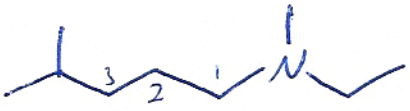
Jasperse
Chem 360
Test 4
Version 3
Answers

JASPERSE CHEM 360 TEST 4 VERSION 3
Ch 19-21 Amines, Carboxylic Acids, Carboxylic Acid Derivatives

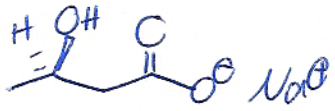
1. Nomenclature. Provide Either the Name or the Structure for the Following Chemicals. (10 points)

a. N-ethyl-N-methyl-4-methyl-1-pentanamine

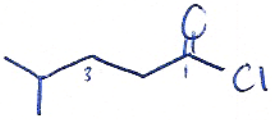
N-ethyl-N-methyl-4-methylpentan-1-amine

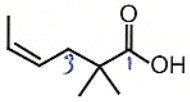


b. sodium (R)-3-hydroxybutanoate



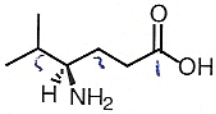
c. 4-methylpentanoyl chloride



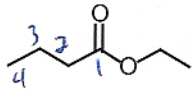
d. 

cis-2,2-dimethyl-4-hexenoic acid

(Z) (Z)-2,2-dimethylhex-4-enoic acid

e. 

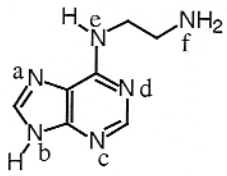
(R)-4-amino-5-methyl hexanoic acid

f. 

ethyl pentanoate

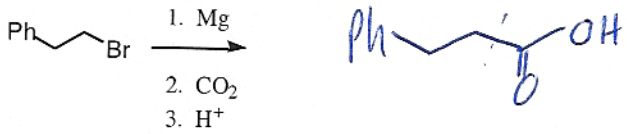
Oops! Ethyl butanoate, not pentanoate

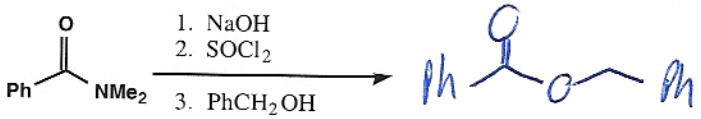
2. For each nitrogen a-f, identify the hybridization of the nitrogen atom, and identify the hybridization of the nitrogen lone pair. [Adenine is an important player in information transfer (DNA, RNA, genetics, etc.) and energy storage/release (ATP/ADP).]

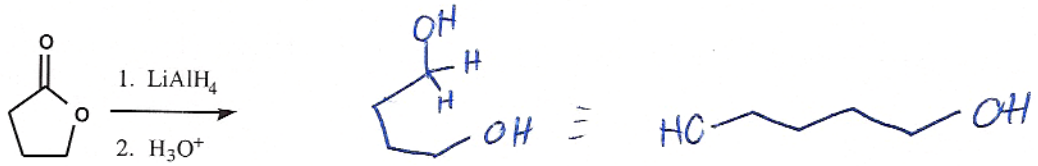


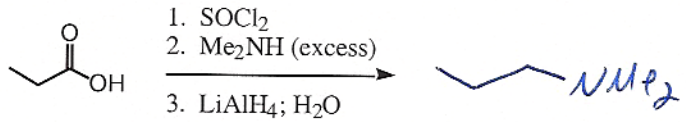
Nitrogen Atom	Hybridization of the Nitrogen Atom	Hybridization of the Nitrogen Lone Pair
a	sp^2	sp^2
b	sp^2	p
c	sp^2	sp^2
d	sp^2	sp^2
e	sp^2	p
f	sp^3	sp^3

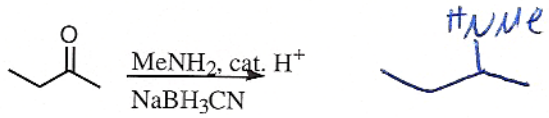
3. Synthesis Reactions. Draw the feature product of the following reactions (need not show any byproducts). (15 points)

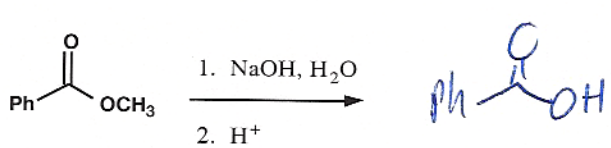
a. 

b. 

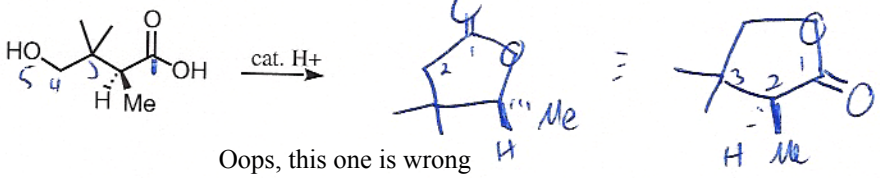
c. 

d. 

e. 

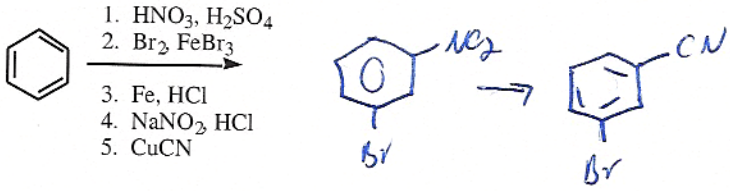
f. 

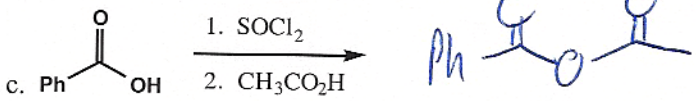
4. Synthesis Reactions. Draw the feature product of the following reactions (need not show any byproducts). (15 points)

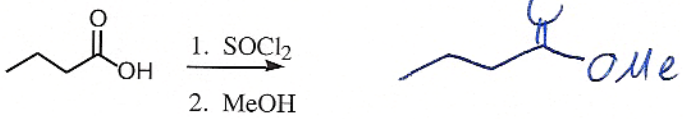
a. 

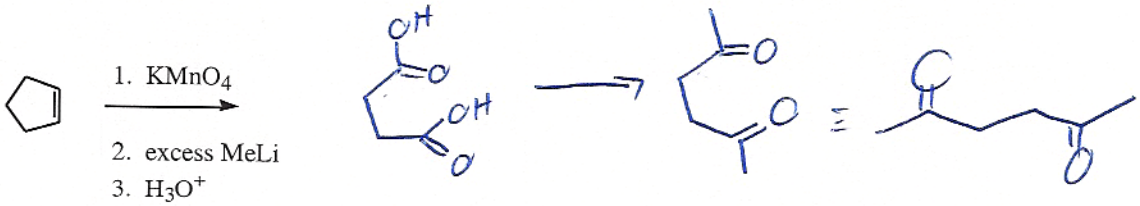
Oops, this one is wrong the methyl should be on the back of carbon 2 next to the carbonyl

note: easiest to get stereo right if you keep chiral C in original orientation

b. 

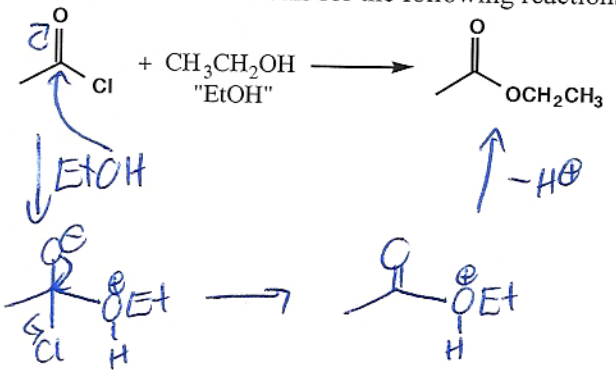
c. 

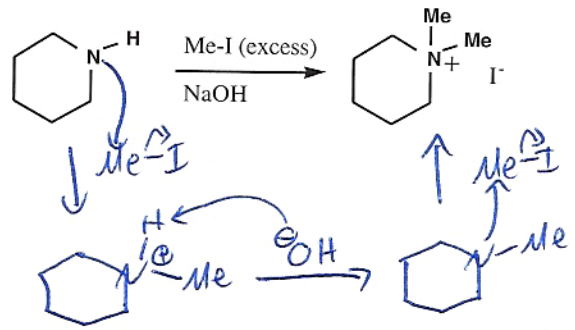
d. 

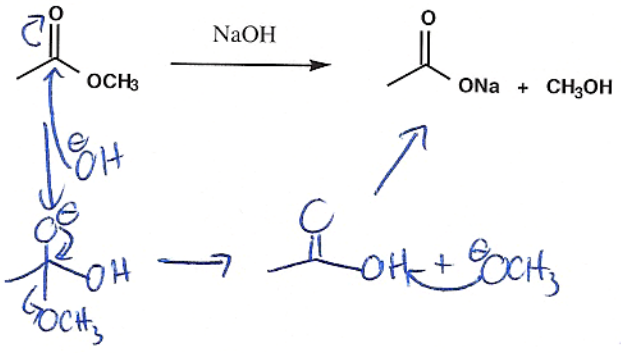
e. 

Oops! These answers are each short one carbon!

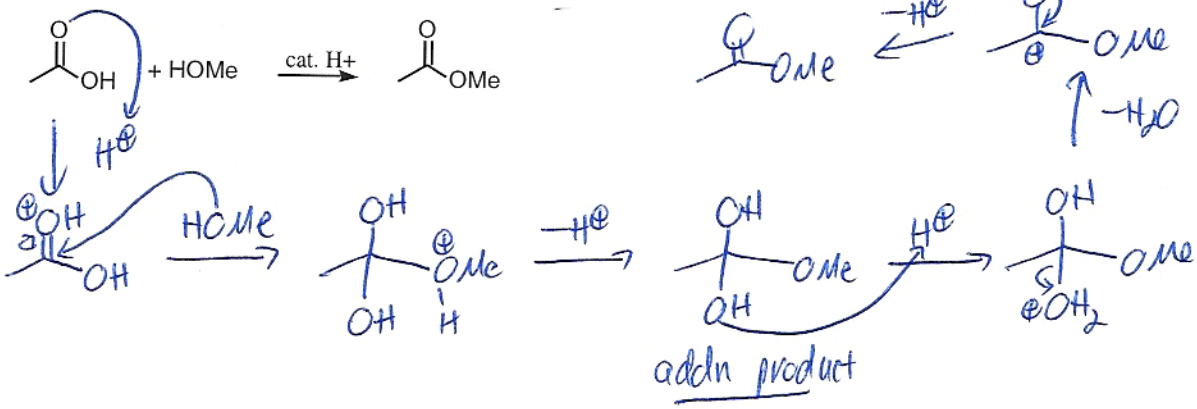
5. Draw the mechanisms for the following reactions. (5 points)



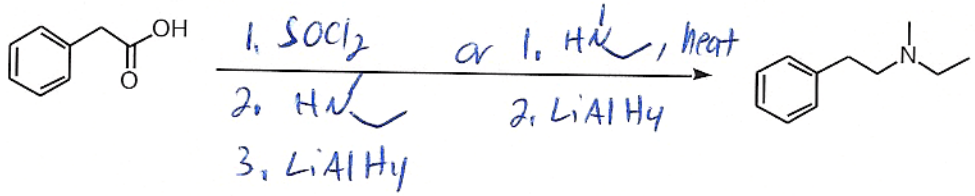


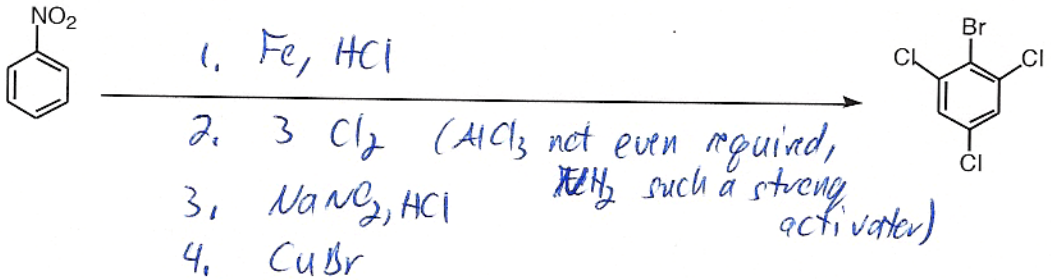


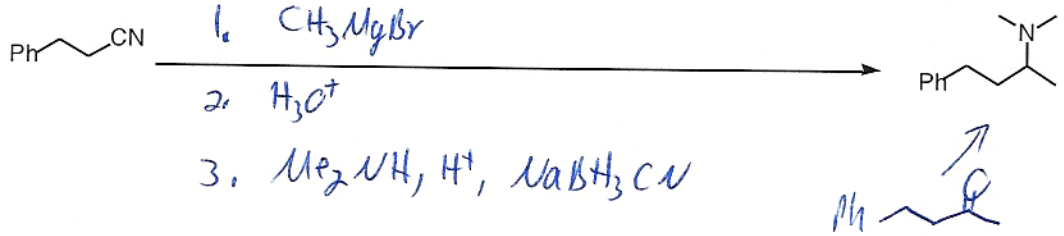
$Na^{\oplus}$ is a spectator counterion. Needs no consideration in mech.

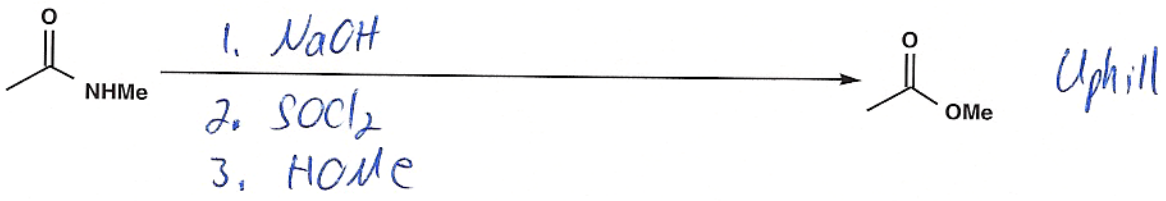


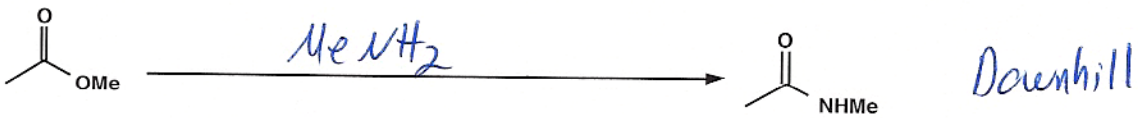
6. Provide Reagents for the following Transformations (15 points)









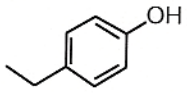


7. Which, when dissolved in diethyl ether, will: (5 points each)

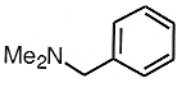
a) Extract into $NaOH/H_2O$? A + D (resonance)

b) Extract into HCl/H_2O? B

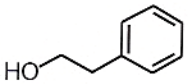
c) Extract into water? None



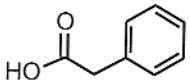
A



B



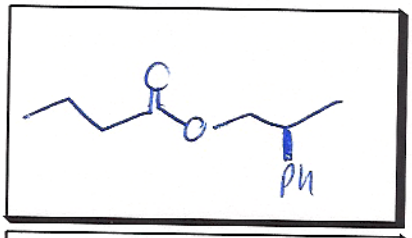
C



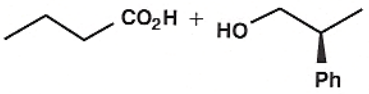
D

8. Hydrolysis Reactions. Draw the starting materials for the following hydrolysis reactions. (6 points)

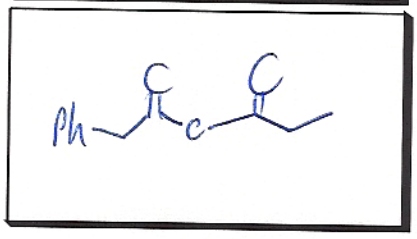
a.



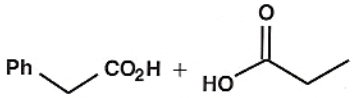
1. $NaOH, H_2O$
2. HCl



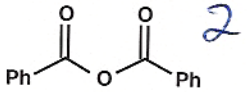
b.



1. $NaOH, H_2O$
2. HCl

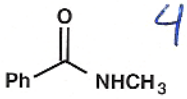


9. Rank the following according to their reactivity toward $NaOH/H_2O$ hydrolysis.



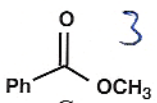
2

A



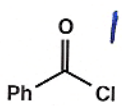
4

B



3

C



1

D

Given the structures **A-D** above, which of the following reactions will proceed spontaneously? (2 points)

A + H_2NCH_3 → **B** Yes

A + $HOCH_3$ → **C** Yes

A + HCl → **D** No

10. Rank the acidity of the following, 1 being most acidic, 3 being least (3 points each)

a. acetic acid vs. water vs. $NH_4^+Cl^-$

1 3 2

b. CH_3OH vs. CH_3NH_2 vs. F_2CHOH

2 3 1

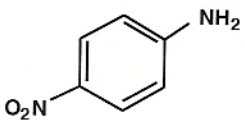
c. p-methoxybenzoic acid vs. benzoic acid vs. acetone

2 1 3

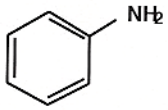
11. Rank the basicity of the following, 1 being most basic, 3 being least (3 points each)

a. CH_3OH vs. $PhNH_2$ vs. CH_3NH_2

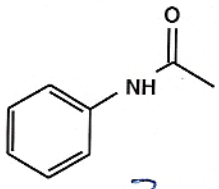
3 2 1

b. 

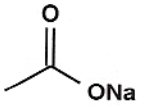
2

vs. 

1

vs. 

3

c. 

2

$(CH_3CH_2)_3N$ 1

H_2O 3