

Problem Set 3

Following are the group assignments for group homework #1. The goals of this activity are to challenge you to work problems that are more complex and to practice working effectively in a group setting with people that you do not necessarily know well. The person with an 'O' after their name will be the organizer of the group and will be required to arrange meeting times and places to complete the assignment. The person with a 'W' after their name will be the person who prepares the final written assignment to be turned in for a grade. Groups will be re-assigned and roles will be changed for each set of homework, so that you have the opportunity to work with a variety of different people and in different roles throughout the semester.

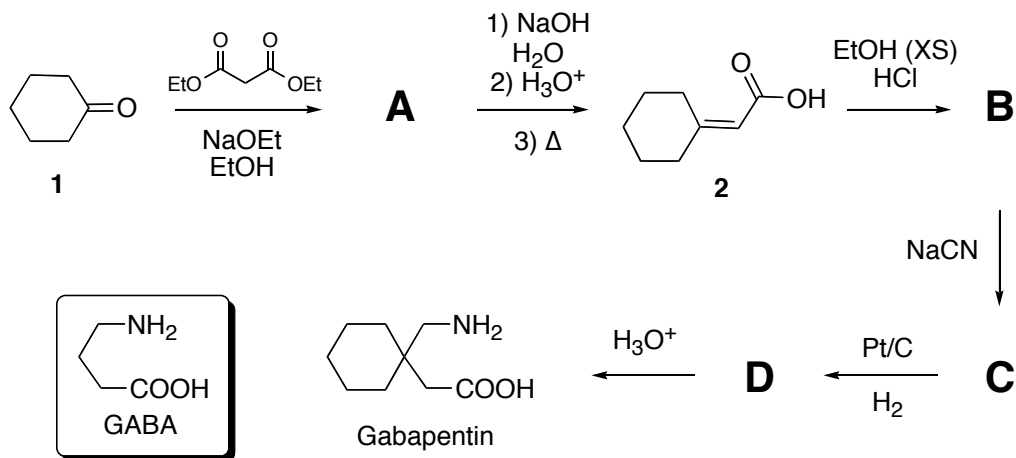
On the next page is the 'grading' scale for each member of your group. After you have completed the homework assignment, please 'grade' the performance of each group member, including yourself, and turn in separately from the group homework for confidentiality purposes. A person who does not show up for the group meetings or does not participate in the problem solving process should receive an 'F' for the group grade. A person who contributes, asks questions, and helps the other group members to understand the problem and answer deserves an 'A'. A person who requires a little extra help and needs another group member to explain a topic **does not** deserve an 'F'. Their lack of understanding will help you as well because you will have to clearly explain the topic to him/her. If you choose to not turn in grades for your group members, I will assume 'average' participation for the entire group.

Submit only one set of answers per group. Please work with your assigned partners to prepare your final draft of answers. You may find it useful to xerox copies of the answer set, so that each group member may have it for reference. Please do not consult with anyone other than people in your group; you may consult me for question clarification only. You may use your textbooks and any other written references from the library. Do not copy anyone else's work. The honor code pledge is printed on the top of the "grading" scale page. By turning this page in, you are acknowledging that you have read and understand the privileges and responsibilities that this code bestows.

This is due Friday, November 11, at the beginning of class.

Steve Howard (W) Chris Lund (O) Dan Freeman Jeff Rock Doug Durand	Brianna Va Emily Pelton (W) Leah Swanson Alyssa Brooks Alex Burleigh (O)	Kyle Carlson Jenna Kesty Trevor Wittwer (W) Eric Nelson Aaron Roessler (O)	Bryce Gode Alex Burum Kelly Rozenboom (W) Rachel Roberg (O) Marcus Perry
Andy Bryan Justin Hahn (W) Krystal Long (O) Zack Alwine Kari Maffitt	Erin Ge (O) David Wold Matija Novakovic Connor Ziegler (W) Jennifer Krantz	Ellen Sauter (O) Maari Hanson (W) Micah Deitz Holly Cooper Luis Valle	Amy Waldner Doug Schroeder Matt Royer (W) Nick Malm Brent McConahey (O)
Tim Lamanna (O) Stephanie Soiseth Bridget Hoesley Ryan Casper (W) Fue Vang	Ben Levy Zach Walgenbach (O) Erik Kraska Brittany Murphy Rachel Chaska (W)	Steph Lewis Mackenzie Consoer Chris Ditlevson (O) Matt Hoke (W) Erik Anderson	Morgan Wells (O) Krista Cruse Nissa Hannemann (W) Chad Olson Sarah Duncan
Danielle Forstner Katie Pesch (W) Rachel Poppy (O) Jenna Paulsen Arie DeGrio	Kristen Burson Rachel Elvebak Mike Stangler (O) Emily Barnard (W) David Wray	Chris Leonard (W) Lauren Hom (O) Jill Verchota Raychal Zupancich	Sunny Sonabend Scott Kyser Danielle Burras (W) Sarah Erickson (O)

1) (20 pts) Gabapentin is structurally related to gamma-aminobutyric acid (GABA), a neurotransmitter that inhibits the central nervous system. Gabapentin is used clinically as an anti-epilepsy drug because it passes through the blood-brain barrier more easily than GABA itself, and thus can accumulate in the appropriate place. Fill in the missing structures in the synthesis of gabapentin starting from **1**.



Compound **A**:

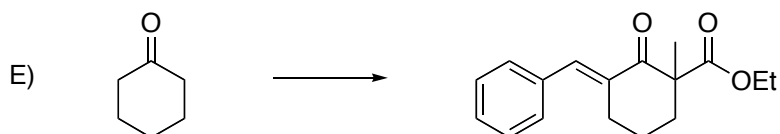
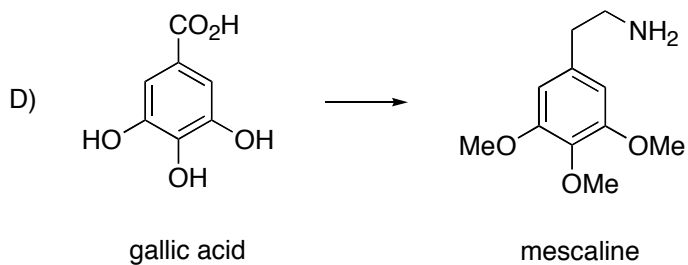
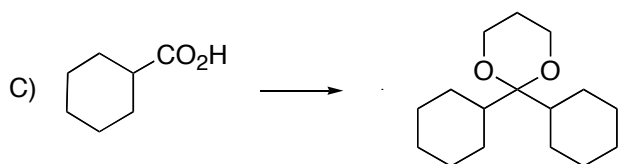
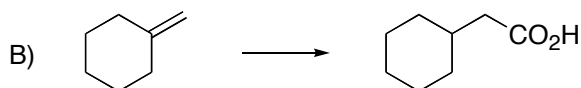
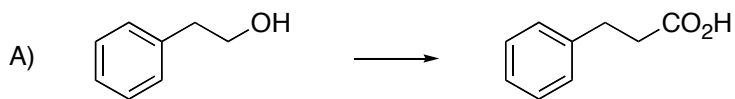
Compound **B**:

Compound **C**:

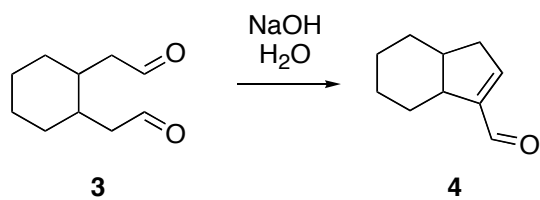
Compound **D**:

2) (18 pts) Provide a mechanism, using curved arrow notation, for the conversion of **2** to compound **B** (from the above reaction scheme). **Be sure to show all proton transfers.**

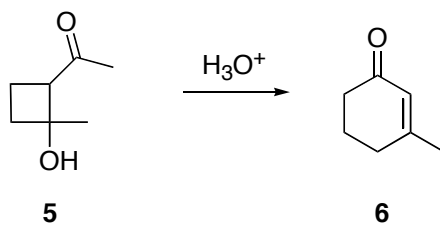
3) (25 pts) Show how each of the products can be made from the indicated starting material. All require multiple steps. You may use any additional reagents you need.



4) (12 pts) Provide a mechanism (using curved arrow notation) for the conversion of **3** to **4** under either base catalysis. **Be careful to show all proton transfers.**



5) (24 pts) Provide a mechanism, using curved arrow notation, for the conversion of **5** to **6** under acid catalyzed conditions. **Be sure to show all proton transfers.**



6) (1 pt) What is the driving force for this reaction (why does it happen)?

Extra Credit (10 pts)

The benzoin condensation involves the combination of two benzaldehyde molecules. It is catalyzed by sodium cyanide. The reaction does not take place if NaOH is used. Propose a mechanism for the reaction.

