

LAST NAME:

FIRST NAME:

UTEID:

**Instructions**

This exam will be closed book. No notes, books, calculators, or molecular models will be allowed. The exam will be comprised of two distinct parts: **Part I** will consist of a series of multiple choice questions. Your answers to these questions must be submitted on a Scantron “bubble” sheet. The answer sheet will be provided for you, but you will need your own #2 pencil(s). Only answers marked on the bubble sheet will be graded. Answers to Part I questions marked on the exam itself cannot be graded. No re-grades will be possible on Part I of the exam.

**Part II** consists of questions for which you will need to write out your answers, using structures and/or words. This part of the exam will be hand-graded. Answers for the Part II questions that are written in pencil will not be eligible for re-grades. Answers written in pencil with ink overlay will not be eligible for re-grades. If you use a pen to answer the Part II questions, only blue or black ink is acceptable. Answers written in red ink cannot be graded.

1. You must have your valid UT ID card (or other government-issued ID) with you. You will need to show it to the proctors when you turn in your exam.
2. Chapter 4 of the University’s “General Information” catalog outlines this university’s policies regarding exams, as well as other quizzes administered during the semester. Specifically, students are expected to remain in the exam room until a test is completed. These policies will be strictly enforced, with no exceptions. You may not leave the room for any reason until you are ready to turn in your exam. If you wish to leave the room, you will need to turn in your exam to the proctors, and you will not be allowed to return. Please, plan accordingly by using the rest room before the exam starts.

**CH 318 N  
EXAM II**

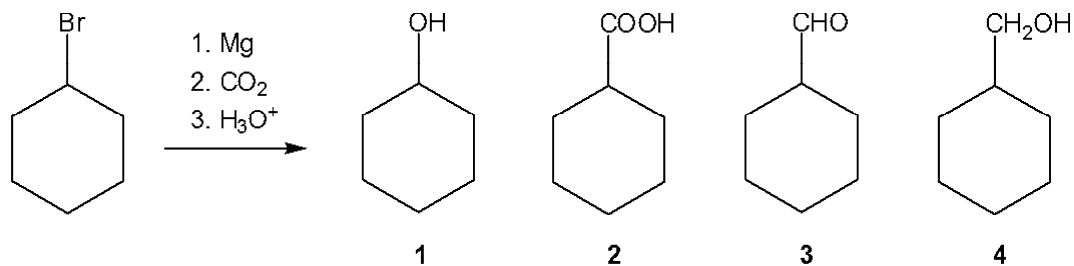
Question	Value	Score
1	9	
2	6	
3	24	
4	21	
5	15	
<b>Section II</b>	<b>75</b>	
<b>Section I</b>	<b>75</b>	
<b>Raw Total</b>	<b>150</b>	
<b>Grade</b>		

## CH318N-Exam II

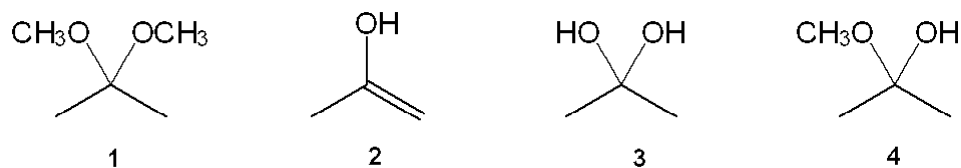
## Objective Test Section

Identify the choice that best completes the statement or answers the question. There is only one correct answer; please carefully bubble your choice on the scantron sheet. (3pts. ea; 75 pts this section)

1. What is the major organic product obtained from the following reaction?

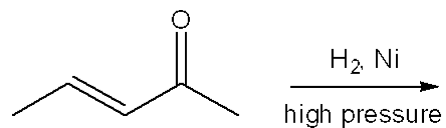


- a. **1**  
 b. **2**  
 c. **3**  
 d. **4**
2. What is the approximate pK<sub>a</sub> value of acetic acid
- a. -2  
 b. 5  
 c. 15  
 d. 35
3. What is the correct assignment of the names of the following functional groups?



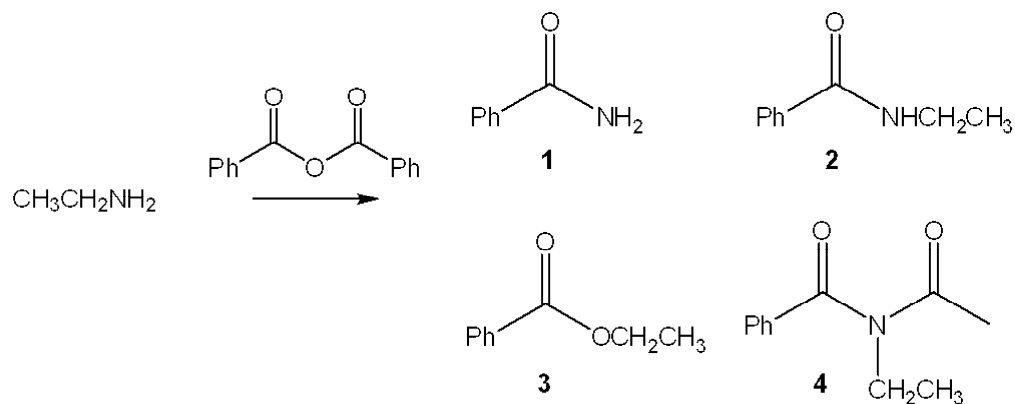
- a. **1** = acetal; **2** = hydrate; **3** = acetal; **4** = hemiacetal  
 b. **1** = acetal; **2** = enol; **3** = hydrate; **4** = hemiacetal  
 c. **1** = hydrate; **2** = hemiacetal; **3** = acetal; **4** = enol  
 d. **1** = enol; **2** = hydrate; **3** = hemiacetal; **4** = enol

4. What is the major organic product obtained from the following reaction?



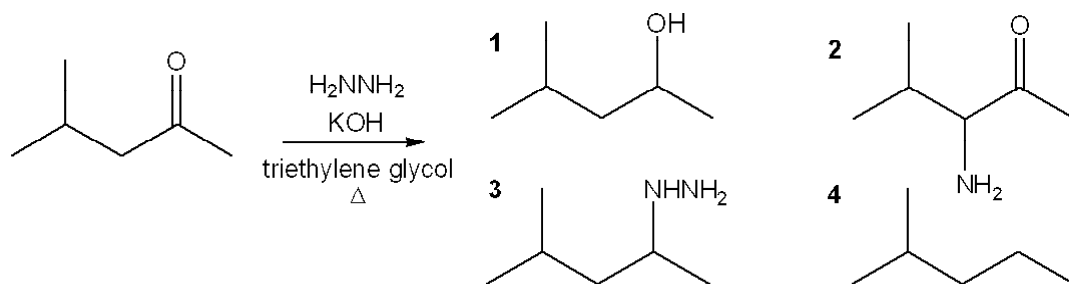
- 2-pentanone
- (E)-3-penten-2-ol
- 2-pentanol
- 4-hydroxy-2-pentanone

5. What is the major organic product obtained from the following reaction?



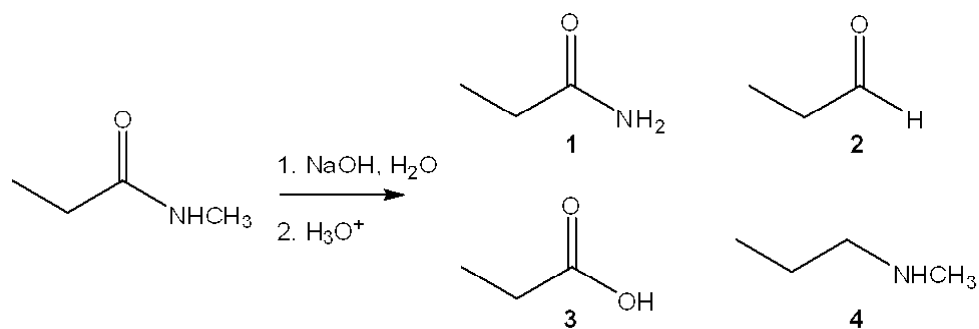
- 1
- 2
- 3
- 4

6. What is the major organic product obtained from the following reaction?



- 1
- 2
- 3
- 4

7. What is the major organic product obtained from the following reaction?

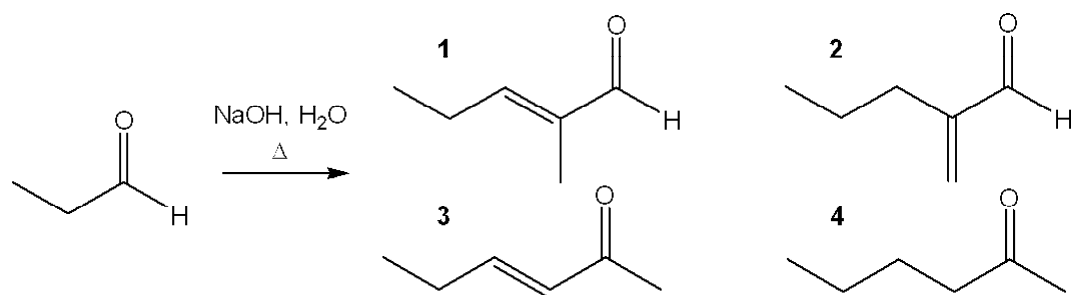


- a. **1**
- b. **2**
- c. **3**
- d. **4**

8. Which of the following is a reactive intermediate in the thermal decarboxylation of a 1,3-diacid?

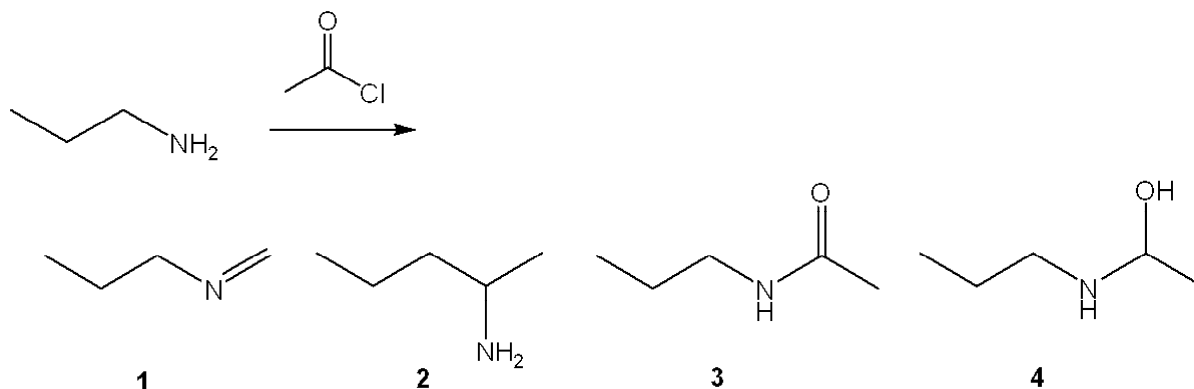
- a. enol
- b. carbocation
- c. carbanion
- d. carboxylate

9. What is the major organic product obtained from the following reaction?



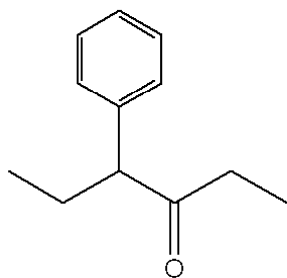
- a. **1**
- b. **2**
- c. **3**
- d. **4**

10. What is the major organic product obtained from the following reaction?



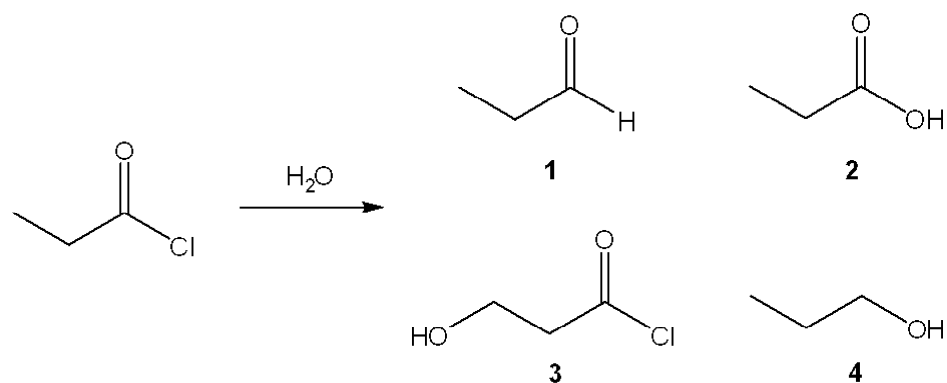
- a. **1**
- b. **2**
- c. **3**
- d. **4**

11. What is the IUPAC name of the following compound?



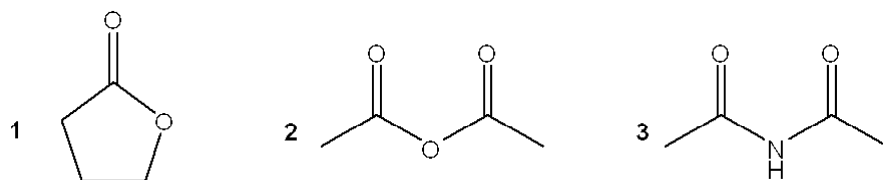
- a. 4-phenyl-3-hexanone
- b. 3-phenyl-4-hexanone
- c. 1,2-diethyl-2-phenylethanal
- d. 1-methyl-1-phenyl-2-butanone

12. What is the major organic product obtained from the following reaction?



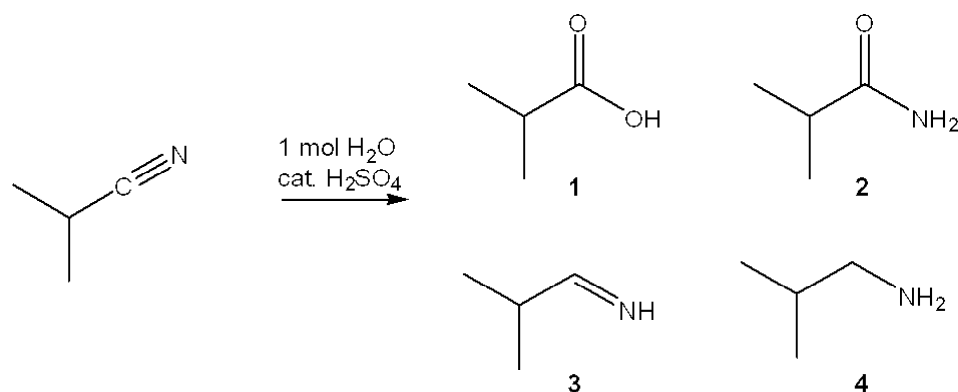
- a. **1**
- b. **2**
- c. **3**
- d. **4**

13. What of the following is the correct assignment of the classes of the following compounds?



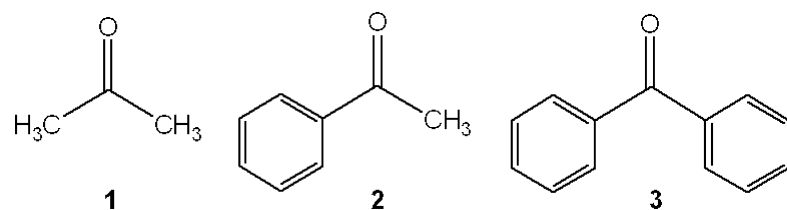
- a. **1** = lactone; **2** = ester; **3** = amide
- b. **1** = ester; **2** = ester; **3** = imide
- c. **1** = ester; **2** = imide; **3** = amide
- d. **1** = lactone; **2** = anhydride; **3** = imide

14. What is the major organic product obtained from the following reaction?



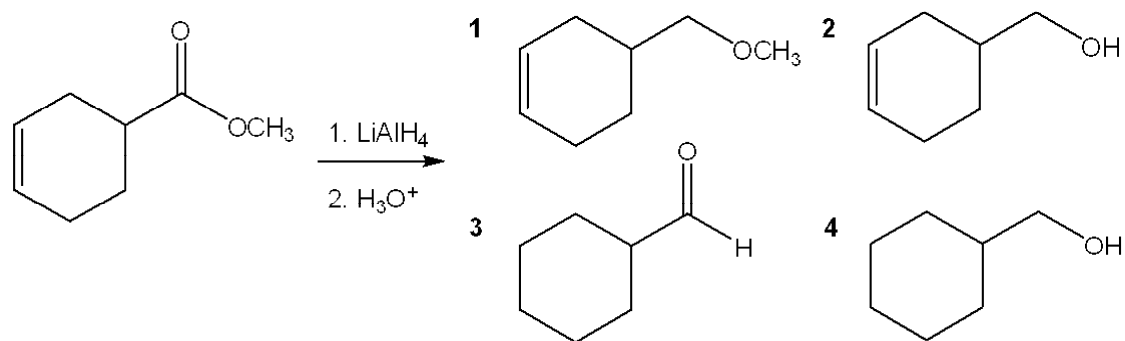
- 1
- 2
- 3
- 4

15. What is the correct assignment of the names of the following ketones?



- 1 = acetone; 2 = phenol; 3 = benzaldehyde
- 1 = acetone; 2 = acetophenone; 3 = benzophenone
- 1 = formaldehyde; 2 = benzaldehyde; 3 = acetophenone
- 1 = acetaldehyde; 2 = acetophenone; 3 = benzaldehyde

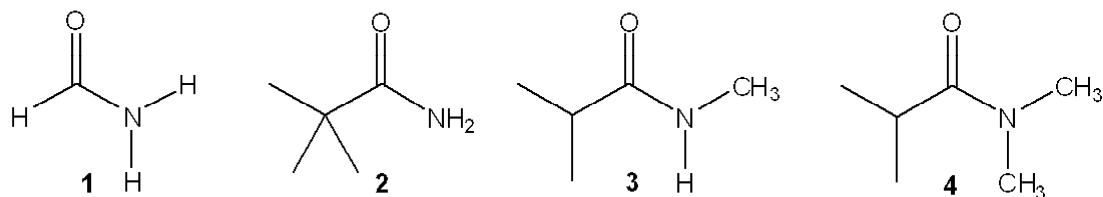
16. What is the major organic product obtained from the following reaction?



- 1
- 2
- 3
- 4

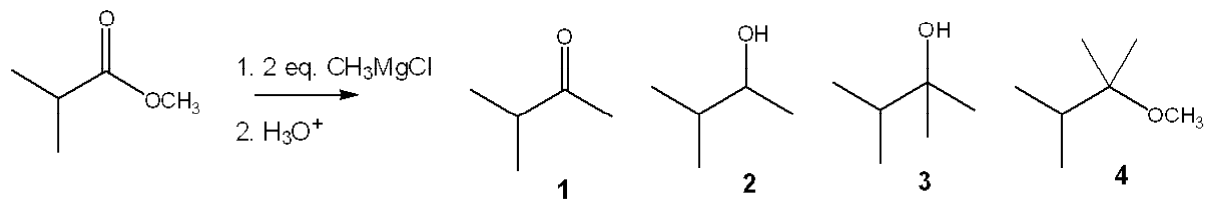
17. What type of reaction takes place upon treatment of a ketone with HCN to form a cyanohydrin?
- nucleophilic addition
  - electrophilic addition
  - nucleophilic substitution
  - electrophilic substitution

18. Which of the following compounds is a 2° amide?



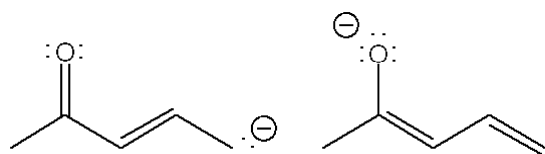
- 1
- 2
- 3
- 4

19. What is the major organic product obtained from the following reaction?



- 1
- 2
- 3
- 4

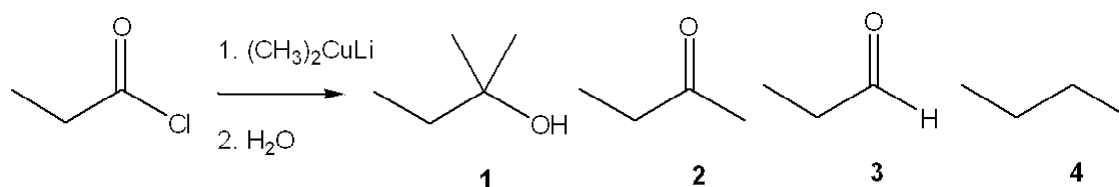
20. What is the relationship between the following two structures?



- tautomers
- constitutional isomers, but not tautomers
- resonance structures
- stereoisomers

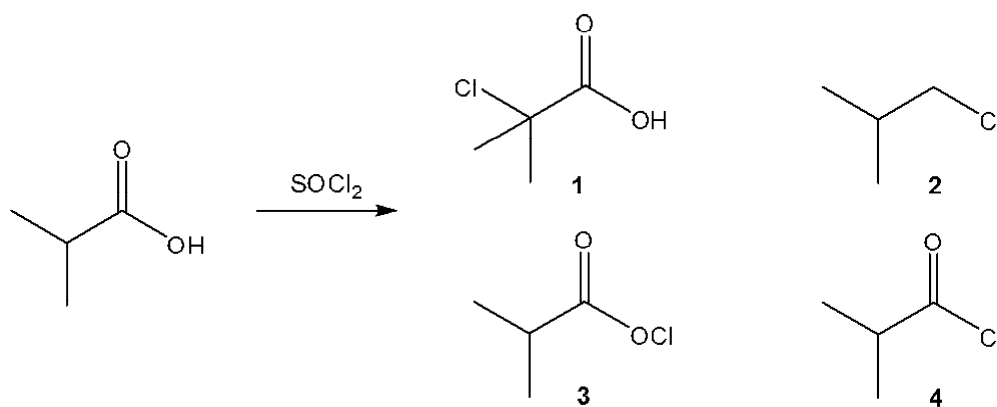
21. Which of the following is the correct order of decreasing reactivity in hydrolysis reactions (more reactive > less reactive)?
- esters > amides > acid chlorides
  - amides > acid chlorides > esters
  - acid chlorides > esters > amides
  - esters > acid chlorides > amides

22. What is the major organic product obtained from the following reaction?



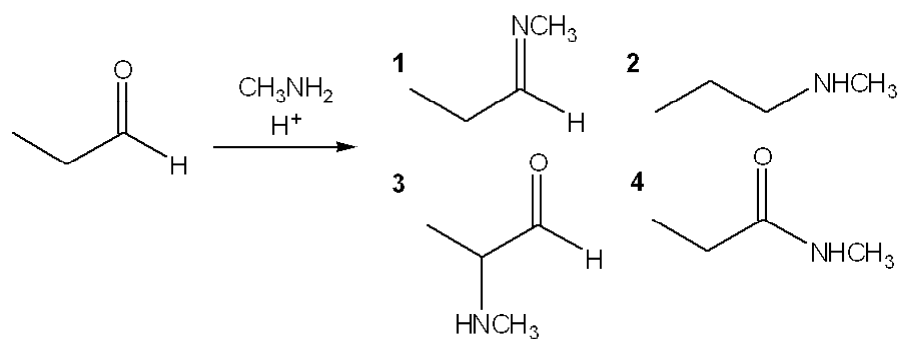
- 1
- 2
- 3
- 4

23. What is the major organic product obtained from the following reaction?



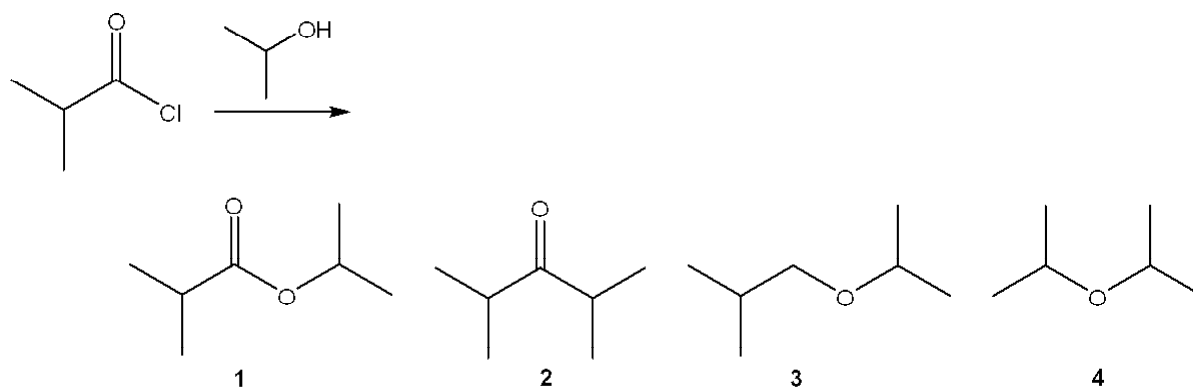
- 1
- 2
- 3
- 4

24. What is the major organic product obtained from the following reaction?



- a. 1
- b. 2
- c. 3
- d. 4

25. What is the major organic product obtained from the following reaction?

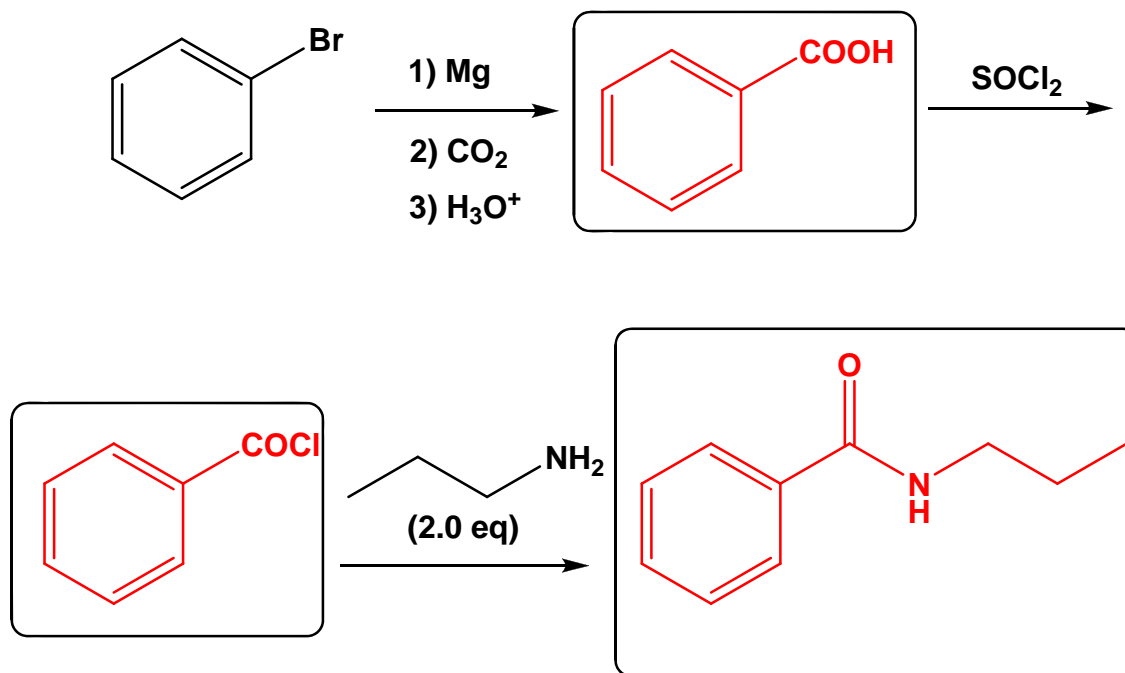
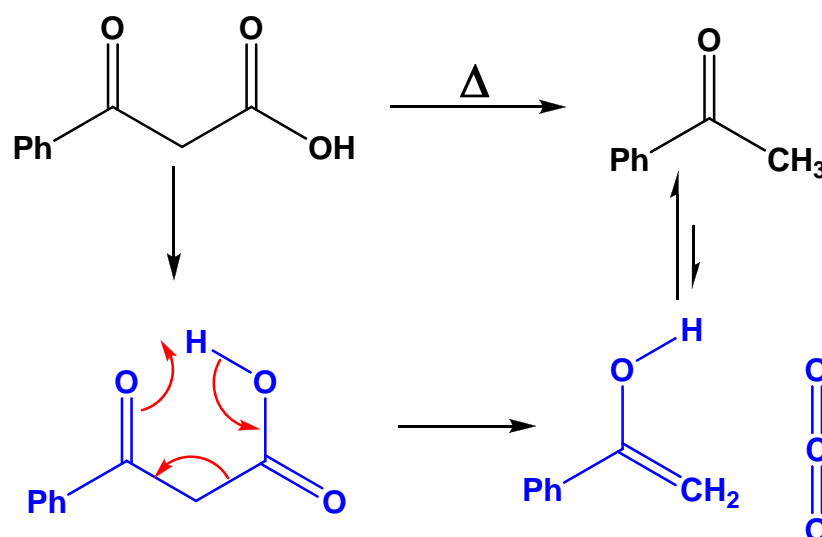


- a. 1
- b. 2
- c. 3
- d. 4

**CH318N-Exam II**  
**Answer Section****MULTIPLE CHOICE**

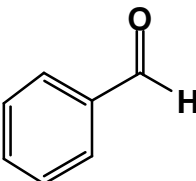
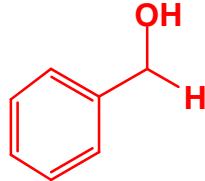
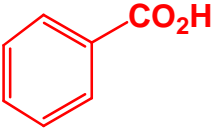
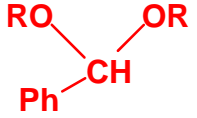
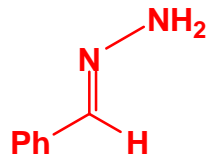
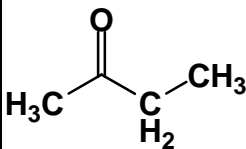
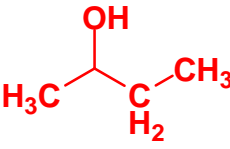
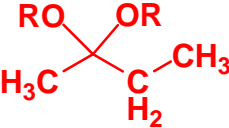
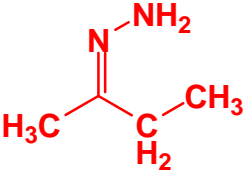
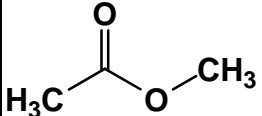
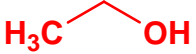
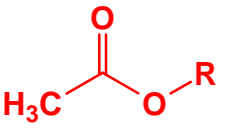
1. ANS: B                   PTS: 3
2. ANS: B                   PTS: 3
3. ANS: B                   PTS: 3
4. ANS: C                   PTS: 3
5. ANS: B                   PTS: 3
6. ANS: D                   PTS: 3
7. ANS: C                   PTS: 3
8. ANS: A                   PTS: 3
9. ANS: A                   PTS: 3
10. ANS: C                   PTS: 3
11. ANS: A                   PTS: 3
12. ANS: B                   PTS: 3
13. ANS: D                   PTS: 3
14. ANS: B                   PTS: 3
15. ANS: B                   PTS: 3
16. ANS: B                   PTS: 3
17. ANS: A                   PTS: 3
18. ANS: C                   PTS: 3
19. ANS: C                   PTS: 3
20. ANS: C                   PTS: 3
21. ANS: C                   PTS: 3
22. ANS: B                   PTS: 3
23. ANS: D                   PTS: 3
24. ANS: A                   PTS: 3
25. ANS: A                   PTS: 3

PART 2: Free Style Answer Format (75 pts in this section)

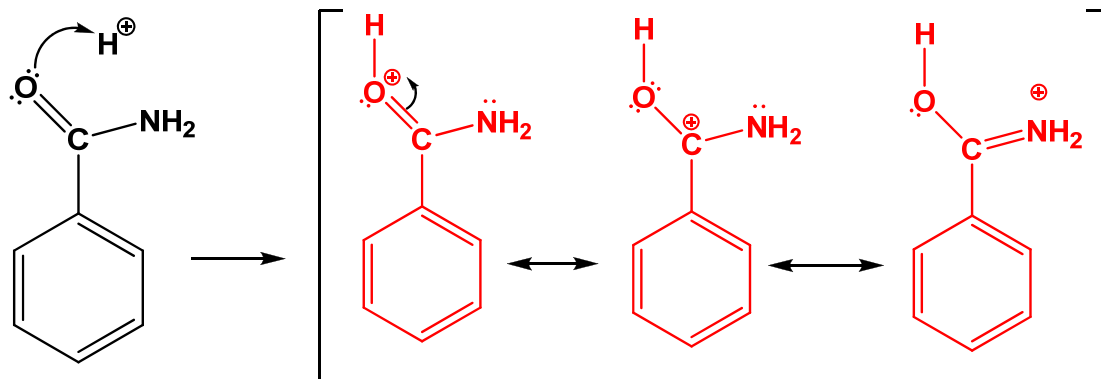
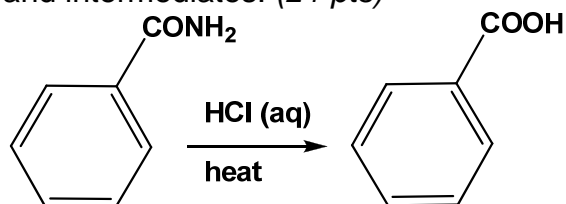
1) **Multi-step synthesis:** Provide the products for the multistep synthesis below. Indicate any relevant stereochemistry (cis, trans, racemate, etc.). (9 pts)2) **Mechanism:** Provide a mechanism for the following transformation. Show all important flows of electrons, charges and intermediates. For this reaction, you must indicate the correct stereochemistry of the transition state. (6 pts)

3) The table below is a summary of reagents and reaction conditions. The reactants are in the left column. Fill in the boxes with the products; for example, in the first box, draw the product of benzaldehyde and LAH. **Note: if there is no reaction, write NR in the table.** (24 pts)

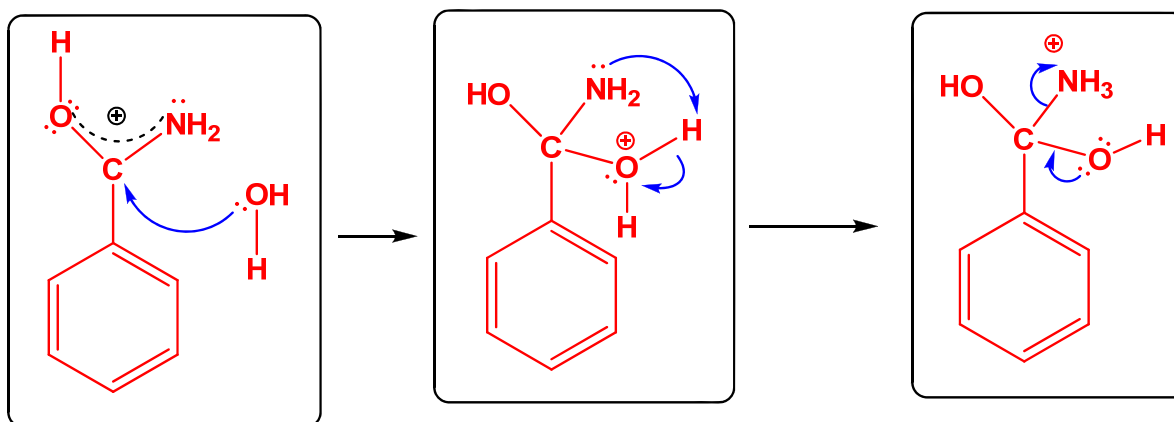
## Reagents &amp; Conditions

	1) $\text{LiAlH}_4$ 2) $\text{H}_3\text{O}^+$	$\text{H}_2\text{CrO}_4$	$\text{ROH}$ (2 eq) $\text{H}_3\text{O}^+$ (cat)	$\text{H}_2\text{NNH}_2$ $\text{EtOH}$ $25^\circ\text{C}$
				
		<b>NR</b>		
		<b>NR</b>	 Transesterification	<b>NR</b>

4) **Mechanism:** Provide a mechanism for the following transformation. Show all important flows of electrons, charges and intermediates. (21 pts)



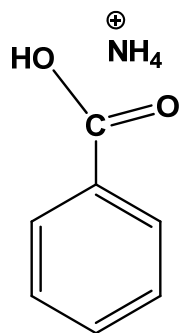
Protonated Amide-must show 3 resonance structures for full credit



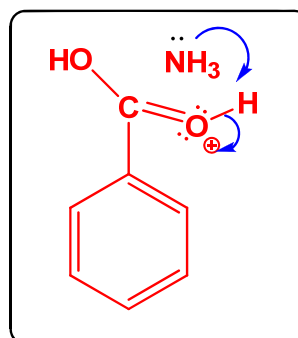
Water attacks the protonated amide

Intramolecular proton transfer

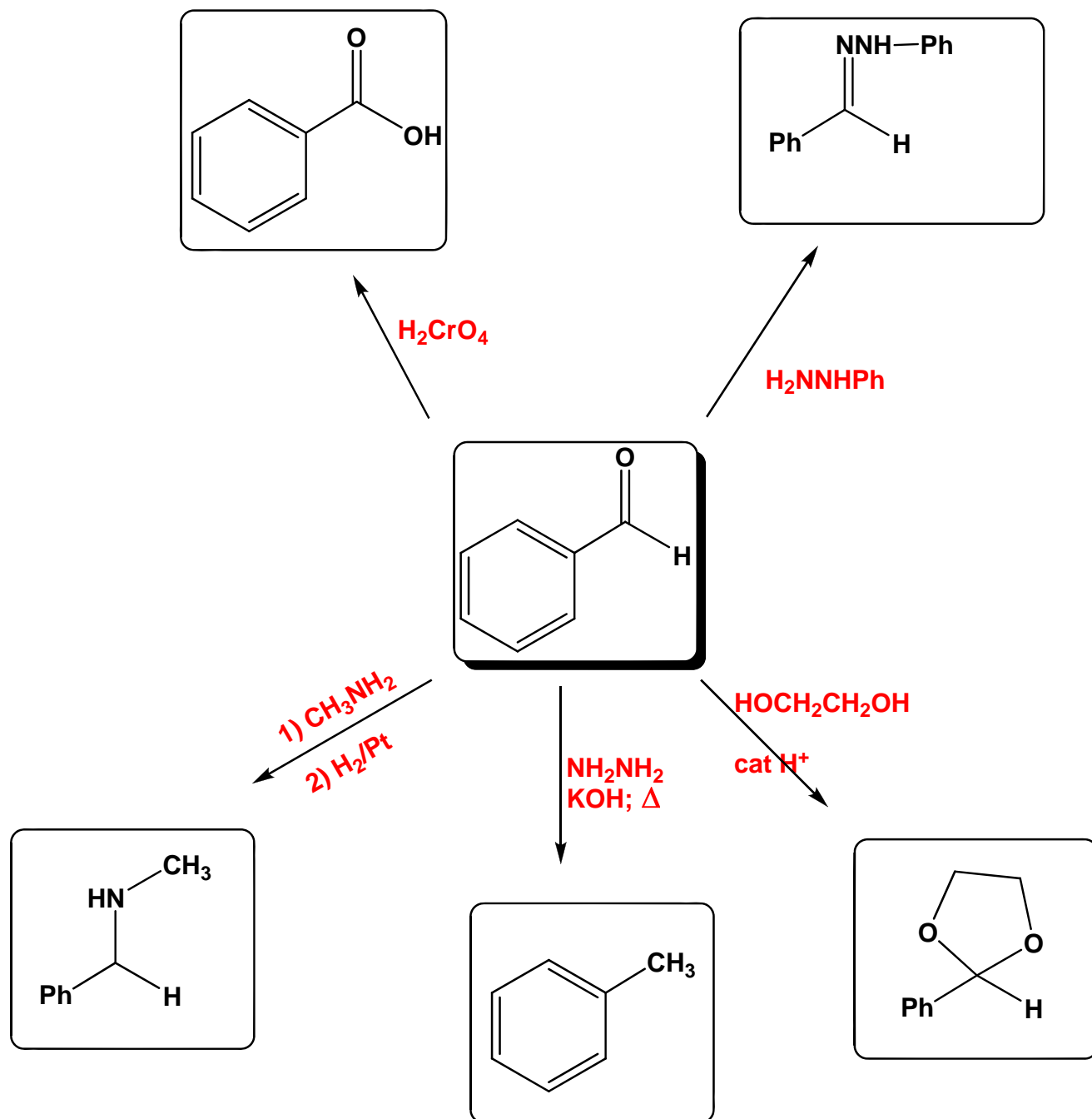
Elimination of ammonia



Acid Base reaction to give final products



5) **Transformations:** Provide the reagent for each of the reactions below. Note that more than one step may be involved and there are more than one set of reagents which can be used. You only need to provide one method. (15 pts)



**END OF EXAM SECTION**