

Seat No. \_\_\_\_\_

Name KEY  
(Please print your name and **CIRCLE** your last name)

**CHEMISTRY 331A**

**FINAL EXAM**

Tuesday, December 16, 2008

- I. (24 points) \_\_\_\_\_
- II. (12 points) \_\_\_\_\_
- III. (12 points) \_\_\_\_\_
- IV. (14 points) \_\_\_\_\_
- V. (45 points) \_\_\_\_\_
- VI. (30 points) \_\_\_\_\_
- VII. ( 5 points) \_\_\_\_\_
- VIII. ( 6 points) \_\_\_\_\_
- IX. ( 2 points) \_\_\_\_\_

\_\_\_\_\_

TOTAL (150 points) \_\_\_\_\_

I. (24 pts) Using structures and/or words briefly explain:

(A) Why acetic acid is more acidic than ethanol?

conjugate base is resonance stabilized

(B) Why  $\text{CH}_4$  should be more stable as a tetrahedron than planar?

C-H bonds further apart  
 $\therefore$  reduced Coulombic repulsion.

(C) Why water is soluble in methanol but not in hexane?

H-bonding

(D) Why carbon dioxide has no dipole moment?

$\text{O}=\text{C}=\text{O}$  is linear

(E) Why 1,3-pentadiene is more stable than 1,4-pentadiene?

Resonance stabilization

(F) Why geckos don't fall of the ceiling?

van der Waal's forces

(G) Why the eclipsed conformation of ethane is the least stable?

torsional strain

(H) Why cis-1,3-dichlorocyclohexane is more stable than cis-1,2-dichlorocyclohexane?

both Cl's can be equatorial

~~(I) Why do dogs roll on dead squirrels?~~

(J) Why cyclohexane is more stable than cyclobutane?

no angle or torsional strain  
in chair form

(K) Why rxn. of Br<sub>2</sub> and cyclopentene leads to the *trans* 1,2-dibromide?

proceeds thru cyclic  
bromonium ion

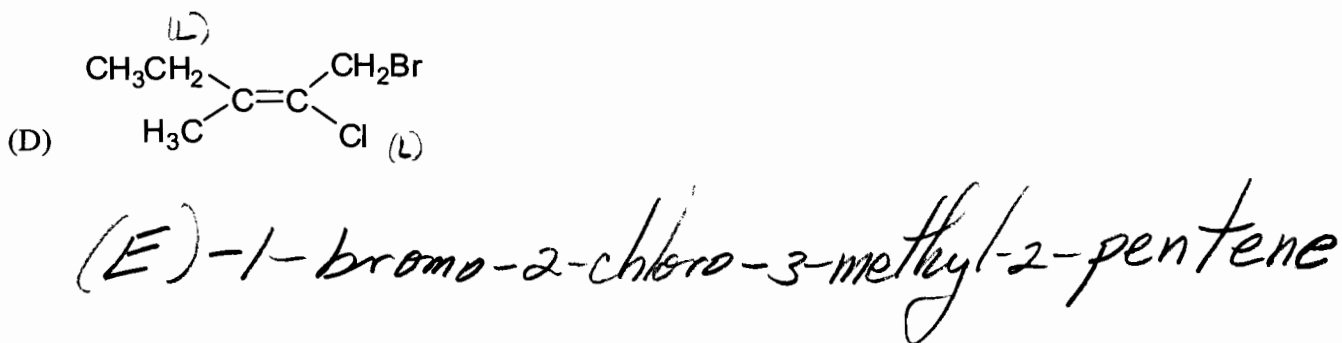
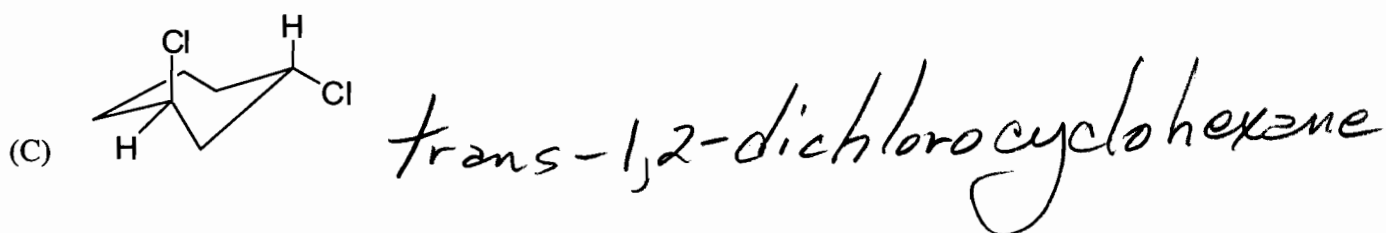
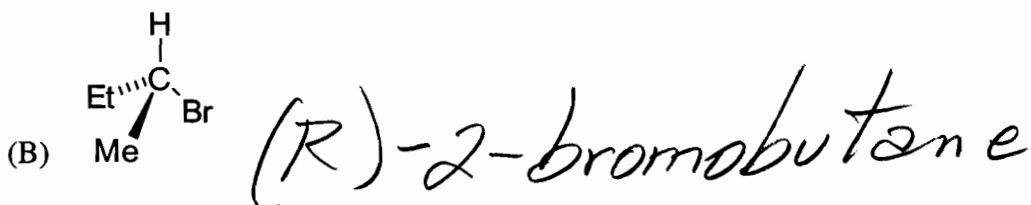
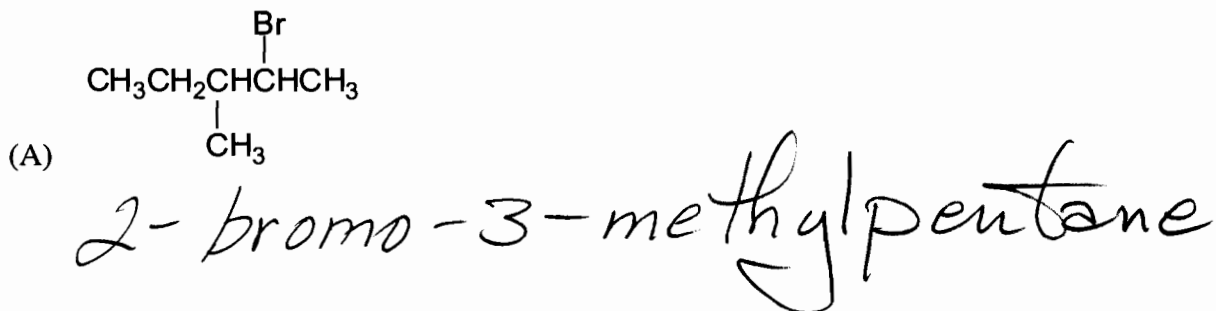
(L) Why Barton uses single-headed arrows (fishhooks) when describing the mechanism of chlorination of ethane?

it is a radical rxn

(M) Why S<sub>N</sub>1 rxns. give racemic products?

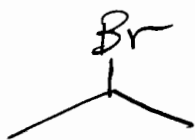
planar intermediate

II. (12 pts) Provide proper, complete names for the following structures.



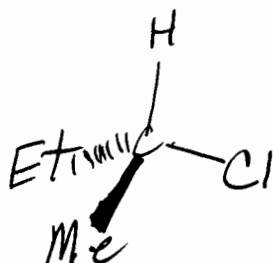
III. (12 pts.) Provide the structures that correspond to the following names.

(A) isopropyl bromide

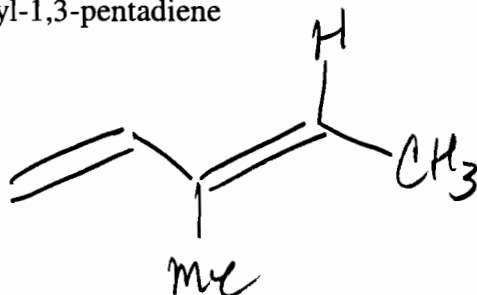


(B) (R)-2-chlorobutane

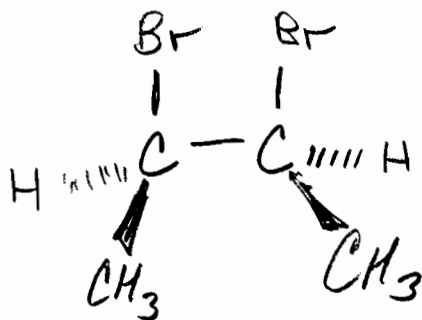
(see II-B!!)



(C) (E)-3-methyl-1,3-pentadiene

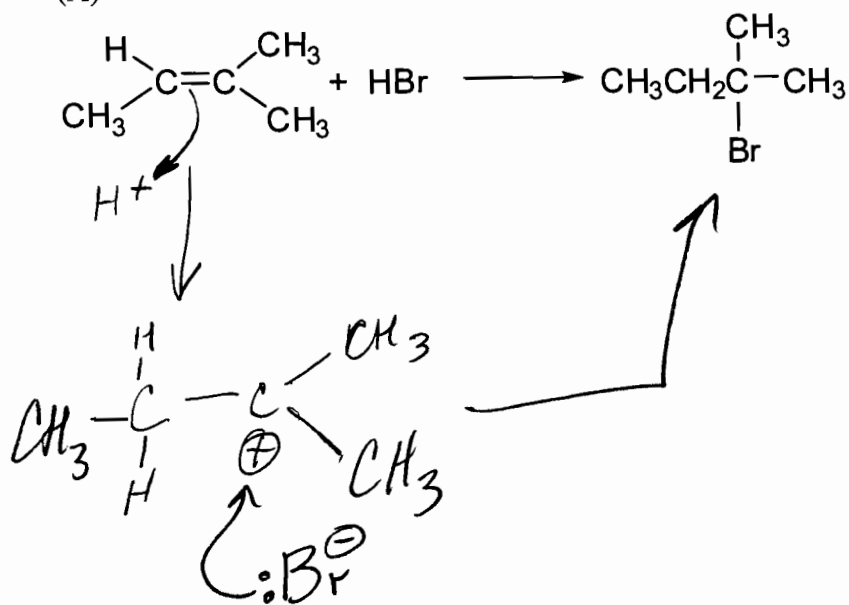


(D) *meso* conformer of 2,3-dibromobutane

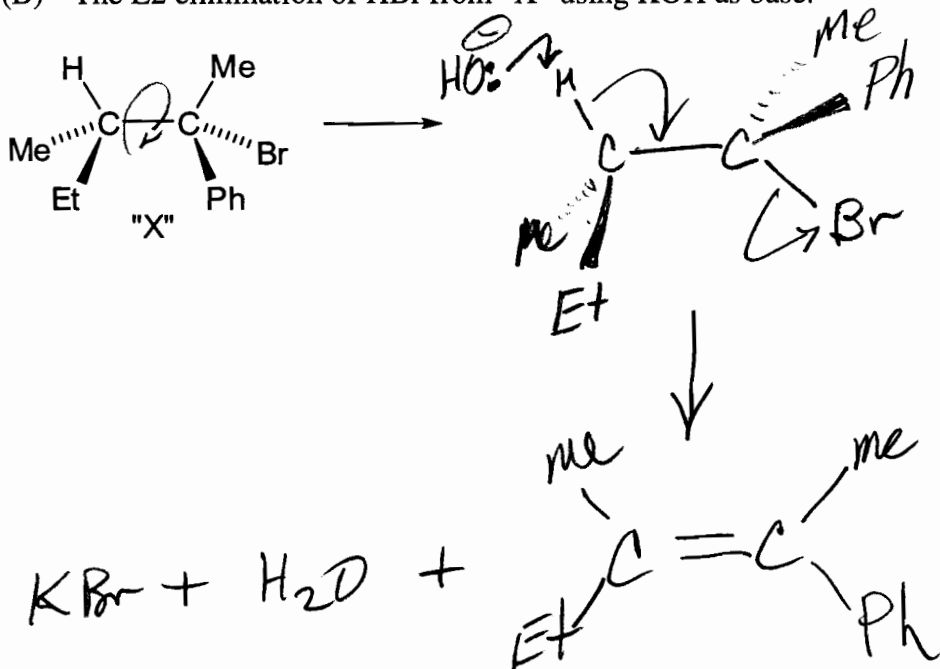


IV. (14 pts.) Write stepwise mechanism for the following transformation. <sup>5</sup>

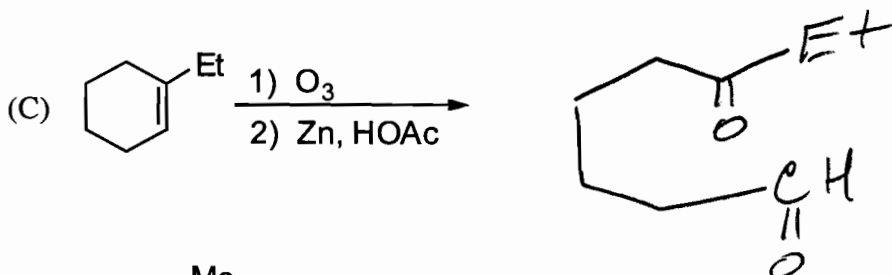
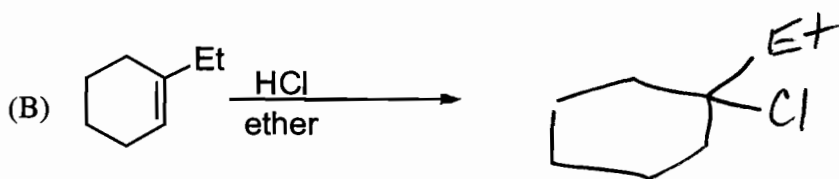
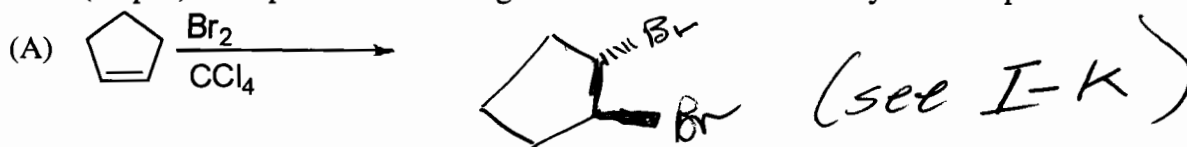
(A)

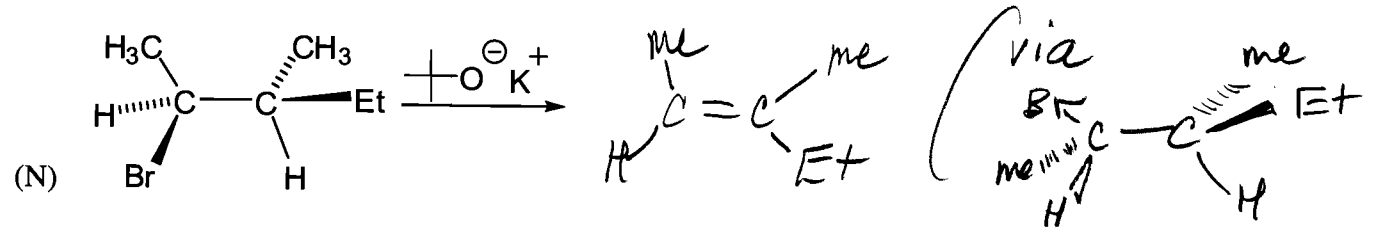
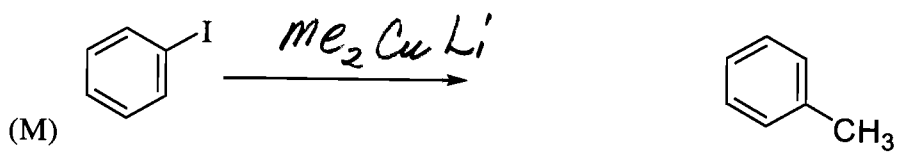
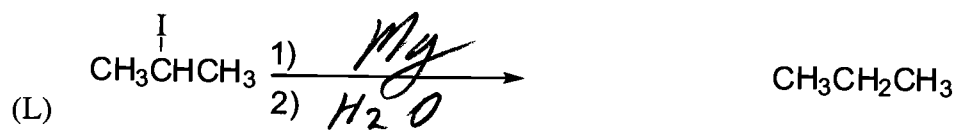
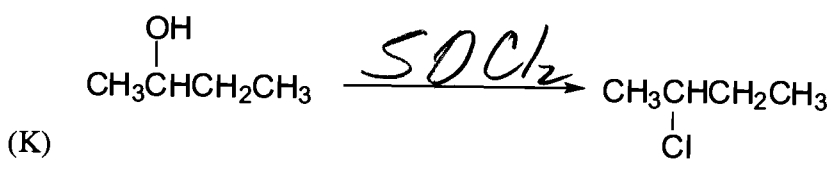
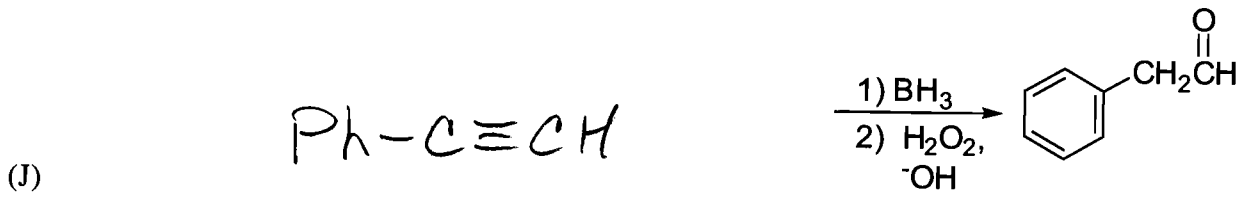
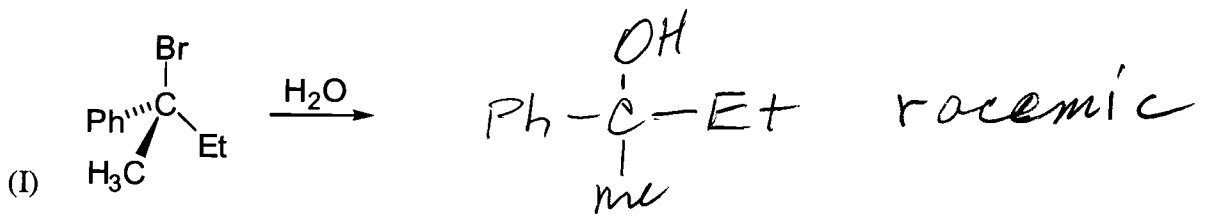


(B) The E2 elimination of HBr from "X" using KOH as base.

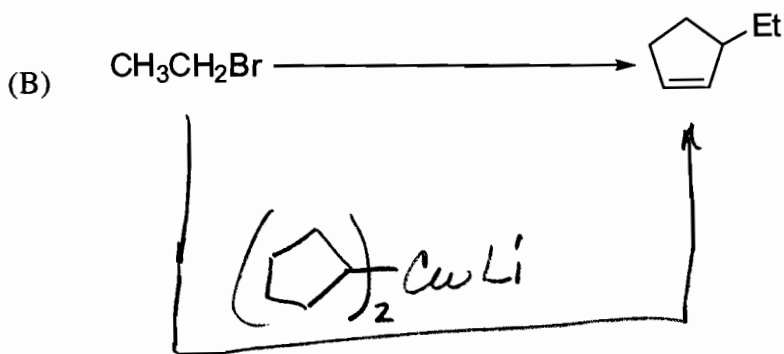
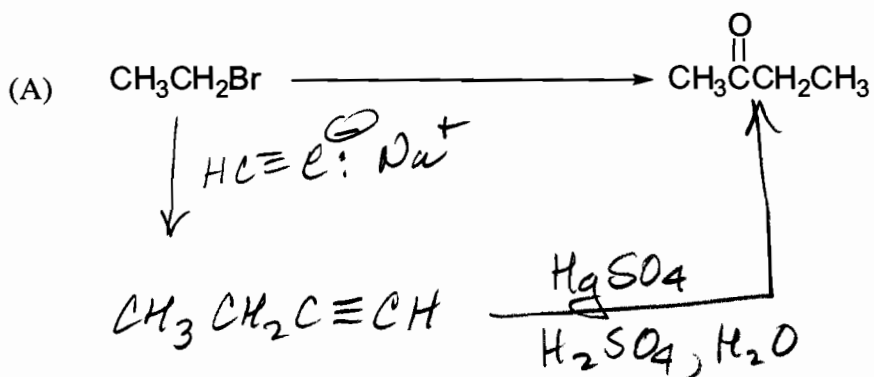


V. (45 pts.) Complete the following rxns. Show stereochemistry when important.



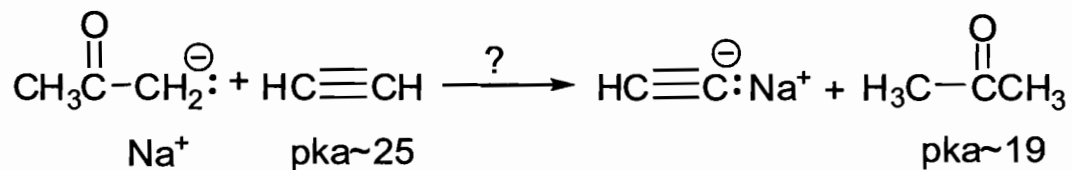


VI. (30 pts.) Show how you would perform the following 2 synthetic transformations. Assume the availability of all needed reagents.

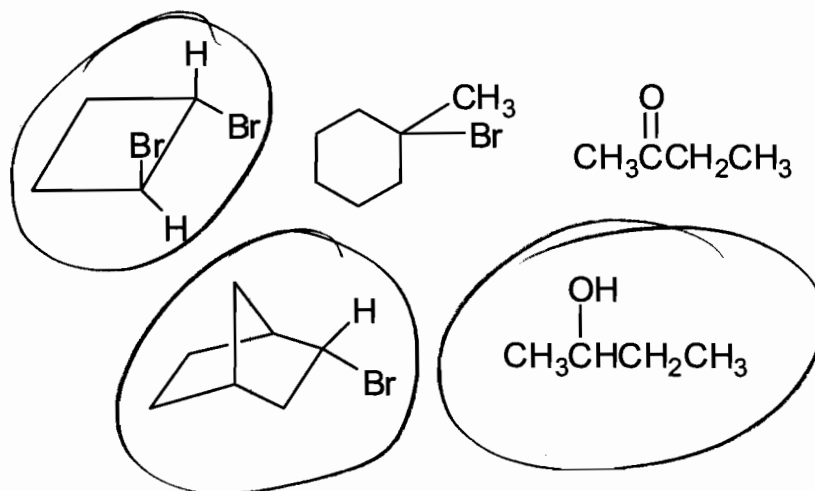


VII. (5 pts) Will the following reaction proceed in the direction shown?

YES  NO



VIII. (6 pts.) Circle the molecules expected to display optical activity.



IX. (2 pts.) Guess how many horses there are in this flask.

Answer: ca. one

