

Name _____

(1 a-j) are TRUE/FALSE (10pts)

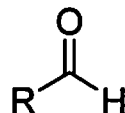
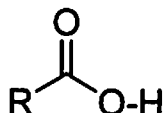
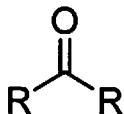
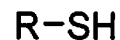
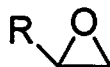
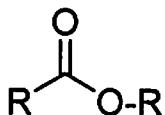
- a) A nucleophile is a two electron donor.
- b) An sp^2 hybridized atom still has one unhybridized p orbital.
- c) Butane and cyclobutane have different molecular formulas.
- d) A Lewis acid is a two electron acceptor.
- e) A chiral molecule has a non-superimposable mirror image.
- f) An ester is a functional group produced by substituting an OH section in a particular acid, with an OR group.
- g) An anion has a negative charge.
- h) Deprotonation of terminal alkynes generates the corresponding acetylide anions.
- i) π bonds are formed by the sideways overlap of aligned p orbitals on adjacent atoms.
- j) A *racemic* mixture is one that contains both possible enantiomers of the product.

2) Define the following terms (2+2=4pts):

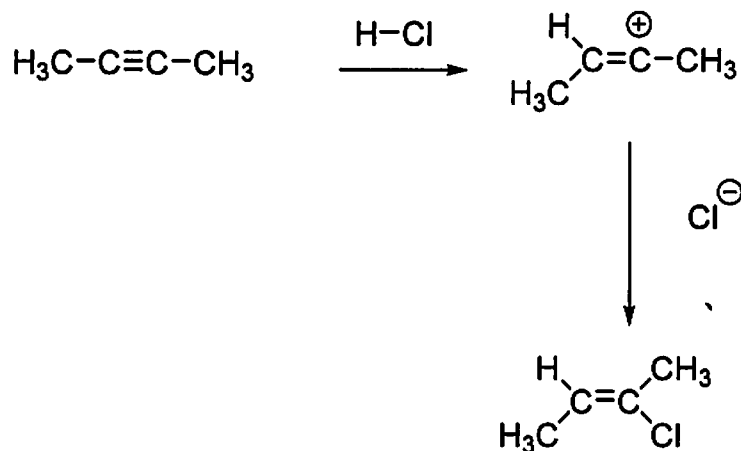
Isomer

Elimination reaction

3) Name the classes of compound (functional group) that the following molecules belong to (e.g. alkane). (6pts)



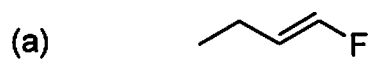
4) Write a mechanism (i.e. curly arrows) for this alkyne addition reaction. (4+1+1=6pts)



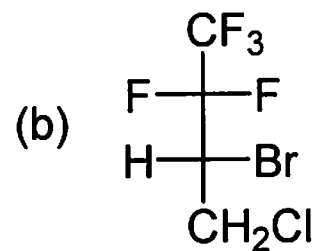
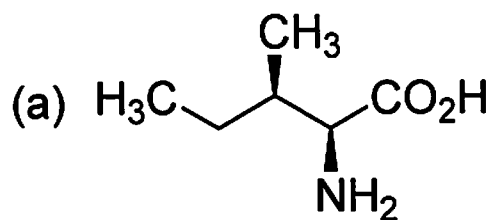
Would you expect this overall reaction to be *exothermic* or *endothermic*?

Do you think the rate determining (rate limiting) step will be the *first* or the *second* step?

5) Name the following molecules in IUPAC form. (12pts)



6) Assign (R) or (S) to every chiral center in these molecules. (6pts)



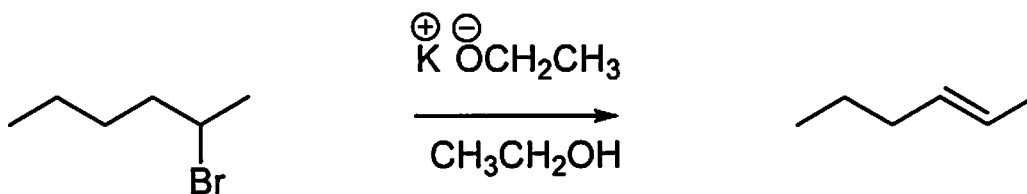
7) (3pts) For *cyclopentanol*:

How many Carbons are there?

How many Hydrogens?

What is the hybridization of the Carbons?

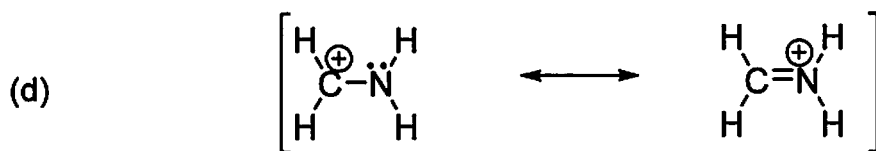
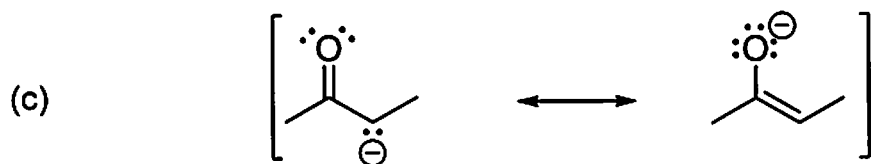
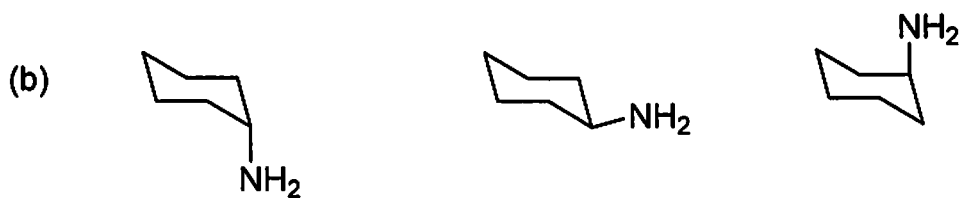
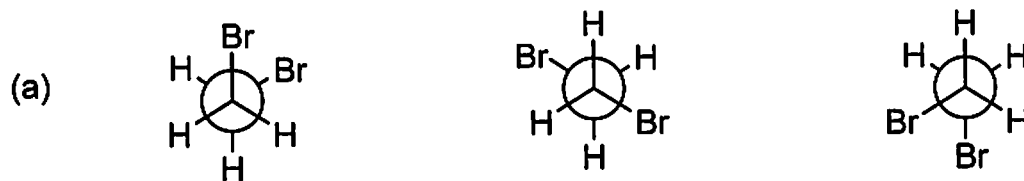
8) Write a mechanism (i.e. curly arrows) for this **E2** elimination.
(4+1+1=6pts)



Is the regiochemistry of this elimination *Saytzeff* or *Hoffman*?

Is the product alkene *E*, *Z* or *neither*?

9) Circle the most stable member of each set. (6pts)



10) The following alcohol will undergo S_N1 reaction with HBr, as shown below.



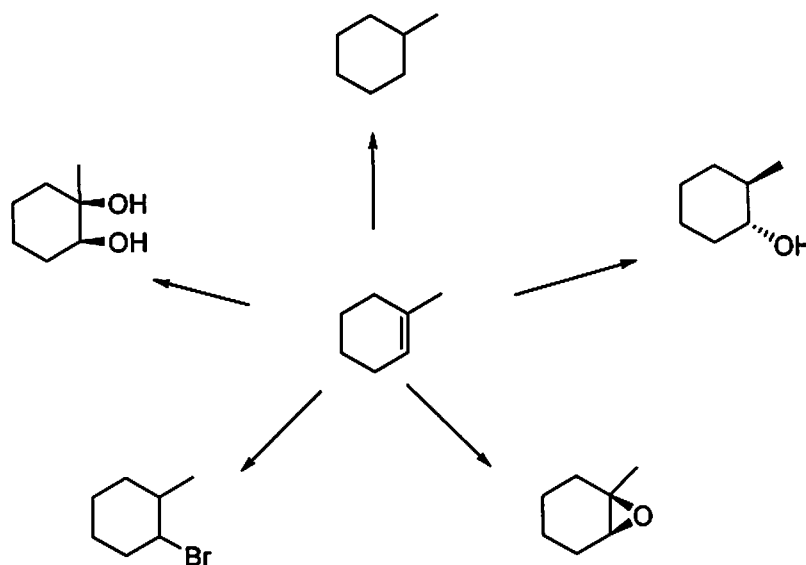
In the space below write the mechanism (i.e. curly arrows) for this S_N1 process, and remember there is a reason why acidic conditions are *essential* for this reaction to occur. (5pts)

11) (2+2=4pts) In both parts provide:

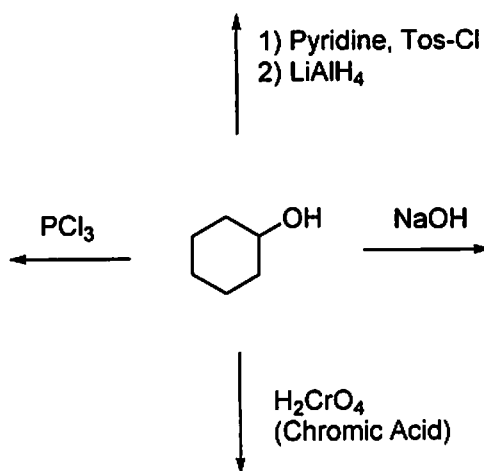
Two different **structural** isomers of *Butyne*.

Two different **stereoisomers** of *But-2-ene*.

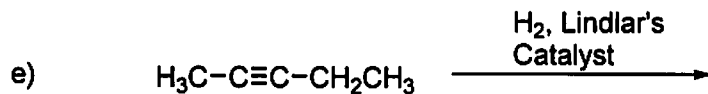
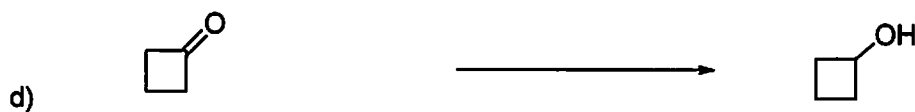
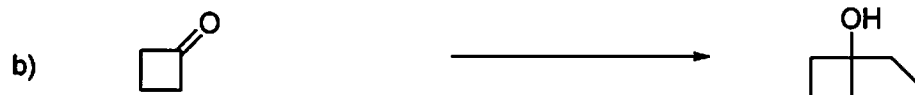
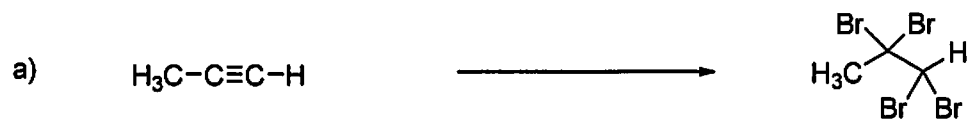
12) Give the reagents for the following alkene reactions. (10pts)



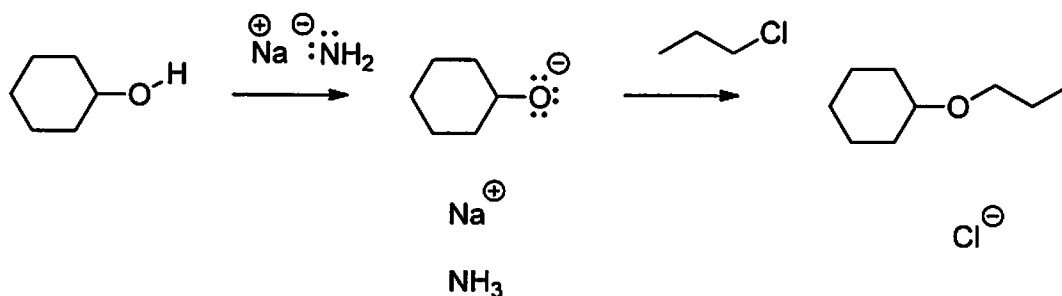
13) Draw the products for the following transformations. (8pts)



14) Give the reagents (for a, b & d), and the products (for c & e). (10pts)

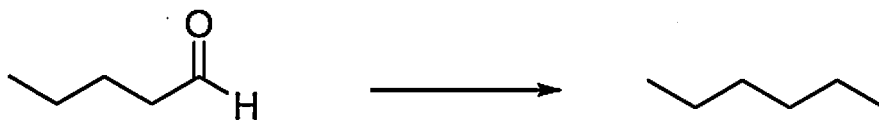


15) Draw in the arrows for the following mechanism of a Williamson ether synthesis. (4pts)



*****BONUS POINTS (up to THREE)*****

Provide a way to achieve this following (multistep) transformation.



Name

JIM NASTICS

(1 a-j) are TRUE/FALSE (10pts)

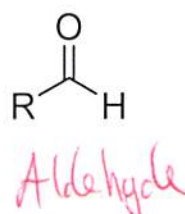
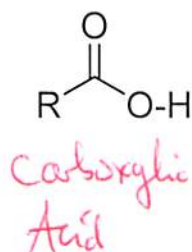
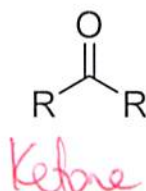
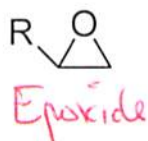
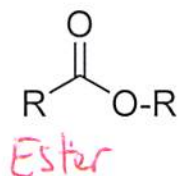
- a) A nucleophile is a two electron donor. T
- b) An sp^2 hybridized atom still has one unhybridized p orbital. T
- c) Butane and cyclobutane have different molecular formulas. T
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2) Define the following terms (2+2=4pts):

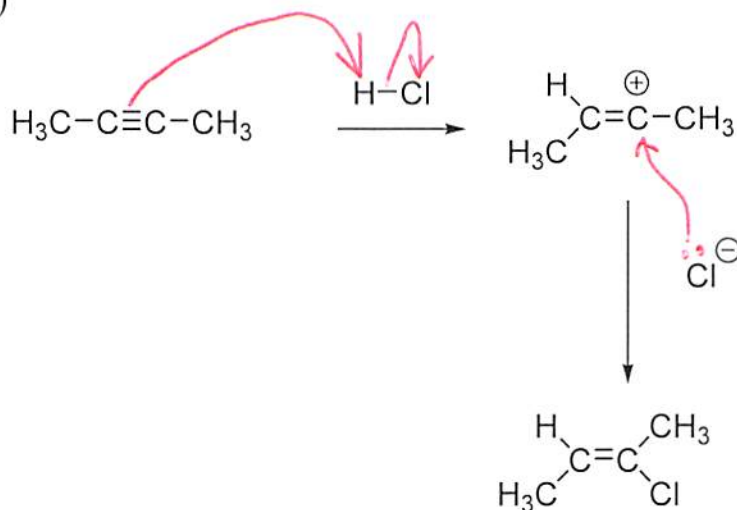
Isomer Same molecular formula but different.

Elimination reaction Removal of two atoms or groups from adjacent atoms forming a new π bond.

3) Name the classes of compound (functional group) that the following molecules belong to (e.g. alkane). (6pts)



4) Write a mechanism (i.e. curly arrows) for this alkyne addition reaction. (4+1+1=6pts)



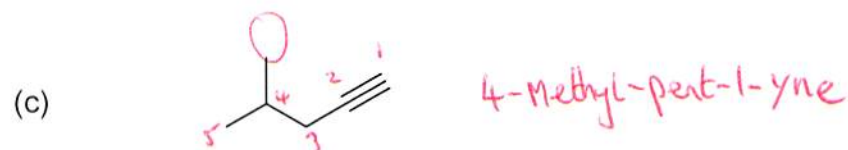
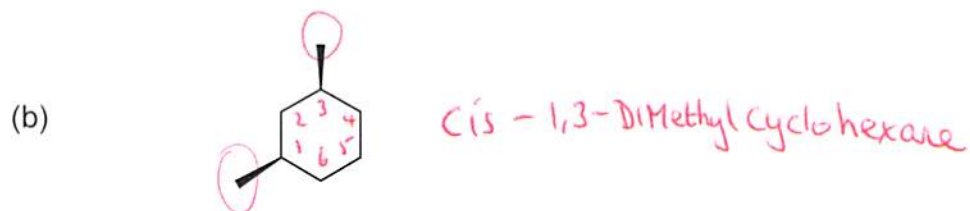
Would you expect this overall reaction to be *exothermic* or *endothermic*?

Exothermic

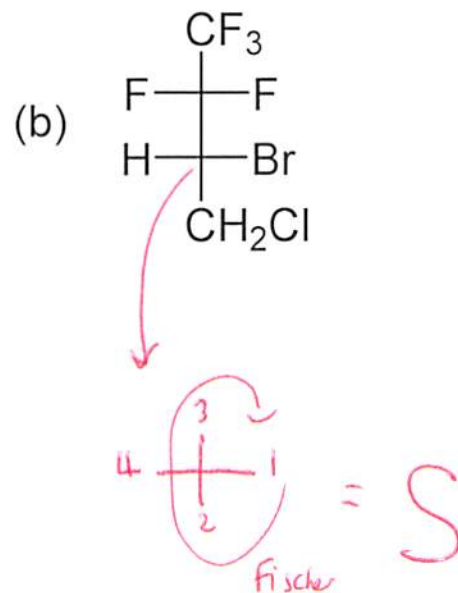
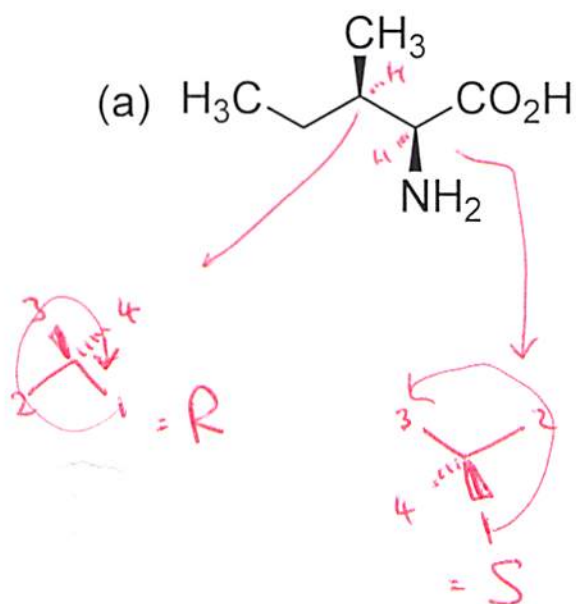
Do you think the rate determining (rate limiting) step will be the first or the *second* step?

first

5) Name the following molecules in IUPAC form. (12pts)



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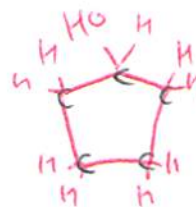


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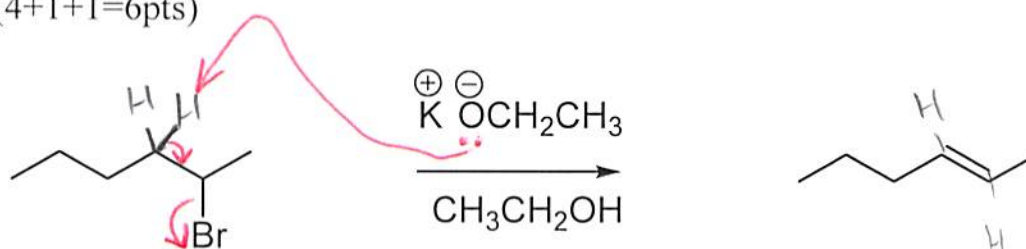
How many Carbons are there? 5

How many Hydrogens? 10

What is the hybridization of the Carbons? sp^3



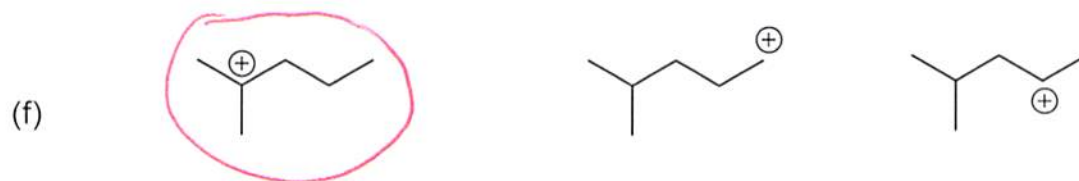
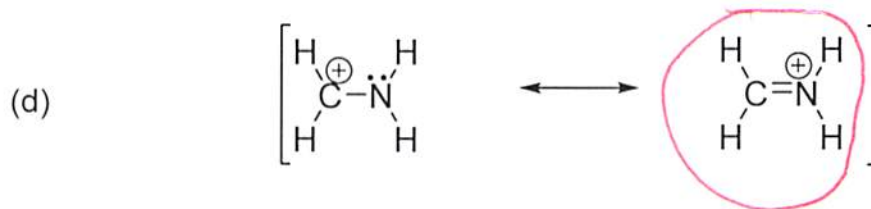
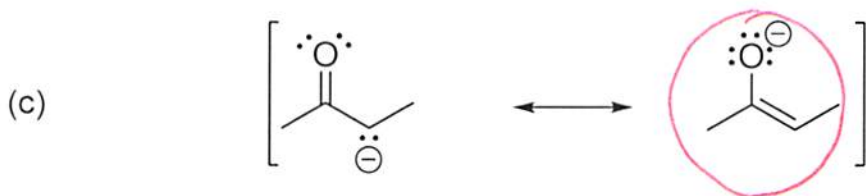
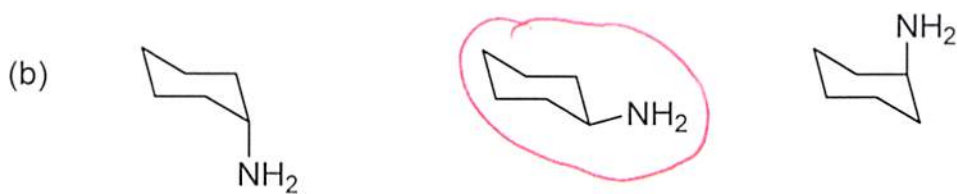
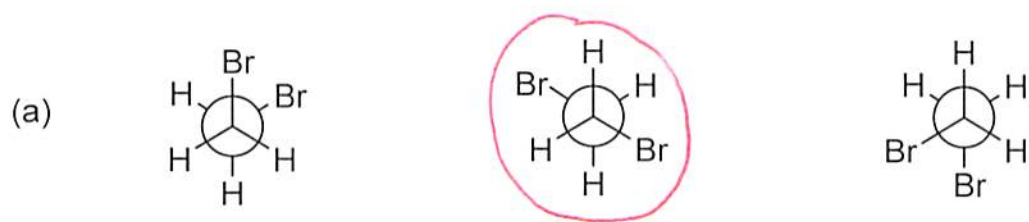
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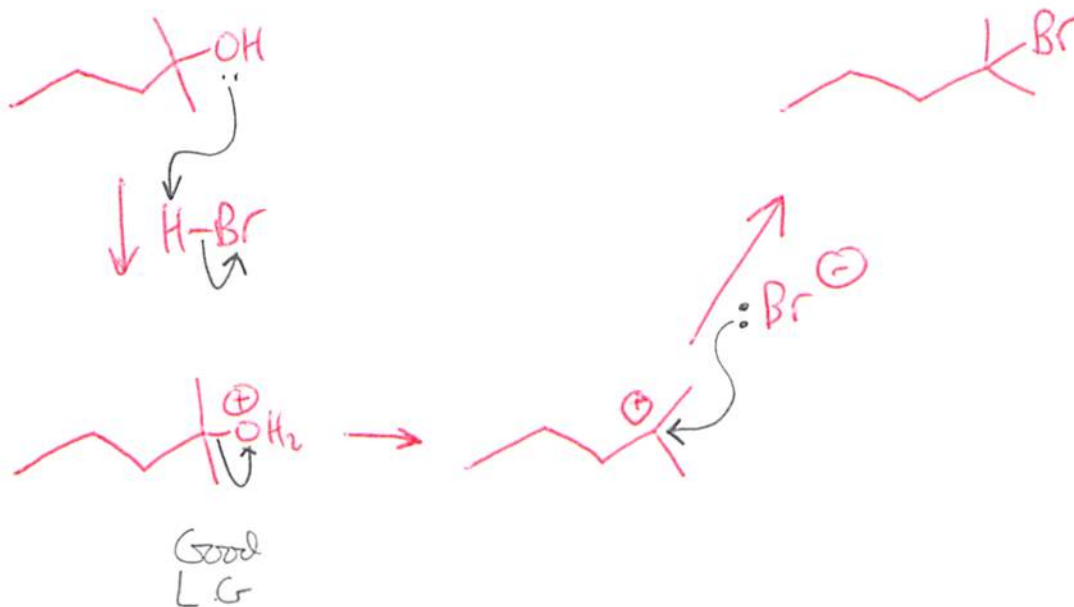
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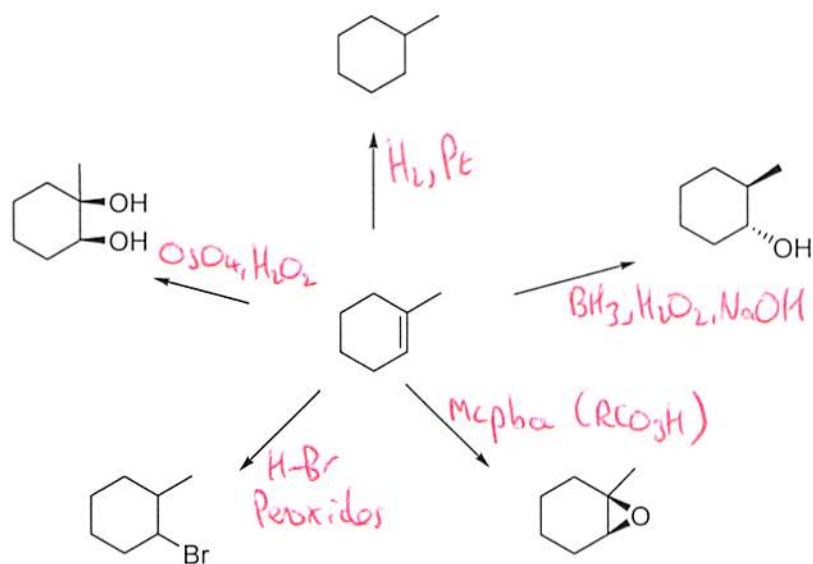
Two different **structural** isomers of *Butyne*.



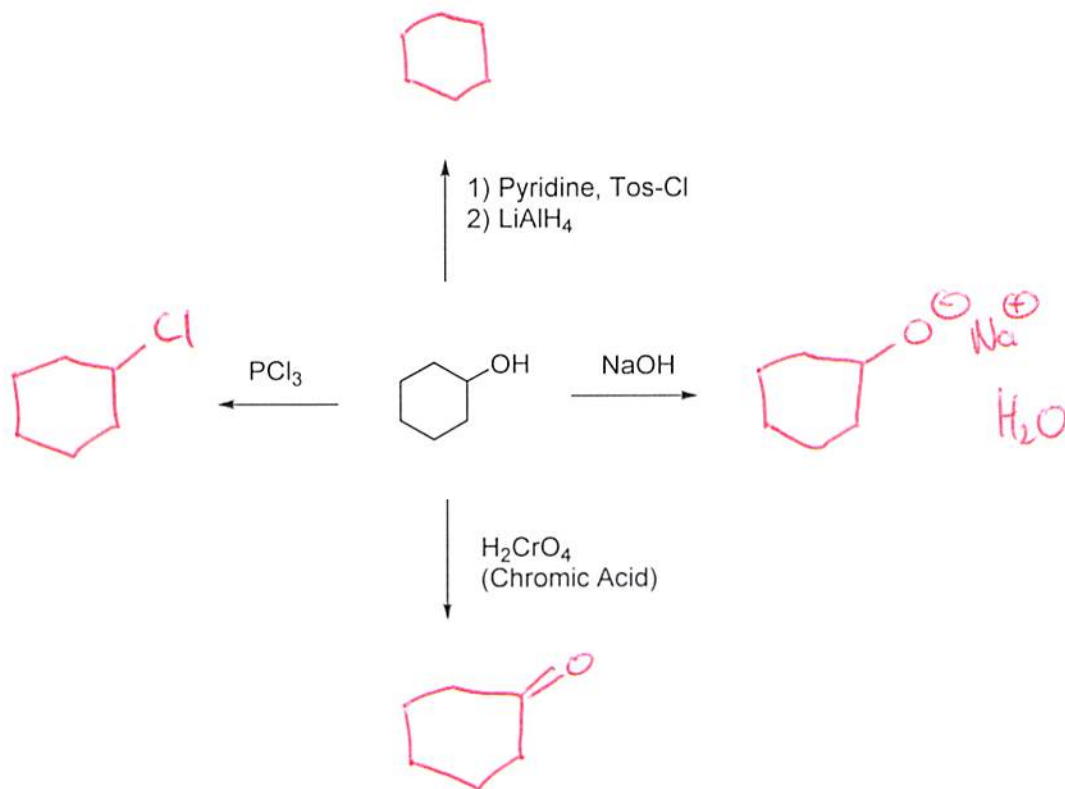
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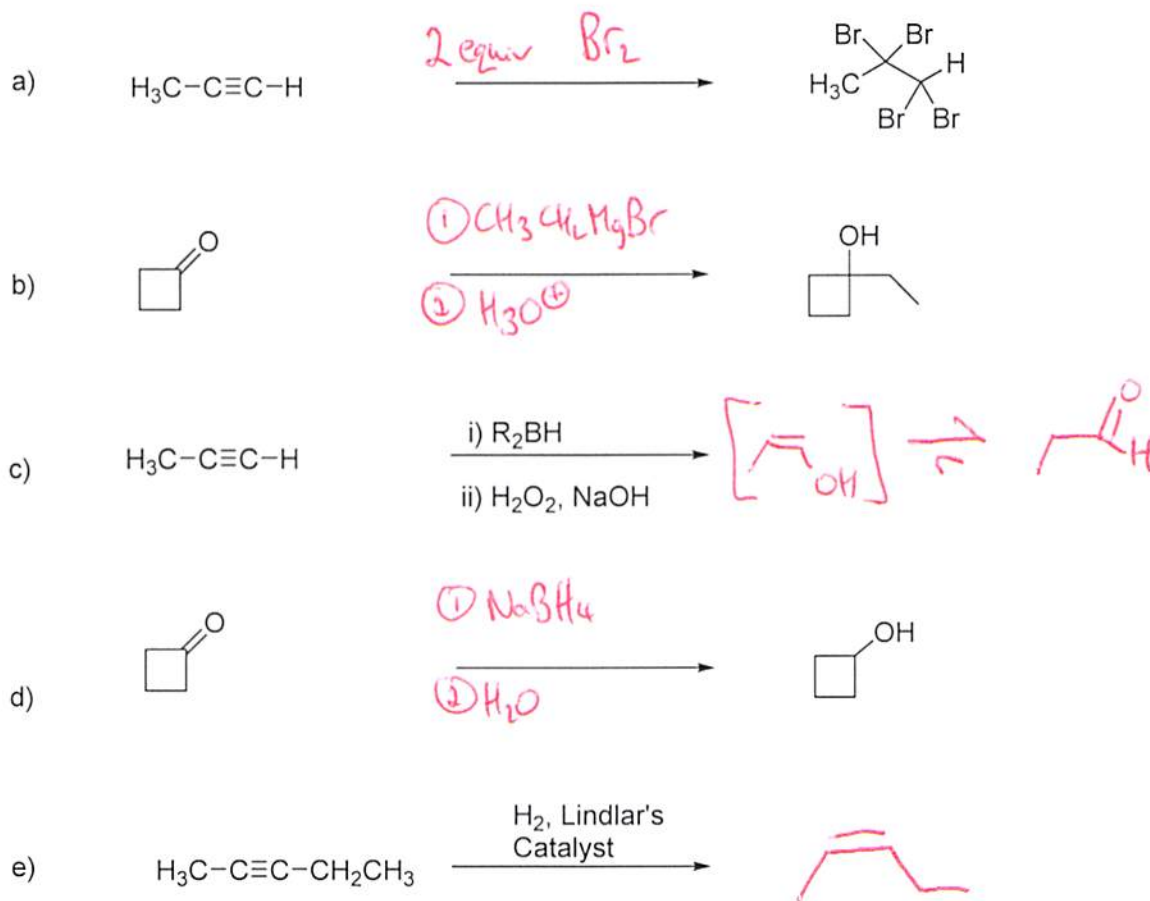
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