

Massachusetts Institute of Technology

5.13: Organic Chemistry II

April 24, 2002

Test 3

Question 1 _____/30 points

Question 2 _____/09 points

Question 3 _____/18 points

Question 4 _____/10 points

Question 5 _____/11 points

Question 6 _____/22 points

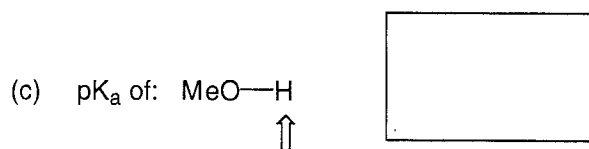
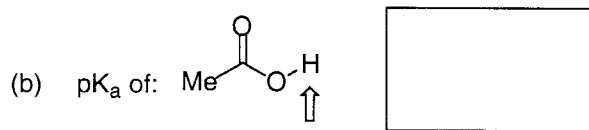
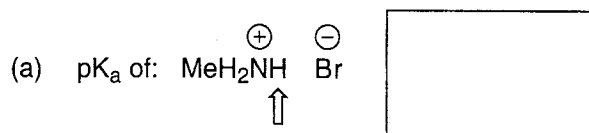
TOTAL _____/100 points

Name _____

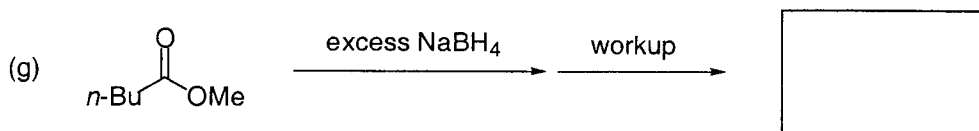
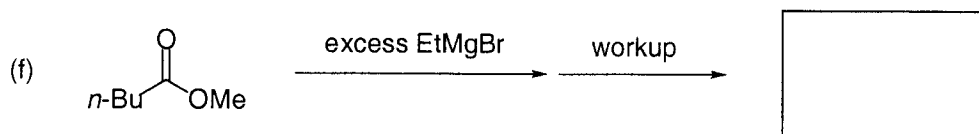
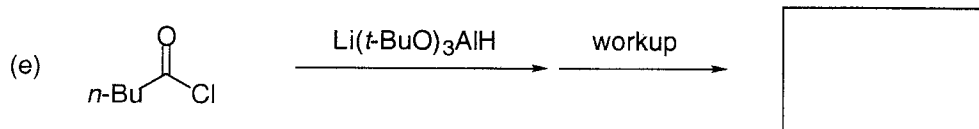
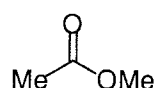
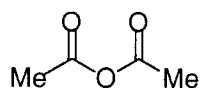
T.A. _____

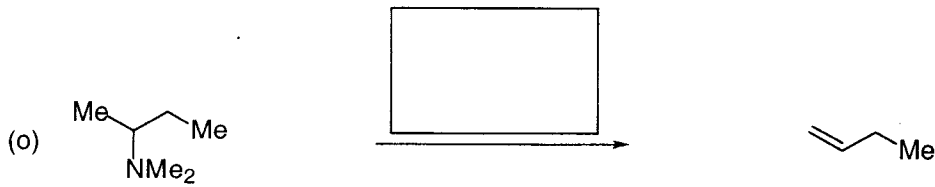
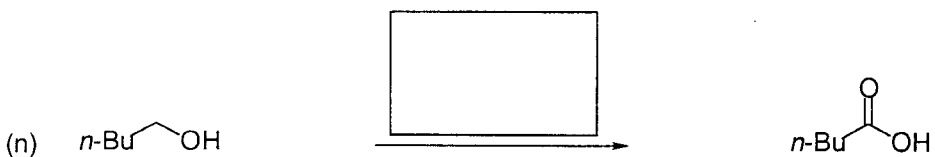
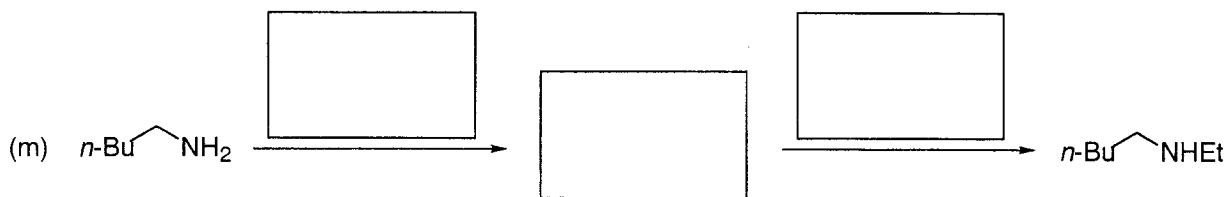
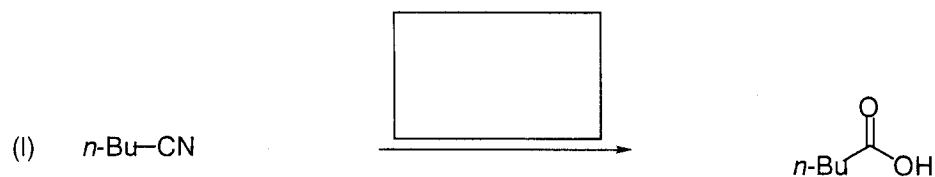
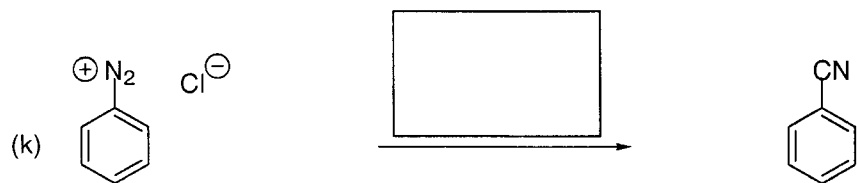
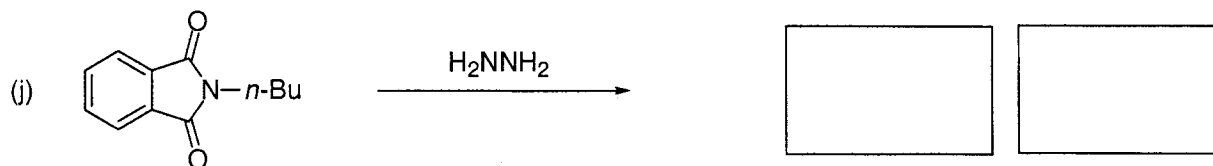
There are seven pages (2-8) of questions in this exam.

(1) (2 points each, 30 points total) Please provide the requested answer/data/reagents. If no reaction is expected, write "NR". Note: *n*-Bu = *n*-Butyl = -CH₂CH₂CH₂CH₃.



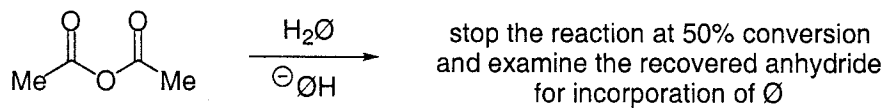
(d) Circle the compound that will react faster with Me₂NH:





Your method should cleanly generate the secondary amine.

(2) (9 points) Consider the experiment outlined below:

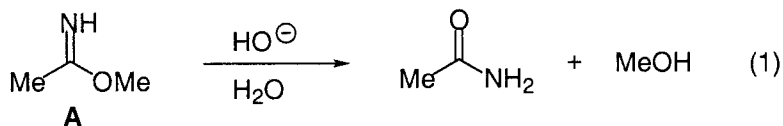


Ø = isotopically labeled oxygen

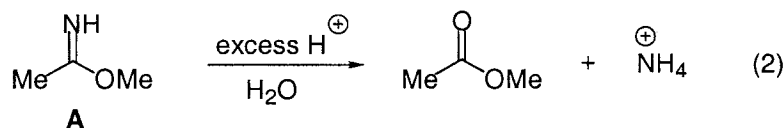
In analogy with the discussion in class regarding the labeling studies of acid chloride, amides, etc., carefully explain what level ("high" or "low") of Ø incorporation you expect to observe in the recovered anhydride. Your explanation should include the mechanism for this hydrolysis reaction.

- (3) (18 points total) Methyl acetimidate (**A**) is hydrolyzed in aqueous sodium hydroxide to (initially) give mainly acetamide and methanol (eq 1). In aqueous acid, **A** hydrolyzes to (initially) give primarily methyl acetate and the ammonium ion (eq 2).

(a) (7 points) Write a detailed mechanism for the illustrated process. Please show all arrow pushing.

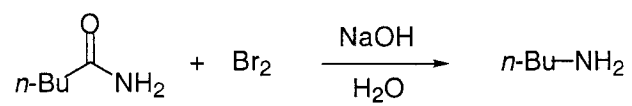


(b) (7 points) Write a detailed mechanism for the illustrated process. Please show all arrow pushing.



(c) (4 points) Briefly explain why the two reactions provide different products.

- (4) (10 points) Provide a mechanism for the Hoffmann rearrangement. Please show all arrow pushing.



- (5) (11 points) Provide a synthesis that will **selectively** convert A to B. Show all of the key intermediates and furnish all of the important reagents.

