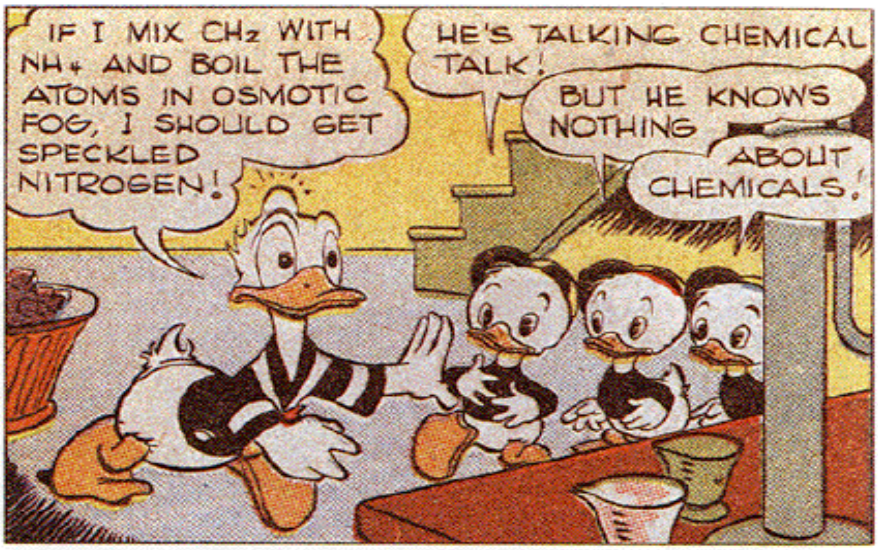
Hour Examination #2, Chemistry 302-302A - 2005



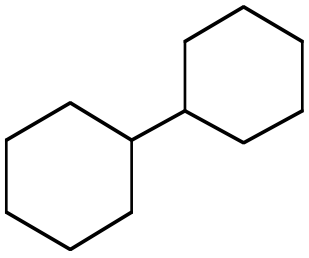
Walt Disney's Comics and Stories, 1942

In the following questions, be pithy (but be right). Pay attention to detail!

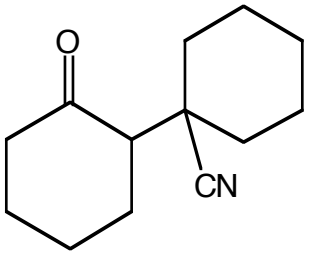
Let's make some molecules for a start. In Problems 1 and 2, you may use any inorganic reagent, simple acids and bases, even if they contain carbons, and "special" reagents such as diazomethane, methyl iodide, triphenylphosphine, carbon, LDA, pyrrolidine, malonic ester [$(CH_3OOC)_2CH_2$], KCN, CuCN, $(CN)_2$ and the sauce from Jiang Xikui's oh-so-succulent steamed turtle.

Mechanisms are not necessary in Problems 1 and 2.

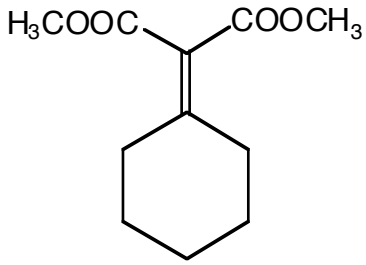
1 (24 points). Show how you would transform cyclohexanone into the following molecules. In part (a) please give us two methods, each of which has a very different carbon-carbon bond forming step.



(a) TWO ways

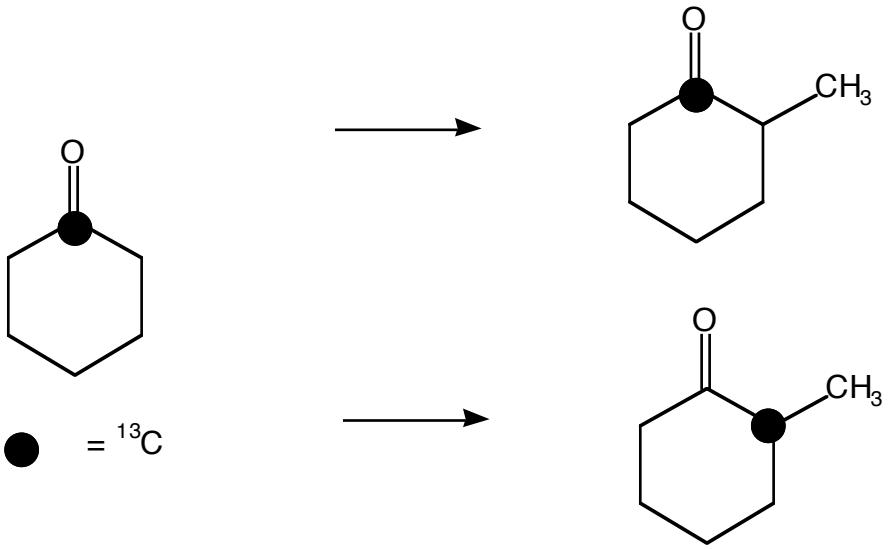


(b)

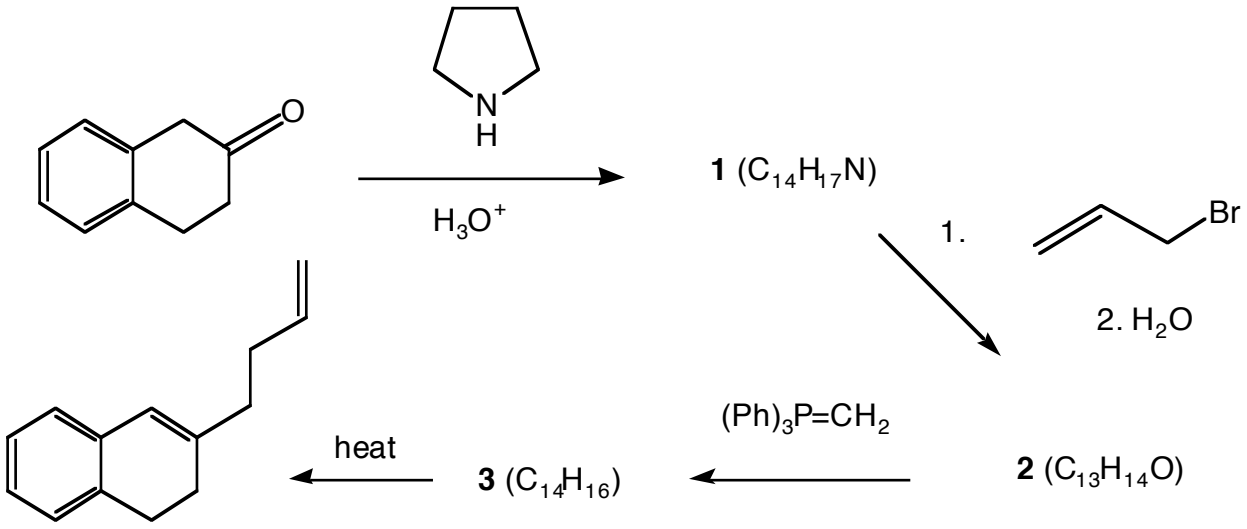


(c)

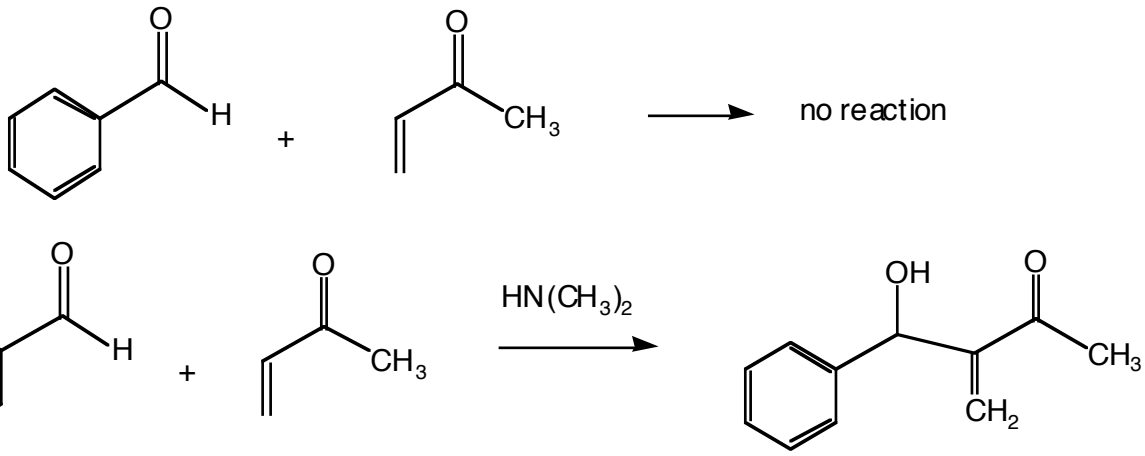
2 (12 points). Show how you would acomplish the following transformations:



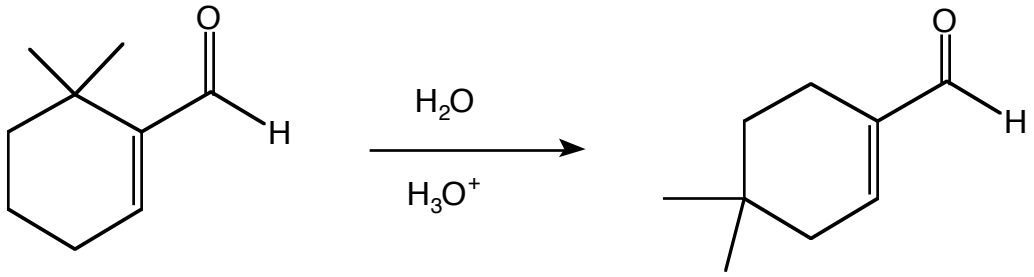
3 (15 points). Provide structures for compounds **1**, **2**, and **3**. Mechanisms are not necessary.



4 (15 points). Provide a mechanism for the following transformation. Be sure to explain clearly the role of dimethylamine.

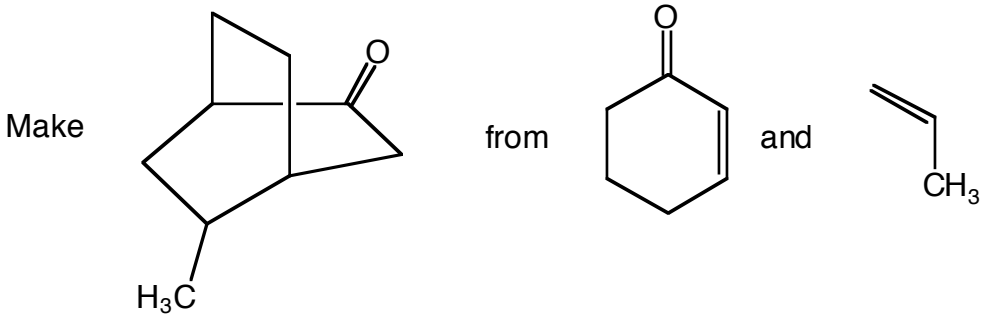


5 (22 points). Provide a mechanism for the following change:

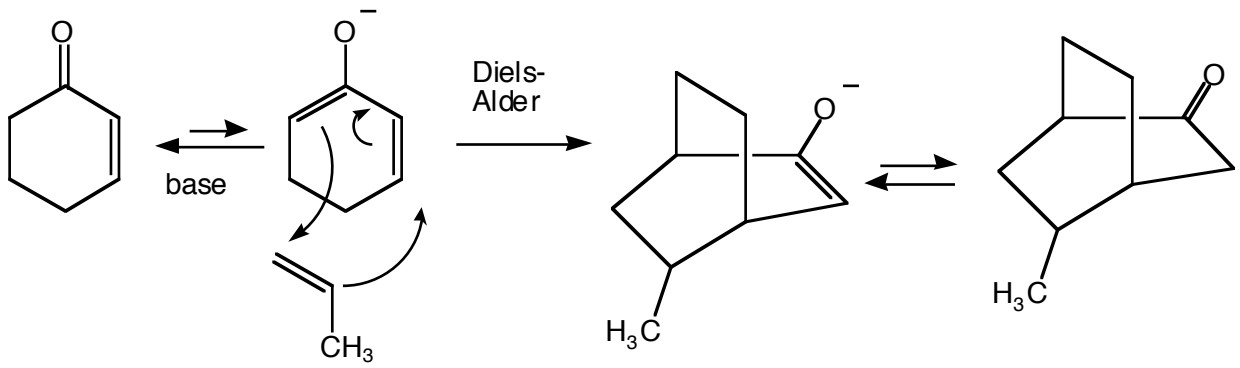


6. (12 points). Warning! This question is much longer than its answer!

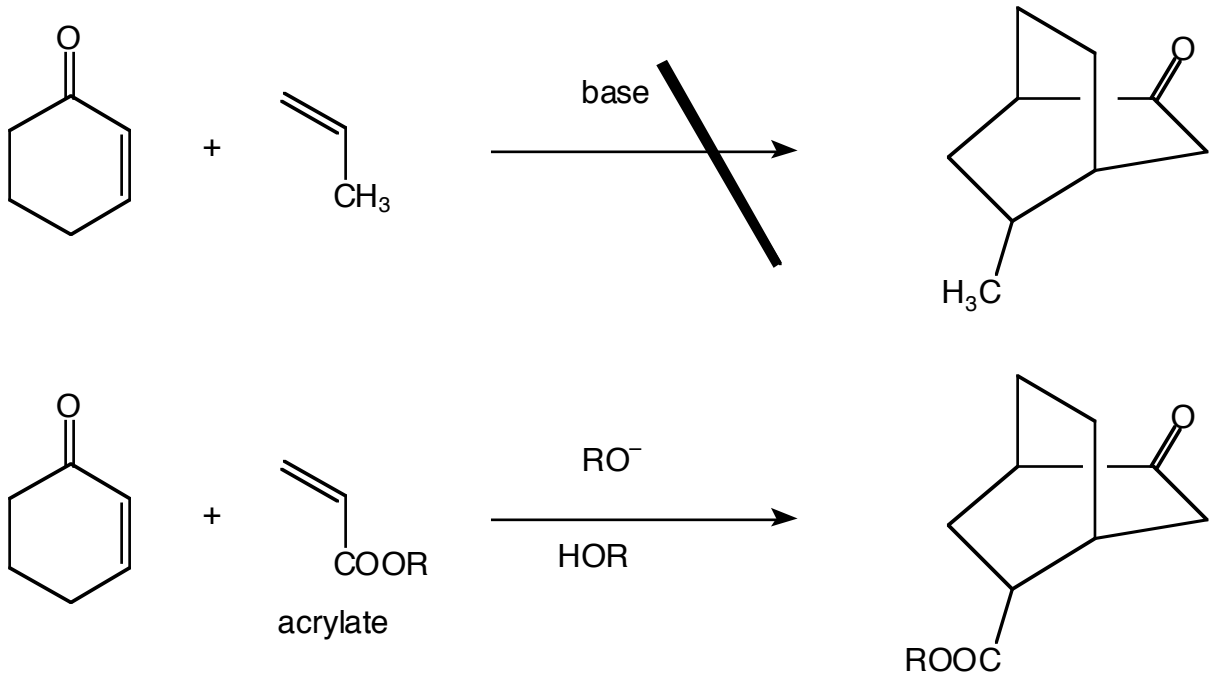
When confronted on her Hour Examination #2 with a request for a synthesis as shown below, Amy Alonza Stagg suggested the following (next page!) clever (but wrong) route involving a Diels-Alder reaction on the enolate.



Amy's solution:



You mark her wrong and, of course, she protests and vigorously demands a regrade. Desperate, you run a test and find that you are right: there is no reaction between the suggested components even in base! Vindication is short lived, however, as you later discover that the simple replacement of the methyl group of propene with an ester (to give acrylate) makes the reaction work.



Provide a mechanism for the successful reaction and explain why propene fails but acrylate succeeds.

Hint: You were right, it is *not* a Diels-Alder reaction.

"I pledge that I have not violated the Honour Code on this examination."