

Chemistry 12B: Midterm 1, Tuesday February 20, 2018

Name: KEY

UCSID: _____ GSI: _____

There are a total of 9 pages on this exam including this one. Time for the exam 8:10AM –9:30 AM. By writing your name on this exam, you have acknowledged that you have all 9 pages and written your answers only on the designated pages with page numbers (*answers written on the back pages will NOT be graded*).

Question 1 _____ (4 pts)

Question 2 _____ (12 pts)

Question 3 _____ (15 pts)

Question 4 _____ (9 pts)

Question 5 _____ (12 pts)

Question 6 _____ (15 pts)

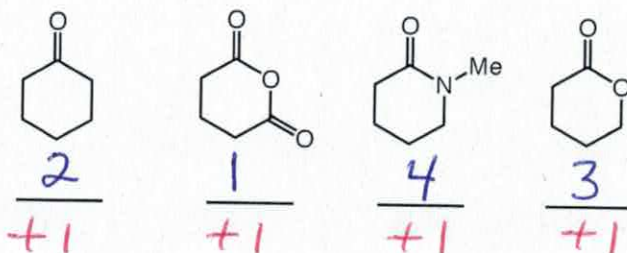
Question 7 _____ (16 pts)

Question 8 _____ (17 pts)

Total -----/100 points

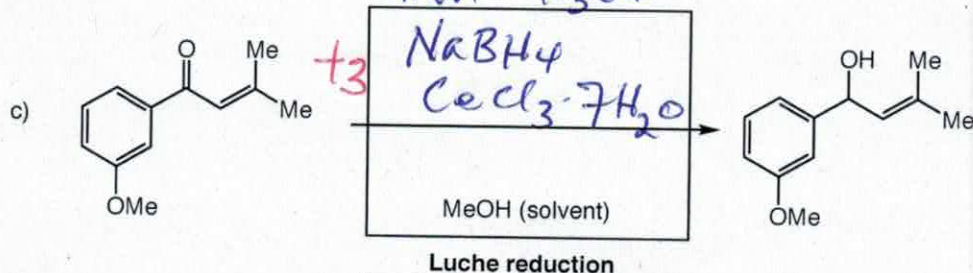
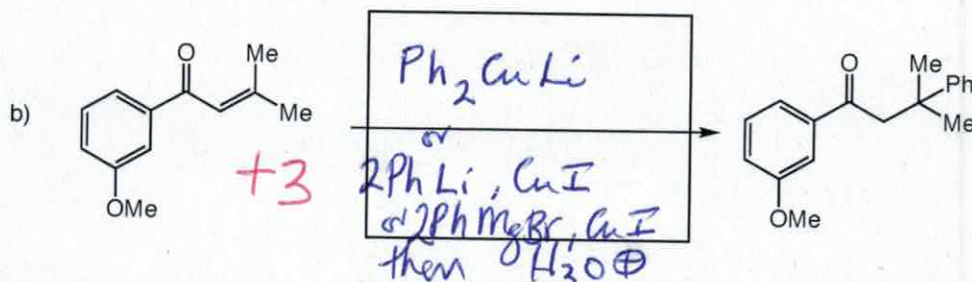
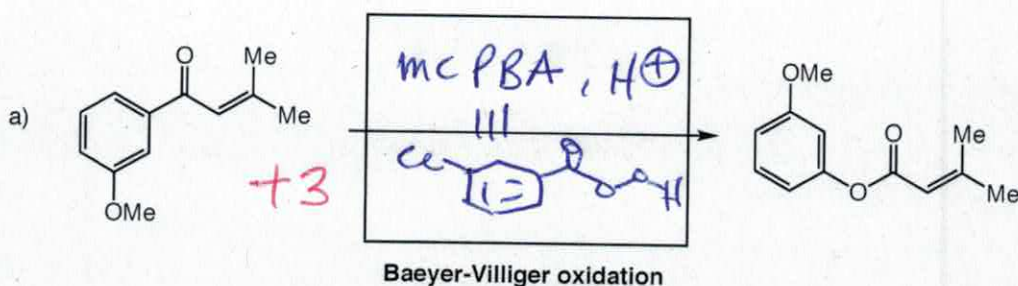
Question 1

(a) Rank the following carbonyl groups from 1-4 with the most electrophilic as 1 (1pt each)

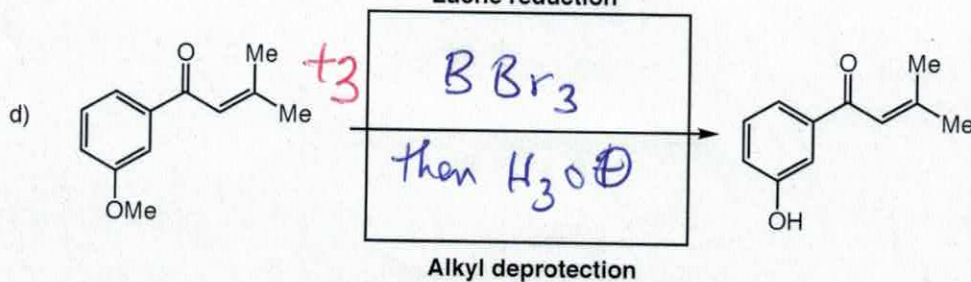


Question 2

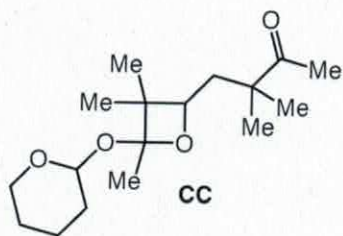
Provide reagents for the following transformations. Indicate the workup conditions as a separate step if necessary (3 pts each)



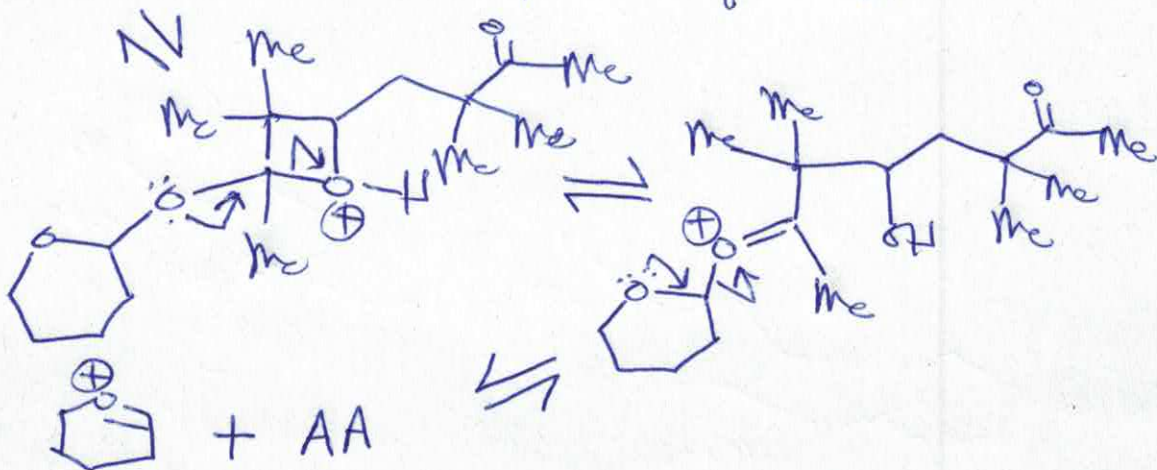
+1 for only NaBH₄



(b) In Part (a), why wouldn't CC (shown below) form from AA as the final product? Explain with no more than two figures and three sentences. (5 pts)

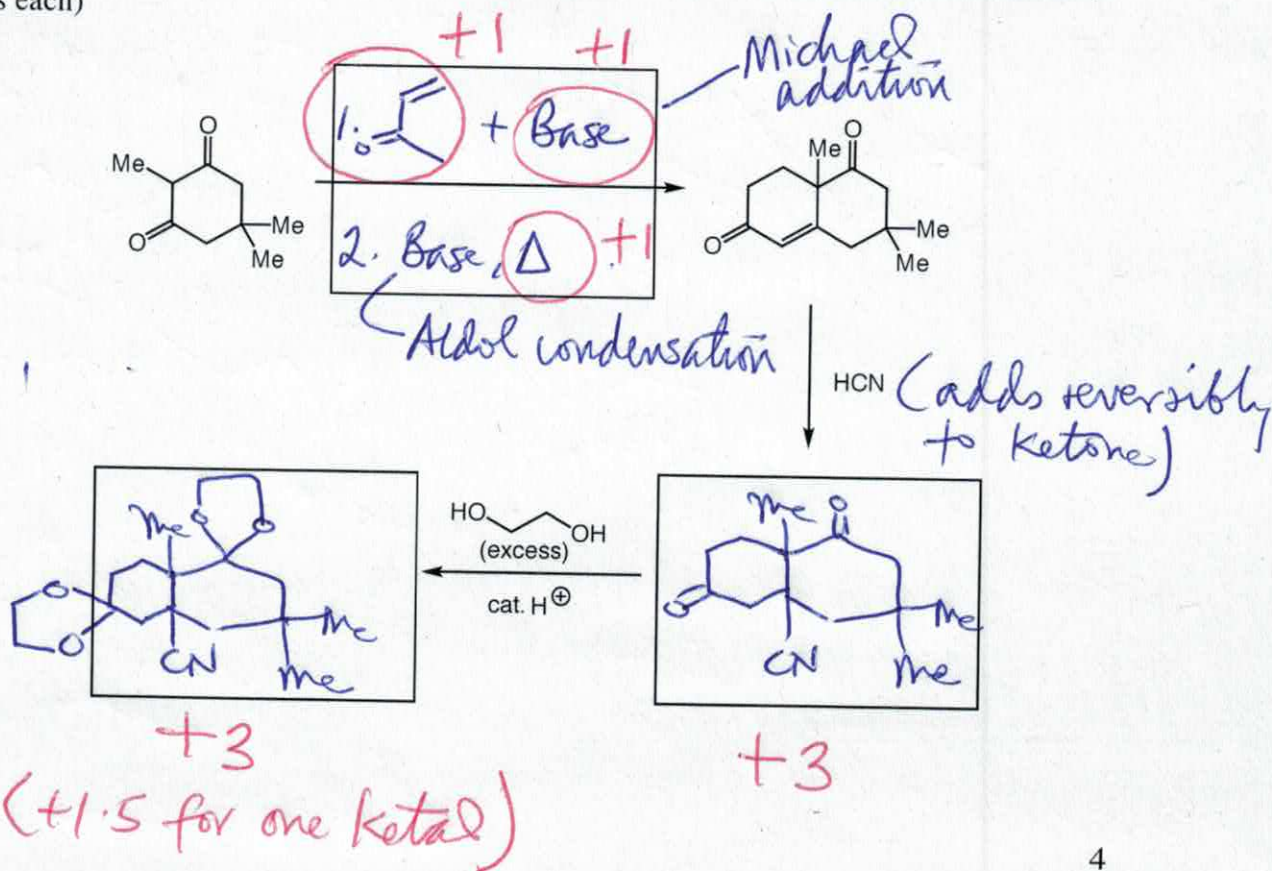


Strain of 4-membered ring +2.5
 Would make this reversible +2.5
 In the presence of acid



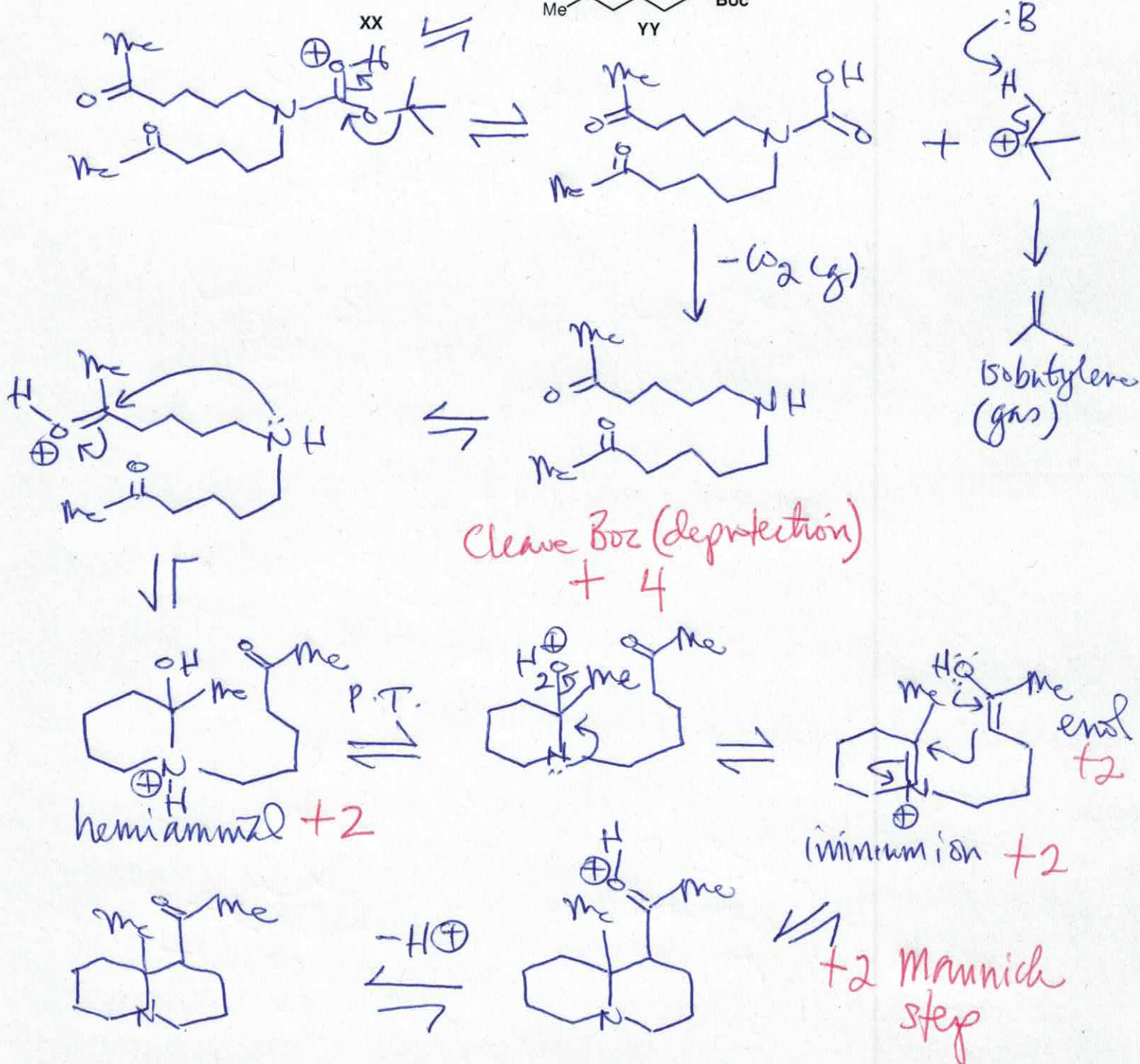
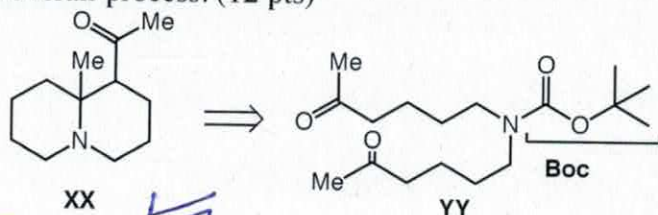
Question 4

Fill in the boxes below. Hint: The first transformation involves a Robinson annulation. (3 pts each)



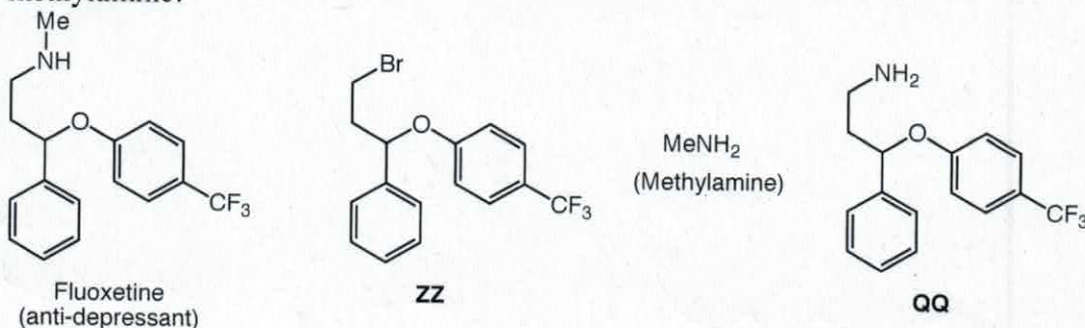
Question 5

Compound **XX** can be prepared from **YY** using the Mannich reaction. The Boc protecting group is also cleaved under the conditions for the reaction. Provide conditions and a mechanism for the overall process. (12 pts)



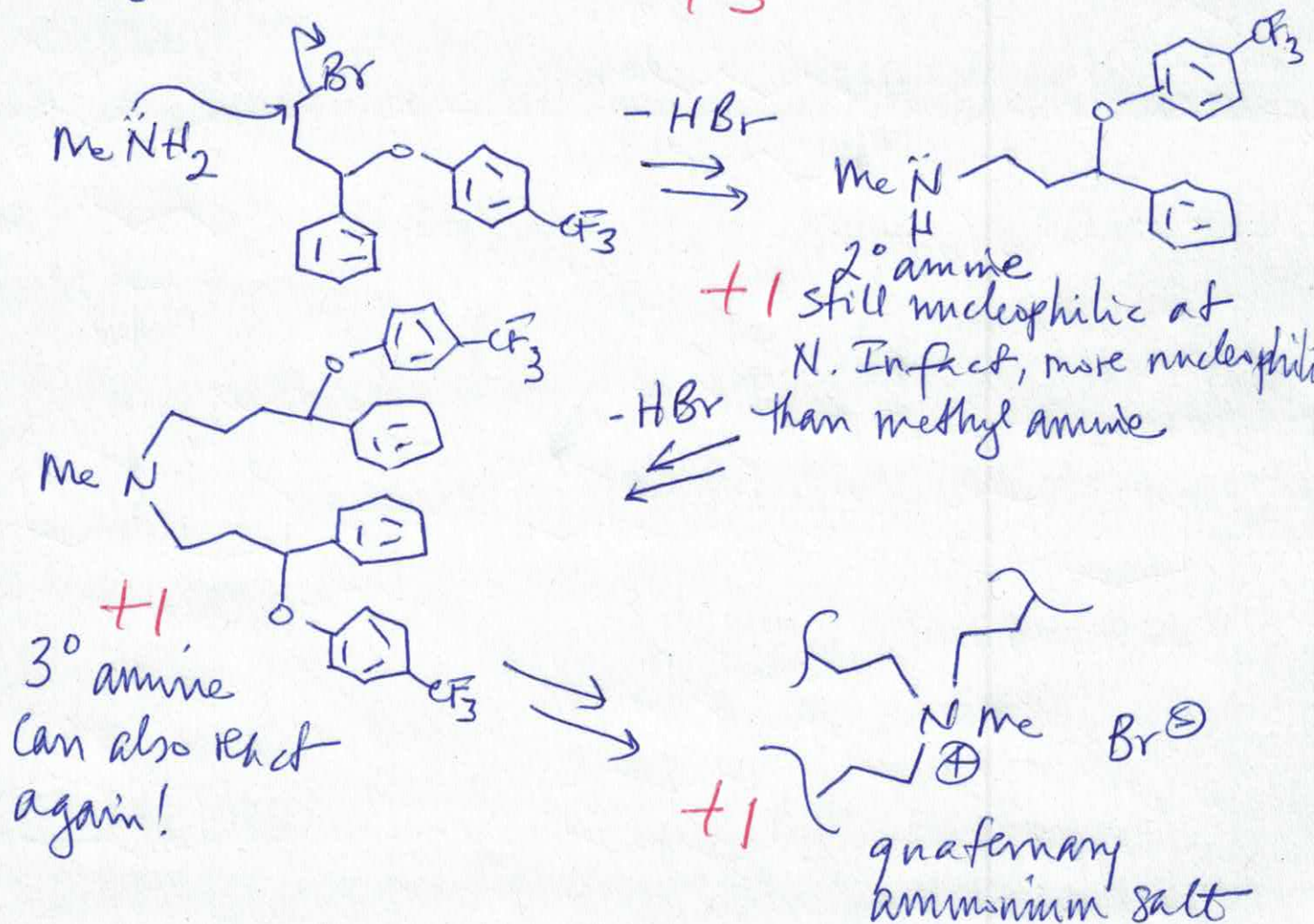
Question 6

Fluoxetine is an anti-depressant that can be prepared from **ZZ** by first converting it to **QQ**. Dr. KnowItAll (Stanford grad) would like to convert **ZZ** directly to Fluoxetine using methylamine.

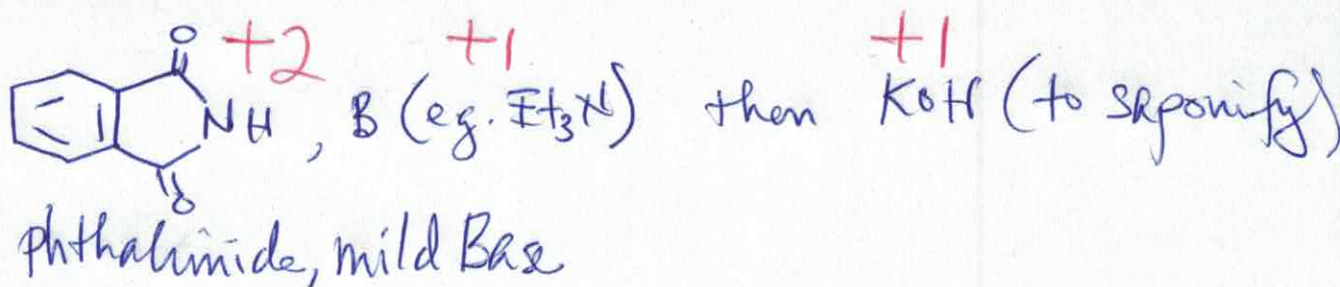


(a) Why is Dr. KnowItAll's idea a bad one? (Use three or less sentences and three or less structures to explain) (6 pts)

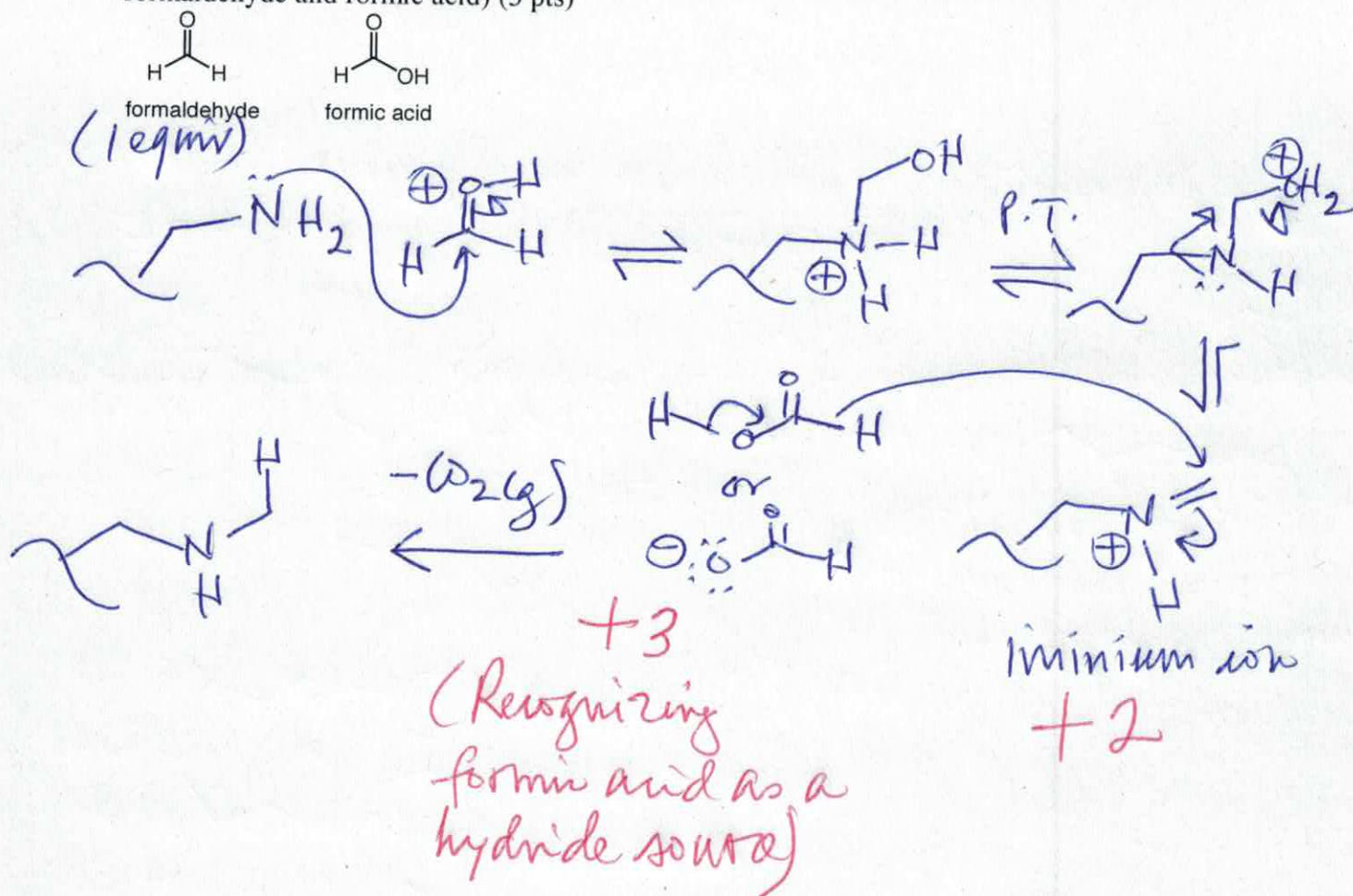
Methylamine can react multiple times with ZZ



B) ZZ is converted to QQ using the Gabriel amine synthesis. Provide reagents for this process. (4pts)

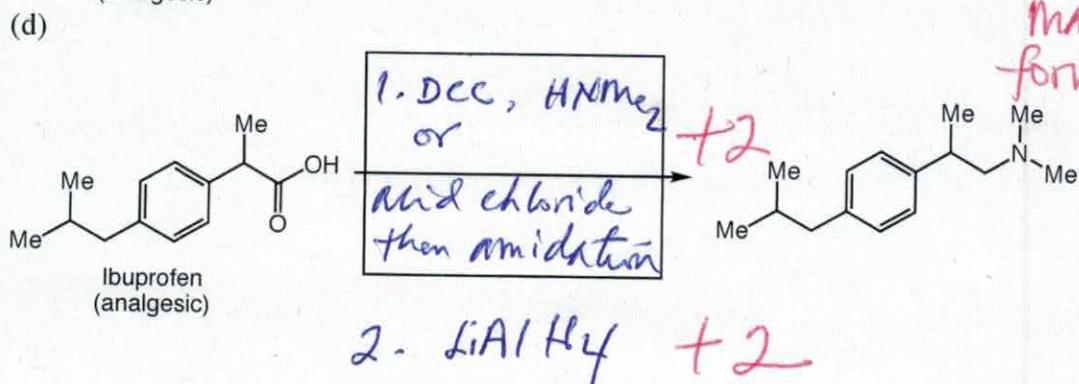
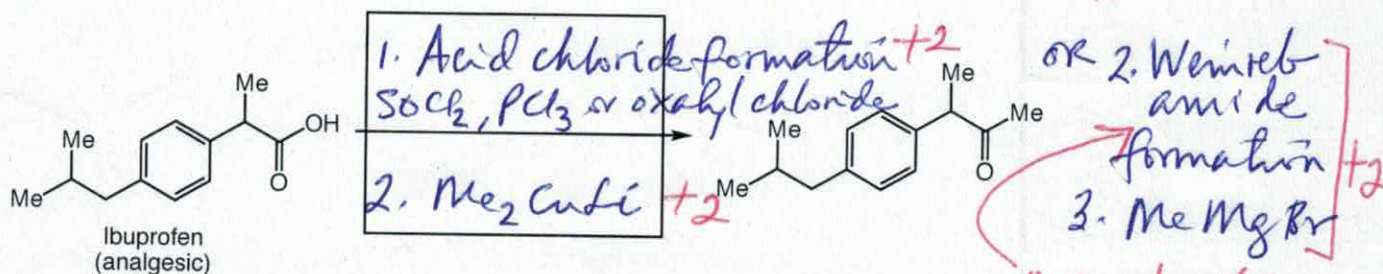
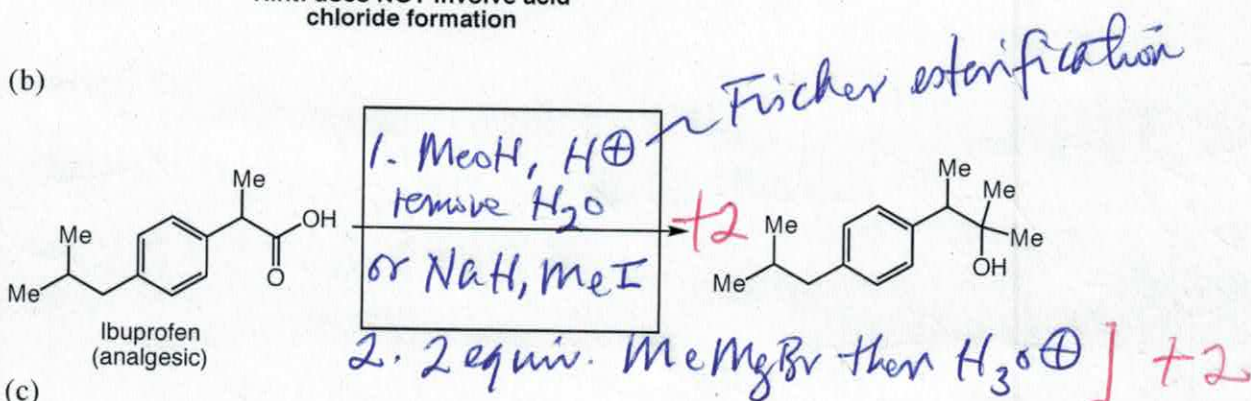
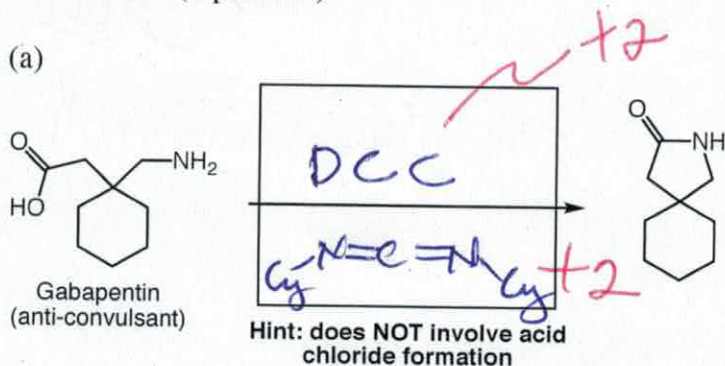


C) Provide reagents and a mechanism for the conversion of QQ to Fluoxetine. (Hint: Use formaldehyde and formic acid) (5 pts)



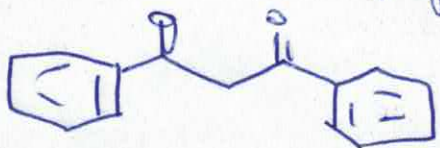
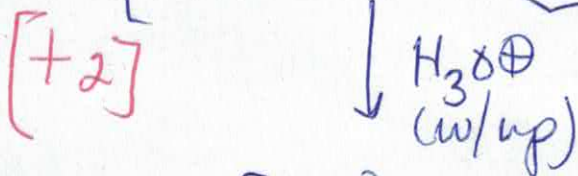
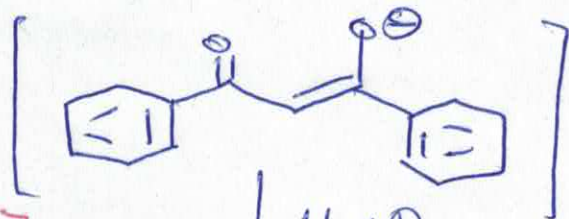
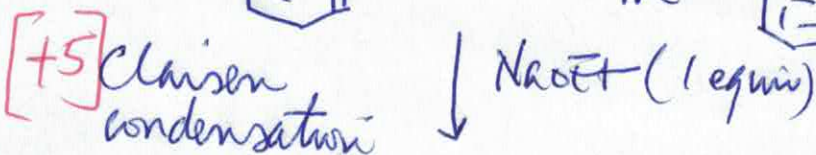
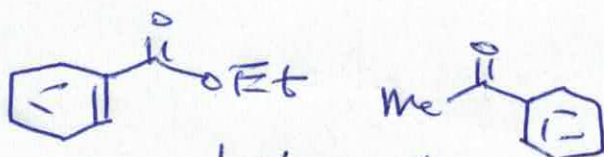
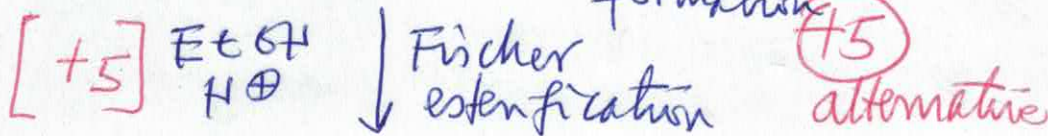
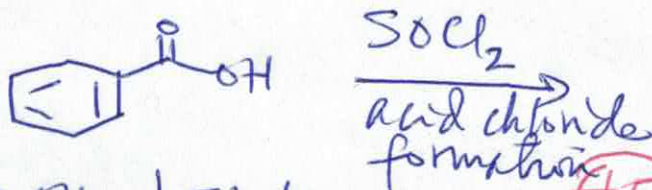
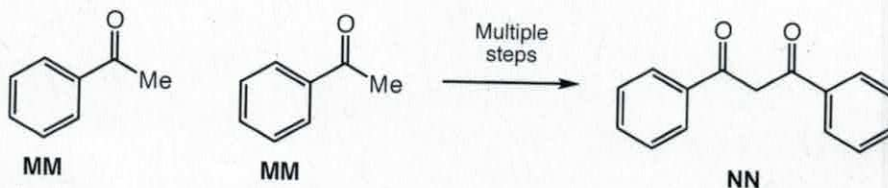
Question 7

Provide reagents (**draw out all organic reagents**) for the following transformations of the important medicines shown below. Note: Multiple steps may be required for some conversions. (4 pts each)



Question 8

NN can be made from two molecules of MM. Propose a synthesis (show reagents but NOT mechanism) for this conversion. Hint: a Claisen condensation and other named reactions we have learned are involved. (17 pts)



The End

