

Organic Chemistry II Final Exam

Name:

Signature:

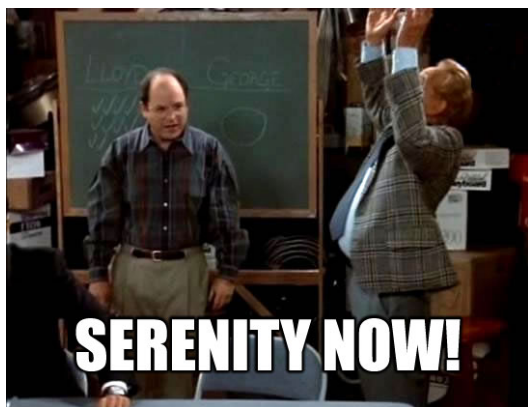
Recitation Instructor:

Instructions. There are 6 sections. The first thing you should do is make sure all of the questions are here, and if not, notify a proctor immediate.

You have 2 hours to complete the exam. Note that 4b is a "Grand Challenge", denoted with a star(*). That one might take a while. It is only 10 points. I would advise that you save it for last.

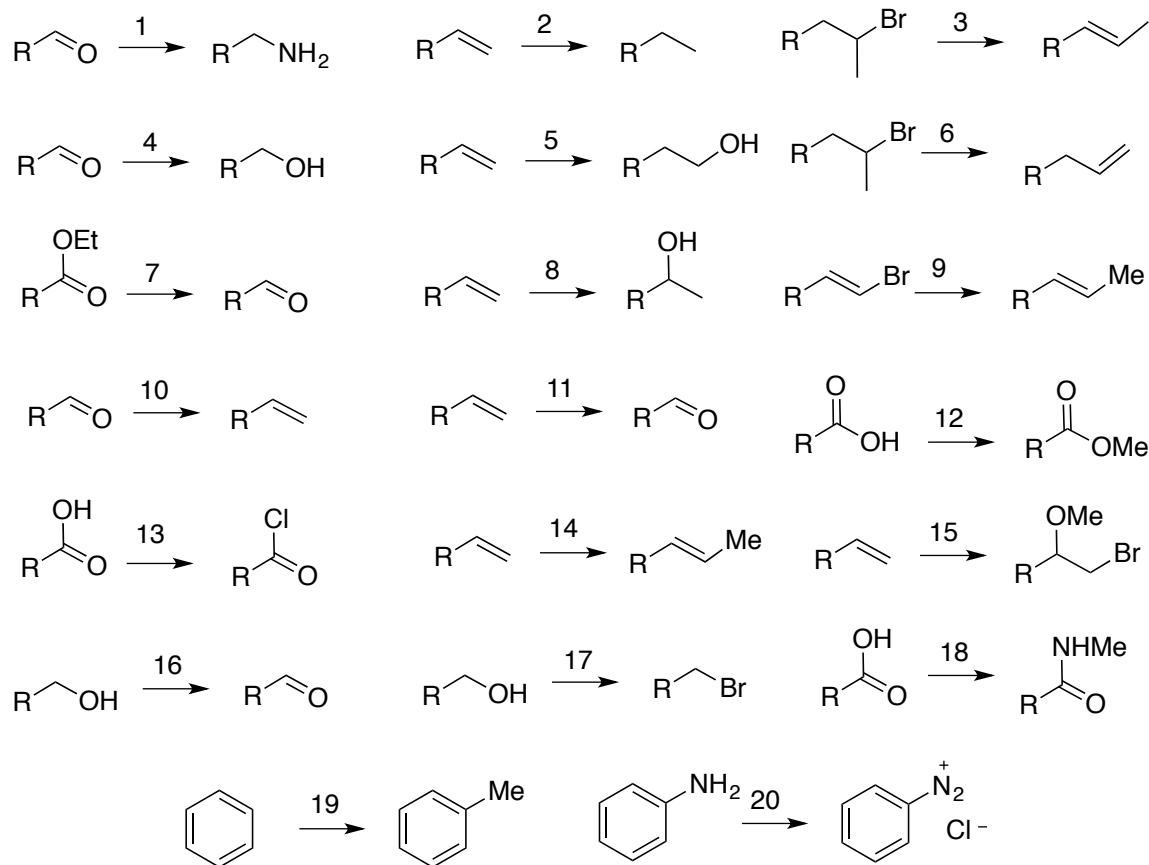
Good luck!

1. __ Summary of All Reactions (20 Points)
2. __ Transition Metal C-C Formation Mechanisms (10 Points)
3. __ Lipids/Nucleic Acids/Peptides (20 Points)
4. __ Prediction of Diastereoselectivity (15 Points)
5. __ Mechanisms (15 points)
6. __ Synthesis (20 Points) ← 2 Pages



1. Summard of all reactions.

You have learned a LOT of reactions over the last few years. Go show me what you remember. (20 points, 1 point per reaction)

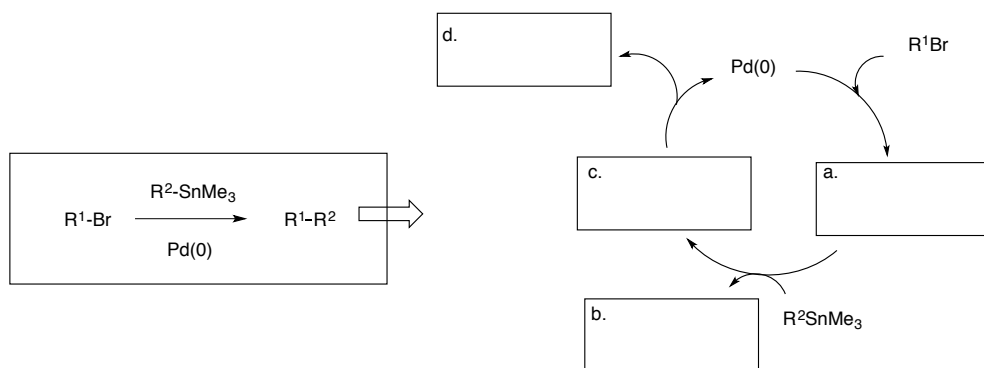


Put the above reaction # next to the appropriate reagents.

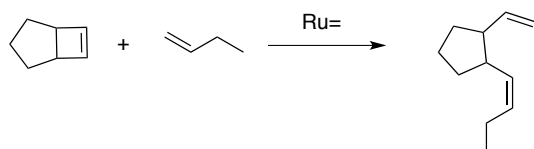
- | | | |
|--|---|--|
| <input type="checkbox"/> a. PBr_3 | <input type="checkbox"/> h. PCC | <input type="checkbox"/> o. DIBAL-H |
| <input type="checkbox"/> b. $MeBr, Pd(0), Et_3N$ | <input type="checkbox"/> i. $SOCl_2$ | <input type="checkbox"/> p. $BH_3; H_2O_2$ |
| <input type="checkbox"/> c. CH_2N_2 | <input type="checkbox"/> j. H_2O, H_2SO_4 | <input type="checkbox"/> q. $Pd/C, H_2$ |
| <input type="checkbox"/> d. $Me_4Sn, Pd(0)$ | <input type="checkbox"/> k. $NaNH_2$ | <input type="checkbox"/> r. $MeCl, AlCl_3$ |
| <input type="checkbox"/> e. $O_3; Me_2S$ | <input type="checkbox"/> l. $MeOH, Br_2$ | <input type="checkbox"/> s. $NaNO_2, HCl$ |
| <input type="checkbox"/> f. $NaBH_4$ | <input type="checkbox"/> m. $MeNH_2, DCC$ | <input type="checkbox"/> t. $t-BuOK$ |
| <input type="checkbox"/> g. $NH_3; NaCNBH_3$ | <input type="checkbox"/> n. $Ph_3P=CH_2$ | |

2. Transition Metal C-C Bond Forming Mechanisms

2a. Demonstrate your understanding of the Stille Cross-Coupling Reaction by Filling in the missing components of the Stille catalytic cycle. (5 points)

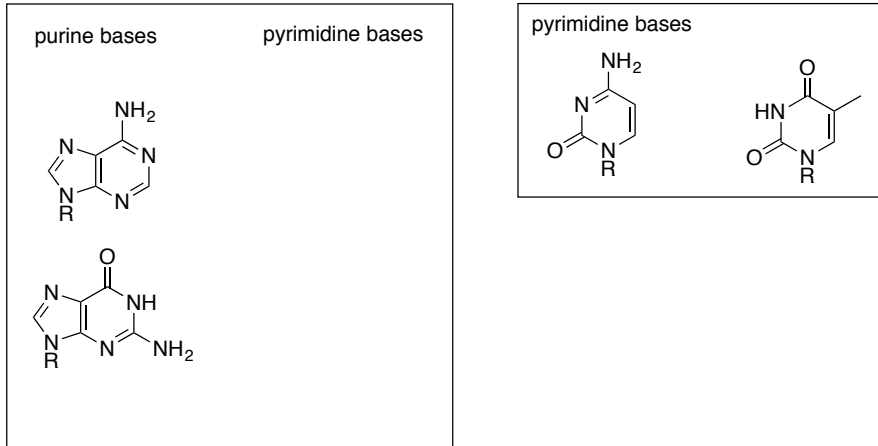


2b. Show the mechanism of the following Ring-Opening-Cross-Metathesis. (5 points)



3. Nucleic Acids/Peptides/Lipids

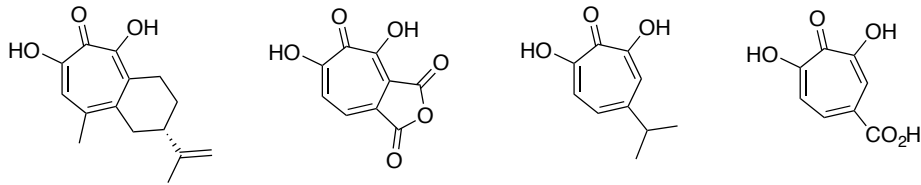
3a. Redraw the pyrimidine base next to the paired purine base and show the hydrogen bonds that exist during the DNA double helix. (8 points).



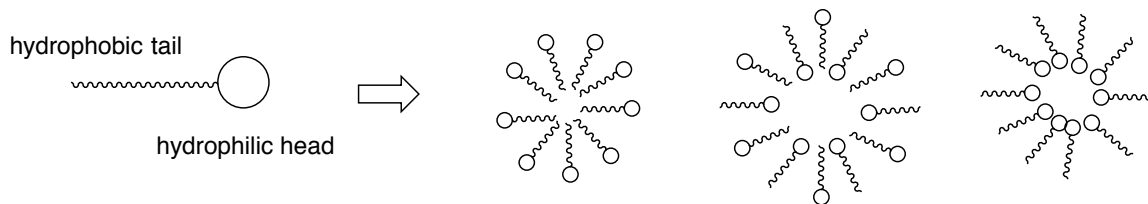
3b. Which of the following statements is the central dogma of molecular biology? (4 points)

- RNA makes DNA which makes Proteins
- DNA makes protein which make RNA
- DNA makes RNA which makes proteins
- Proteins make DNA which make RNA
- Kevin Smith made Dogma featuring Ben Affleck and Matt Damon

3c. Circle the compounds that you would expect to be terpenes (4 points)

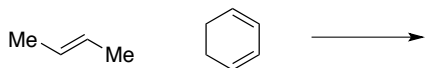


3d. Which of the following is an accurate depiction of a micelle in an aqueous solution (4 points)

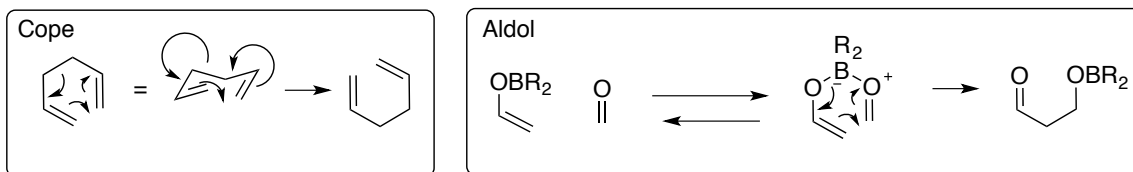


4. Prediction of Diastereoselectivity

4a. Show the Diels-Alder product of the following reaction, making sure to address the correct stereochemistry. You do not need to show the transition state leading to the correct diastereomer, but can if it helps you (5 points)

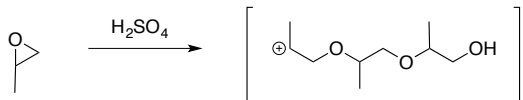


4b.* There are some parallels between the mechanism of certain Aldol-like reactions (below) and Cope rearrangements, and thus also similarities of diastereoselectivity. With this in mind, using what you know about the Cope rearrangement's chair-like transition state, predict the diastereoselectivity of the following Aldol reaction. Keep in mind that the coordination of the boron to the carbonyl is reversible, offering two options for transition states, one of which is higher energy than the other. You must show the chair-like transition state for full credit (10 points)

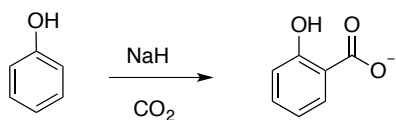


5. Mechanisms

5a. Show a mechanism that leads to the chain growth polymerization intermediate (bracketed) (7.5 points)

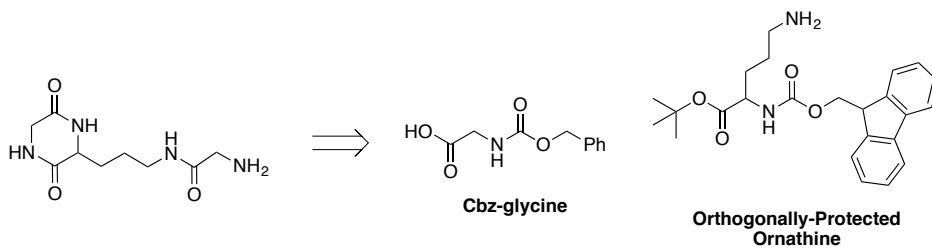


5b. Show a mechanism for the following transformation (7.5 points)



6. Synthesis (Page 1)

6a. Propose a Synthesis of the Following Cyclic Peptide starting from CBz-glycine and the orthogonally-protected ornathine (10 points).



6. Synthesis (Page 2)

6b. Propose a synthesis of limonene from 2-methyl-2-butene (10 points)

Hint: You can actually do this in 3 steps if you consider a pretty awesome reaction we learned this semester that makes cyclohexenes... Consider that hint my holiday gift to you all.

