

MI

Name: _____
Last First MI

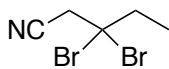
Grading Page (Exam 3):

Page	Points Possible	Points Earned
Multiple Choice (3-4)	22	
5	22	
6	31	
7	25	
TOTAL	100	

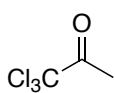
Multiple-Choice

Reach each question carefully. Record your answers on your Scantron sheet. Additionally, circle/write each answer directly on this exam. (2 points each)

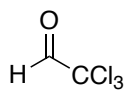
1. What is the IUPAC name for the following molecule?



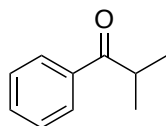
- a. 3,3-dibromobutanenitrile
 - b. 3,3-dibromopentanenitrile
 - c. 2,2-dibromo-1-cyanobutane
 - d. 3,3-dibromopentanitrile
2. Which compound will give the largest percentage of hydrate at equilibrium?



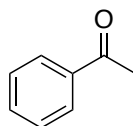
a



b

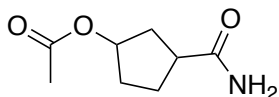


c

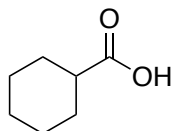


d

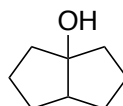
3. Which of the following do you expect to be water-soluble? *Bubble in the letter for all that apply!*



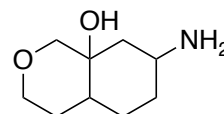
a



b

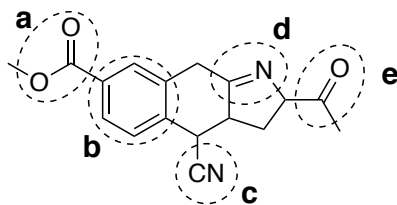


c

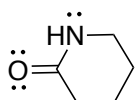


d

4. Which of the circled functional groups will undergo hydrolysis when subjected to H^+/H_2O ? *Bubble in the letter for all that apply!*



5. If the amide below is reacted with a strong acid, which atom would be selectively protonated?



- a. The oxygen
 - b. The nitrogen
6. Which one of the following carbonyl compounds is the least stable?



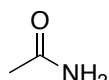
a



b



c



d

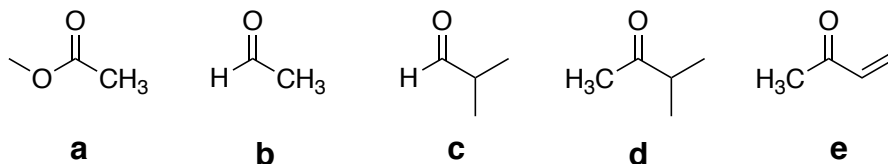


e

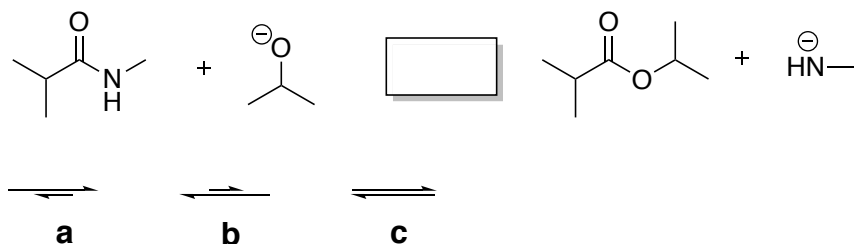
7. What is the driving force for the base mediated amide hydrolysis?

- Formation of the more stable carboxylic acid.
- An acid base reaction between the carboxylic acid that forms and the amide (R_2N^-) anion.
- Loss of water
- Protonation of the amine by the acid to give an ammonium salt.
- None of the above

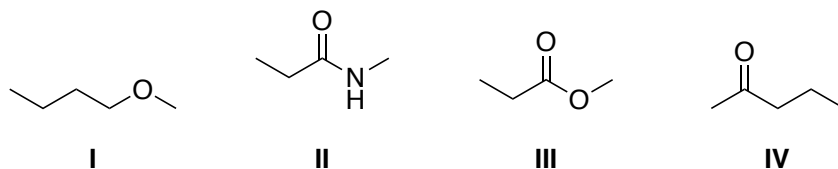
8. Which one of the indicated carbonyls is the least reactive toward a nucleophile?



9. Which arrow best describes the reaction shown below?

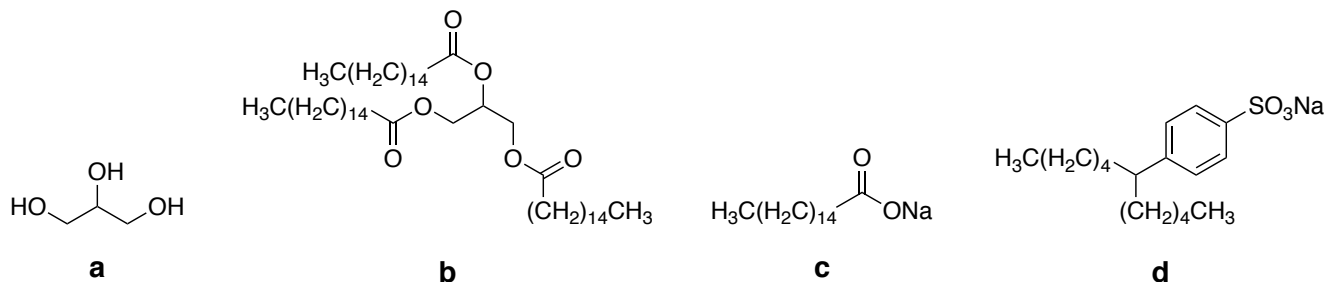


10. Rank the compounds shown below in order of increasing boiling point.



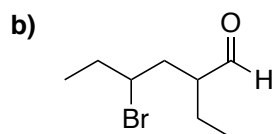
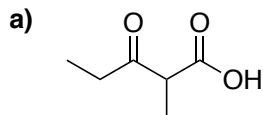
- $IV < I < III < II$
- $I < III < II < IV$
- $I < III < IV < II$
- $I < IV < III < II$
- None of the above are correct

11. Which one of the following represents a detergent?



Completion Section: Answer the remaining questions on the exam itself. Read the questions carefully and provide complete explanations.

12. Provide the IUPAC name for each compound shown below. (3 points each)

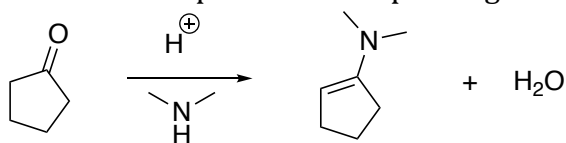


13. Draw the structure for **methyl 3-hydroxybutanoate** and then write the common name for this molecule. (4 points)

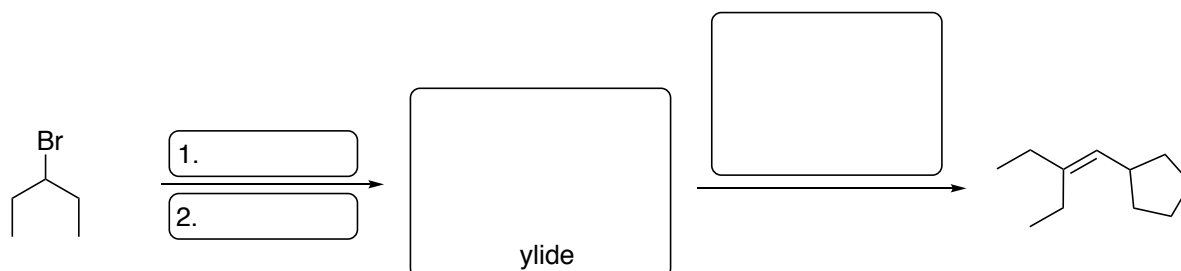
Structure

Common Name

14. Show the complete electron pushing mechanism for the reaction below. (8 points)



15. Show how the following alkene can be prepared via a Wittig reaction by filling in the boxes with the appropriate structures or reagents. (4 points)



16. Draw a representative structure for each of the following. (1 point each)

anhydride

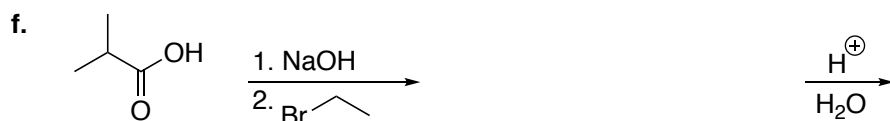
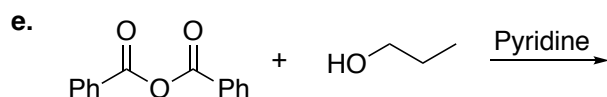
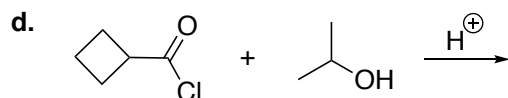
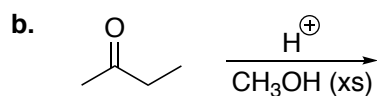
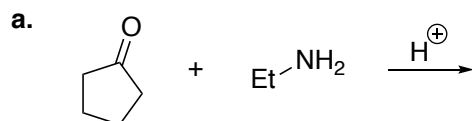
acetal

γ -lactam

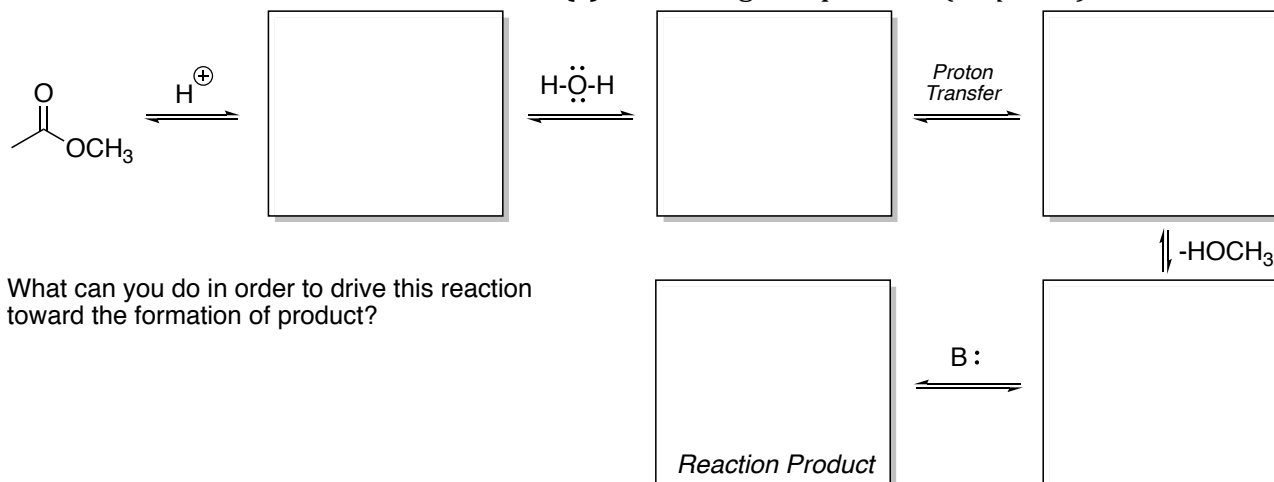
imine

cyanohydrin

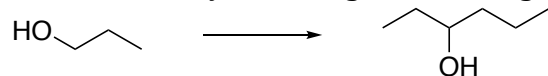
17. Predict the major organic product(s) for each reaction below. (2 points each)



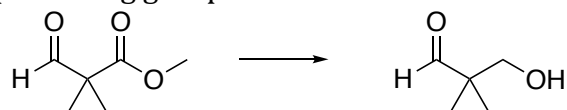
18. Complete the electron pushing mechanism by (a) filling in the missing boxes, (b) drawing in curved arrows to show electron flow, and (c) answering the question. (10 points)



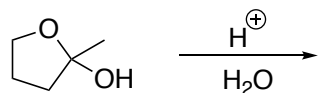
19. Provide a reasonable synthesis for the compound shown below using the provided starting material and any other organic or inorganic reagents. (4 points)



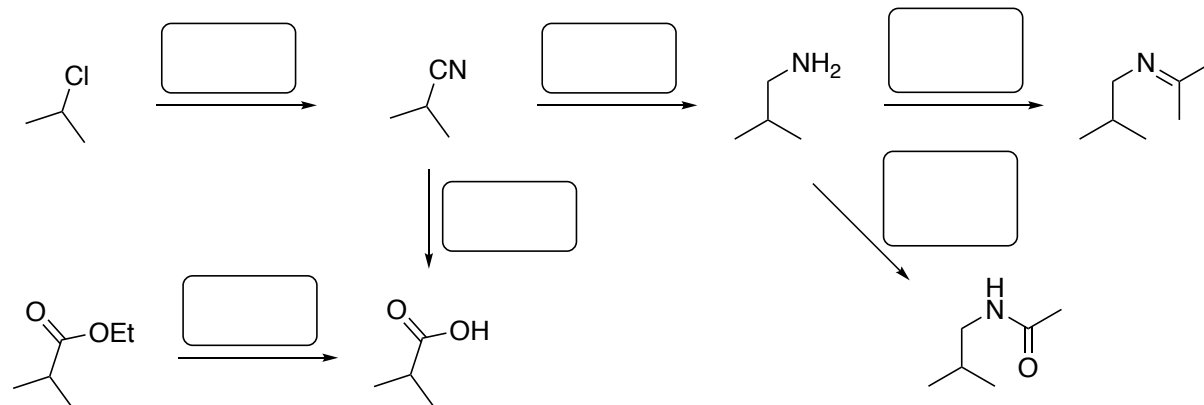
20. An aldehyde is more reactive toward a reducing agent than an ester. For this reason, the following ester can't be selectively reduced by reacting with LAH. Explain (show) how you can make use of a protecting group to achieve the desired transformation. (4 points)



21. What is the product upon hydrolysis of the following hemiacetal? (2 points)



22. Fill in the missing reagents in the synthetic scene below. (2 points each)



23. Draw the structure of the dipeptide that is formed by the DCC coupling of Boc-protected valine and MOM-protected alanine. (3 points)

