

Chemistry 325  
Summer, 2008  
Final Examination  
Friday, August 1, 2008

The time limit for this examination is 120 minutes. The maximum score possible for this examination is 200 points. You may use molecular models.

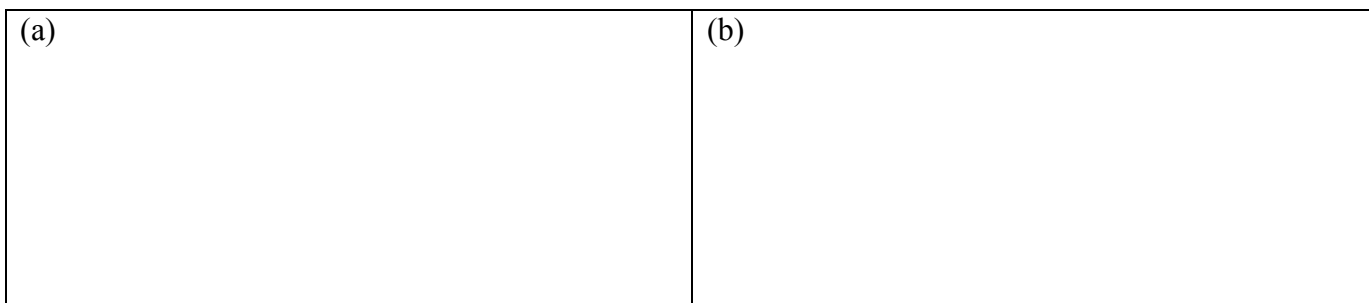
NAME: \_\_\_\_\_

SECTION I. Nomenclature [20 pts]

1. Draw the structures of:

(a) *S*-4-methylhept-2-yne. [5 pts]

(b) *R*-3-chloro-1-methylcyclohexene [5 pts]



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

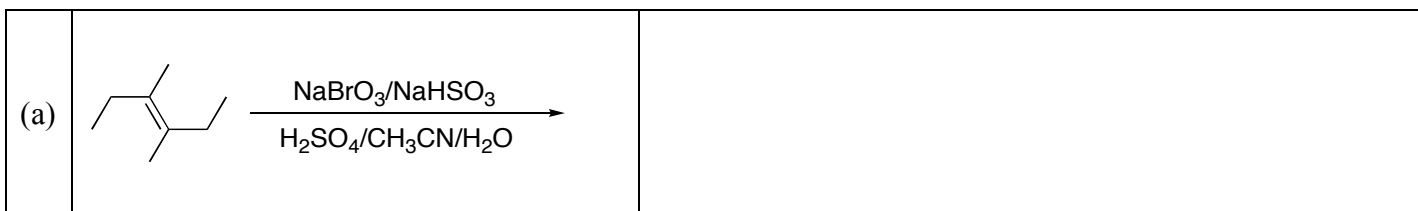


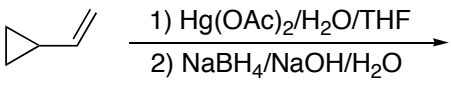
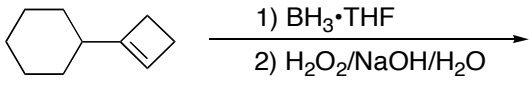
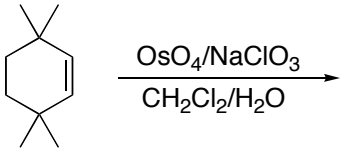
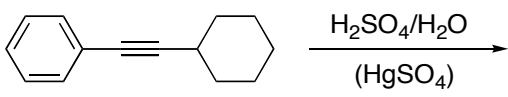
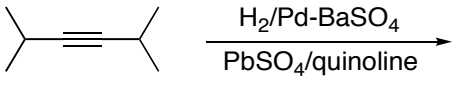
(a) \_\_\_\_\_

(b) \_\_\_\_\_

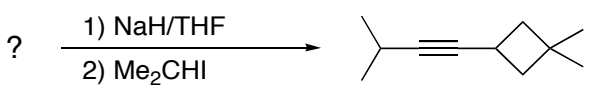
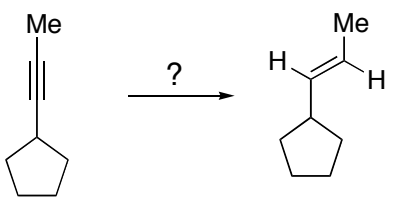
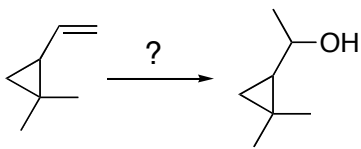
SECTION II. Reactions and Theory [160 pts]

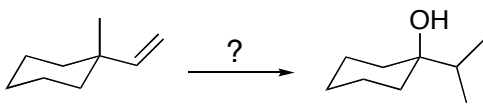
3. [5 pts. each; 30 pts total]. Complete the following reactions by drawing the structure of the major organic product.



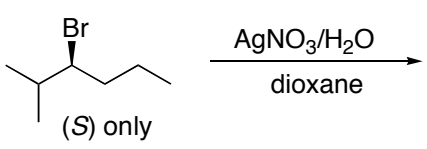
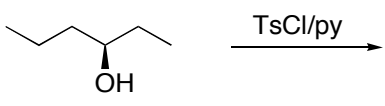
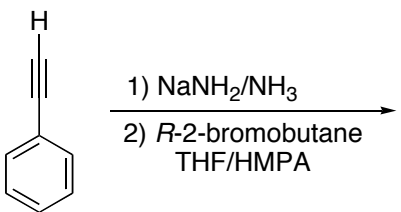
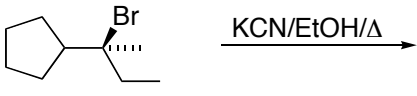
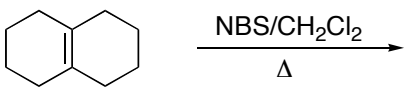
(b)		
(c)		
(d)		
(e)		
(f)		

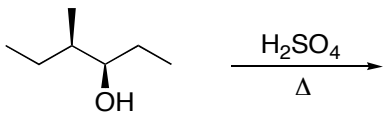
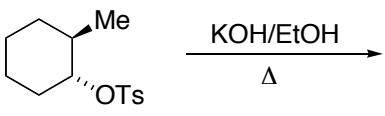
4. [6 pts. each; 30 pts] Complete the following reactions by drawing the structure of the starting alkene or providing the structure of the missing reagent.

(a)		
(b)		
(c)		

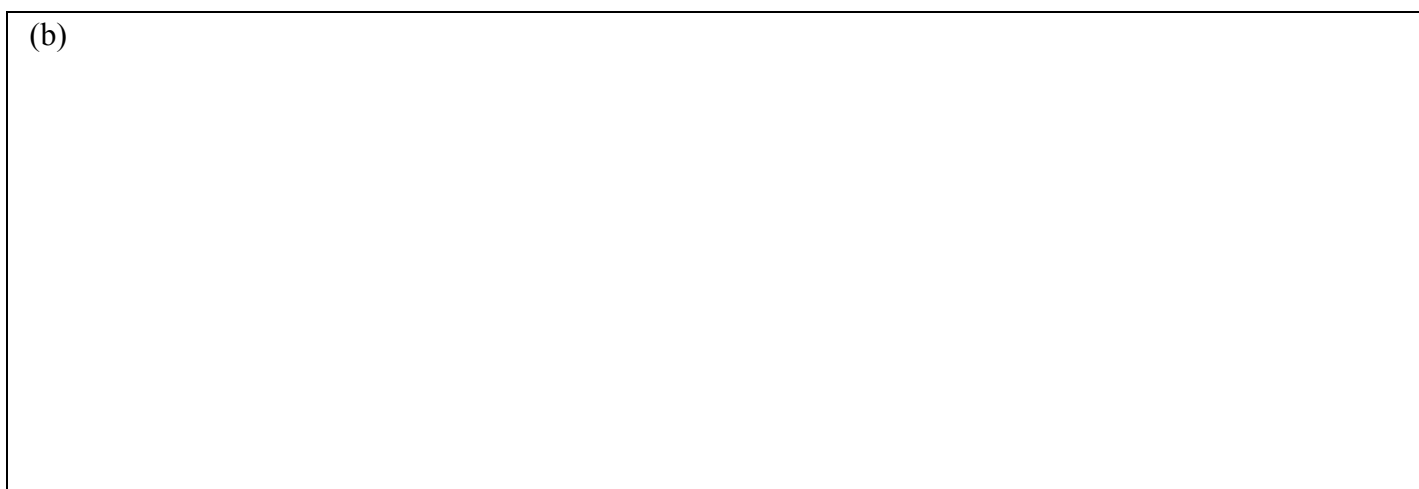
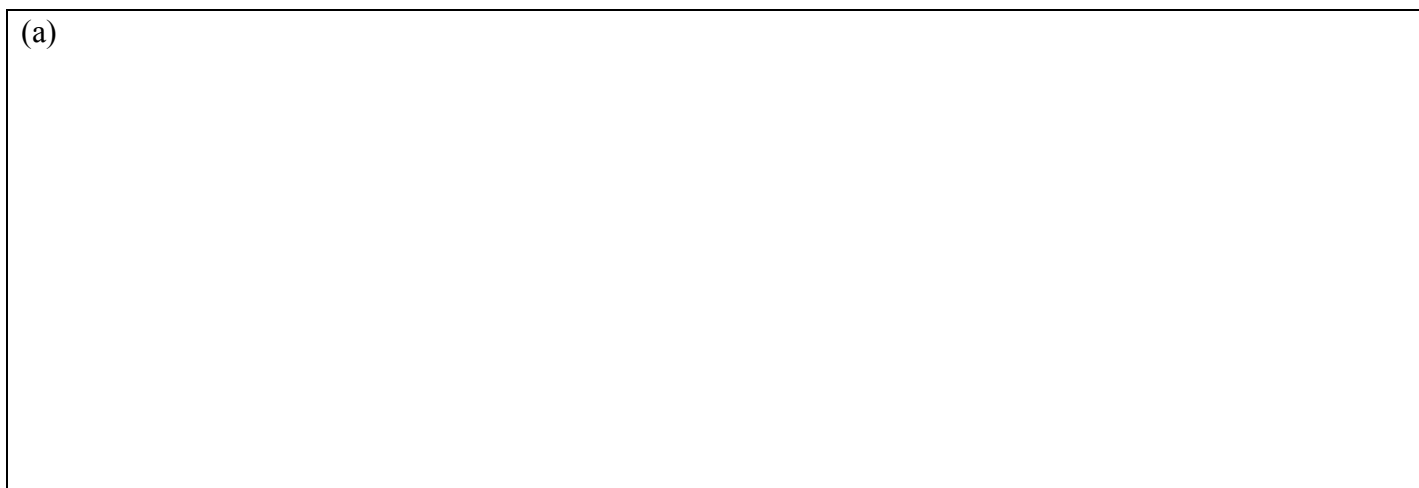
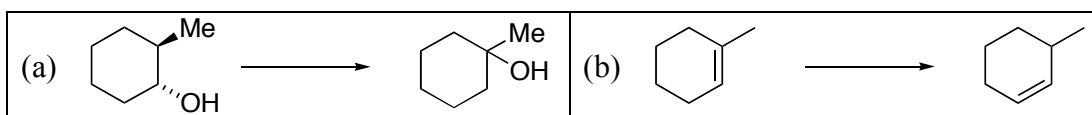
(d)	$? \xrightarrow[\text{H}_2\text{SO}_4/\text{CH}_3\text{CN}/\text{H}_2\text{O}]{\text{NaBrO}_3/\text{NaHSO}_3} \text{HO}-\text{CH}(\text{H})-\text{CH}(\text{Br})(\text{H})-\text{C}_6\text{H}_5$	
(e)		

5. Complete each of the following reactions. [5 pts each, 35 pts]

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

<p>(f) </p>	
<p>(g) </p>	

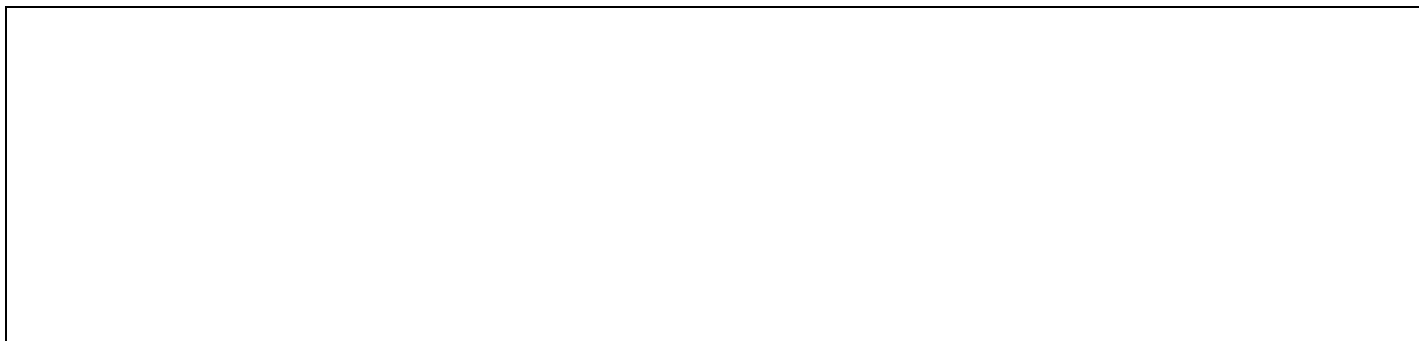
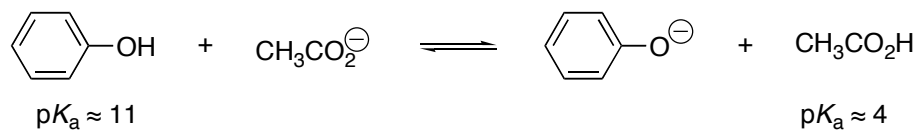
6. It is often useful to be able to move a functional group from one location in a molecule to another. Design reaction sequences that will allow each of the following transformations to be accomplished. [15 pts each, 30 pts]



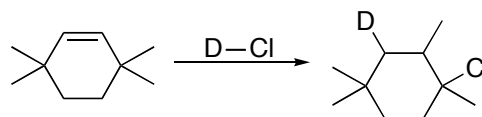
7. Draw the lowest energy conformation of *cis*-1,2-dibromocyclohexane. [10 pts]



8. What is the approximate value of the equilibrium constant for the following reaction? [5 pts]

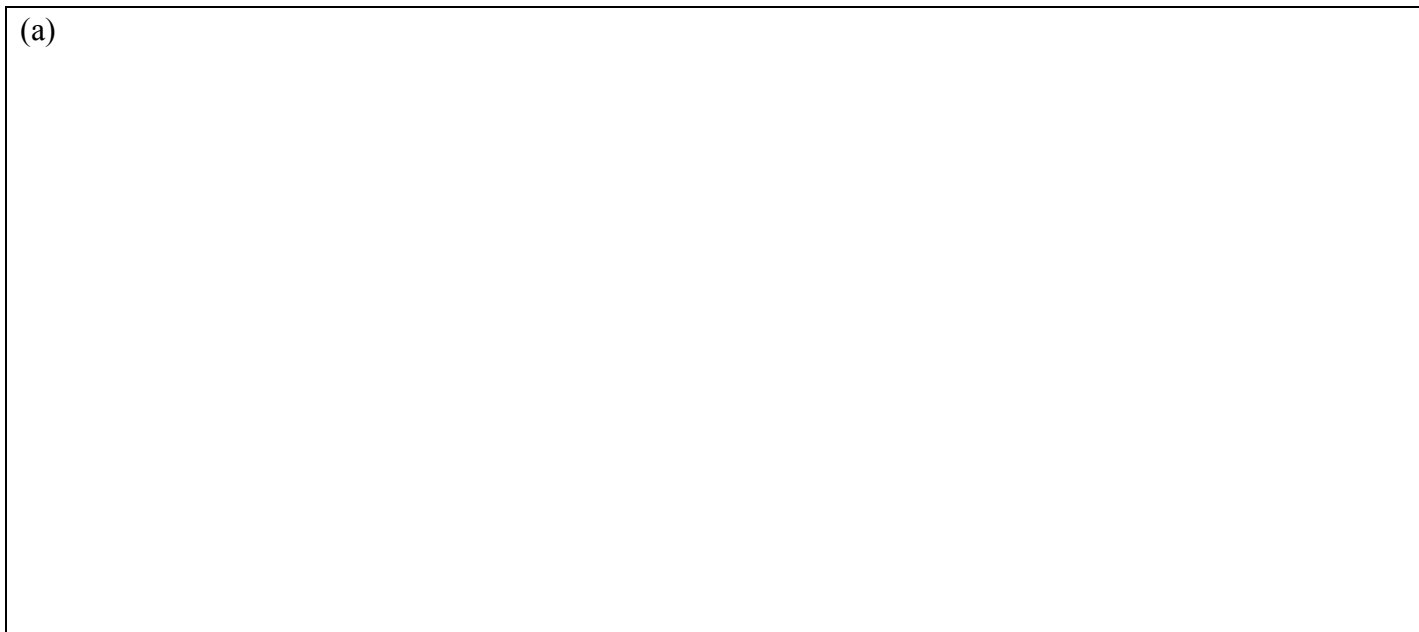


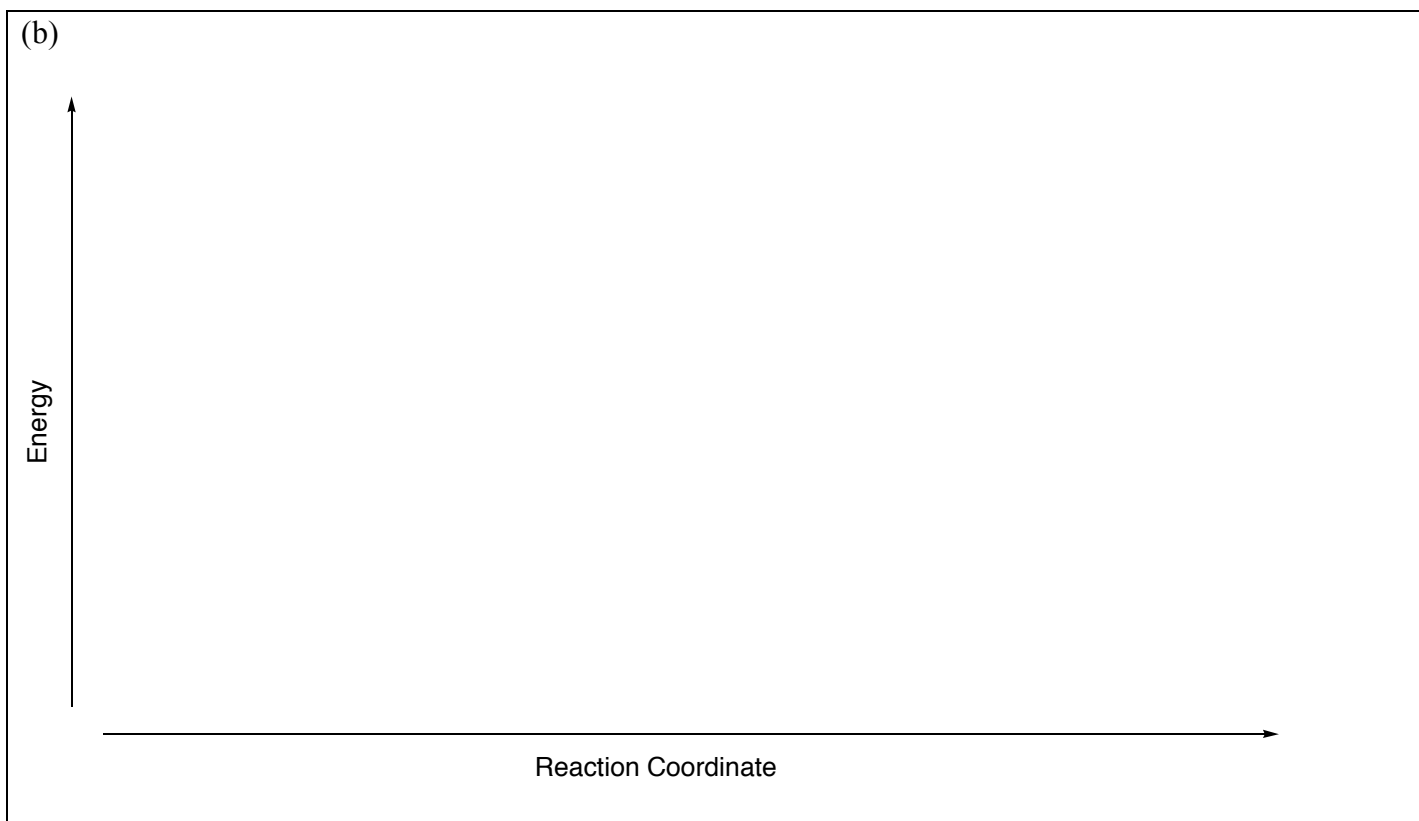
9. (a) Write a mechanism that accounts for the transformation shown at right. [10 pts]



(b) Sketch the reaction coordinate diagram for this reaction (remember to pay attention to the relative energies of the species involved) [10 pts]

(a)





SECTION III. Synthesis [20 pts]. Design a rational synthesis of the target molecule shown from hydrocarbons containing five or less carbon atoms. Your synthesis should yield only the stereoisomer shown (racemic compounds are permitted). Partial credit is available for this question, and points are explicitly allocated to stereochemistry.

