Chemistry 3B, Midterm 2

Wednesday, November 13, 2002

Student name: _____

Student signature: _____

Write TA's name or Lecture Only: Chungi Qian

1. Please make sure that the exam has 9 pages including this one.
2. Please write your answers in the spaces provided.
3. Write clearly; illegible or ambiguous answers will be considered incorrect.
4. Only writing implements are allowed **(No Calculators)**.

GOOD LUCK!

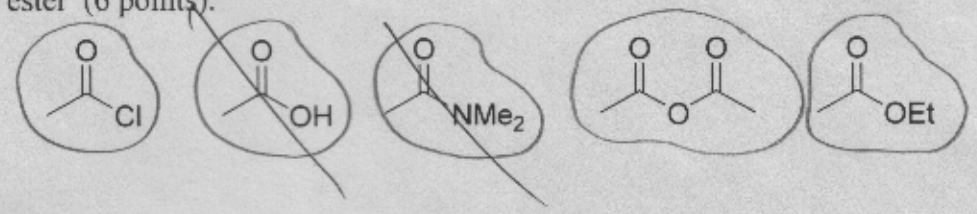
1.	30 points	22
2.	60 points	~~57~~ 54
3.	20 points	19
4.	20 points	
5.	20 points	
6.	20 points	
7.	10 points	
Total	**180 points**	

MINI-PERIODIC TABLE

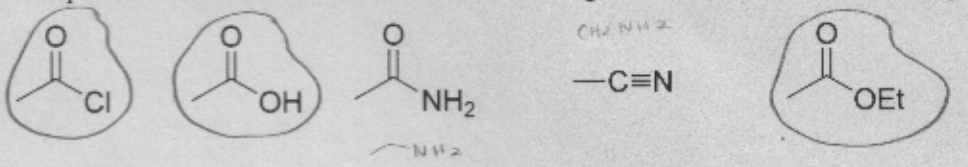
I	II	III	IV	V	VI	VII	VIII
H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar
K	Ca	Ga	Ge	As	Se	Br	Kr

1. Answer the following questions. Every wrong answer cancels a correct answer (30 points).

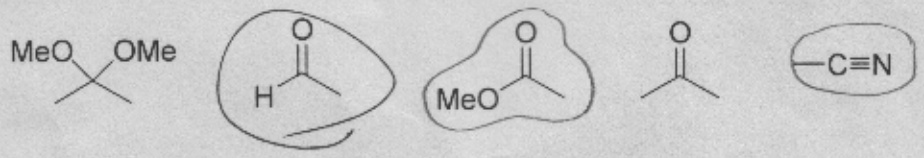
(a). Circle the carboxylic acid derivatives that upon heating with methoxide in methanol provide the methyl ester (6 points).



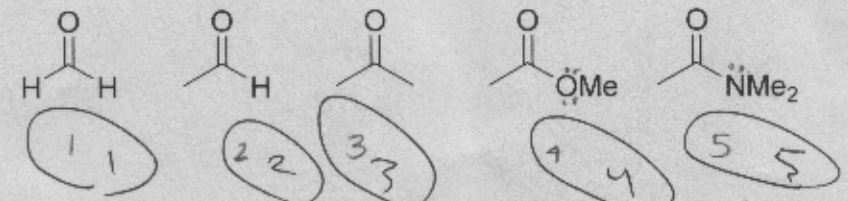
(b). Circle the compounds that would react with $LiAlH_4$ to give an alcohol after work-up (6 points).



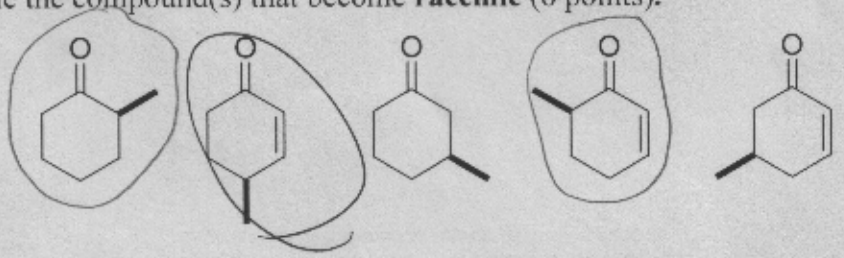
(c). Circle the compounds that are converted into a **new** compound upon treatment with aqueous sodium hydroxide and heat (6 points).



(d). Rank the following carbonyl compounds from most electrophilic to least electrophilic [1 = **most** electrophilic, 5 = **least** electrophilic] (6 points).



(e). Each of these enantiomerically pure compounds is heated with H_2O, H^+ for an extended period of time. Circle the compound(s) that become **racemic** (6 points).



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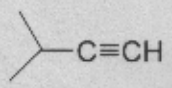
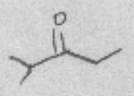
2. For each of the following reactions supply the missing reagents or major organic product in the space provided. If no reaction is expected indicate by N.R. (60 points total).

(a) 

1. H_2O, H^+, Hg^{2+}
2. LDA
3. MeI



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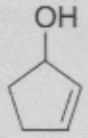
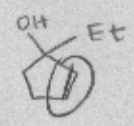
(b) 

1. MnO_2
2. EtMgBr (1,2)
3. aqueous workup



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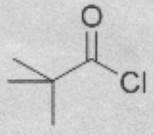
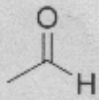
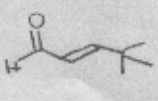
(c) 

1. $LiHAl[OC(CH_3)_3]_3$
2.  , HO-, Δ


cis + trans

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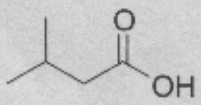
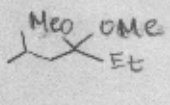
(d) 

1. $SOCl_2$
2. Et_2CuLi
3. MeOH, H+



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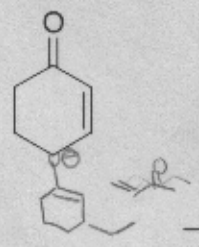
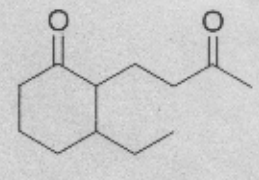
(e) 

1. $(CH_3CH_2)_2CuLi$
2.  , H^+/H_2O



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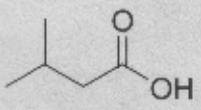
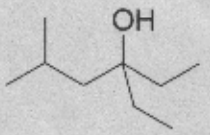
(f) 

1. $LiAl[OC(CH_3)_3]_3H$
2. 2 CH_3CH_2MgBr
3. H^+/H_2O

} 2



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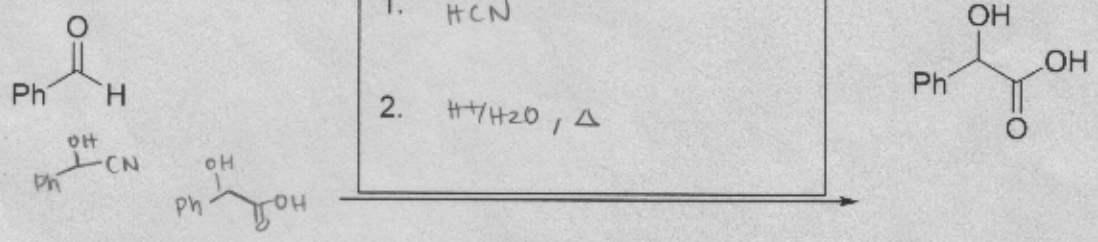
CH_3CH_2MgBr

(g) 

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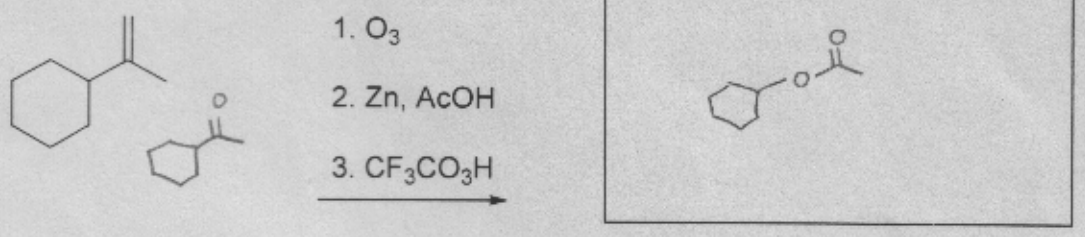
(h) 

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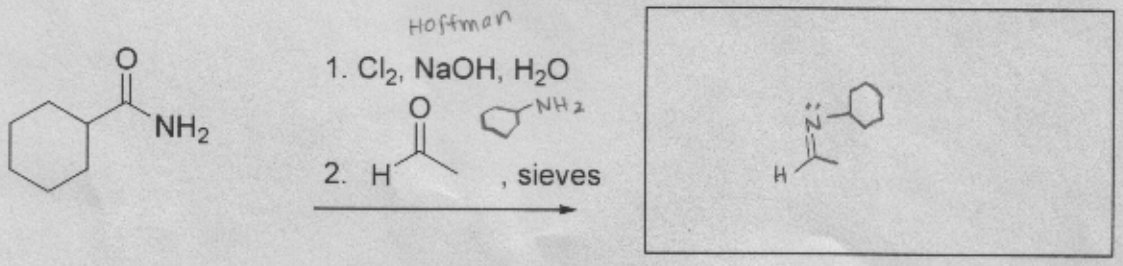
(i) 

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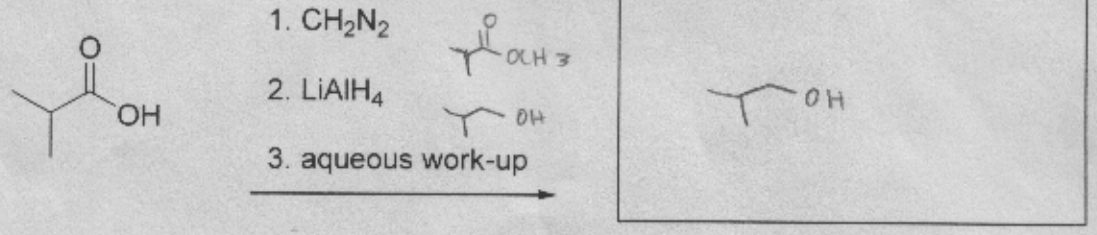
(j) 

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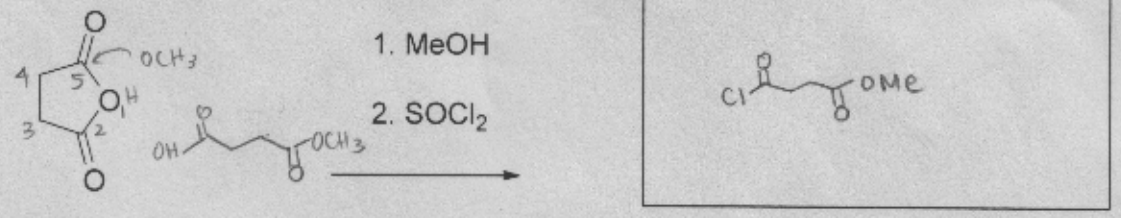
(k) 

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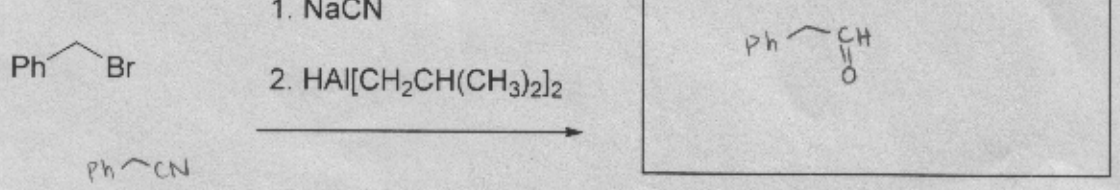
(l) 

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3. The following reaction is extensively used in the synthesis of the important class of ionophore antibiotics. Provide a mechanism (20 points).

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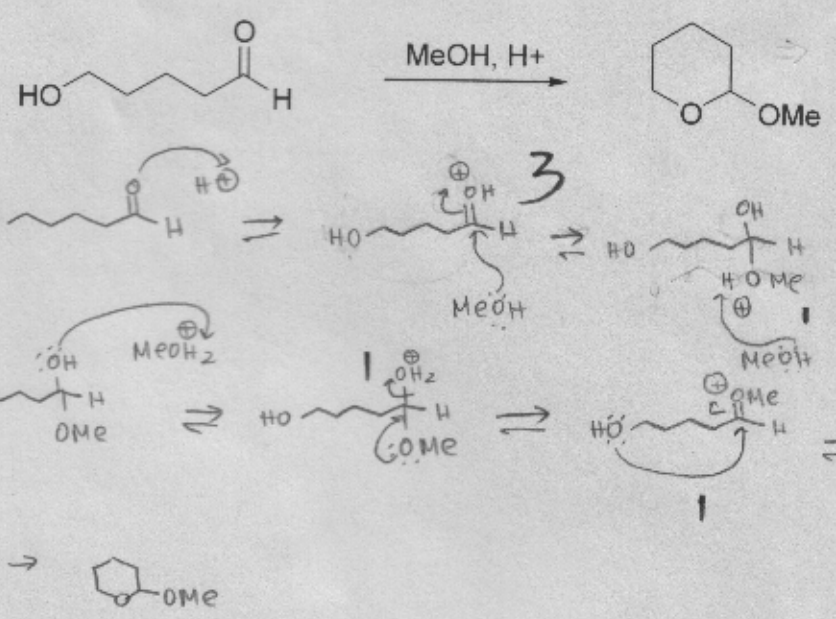
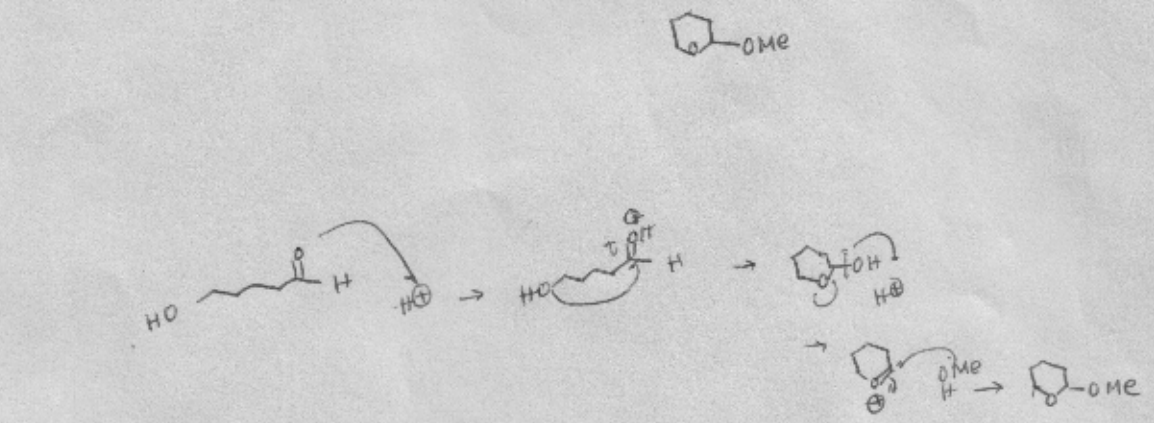
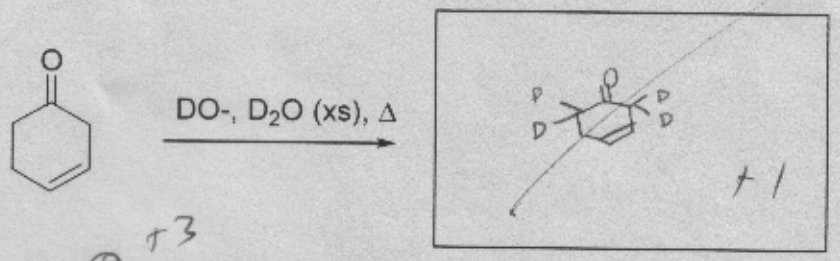
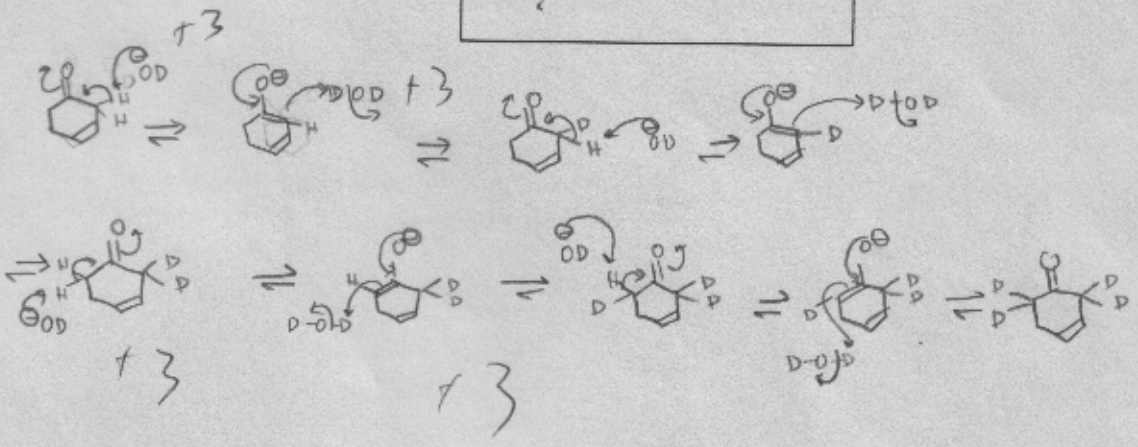


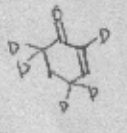


4. Draw the product of the below transformation and show the mechanism for its formation. Make sure to provide a mechanism for all sites of deuterium incorporation (20 points).

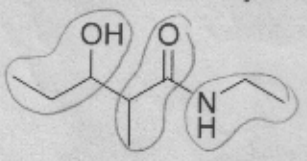


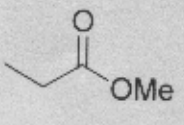


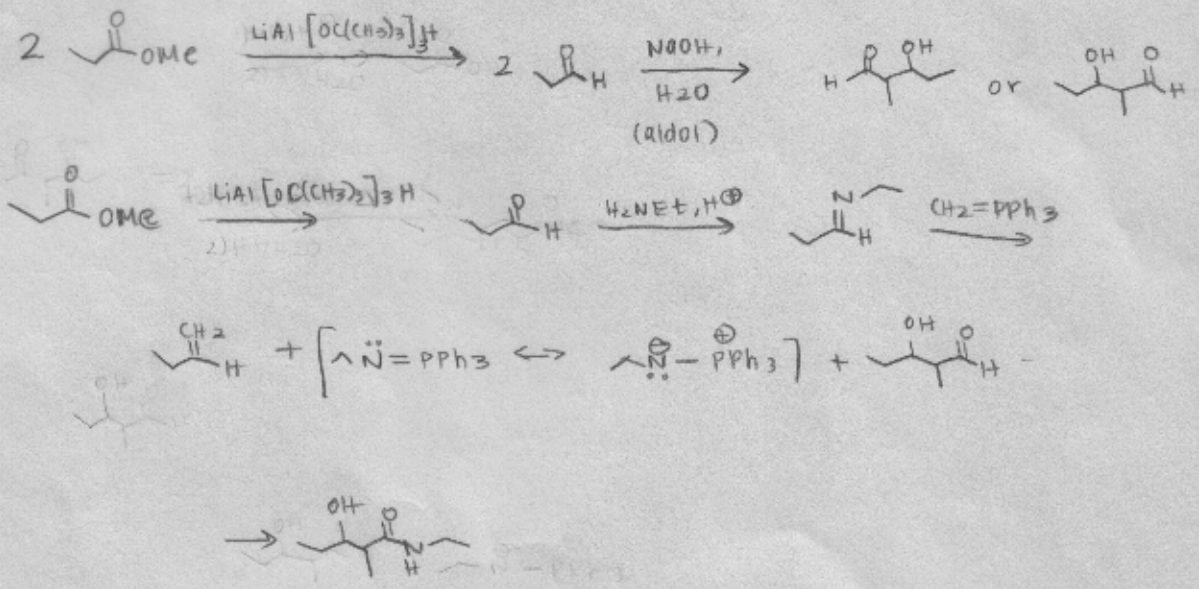
13/20



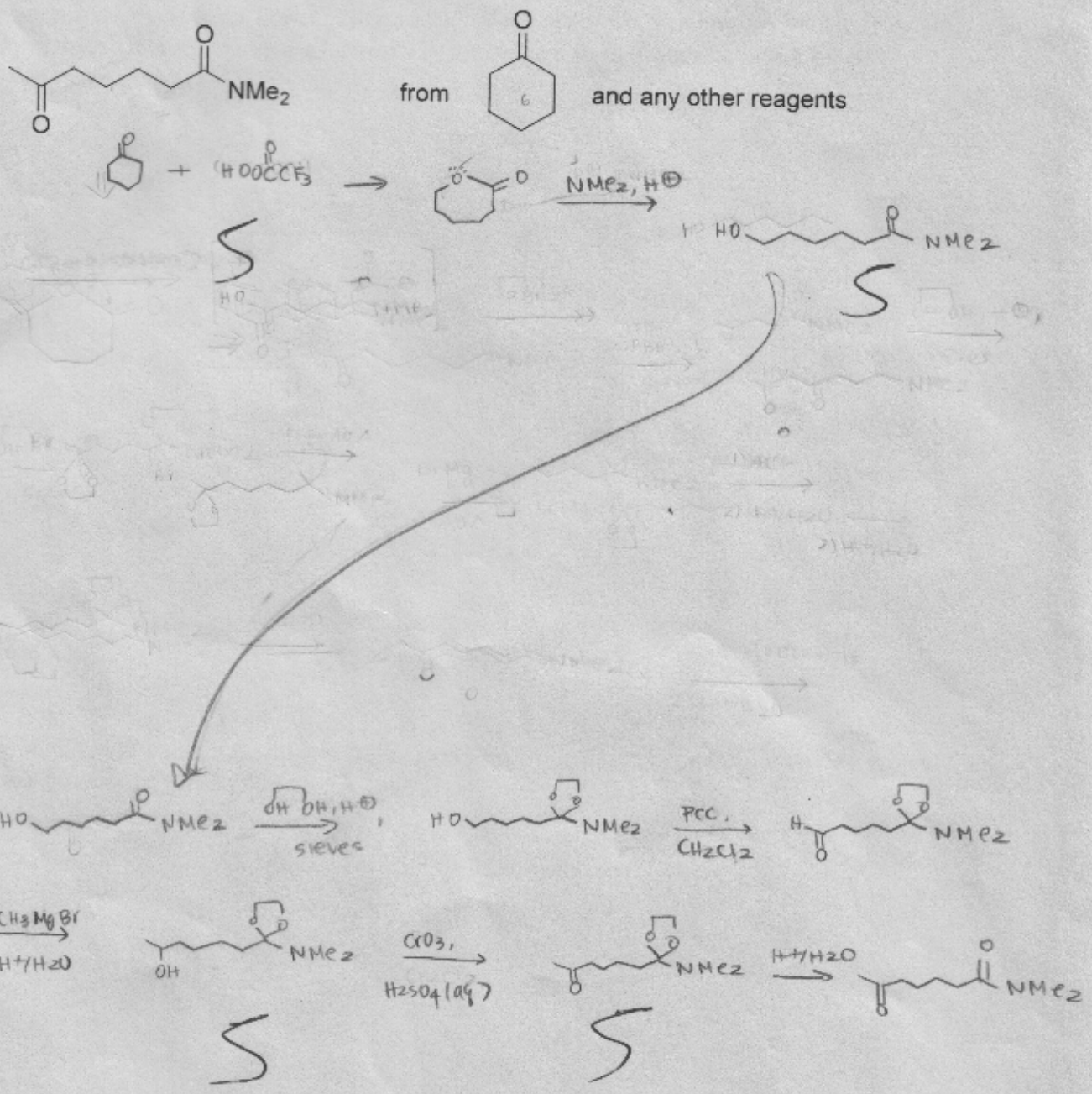
5. Provide the most efficient synthesis. You may employ any reagents of your choice (20 points).



from 3 equiv of 



6. Provide the most efficient synthesis. You may employ any reagents of your choice (20 points).



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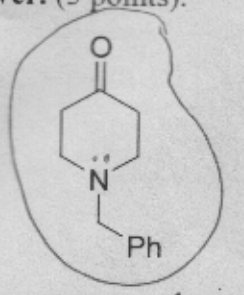
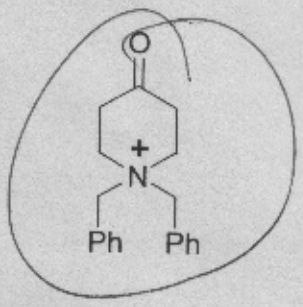
7. B

(a) The molecules drawn below are key building blocks in the synthesis of many psychoactive drugs. Circle the compound that would have the **largest** K_{eq} for hydrate formation. **Provide a brief explanation for your answer.** (5 points).

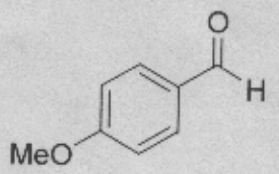


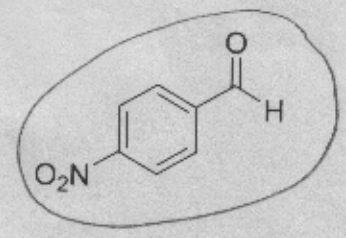


+2

By basic attack, the $^{\ominus}OH$ would not attack the nitrogen. It'll attack the carbonyl carbon w/a "$\delta+$".

(b) Circle compound below that would have the **largest** Keq for hydrate formation. **Provide a brief explanation for your answer.** (5 points).





+2

NO_2 is a deactivating group

resonance

+1