

Massachusetts Institute of Technology

5.13: Organic Chemistry II

May 20, 2002

FINAL EXAM

- Question 1 ____/08 points
Question 2 ____/06 points
Question 3 ____/30 points
Question 4 ____/05 points
Question 5 ____/15 points
Question 6 ____/15 points
Question 7 ____/25 points
Question 8 ____/06 points
Question 9 ____/10 points
Question 10 ____/42 points
Question 11 ____/12 points
Question 12 ____/12 points
Question 13 ____/12 points
Question 14 ____/12 points
Question 15 ____/14 points
Question 16 ____/14 points
Question 17 ____/20 points
Question 18 ____/14 points
Question 19 ____/14 points
Question 20 ____/14 points

TOTAL ____/300 points

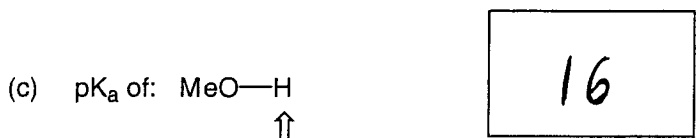
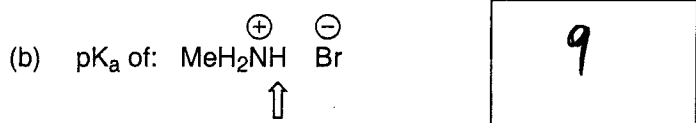
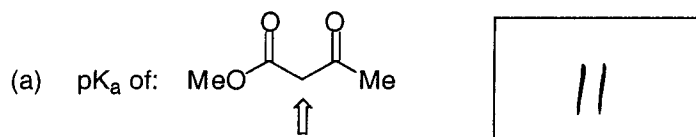
There are nineteen pages (2-20) of questions in this exam.

Name Mr. Key

T.A. _____

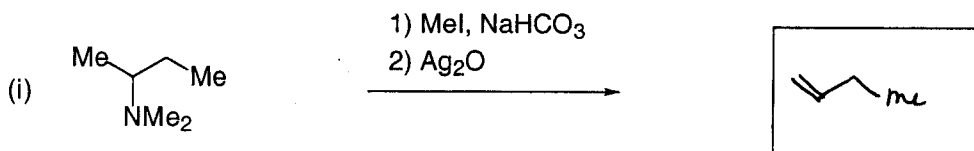
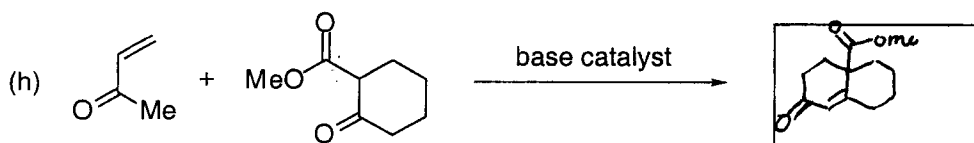
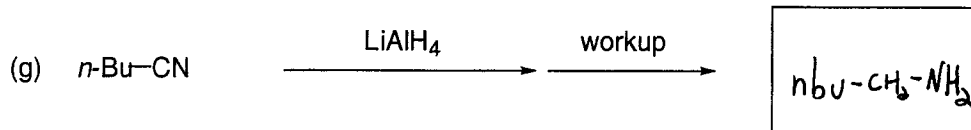
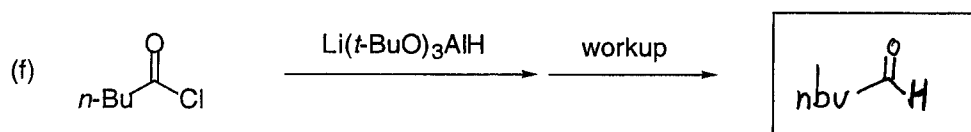
HAVE A GREAT SUMMER!!

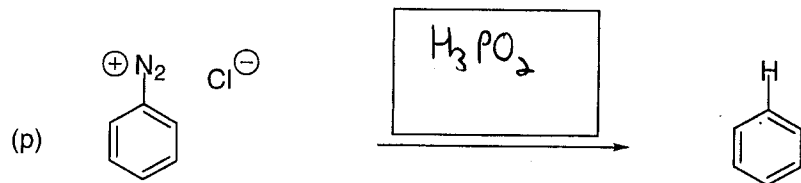
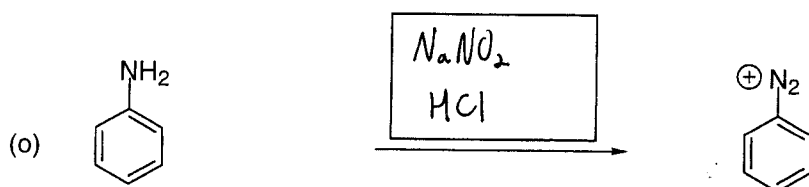
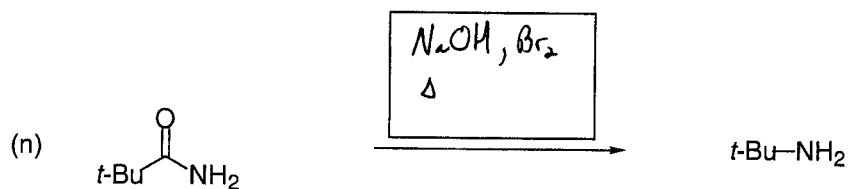
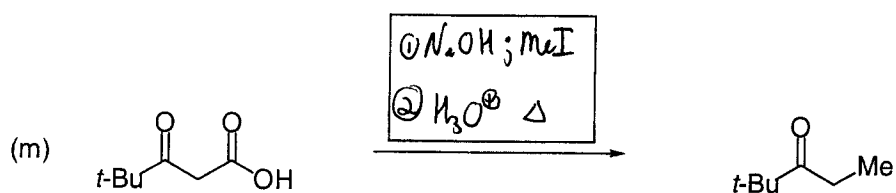
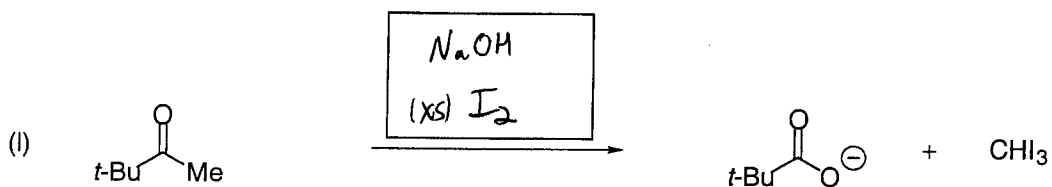
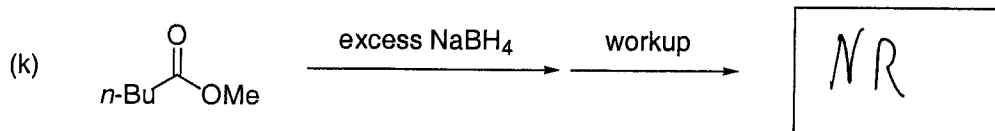
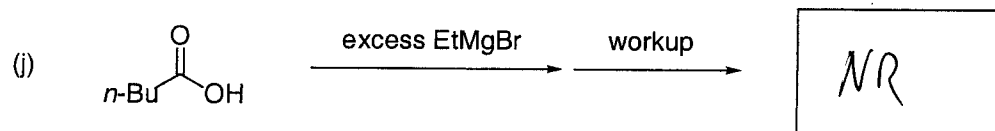
(10) (2 points each, 42 points total) Please provide the requested answer/data/reagents. If no reaction is expected, write "NR".

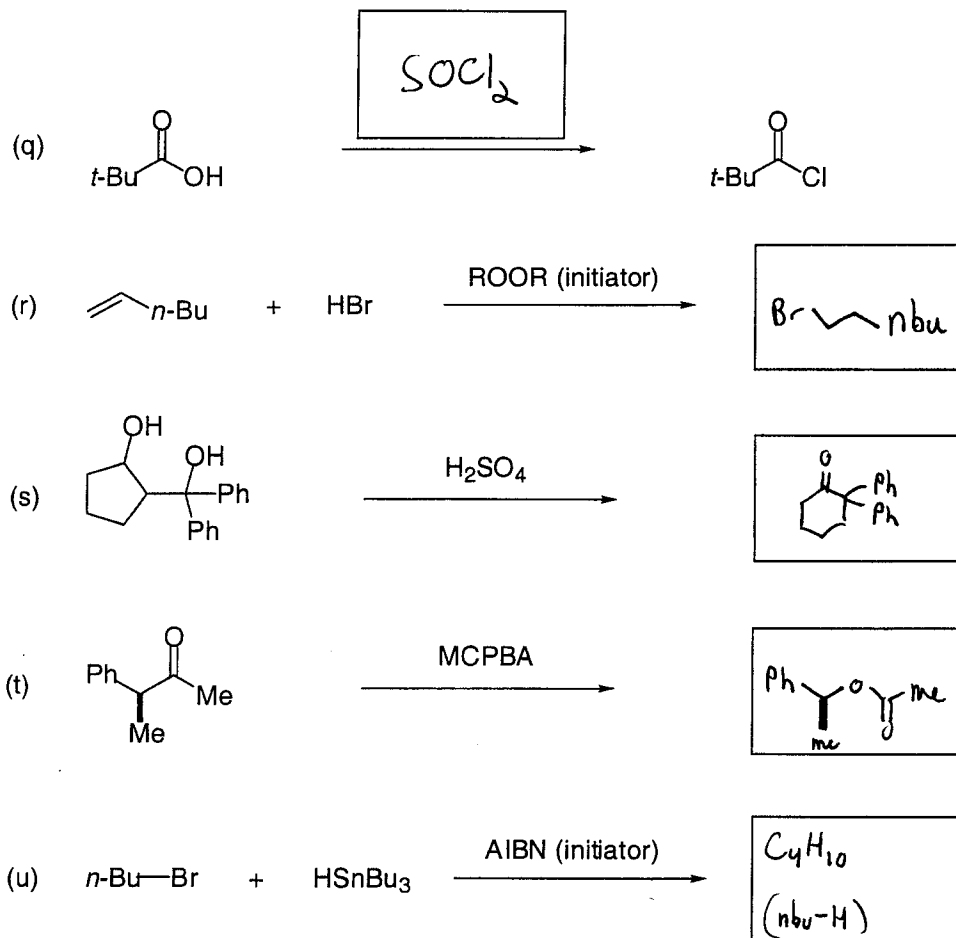


(d) Inversion barrier of NMe_3 , in kcal/mol (circle one): 5 20 50 100

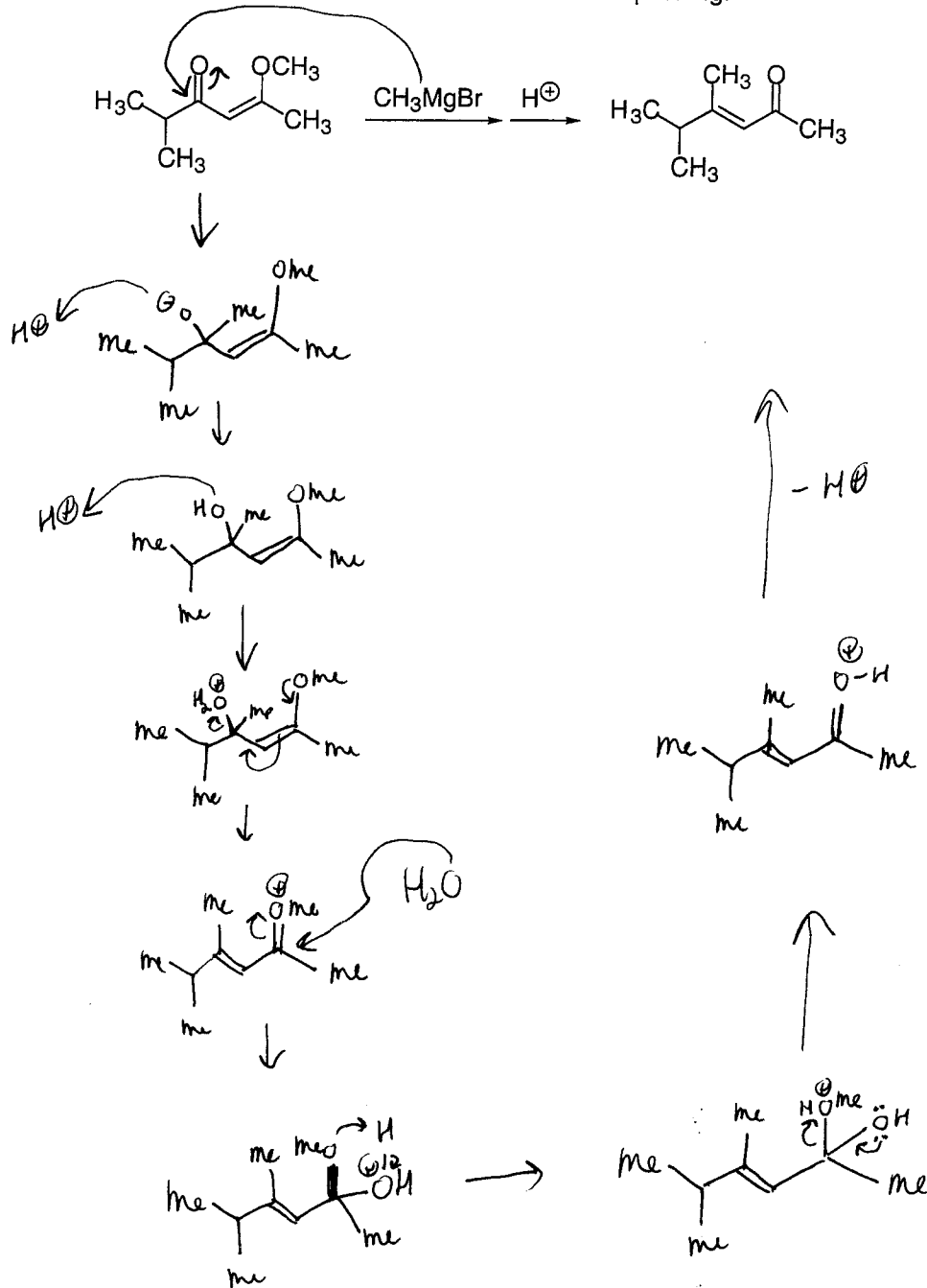
(e) The most stable radical (circle one): Me- $\dot{C}H_2$ Me- $\dot{N}H$ Me- \dot{O}



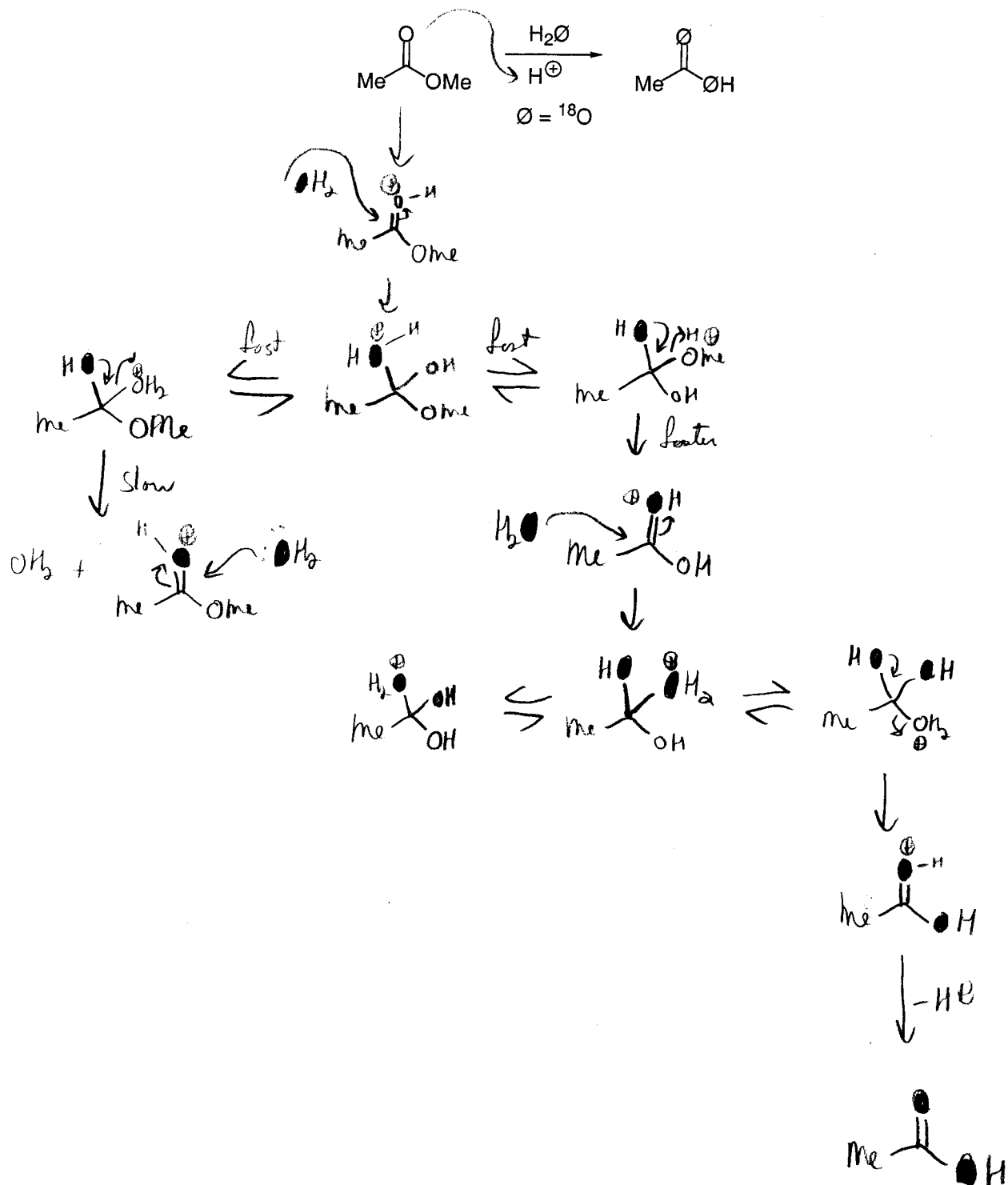




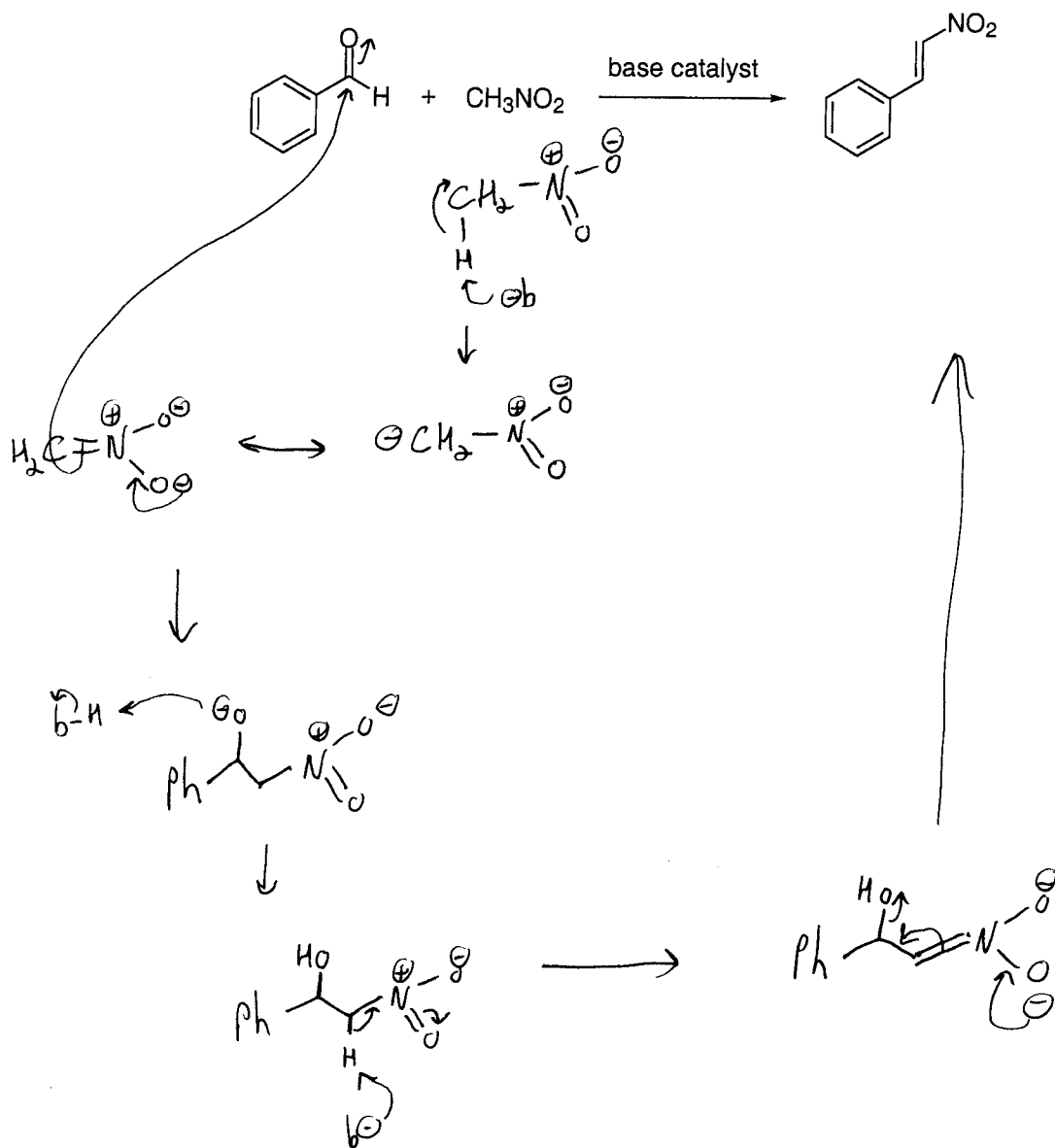
(11) (12 points) Provide the best mechanism. Please show all arrow pushing.



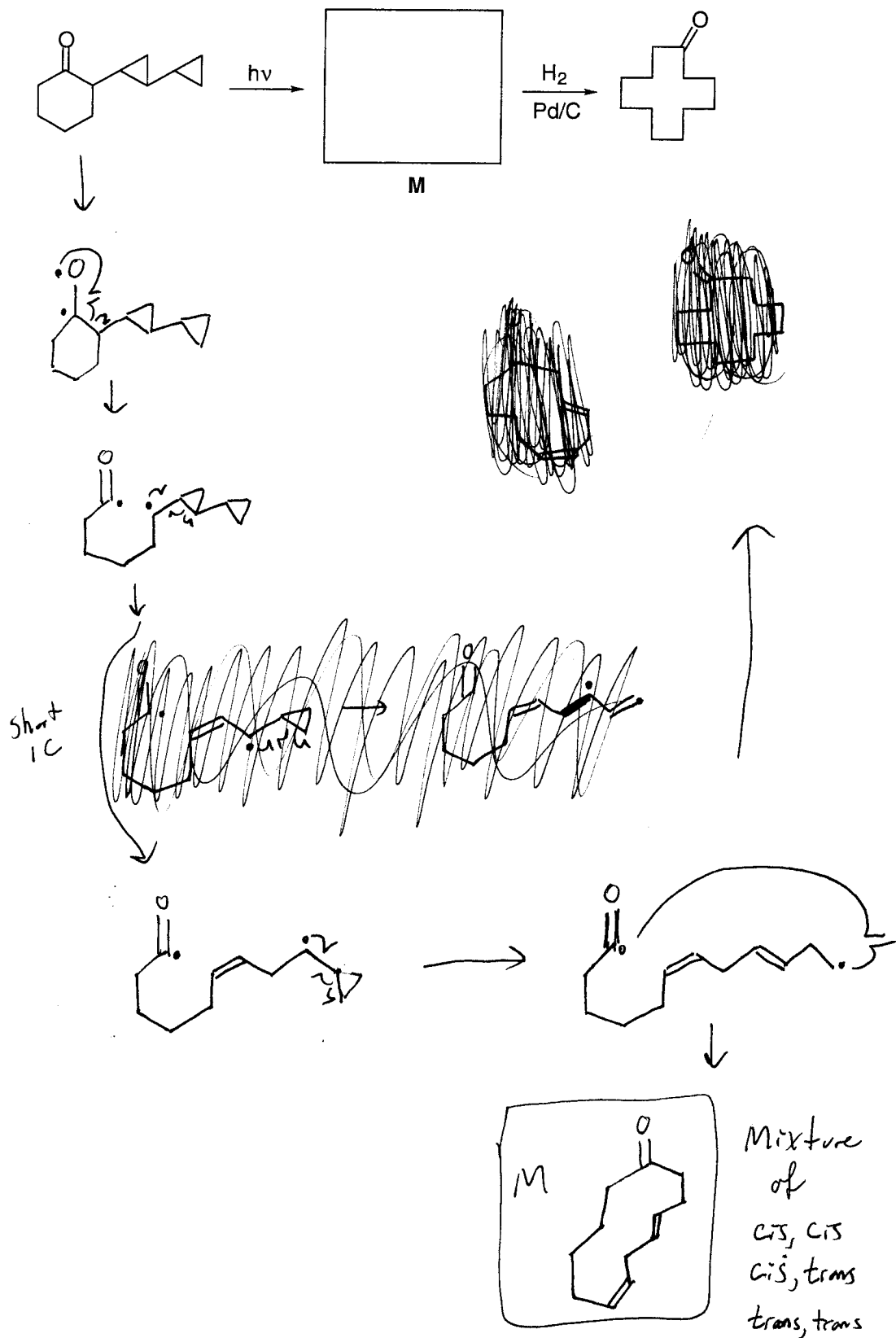
(12) (12 points) Provide a mechanism for the illustrated transformation. Please show all arrow pushing.



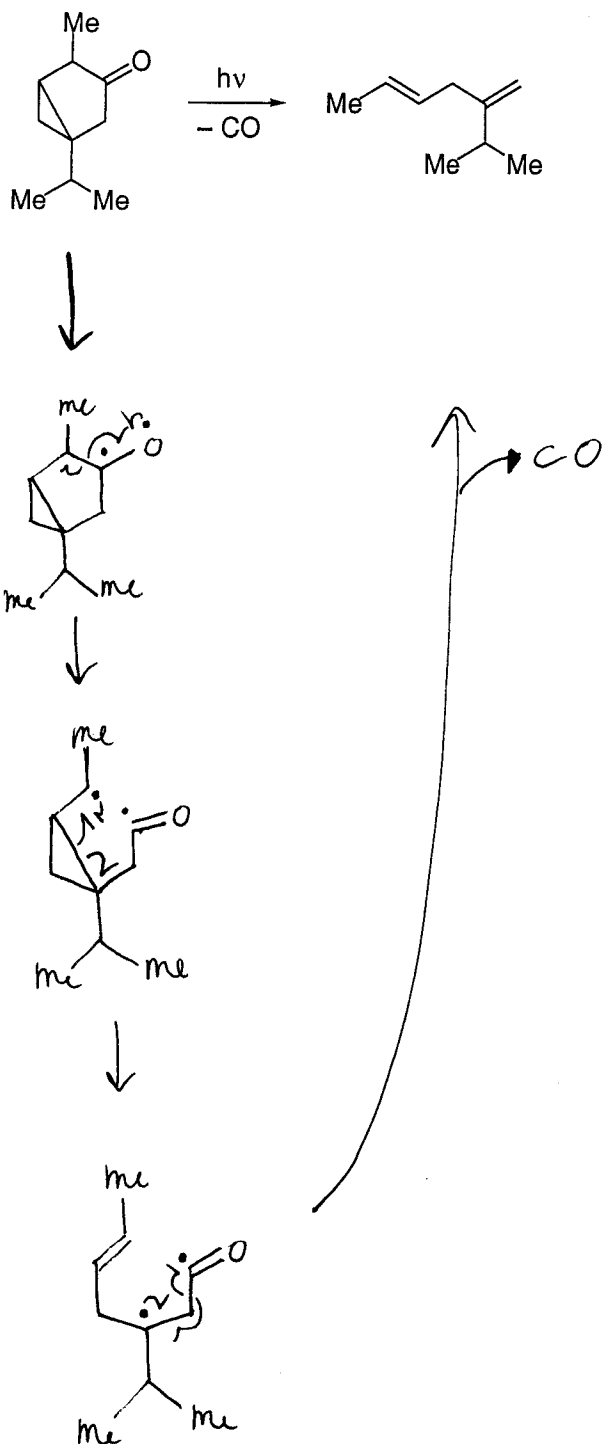
(13) (12 points) The Henry reaction is a variant of the aldol condensation in which the conjugate base of a nitroalkane is the nucleophile. Provide the best mechanism for this reaction. Please show all arrow pushing.



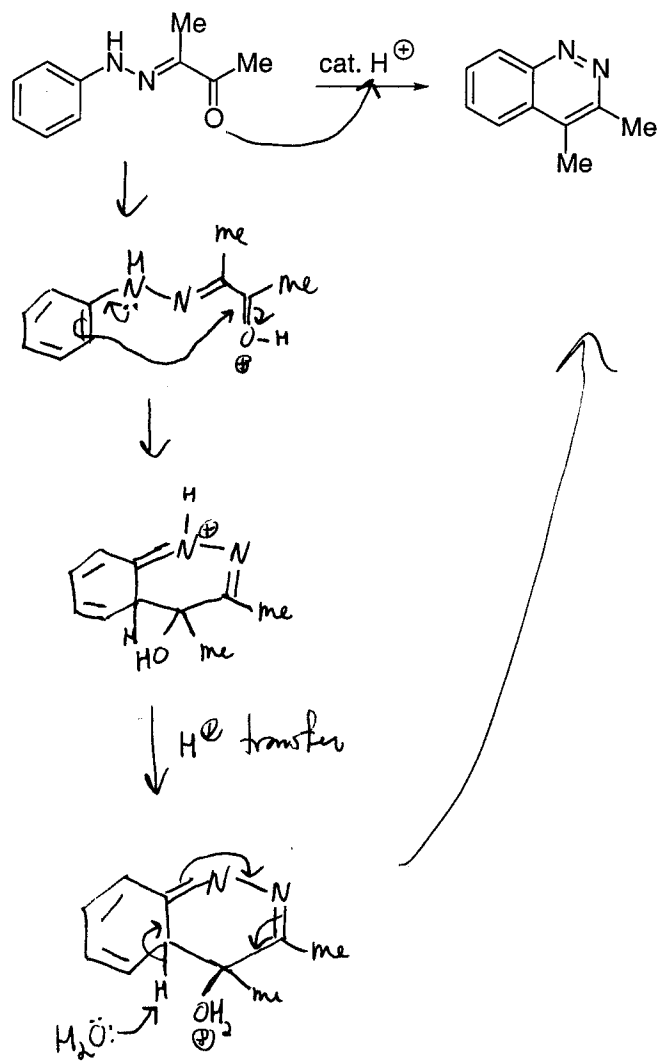
(14) (12 points). Provide a structure for **M** and a mechanism for its formation. Please show all arrow pushing.



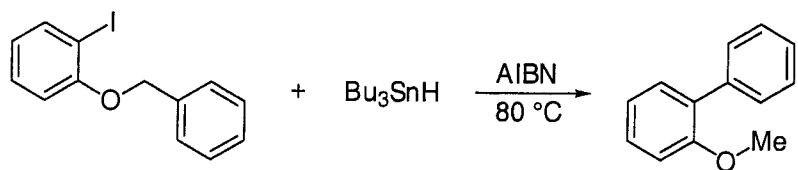
(15) (14 points) Provide a mechanistic rationale for the reaction illustrated below. Please show arrow pushing.



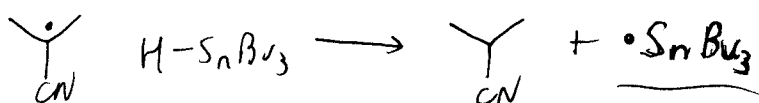
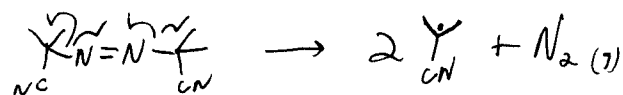
(16) (14 points) Provide the best mechanism. Please show all arrow pushing.



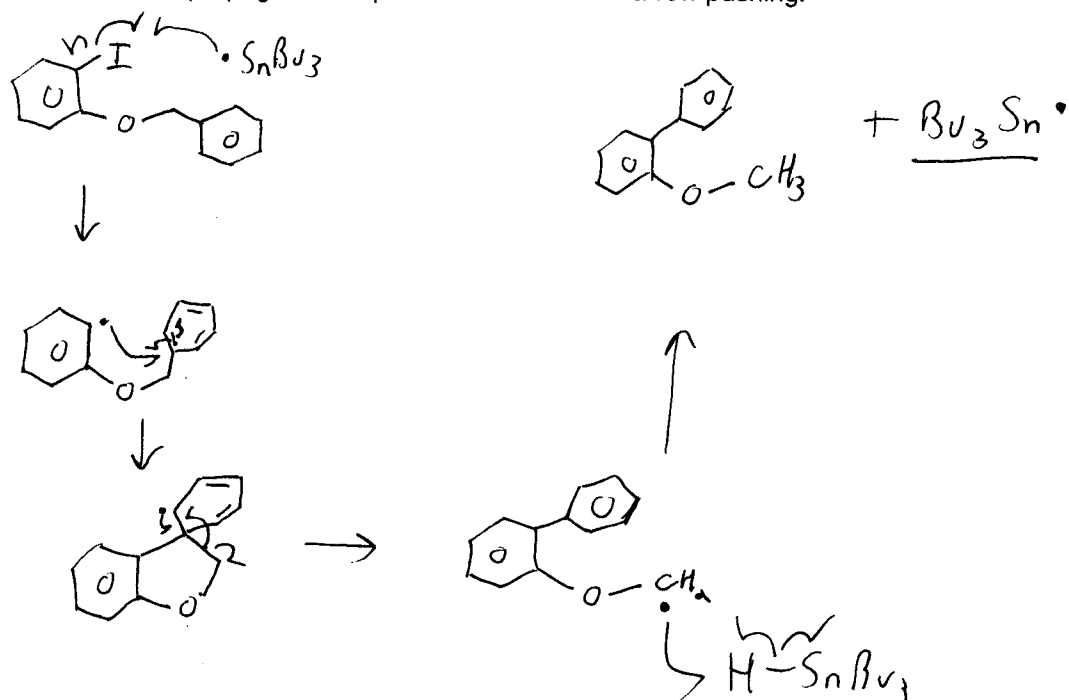
(17) (20 points total) For the following reaction:



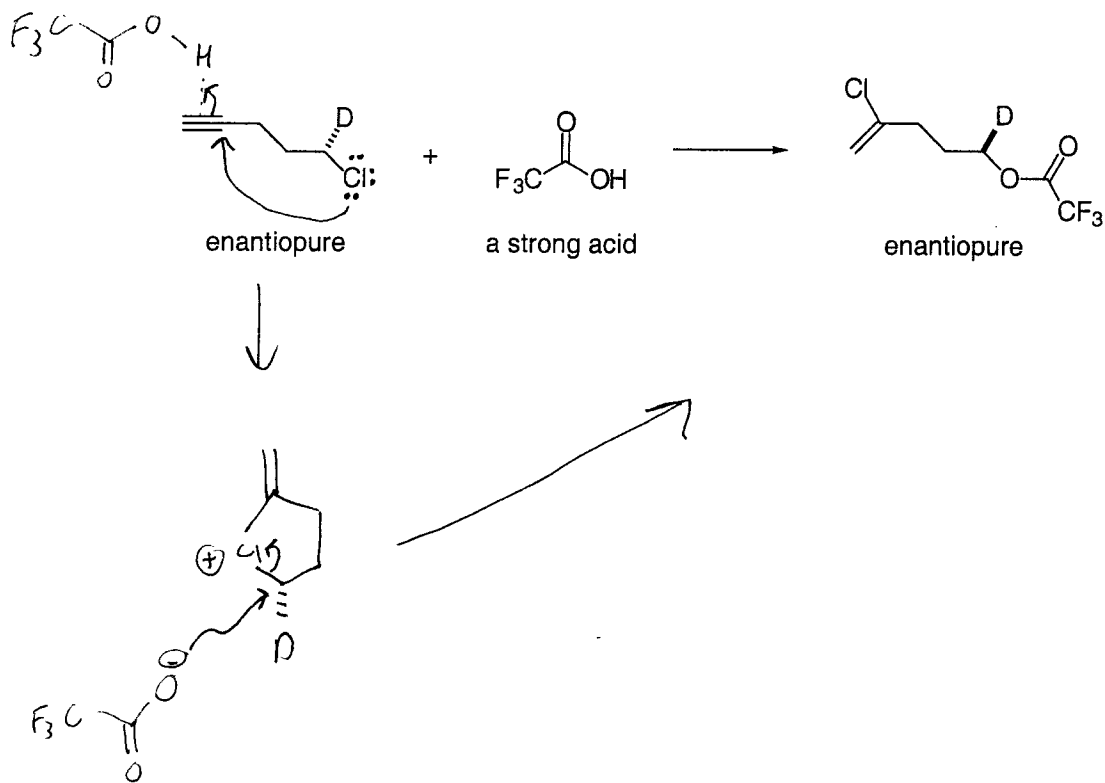
(a) (6 points) Draw the initiation sequence. Please show arrow pushing.



(b) (14 points) Draw the propagation sequence. Please show arrow pushing.



(19) (14 points) Provide a mechanism for the illustrated reaction that relies upon Cl serving as a neighboring group. Please show all arrow pushing.



~~(X)~~ For 18 + 20

See previous solutions
in the psets