

Chemistry 325  
Fall, 2008  
Examination #2  
VERSION A  
Friday, October 31, 2008

The time limit for this examination is 50 minutes. The maximum score possible for this examination is 100 points. You may use molecular models.

NAME:

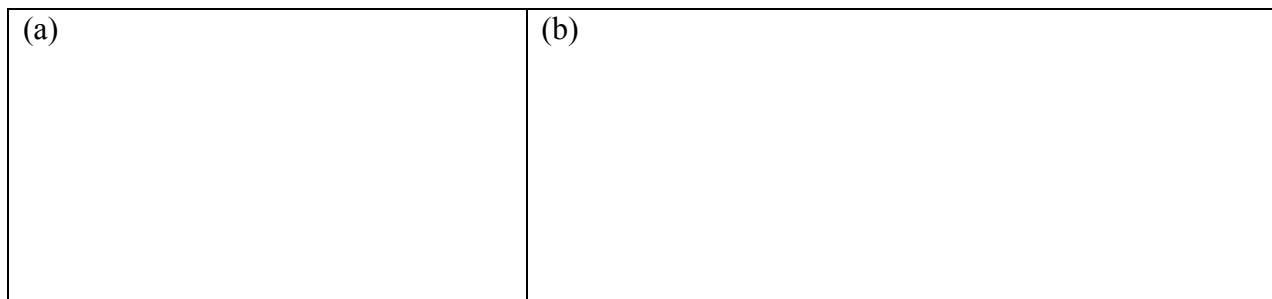
NAME: \_\_\_\_\_

SECTION I. Nomenclature [15 pts]

1. Draw the structures of the following compounds [5 pts each]:

(a) *Z*-1-cyclohexyl-1,6-heptadiene.

(b) (2*E*,4*R*)-4-isopropylhex-2-ene.

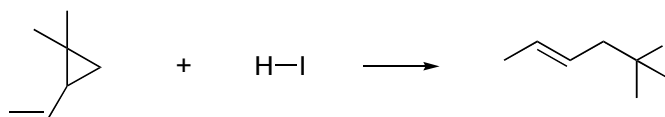


2. Write a correct name for the following compound [5 pts]:

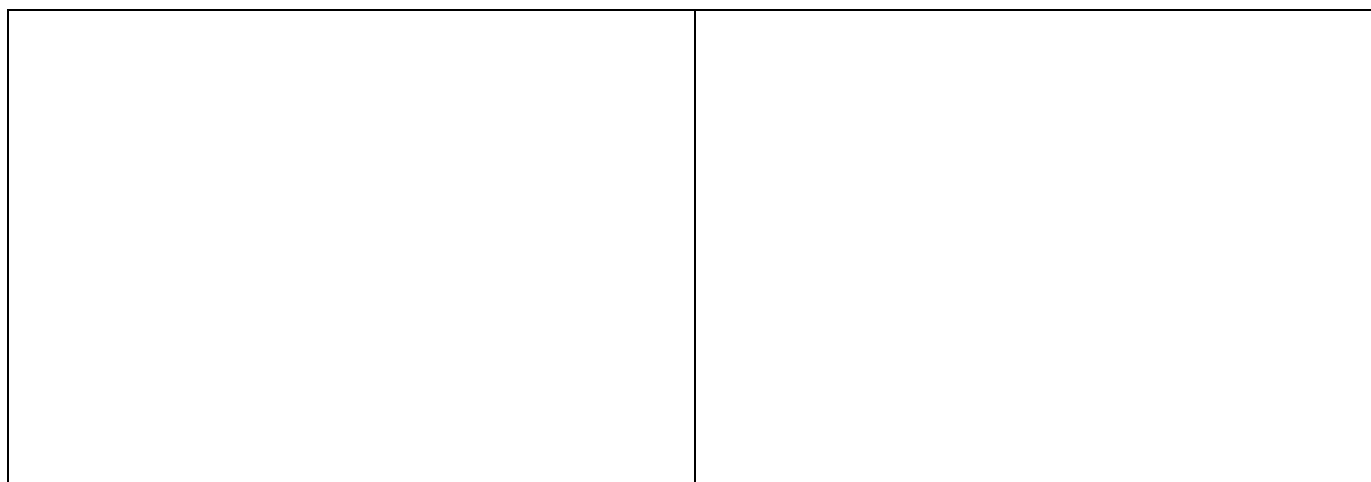


SECTION II. Reactions and Theory [85 pts]

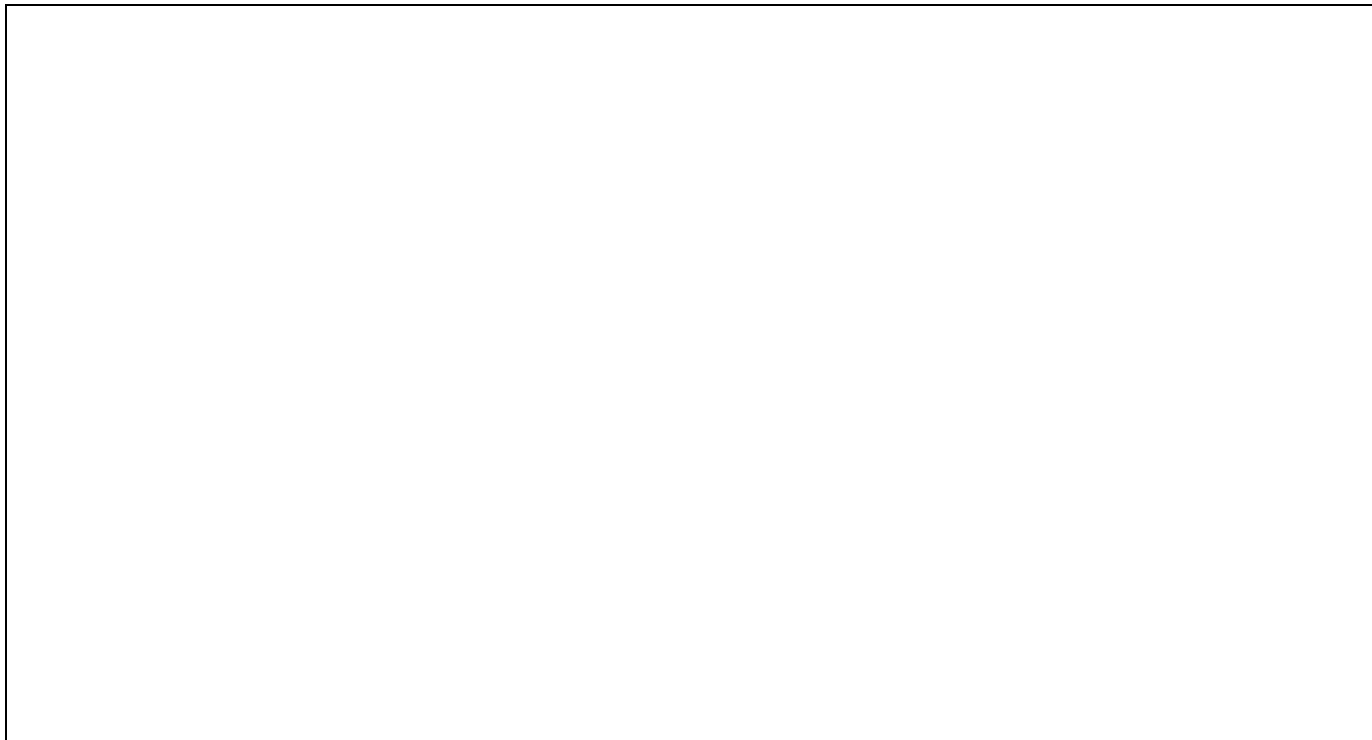
3. The reaction of the alkene below with hydrogen iodide gives the unsaturated alkyl iodide shown as the major final product. The reaction proceeds by a sequence involving two different carbocations.



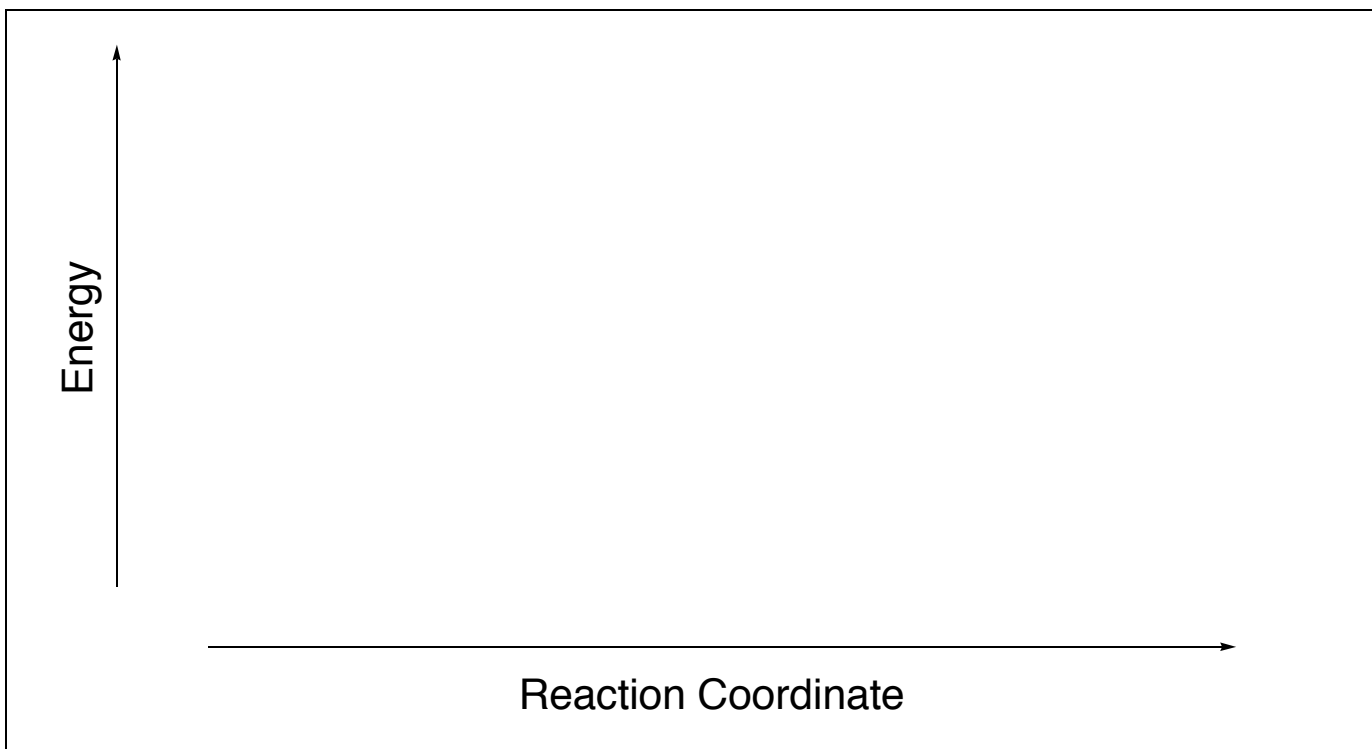
(a) [8 pts.] Draw the structures of the two carbocation intermediates involved in this reaction



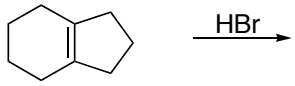
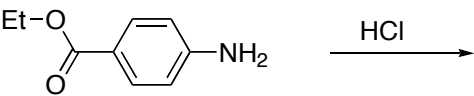
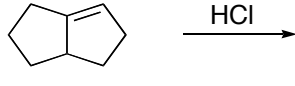
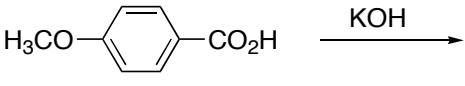
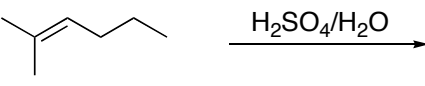
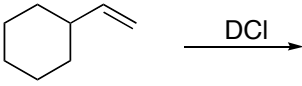
(b) [8 pts] Write a reasonable mechanism for this reaction.



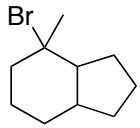
(c) [8 pts.] Draw a fully-labeled reaction potential energy profile (reaction coordinate diagram) for the reaction. Your diagram should show the location and relative energy of every reactive intermediate. PAY PARTICULAR ATTENTION TO THE RELATIVE ENERGIES OF ALL SPECIES INVOLVED

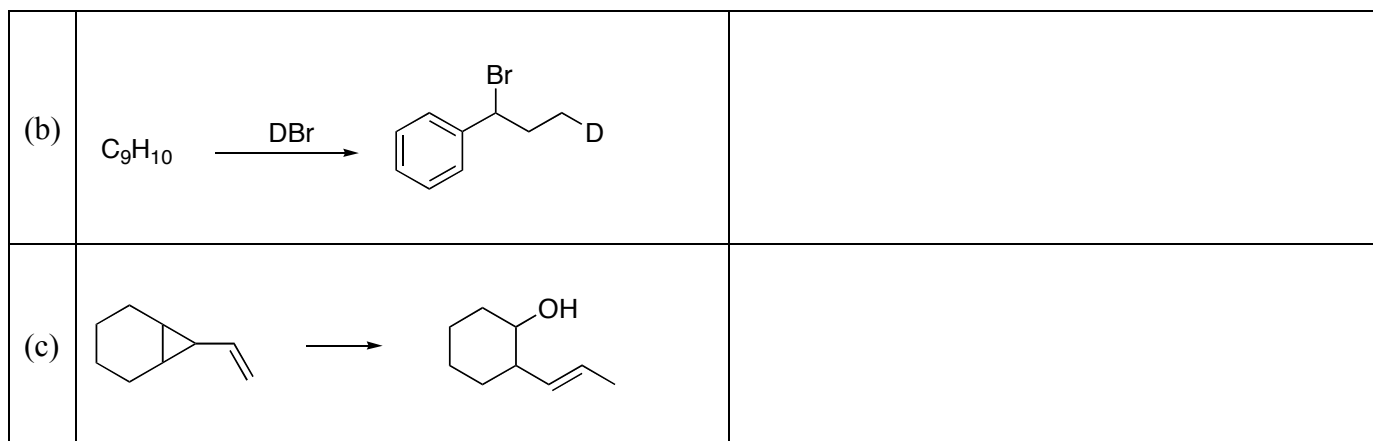


4. [4 pts. each] Complete the following reactions by drawing the structure of the major organic product. Where the product is a racemate, draw only one enantiomer of the product.

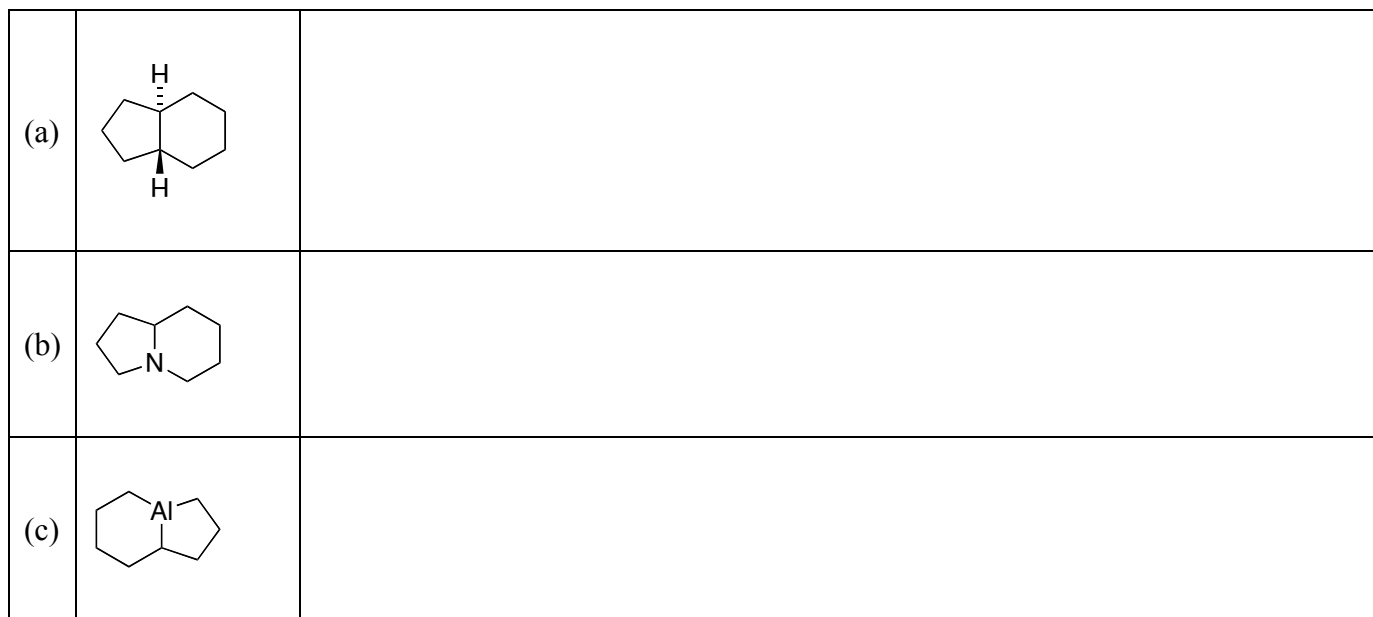
(a)		
(b)		
(c)		
(d)		
(e)		
(f)		

5. [5 pts. each] Complete the following reactions by drawing the structure of the starting alkene or providing the missing reagent. The molecular formula is given for some missing reactant alkenes. Note that stereochemistry may be important in some of these reactions.

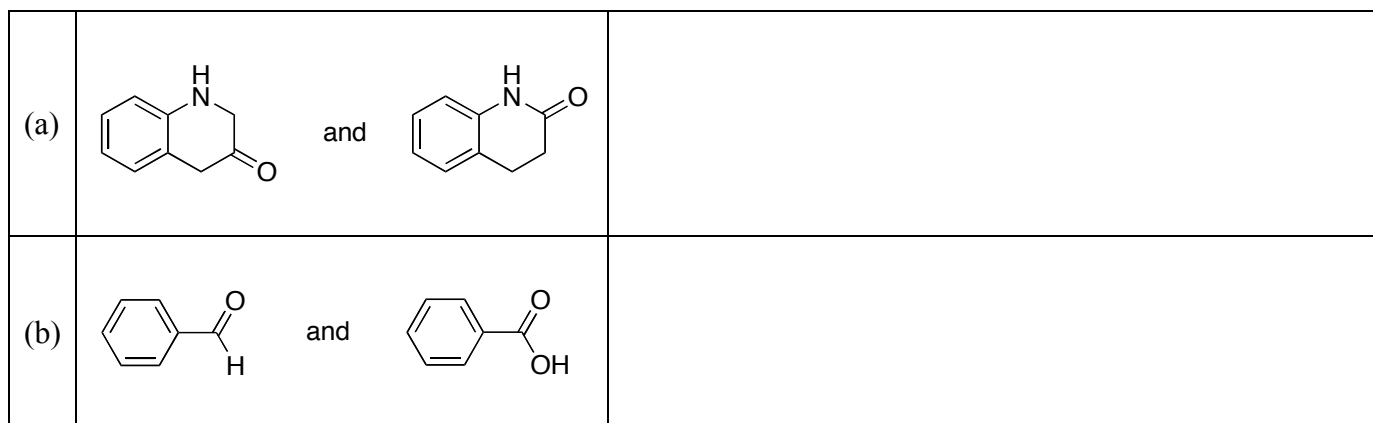
(a)	$C_{10}H_{16}$ $\xrightarrow{HBr}$  this regioisomer only	
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6. [2 pts each] Identify each of the following species as a Lewis acid, a Lewis base, or neither.



7. [4 pts each] Predict which of the following pairs of compounds will be the stronger acid.



8. [8 pts] Provide a reasonable explanation for the observation that the addition of one mole of HCl to the diene below gives the product shown, and not the other. [Hint: the mechanism of the reaction will be useful here]

