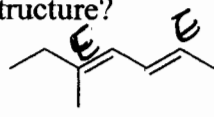


Name KEY
 CHE 241, Test 2a
 October 25, 2007

90+ 1
 80+ 1
 70+ 111
 60+ 11
 <60 11

1. Multiple choice. Choose the one best answer for each question. (2 points each)

Which is the correct IUPAC name for the following structure?



- (a) (2Z,4Z)-5-methyl-2,4-heptadiene
- (b) (2E,4Z)-5-methyl-2,4-heptadiene
- (c) (2Z,4E)-5-methyl-2,4-heptadiene
- (d) (2E,4E)-5-methyl-2,4-heptadiene

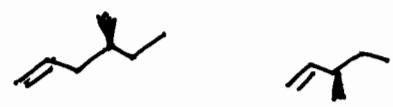
Which of the following is **not** true of racemic mixtures?

- (a) Plane polarized light passes through with no observable changes.
- (b) Both enantiomers are present in equal amounts.
- (c) No light will pass through the racemic mixture.
- (d) The specific rotation is zero.

high 96
 median 77
 low 44
 ave 70.5

Which of the following compounds will yield an optically active product upon hydrogenation?

- (a) (S)-4-methyl-1-hexene
- (b) (S)-3-methyl-1-pentene
- (c) Both of the above.
- (d) Neither of the above.

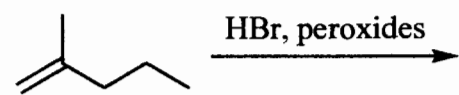


Which is the most effective method to accomplish the transformation shown?



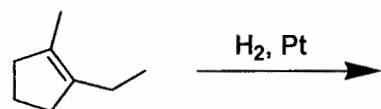
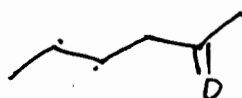
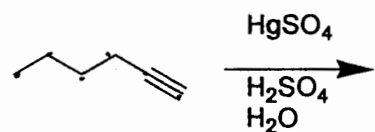
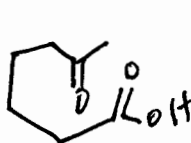
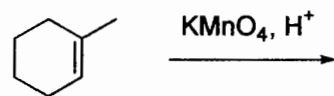
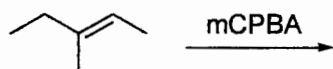
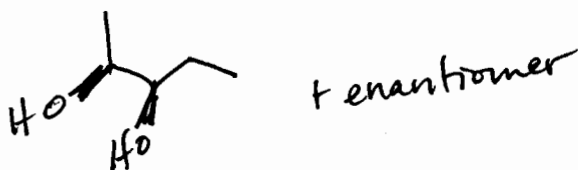
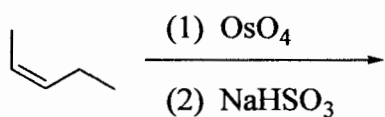
- (a) H_3O^+
- (b) (1) $Hg(OAc)_2, H_2O$; (2) $NaBH_4$
- (c) (1) $BH_3, ether$; (2) $H_2O_2, H_2O, ^-OH$
- (d) Any of the above methods will work equally well.

Which of the following intermediates best explains the characteristic regiochemistry observed when HBr adds to an alkene in the presence of peroxides, like in the reaction shown?

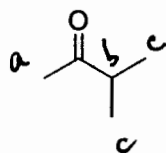


- (a)
- (b)
- (c)
- (d)

2. Provide the major product(s) for each of the following reactions, showing stereochemistry where appropriate. (4 points each)

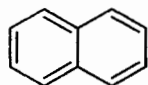


3. (a) Predict how the ¹H NMR spectrum for the compound shown below will appear, paying attention to the splitting, integrals, and chemical shifts. (5 points)

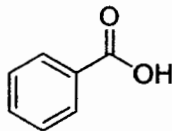


a	3H	singlet	middle, closer to b
b	1H	multiplet	farthest downfield
c	6H	doublet	farthest upfield

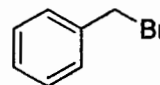
(b) Consider a sample that is a mixture composed of naphthalene, benzoic acid, and benzyl bromide, with the structures shown below. Assume that the chromatography uses a silica column, and the solvent system is based on acetone, with an increasing proportion of isopropanol being added as a function of time. Predict the order of elution of the components in this mixture. Explain why the compounds elute in the order that you predict. (5 points)



elutes first
 b/c least polar



elutes last
 because m. polar



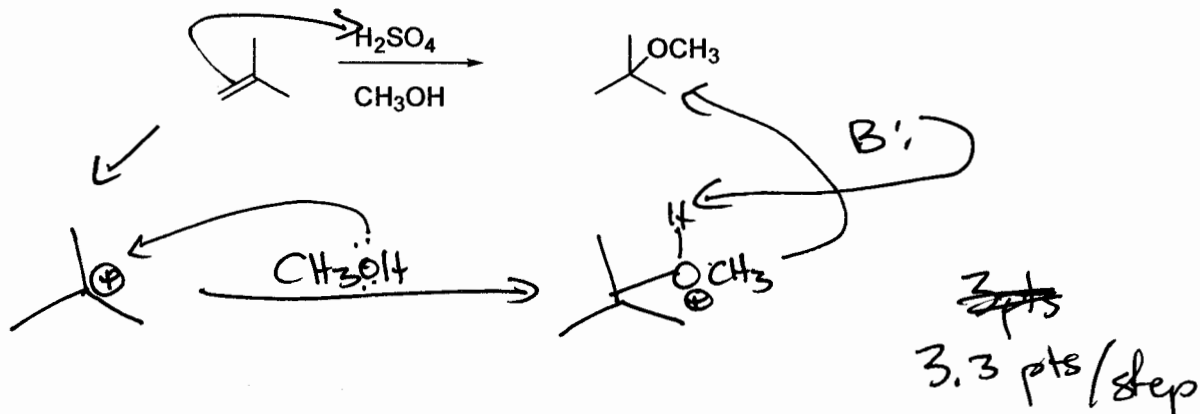
middle

Silica gel stationary phase is polar, so order of elution depends on how strongly compounds adsorb to stationary phase

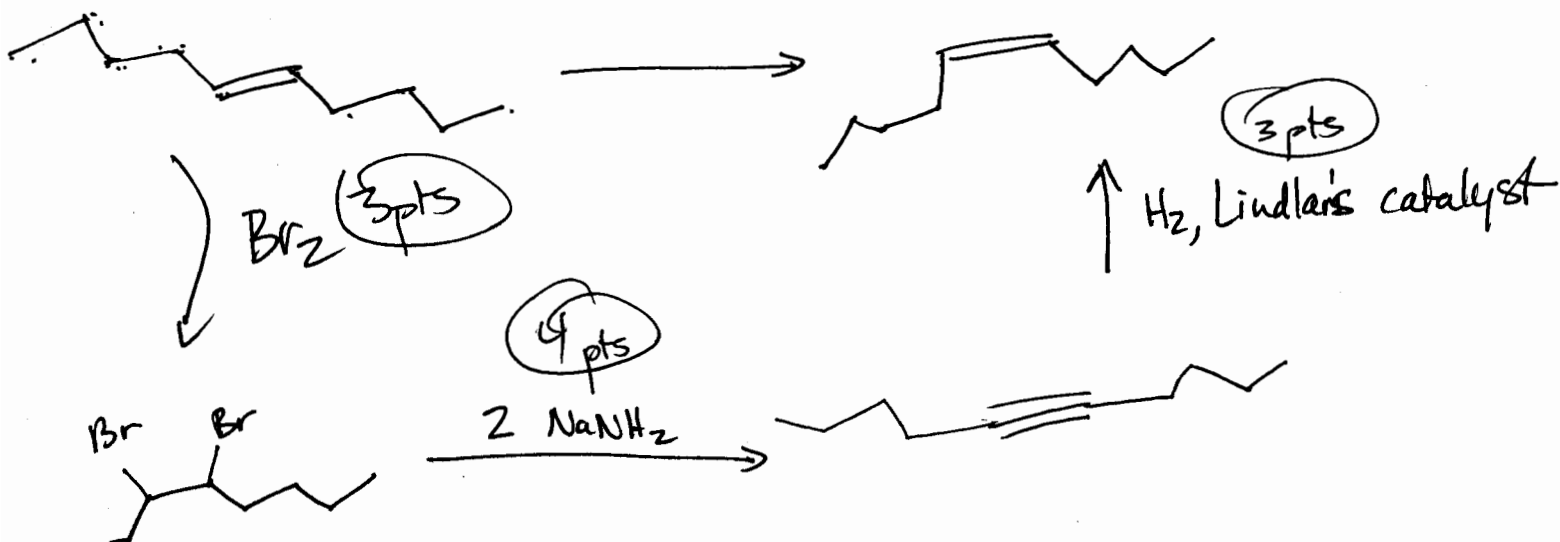
4. (a) Propose a mechanism for the following reaction, using arrows to show the flow of electrons. (10 points)



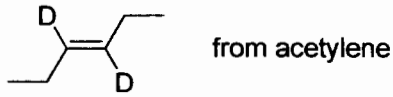
(b) Reaction of 2-methylpropene with CH_3OH in the presence of H_2SO_4 catalyst yields methyl *tert*-butyl ether, $\text{CH}_3\text{OC}(\text{CH}_3)_3$, by a mechanism analogous to that of acid-catalyzed alkene hydration. Write the mechanism, using curved arrows for each step. (10 points)



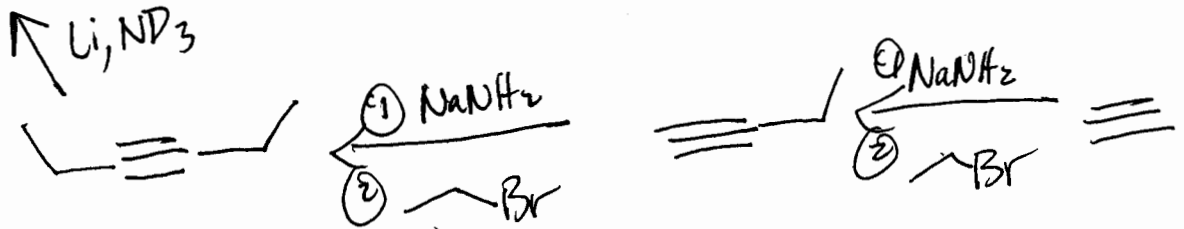
5. (a) Propose a method to convert *trans*-5-decene to *cis*-5-decene, using any necessary reagents. (10 points)



(b) Propose a method to prepare the compound shown from acetylene, using any necessary reagents. (10 points)

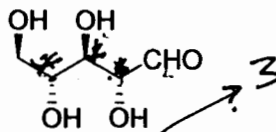


2 pts / step



6. L-(+)-ribose has the following structure. (20 points)

2 pts / part



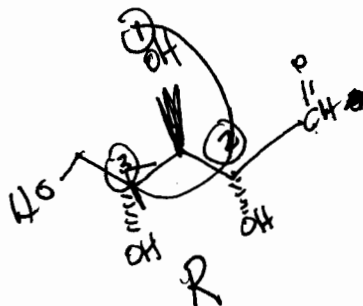
R, R, R

(a) How many stereogenic centers does ribose have? Identify them and assign the absolute configuration (R or S) to each one.

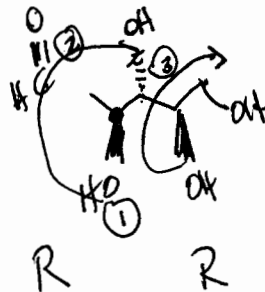
(b) How many stereoisomers of ribose are there? $2^n = 8$

(c) Draw the structure of the enantiomer of ribose. If possible, predict whether this compound will be dextrorotatory or levorotatory. If it's not possible, explain why.

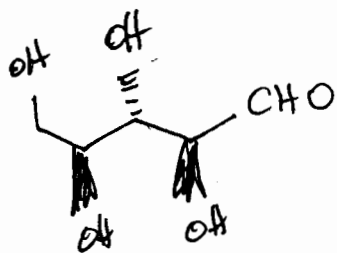
(d) Draw the structure of a diastereomer of ribose. If it's not possible, predict whether this compound will be dextrorotatory or levorotatory. If it's not possible, explain why.



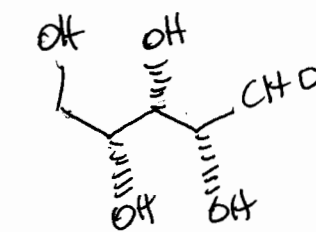
enantiomer



diastereomer



levorotatory



impossible to predict optical rotation b/c no relationship to R/S