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

Last Name _____

First Name _____

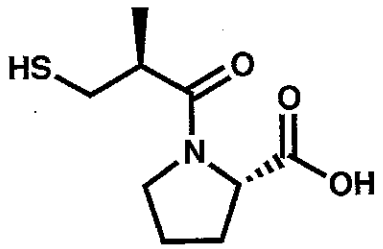
General Instructions:

(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 captopril, which is used to treat high blood pressure and congestive heart failure. CIRCLE each stereogenic center, and assign the configuration (R or S).



2. (14 points) Draw all stereoisomers of bromo-dichloro-cyclohexane that are NOT chiral and NOT meso.

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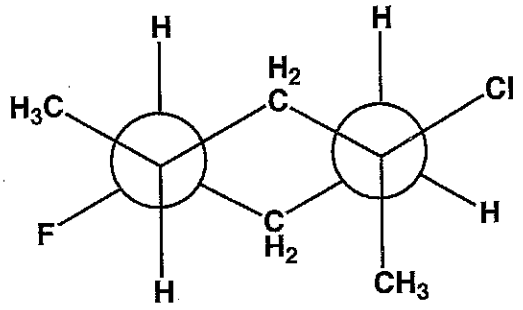
3. (19 points) Consider the Newman projection shown below.



(a) Draw the regular hexagon image (not a chair) that corresponds to the Newman projection.

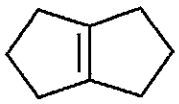
(b) Draw the chair conformation that corresponds to the Newman projection.

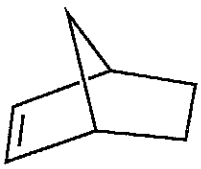
(c) Draw the other chair conformation available to this molecule.

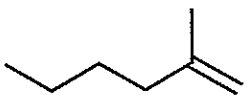
(d) Which conformation is more stable? (Circle the appropriate answer below.)

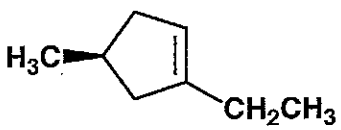
The conformation in (a). The conformation in (b).

4. (26 points) Show the major product(s) expected from the reactions below.

(a)  H_2, Pd/C →

(b)  1) O_3 → 2) H_2O_2, H_2O

(c)  HBr → tBuOOtBu, Δ

(d)  (H_3C and CH_2CH_3) Cl_2 → CH_2Cl_2

(The starting material is a single enantiomer.)

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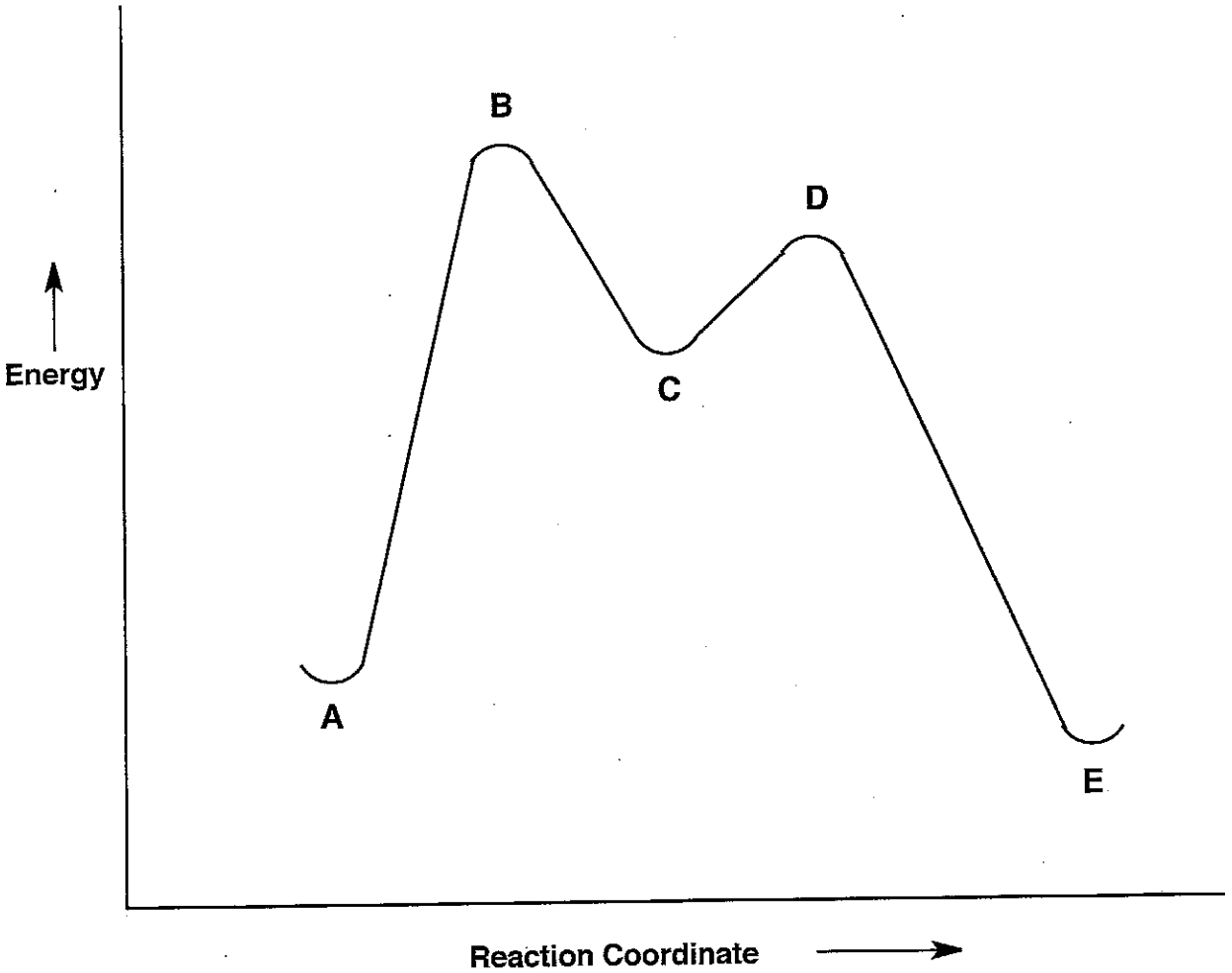
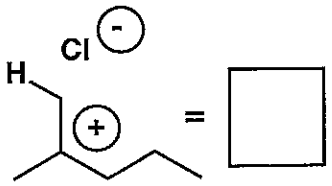
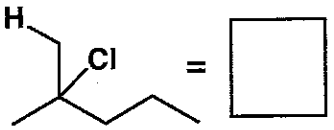
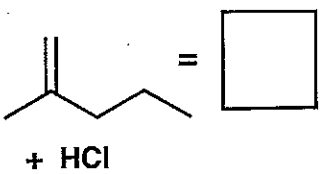
5. (20 points) Answer the questions below based on the reaction energy diagram.

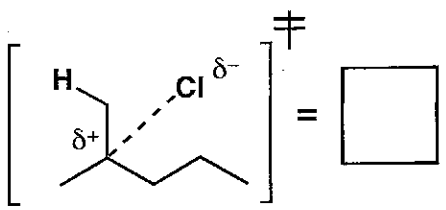


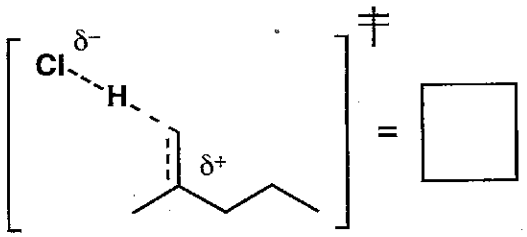
Shown below are species involved in the reaction of an alkene with HCl. Indicate which location (among A-E) on the diagram corresponds to each species (fill in the boxes).











6. (12 points) Draw a mechanism (curved arrows) for each reaction shown below. Be sure to draw all intermediates.

(a)

(b)