

# CHEMISTRY 112A FALL 2014

## EXAM 3

NOVEMBER 25, 2014

NAME- WRITE BIG \_\_\_\_\_

STUDENT ID: \_\_\_\_\_

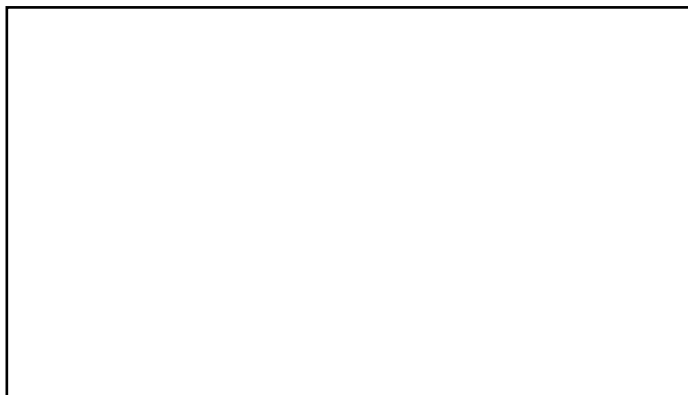
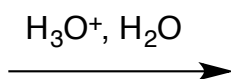
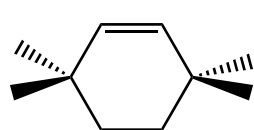
SECTION AND/OR GSI IF YOU ARE IN THE LABORATORY COURSE: \_\_\_\_\_

- You will have 75 minutes in which to work.
- **BE NEAT!** Non-legible structure drawings will not be graded.
- Only answers in the answer boxes will be graded – you can write in other places, but we only grade the answers in the boxes.
- All pages of the exam must be turned in.
- No calculators
- Molecular models may be used

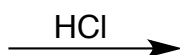
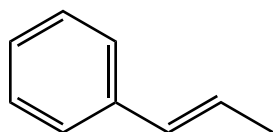
Problem	Points (Maximum)
1	20
2	11
3	11
4	23
5	20
6	15
<i>Total</i>	<i>100</i>

1. (20 points) For each reaction, draw the major products, **including all stereoisomers**. Write NR if you think there will be no reaction.

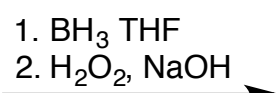
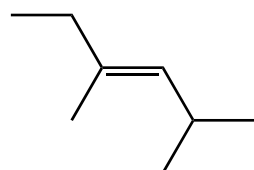
a.



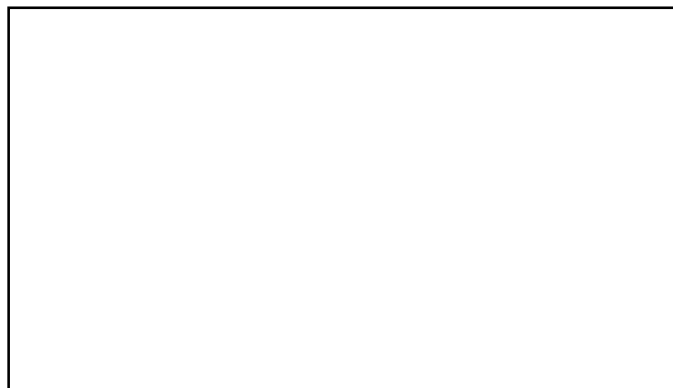
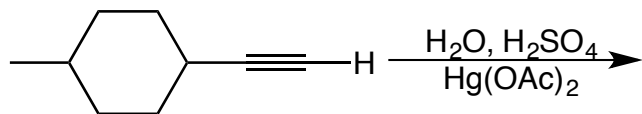
b.



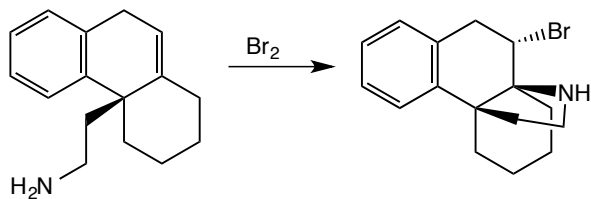
c.



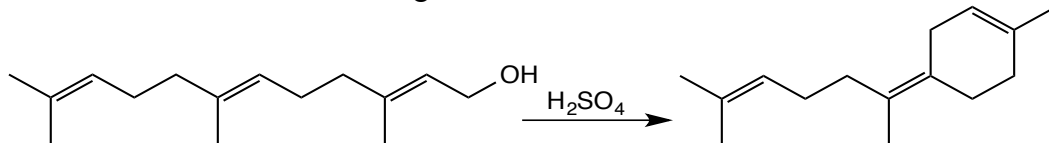
d.



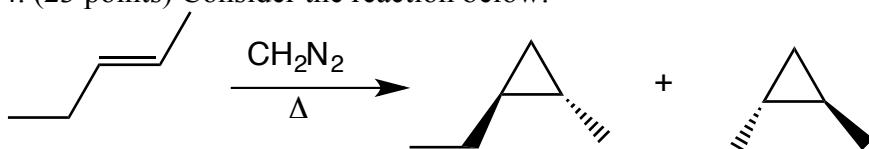
2. (11 points) Consider the following reaction, which produces the major product shown. Draw a mechanism for the reaction using arrows to show the movement of electrons.



3. (11 points) Consider the following reaction, which produces the major product shown. Draw a mechanism for the reaction using arrows to show the movement of electrons.



4. (23 points) Consider the reaction below:



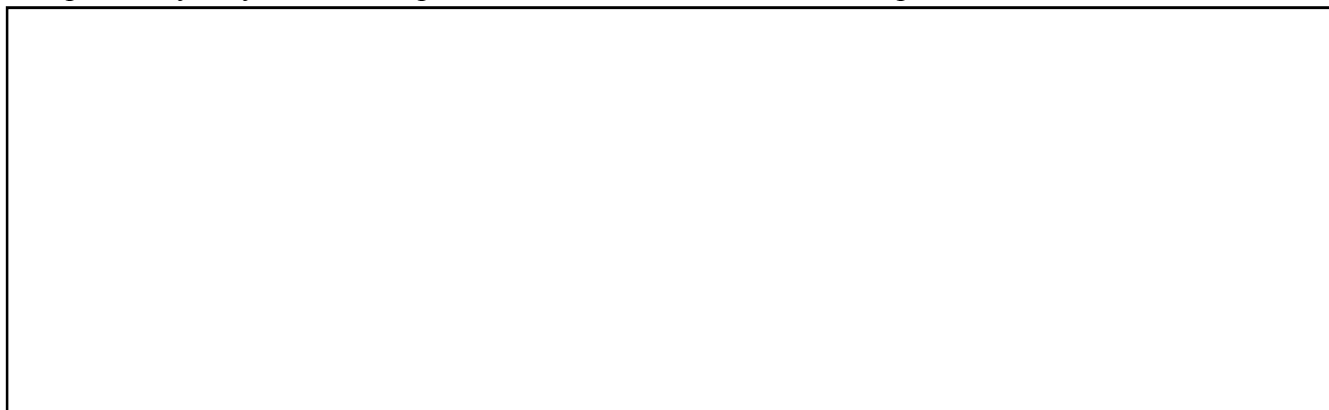
a. Draw the mechanism of this reaction using arrows to show the flow of electrons. Make sure to show the formation of the active reagent and how both stereoisomers are formed.



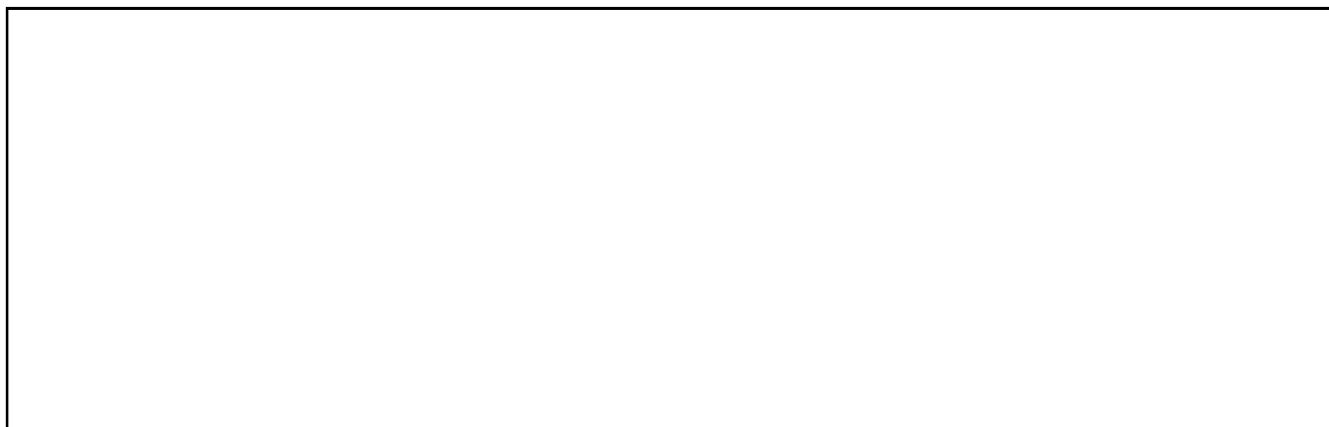
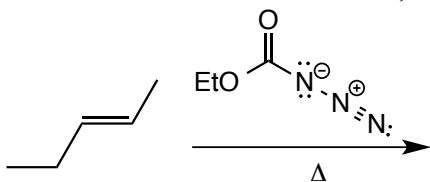
b. In the addition to alkenes, the carbene acts as both a Lewis acid and Lewis base. Sketch and label the orbital on the carbene that is acting as a Lewis acid and the orbital on the alkene that is acting as a Lewis base on a line drawing representation of this step of the reaction.



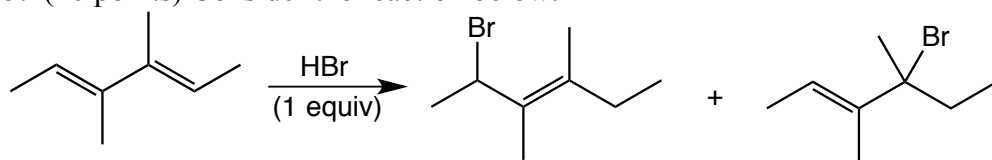
c. Explain why only two of four possible stereoisomers are formed as products.



d. Nitrenes are the nitrogen analogs of carbenes. The reagent in the following reaction will generate a nitrene upon heating. Using arrows to represent electron flow, show the formation of the nitrene, its reaction with the alkene shown, and the products formed.



5. (20 points) Consider the reaction below:



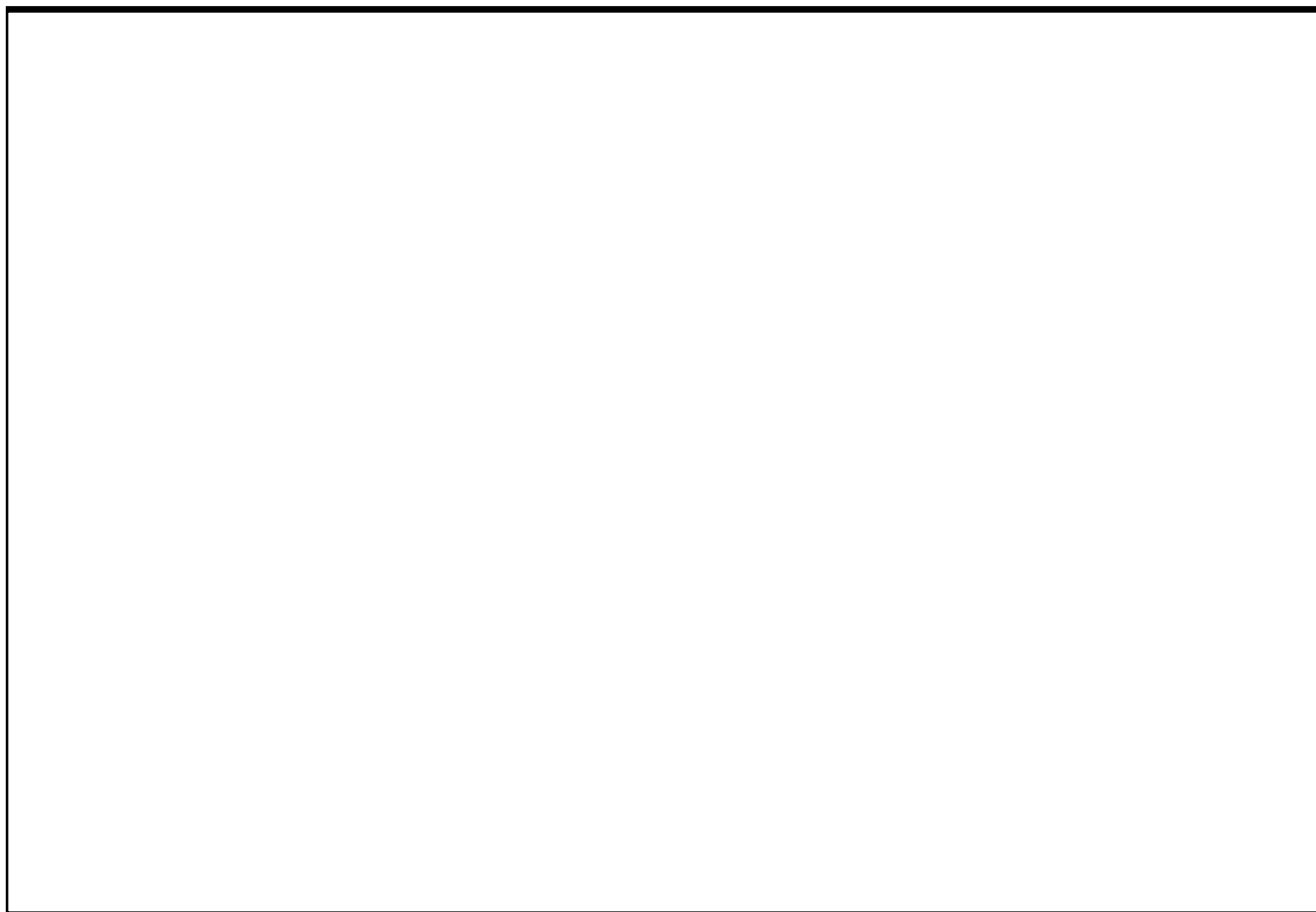
a. Draw a mechanism with arrows that shows formation of both products.



b. Which product is the kinetic product and which is the thermodynamic product? Explain your answer.

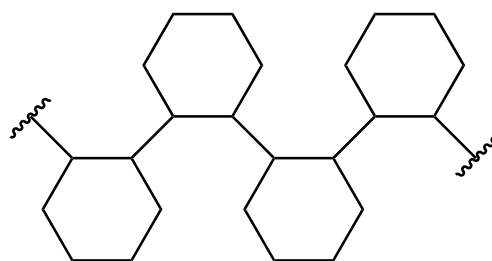
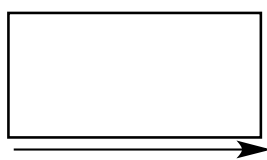


c. Draw a reaction energy coordinate diagram that shows formation of both products.



6. (15 points) Predict starting materials and plan synthesis.

a. Fill in the boxes in the following reactions. Note that only the organic products have been drawn.



b. Synthesize the product from the indicated starting materials and any other reagents.

