

*CHEM 14D Midterm 2*  
November 19, 2018

**\*Full Name on Every Page\* \*Write Dark\* \*Only front pages will be scanned\***

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Name (Last) \_\_\_\_\_ (First) \_\_\_\_\_ Student ID \_\_\_\_\_  
Lecture \_\_\_\_\_

Question	1	2	3	4	5	<b>FULL Name on every page</b>	Total
Points	12	20	25	20	21	2	100

- 1. Write your full name on every page.**
- 2. Answers written on the back of the exam will not be graded.**
- 3. This is a closed book exam. The use of notes, cell phones, calculators, or other devices will not be allowed during exam.**
- 4. Where applicable, answers without a clear indication of stereochemistry will not be given any credit.**
- 5. You may use model sets brought in a clear ziplock bag.**
- 6. For full credit show your work, partial credit will be awarded.**
- 7. A periodic table will be provided to you.**
- 8. Show your student ID when turning in your exam.**

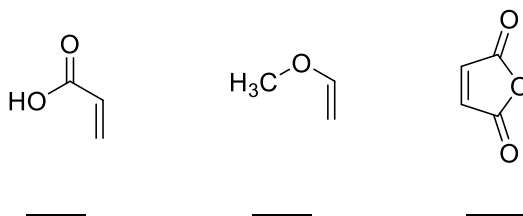
1.1. (3 points) Circle the option that best completes the sentence.

Reacting an alkyne with 2 equivalents of HCl gives a ( **vicinal** / **geminal** ) dichloride.

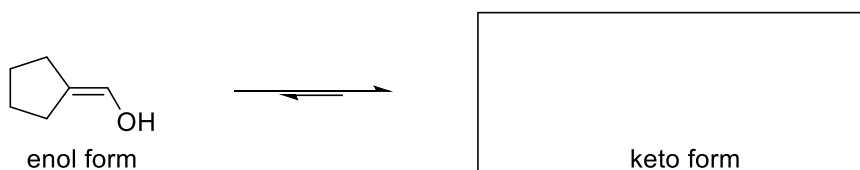
Alkenes typically undergo ( **addition** / **elimination** ) reactions with electrophiles.

Markovnikov's rule can be used to describe ( **stereo-** / **regio-** ) selectivity.

1.2. (3 points) Rank the following dienophiles in order of reactivity in a Diels-Alder reaction. (1 = most reactive)



1.3. (3 points) Show the product of tautomerization of the following enol to its keto form.



1.4. (3 points) Circle true or false for the following statements:

Reacting OsO<sub>4</sub> with an alkene adds two -OH groups with anti addition.

**True** or **False**

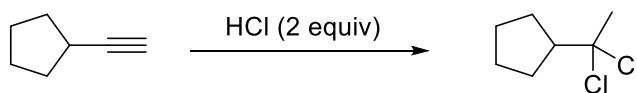
The pK<sub>a</sub> of an alkyne is 25.

**True** or **False**

Epoxides are attacked by Me-Li at the most-substituted carbon.

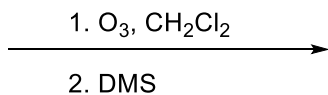
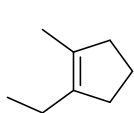
**True** or **False**

2.1. (20 points) For each part, provide a detailed arrow-pushing reaction mechanism for the reaction shown.

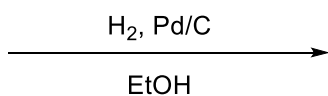
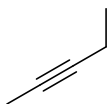


3.1. (25 points) Predict the major organic product(s) derived from the substrates shown to the left of the arrow in the following reactions. **If multiple stereoisomers would form, just draw one.**

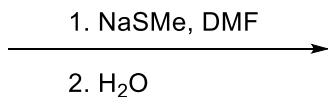
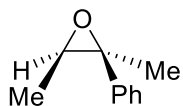
(a)



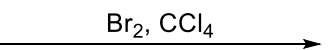
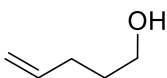
(b)



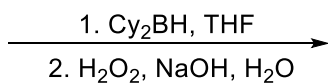
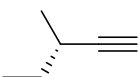
(c)



(d)

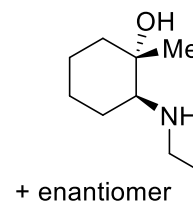
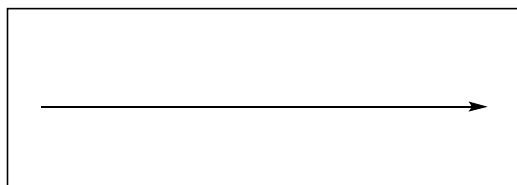
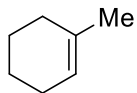


(e)

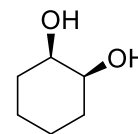
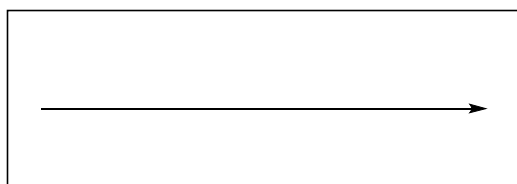


4.1. (20 points) Predict the missing reagent(s) to accomplish the following transformations.

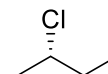
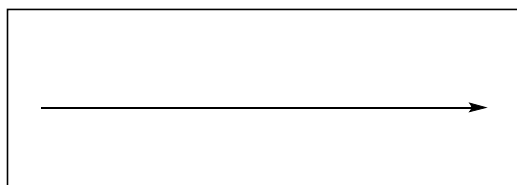
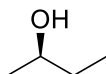
(a)



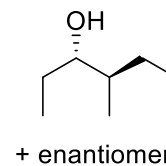
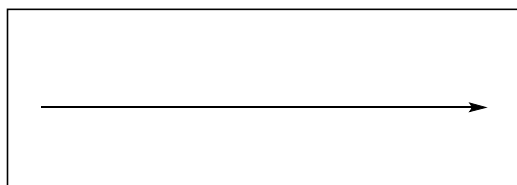
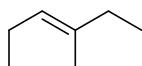
(b)



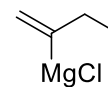
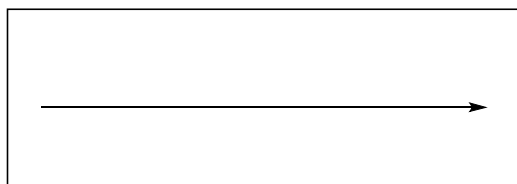
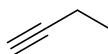
(c)



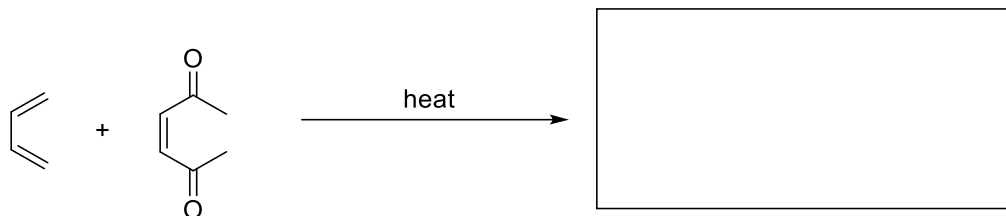
(d)



(e)



5.1. (6 points) Draw the product of the following Diels-Alder reaction (showing relative stereochemistry).



5.2. (15 points) Propose syntheses for the molecule shown from the indicated starting material. You may also use fragments of 2-carbons or less. These fragments may only contain combinations of the following atoms: C, H, O, Br, I, Cl (with single or double bonds). Please be sure to include key reagents and solvents in your solutions, consistent with what you have learned in this course. If you must use an organometallic, show how it's made. It is not necessary to show mechanisms or retrosynthetic analyses in your solutions. Hint: There is often more than one correct answer! **Don't worry about stereochemistry.**

