

# CHE 322 Organic Chemistry II

Exam 2 Form 1

Thursday March 21, 2024

8:30 PM – 9:50 PM

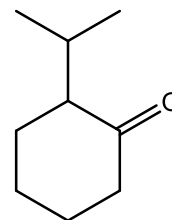
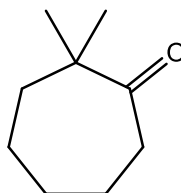
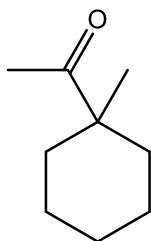
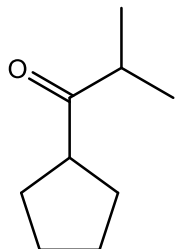
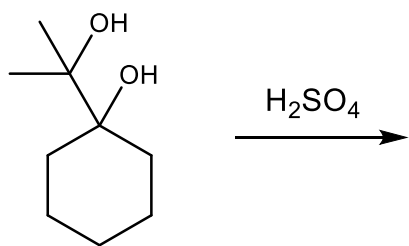
1. Write your nine digit University ID number in the nine boxes provided and then bubble in each of the nine digits.
2. Print your name and sign your answer form using the spaces provided.
3. Questions 1 to 10 are multiple choice questions worth 5 points. Bubble your answers on the answer form. Questions 11-17 are short answer questions with points as indicated. Write out your answers in the indicated place on the answer form.

|        |   | Group |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--------|---|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|        |   | 1     | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Period | 1 | H     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | He |
|        | 2 | Li    | Be |    |    |    |    |    |    |    |    |    |    | B  | C  | N  | O  | F  | Ne |
|        | 3 | Na    | Mg |    |    |    |    |    |    |    |    |    |    | Al | Si | P  | S  | Cl | Ar |
|        | 4 | K     | Ca | Sc | Ti | V  | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr |
|        | 5 | Rb    | Sr | Y  | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I  | Xe |
|        | 6 | Cs    | Ba |    | Hf | Ta | W  | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |
|        | 7 | Fr    | Ra |    | Rf | Db | Sg | Bh | Hs | Mt | Ds | Rg | Cn | Nh | Fl | Mc | Lv | Ts | Og |



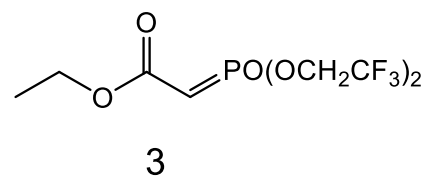
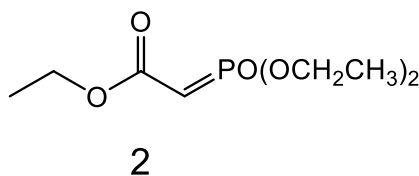
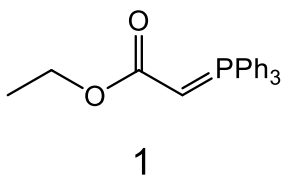
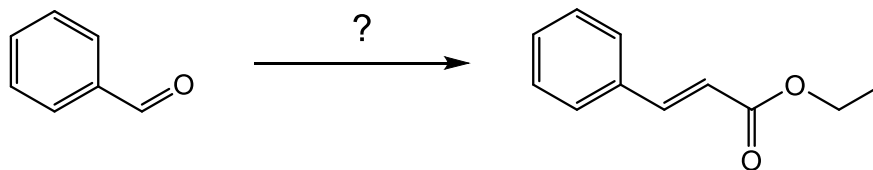
Stony Brook University

1. Select the two possible products of the following reaction.



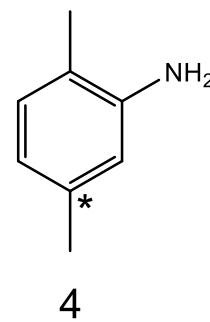
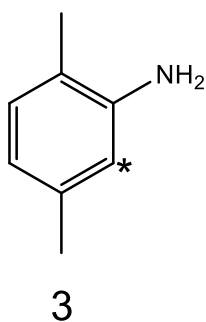
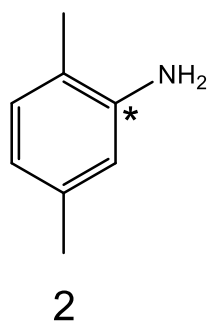
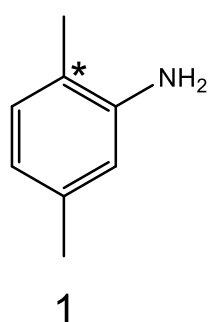
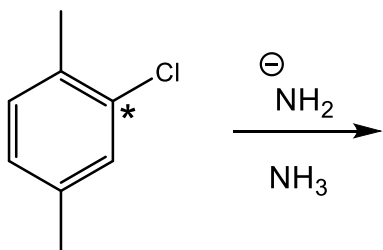
- A. 1 and 2    B. 1 and 3    C. 1 and 4    D. 2 and 3    E. 2 and 4    F. 3 and 4

2. Which reagent(s) will NOT be ideal for synthesizing the following product in a Wittig reaction?



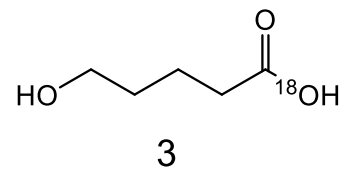
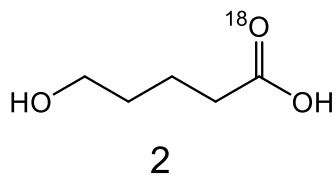
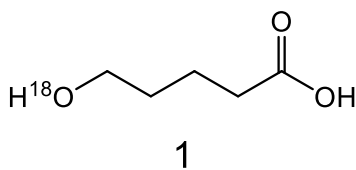
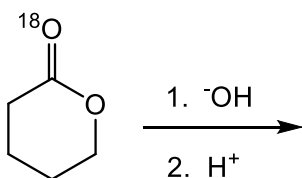
- A. 1 only    B. 2 only    C. 3 only    D. 1 and 2    E. 1 and 3    F. 2 and 3

3. Select the products from the following nucleophilic aromatic substitution reaction that goes through an elimination-addition mechanism. The asterisk denotes a radiolabeled carbon atom.



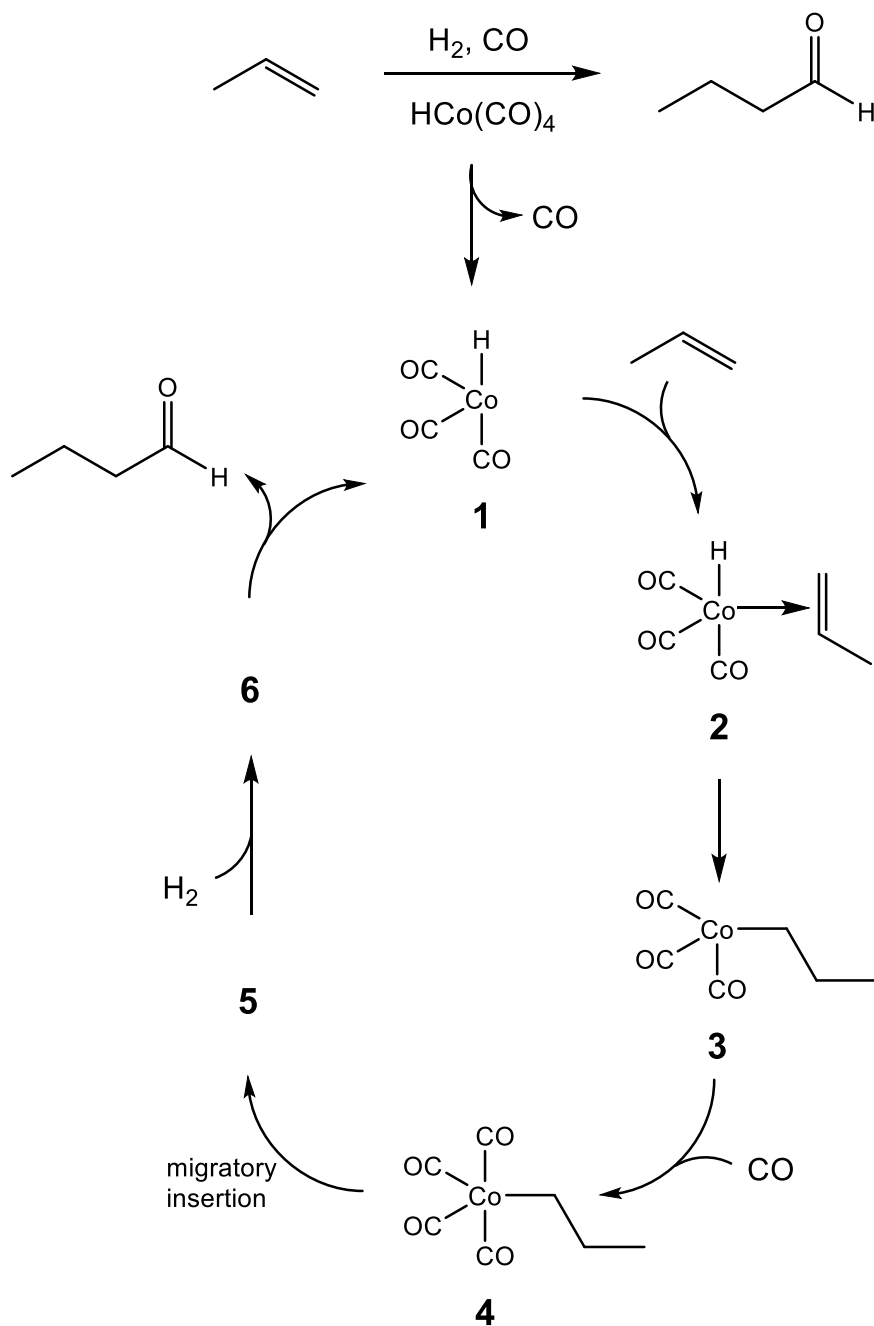
- A. 1 and 2    B. 2 and 3    C. 3 and 4    D. 1, 2, 3    E. 2, 3, 4    F. 1, 2, 3, 4

4. Select the major product(s) from the following saponification of an oxygen-18 radiolabeled lactone.



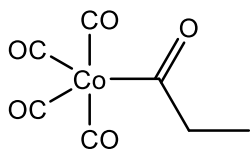
- A. 1 only    B. 2 only    C. 3 only    D. 1 and 2    E. 1 and 3    F. 2 and 3

The following mechanistic cycle is of a reaction known as hydroformylation. Refer to this scheme for the next three problems.

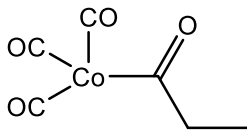


5. Which of the first four intermediate structures are 18 electron complexes?
- A. 1 and 2    B. 1 and 3    C. 2 and 4    D. 3 and 4    E. 1, 2, 3    F. 2, 3, 4
6. How would you classify the step that goes from intermediate 3 to intermediate 4?
- A. ligand association    B. oxidation addition    C. migratory insertion  
D. ligand disassociation    E. reductive elimination    F. migratory deinsertion

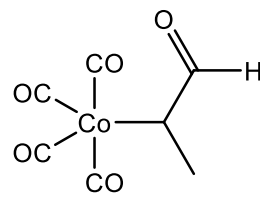
7. Select the structure for intermediate **5**.



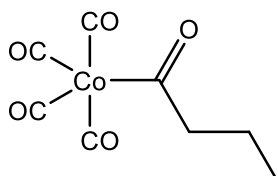
**A**



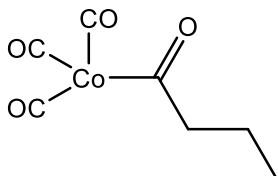
**B**



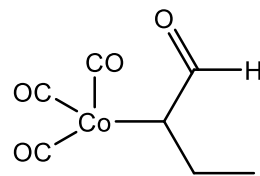
**C**



**D**

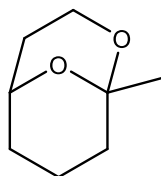
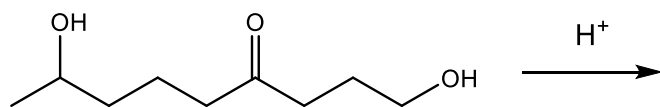


**E**

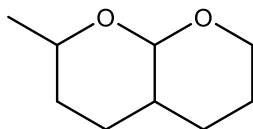


**F**

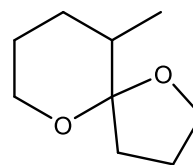
8. Select the acetal that forms when the following compound is treated with acid.



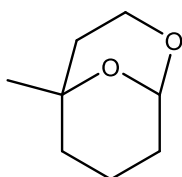
**A**



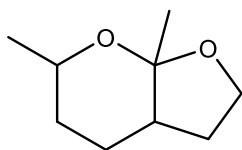
**B**



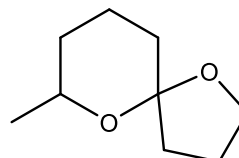
**C**



**D**

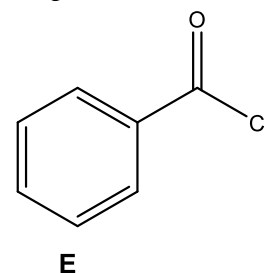
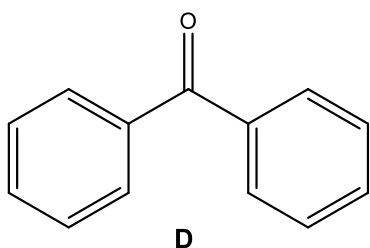
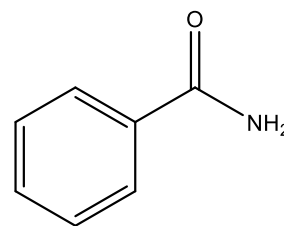
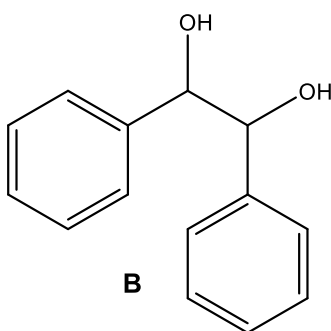
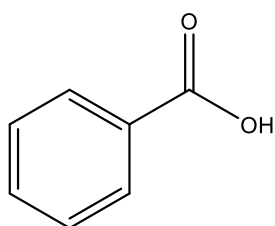
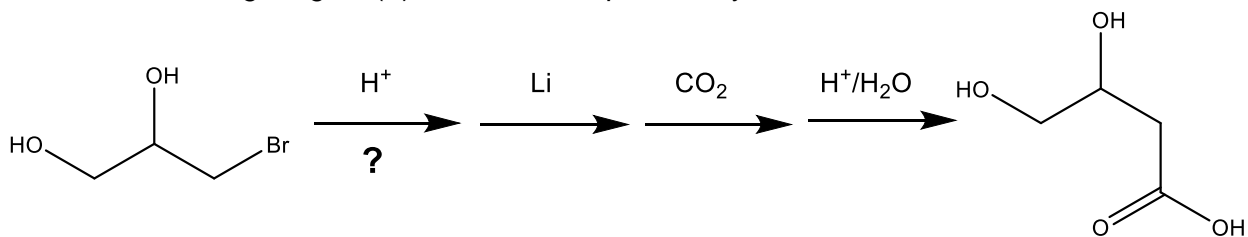


**E**

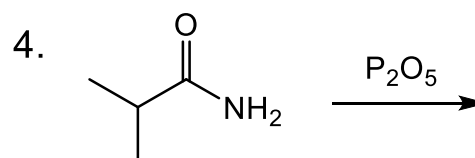
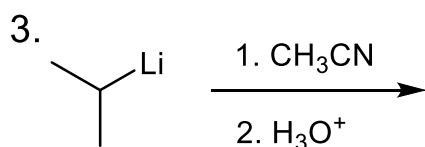
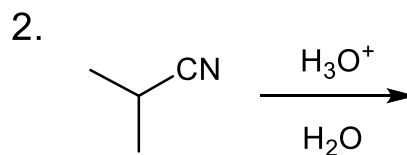
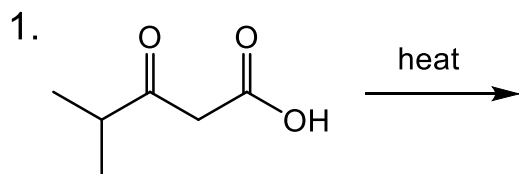


**F**

9. What is the missing reagent (?) for the first step of this synthesis?

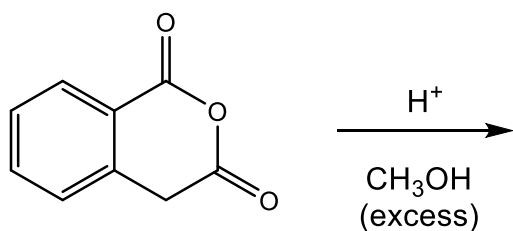


10. Which reactions will give the same major product?

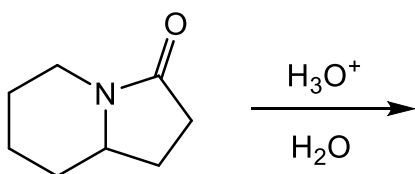


- A. 1 and 2    B. 1 and 3    C. 1 and 4    D. 2 and 3    E. 2 and 4    F. 3 and 4

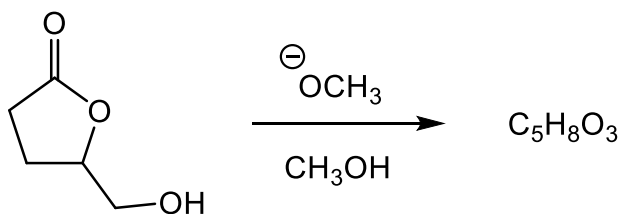
11. Draw the major product of the following reaction. 5 pts



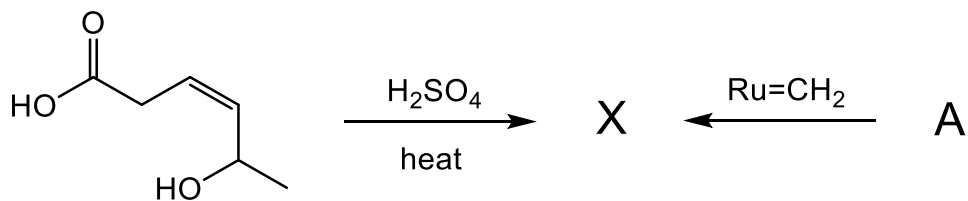
12. Draw the expected major product of the following acid-catalyzed hydrolysis. 5 pts



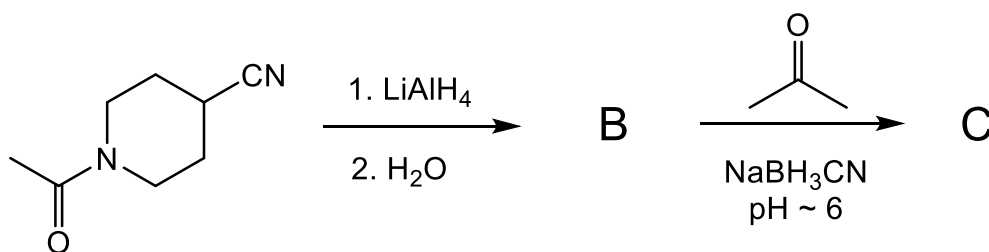
13. Draw the product of the following transesterification. 5pts



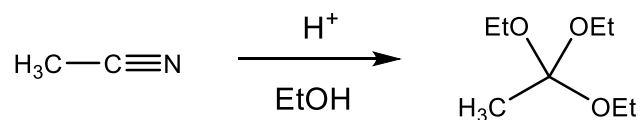
14. Based on the scheme below, determine, and draw the structure of compound **A** only. 5 pts



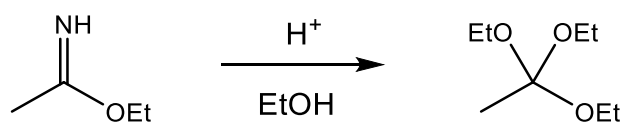
15. Based on the scheme below, determine, and draw compounds **B** and **C**. 10 pts



16. Acid catalyzed hydrolysis of a nitrile leads to a carboxylic acid. But if you treat a nitrile with acid in an alcohol solvent, it leads to a functional group known as an orthoester.

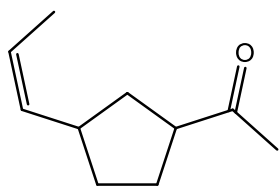


Provide a curved arrow mechanism to illustrate all the bond breaking and bond making steps of the reaction starting from the intermediate shown below. 10 pts

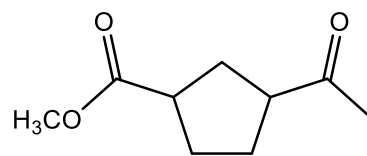




17. Propose a synthesis of the target compound from the starting material shown. You may use any reagents. 10 pts



**target compound**



**starting material**



