Hour Exam #2 (PM)
Chemistry 343
Professor Gellman
2 November 2011

Last Name Answer

First Name key

General Instructions:

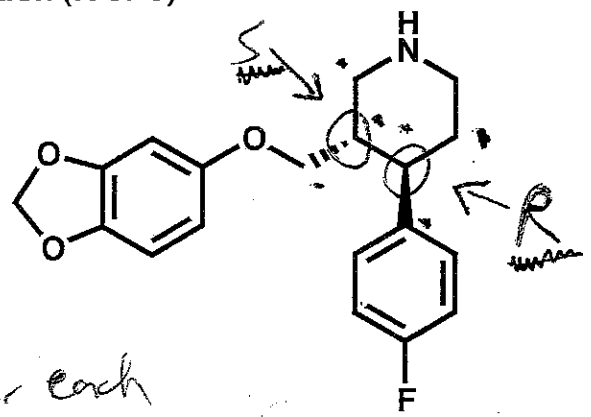
(i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit.

(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. (9 points) Shown below is the drug paroxetine, an antidepressant. CIRCLE each sp^3 stereogenic center, and assign the configuration (R or S).

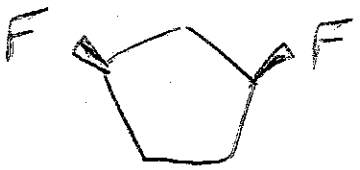
+3 for one correct circle, or +5 for both. (-1 for additional circle(s))



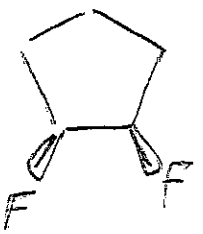
+2 for each correct R or S

2. (14 points) Draw all achiral (i.e., non-chiral) stereoisomers of difluoro-cyclopentane.

+4



+5



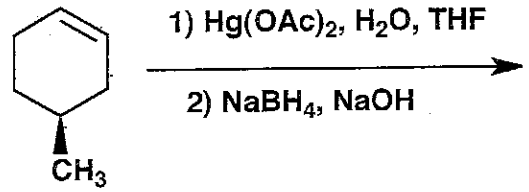
+5

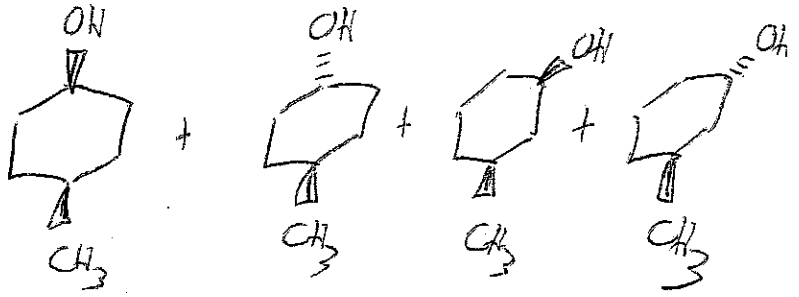
(-1 for extra structures)

Name _____

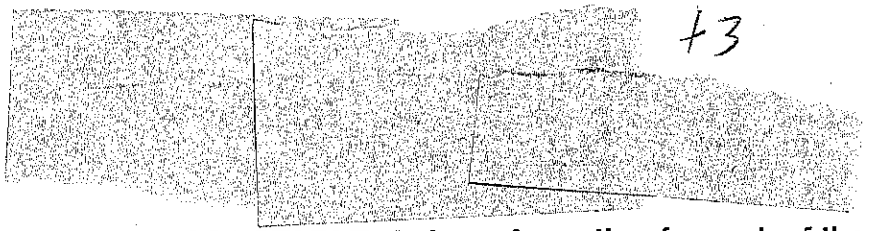
3. (24 points)

(a) Show all expected products from the reaction below. Note that the starting material is a single enantiomer. Draw the products in the "regular hexagon" format (as the starting material is drawn), rather than as chairs.





(*S*) enantiomer only



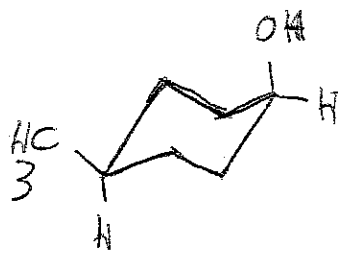
+3 +3 +4 +4

[-2 for enantiomer of either 1,3 case]

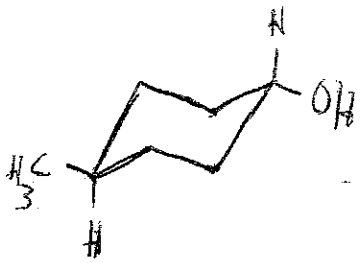
(b) Draw the MOST STABLE chair conformation for each of the products of the reaction above. In choosing the most stable chair, consider the following facts.

-- For methyl-cyclohexane, the conformation with equatorial methyl is 1.8 kcal/mol more stable than the conformation with axial methyl.

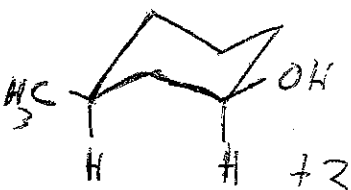
-- For hydroxy-cyclohexane, the conformation with equatorial hydroxyl is 0.9 kcal/mol more stable than the conformation with axial hydroxyl



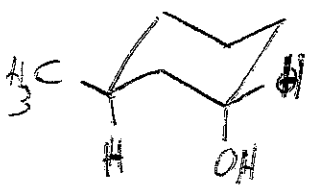
+2



+2



+3



+3

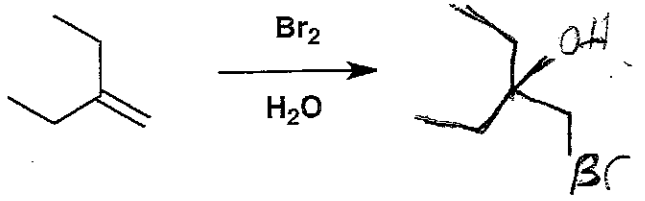
[-1 for enantiomer of either 1,3 case]

no pts for enantiomer of either 1,4 case

Name _____

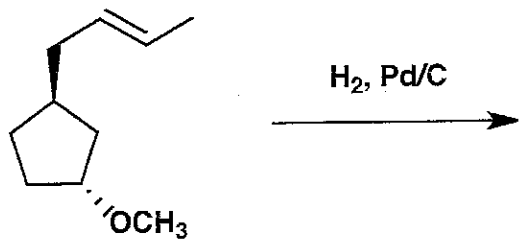
4. (24 points) Show the major product(s) expected from the reactions below.

(a)



+5 (-3 for incorrect regioisomer)
+2 for dibromo

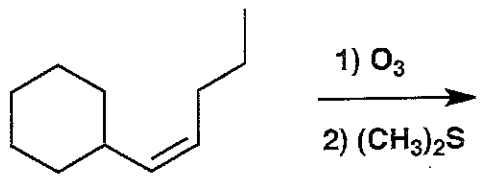
(b)

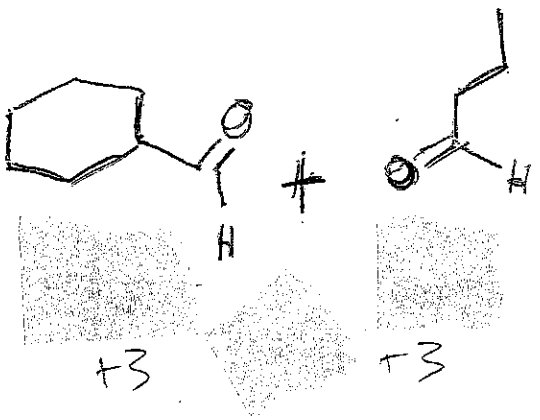


(The starting material is a single enantiomer.)

+5 (-2 if no stereochem)
-2 for $-OCH_3$ issues

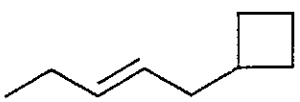
(c)

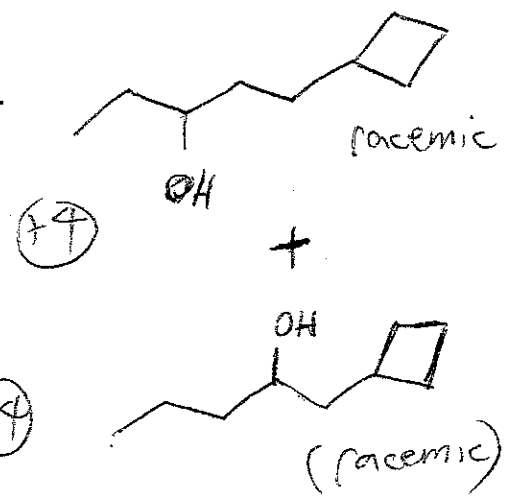




(+2 for carboxylic acids or alcohols)

(d)

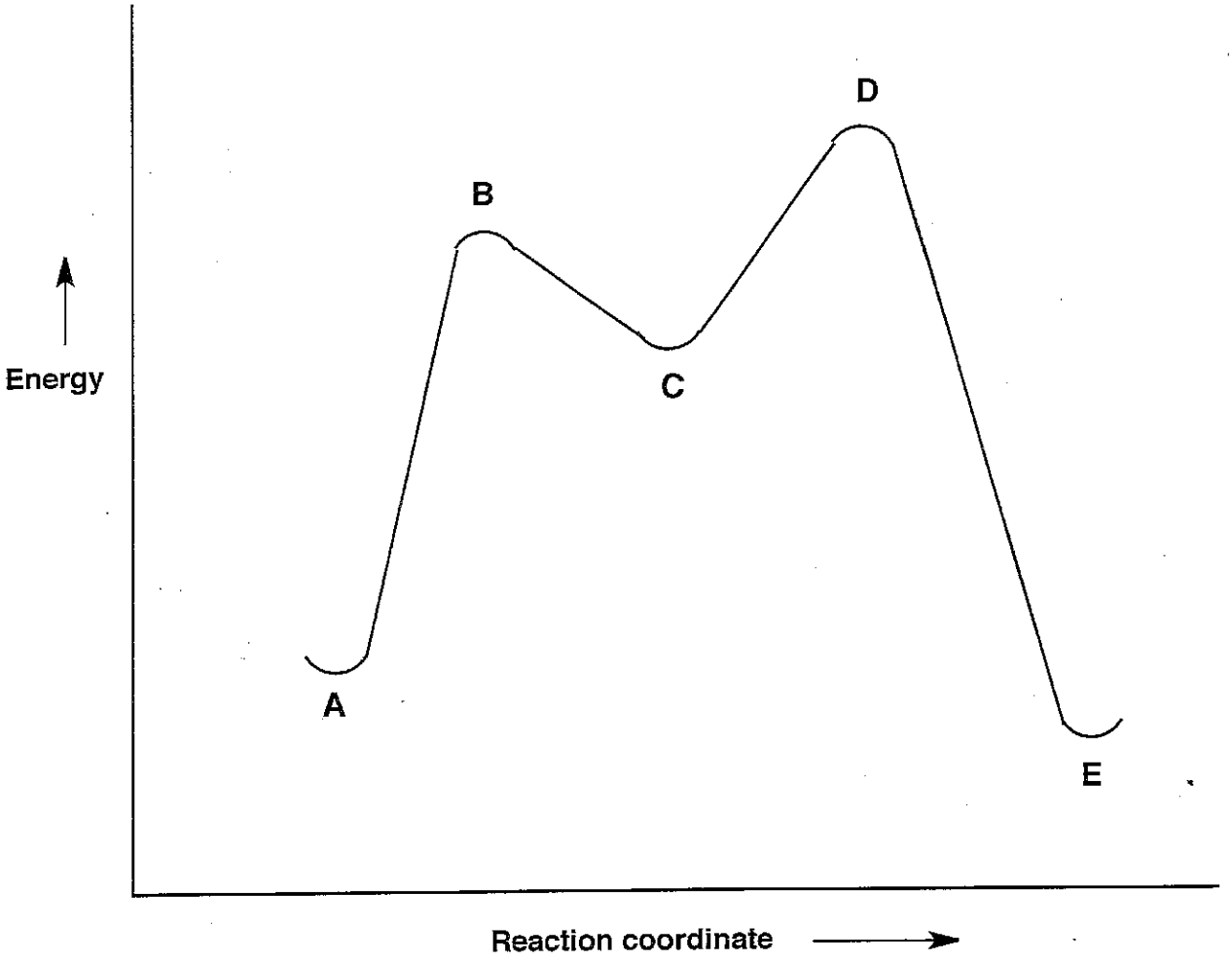




(-1 for each missing "racemic" or "(±)")

Name _____

5. (12 points) Answer the questions below based on the reaction energy diagram.



Which species among A-E is the product? E

Which species among A-E is the intermediate in the reaction mechanism? C

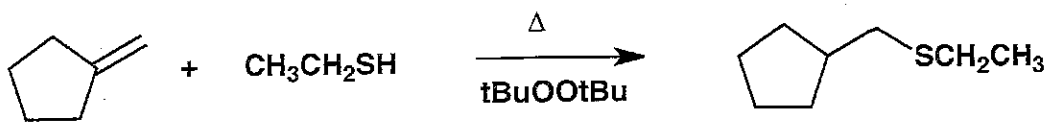
Which species among A-E is the rate-determining transition state? D

+4 each

Name _____

6. (9 points) Shown below is a reaction between a thiol and an alkene that proceeds via a mechanism that involves radicals. Show the propagation steps for this mechanism.

Overall reaction:



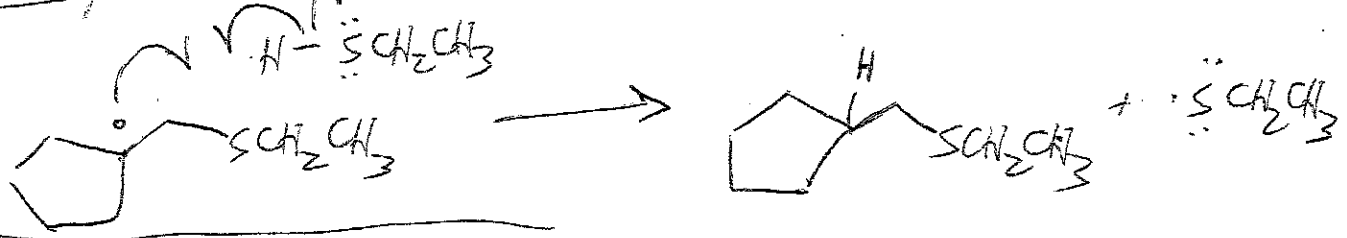
Initiation produces this species: $CH_3CH_2-\ddot{S}\cdot$

Propagation steps:

+3 for this intermediate

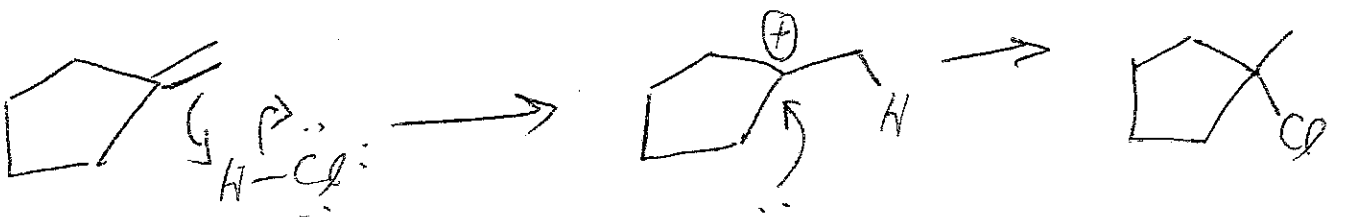
(1)

(2)



+1 for each half-arrow (+6 total)

7. (8 points) Draw a mechanism (curved arrows) for the reaction shown below. Be sure to draw all intermediates.



+2 for each curved arrow (+6 total)

+2 for $C^{\oplus}$ intermediate