

CHEM 233 Exam 2

Bennett Department of Chemistry

West Virginia University

Instructor: X. Michael Shi

April 10th, 2008

Name: _____

This exam is a closed book, closed notes.

Calculators and a molecular model set are allowed.

You must show your work in order to receive partial credited.

Question #1 (8 points): _____

Question #2 (32 points): _____

Question #3 (15 points): _____

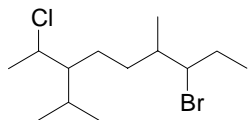
Question #4 (30 points): _____

Question #5 (15 points): _____

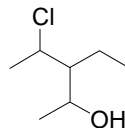
Total (out of 100) : _____

Question 1 Nomenclature (8 points):

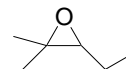
1a) Name the following molecules (5 points).



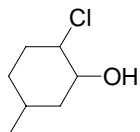
7-Bromo-2-chloro-3-isopropyl-6-methyl-nonane



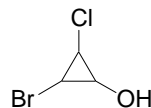
4-Chloro-3-ethyl-pentan-2-ol



3-Ethyl-2,2-dimethyl-oxirane

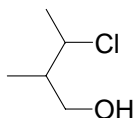


2-Chloro-5-methyl-cyclohexanol

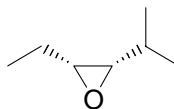


2-Bromo-3-chloro-cyclopropanol

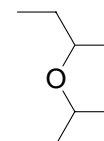
1b) Draw the following molecules from the given names (3 points).



3-Chloro-2-methyl-butanol



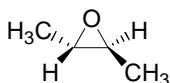
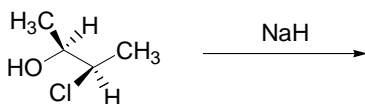
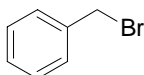
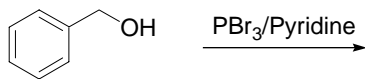
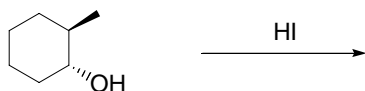
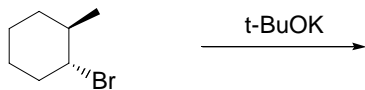
cis-2-Ethyl-3-isopropyl-oxirane

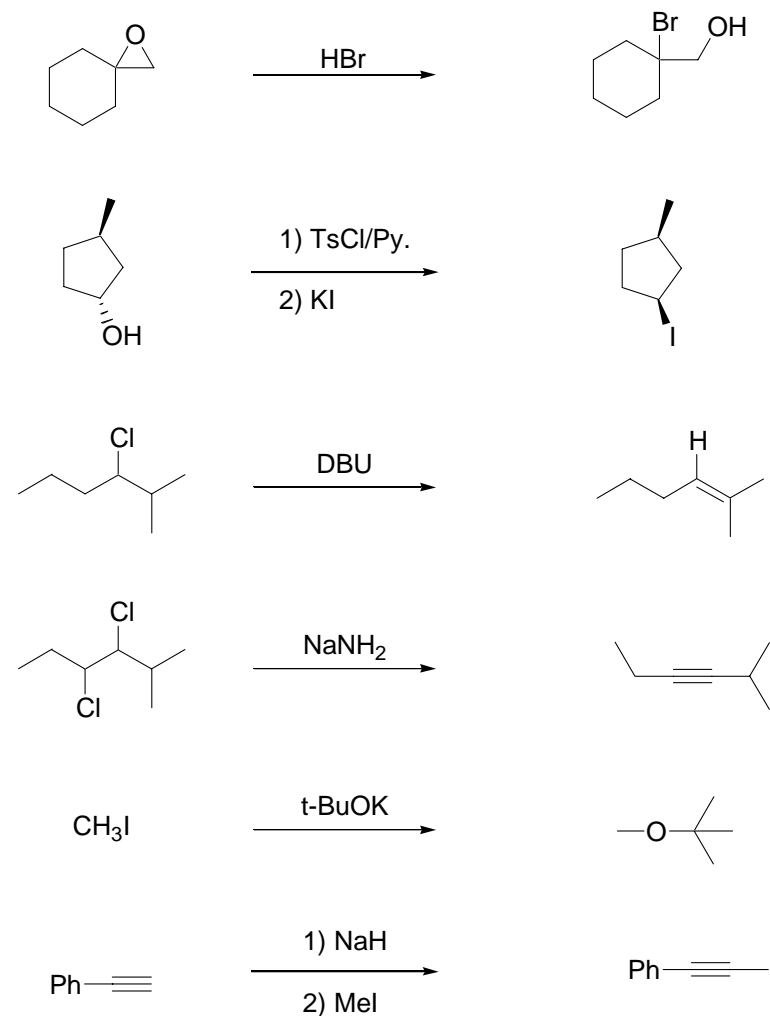


2-Isopropoxy-butane

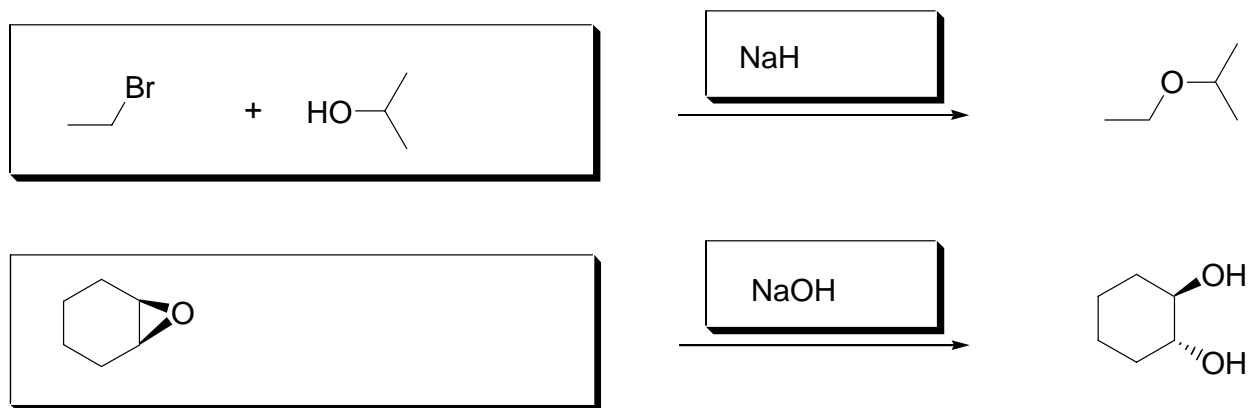
Question 2 Organic reactions (32 points):

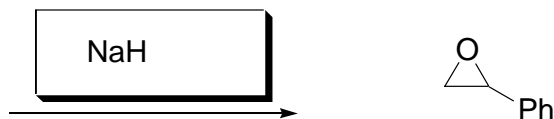
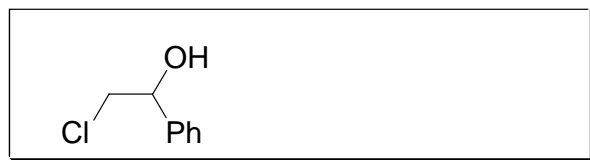
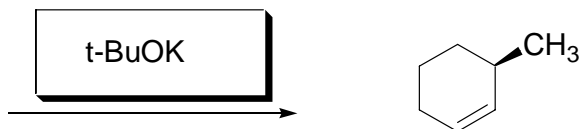
2a) Draw the Major products from the following reactions (20 points).





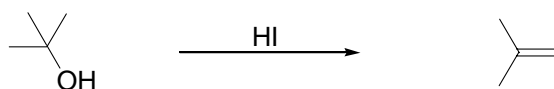
2b) Draw the starting materials and detailed reaction conditions for the synthesis of the following molecules (12 points).





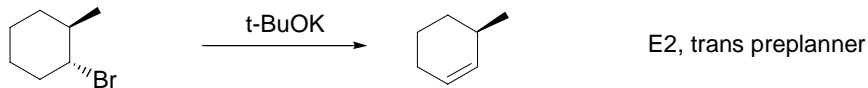
Question 3 Reaction Mechanism (15 points):

3a) Draw the energetic diagram of the following reaction; clearly indicate the intermediates and transition states (5 points).

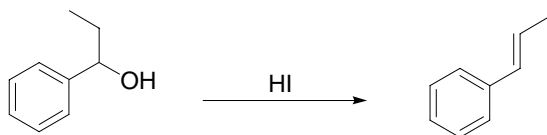


E1

3b) Use some reaction examples to explain the stereochemistry perspective of E1 and E2 reactions (4 points).

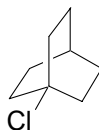


E2, trans preplanner



E1, carbocation, more stable double bonds

3c) Explain why the following molecule does not undergo nucleophilic substitution by either SN1 or SN2 (3 points).



Can not go SN2, back side attack is blocked by the ring.

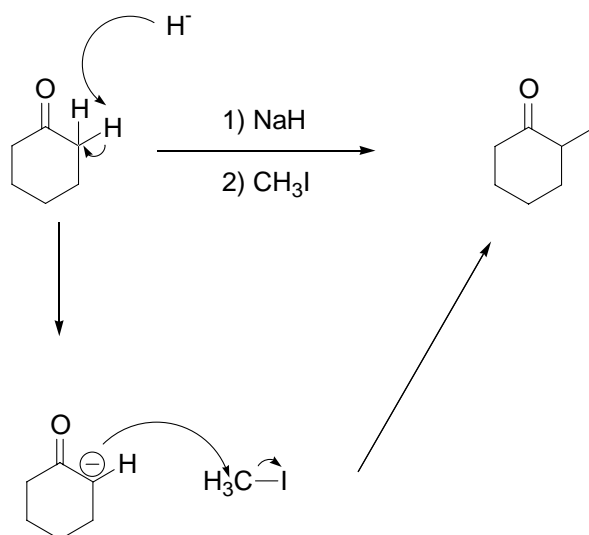
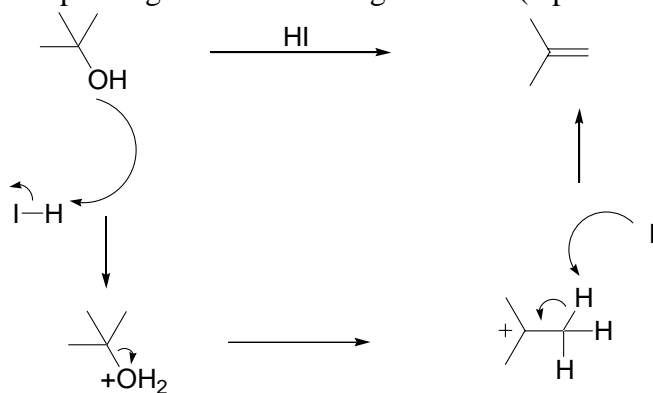
No SN1: bridge carbon is hard to form Carbocation (flat sp², 120°)

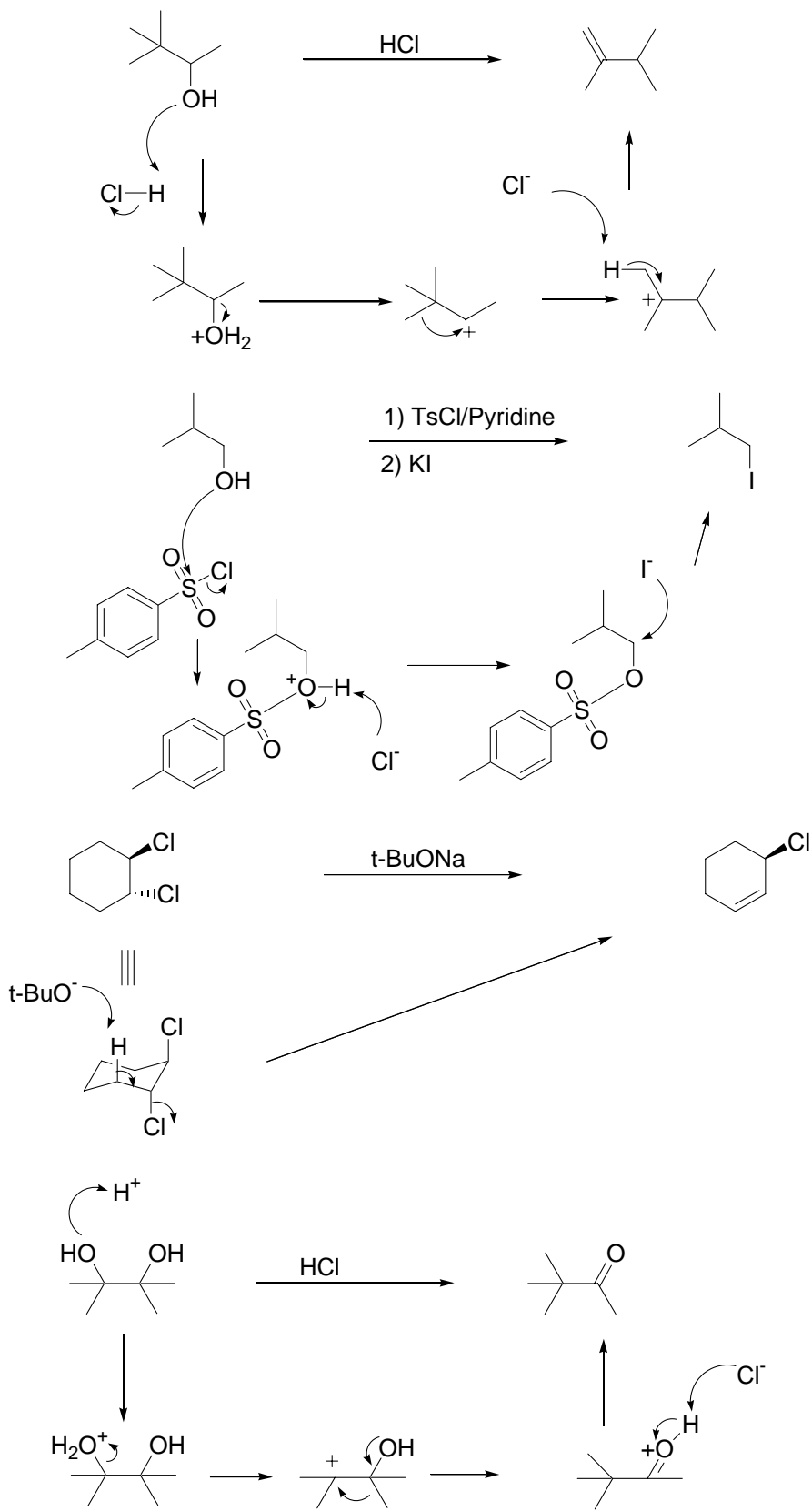
3d) Explain the Zaitsev rule (more substituted double is more stable) (3 points)

Check the book: basically, more substituted, better hyperconjugation and more electrodonation from the alkyl.

Question 4 Electron pushing (30 points):

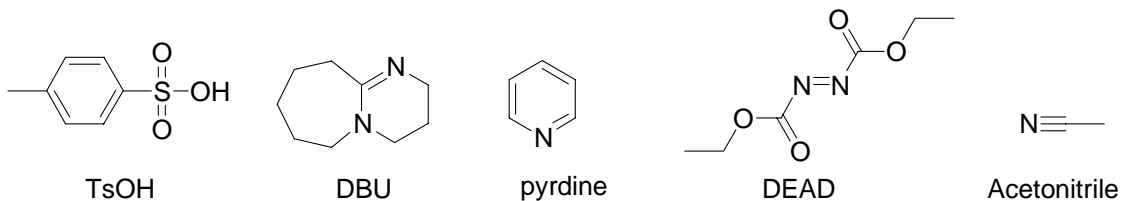
Draw the detailed electron-pushing for the following reactions (5 points for each question).



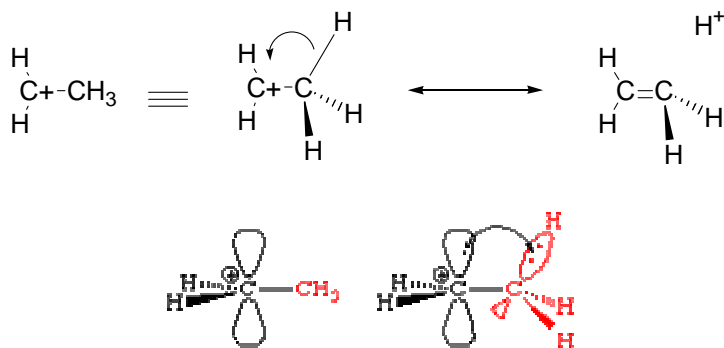


Question 5 (15 points):

5a) Draw the chemical structures of the following molecules (5 points).



5b) Use resonance structures and description to clearly explain what is the hyper conjugation (3 points).



5c) Explain why the alkyne is more acidic than alkene (2 points).

Sp² vs Sp³. check your class note for more details

5d) Rank the stability of the following molecules and explain why (5 points).

