Chemistry 112B: Midterm 1, Thursday March 6, 2008

Name: Key

UCSID: _____ *GSI:* _____

Question 1 _____ (35 points)

Question 2 _____ (25 points)

Question 3 _____ (25 points)

Question 4 _____ (25 points)

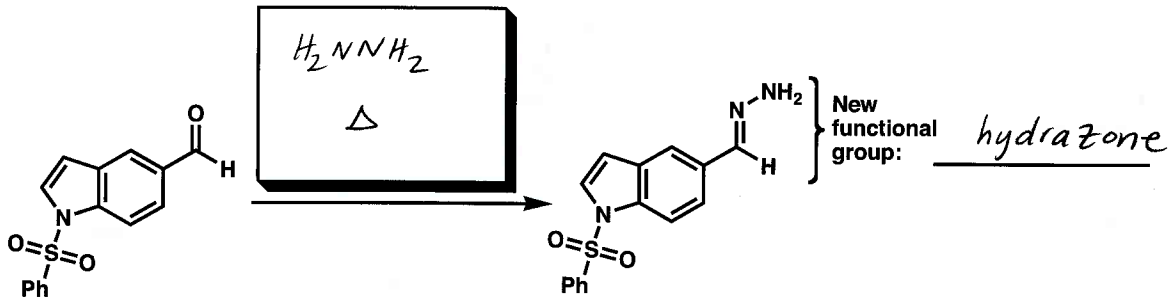
Question 5 _____ (30 points)

Question 6 _____ (35 points)

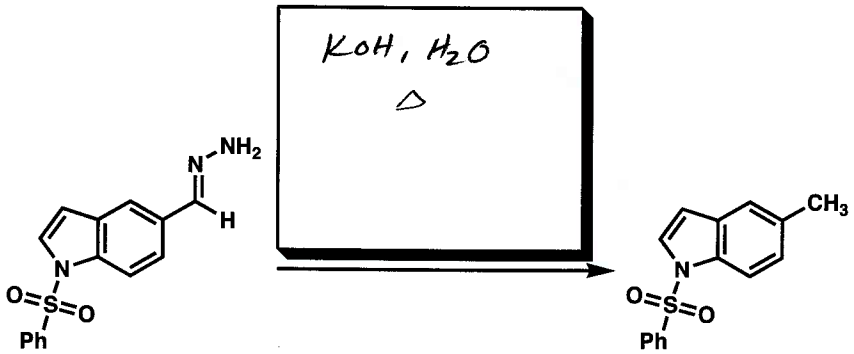
Total ———————————/175 points

Question 1

(a) Propose reagents and reaction conditions for the following transformation, and a name for the functional group in the product. (5 points)

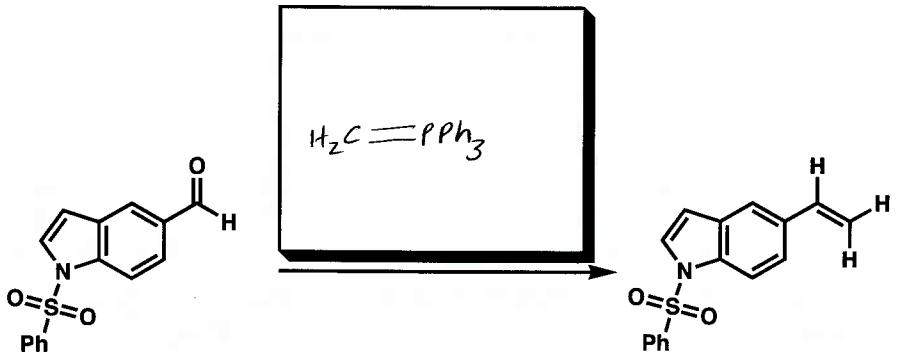


(b) Propose reagents for the following transformation and a name for this type of reaction. (5 points)



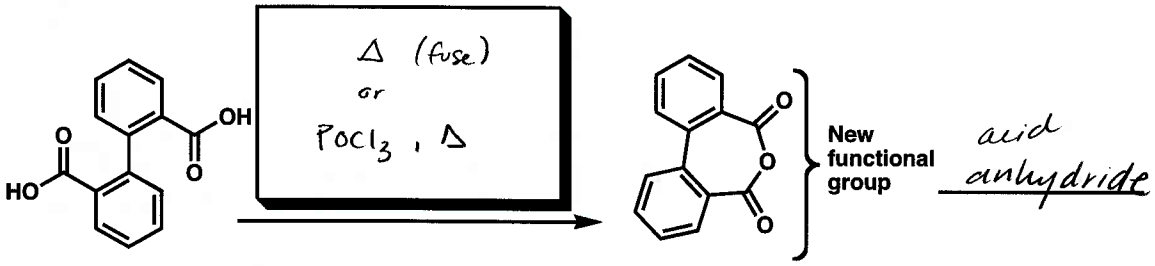
Name: Wolff-Kishner

(c) Propose reagents for the following transformation and a name for this type of reaction. (5 points)

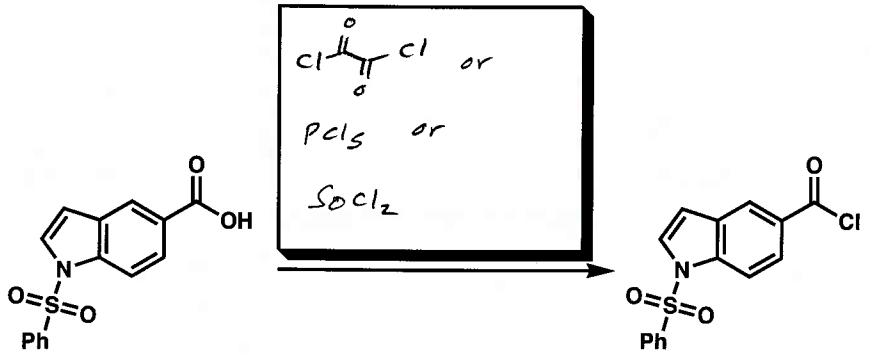


Name: Wittig

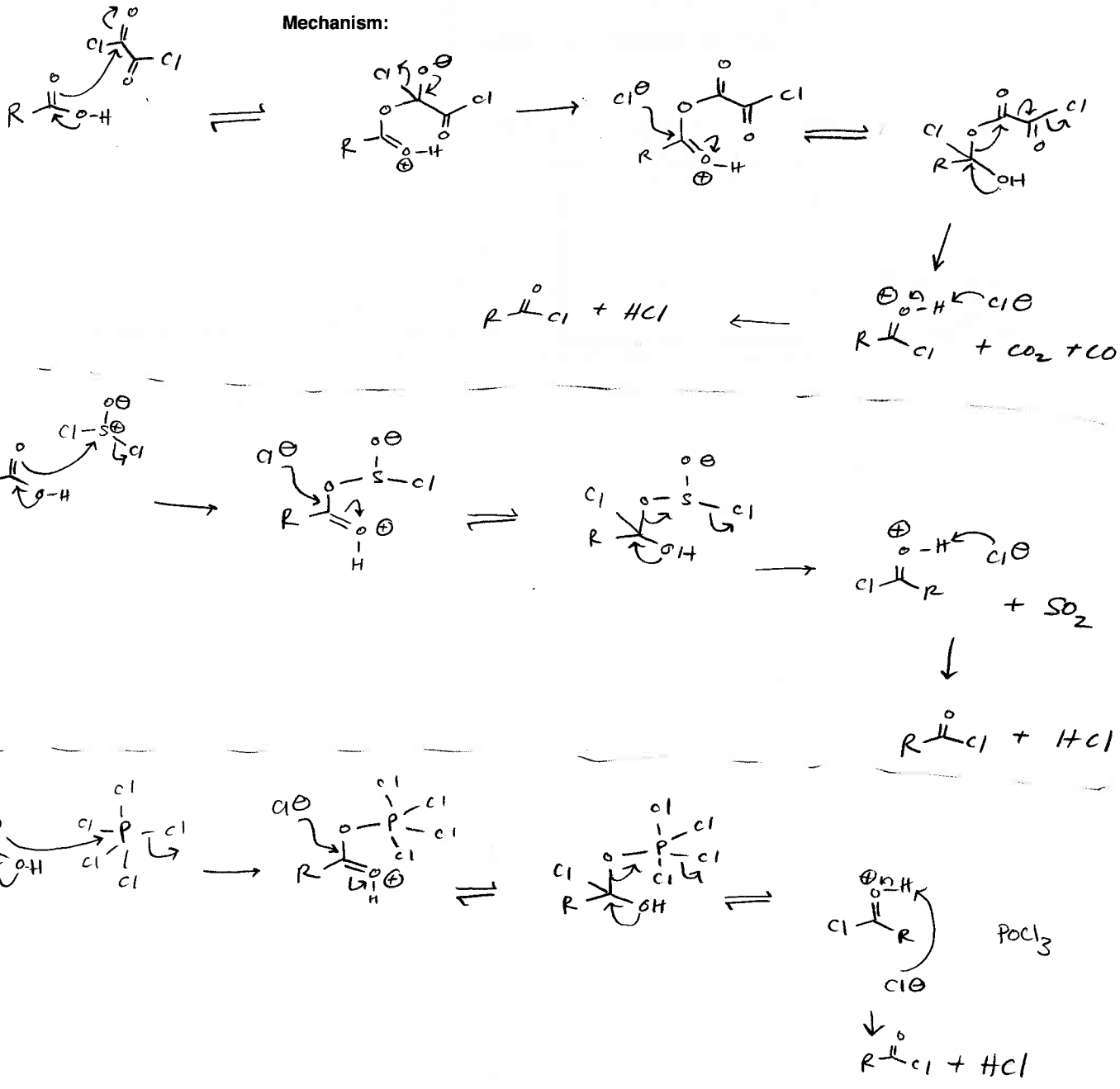
(d) Provide reagents and conditions for the following reaction, and name the new functional group in the product. (5 points)



(e) Propose reagents for the following transformation and provide a mechanism for this reaction (use R to abbreviate as necessary). (15 points).

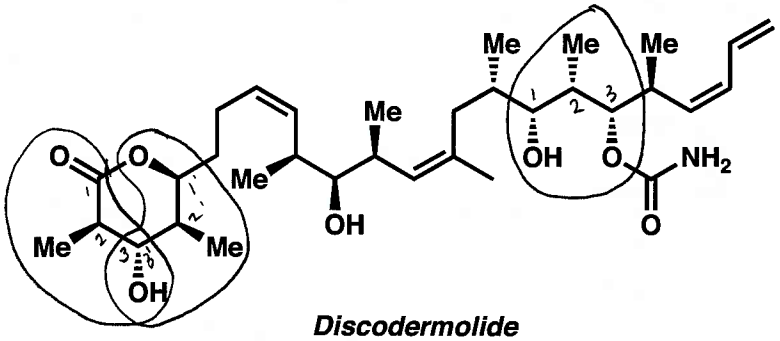


Mechanism:



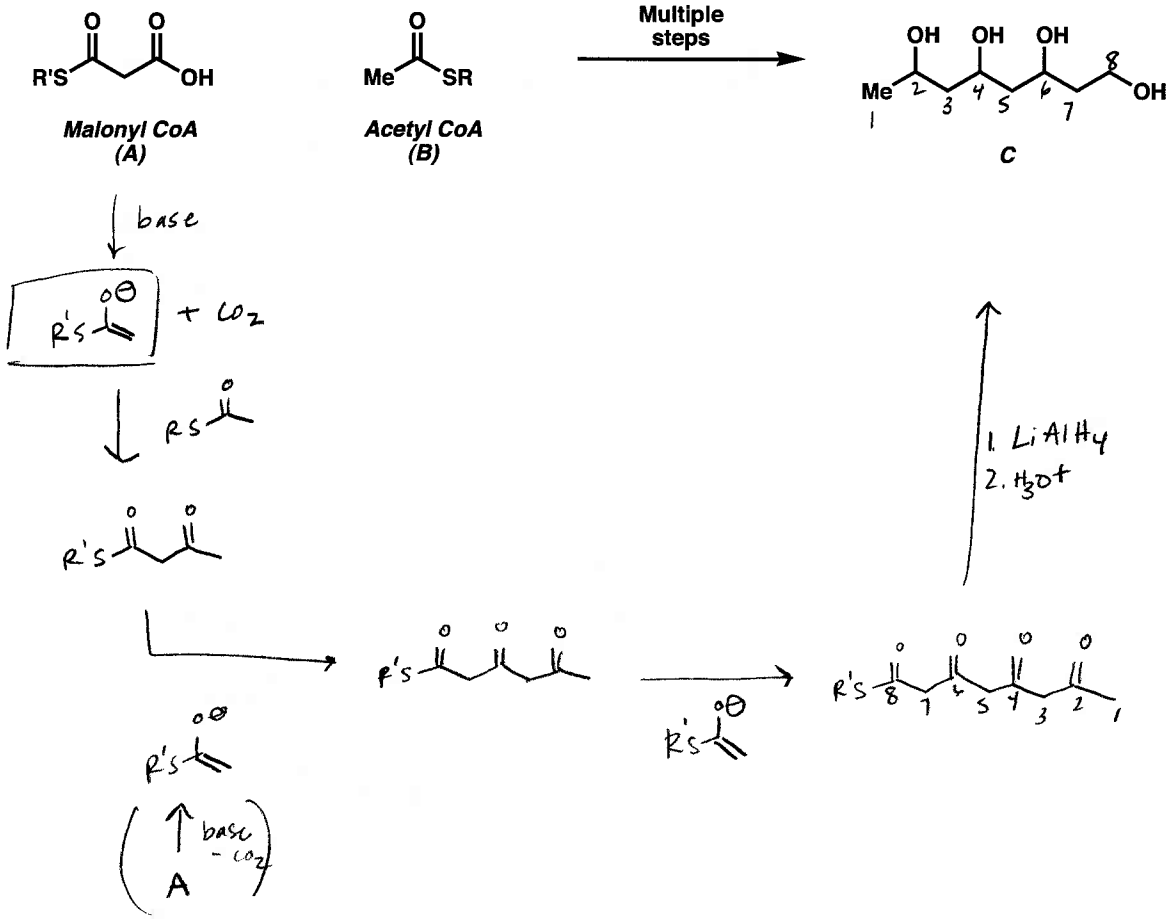
Question 2

(a) Discodermolide (shown below) is a famous anti-cancer compound that succeeds in curbing cancer where many others fail. The *aldol reaction* and the *aldol condensation* are two reactions that may be applied in building discodermolide. Circle **three** examples of either one of these reactions in discodermolide. (Hint: the aldol or aldol condensation reactions may be followed by oxidation, reduction or protection reactions). (9 points)



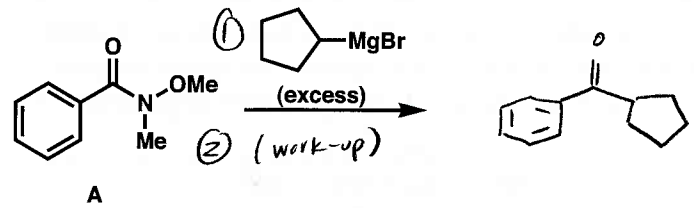
Discodermolide

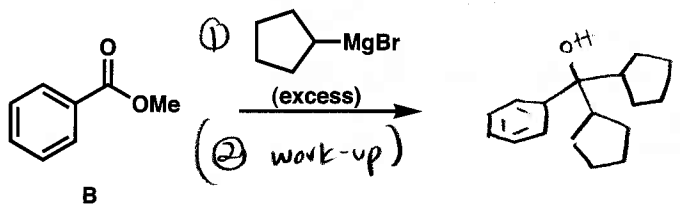
(b) Nature uses malonyl CoA (**A**) and acetyl CoA (**B**) to make the products of aldol reactions and aldol condensations using Claisen reactions. Propose how you would make **C** using **A** and **B**. (16 points)



Question 3

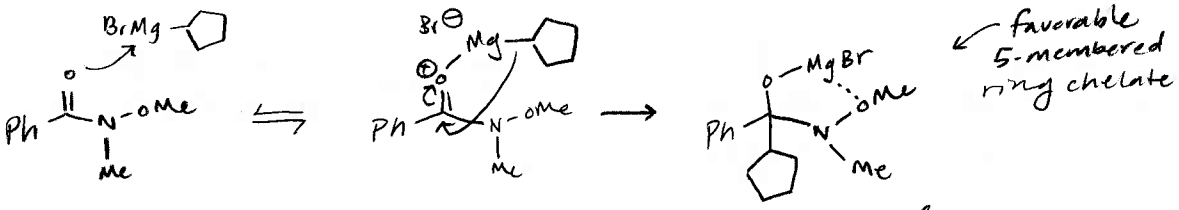
(a) Predict the products of the following reactions. (10 points)





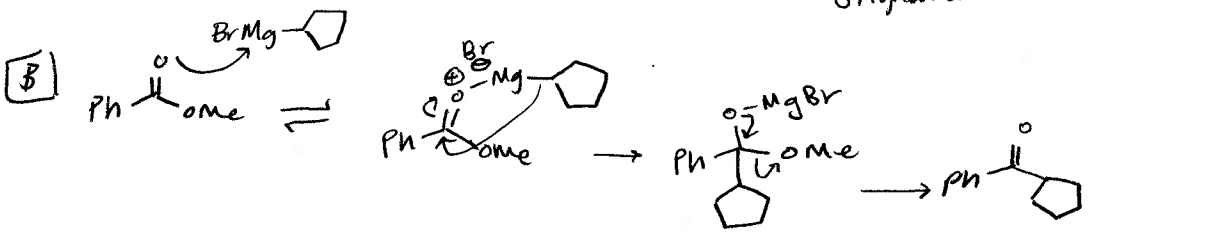
(b) Explain using a mechanism why the expected products you indicated in part (a) for **A** and **B** were obtained (15 points).

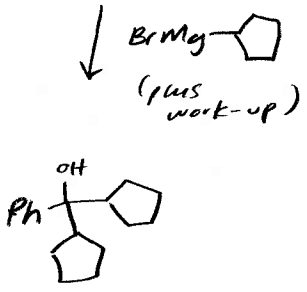
A



stabilization of the tetrahedral intermediate ∴ avoid 2nd addition of Grignard

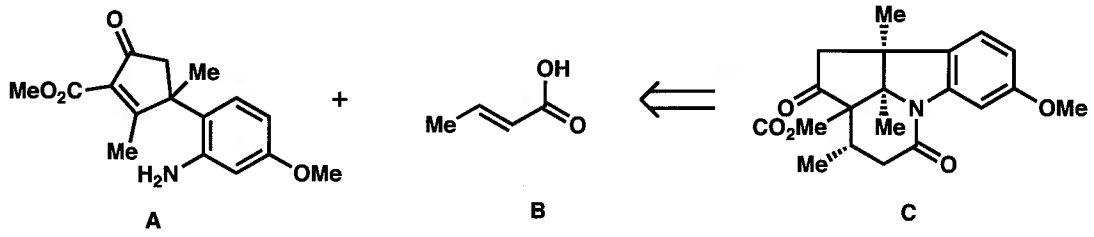
B

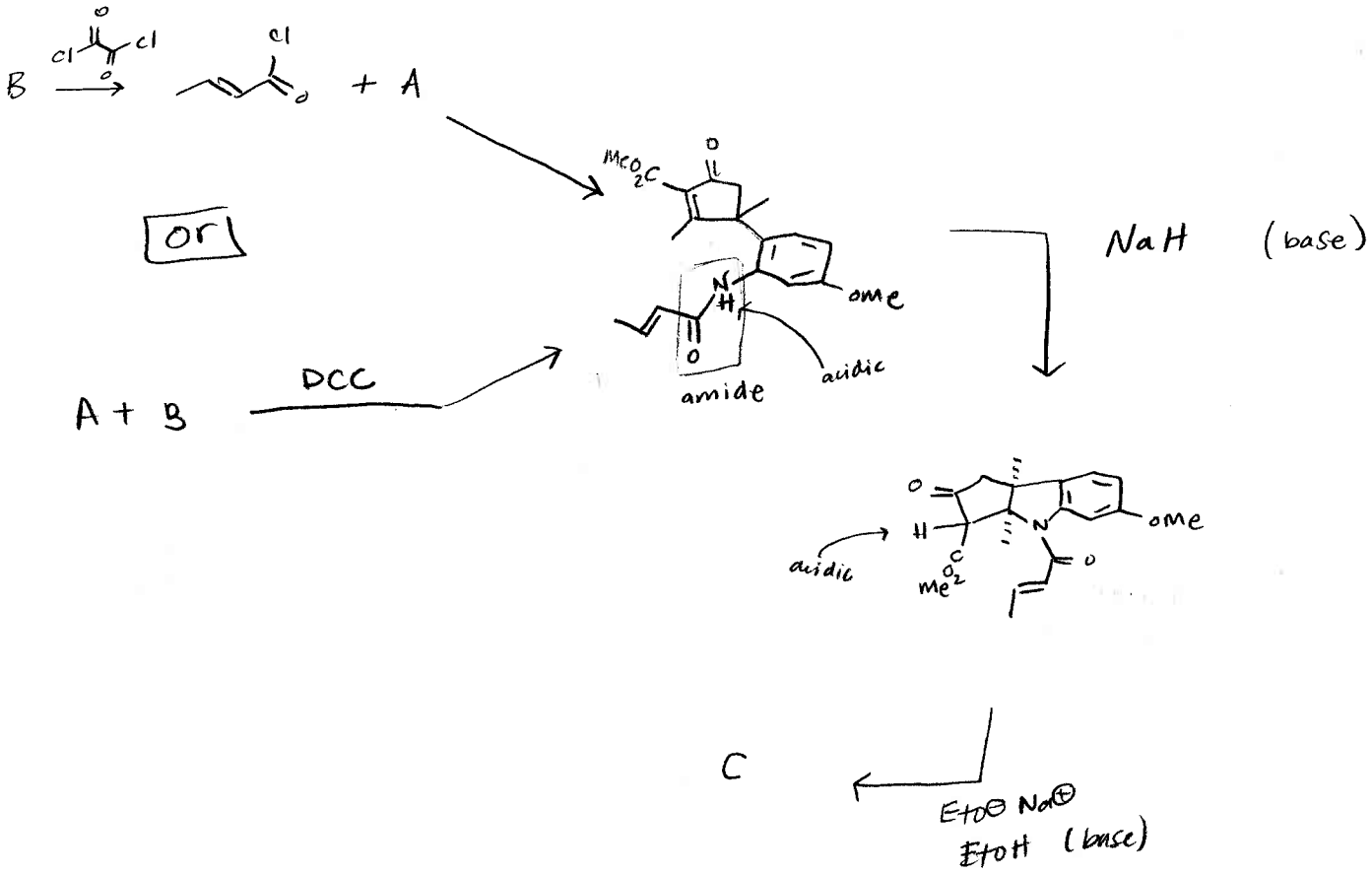




Question 4

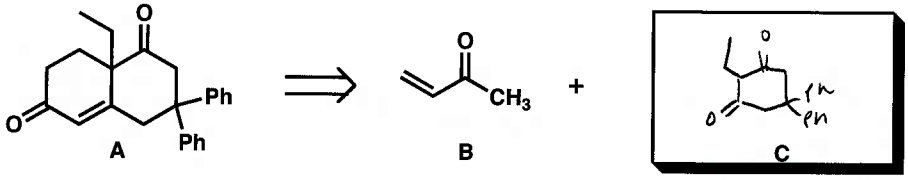
Propose a synthesis of **C** and give appropriate reagents starting from **A** and **B** given that an amide bond is formed first. (25 points)

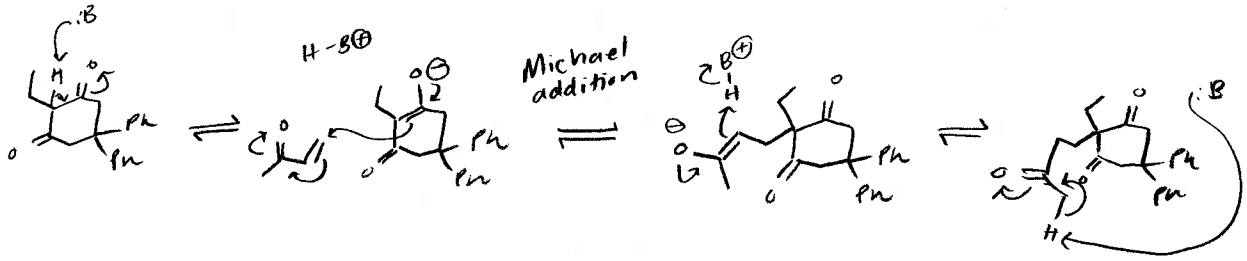


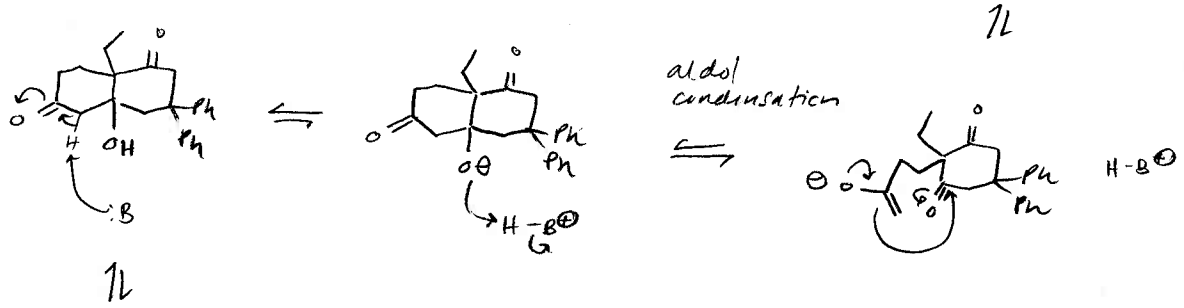


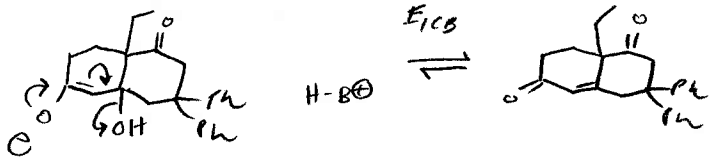
Question 5

Propose a mechanism for the formation of **A** below using a Robinson annulation. What is the identity of **C**? (30 points)



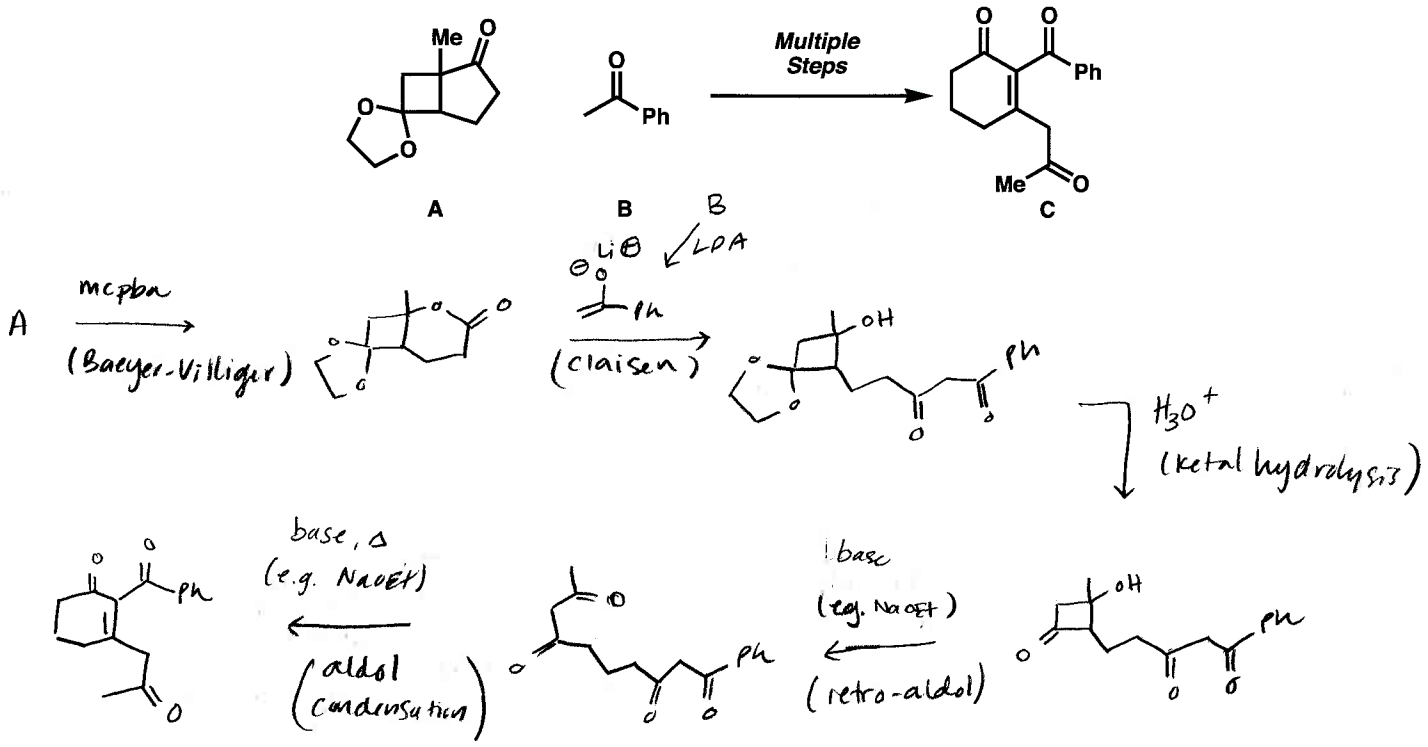




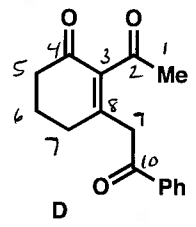


Question 6

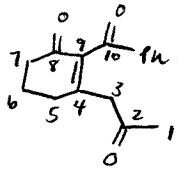
(a) Propose a synthesis of **C** from **A** and **B** using the following sequence of reactions: 1) Baeyer Villiger, 2) Claisen condensation, 3) ketal hydrolysis, 4) Retro aldol and 5) aldol condensation. You may use any other transformations you deem necessary. Indicate the necessary reagents and conditions (25 points).



(b) Explain with a mechanism using any intermediate from part (a) why **D** might be expected as a by-product of this reaction. (10 points)



D



C