Final Exam
Chemistry 343 (AM)
Professor Gellman
19 December 2011

Last Name _____

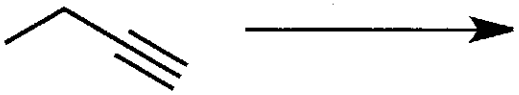
First Name _____

00192

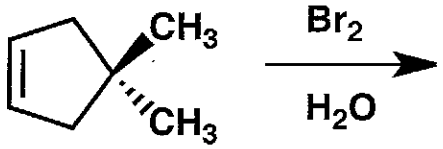
General Instructions:
(i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit. Models are allowed.
(ii) Print your name on each page.
(iii) Please keep your paper covered and your eyes on your own work. Misconduct will lead to failure in the course.

1. (34 points) Show the major product or products expected from each reaction.

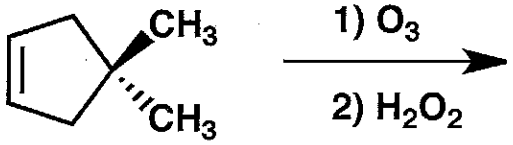
(a)



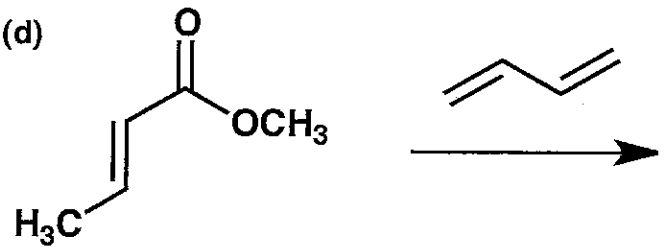
(b)



(c)



(d)



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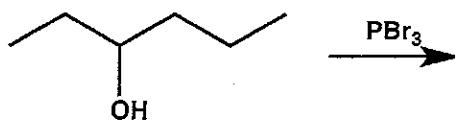
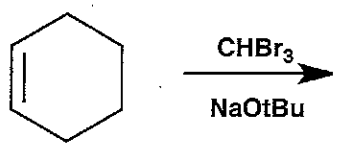
1. (cont.)

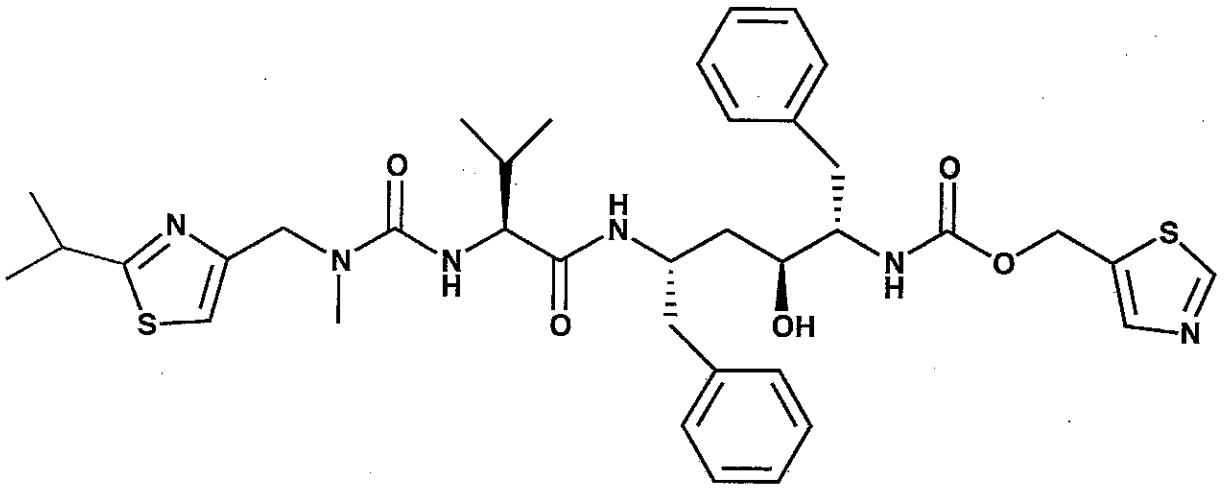
(e)



(f)



2. (12 points) Shown below is a drug called ritonavir for patients infected with HIV. CIRCLE all sp^3 stereogenic centers, and indicate whether each configuration is R or S.



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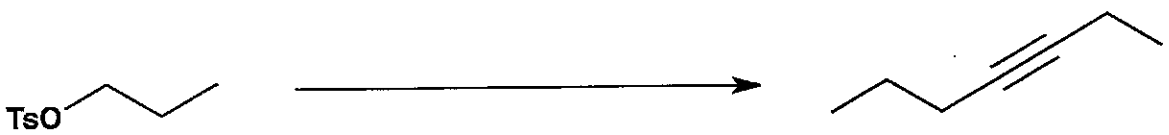
3. (23 points) Show the reagents required to convert the starting molecule to the indicated product. If necessary, be sure to differentiate clearly between distinct steps, by using "1)," "2)," etc. over the arrow.

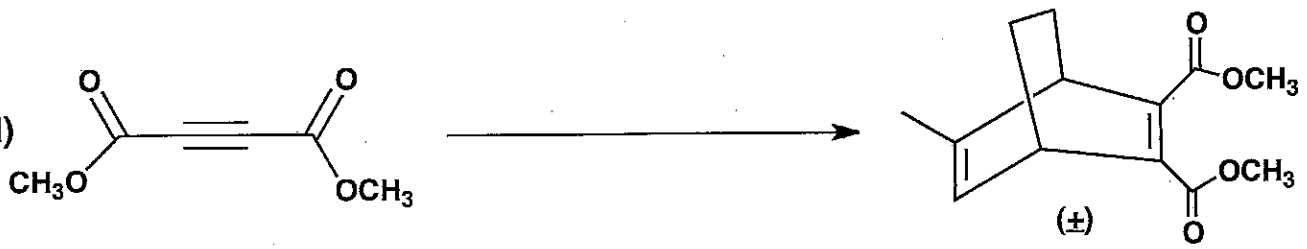
(a)

(b)

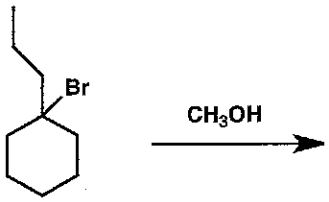
(c)



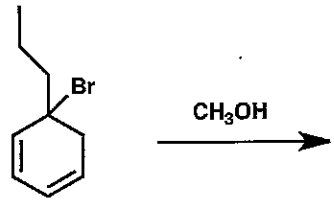
(d)



4. (24 points) Reaction (i) below produces three products, A, B and C. A and B are isomers, and these compounds each react with one equivalent of H_2 in the presence of Pd/C to produce the same product. Reaction (ii) produces only one product (D).

(i) 

A + B + C

(ii) 

D

(a) Draw the products in the indicated boxes below.

A =

B =

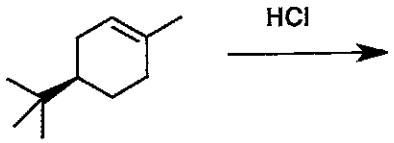
C =

D =

(b) Explain in ONE SENTENCE why only one product is formed in reaction (ii).

5. (20 points)

(a) The reaction shown below leads to two isomeric products. Draw those products.



(Single enantiomer)

(b) Draw the most stable conformation of each product.

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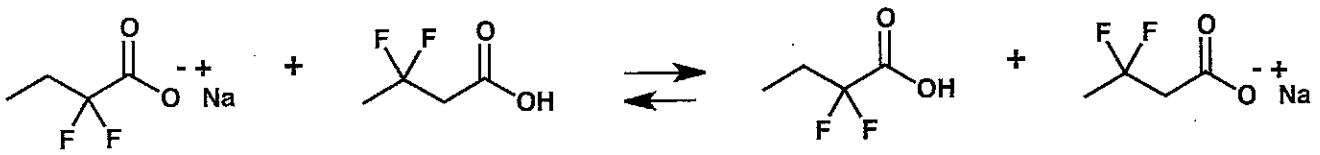
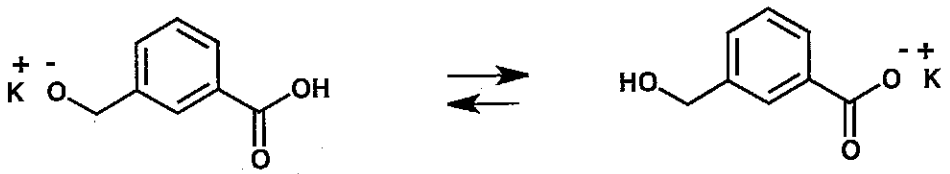
6. (8 points) For each equilibrium shown below, CIRCLE the side that you would expect to be favored.

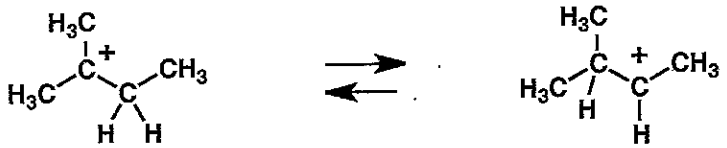
(a)



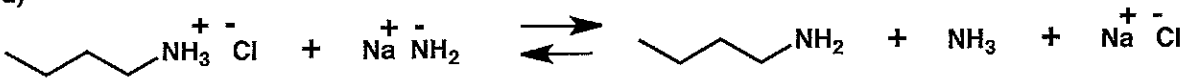
(b)



(c)

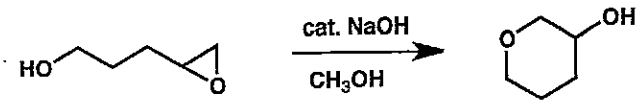


(d)

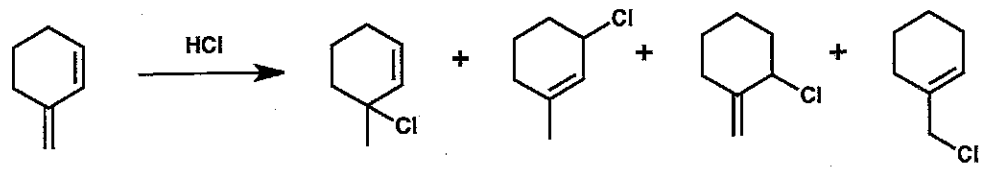


7. (30 points) Provide a mechanism (curved arrows) for each reaction shown below. Be sure to show intermediates and all important resonance structures.

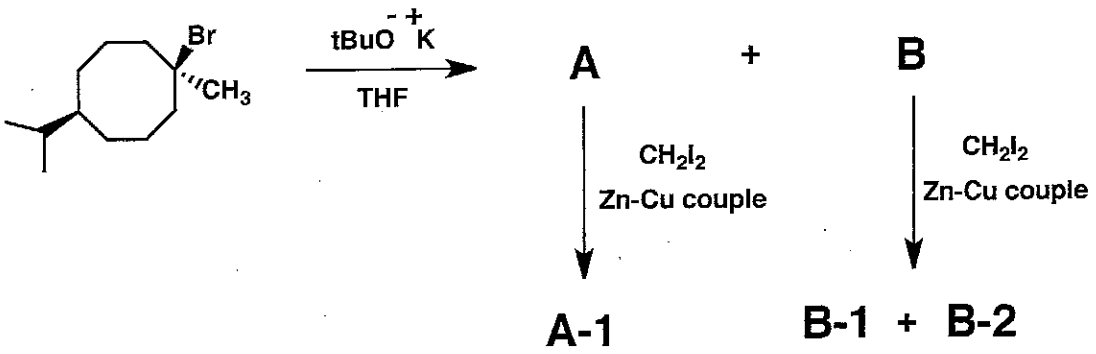
(a)



(b)



8. (25 points) When the starting material shown below is allowed to react under the conditions shown, two isomeric products result, A and B. B is chiral and racemic, but A is not chiral. Compound A forms only one product, A-1 (not chiral), under the second reaction conditions, but compound B forms two new products under the second reaction conditions, B-1 and B-2. B-1 and B-2 are both chiral and racemic. Draw the structures of all five compounds in the indicated boxes.



A =

B =

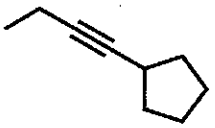
A-1 =

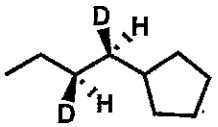
B-1 =

B-2 =

9. (24 points) Devise a synthetic route from the indicated starting material to the indicated target in each of the two cases below. Each route should be as short and as selective as possible. You may use any other organic molecules and any inorganic reagents in your synthetic plans. Show the expected product after each step in each synthetic route. (Do not provide mechanistic information.)

(a)

Starting material = 

Target = 

(±)

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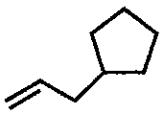
9. (cont.)

Starting material = 

Target =