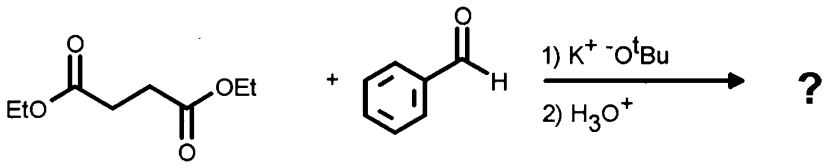
UNIVERSITY OF WINDSOR
SCHOOL OF PHYSICAL SCIENCES-CHEMISTRY AND BIOCHEMISTRY

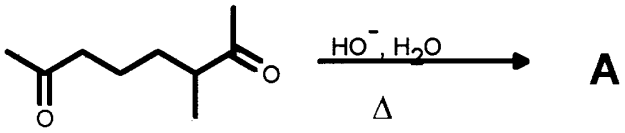
59-331/333 **Feb. 8, 1999**
First Test **Time: 50 minutes**

1. Give the complete mechanism for the Stobbe condensation between ethyl succinate and benzaldehyde. Please show which steps are reversible, how the reaction is driven to completion, and any small molecules which are evolved during the reaction. (**10 marks**)



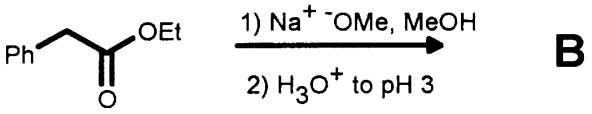
2. Indicate the structure of the expected major product(s) from each of the following reactions. Include stereochemistry where it is relevant. Mechanisms are *not* necessary, but showing your work is likely to be a help. (**5 for each letter, 40 marks total**)

a)

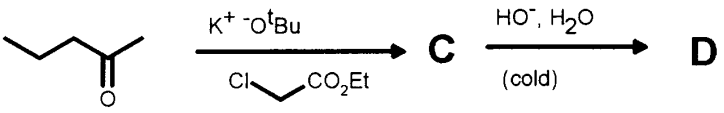


b)

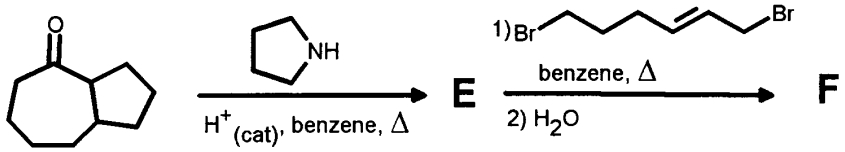
2



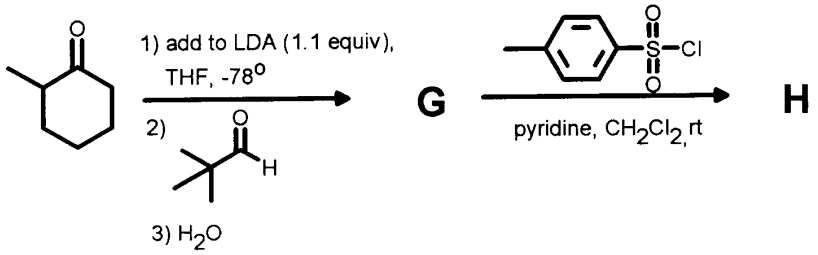
c)



d)

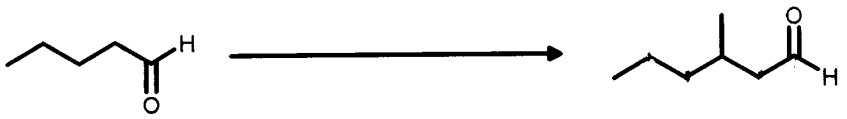


e)



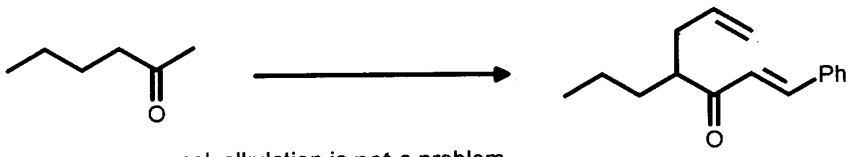
3. Show by equation how you could prepare the products illustrated below for the given starting material. You may use *any* other reagents that you deem fit. Show all reagents, conditions, and *intermediates which could be isolated.* Mechanisms are not necessary, but may be a help. Note: assume simple ketone alkylations are prone to polyalkylation unless told otherwise.(**10 marks each, 30 marks total**)

a)



b)

c)



assume polyalkylation is not a problem

Bonus: One of the tradition methods for the synthesis of the pyridine ring system is the *Hantzsch* synthesis. A modified version of this uses a β-diketone and ammonium acetate. Keeping in mind that ammonium acetate is essentially (NH_3 + acetic acid), propose a reasonable mechanism for the following: