Organic Chemistry 32-335
Exam #4- 2001

Printed Name:_____

Signature:_____

Section#:_____

1. Be sure your exam has 6 pages, including this page.

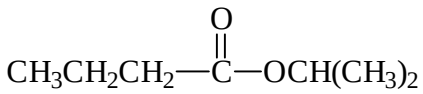
2. Read each problem carefully. Write **clearly;** illegible answers will be considered incorrect.

3. Avoid looking or even glancing at other students' exams.

4. Please leave quietly from the front door.

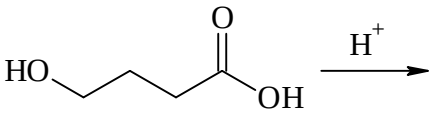
Part 1. (4 points each, circle only one answer for multiple choice questions!)

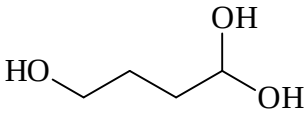
1. Provide an IUPAC name or acceptable structure for the following compounds:

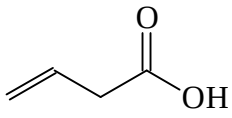
(A) 

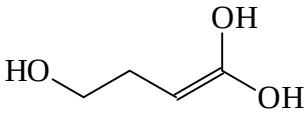
(B) 3-Chloro-2-pentanamine

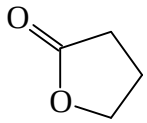
2. The major organic product expected from this reaction is:



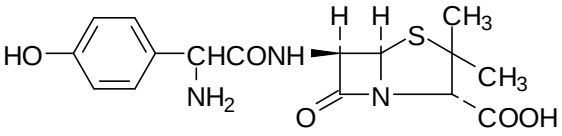
(A) 

(B) 

(C) 

(D) 

3. Amoxicilin is an antibiotic used to treat certain infections. Based on its structure shown here, what type of functional group is NOT present in this molecule?



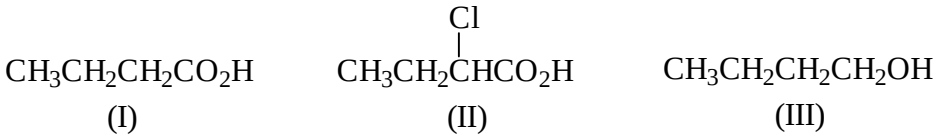
A) an ester B) an amine C) a lactam D) an acid

4. Provide a reagent that allows for successful completion of this reaction:

5. After the above reaction is completed, the basicity of the nitrogen in the product:

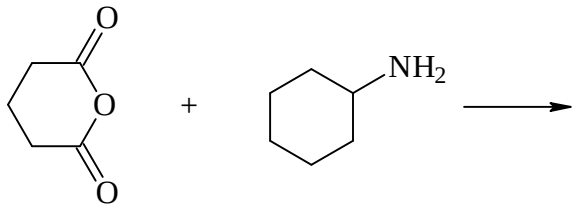
(A) has increased (B) has decreased (C) is unchanged

6. The acidity for these compounds increase in this order (weakest first):

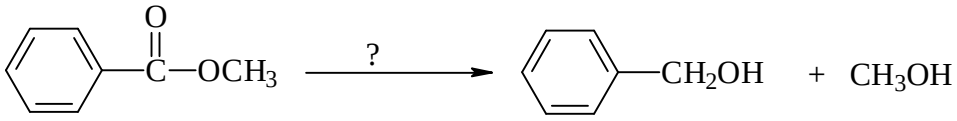


(A) I > II > III
(B) II > III > I
(C) III > I > II
(D) II > I > III

7. Predict the product expected from the following reaction:



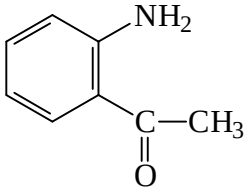
8. Which reaction condition can be used to accomplish the following synthesis?

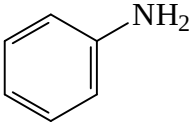


(A) $NaBH_4$, then H_3O^+
(B) H_2, heat
(C) $LiAlH_4$, then H_3O^+
(D) NaOH, heat
(E) $K_2Cr_2O_7$ then H_2O

9. Which of the following is expected to be the least basic?

(A) $CH_3CH_2CH_2NH_2$

(B) 

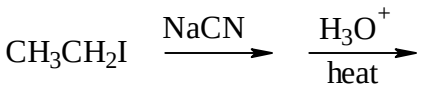
(C) 

(D) $(CH_3)_3N$

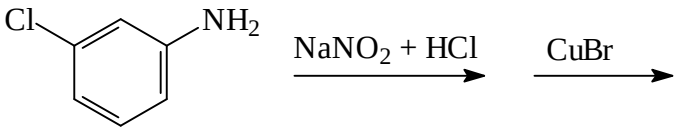
10. The nitrogen in trimethylamine is:

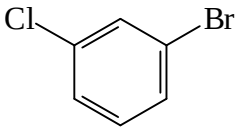
(A) sp^2 hybridized
(B) sp^3 hybridized
(C) sp hybridized
(D) sp^3d^2 hybridized

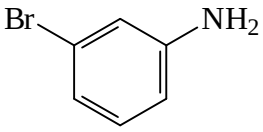
11. Give the final organic product formed following these reaction sequences (hint: draw the intermediate formed)

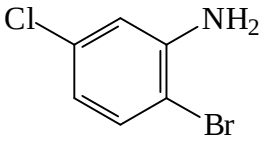


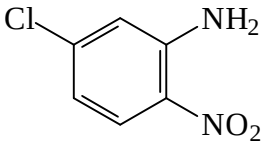
12. Predict the organic product from these synthetic transformation sequence:



(A) 

(B) 

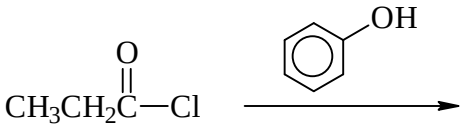
(C) 

(D) 

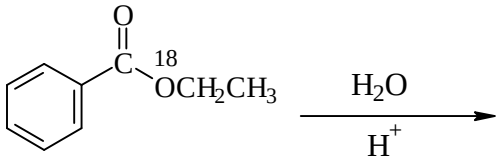
13. The best reagent for separating aniline from toluene in an ether solution is:

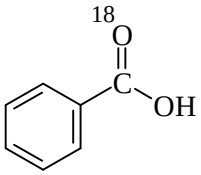
A) 10% NaOH B) 10% HCl C) Saturated $NaHCO_3$
D) Distilled H_2O

14. Predict if the following reaction can proceed as written. If the reaction cannot proceed, simply write "No Rxn" in the box. If yes, draw the organic product.

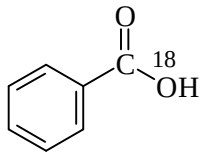


15. Based on the mechanistic approach in Chapters 20-21, which of the following products is most likely to be obtained from this reaction?

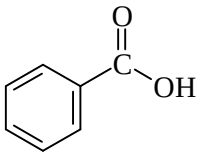




(A)



(B)

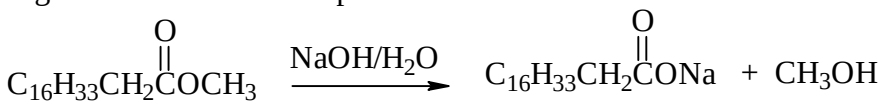


(C)

(D) None of the above

Part 2. (40 points)

1. (14pts) Saponification is a process used in the ancient time "to make soap". The following shows one such example.



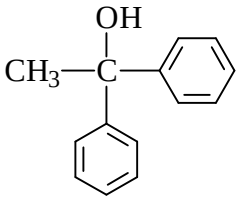
(A) Write a plausible, step-by-step mechanism to account for the product formation.

(B) Is NaOH a catalyst in this reaction? Briefly explain.

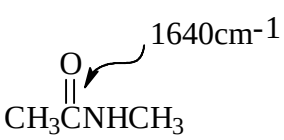
(C) Unlike acid catalyzed esterification which has a low yield due to reversible equilibrium, the yield of this process is very high. For each step you wrote in (A), indicate which one is not reversible.

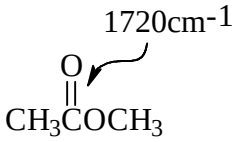
2. (4pt) Acetic acid has a b.p. higher than that of 1-propanol. Explain why.

3. (12 points) Design a feasible synthetic approach to the following target compound, starting from bromobenzene and phenylacetate. Be sure to show detailed steps and indicate reagents needed for each one.



4. (4pt) The amide shown below has a lower C=O stretching frequency ($1680cm^{-1}$) than the ester ($1720cm^{-1}$). Provide an explanation.





5. (6 points) In the Mass Spectrum of ethyl propyl amine, the base peak shows up at m/z=58. Show how the fragmentation occurs and explain why the ion at m/z=58 is so stable. (Problem 19-10)