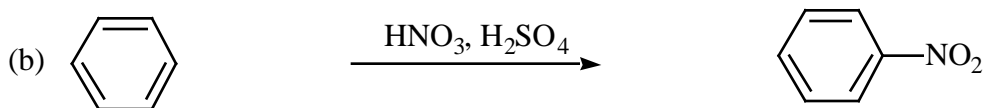
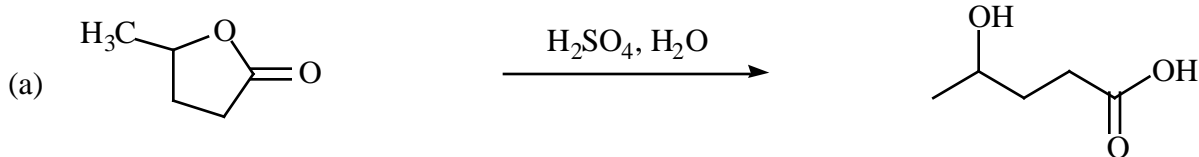


Chemistry 2522, Spring Semester 2000
Sample Midterm 2 Exam

Chapters 17-22 through p. 867 of Brown & Foote text

This exam has 6 problems (100 pts) on 4 pages. Make sure your copy is complete and correct.
Answer key is available in PDF format at: www.d.umn.edu/~vzhdanki/2522/

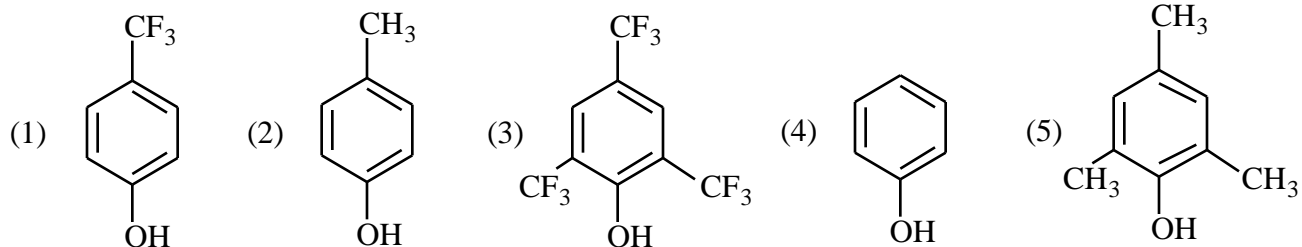
1. (20) Using **curved arrows** and showing the structure of the **intermediates**, write **mechanisms** that account for the products in the following reactions (10 pts each):



2. (17 pts) (a) (6 pts) Arrange the following compounds in order of **increasing acidity**:

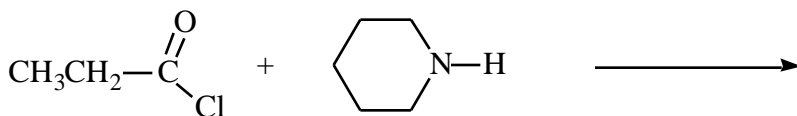
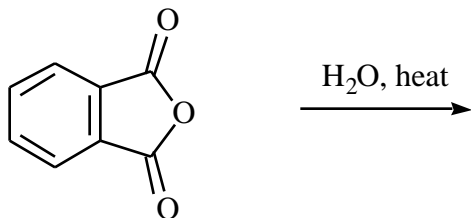
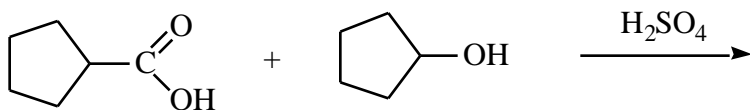
- (1) CF_3COOH , (2) CBr_3COOH , (3) Cl_3COOH , (4) $\text{CH}_3\text{CH}_2\text{OH}$, (5) $\text{CH}_3\text{CH}_2\text{COOH}$,
 (6) CH_3COOH

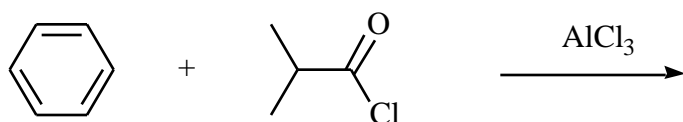
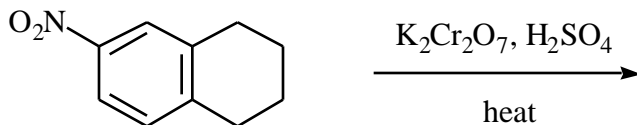
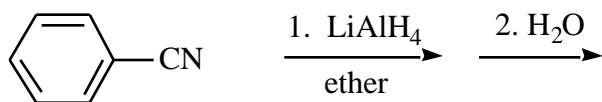
(b) (5 pts) Arrange the following **phenols** in order of **increasing acidity**:



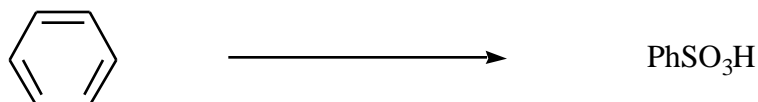
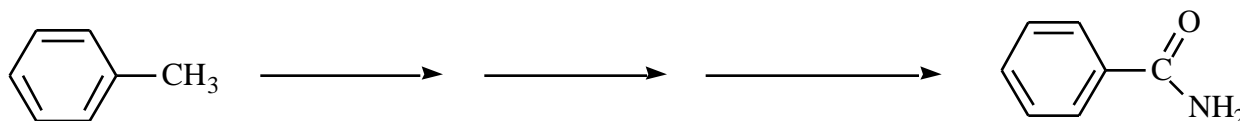
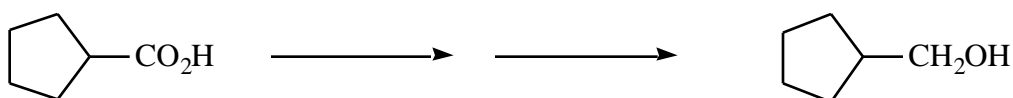
(c) (6 pts) Draw the important resonance contributor of ***o*-nitrophenolate anion** that explains the **high acidity** of *o*-nitrophenol:

3. (18; 3 pts each) Complete the following equations:

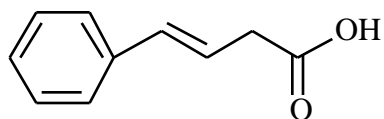




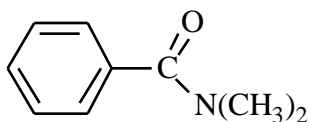
4. (12) Give the **reagents on the arrow** that can be used to convert the reactant to the indicated product in high yield. (2 pts each reagent)



5. (18) Give either the **IUPAC name** (including *E*, *Z* designation, when appropriate) or the **correct structure** for each of the following compounds (3 pts each).

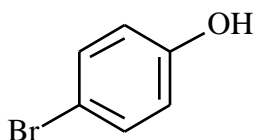


3-oxopentanoic acid



o-chlorotoluene

3,5-dinitrobenzoic acid

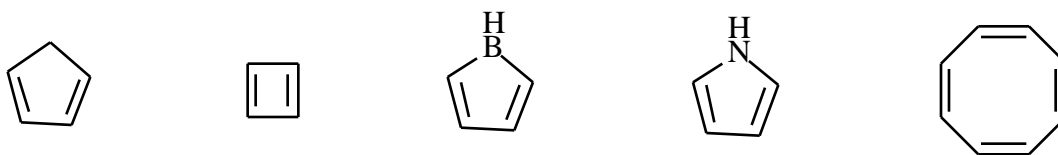


6. (15, 5 pts each) For each of the following questions (a)-(c) **circle** the item that is the correct answer.

(a) Which one of the following compounds has the **highest** reactivity in **nucleophilic acyl substitution**?

acetic anhydride 4-butanolactone benzamide ethyl acetate *N*-methyl formamide
succinimide

(b) Which one of the following molecules is **aromatic** according to the Hückel criteria?



(c) Which of the following compounds has the **highest** boiling point?

ethanal ethane ethanol benzene acetic acid propanone cyclohexane