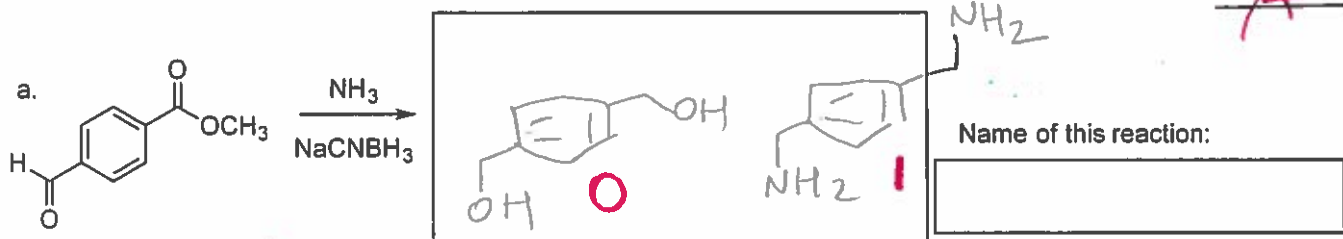


3  
3  
3

# PARTIAL / incorrect

3. Fill in the boxes with the appropriate starting material, reagent or major product (33 points). Show stereochemistry where appropriate (you must DRAW the enantiomers/diastereomers)

A

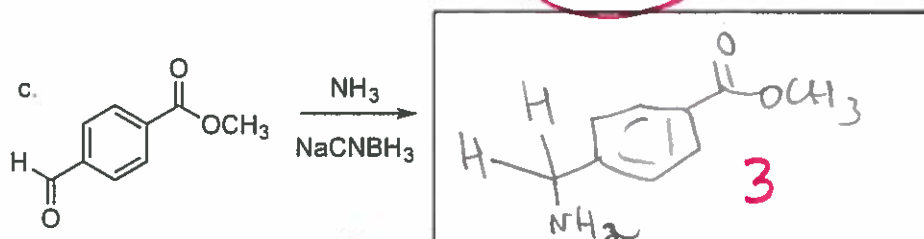
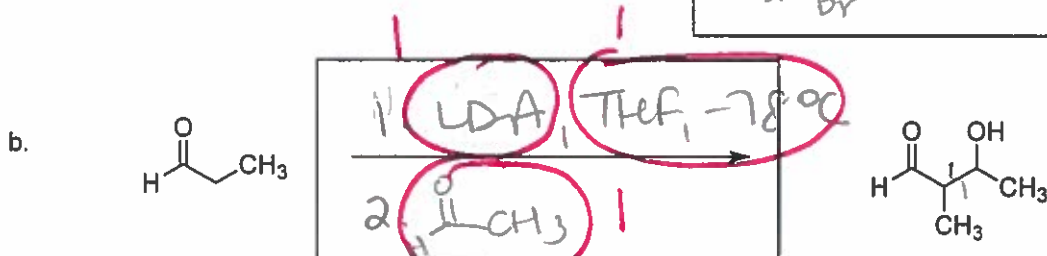
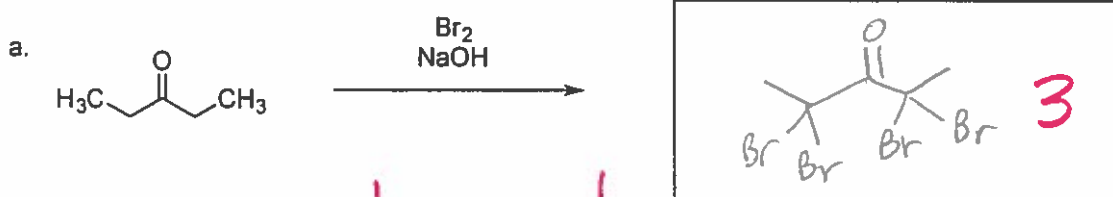


all zero



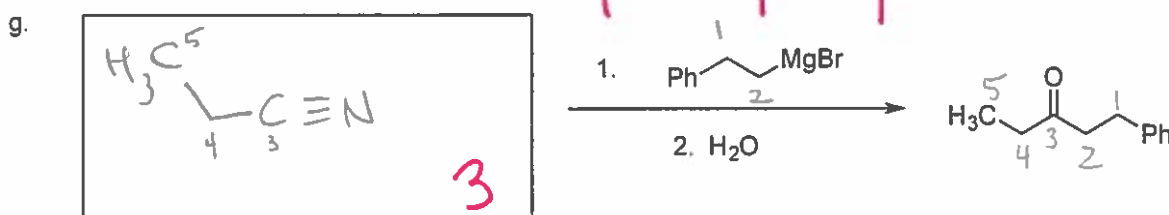
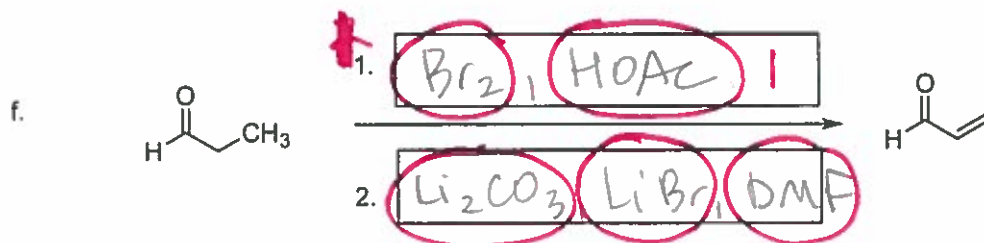
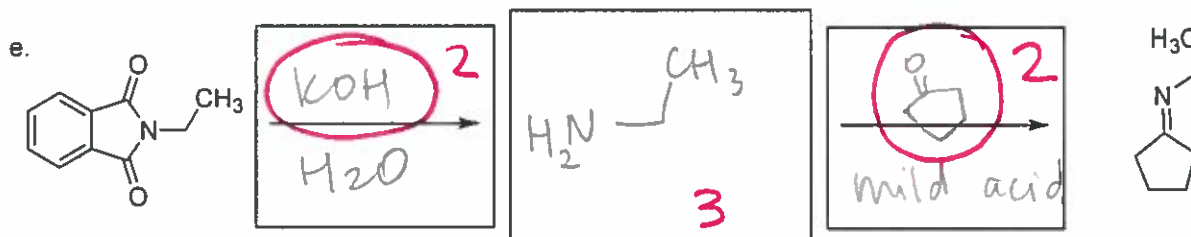
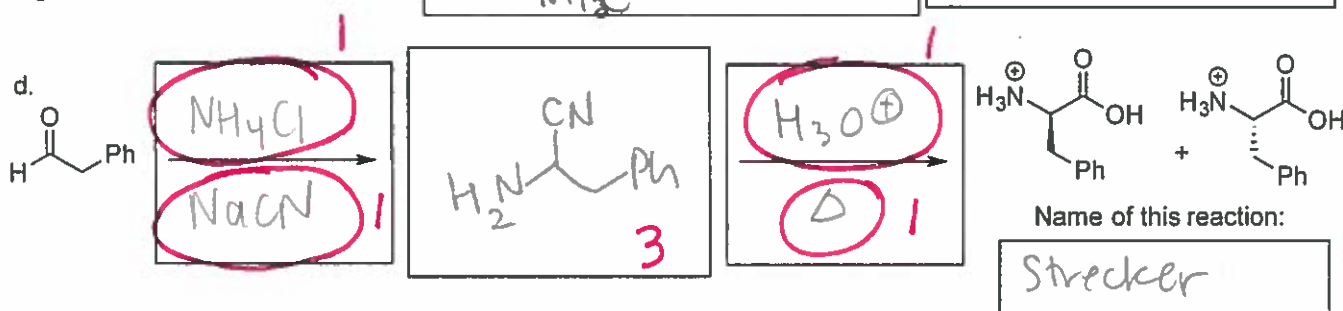
3. Fill in the boxes with the appropriate starting material, reagent or major product (33 points). Show stereochemistry where appropriate (you must DRAW the enantiomers/diastereomers)

B



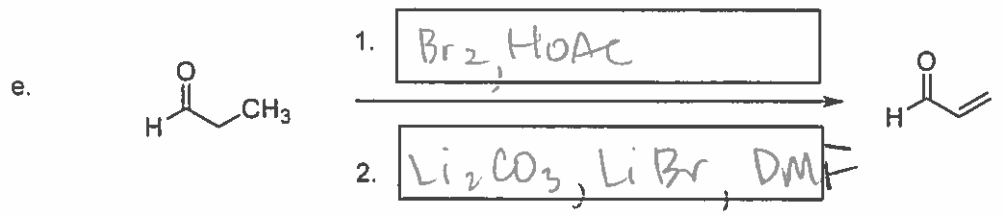
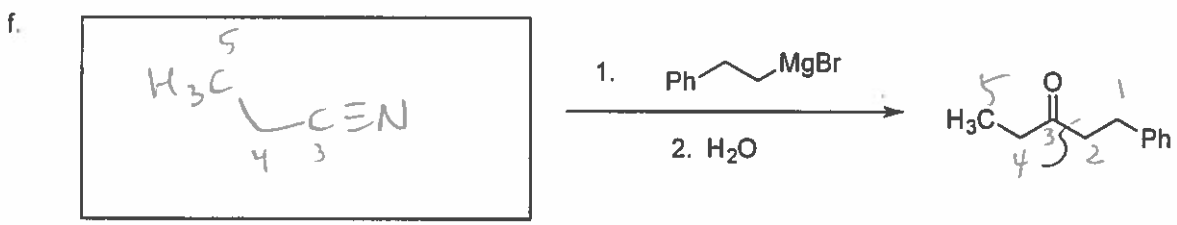
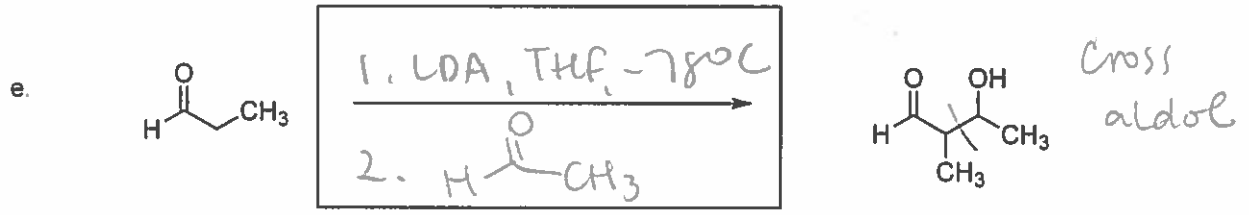
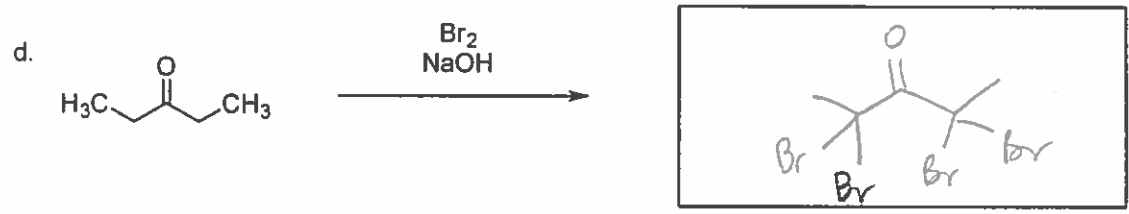
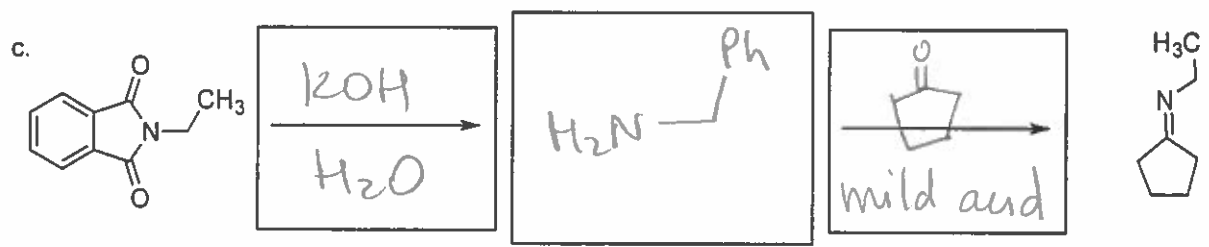
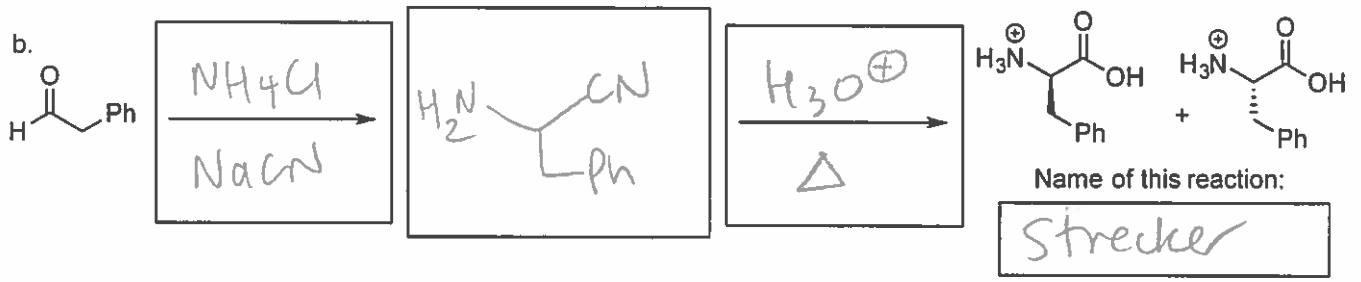
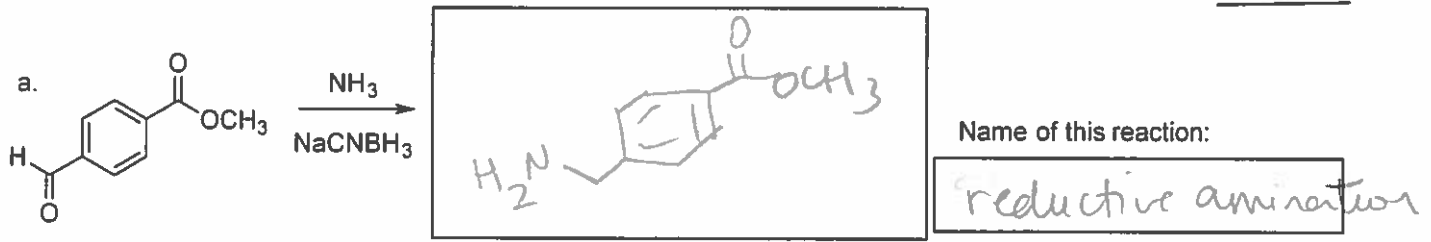
Name of this reaction:

reductive amination



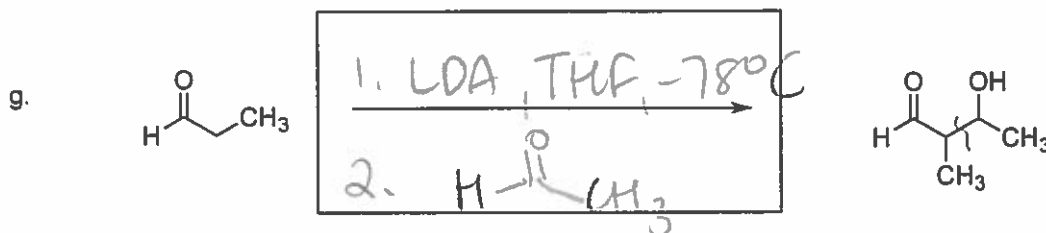
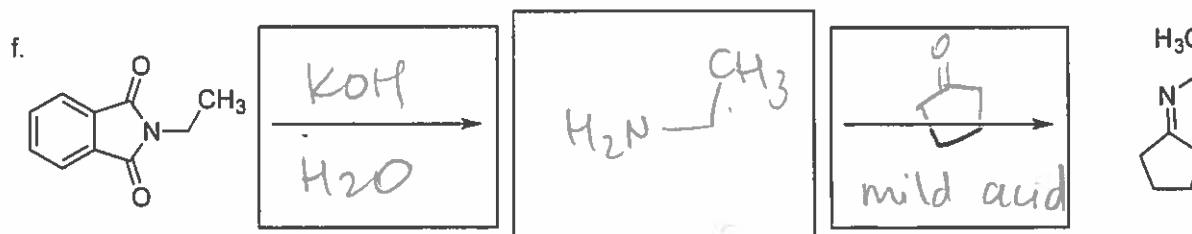
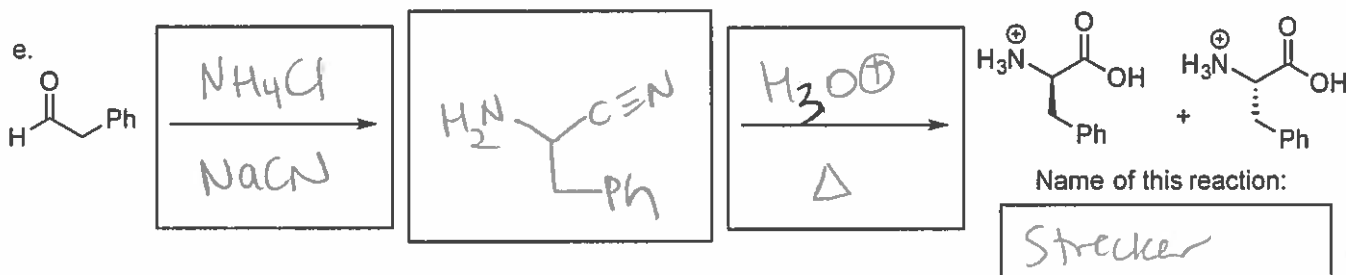
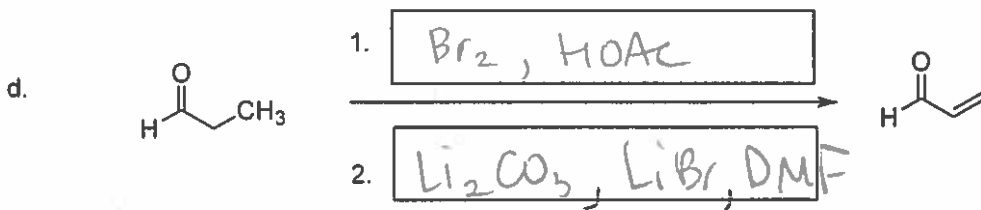
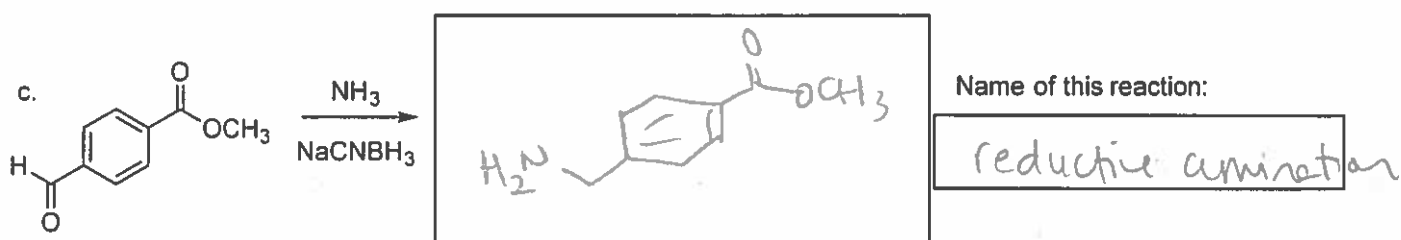
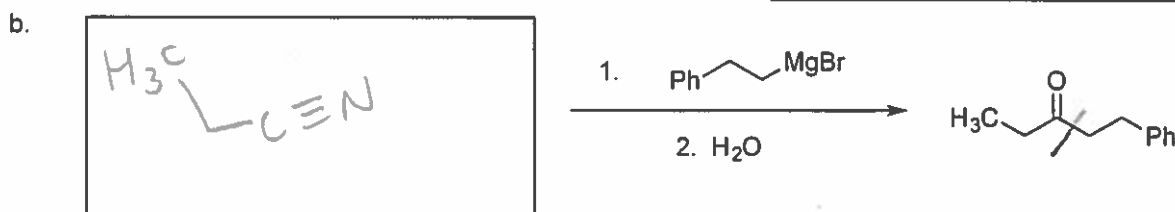
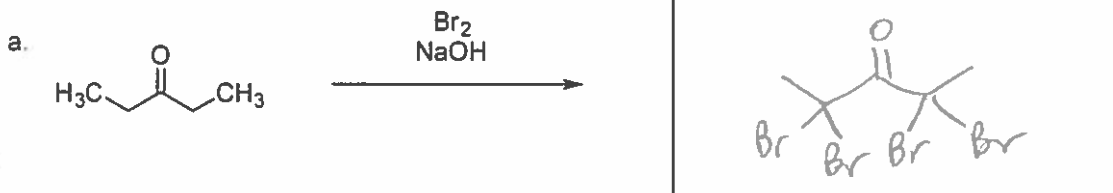
3. Fill in the boxes with the appropriate starting material, reagent or major product (33 points).  
 Show stereochemistry where appropriate (you must DRAW the enantiomers/diastereomers)

C



3. Fill in the boxes with the appropriate starting material, reagent or major product (33 points). Show stereochemistry where appropriate (you must DRAW the enantiomers/diastereomers)

D

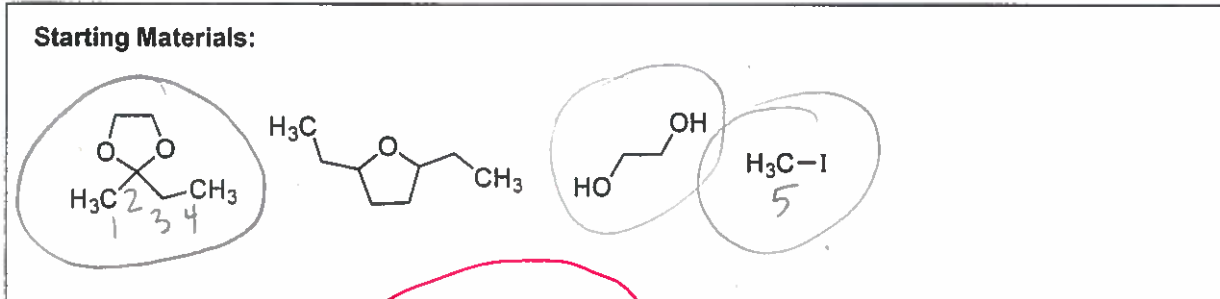


4. (7 points) Propose a synthesis of the target below.

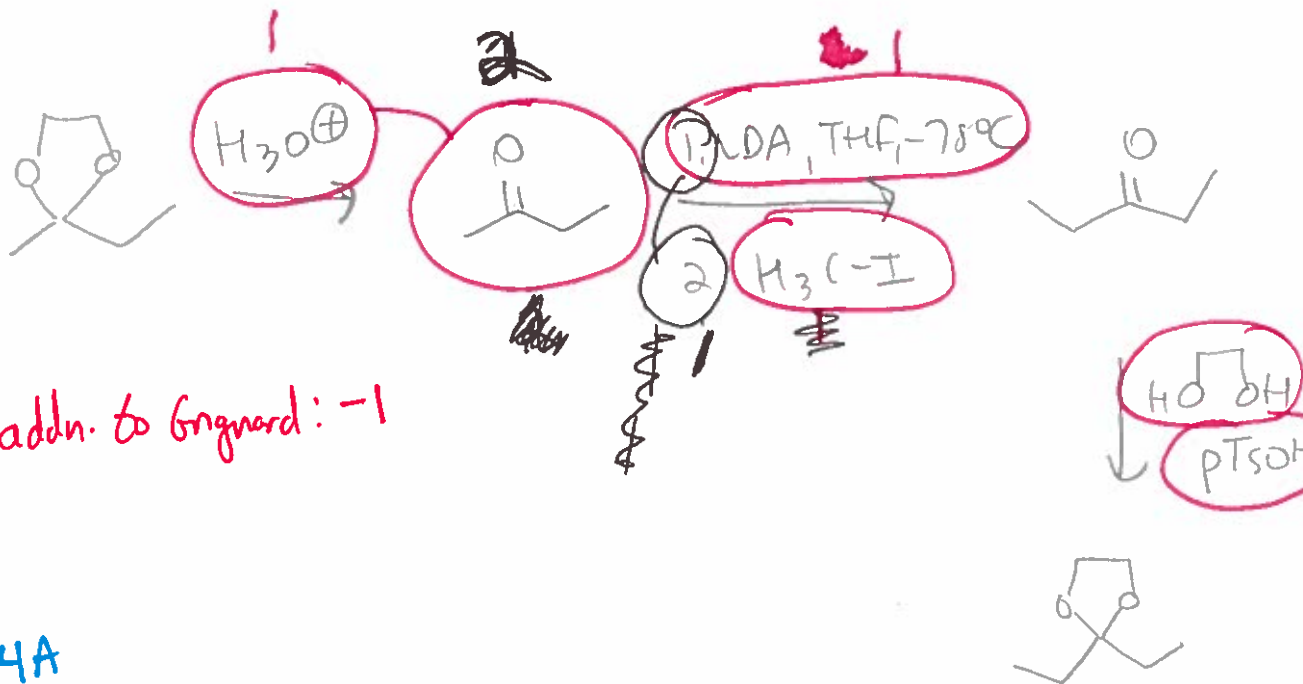
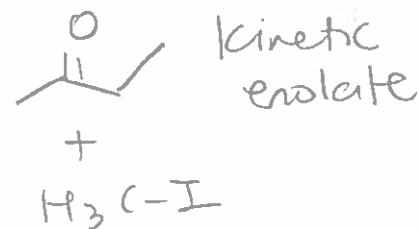
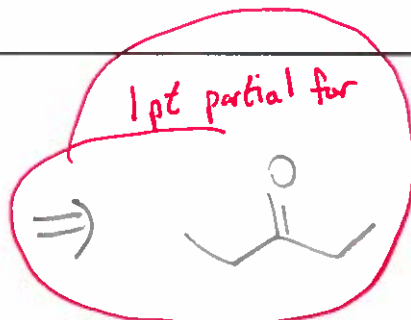
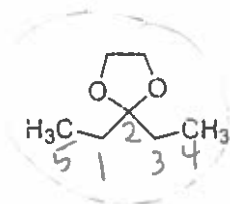
Initials: \_\_\_\_\_

All carbons must come from the starting materials provided, you can use any reagent you wish.  
YOU CAN IGNORE STEREOCHEMISTRY.

Starting Materials:



Target A.



enolate addn. to Grignard: -1

M1 S19 4A  
Capcard Lecture 10  
Capcard Lecture 21

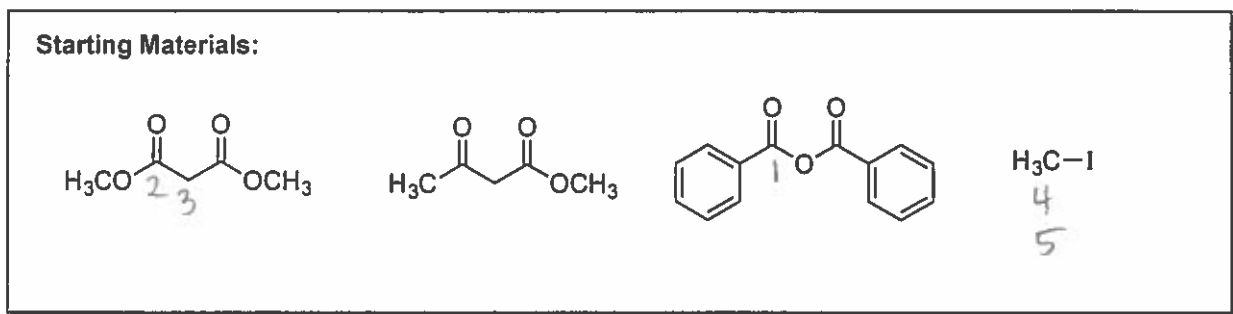
NAME, HOME = 0

8

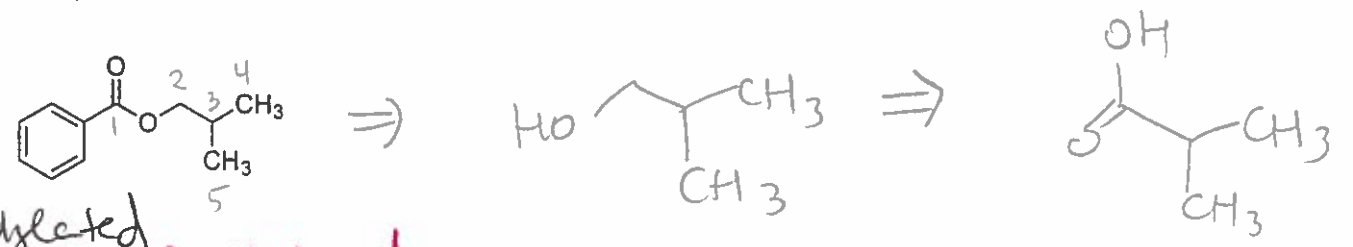
5. (8 points) Propose a synthesis of the target below.

Initials: \_\_\_\_\_

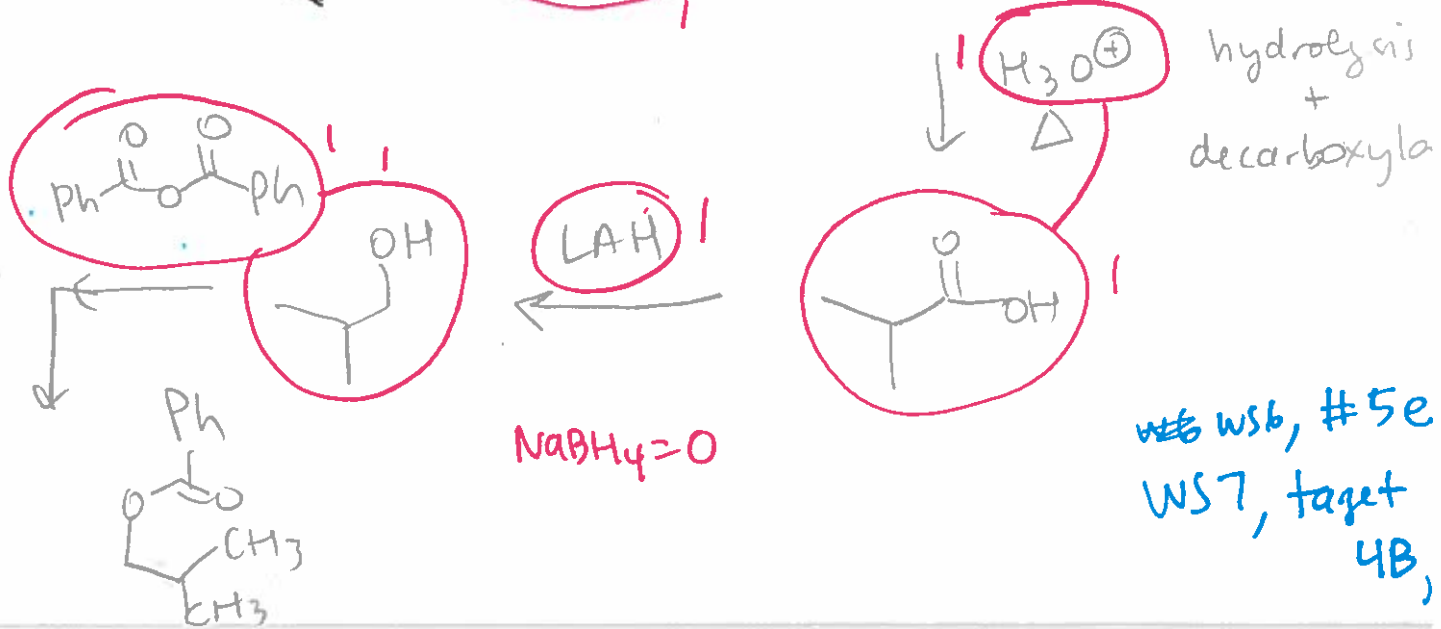
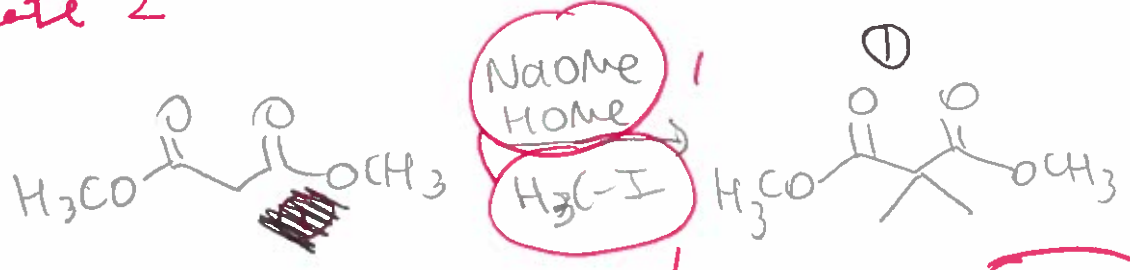
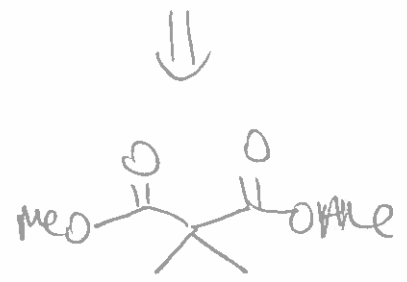
All carbons must come from the starting materials provided, you can use any reagent you wish.  
YOU CAN IGNORE STEREOCHEMISTRY.



Target A.



~~correct SM 3-diol~~  
 dialkylated  
 alkylate 2  
 decarbox 2  
 redox 1  
 acylate 2



WS6, #5e  
 WS7, target  
 4B,

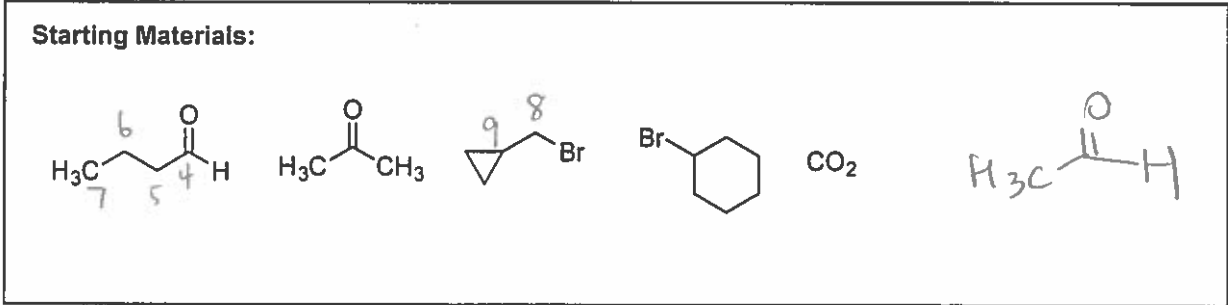


9

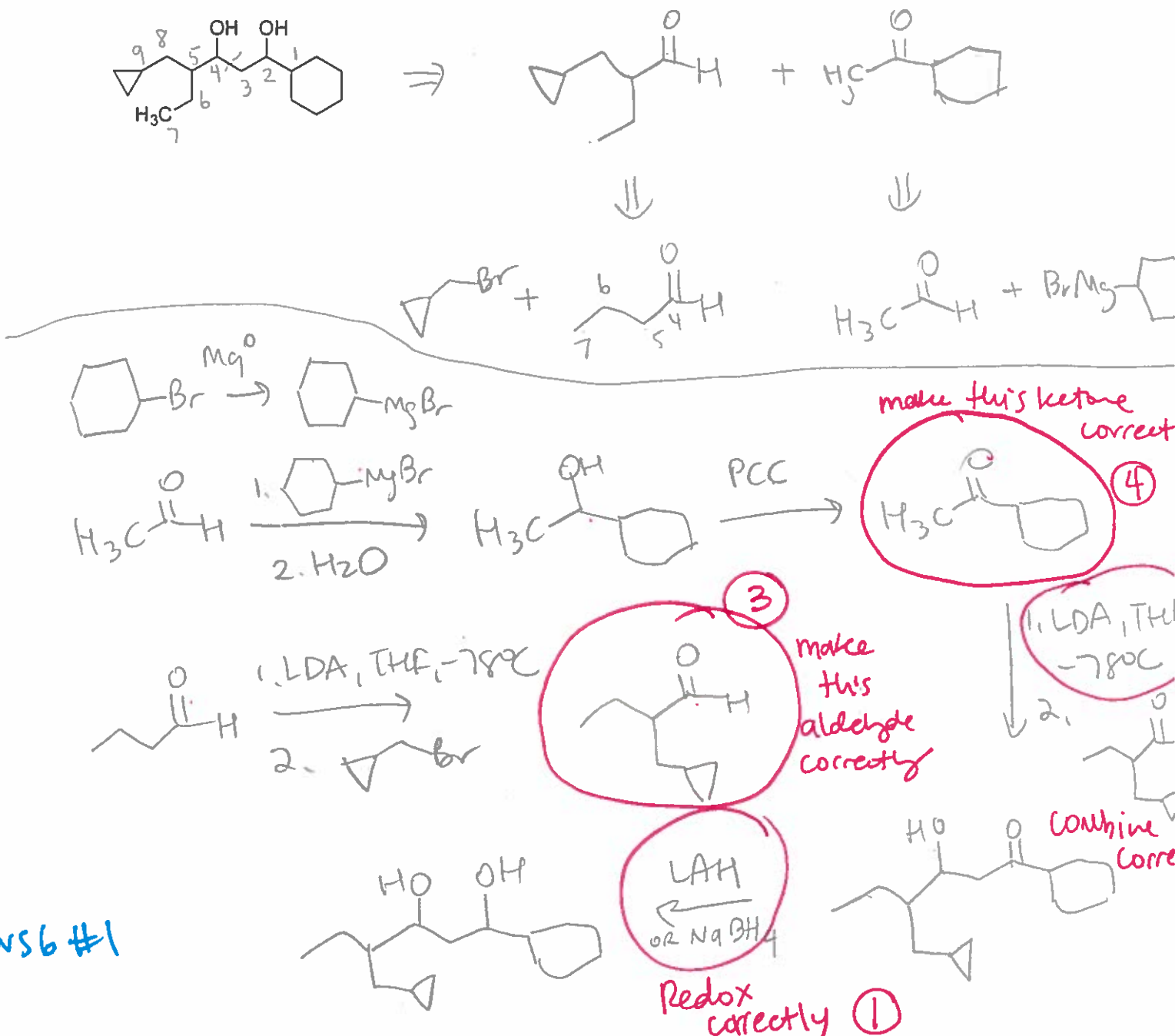
6. (9 points) Propose a synthesis of the target below.

Initials: \_\_\_\_\_

All carbons must come from the starting materials provided, you can use any reagent you wish.  
YOU CAN IGNORE STEREOCHEMISTRY.



Target A.



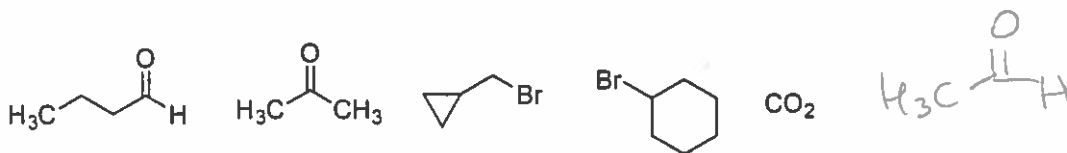
WS6 #1

6. (9 points) Propose a synthesis of the target below.

Initials: \_\_\_\_\_

All carbons must come from the starting materials provided, you can use any reagent you wish.  
YOU CAN IGNORE STEREOCHEMISTRY.

Starting Materials:



Target A.

