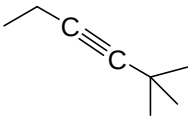
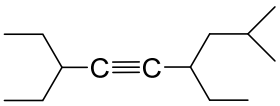
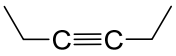
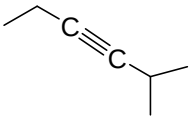
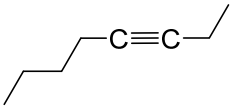
1) Name.

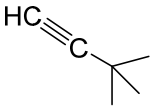


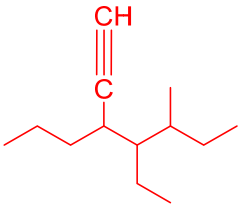


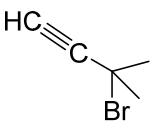


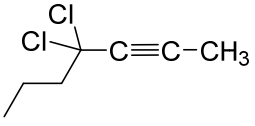












2) Draw the structures.

3,3-dimethyl-4-octyne

2,2,5,5-tetramethyl-3-hexyne

3-*sec*-butyl-1-heptyne
(recall: *sec* = secondary)

5-*tert*-butyl-2-methyl-3-octyne
(recall: *tert* = tertiary)

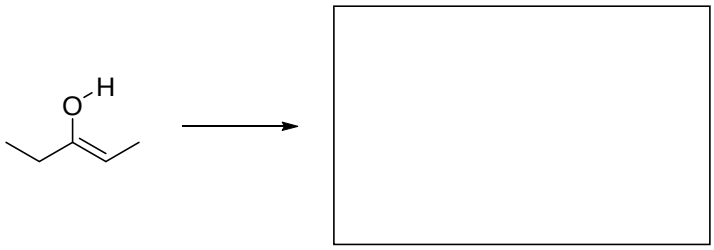
4,4-dimethyl-2-pentyne

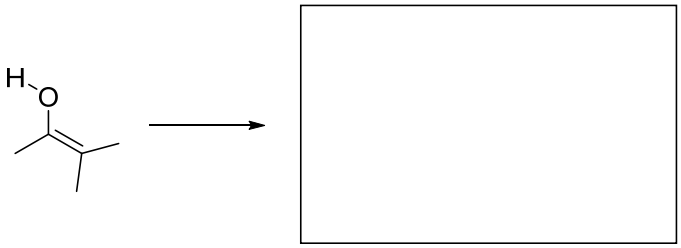
5-ethyl-2,5-dimethyl-3-heptyne

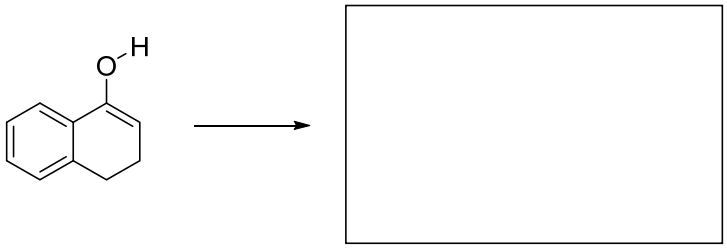
2-heptyne

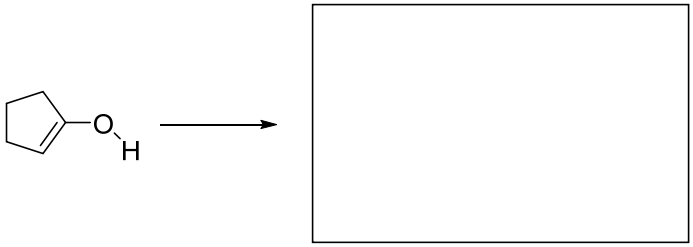
2,2-dimethyl-4-octyne

3) Draw the ketone tautomer of each enol present under slightly acidic conditions.

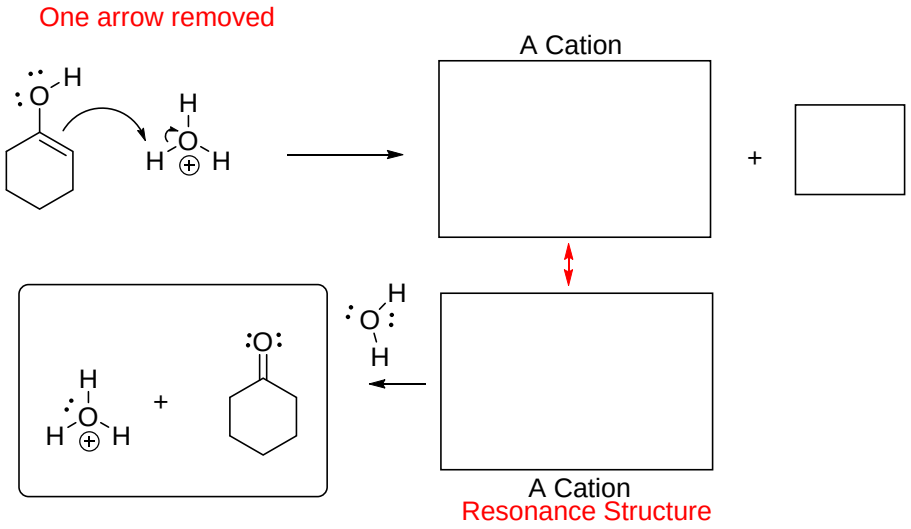




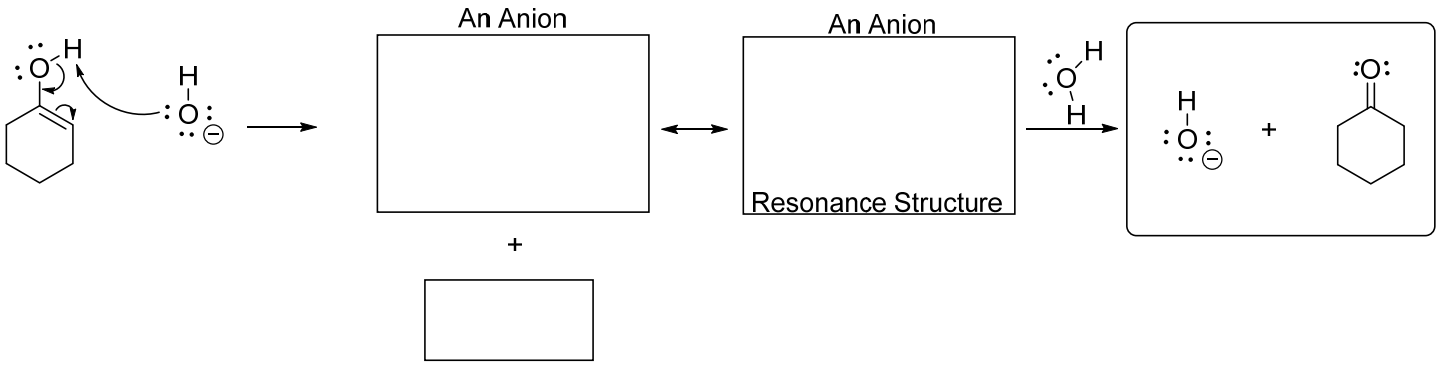


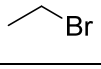
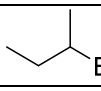
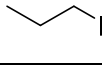
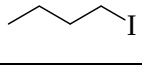


4) Complete the mechanism for the acid-catalyzed tautomerization reaction. Use curved arrows ( ) where necessary to show movement of electrons. Fill-in the empty boxes.

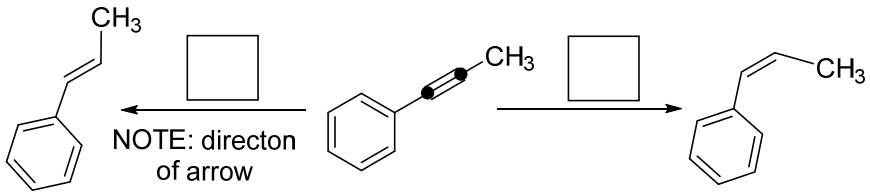


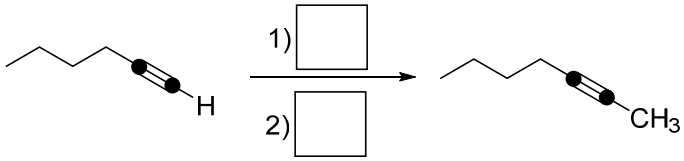
5) Complete the mechanism for the base-catalyzed tautomerization reaction. Use curved arrows ( ) where necessary to show movement of electrons. Fill-in the empty boxes.

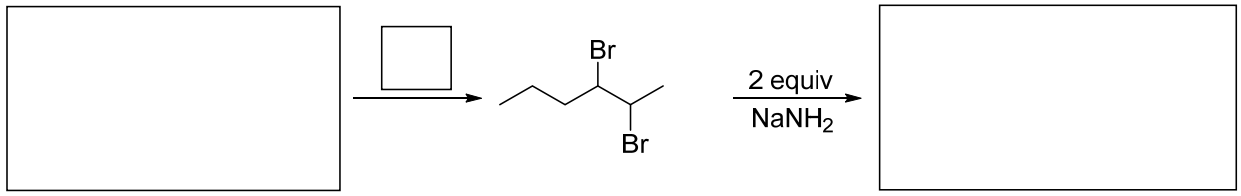


(A) 	**(B)** 	**(C)** 	**(D)** 
(E) HBr	**(F)** Na or Li metal in NH_3 (liquid)	**(G)** HCl	**(H)** CH_3Br
(I) 1) $Hg(OAc)_2$, H_2O 2) $NaBH_4$	**(J)** H_2, Lindlar catalyst	**(K)** excess H_2, Pd/C	**(L)** H_2O, H_2SO_4, Heat **(dehydration cond'ns)**
(M) 1) OsO_4 2) $NaHSO_3$, H_2O or NMO	**(N)** $KMnO_4$, H_3O^+	**(O)** Br_2, excess H_2O	**(P)** Br_2
(Q) 1) BH_3, THF 2) HO^-, H_2O_2, H_2O	**(R)** 1) O_3, –78 C 2) Zn, acetic acid, H_2O	**(S)** excess $NaNH_2$ (in NH_3 solvent)	**(T)** Br_2, excess CH_3OH
(U) HIO_4	**(V)** $CHCl_3$, KOH (base)	**(W)** H_2O	**(X)** Cl_2 (in CH_2Cl_2 solvent)
(Y) H_2O, H_2SO_4, $HgSO_4$ **(room temp)**	**(Z)** MnO_2 (in THF solvent)	**(AA)** CH_2I_2, Zn(Cu)	**(BB)** H_3O^+ **(mild addition cond'ns)**
(CC) NBS, *hν* *N*-bromosuccinimide	**(DD)** *m*-chloroperoxybenzoic acid (*m*CPBA)	~~**(EE)** Br_2 (in CCl_4 solvent)~~	

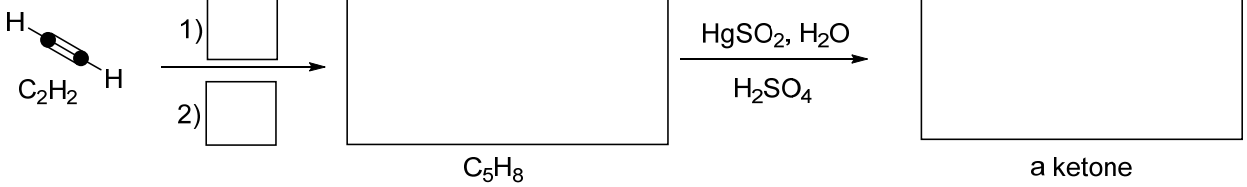
Fill in the blanks below with either of the following: (**A letter can be used more than once**)
--**small boxes:** a letter corresponding to a reagent (Table above)
--**rectangles:** a reaction pathway intermediate







An alkene



C_5H_8 a ketone

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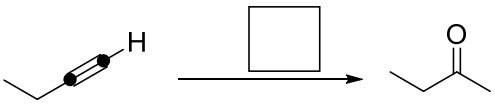
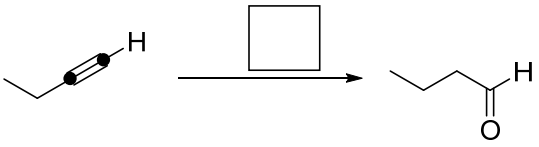
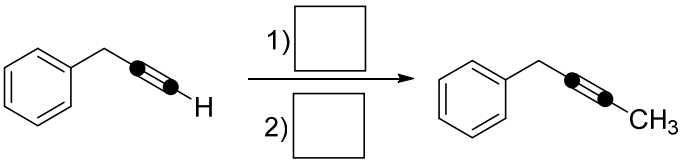
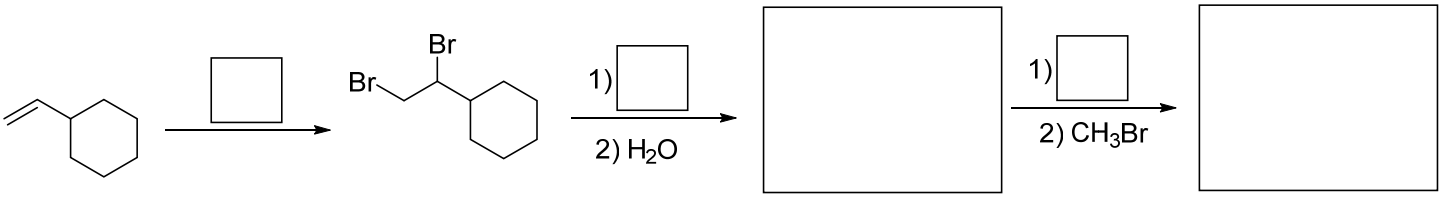
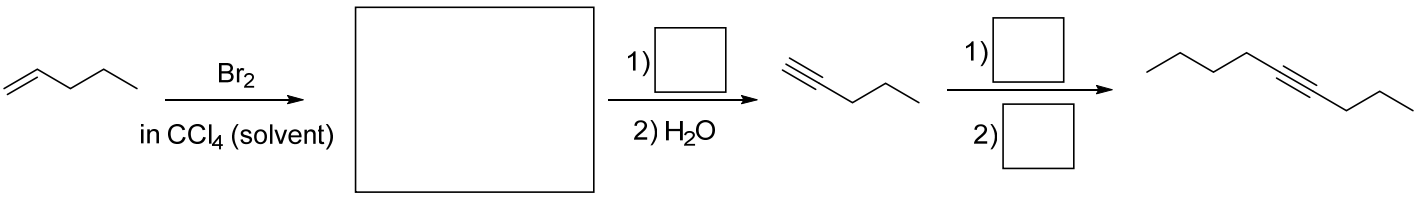
continued on next page


H
O


H
H
O

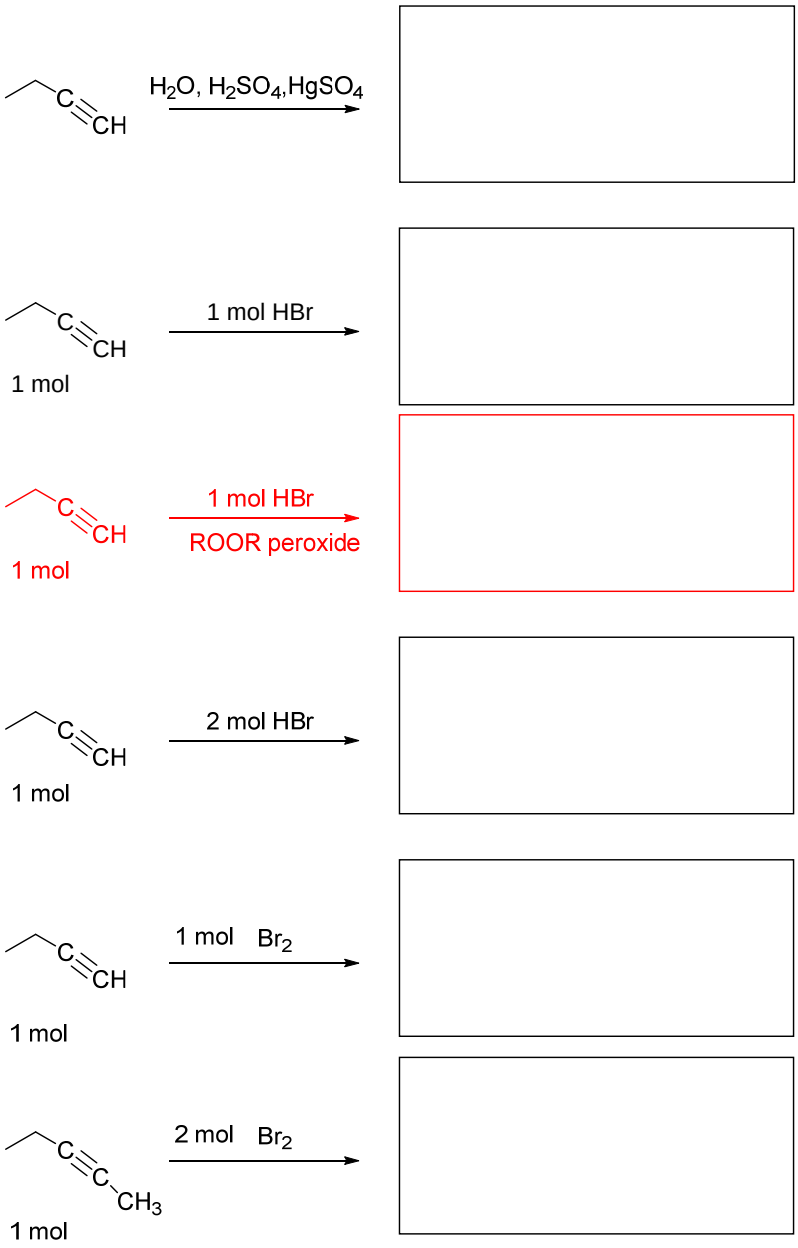

1)
2)
H
CH3

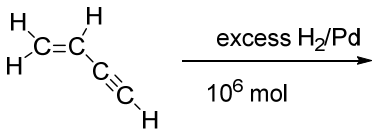

Br
Br
1)
2) H2O
1)
2) CH3Br


Br2
in CCl4 (solvent)
1)
2) H2O
1)
2)

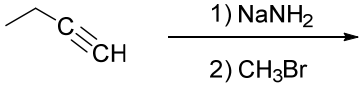
---

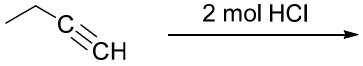
6) Predict the products of the following reactions.



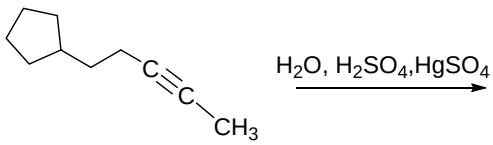


1 mol

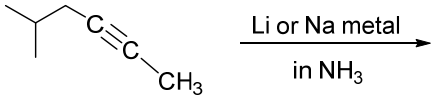




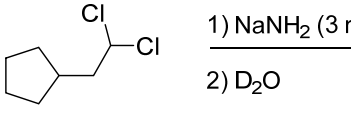
1 mol



2 ketones form

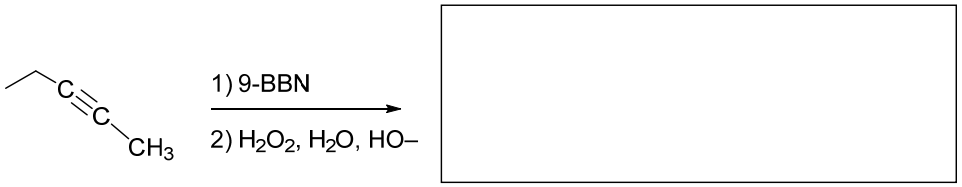


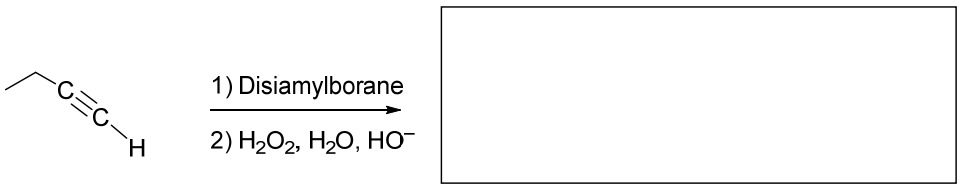
show stereochemistry

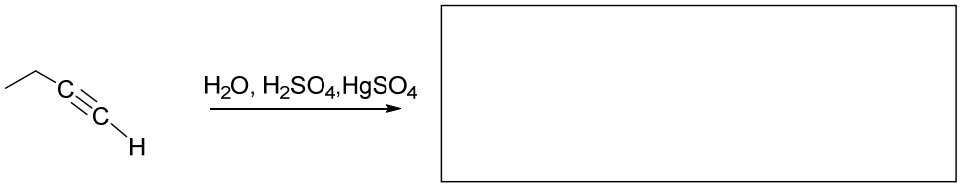


1 mol

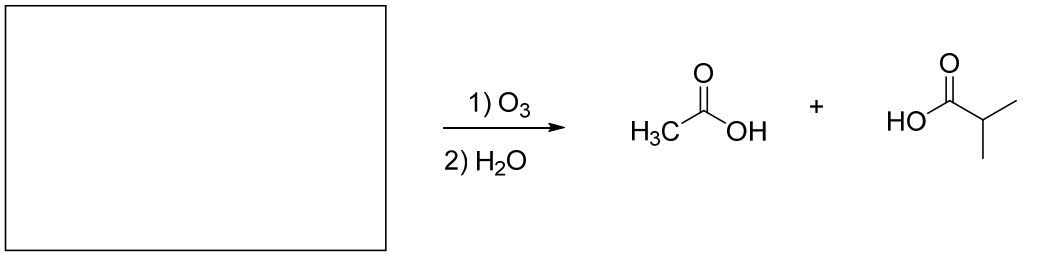
7) Draw the MAJOR product for the following.
NOTE: Disubstituted Boranes (9-BBN or Disiamylborane) are used with alkynes to prevent the addition of a boron atom to each π-bond of the alkyne.

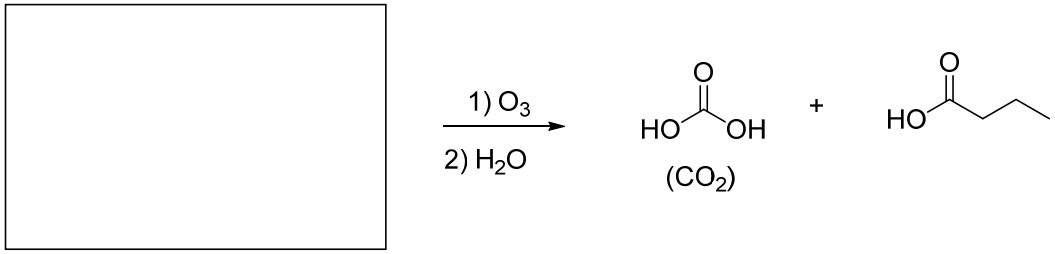


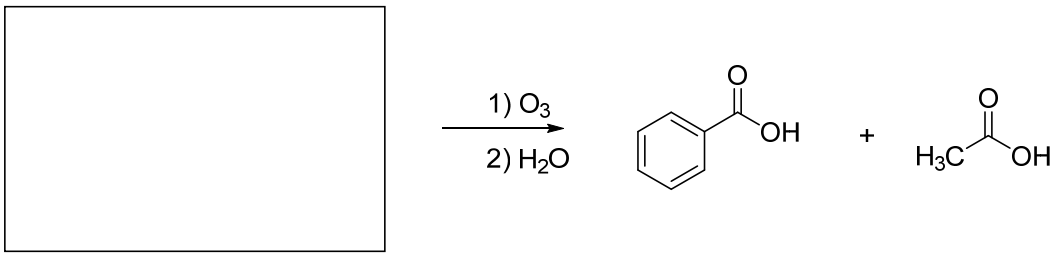


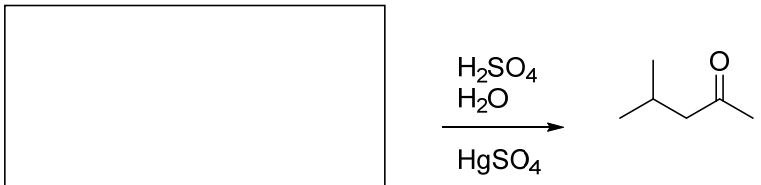


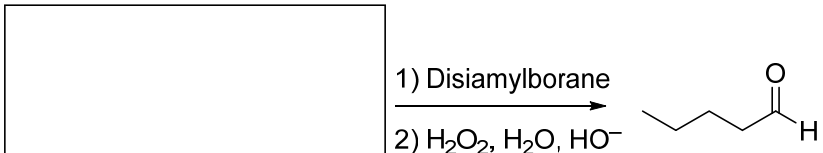
8) Draw the alkyne reactants.

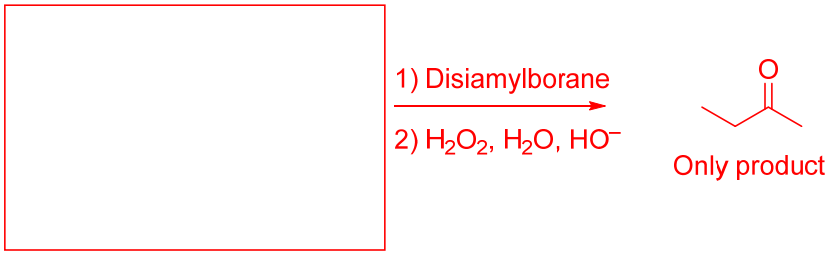





1) O_3
2) H_2O
O
OH
+
H_3C
O
OH


H_2SO_4
H_2O
$HgSO_4$
O


1) Disiamylborane
2) H_2O_2, H_2O, HO^-
O
H


1) Disiamylborane
2) H_2O_2, H_2O, HO^-
O
Only product