Chemistry 342-75
Spring 2015
Exam 3
Dr. Richter

Name KEY

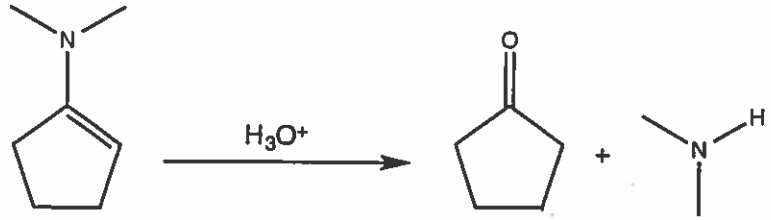
Signature _____

You are required to answer all question sets. Please note that some of the question sets offer you a choice of questions - do only the number of questions asked for. Please write legibly and draw clearly. Points will be deducted for illegible and unclear answers. The point total for this exam is 100 and the value of each question set is shown in parenthesis beside that set. ***READ ALL QUESTIONS CAREFULLY AND APPORTION YOUR TIME ACCORDINGLY***.

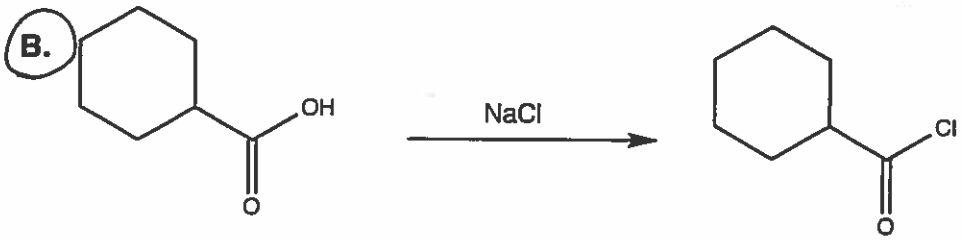
PART ONE: STRUCTURE, REACTIVITY, AND MECHANISM

1. Which reactions(s) (A-E) below ***would NOT*** occur as written? *Circle all that apply.* **(6)**

A.



B.



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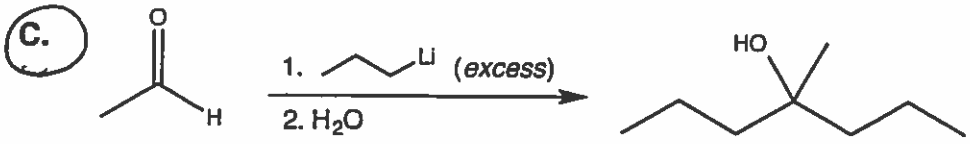
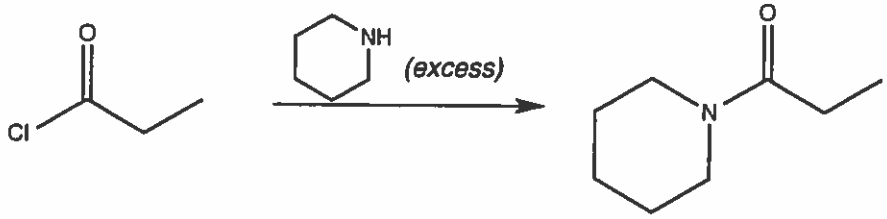
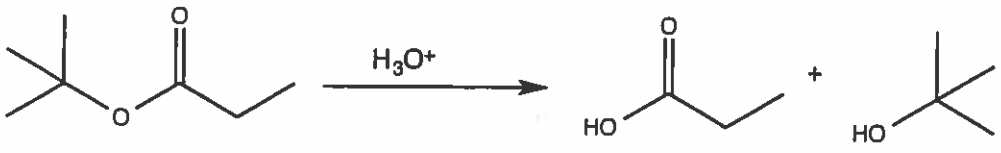


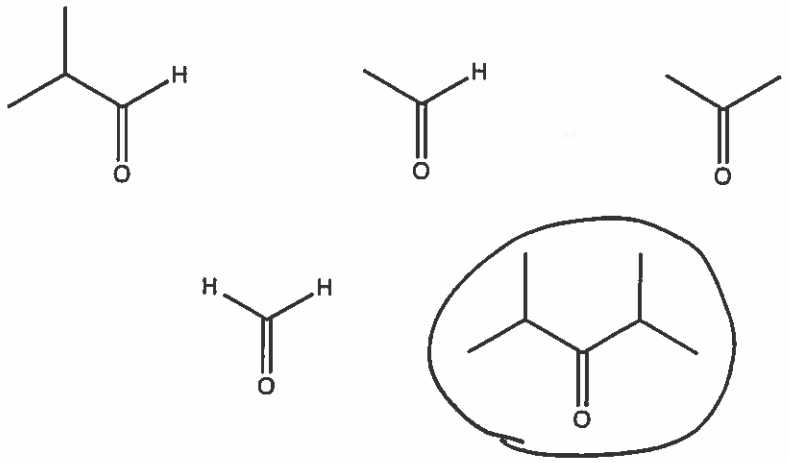
D.



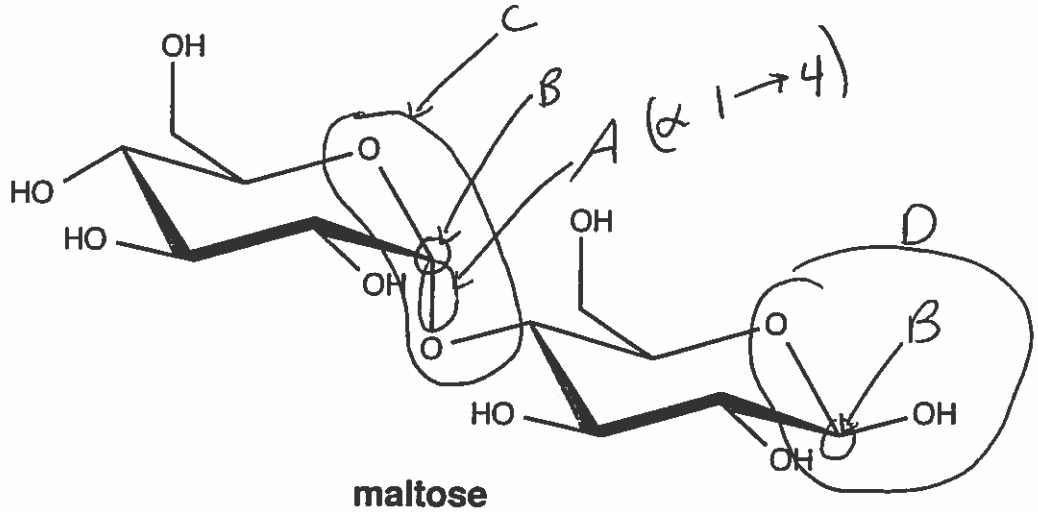
E.



2. Of the five structures below, circle the ***one*** structure that you would expect to have the lowest % hydrate at equilibrium after treatment with catalytic OH^- in water. **(4)**



3. Consider the D-glucose disaccharide below, maltose.



maltose

On the structure of maltose (above) ***circle and label*** each of the following: **(5)**

A. The glycosidic bond. Which of the following correctly describes the bond? *Check your answer.*

—— α 1→3

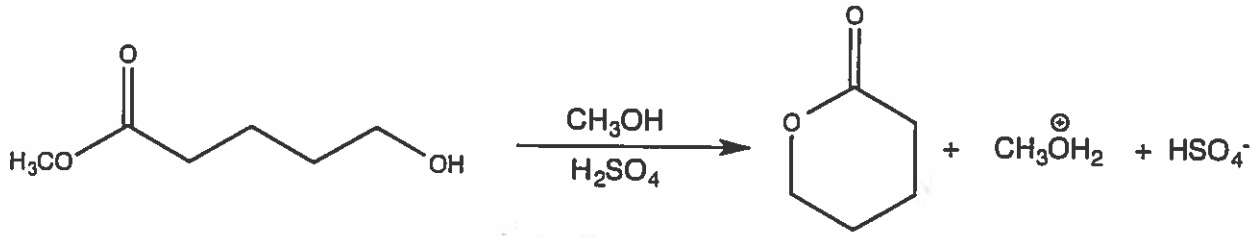
—— β 1→3

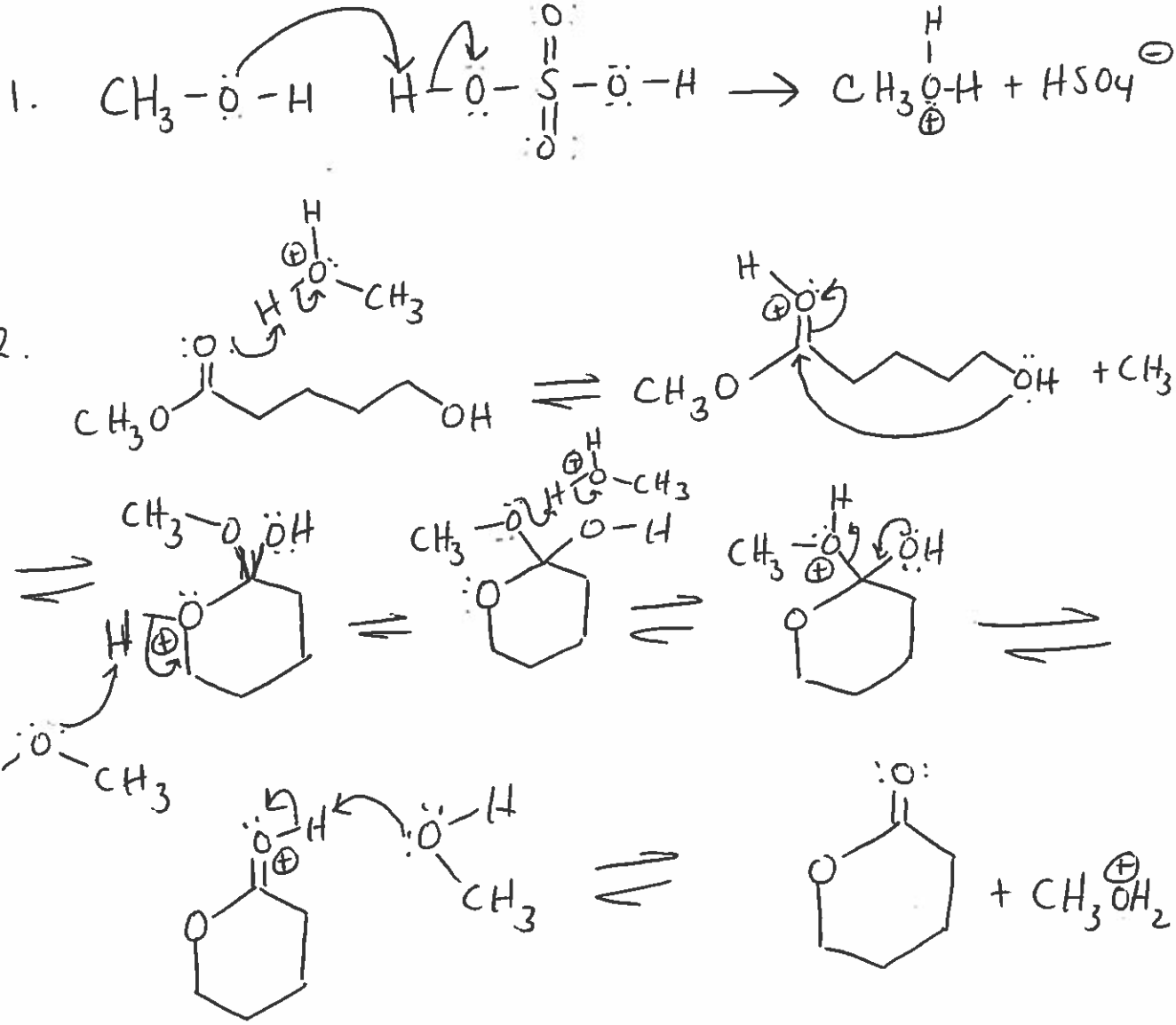
X α 1→4

—— β 1→4

B. An anomeric carbon atom.
C. An acetal functionality.
D. A hemiacetal functionality.

4. A trans-esterification reaction follows essentially the same mechanism as a Fischer esterification, only with a different leaving group. Use what you know about Fischer esterification, and the behavior of acid-catalyzed mechanisms in general, to draw the stepwise mechanism for the following trans-esterification. You must account for the formation of all products to receive full credit. **(14)**

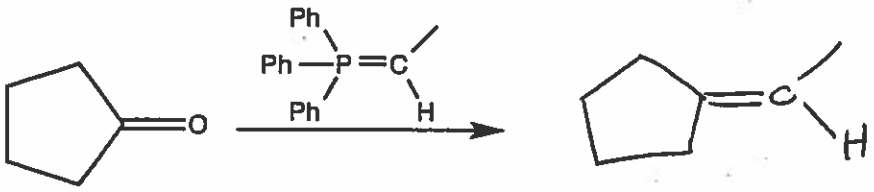




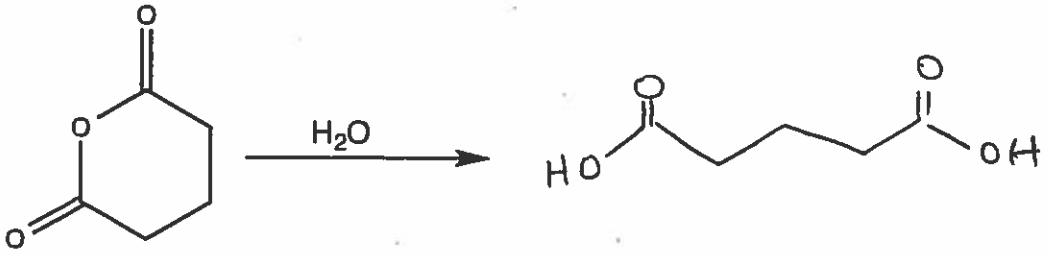
PART TWO: PREDICT THE PRODUCT - For ***eight*** (8) of the following questions 5-15 predict the ***major*** organic product(s) showing stereochemistry where appropriate. **(32)**

*Check the corresponding boxes for the EIGHT answers that you want graded, otherwise **5-12 will be graded automatically**.*

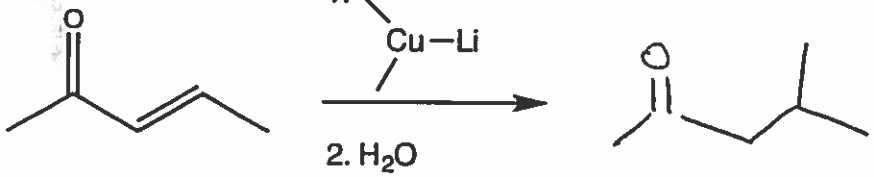
☐ **5.**



☐ **6.**

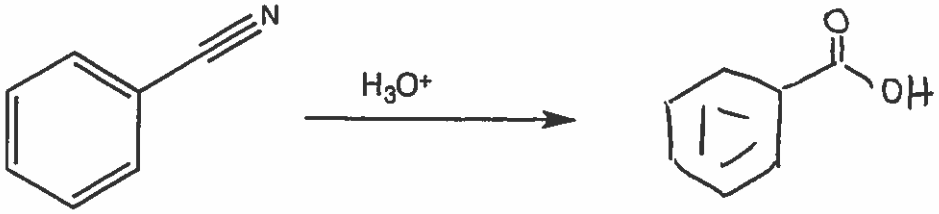


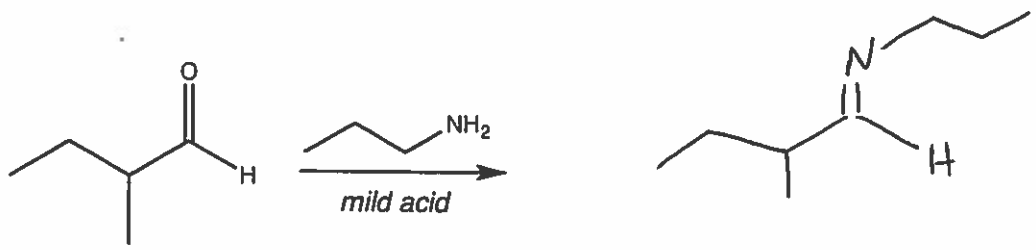
☐ **7.**



☐ **8.**

☐ **9.**



10. 

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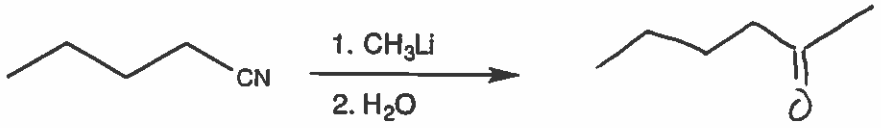
11. 

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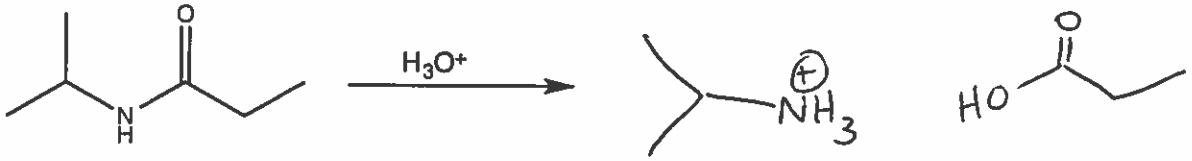
12. 

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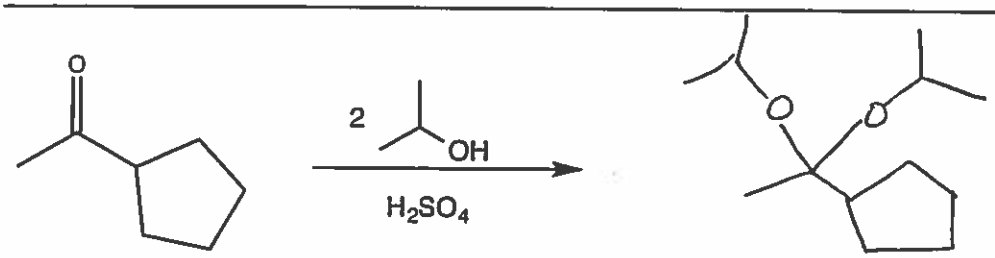
13. 

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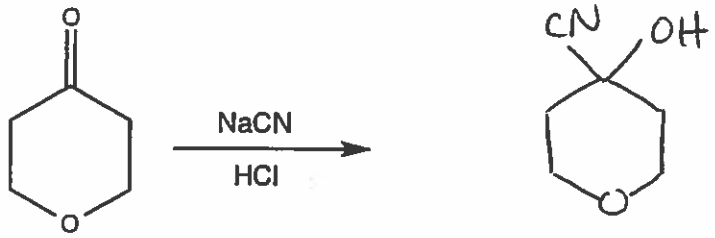
14. 

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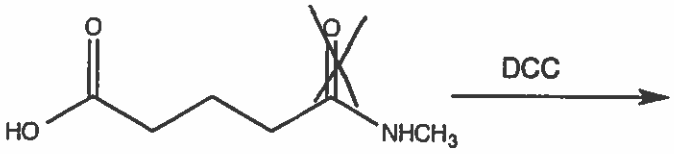
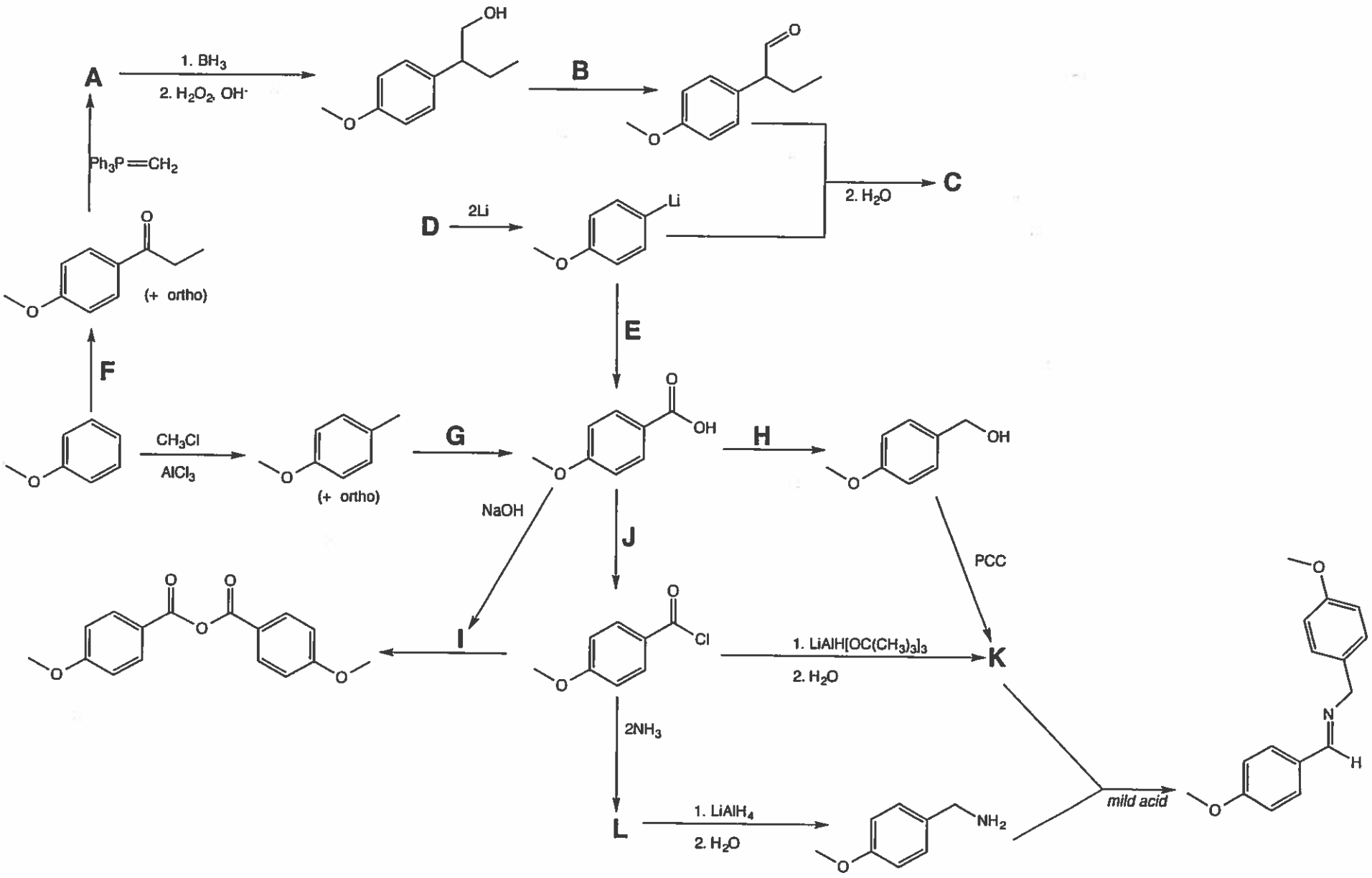
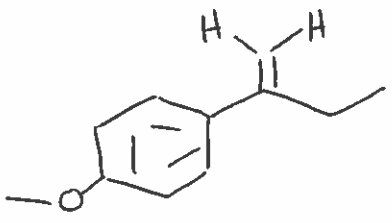
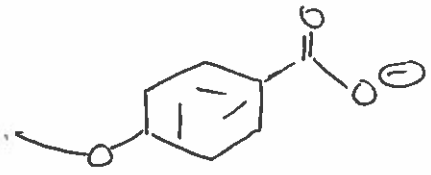
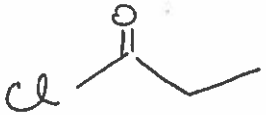
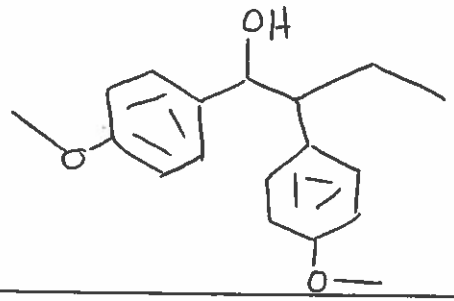
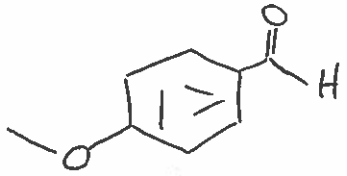
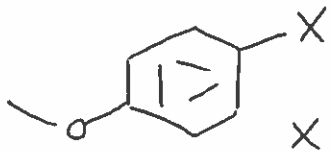
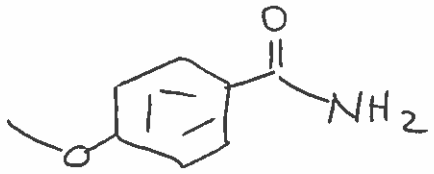
15. 

Question thrown out

PART THREE: SYNTHESIS

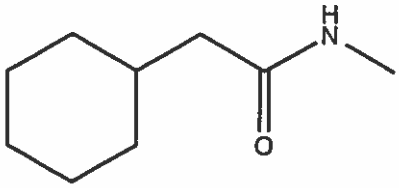
16. Fill in the missing reagents and/or products in the synthetic scheme outlined below. Place your answers in the table provided on the next page. **(24)**



	MISSING REAGENT/PRODUCT		MISSING REAGENT/PRODUCT		MISSING REAGENT/PRODUCT
A		E	1. CO_2 2. H_3O^+	I	
B	PCC	F	 + $AlCl_3$	J	$SOCl_2$
C		G	$KMnO_4$	K	
D	 X = Cl or Br	H	1. $LiAlH_4$ 2. H_2O	L	

17. Propose a reasonable synthesis for structure **A** **OR** **B** below. You must start from the indicated organic substrates, but you may use any inorganic reagents you need. **Use the blank page following the questions to write your answers.** DO NOT SQUEEZE YOUR ANSWERS IN UNDER THE QUESTIONS!! **(15)**

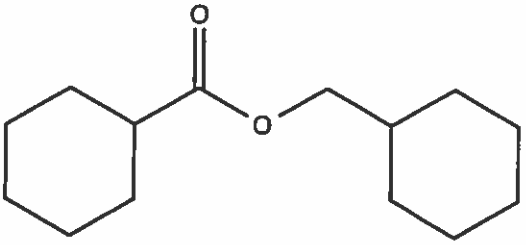
A



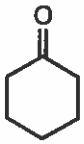
from cyclohexene and any 1-carbon compounds

OR

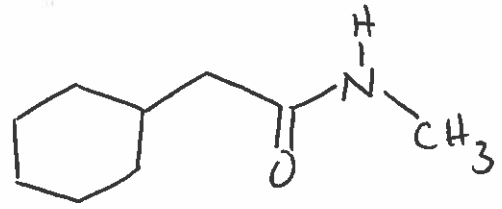
B

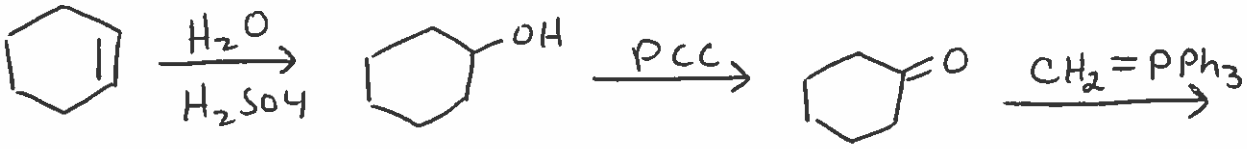


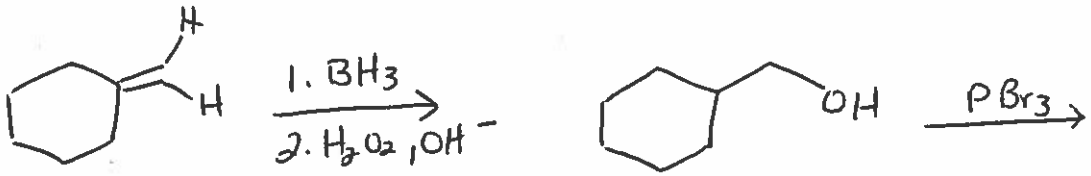
from cyclohexanone and any 1-carbon compounds

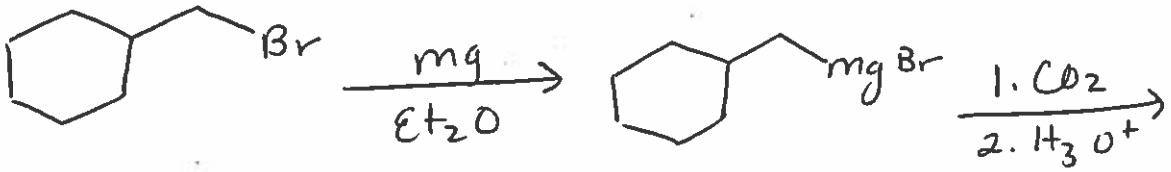


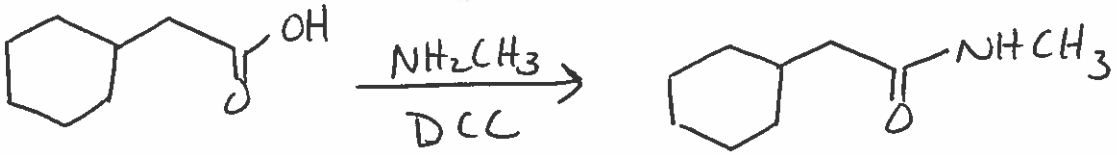
One possible answer for each shown (many other answers would work as well)

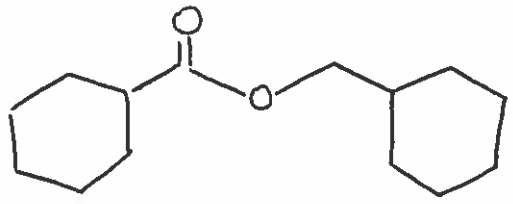
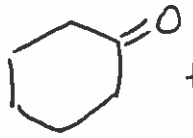
A  from  + 1C compounds

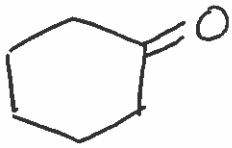


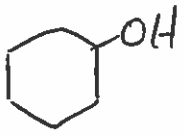


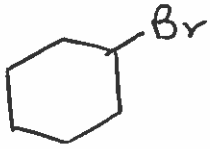


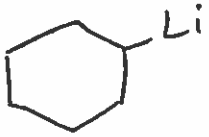


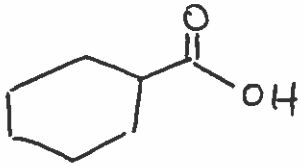
B.  from  + 1 C compounds



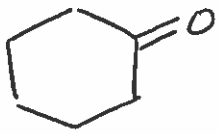


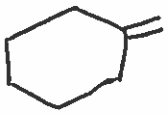


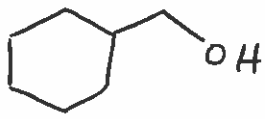




Piece 1







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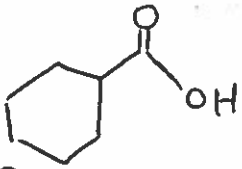
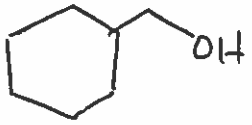


Piece1 +


Piece2