

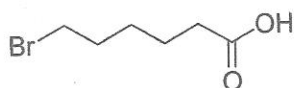
Chemistry 3331
Organic 2
Professor Eaton
Spring 2013

EXAM 3

1. (2 pts) Draw the structure of Benzoic Acid

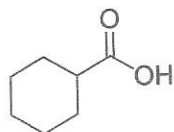


2. (3 pts) For the molecule drawn below provide the IUPAC name



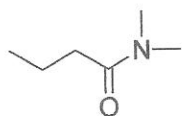
6-bromohexanoic acid

3. (3 pts) For the molecule drawn below provide the IUPAC name



cyclohexanecarboxylic acid

4. (3 pts) Name the molecule drawn below according to the IUPAC rules

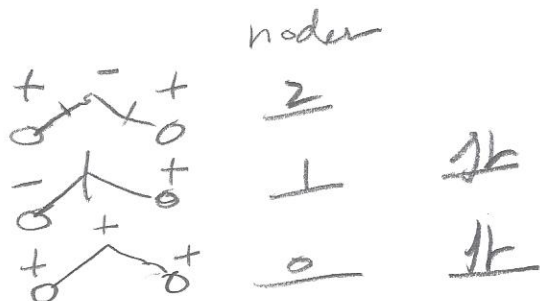


N,N-dimethylbutanamide

5. (3 pts) The carboxylic acid carbonyl oxygen is:

- a. sp² hybridized
- b. sp³ hybridized
- c. a hydrogen bond donor
- d. a hydrogen bond acceptor
- e. b and c
- f. a and d

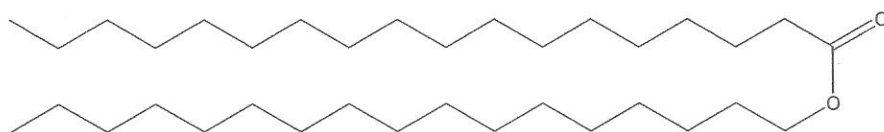
6. (3 pts) Draw the MO diagram for the carboxylate anion



7. (3 pts) The order of reactivity at the carbonyl carbon for a carboxylic acid derivatives is:

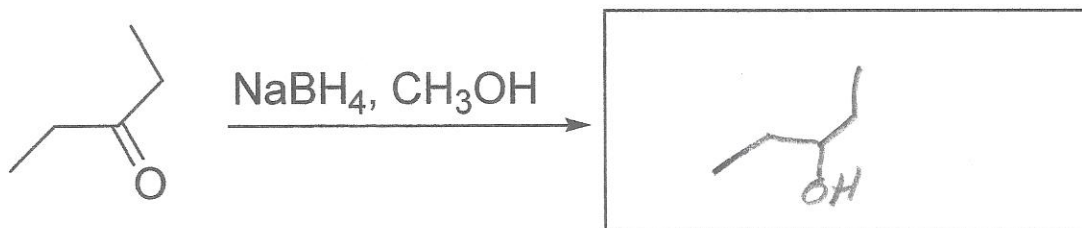
- a. ester > amide > carboxylic acid > anhydride
- b. amide > ester > anhydride > carboxylic acid
- c. carboxylic acid > anhydride > ester > amide
- d. ester > anhydride > amide > carboxylic acid
- e. anhydride > ester > amide > carboxylic acid
- f. none of the above

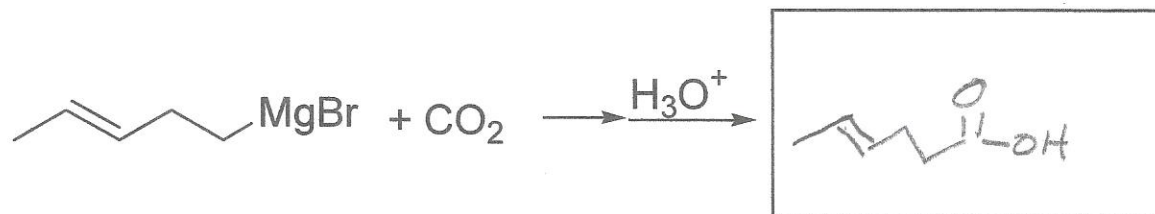
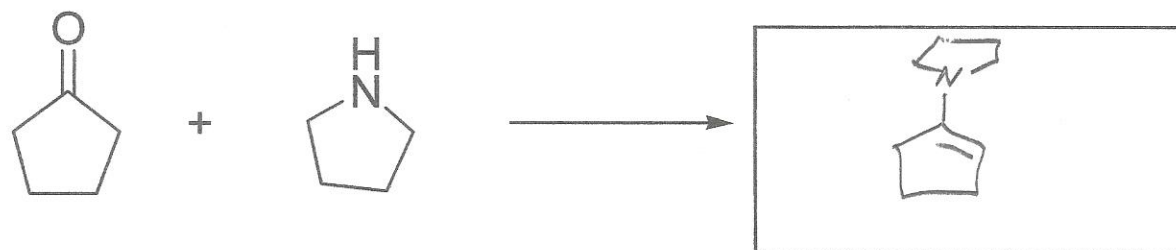
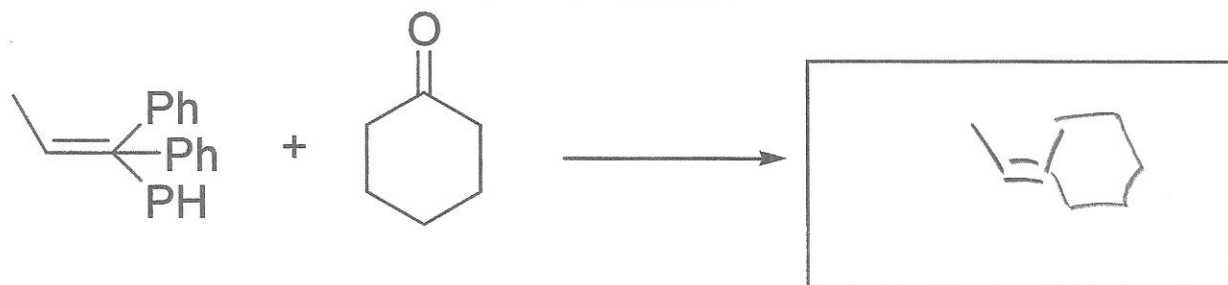
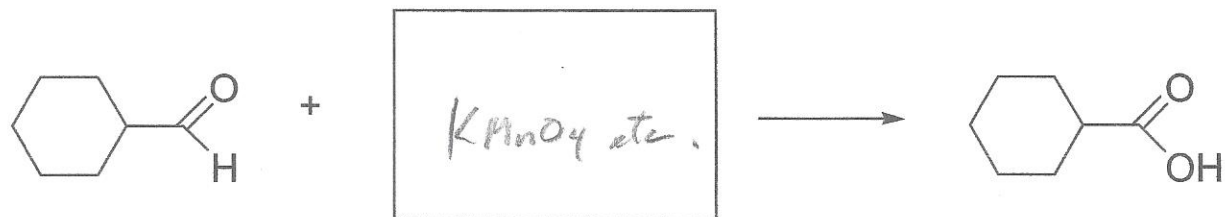
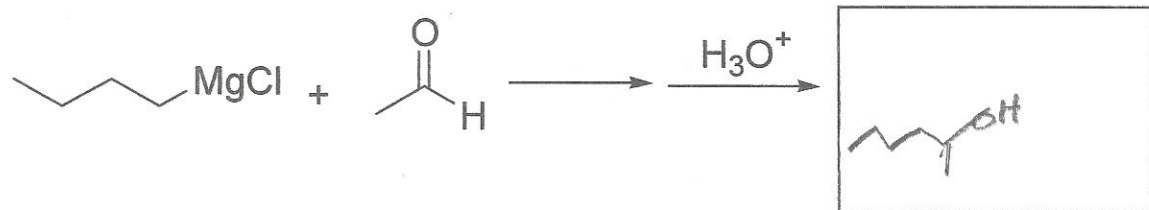
8. (3 points) The molecule drawn below is an example of a:

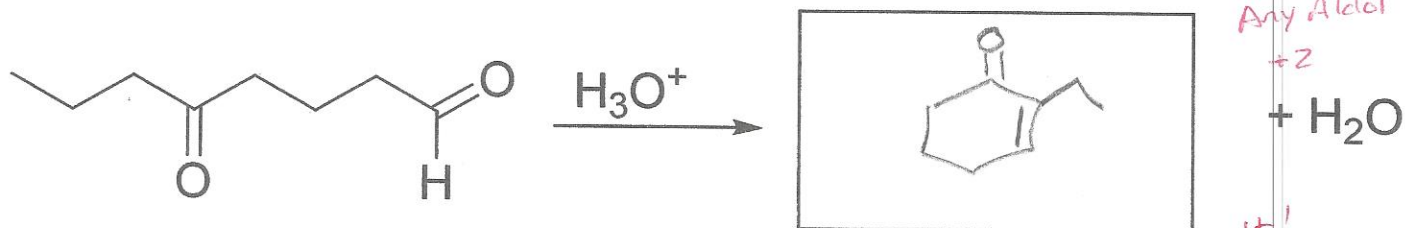
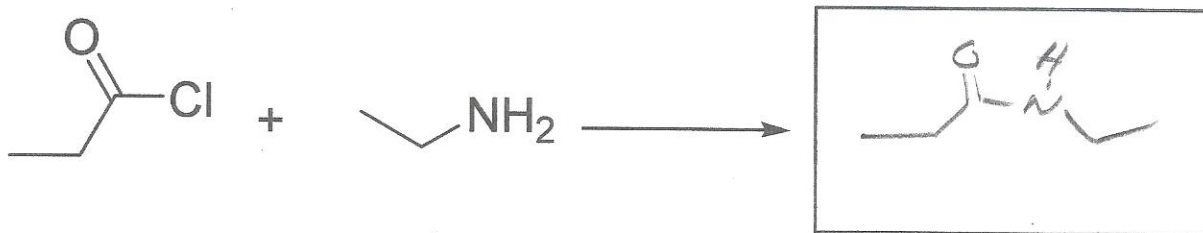
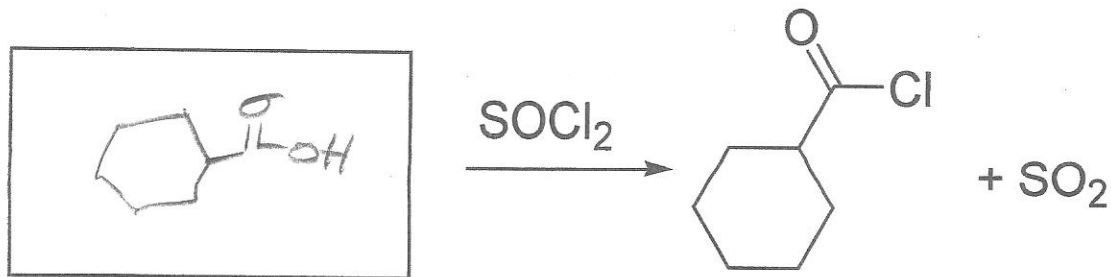


- a. Wax
- b. Soap
- c. Triglyceride
- d. Phospholipid

9. (50 pts) For the reactions shown below, fill in the box to complete the chemical equation. Draw only organic products.





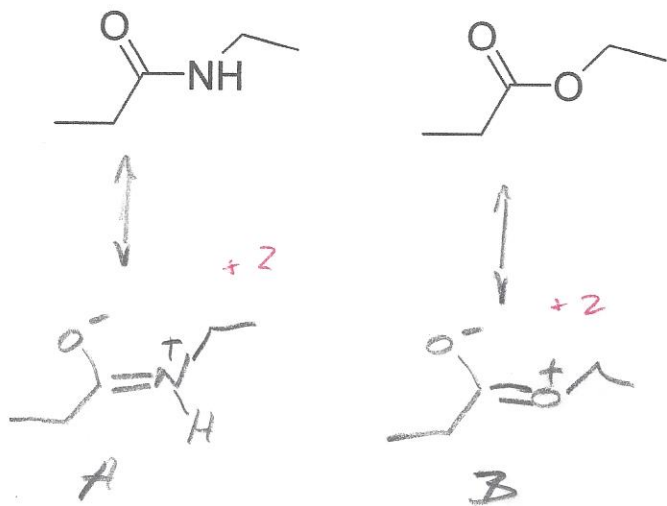


Any Aldol
+2
+ H₂O

15'

10. (7 points) Draw all of the resonance structures possible for the amide and ester drawn below. Explain what the resonance structures are depicting in terms of the structure and carbonyl reactivity of these molecules.

7'



The resonance structure A is an important contributor but B is not. A implies partial π bond between N and carbonyl carbon. In both the amide and ester the lone pair of the heteroatom donates electron density to the carbonyl and in the amide, this decreases reactivity significantly.

22'

11. (20 points) Using only the organic molecules drawn below and any other non-organic reagents that are needed, draw a synthetic scheme for the preparation of A.

