

ORGANIC CHEMISTRY
Cumulative Examination
for the doctoral degree

December 6 1997

I. Consider the reaction scheme at the right (adapted from Cossy et al. *J. Org. Chem.* **1997** 62 7900) and answer the following questions.

1. (8) a. What is the purpose of the catalytic iodides in the conversion of **1** to **2**.

b. Give a mechanism for the conversion of **1** to **2**.

2. (10) Supply reagents and conditions necessary for the conversion of **2** to **3**.

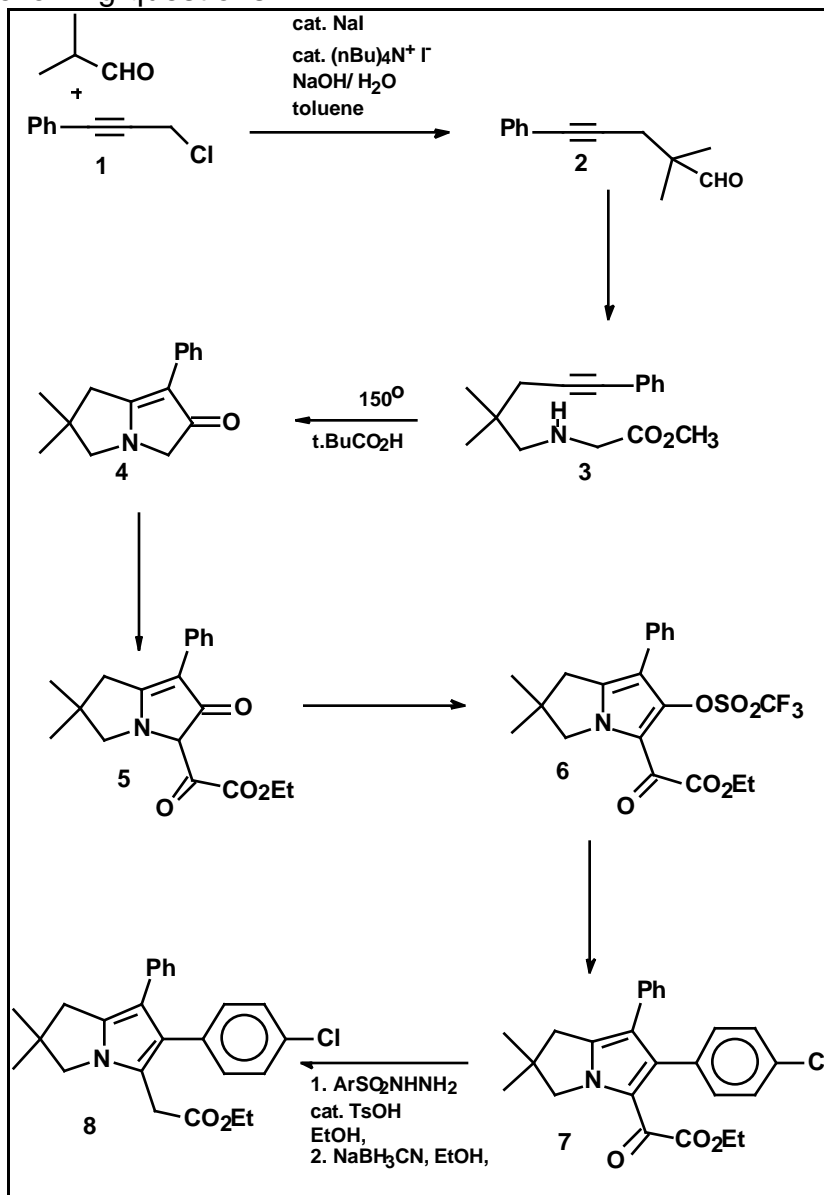
3. (10) Give a mechanism for the conversion of **3** to **4**.

4. (7) Give reagents and conditions necessary for the conversion of **4** to **5**.

5. (5) Design a method for making the triflate **6** from **5**.

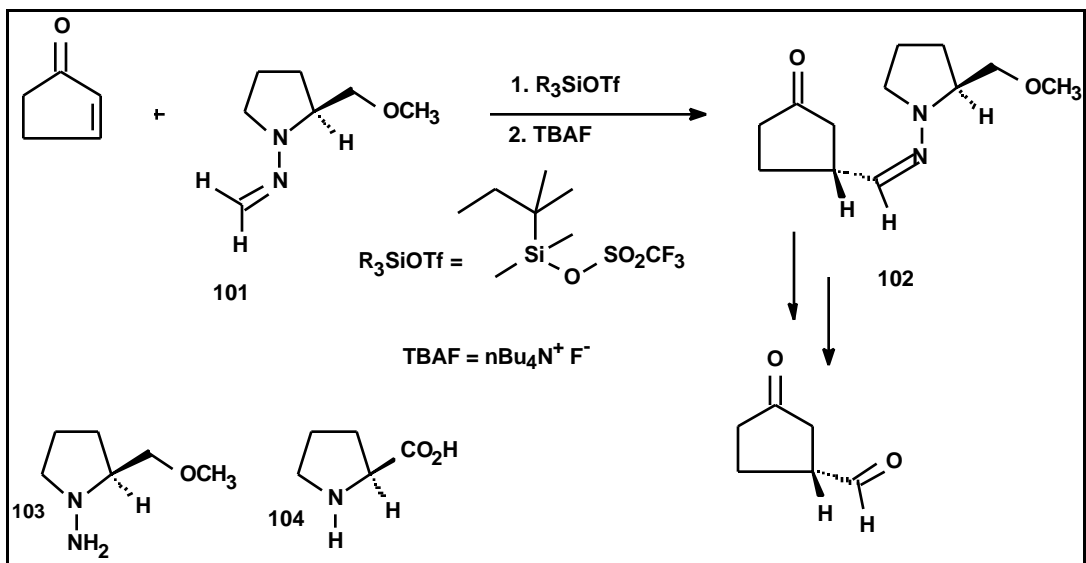
6. (10) The conversion of **6** to **7** uses methodology which has been discussed in one or more seminars this semester and has also been the subject of other cumulative exam questions. Give a method for carrying out this transformation.

7. (10) Show the product of the first step in the conversion of **7** to **8**, and give mechanism for the conversion of this product to **8** using the reagents and conditions of step 2.



II. Diez et al. (*JOC* **1997** 62 5144-5155) have reported a method for the generation of chiral dicarbonyl compounds through the use of a formyl anion synthon. The transformation proceeds as outlined for 2-cyclopenteneone in Scheme 2.

Scheme 2



- (13) Give a mechanism for the conversion of 101 to 102.
- (12) Outline a synthesis for the chiral auxiliary 103 from proline 104.

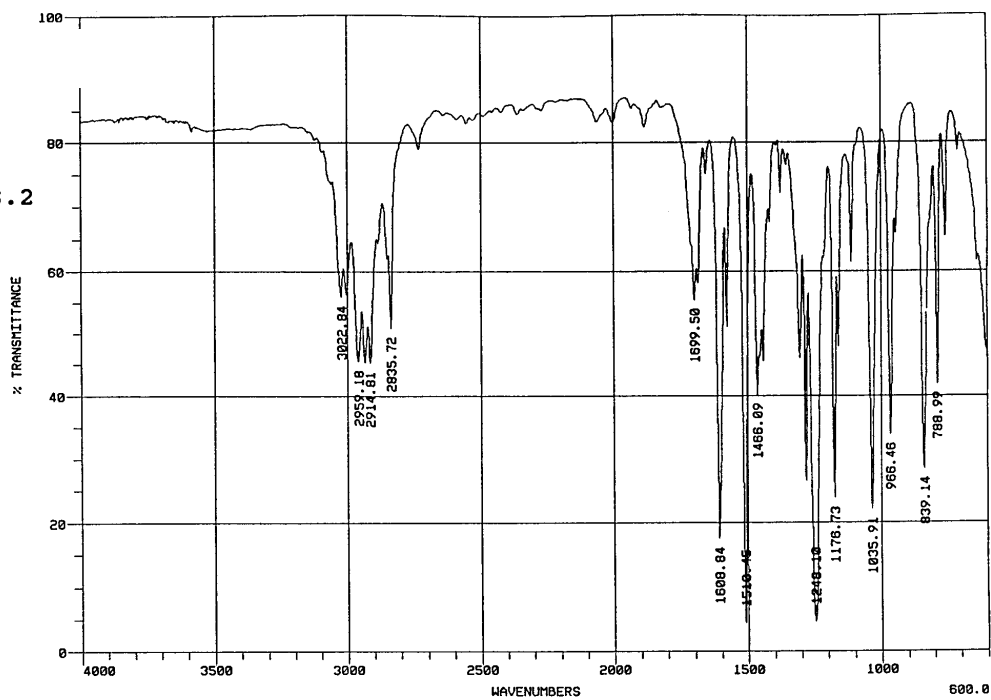
III. (15) Give the structure of the product having the characteristics shown on the next page and assign the 1H NMR spectrum.

MW 148
 %C 81.0% H 8.2

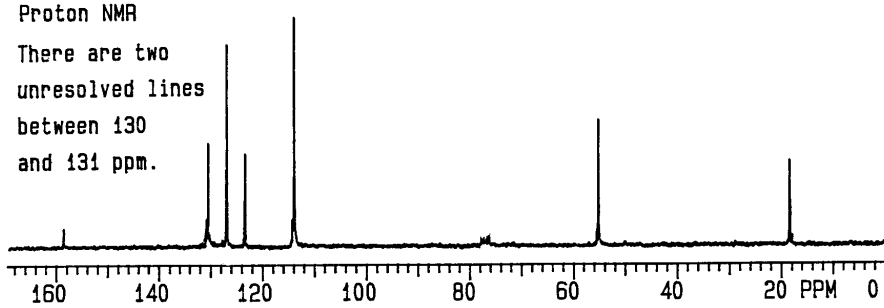
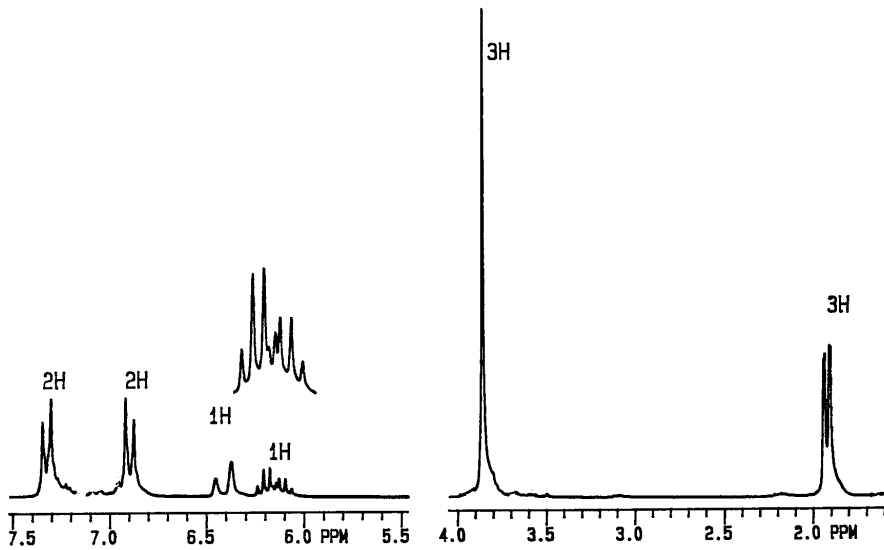
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Mass Spec. Data

m/z	relative abund.
77	12
105	11
117	14
133	12
147	44
148	100



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Carbon 13 NMR