

NAME _____

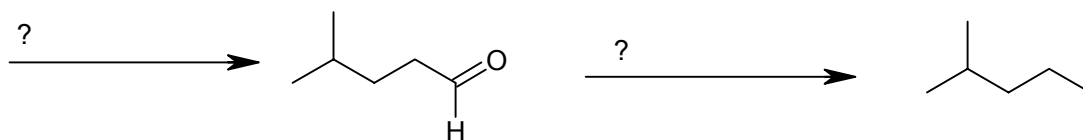
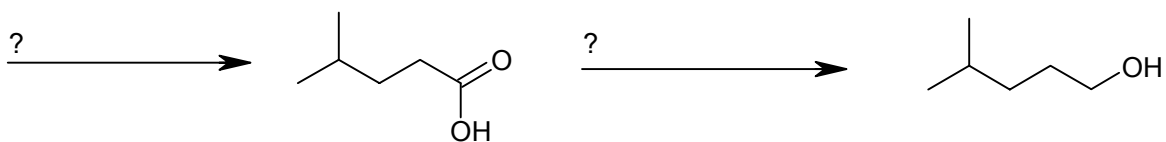
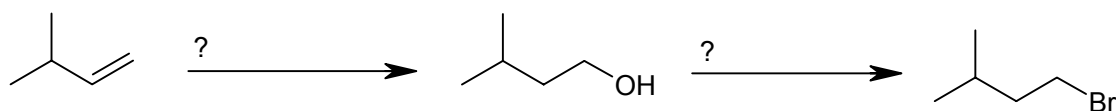
Final Exam, Organic Chemistry II, CHEM 332
Spring 2002, May 17
Section 003, Dr. Sweeting
Full credit on this exam is 200 points
With bonuses and extra credit, it is possible to earn 256.

I anticipate that I will have completed and submitted the grades for the course by Monday 20 May. They should be posted for your perusal within a day. If you wish to learn your final exam grade, you may e-mail me. If you wish to see your final exam, I expect to be in the vicinity of my office M-R from May 27 to July 18; stop by then or in the fall.

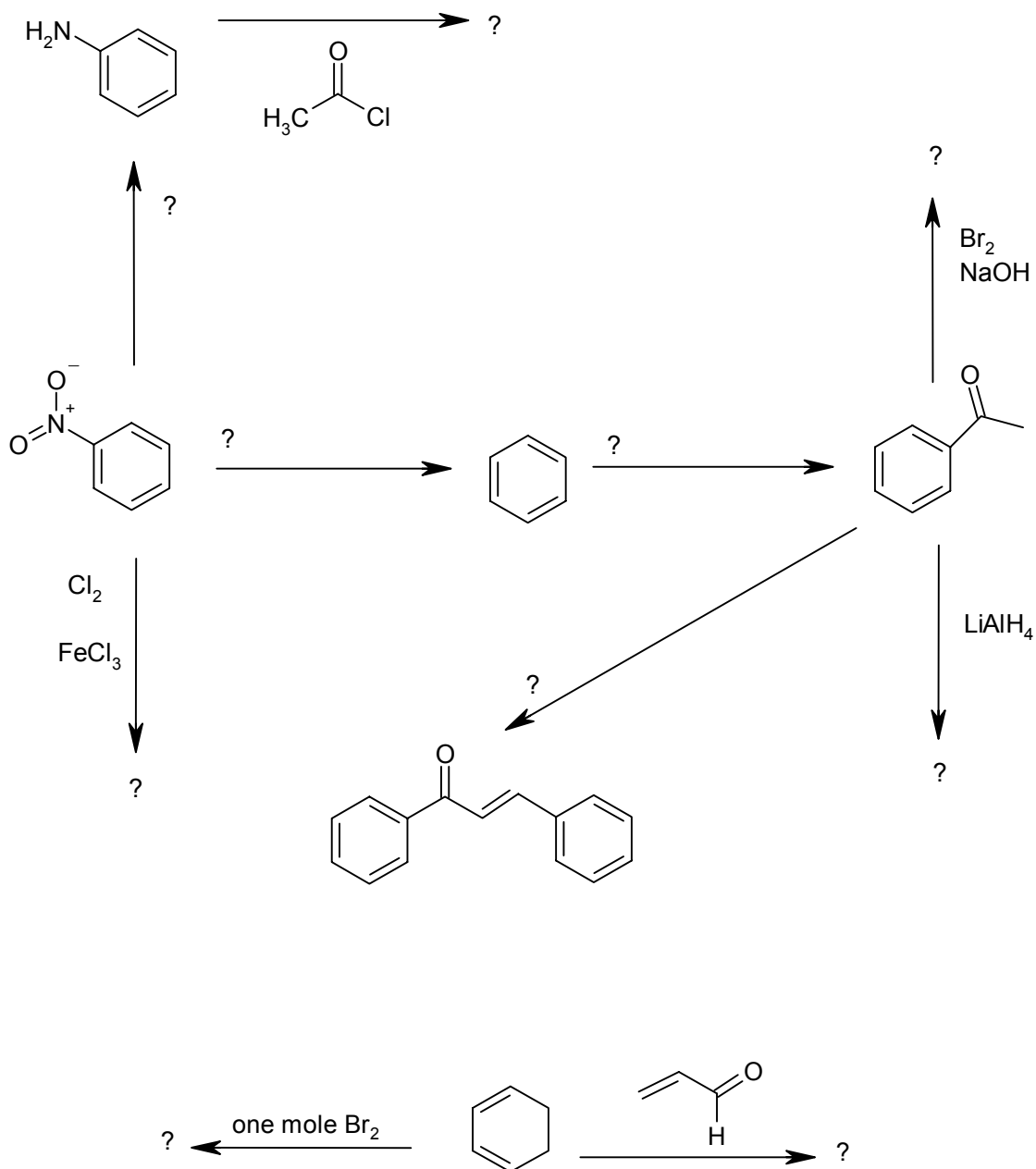
If you are unable to do a problem because of not being able to identify a compound from its name, you may "purchase" the structure from me for 4 points (except in the nomenclature questions).

I wish you all success on this exam and in your future studies. Have a great summer!

1. Identify the missing reagents in the following scheme. More than one reagent or step may be necessary to accomplish some of the transformations; be sure to make the order of multiple steps clear. You need not show the inevitable neutralization step for each reaction. This sequence is McMurry's problem 20.42. (5 points each, 30 points)



2. Identify the missing reagents in the following scheme. More than one reagent or step may be necessary to accomplish some of the transformations; be sure to make the order of multiple steps clear. You need not show the inevitable neutralization step for each reaction. (4 points each, 40 total)

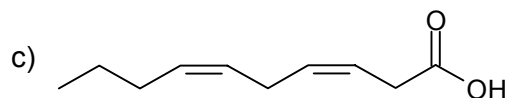
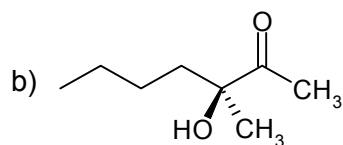
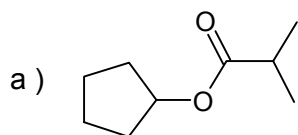


3. Please write the structures of each of these compounds from their IUPAC names (15 points)

a) 2-diethylamino-N-(2,6-dimethylphenyl)acetamide

b) (*R*)-2,3-dihydroxypropanal (D-gyceraldehyde)

4. Please write IUPAC names for each of the following compounds, including stereochemistry where appropriate (25 points):



5. Write the currently accepted mechanisms of two or more of the four reactions below. To get full credit on the exam, you need to earn 30 points on this question. To earn full credit for any mechanism, you must show all the intermediates for which there is some evidence, all proton transfers to and from the organic compounds, and arrows to indicate whether the reaction steps occur at equilibrium or not. Extra credit for additional correct answers.

a) Base-catalyzed reaction of methyl benzoate with methyl hexanoate. Please identify the best catalyst.(10 points)

b) Lewis-acid-catalyzed reaction of acetyl chloride with benzene. Please identify the best catalyst.(10 points)

c) Acid-catalyzed reaction of benzoic acid with 2-propanol to form an ester.(20 points)

d) Acid-catalyzed reaction of cyclohexanone with ethane-1,2-diol (ethylene glycol) to form a cyclic ketal.(20 points)

6. Please explain what the following compounds, reactions or phenomena are, giving an example (with structure) when possible. (5 points each, 30 total)

a) aldopentose

b) polyester

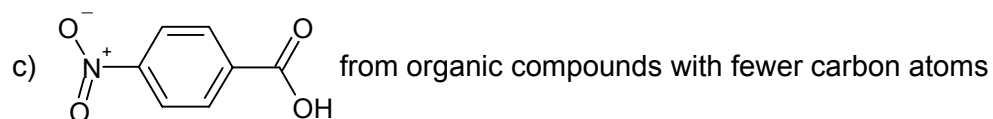
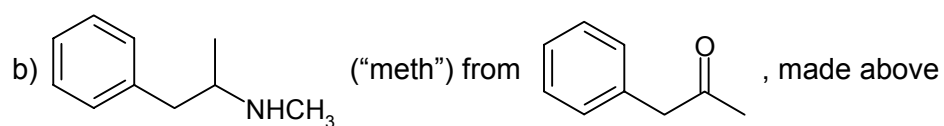
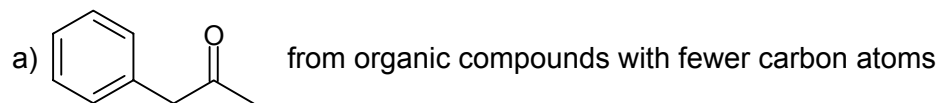
c) diazonium salt

d) lipid

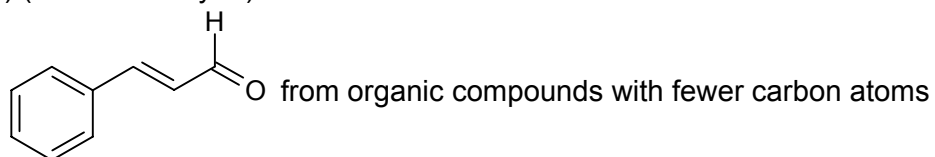
e) neurotransmitter

f) polynuclear aromatic compound

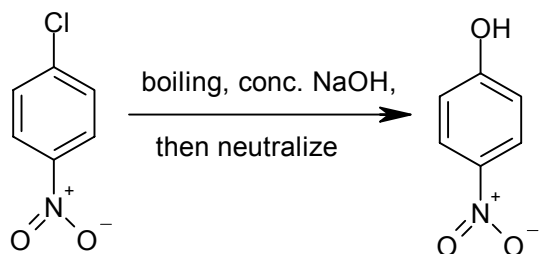
7. Please outline a synthesis of THREE of the following compounds. Additional solutions will earn additional credit. (10 points each)



d) (cinnamaldehyde)



8. BONUS: Aromatic rings with electron-withdrawing substituents can actually react with nucleophiles, by a process called (not surprisingly) nucleophilic aromatic substitution. These reactions are discussed in McMurry but we did not discuss them in class to avoid confusion with electrophilic aromatic substitution. An example of the nucleophilic substitutions is given below.



a) Propose a mechanism for this reaction using your experience with other mechanisms and the identity of the product to help you. (8 points)

b) Under these conditions, *m*-nitrochlorobenzene does not react (it must be heated to about 300 C under about 100 atmospheres of pressure to react). Use the mechanism you have proposed to explain this difference in reactivity. (8 points)