

UNIVERSITY OF WINDSOR  
CHEMISTRY AND BIOCHEMISTRY

Chemistry 59-331/333  
Final Examination

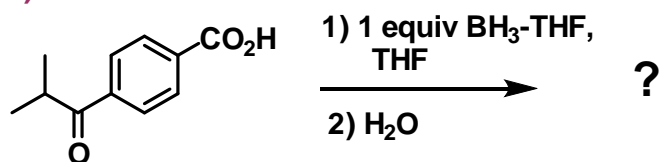
Apr. 15, 2011  
Time: 3 hours

Answer all questions in the exam booklet

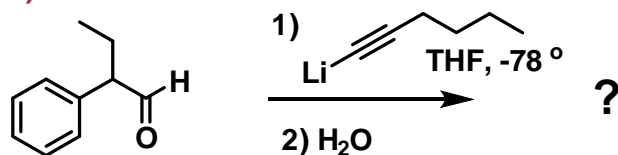
1. Do any eight (8). Total 40 marks

Indicate the structure of the expected major product from each of the following transformations. Mechanisms are not necessary, but showing your work may be a help. Include product stereochemistry where it applies (\*).

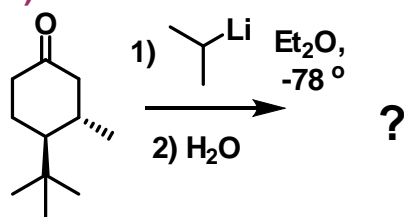
a)



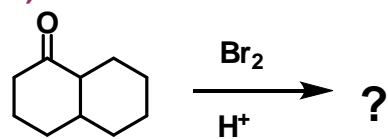
b)\*



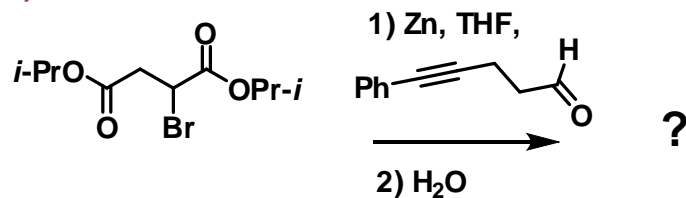
c)\*



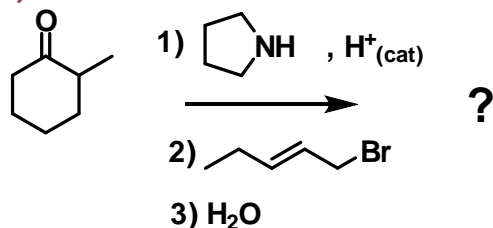
d)



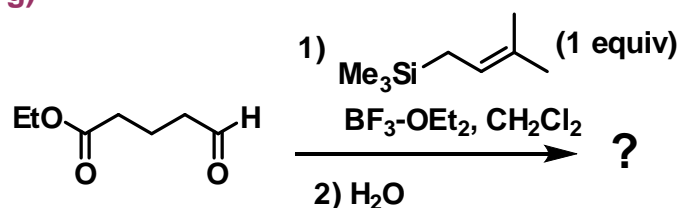
e)



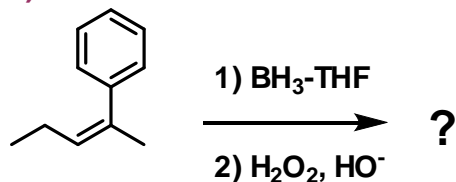
f)



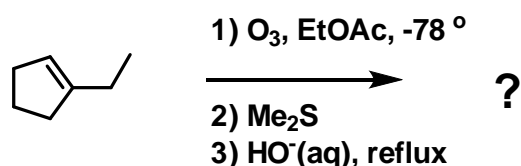
g)



h)\*

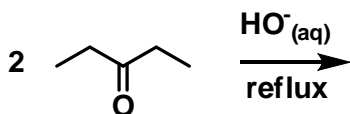


i)



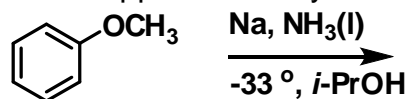
## 2. Total 20 marks

- a) Draw the complete mechanism for the 'weak' base induced aldol condensation between two molecules of 3-pentanone. Note the conditions specifically intended to force the reaction to completion. The full answer will show any small molecules which 'come off' during the reaction, the appropriate intermediates and final product, and whether each step is (practically speaking) reversible or irreversible.

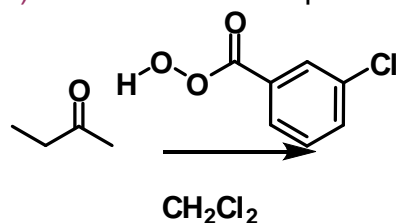


## b) Do i) or ii), but not both

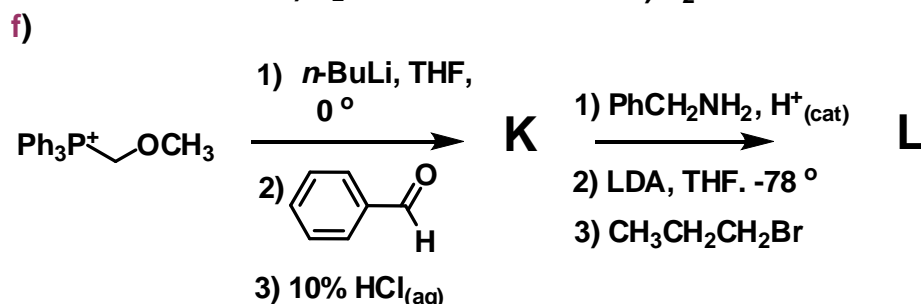
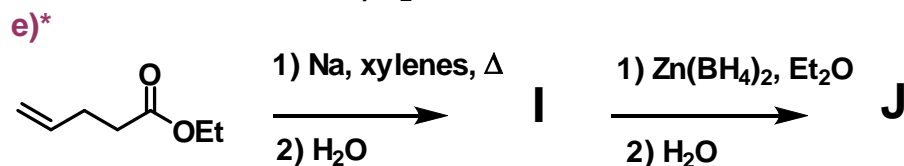
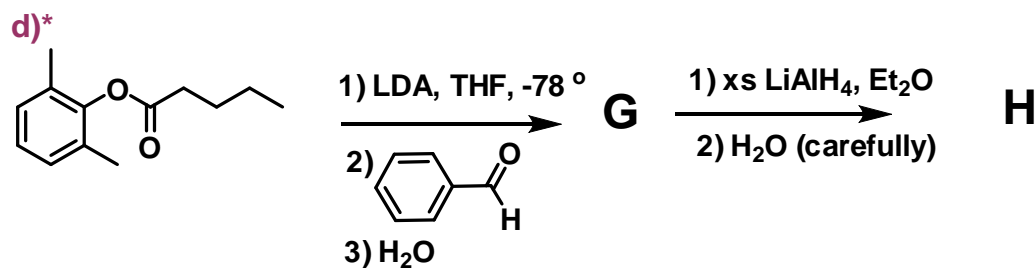
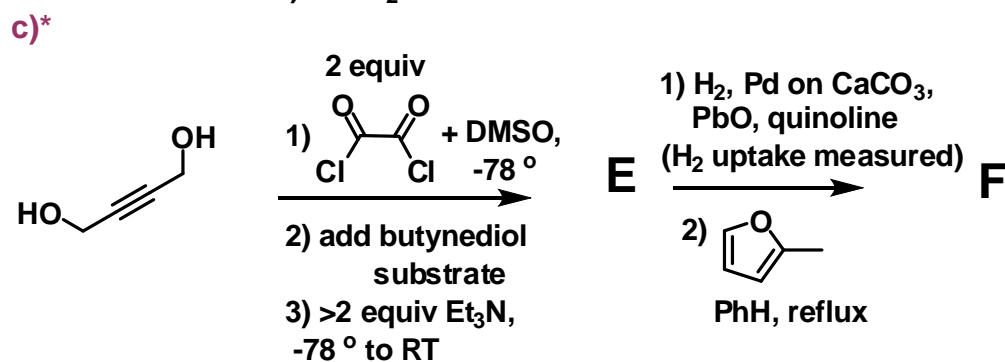
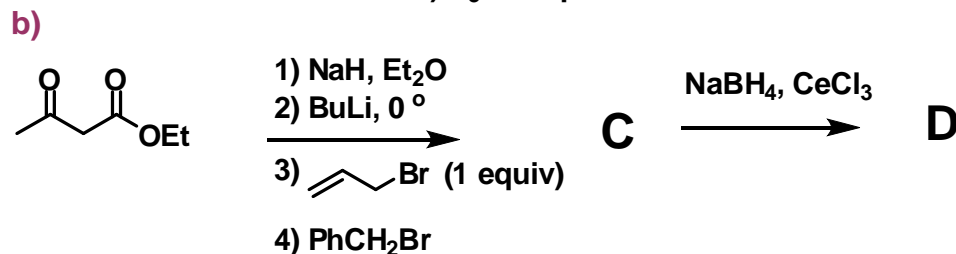
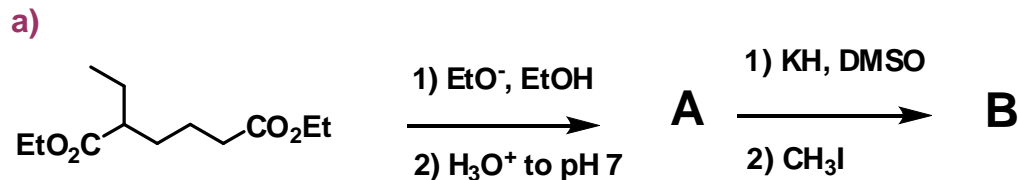
- i) Show the complete mechanism for the dissolving metal reduction of anisole. The stoichiometry of reaction is not implied by what is shown below; it should be apparent from your answer.



- ii) Show the complete mechanism for the Baeyer-Villiger of 2-butanone.



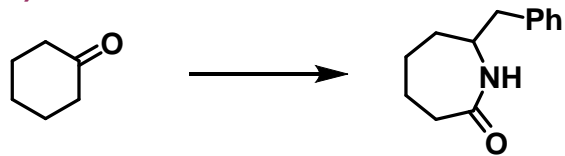
3. Do any five (5) of the questions (a-f). Mechanisms are not necessary, but showing your work may be a help. Include product stereochemistry where it applies (\*).



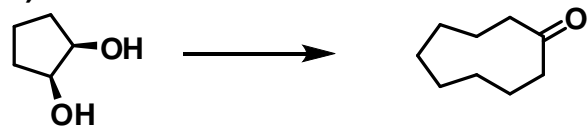
4. Do any seven (7). Total 70 marks

Show by equation how you would prepare the illustrated compounds below from the given starting material. You may use any other reagents you deem fit. Show all reagents, conditions, and isolable intermediates. Mechanisms are not necessary, but showing your work may be a help. Indicate stereochemistry where it applies.

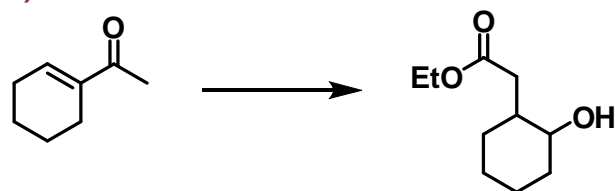
a)



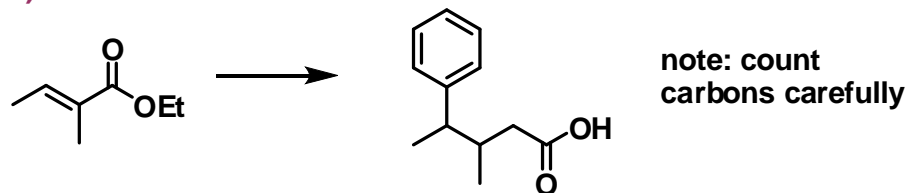
b)



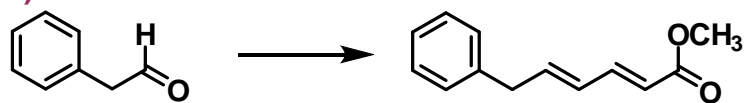
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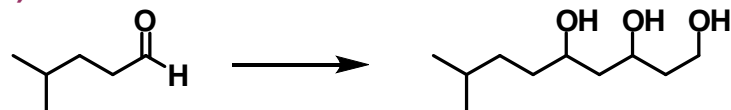
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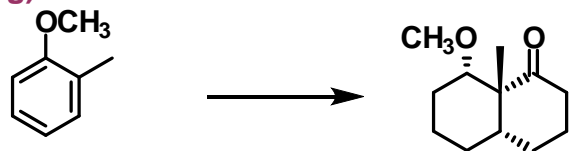
e)



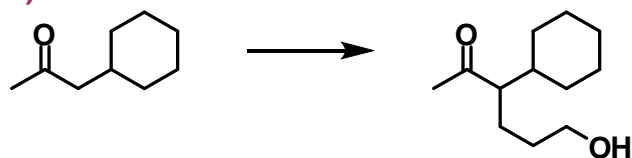
f)



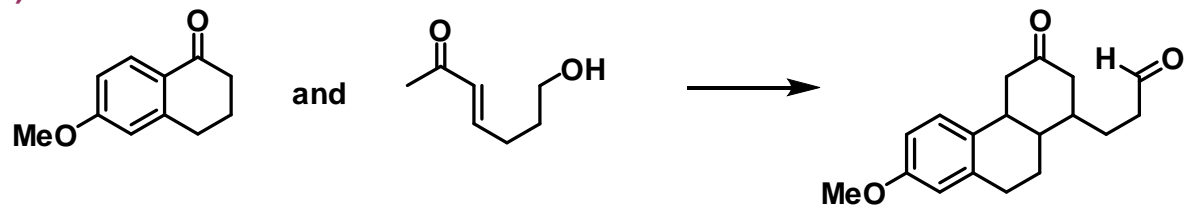
g)\*



h)

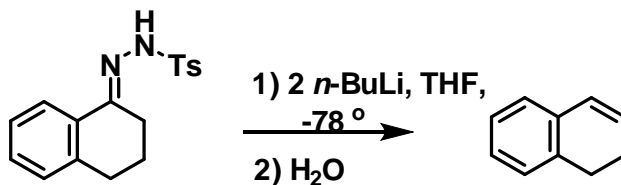


i)



**Bonus:**

- i) Another ketone deoxygenation reaction, with a twist, is called the Shapiro reaction. It involves the ketones tosylhydrazone, and ultimately gives an alkene rather than an alkane. Can you propose a reasonable mechanism for this process?



- ii) As we have seen, 1,2-dioxygenated compounds are not especially easy to prepare by condensation type chemistry, and yet a few methods are known. One of them, call the benzoin condensation, is fairly effective for with aromatic aldehydes but otherwise limited in scope. Propose a reasonable mechanism for the transformation.

