

COLUMBIA UNIVERSITY

Chemistry S3444 Org Chem II Prof. I.J. Borowitz
 Summer 1992 Exam. No. 2: Tu July 28, 1992

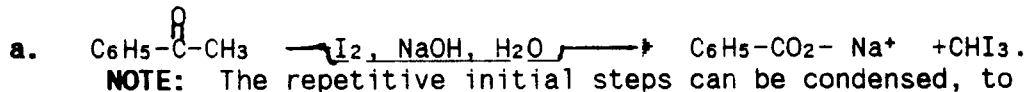
NAME: _____

Please use a non-red pen. Answer questions in the provided space. If you write any answers on the back of the page, indicate this on the front of that page. **Good Luck!**

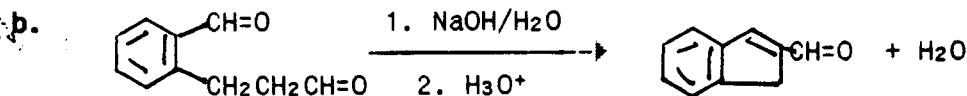
Note: **Points** appear in parentheses and margin.

Question	max. pts.	points
1. 6 + 5 + 5	= 16	
2. 6 x 3	= 18	
3. 3+3+5+6	= 17	
4. 5 + 10	= 15	
5. 3+3+4+8+2	= 20	
6. 2+2+2 +8	= 14	
TOTAL	100	

1. (16) Give the detailed mechanisms for the following reactions. Use arrows to show electron flow. Show each step separately.

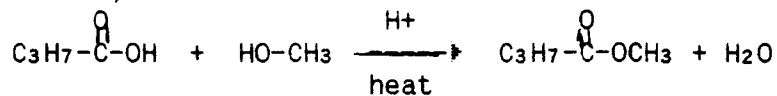


6pt



5pt

1c. Mechanisms, cont'd

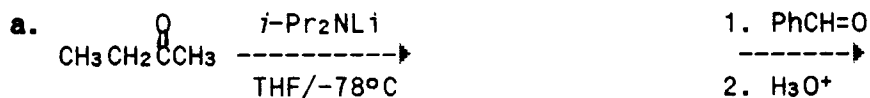


5 pt

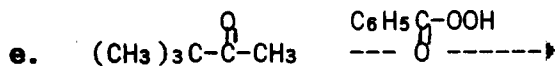
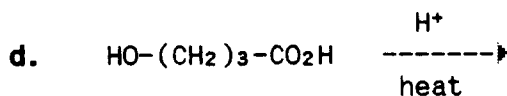
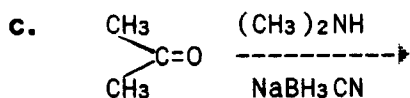
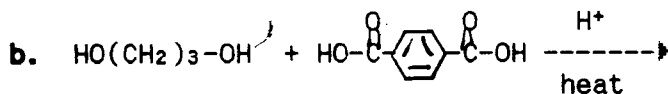
Graders: Add pts for 1a, 1b to 1c here:

2. Fill in the missing reagents or major organic products for each of the following reaction sequences.

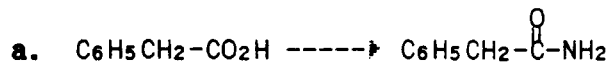
(18)



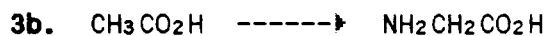
3 pt each



(17) 3. Do the following transformations writing the structures of all necessary organic / inorganic reagents. More than one step may be necessary.



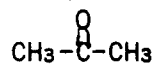
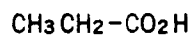
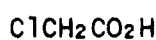
3pt



3pt

3c. Rank the following compounds: strongest (# 1) to weakest (# 5) acidity:

5pt



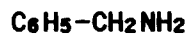
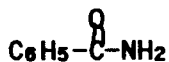
d. Explain your ordering with words and by writing structures including resonance and/ or inductive effects for **three** of the above structures:

6pt

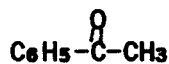
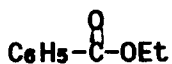
4. (15) Distinguish between the members of **each** of the following pairs of compounds by the requested number of chemical tests or reactions. Write structures of all organic and inorganic products for reactions or tests and also **observations** for the tests (what would you see). Write what happens, if anything, to each compound in the pair.

(5) a.

One test or reaction



(10) b. Two tests or reactions (or one of each)



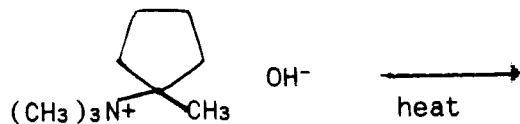
(20) 5. a. Simple enols are less stable than the tautomeric keto forms because (circle one correct answer):

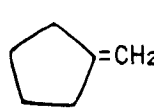
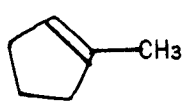
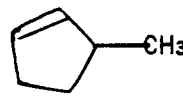
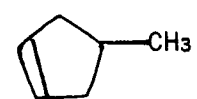

1. severe angle strain exists in the enol form
2. fewer atoms are coplanar in the keto form
3. the enol cannot be chiral
4. the C=C π bond is weaker than the C=O π bond

3pt

b. Which compound is the major product in the Hofmann elimination of applied to:

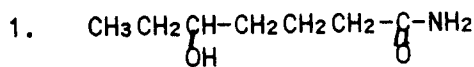
3pt



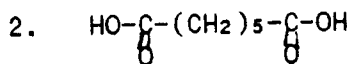
1. 
2. 
3. 
4. 
5. 

c. Write IUPAC names (with numbering) for the following molecules:

2pt



2pt



d. Using any necessary organic/ inorganic reagents, write TWO DIFFERENT methods for converting $\text{C}_6\text{H}_5-\text{CH}_2-\text{Br}$ to $\text{C}_6\text{H}_5-\text{CH}_2-\text{CO}_2\text{H}$.

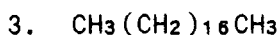
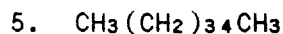
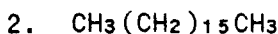
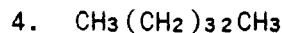
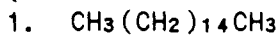
4pt x 2
= 8pt

e. Which one of the following sets of conditions can be used to carry out the conversion of $\text{CH}_3\text{CH}_2-\text{CO}_2\text{H} \longrightarrow \text{CH}_3\text{CH}_2-\text{NH}_2$ (circle correct answer):

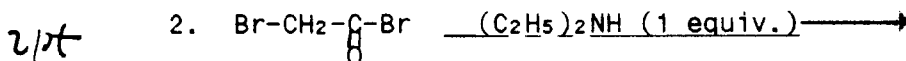
2pt

1. SOCl_2 ; then NH_3 ; then H_3PO_2
2. CH_3Li ; then NH_3 , H_2 , Ni
3. SOCl_2 ; then NH_3 ; then Br_2 , NaOH , H_2O
4. PCl_5 ; then NH_3 ; then HCl , NaNO_2
5. PCl_5 ; then CH_3NH_2 ; then KMnO_4 , OH^- , H_2O , heat

6. (14) a. When the Kolbe electrolysis procedure is applied to an aqueous solution of potassium stearate $\text{CH}_3(\text{CH}_2)_{16}\text{CO}_2^- \text{K}^+$, there is produced (circle one correct answer):



b. Write the required organic/inorganic reagents or the major reaction products for the conversions:



Write the structure of a real example of each of the following groups of compounds. Use real groups, not "R".

c. a lactam

d. an isocyanate

e. an amine which gives a benzene-sulfonamide that is **not soluble** in $\text{NaOH}/\text{H}_2\text{O}$.

f. a dicarboxylic acid that forms a cyclic anhydride upon heating

SCRAP

SCRAP