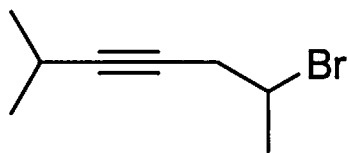


Name \_\_\_\_\_

1-10 are True / False (10pts)

- 1) The alkyne triple bond is made up of one  $\sigma$ , and two  $\pi$  covalent bonds.
- 2) Hept-1-yne and Hept-2-yne are structural isomers.
- 3) The Oxygen in Propan-1-ol is  $sp$  hybridized.
- 4) But-1-ene is a terminal alkyne.
- 5) Ethers have the general structural motif of R-O-O-R.
- 6) Lindlar's catalyst is used to control the hydrogenation of alkynes so that the reaction proceeds only to alkene products.
- 7) Structural isomers that are in equilibrium with each other are called Torsion-molds.
- 8) The carbon-carbon triple bond is shorter and stronger than a carbon-carbon single bond.
- 9) The elemental symbol for lithium is Li.
- 10) Organometallic reagents have a metal and a carbon covalently bound together.

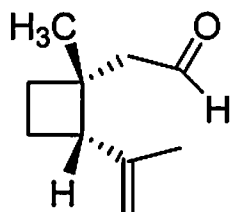
11) Name this molecule in IUPAC form. (3pts)



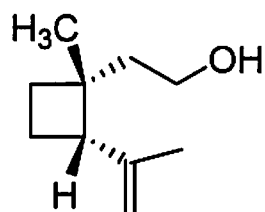
12) (2+2=4pts) a) Draw a line angle diagram (stick figure) of any *tertiary alcohol*.

b) Draw a line angle diagram of your tertiary alcohol after its most acidic hydrogen was deprotonated.

13) (1+1+2+2+2=8pts) Below are the molecules trivially called GRANDISAL and GRANDISOL (A and B, respectively). They are both pheromones primarily functioning as sex attractants for the cotton boll weevil (and other related insects). The cotton boll weevil is an agricultural pest that can cause significant economic damage if not controlled, so these molecules find commercial use as a “lure” in an insecticide used to protect cotton crops from the boll weevil.



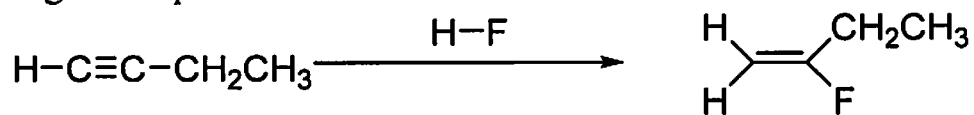
**A**



**B**

- For A, circle the *Aldehyde* functional group.
- For B, what class of alcohol is this (*primary*, *secondary* or *tertiary*)?
- Provide a set of reagents that would convert A to B.
- Provide a set of reagents that would convert B to A.
- Molecule B has two chiral centers, how many of those chiral centers have an absolute configuration (stereochemistry) of R?

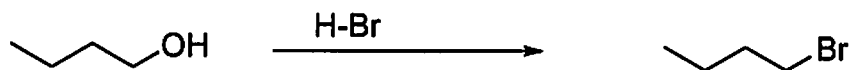
14) (3+1+1=5pts) a) Draw the mechanism (*i.e. curly arrows*) for the following electrophilic addition.



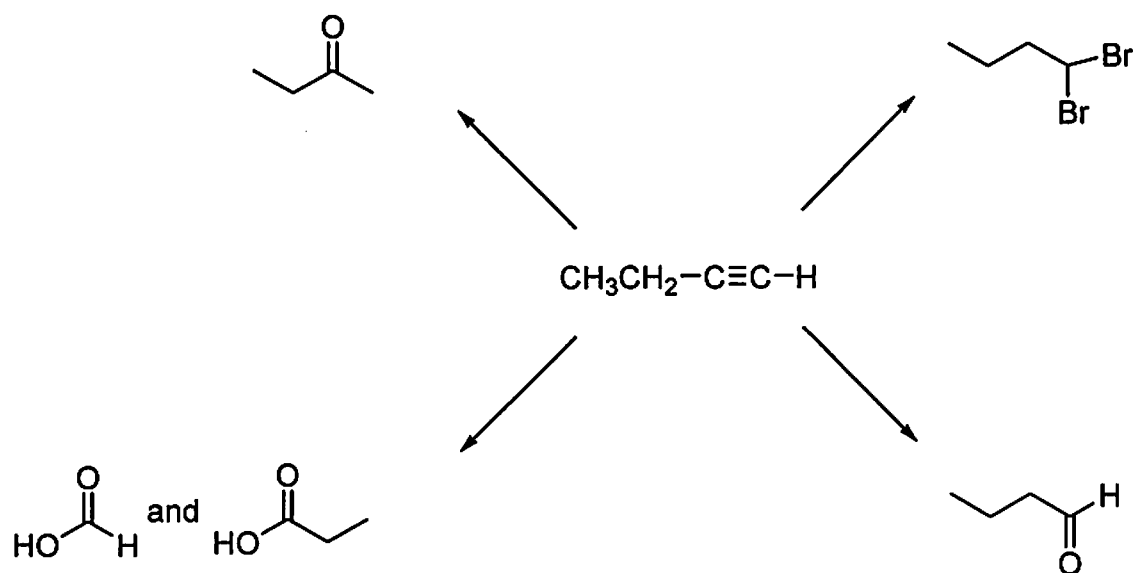
b) How would you describe the REGIOCHEMISTRY of this addition?

c) How would you describe the STEREOCHEMISTRY of this addition?

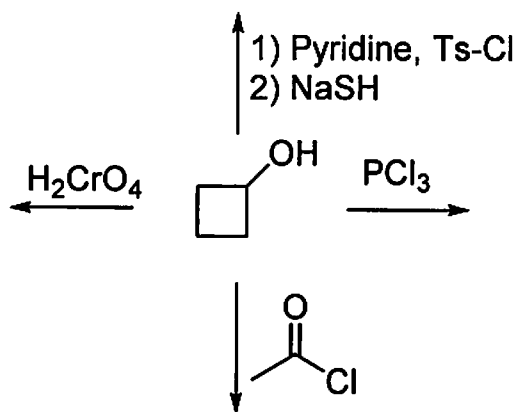
15) Write the mechanism for the  $\text{S}_{\text{N}}2$  reaction of this alcohol. (4pts)



16) Provide the sets of reagents for the following transformations. (8pts)



17) Draw the products generated in the following reactions. (8pts)



**\*\*BONUS QUESTION (up to 2 points)\*\***

When cyclopentene reacts with  $\text{OsO}_4$ ,  $\text{H}_2\text{O}_2$  (*syn addition of OH and OH*), does it produce a chiral product?

In one sentence, explain your answer.



Name

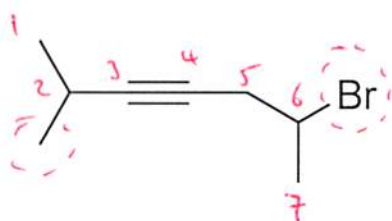
Sal Tlay Ka Siti

1-10 are True / False (10pts)

- 1) The alkyne triple bond is made up of one  $\sigma$ , and two  $\pi$  covalent bonds. T
- 2) Hept-1-yne and Hept-2-yne are structural isomers. T
- 3) The Oxygen in Propan-1-ol is  $sp$  hybridized. False
- 4) But-1-ene is a terminal alkyne. False
- 5) Ethers have the general structural motif of R-O-O-R. False
- 6) Lindlar's catalyst is used to control the hydrogenation of alkynes so that the reaction proceeds only to alkene products. T
- 7) Structural isomers that are in equilibrium with each other are called Tortoise-molds. False
- 8) The carbon-carbon triple bond is shorter and stronger than a carbon-carbon single bond. T
- 9) The elemental symbol for lithium is Li. T
- 10) Organometallic reagents have a metal and a carbon covalently bound together. T



11) Name this molecule in IUPAC form. (3pts)



6-BROMO-2-METHYLHEPT-3-YNE

12) (2+2=4pts) a) Draw a line angle diagram (stick figure) of any *tertiary alcohol*.

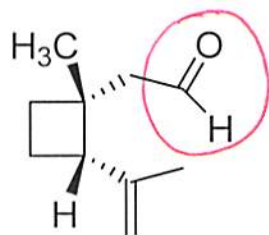
e.g.



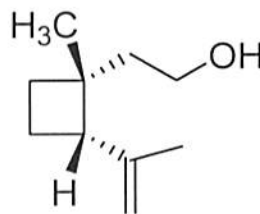
b) Draw a line angle diagram of your tertiary alcohol after its most acidic hydrogen was deprotonated.



13) (1+1+2+2+2=8pts) Below are the molecules trivially called GRANDISAL and GRANDISOL (A and B, respectively). They are both pheromones primarily functioning as sex attractants for the cotton boll weevil (and other related insects). The cotton boll weevil is an agricultural pest that can cause significant economic damage if not controlled, so these molecules find commercial use as a "lure" in an insecticide used to protect cotton crops from the boll weevil.



A



B

a) For A, circle the *Aldehyde* functional group.

b) For B, what class of alcohol is this (*primary*, *secondary* or *tertiary*)?

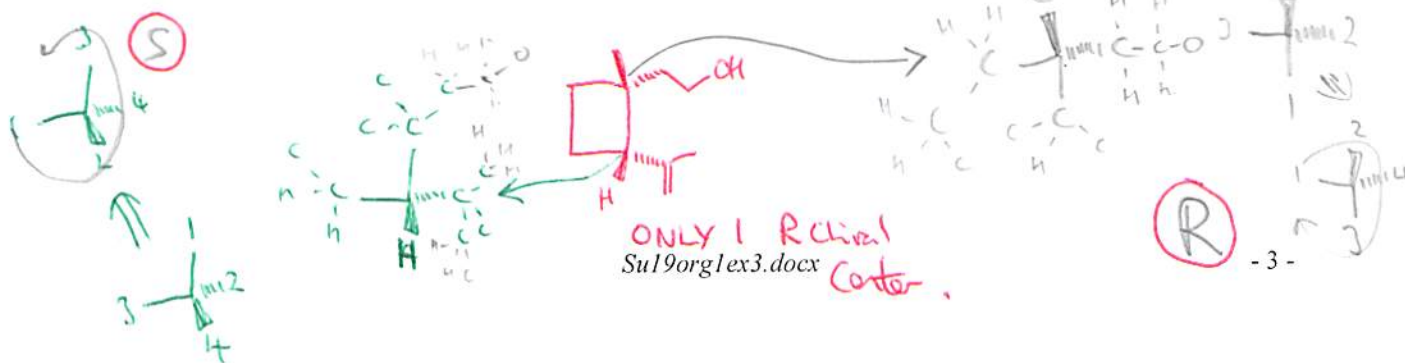
c) Provide a set of reagents that would convert A to B.

NaBH<sub>4</sub>, then H<sub>2</sub>O  
(LiAlH<sub>4</sub>)

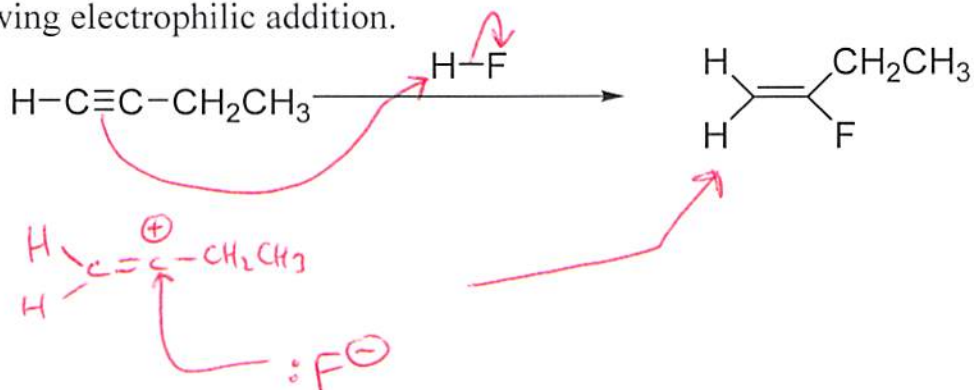
d) Provide a set of reagents that would convert B to A.

P.C.C.

e) Molecule B has two chiral centers, how many of those chiral centers have an absolute configuration (stereochemistry) of R?



14) (3+1+1=5pts) a) Draw the mechanism (i.e. curly arrows) for the following electrophilic addition.



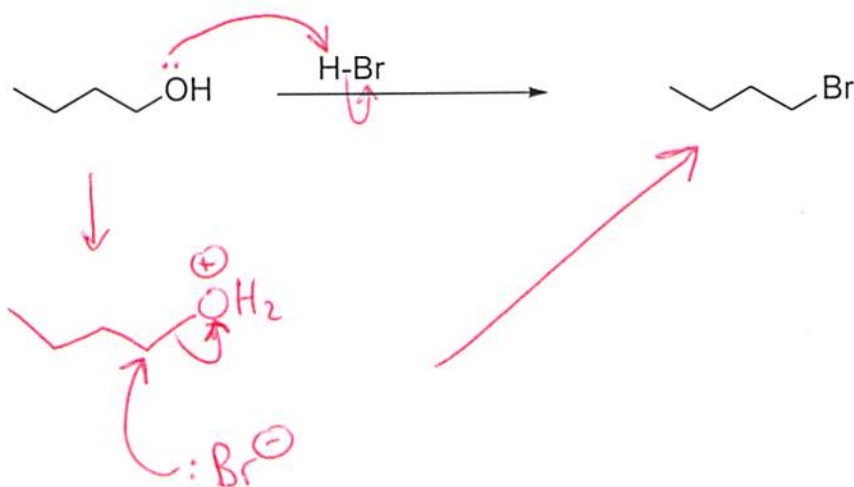
b) How would you describe the REGIOCHEMISTRY of this addition?

Markovnikov

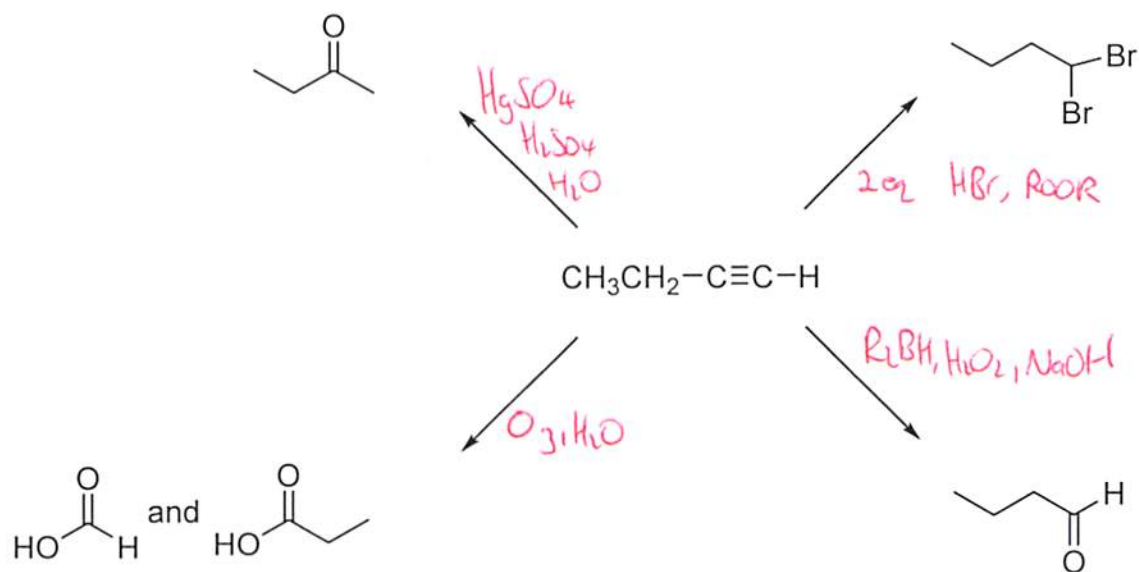
c) How would you describe the STEREOCHEMISTRY of this addition?

Unable to determine / both syn & anti / N/A.

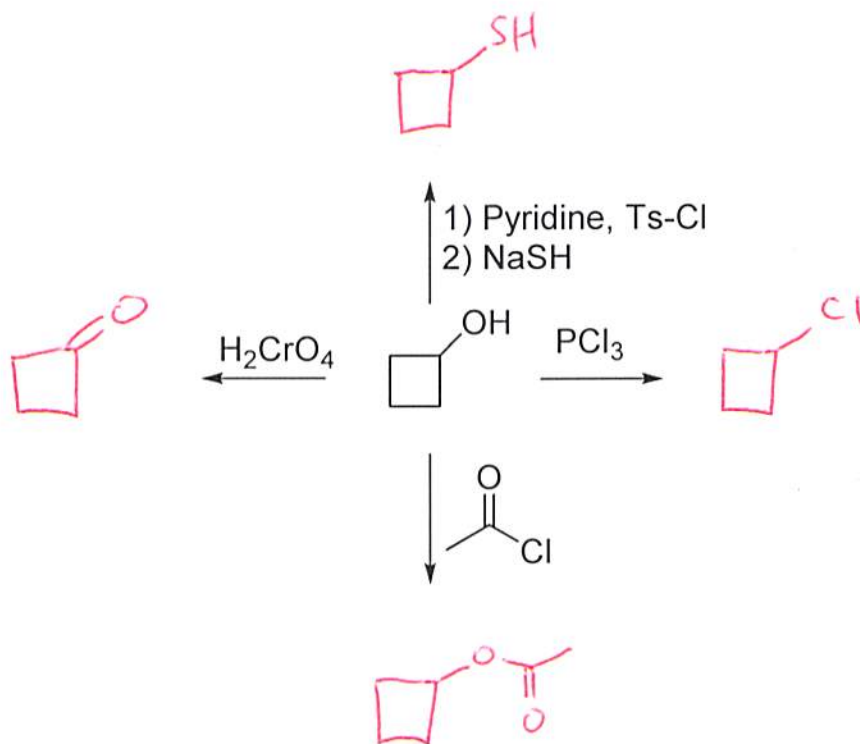
15) Write the mechanism for the  $\text{S}_{\text{N}}2$  reaction of this alcohol. (4pts)



16) Provide the sets of reagents for the following transformations. (8pts)



17) Draw the products generated in the following reactions. (8pts)



**\*\*BONUS QUESTION (up to 2 points)\*\***

When cyclopentene reacts with  $\text{OsO}_4$ ,  $\text{H}_2\text{O}_2$  (*syn addition of OH and OH*), does it produce a chiral product?

No

In one sentence, explain your answer.

Although the molecule has two chiral centres, it is identical to its mirror image, and is correctly described as a Meso compound.

