

Name _____

CHE 241, Test 2 makeup

November 8, 2004

Due at the beginning of class on November 10, 2004

Work on another sheet of paper. You may use your books and your notes, but you may not consult classmates or any other individuals.

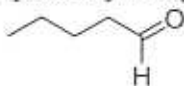
This extra credit assignment has 60 possible points. The number of points you earn on this assignment will be divided by three and then added to your grade for exam 2, allowing you to improve your grade by 20 points.

1. Sometimes Markovnikov's rule is followed and sometime it is broken. Consider the addition of **either** HBr or water to 1-methylcyclohexene. (15 points)

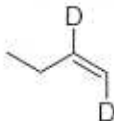
- What reagents will cause the reaction to follow Markovnikov's rule? (Show the reaction.)
- What reagents will cause the reaction to break Markovnikov's rule? (Show the reaction)
- Provide an explanation why each reagent gives the product that it does, showing **at least** the relevant **transition state(s)** or **intermediate(s)**.

2. (10 points each)

(a) Synthesize pentanal (structure shown below) from organic compounds with three or fewer carbons plus any inorganic reagents.

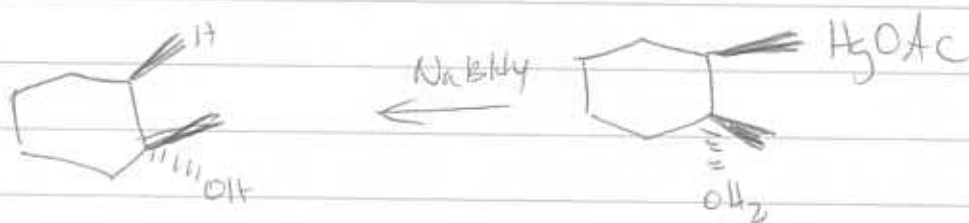
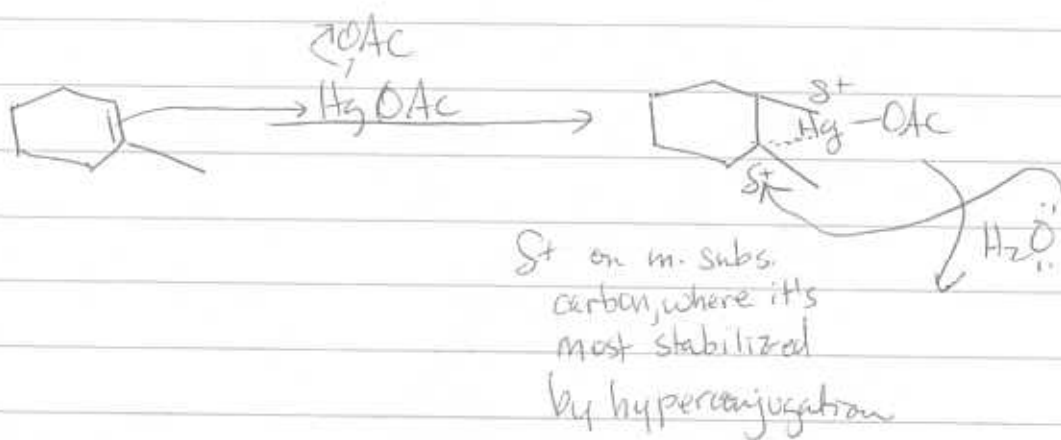
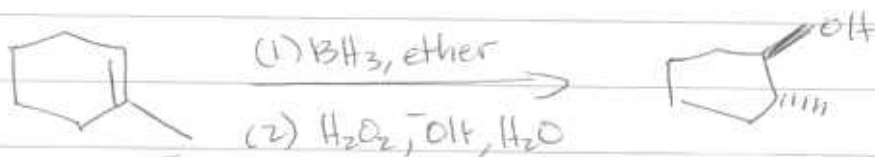
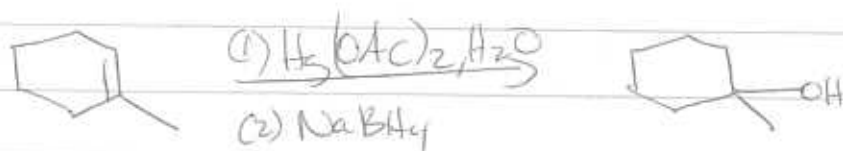
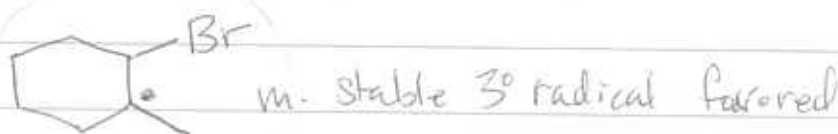
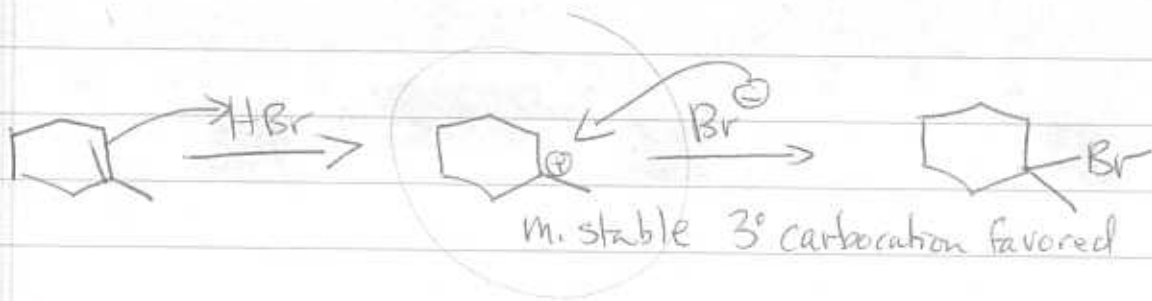


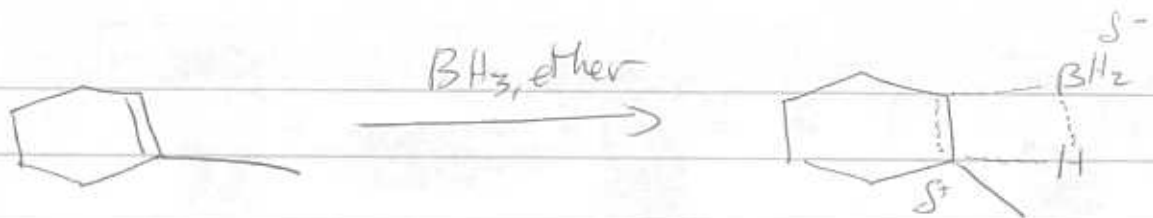
(b) Synthesize *trans*-1,2-dideuterio-1-butene (structure shown below) from organic compounds with three or fewer carbons plus any inorganic reagents.



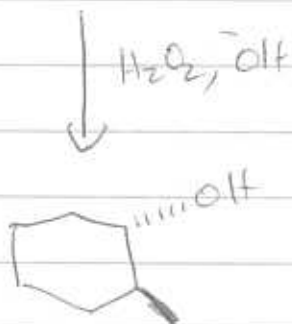
(c) Synthesize hexane from alkyl halides with three or fewer carbons plus any inorganic reagents.

3. Reaction of Br₂ with *cis*-3-hexene gives an optically inactive product. The same reaction with *trans*-3-hexene gives an optically inactive product with different chemical and physical properties. Provide a mechanism to explain all of these observations, using arrows to show the flow of electrons and showing each step. (15 points)



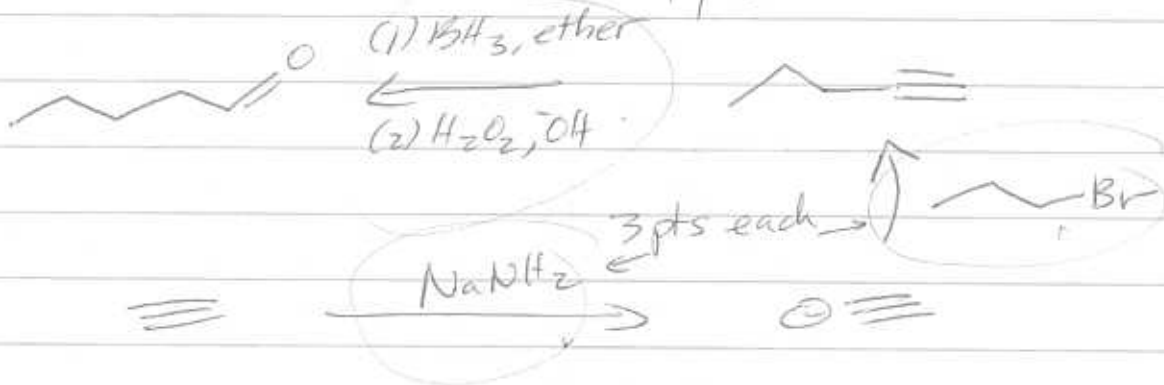


favored by sterics and electronics



2.

(a)

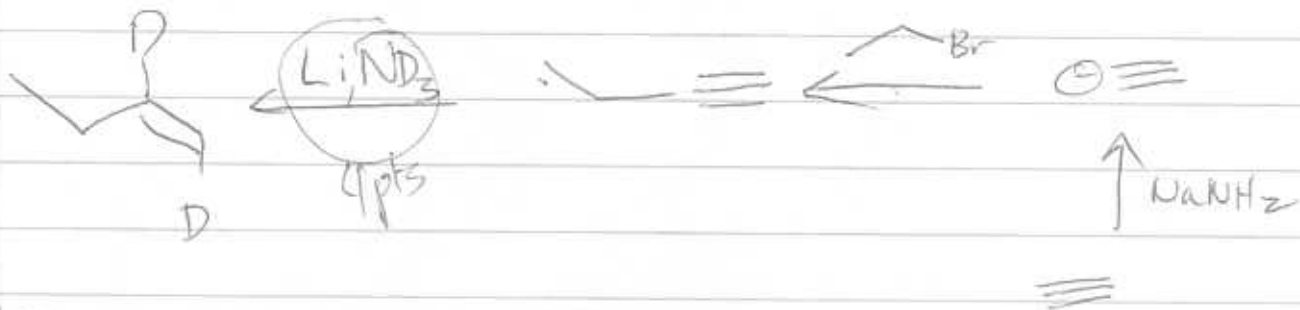


4 pts

(1) BH_3 , ether
 (2) H_2O_2 , OH^-

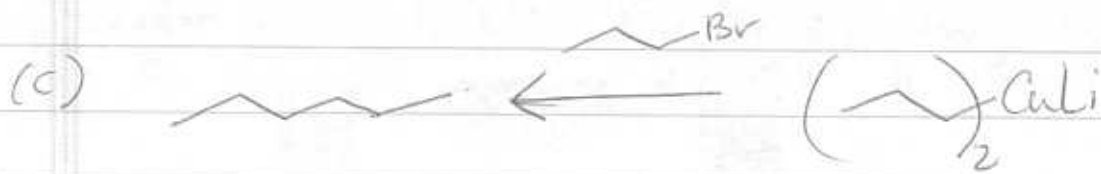
3 pts each

(b)

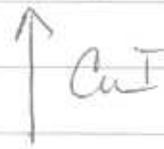
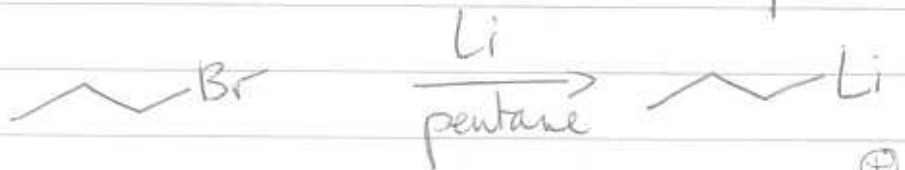


4 pts

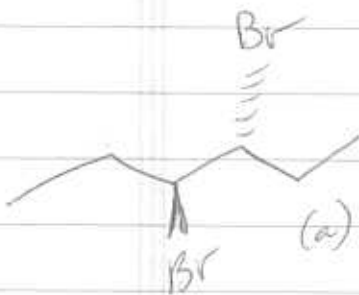
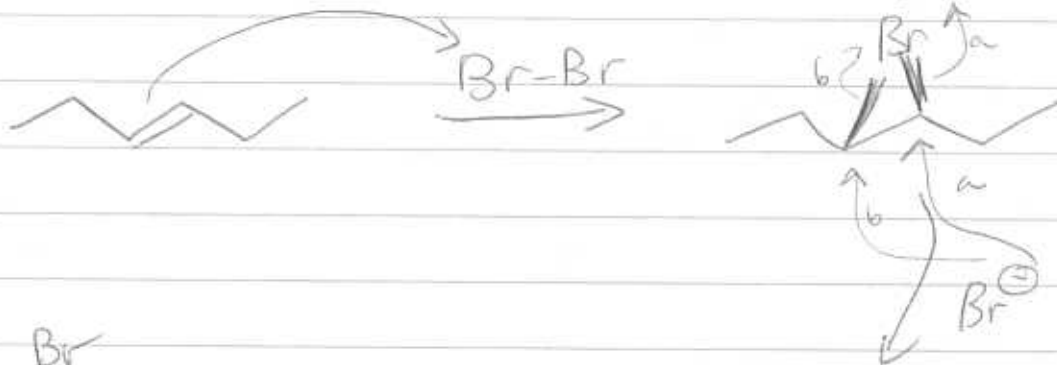
3 pts/step



3pts/step

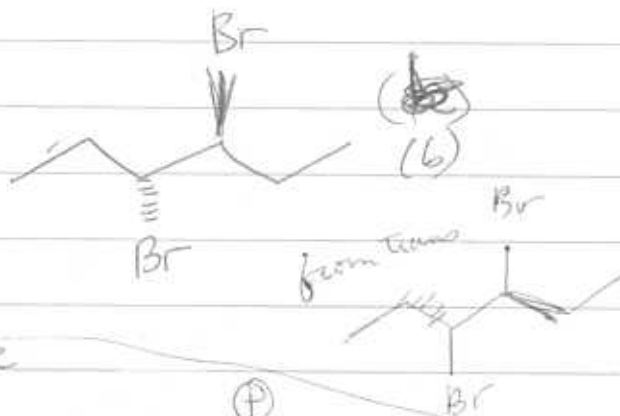


3.

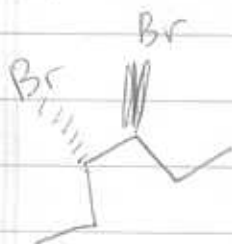


50/50 mix of enantiomers.

\therefore optically inactive



diastereomers
 \therefore different phys. prop.



50/50 mix of enantiomers

\therefore optically inactive

