CHM 2220 EXAM 3 July 6, 2017

Last Name (printed): Bhagirath First Name (printed): Neha

Access ID (ex. xx1234) fv6870 Section: 002 004 005 006 007 008 009 (ENG)

You must have the correct section number to earn credit for your exam.

Signature: Neha B.

Academic Integrity Pledge

During the exam I will

- turn off my cell phone and put it away (out of sight and not on my person)
- close all books, notebooks, etc. and put them under the seat in which I sit
- keep my eyes down and focused on my own paper
- keep my answers covered
- sit in the area assigned to my section

I will stop writing when time is called.

I will hand in my paper when told to do so.

During the exam I will not

- have any papers other than those provided
- have any writing on my clothing or person or desk
- talk to anyone other than the instructor

I understand that the ***minimum consequence*** of any behavior contrary to this pledge is that I will receive a ***zero on this exam*** that will not be replaced by the percent earned on my final exam.

Name (sign) Neha B.

Scoring

Please write the answers to the multiple choice questions here.

1. C	5. D	9. B	13. A	17. B
2. E	6. D	10. C	14. C	18. B
3. B	7. A	11. C	15. E	19. A
4. A	8. B	12. E	16. B	

MC Ques 51 / 57 points

Page 8 20 / 20 points

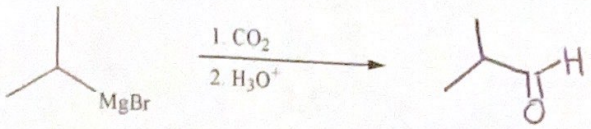
Page 9 4 / 12 points

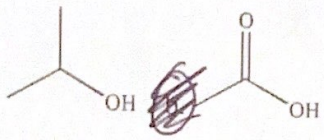
Page 10 12 / 18 points

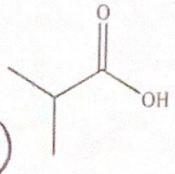
Total 87 / (100 points)

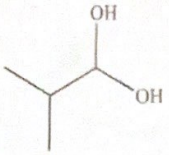
91

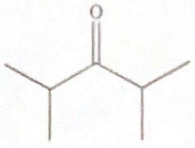
1. Predict the product of the following reaction.



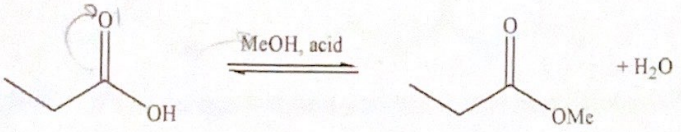
a. 

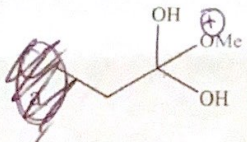
c. 

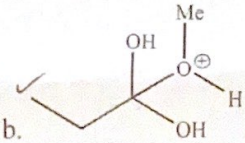
d. 

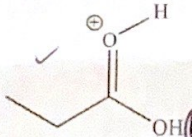
e. 

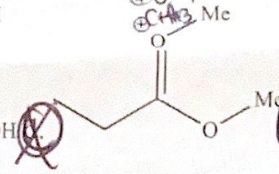
2. Which of these structures is not a mechanistic intermediate in acid-catalyzed esterification of a carboxylic acid?

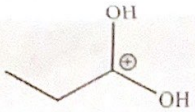


a. 

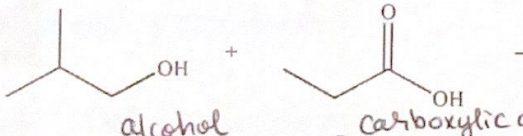
b. 

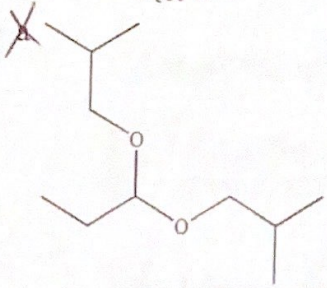
c. 

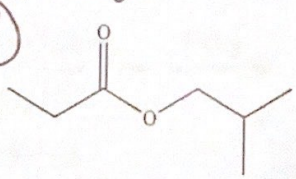
d. 

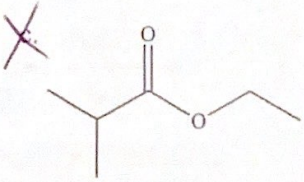
e. 

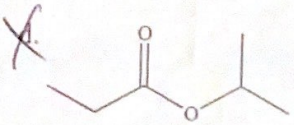
3. Predict the major organic product of the following reaction.

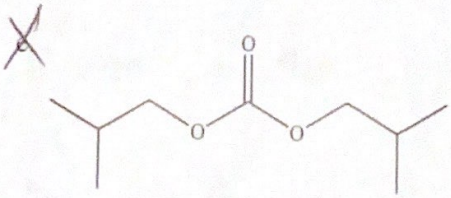


a. 

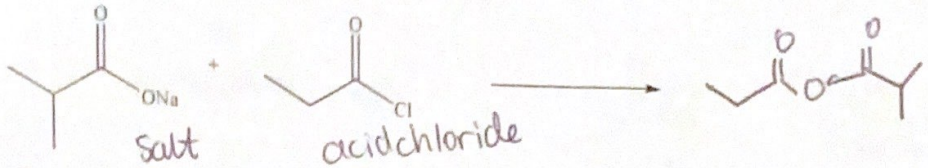
b. 

c. 

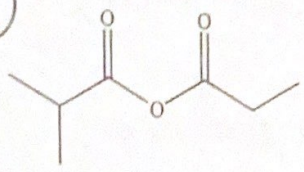
d. 

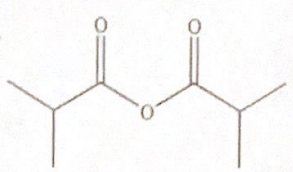
e. 

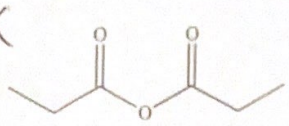
4. What is the major organic product of the following reaction?

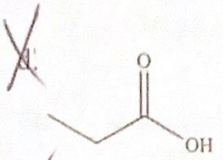


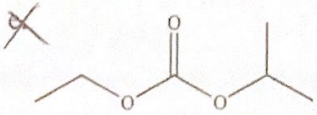
a.

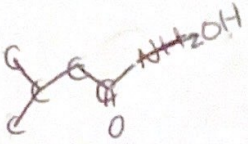




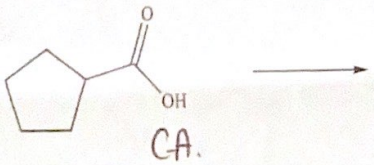








5. Which reagent would you use to accomplish the following transformation?



CA.

Ketone

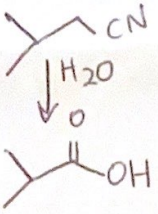
a. $LiAlH_4$

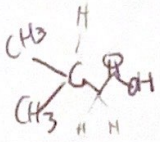
b. CH_3Br, then H_3O^+

c. 1 equiv. CH_3Li, then H_3O^+

d. 2 equiv. CH_3MgBr, then H_3O^+

e. CH_3OH and trace H_2SO_4





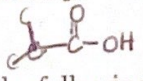
6. What is the product of the following sequence of reactions?

D

$$(CH_3)_2CHCO_2H \xrightarrow[(2)\ H_2O]{(1)\ LiAlH_4} \xrightarrow{PBr_3} \xrightarrow[DMSO]{KCN} \xrightarrow[heat]{H_2O,\ H^+}$$

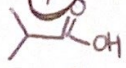
a. $(CH_3)_2CHCH_2CH_2NH_2$

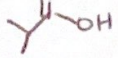
b. $(CH_3)_2C{=}CHCO_2H$

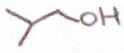


c. $(CH_3)_2CHCHBrCO_2H$

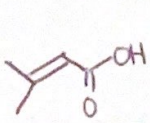
d. $(CH_3)_2CHCH_2CO_2H$

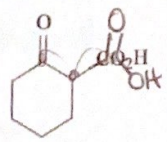




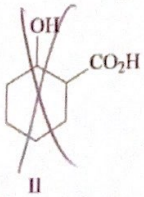


7. Which of the following undergo decarboxylation upon heating?

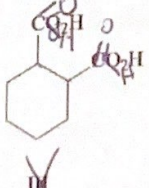




I



II



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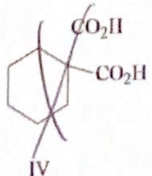
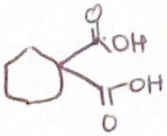
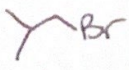
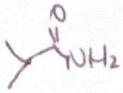


IV







A) I and IV B) I and III C) II and III D) III and IV

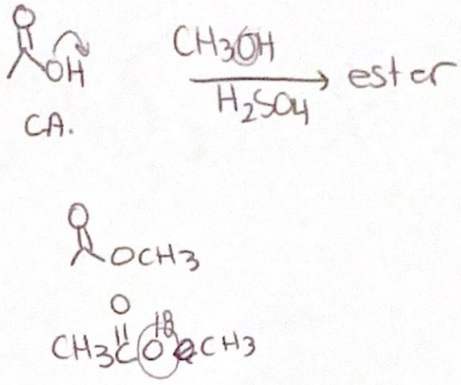
8. Reaction of acetic acid, CH_3CO_2H, with isotopically labeled $CH_3{}^{18}OH$ and catalytic sulfuric acid gives:

A) $CH_3C(={}^{18}O)OCH_3 + H_2O$

B) $CH_3C(=O){}^{18}OCH_3 + H_2O$

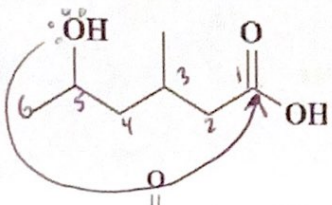
C) $CH_3C(=O)OCH_3 + H_2{}^{18}O$

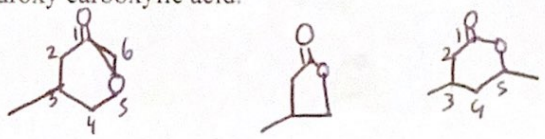
D) equal amounts of A and B



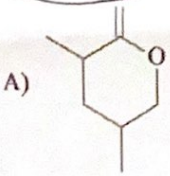
9. Identify the lactone formed by the following hydroxy carboxylic acid.

cyclic esters





A)



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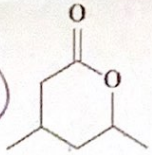
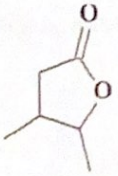
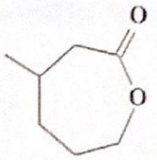


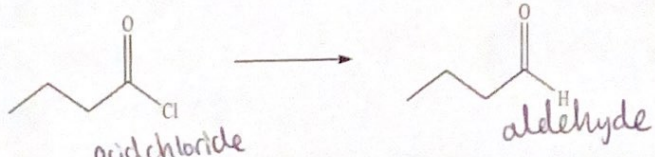
C)



D)



10. Which of the following reagents would you use to accomplish this transformation?



a. $LiAlH_4$

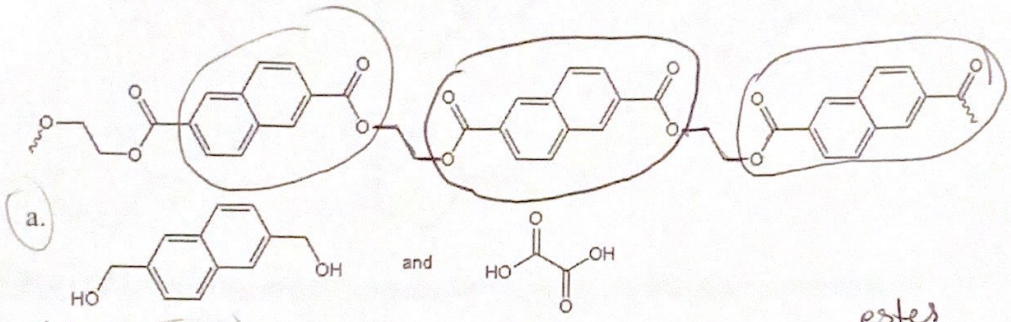
b. Me_2CuLi

c. H_2/Pd, quinoline, $BaSO_4$

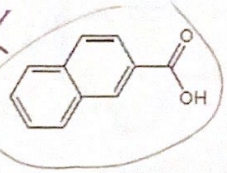
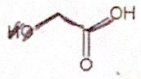
d. CH_3MgBr

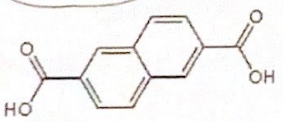
e. H_2O

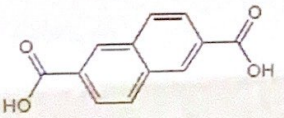
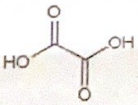
1. Which pair of starting materials is needed to make Pentex™ polymer, whose structure fragment is shown below?

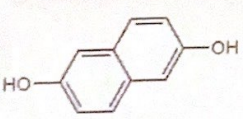


a. and

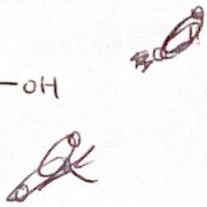
 and 

c.  and 

 and 

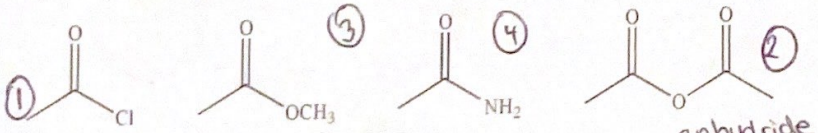
 and 

esters



ester + alcohol

2. Place the following compounds in order of increasing resonance stabilization.



I acid chloride most unstable so most reactive II ester III amide IV anhydride

a. III < II < IV < I

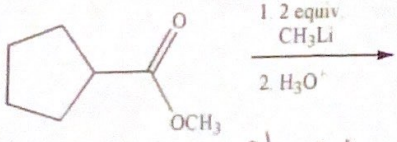
b. III < IV < II < I

c. I < IV < II < III

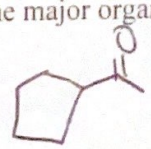
d. IV < I < II < III

e. I < IV < III < II

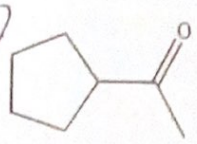
3. Which of the following compounds is the major organic product of the reaction conditions shown?

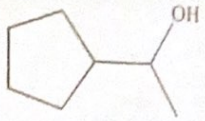


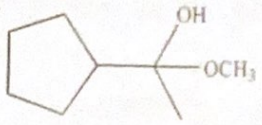
1. 2 equiv CH_3Li
2. H_3O^+

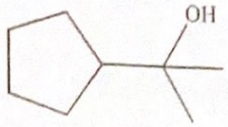


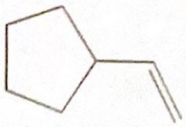
ester + → ketone

a. 

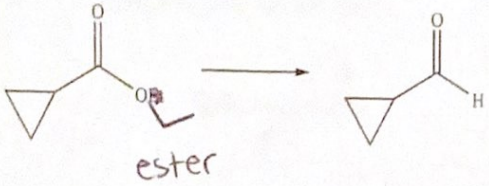
b. 

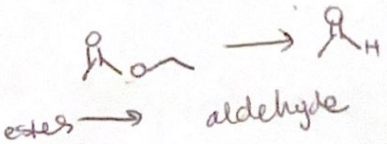
c. 

d. 

e. 

14. Which of the following reagents would you use to accomplish this transformation?





a. $NaBH_4$

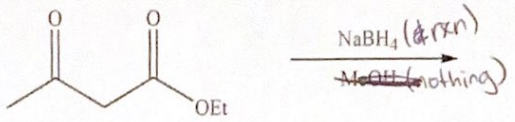
b. $LiAlH_4$

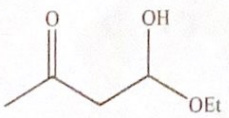
c. DIBAL-H

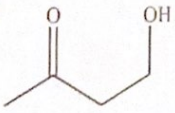
d. H_2

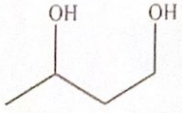
e. H_3O^+

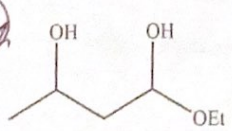
15. What is the product of the reaction conditions shown?

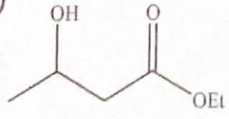


a. 

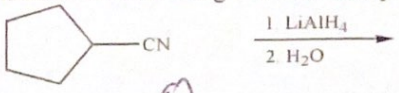
b. 

c. 



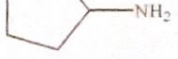
e. 

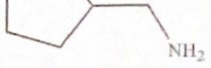
16. Which of the following is the correct product of the reaction conditions shown?

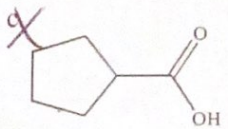


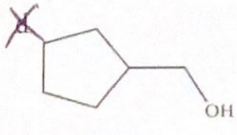
Nitrile $LiAlH_4$ → amine

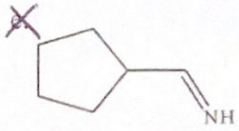
~~Aldehyde~~

a. 

b. 







Salt
CA → acid chloride

17. Which of the following has the fastest rate of hydrolysis using H_3O^+ to give acetic acid (CH_3CO_2H)?

A) CH_3COCCH_3 (O O)

B) CH_3CCl (O)

C) $CH_3COCH_2CH_3$ (O)

D) CH_3CNH_2 (O)

acid chloride
anhydride
ester
amide

amide ? H_3O^+ → CH_3–C(=O)–OH

D) amide NH_2 B) acyl. $-Cl$ A) anhy.

18. Which of the following best represents a mechanistic step in the acid-catalyzed hydrolysis of acetonitrile?

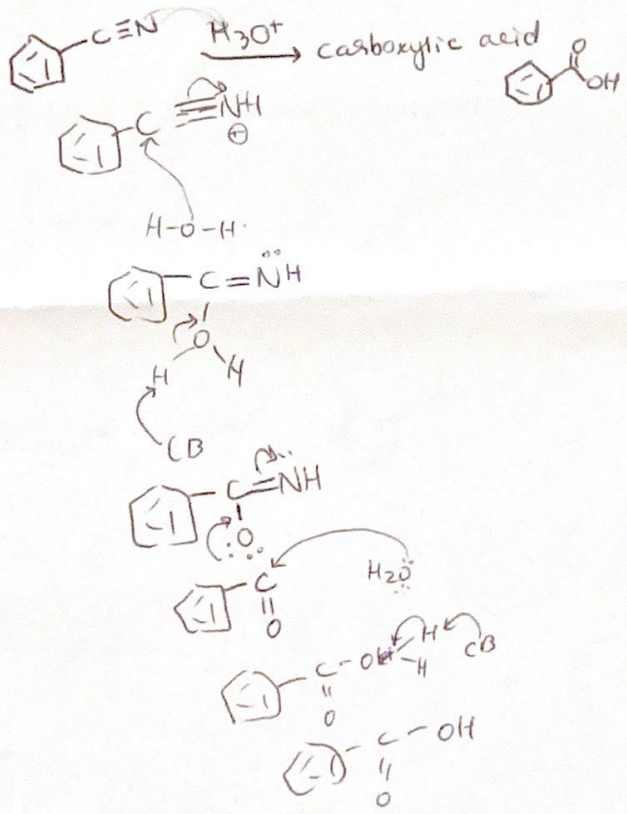
C) ester

A) $H_3C-C\equiv N:$ with $H-\ddot{O}:$ H

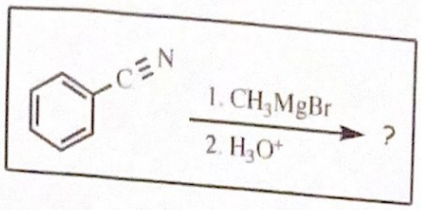
B) $H_3C-C\equiv N^+-H$ with $H-\ddot{O}:$ H

C) $H_3C-C\equiv N:$ with $H-\ddot{O}:^-$

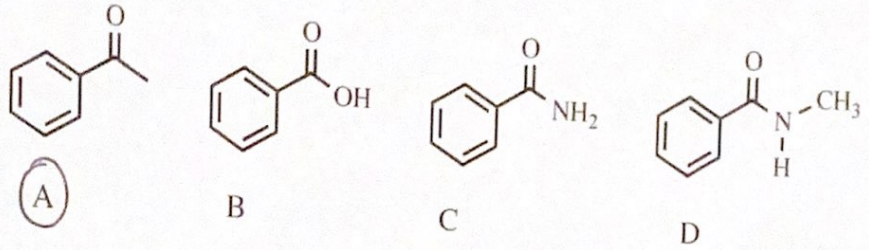
D) $H_3C-C\equiv N:$ with $H-\ddot{O}:$ H



19. What major product is formed in the reaction shown?



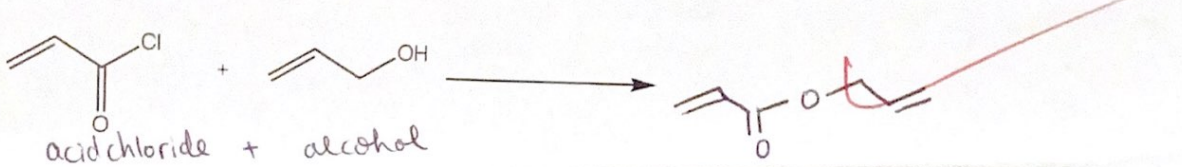
ketone



A B C D

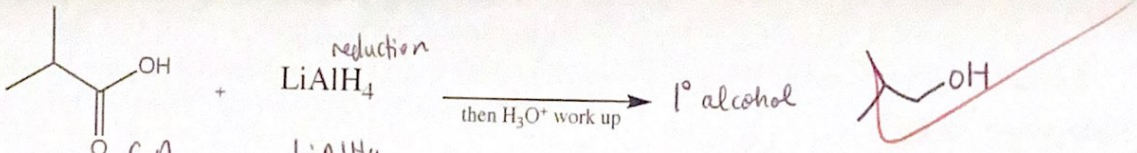
Write the major organic product formed in the following reactions. Write NR if you expect NO REACTION to occur. (4 points each)

20.



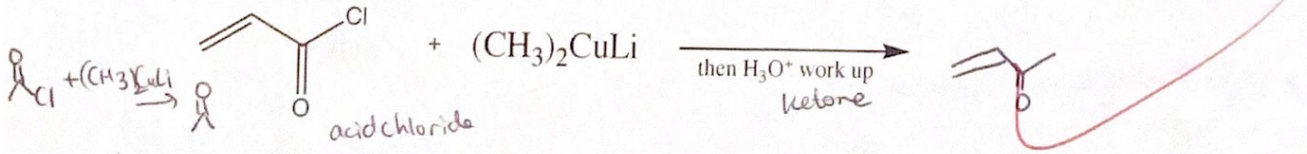
acid chloride + alcohol

21.



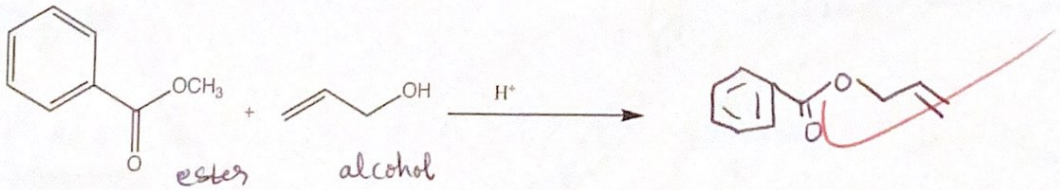
C.A. $LiAlH_4$

22.



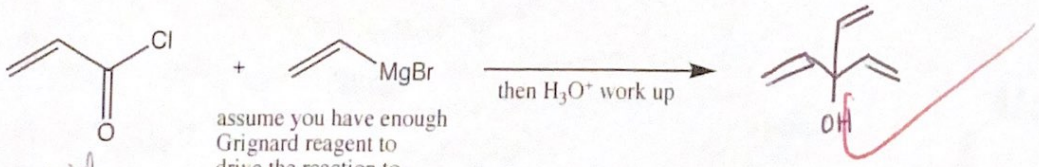
acid chloride

23.



ester alcohol

24.

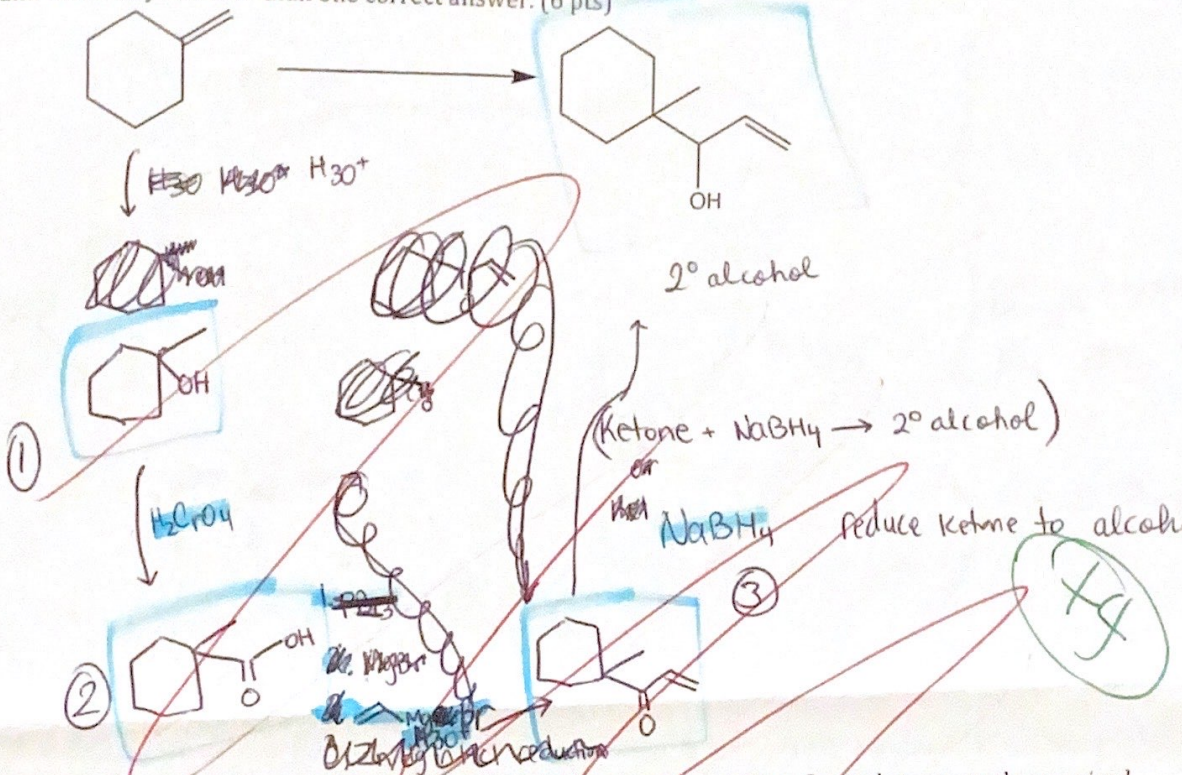


acid chloride

assume you have enough Grignard reagent to drive the reaction to completion

grignard

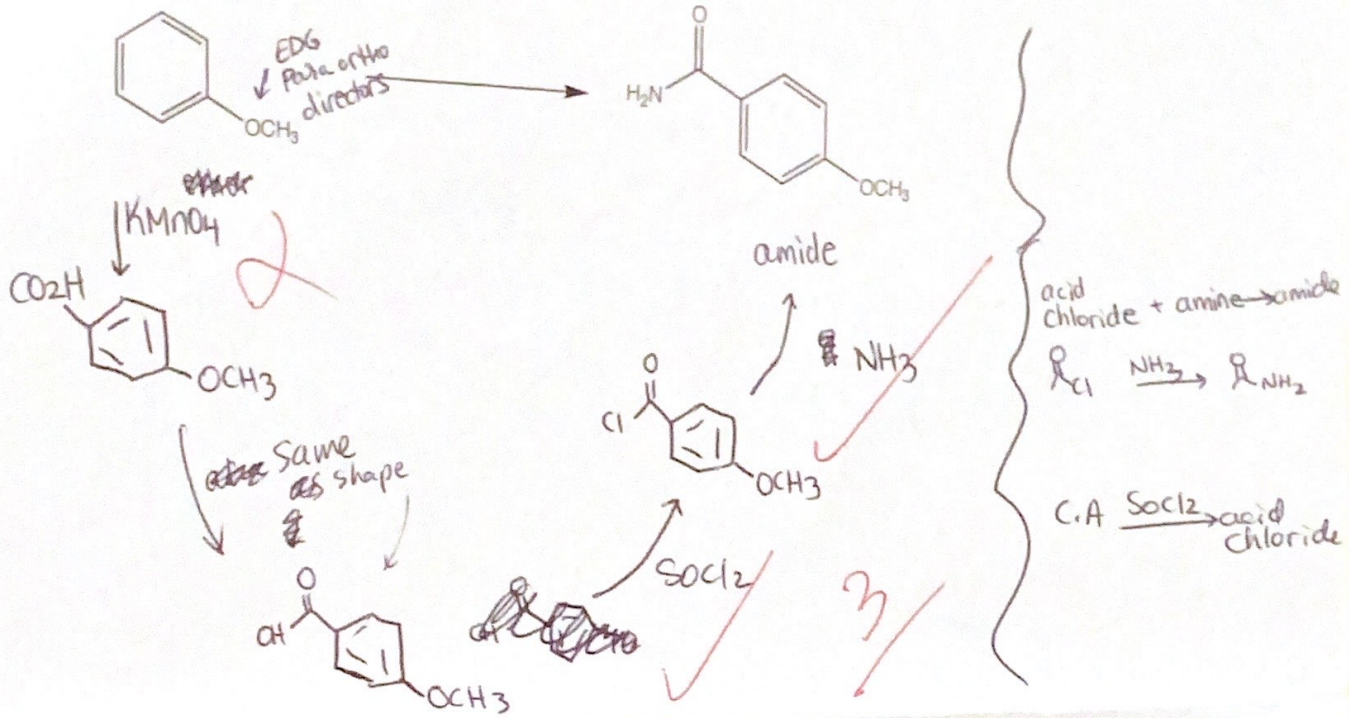
25. Provide reagents necessary to carry out the following transformations. Several steps may be required and there may be more than one correct answer. (6 pts)



26. Provide reagents necessary to carry out the following transformations. Several steps may be required and there may be more than one correct answer. (6 pts)

ester + grignard → 3° alcohol

27. Provide reagents necessary to carry out the following transformations. Several steps may be required and there may be more than one correct answer. (6 pts)



28. Indicate a plausible mechanism for the following reaction. Be sure to show bond making and bond breaking as well as all electron movement. Every arrow counts. Be precise! Don't forget to show charges where necessary. (8 points)