CHEM 3331 (Richardson) Midterm Exam 3 – Apr. 16, 2019

Your Name: Key

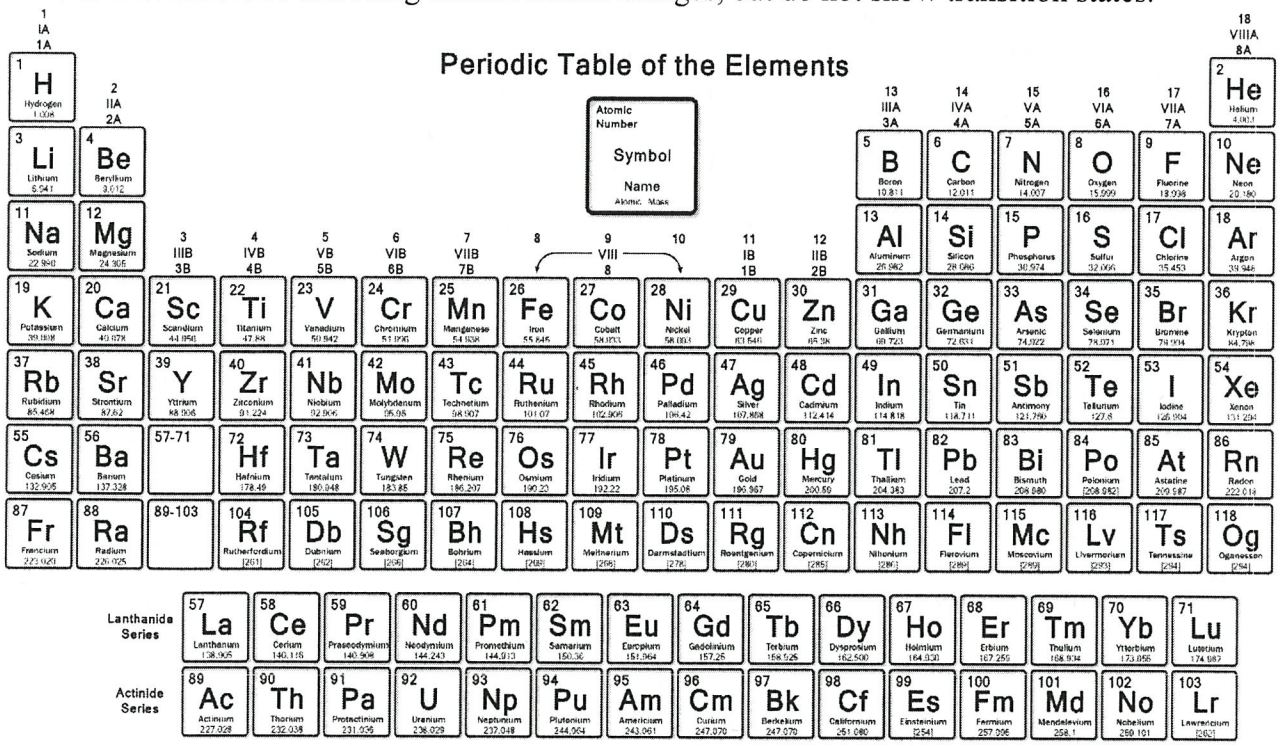
Student ID: _____

Recitation (check one)

O 130 (Wed 8:00 w/ Olivia)
O 134 (Wed 12:00 w/ Olivia)
O 136 (Wed 2:00 w/ Lacey)
O 138 (Wed 4:00 w/ Lacey)
O 141 (Thu 9:00 w/ Chance)
O 143 (Thu 11:00 w/ Chance)
O 145 (Thu 1:00 w/ Lacey)
O 147 (Thu 3:00 w/ Will)
O 149 (Thu 5:00 w/ Will)
O 235 (Wed 1:00 w/ Lauren)
O 237 (Wed 3:00 w/ Lauren)
O 239 (Wed 5:00 w/ Zepeng)
O 240 (Thu 8:00 w/ Zhenhao)
O 242 (Thu 10:00 w/ Lauren)
O 244 (Thu 12:00 w/ Lauren)
O 246 (Thu 2:00 w/ Brianna)
O 248 (Thu 4:00 w/ Brianna)

Question	Score	Out of
1		30
2		15
3		15
4		30
5		10
6		10 e.c.
Total		100

This is a closed-book exam. The use of notes, calculators, or cell phones will not be allowed during the exam. You may use models sets brought in a clear bag. Use the backs of the pages for scratch work. If your final answer is not clearly specified, you will lose points. For mechanisms, show all intermediates including correct formal charges, but do not show transition states.

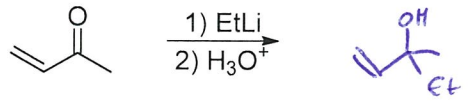


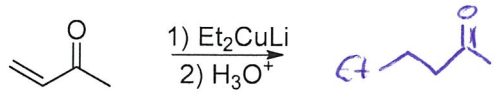
pKa Values

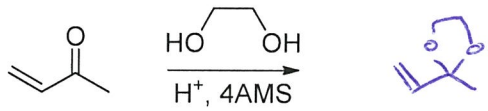
HI	-10	CH_3COOH	4.7	ArOH	10	HC≡CH	26
HBr	-8	HN_3	4.7	RSH	10-12	H_2	35
HCl	-6	H_2S	7.0	H_2O	15.7	NH_3	36
H_3O^+	-1.7	NH_4^+	9.3	ROH	16-18	$H_2C{=}CH_2$	45
HF	3.2	HCN	9.4	O=C-CH	9-25	CH_4	60

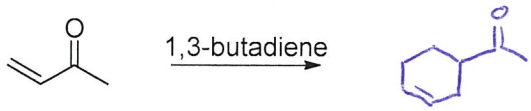
Average: 63.7
Curve: 11.5
St. Dev: 23.1
Max: 107
Min: 3

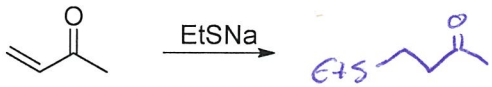
1) Predict the major product of the following reactions. If no reaction occurs, then write NR. Do not show stereochemistry. If an aldol-type reaction occurs, assume it only occurs once and does not involve subsequent additions. (30 pts; 3 pts each)

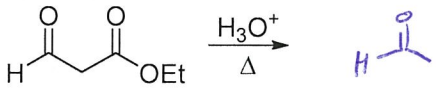
a. 

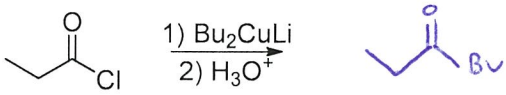
b. 

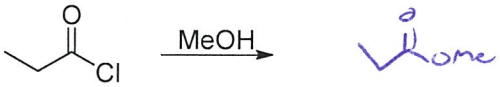
c. 

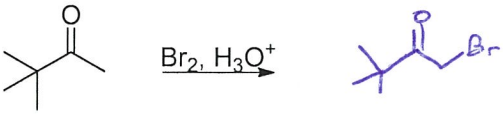
d. 

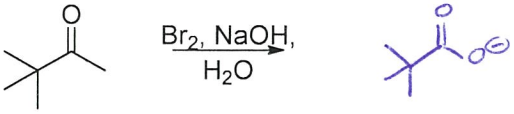
e. 

f. 

g. 

h. 

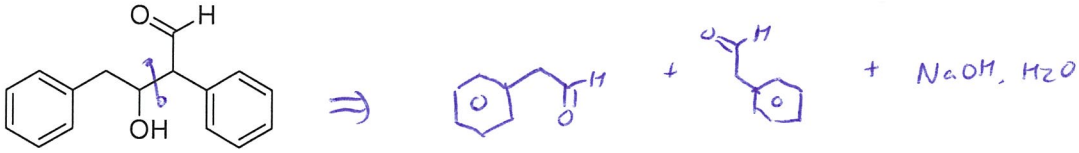
i 

j. 

$CHBr_3$

2) Show how you would use an aldol or Claisen reaction to make each compound. (15 pts; 5 pts each)

a.



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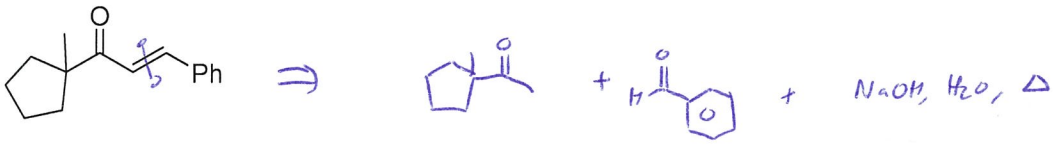
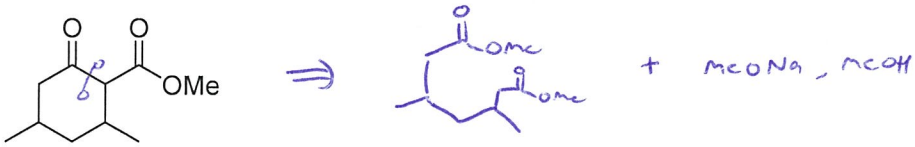
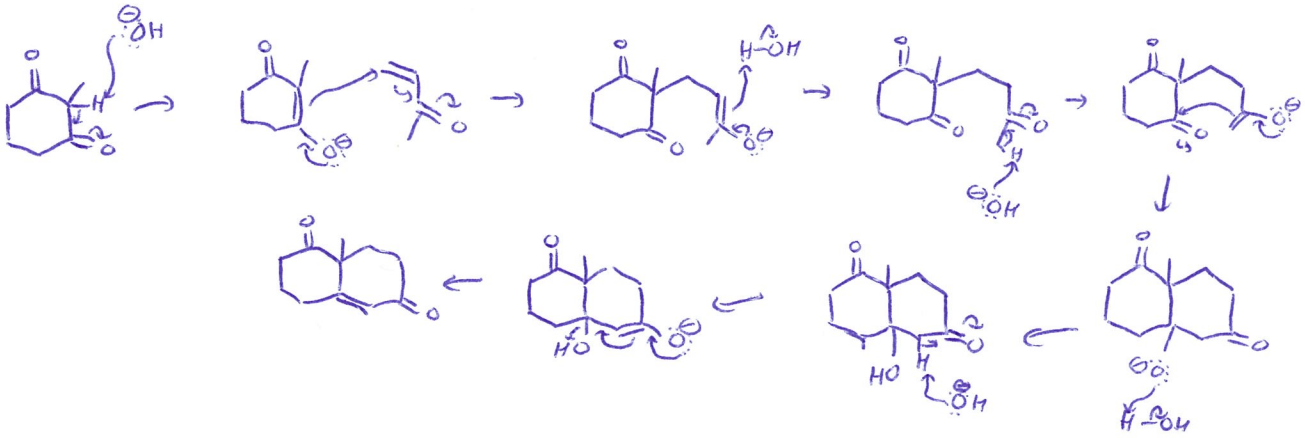


c.

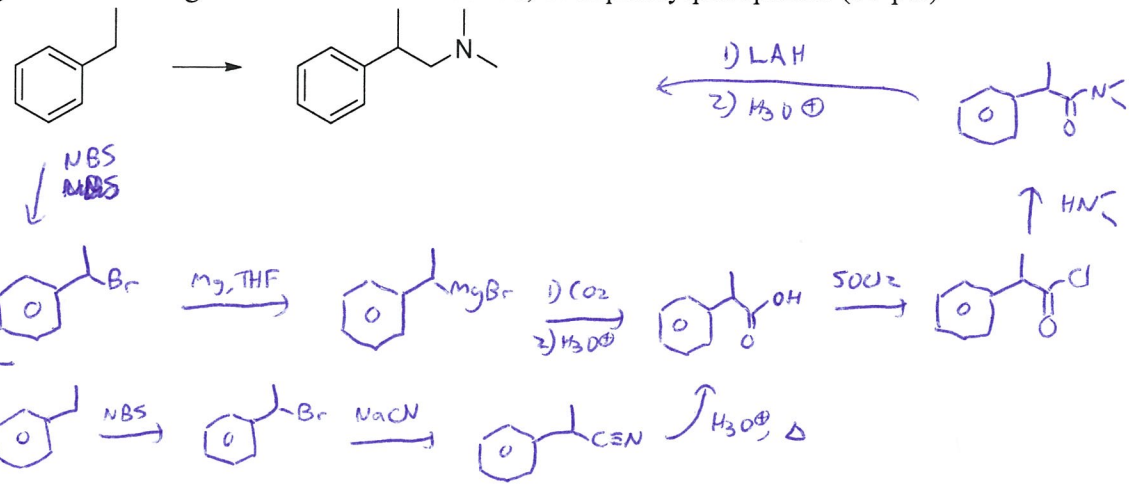


3) The Wieland-Miescher ketone is an important precursor in the synthesis of many steroids and other compounds including Taxol (used to treat cancer). It is synthesized from methyl vinyl ketone and 2-methyl-1,3-cyclohexanedione by Robinson annulation. Draw the mechanism for its formation and the structure of the Wieland-Miescher ketone. (15 points)

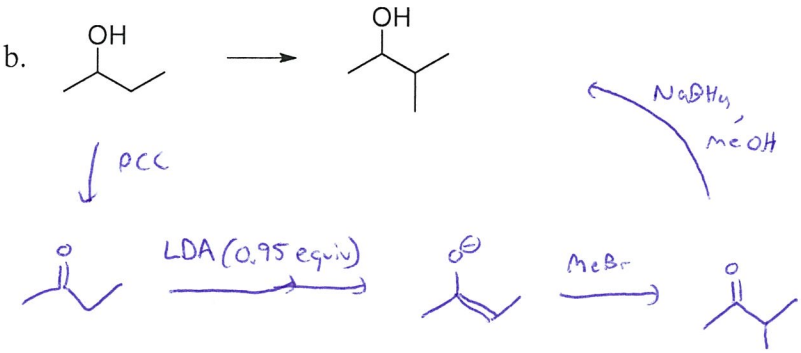


4) Find a way to synthesize the desired product from the given starting material plus any other reagents containing at most six carbon atoms, or triphenylphosphine. (30 pts)

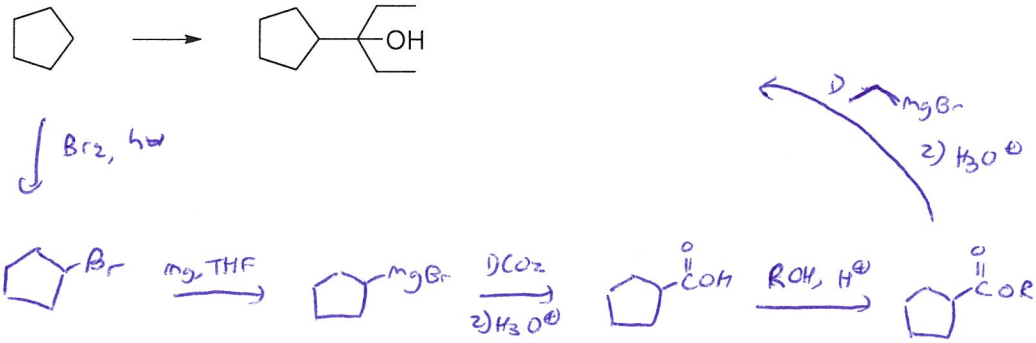
a.



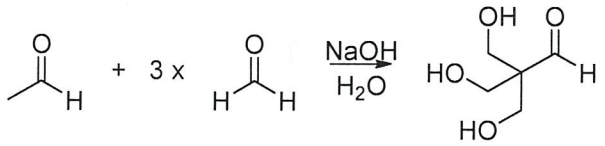
b.

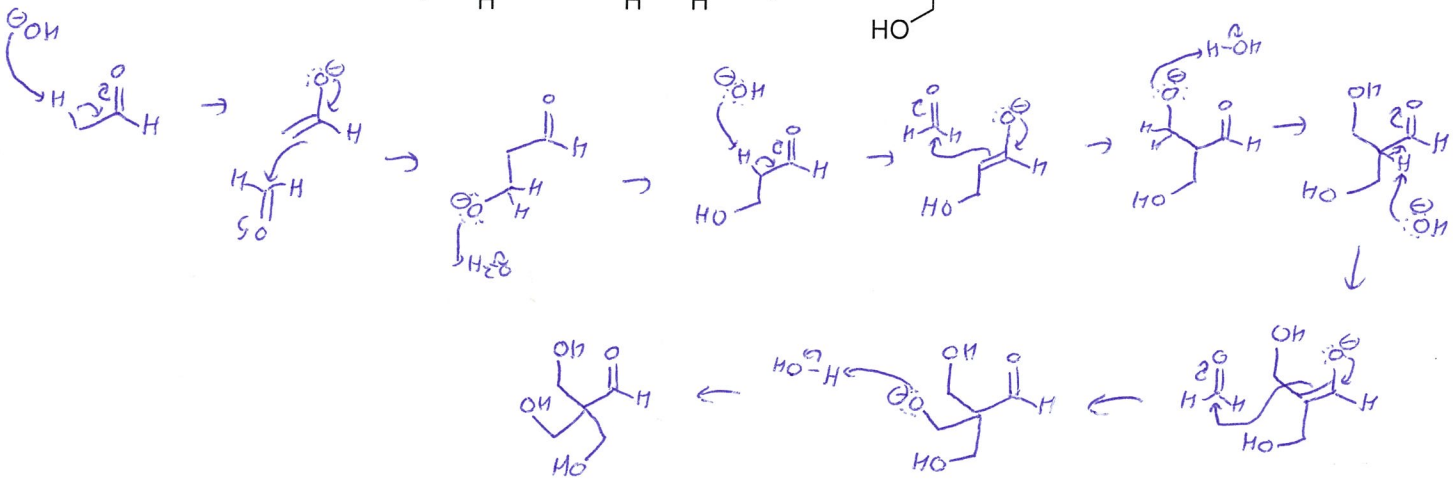
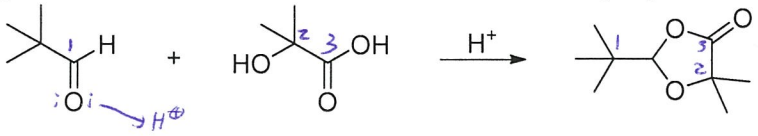
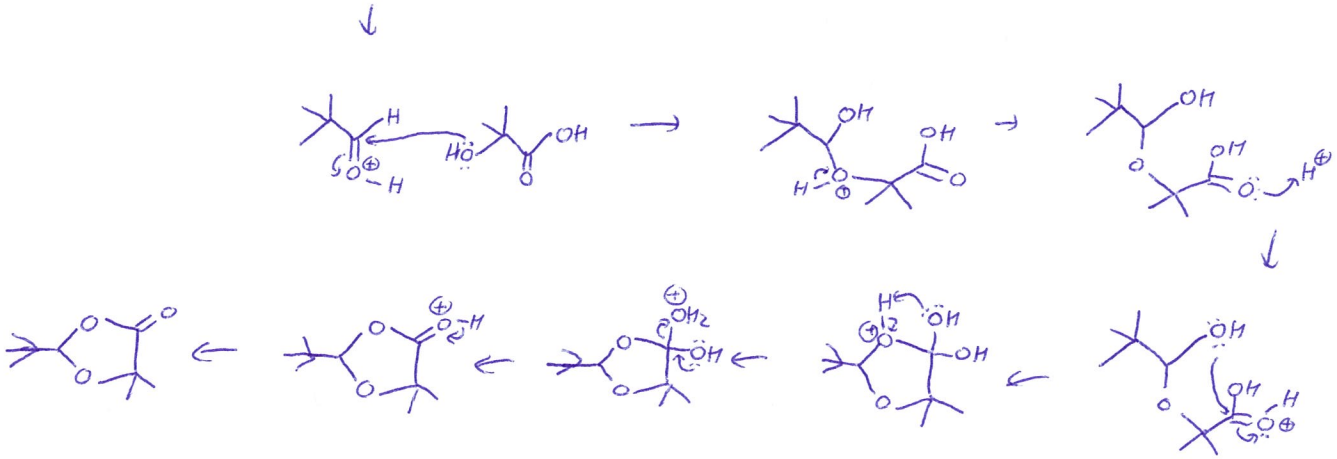


c.



5) Formaldehyde might look like an ideal electrophile for an aldol reaction – it cannot form an enolate and has a large partial positive charge. However, it is a little *too* reactive and is attacked by enolates too easily. If excess formaldehyde is present, the following reaction will take place. Show a mechanism for this reaction. (10 points)





6) Extra credit! Suggest a reasonable mechanism for this reaction. (10 points e.c.)