Chem 112B Midterm 2

Instructor: Richmond Sarpong
March 23rd 2017
8:10-9:30 am, 100 Lewis

You have **80 minutes** to complete this exam. Please write you answers clearly only on the pages indicated *and be as detailed as possible*. Nothing written outside the numbered pages will be graded. There should be 8 total pages in this exam.

Name:_____

UID:_____

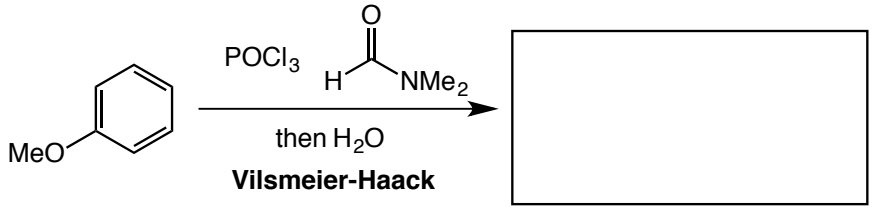
GSI Name:_____

Question	Score
1	_____ (14 points)
2	_____ (15 points)
3	_____ (15 points)
4	_____ (17 points)
5	_____ (20 points)
6	_____ (19 points)

Total _____*(100)*

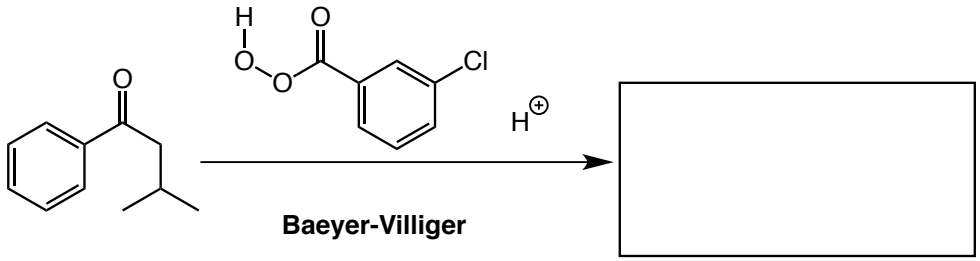
Question 1 (14 points):
Provide reagents to accomplish the transformations shown below. Note that a given transformation may require multiple steps (2 pts each; 14 pts total):

A.



Vilsmeier-Haack

B.



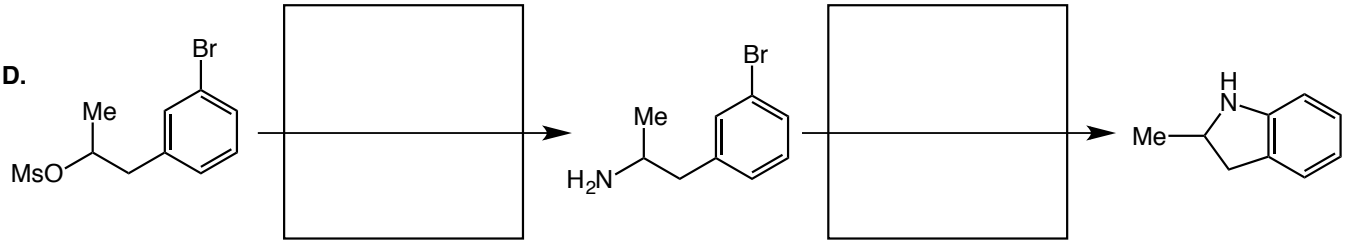
Baeyer-Villiger

C.

Friedel-Crafts acylation

Wolff-Kishner

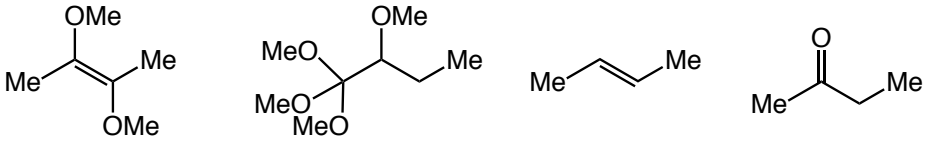
D.



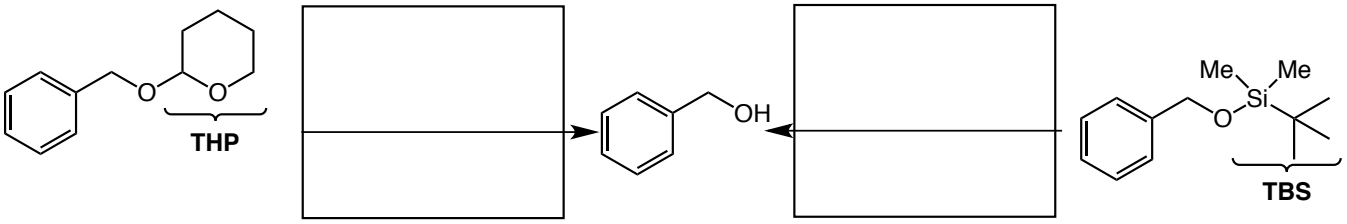
Gabriel amination

Question 2 (15 points):

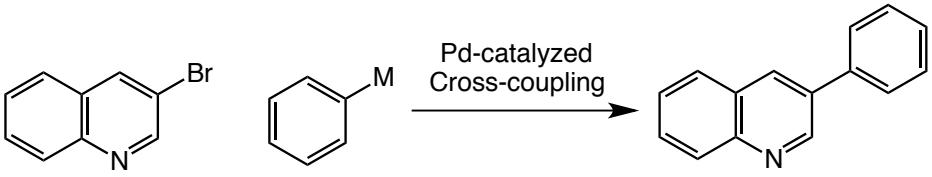
(a) Rank the following molecules (from 1 to 4) in terms of increasing oxidation level (1 for the lowest level). (4 pts total)



(b) Provide conditions for the following **deprotection** steps (i.e., removal of the protecting group). (2.5 pts each)



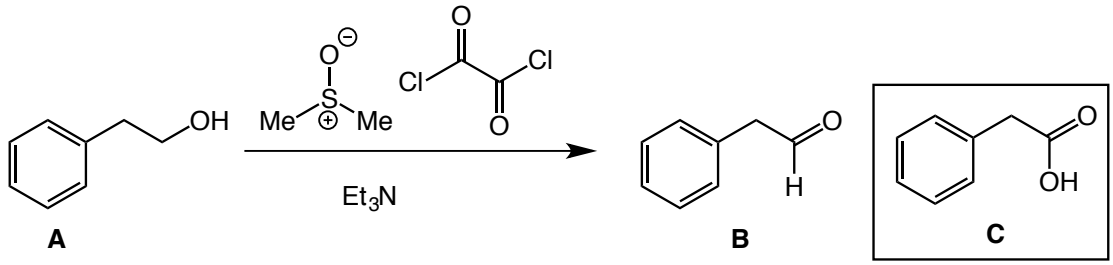
(c) Provide the names associated with the following cross-coupling reactions (6 pts)



M = $B(OH)_2$ M = $SnBu_3$ M = MgBr

Question 3 (15 points):

(a) A Swern oxidation provides aldehyde **B** from alcohol **A** whereas a Jones oxidation provides acid **C**. Provide a detailed mechanism for the formation of **B**: (9 pts)

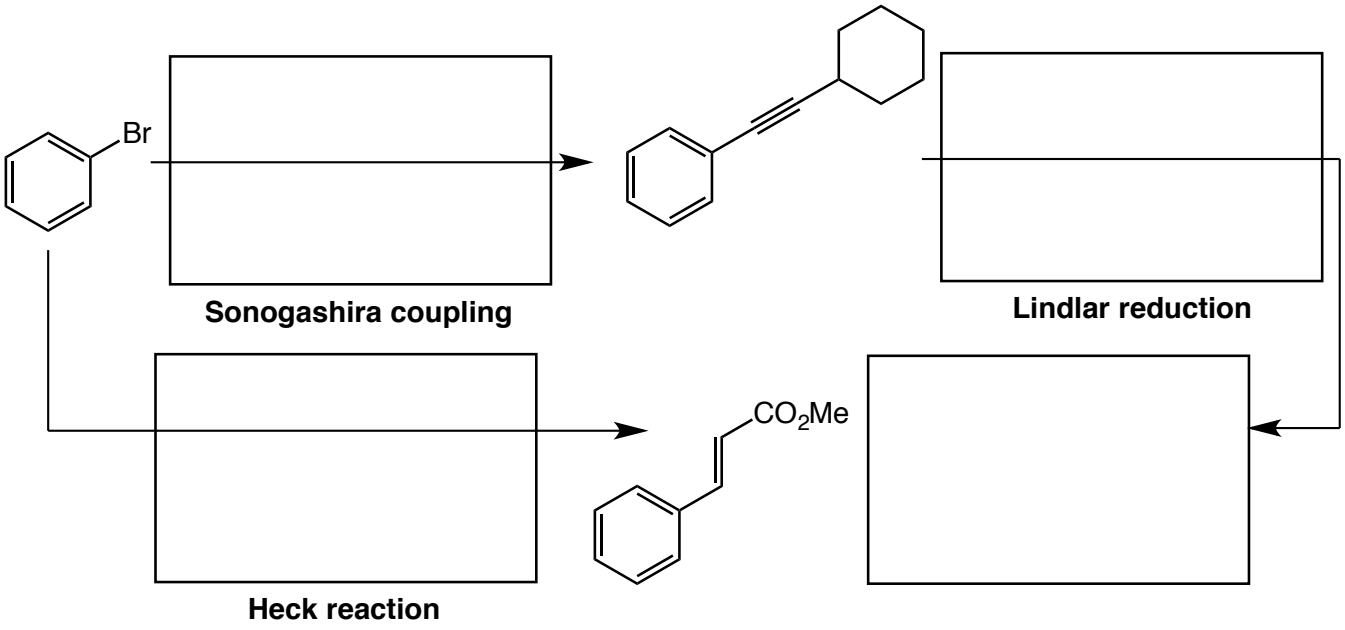


A **B** **C**

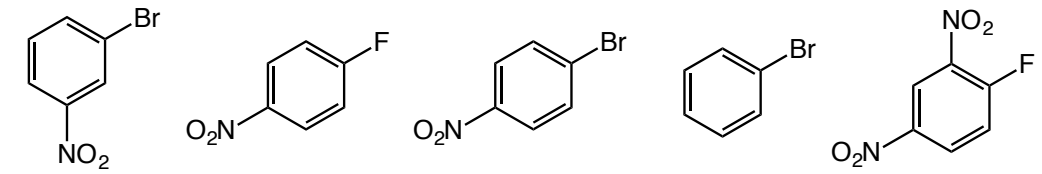
(b) Explain with a mechanism how **C** forms from **A** under the Jones oxidation conditions. In addition, you may add up to two sentences (6pts)

Question 4 (17 Points):

(a) Provide reagents for the following transition metal-catalyzed transformations (3 pts each; 12 pts total)

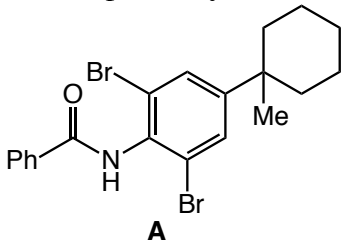


(b) Rank the following benzene derivatives from 1 to 5 in terms of rate of reaction in a S_NAr reaction <u>with 1 being the fastest</u>. (5pts)



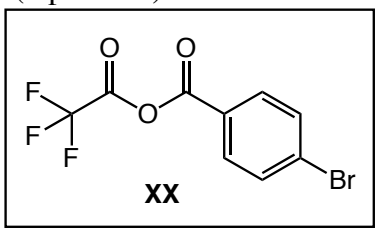
_____ _____ _____ _____ _____

Question 5 (20 points):
Provide a synthesis of **A** (shown below) from benzene and any other reagents you deem necessary. For each step, clearly indicate the equivalents of reagents that you need.

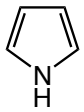


A

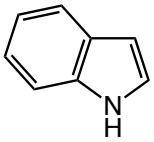
Question 6 (19 points):
Mixed anhydride **XX** (shown below) forms an acylium intermediate in the presence of a Lewis acid.
(a) Circle the positions on pyrrole and on indole that will react first with the acylium intermediate that is formed from **XX**. (2 pts each)



XX



pyrrole



indole

(b) Provide a mechanism for the S_EAr reaction of pyrrole and **XX** in the presence of a Lewis acid (LA) (15 pts)

The End