

ANSWER KEY

Exam 4 Organic Chemistry Chem 141 Fall 2008

LECTURE SECTION: Daytime / Evening (circle one)

This exam is a closed-book, closed-notes exam. You may use molecular model kits. No other outside material may be used and you may not discuss the exam with anyone else.

The exam has 12 questions for a total of 100 points. The exam duration is 2¹/₂ hours. Good luck!

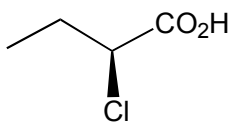
For grading purposes only:

Pages	Problems	Points	Grader
1 - 2	1 - 4	_____	_____
3 - 4	5 - 8	_____	_____
5 - 6	9 - 12	_____	_____
TOTAL	_____ points	_____ %	

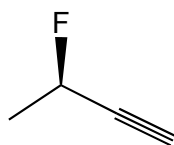
ANSWER KEY

1. Draw line-bond structures for the following molecules (12 points)

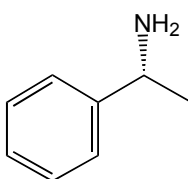
(a) *S*-2-chlorobutanoic acid



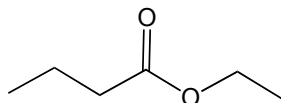
(b) *R*-3-fluorobutyne



(c) *R*-1-amino-1-phenylethane

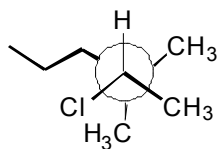


(d) ethyl butanoate



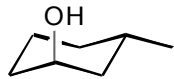
2. Name the following structures according to IUPAC conventions including *R/S* when appropriate. (8 points)

(a)



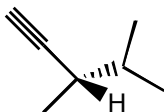
S-2-chloro-3,3-dimethylhexane

(b)



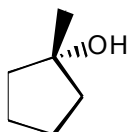
1*S*,3*S*-3-methylcyclohexanol

(c)



S-3,4-dimethylpentyne

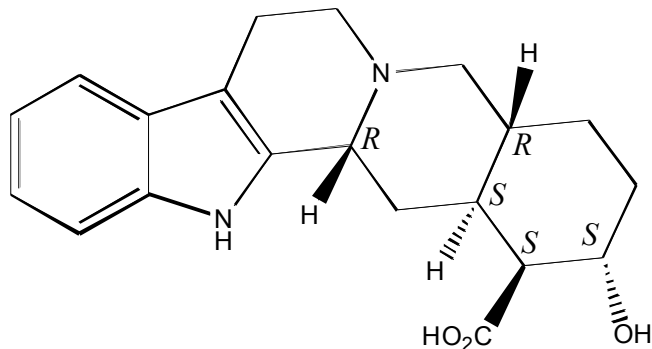
(d)



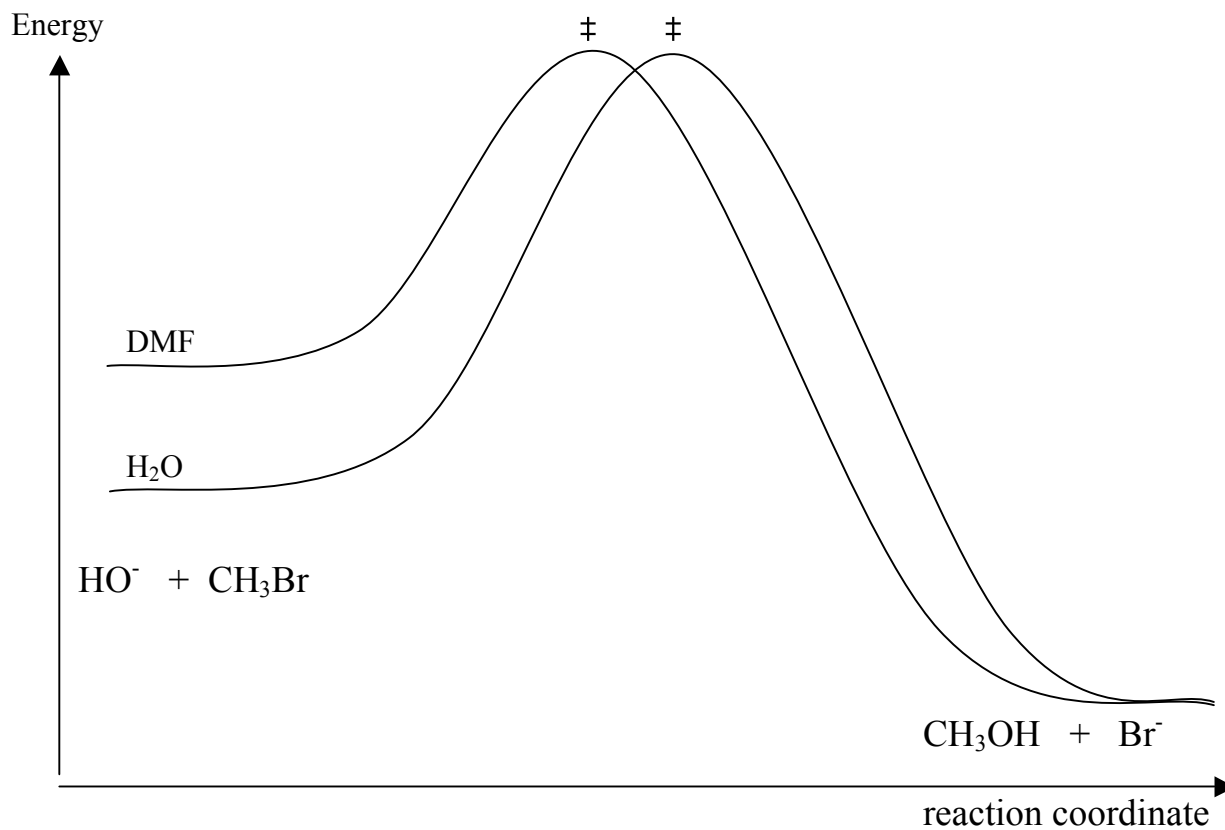
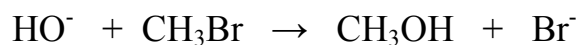
1-methylcyclopentanol

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3. Assign *R/S* configurations for all the stereocenters of the following compound. (2 points each)

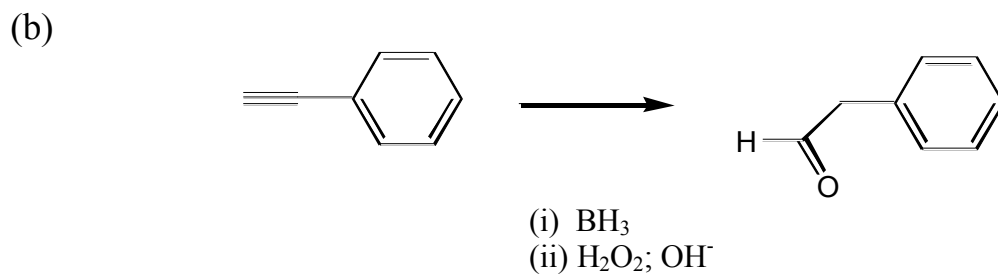
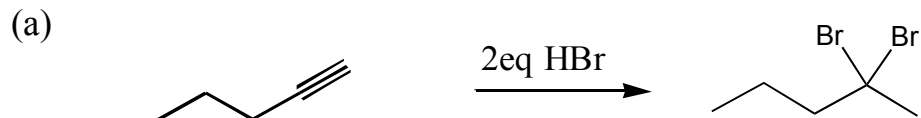


4. Draw free energy diagrams to show how an aprotic polar solvent (eg. DMF) or a polar protic solvent (eg. water) influences the following S_N2 reaction. (8 points)

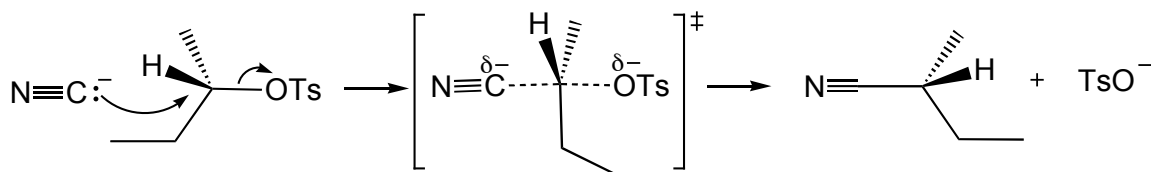
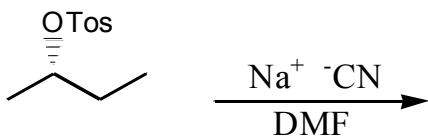


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5. Provide reagents or products to complete the following transformations. (2 points each)



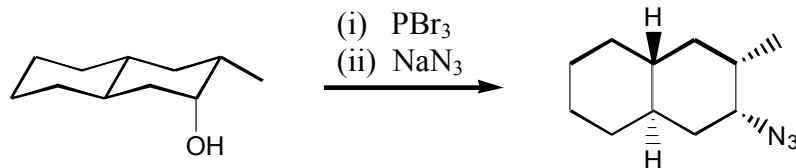
6. Show the mechanism, transition state and products of the following reaction. (8 points)



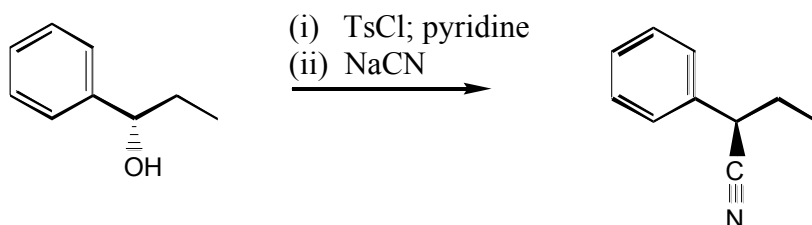
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7. Provide the reagents necessary to complete the following reactions. Some transformations may require more than one step. (4 points each)

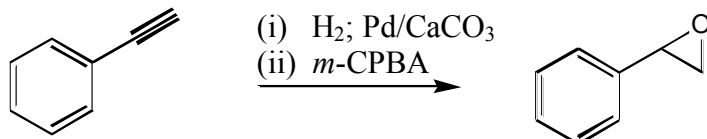
(a)



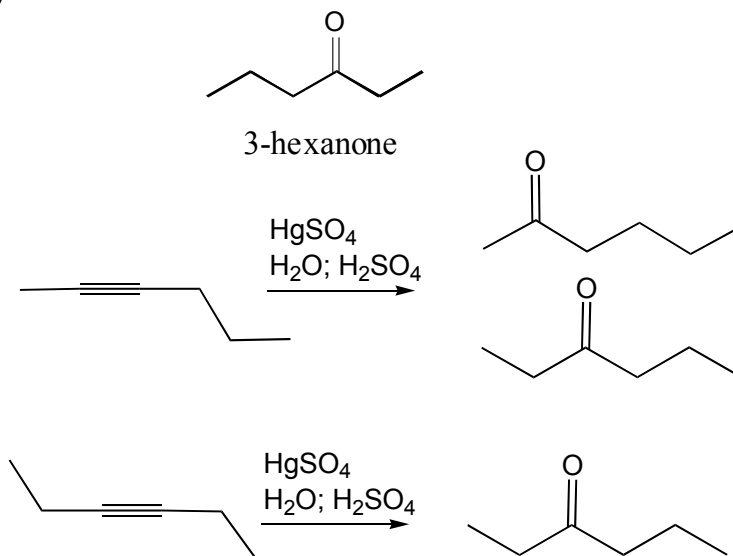
(b)



(c)



8. Draw line-bond structures for the products of hydroxymercuration of 3-hexyne and 2-hexyne. Which starting material would be best suited to prepare 3-hexanone? (8 points)

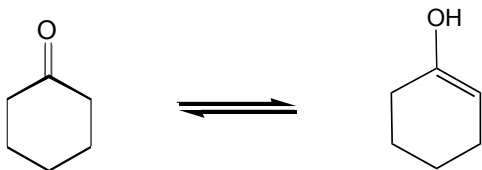


3-hexyne gives only the desired product, so is the better starting material.

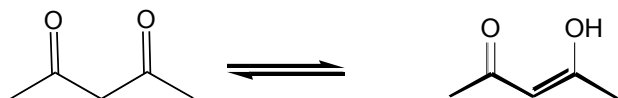
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9. Draw the keto or enol tautomers of the following structures. (3 points each)

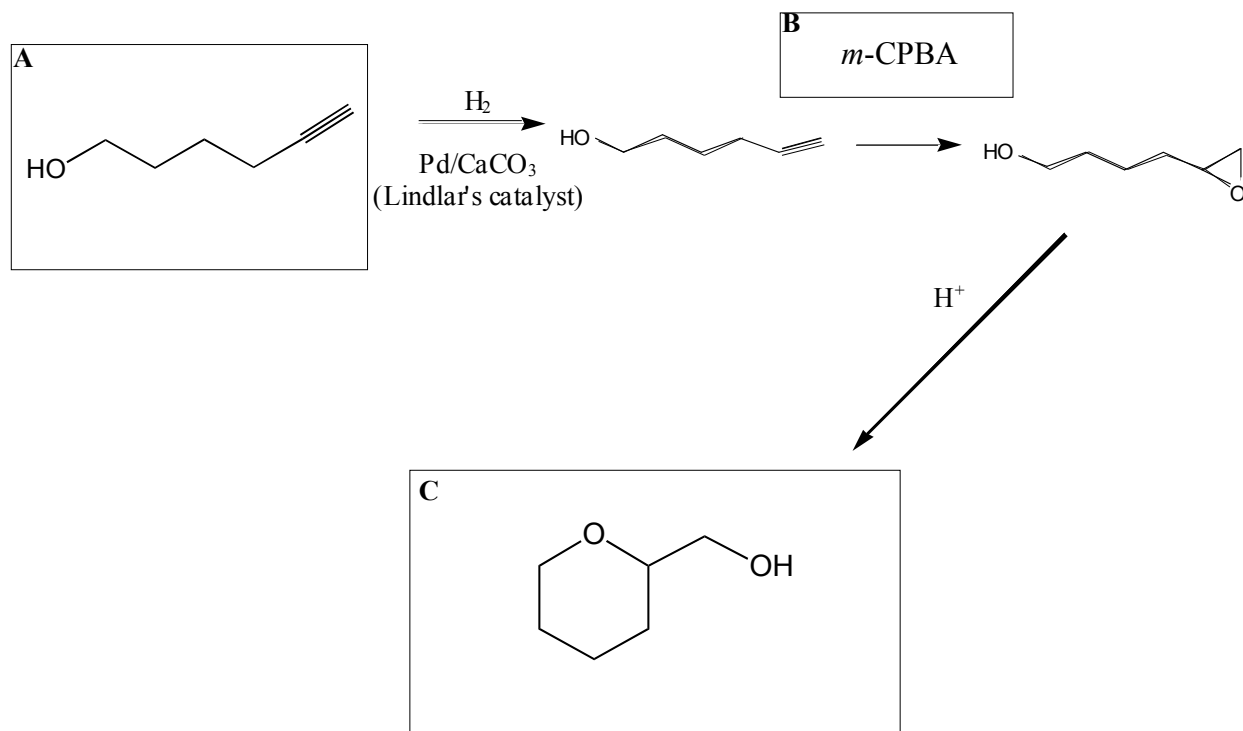
(a)



(b)



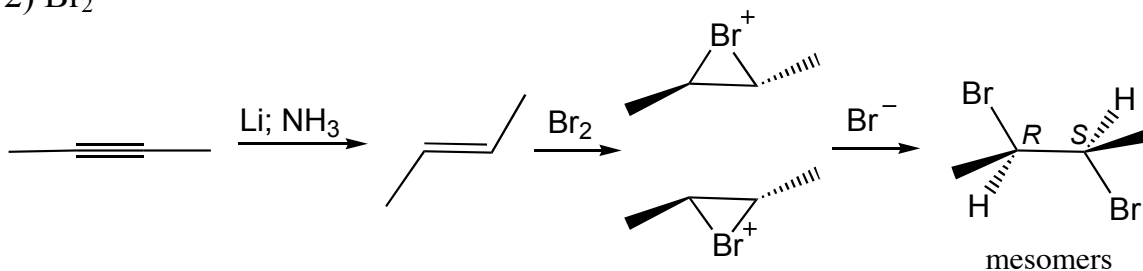
10. Provide structures and/or reagents A-C to complete the following transformation. (9 points)



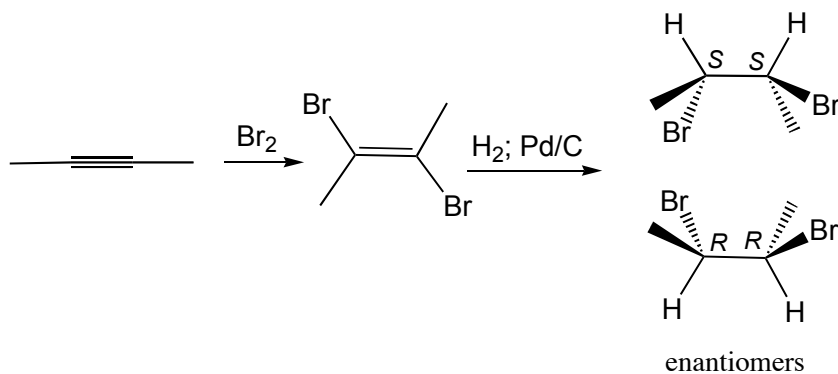
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11. Draw all the stereoisomers from the reaction of 2-butyne with:

- (a) A 2-step reaction:
 1) 2eq Li, NH₃ (liquid)
 2) Br₂



- (b) A 2-step reaction:
 1) 1 eq Br₂
 2) H₂, Pd/C



For (a) and (b) identify the relationship between the products (enantiomers, diastereomers, mesomers). (12 points)

12. If your TA was a superhero what would his/her superhero name be? What would their superpowers let them do? (3 points)