

# Alkyne Reaction Worksheet - Chapter 9

1. Predict the product(s) of the reaction of 4-methylpentyne with reagents (a) through (p), indicating proper regiochemistry. Assume reagents are used in excess, unless otherwise stated.

(a) HBr, Ether      (b)  $\text{Cl}_2, \text{CH}_2\text{Cl}_2$       (c) 1.  $\text{O}_3$ ; 2.  $\text{Zn}, \text{H}_3\text{O}^+$       (d)  $\text{H}_3\text{PO}_4, \text{KI}$

(e)  $\text{H}_2$ , Lindlar cat.      (f) 1.  $\text{BH}_3, \text{THF}$ ; 2.  $\text{H}_2\text{O}_2, \text{NaOH}$       (g)  $\text{H}_2\text{SO}_4, \text{H}_2\text{O}, \text{HgSO}_4$

(h)  $\text{Li}, \text{NH}_3$       (i)  $\text{H}_2, \text{Pd/C}$       (j) 1.  $\text{NaNH}_2$ ; 2. Ethylbromide

(k) 1.  $\text{NaNH}_2$ ; 2. 2-bromopropane. *SKIP, all "NR"*

*see attached*

(l) reagent (a) then 2KOH

(m) reagent (b) then  $2\text{NaNH}_2, \text{NH}_3$

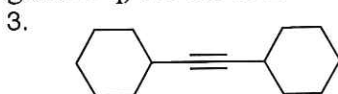
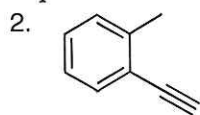
(n) reagent (e) then HBr

(o) reagent (e) then  $\text{OsO}_4, \text{NMO}$

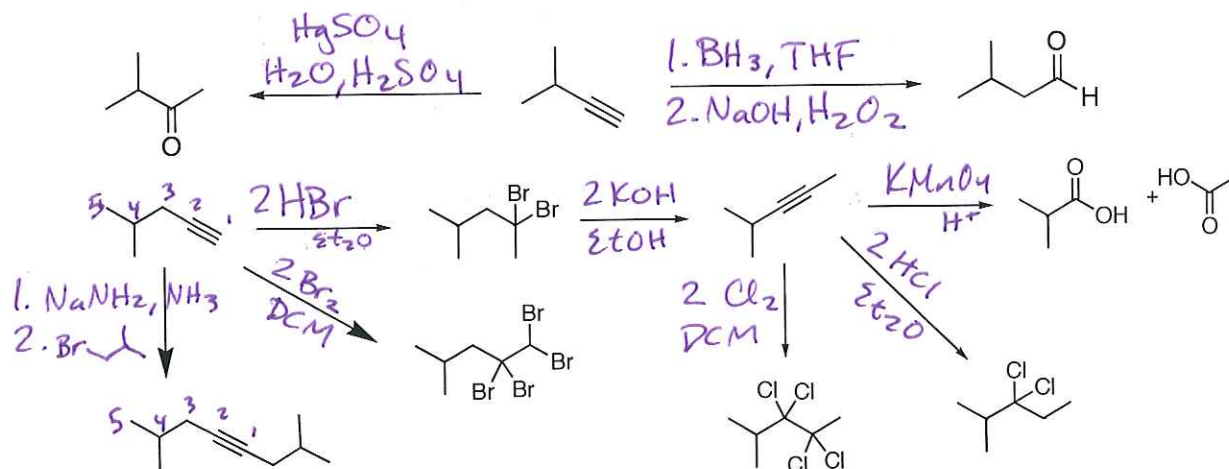
(p) reagent (h) then reagent (c)

(q) reagent (h) then reagents (f)

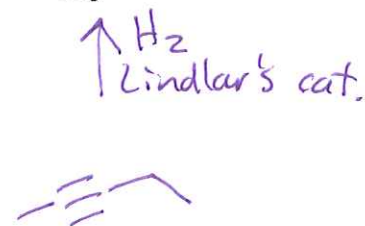
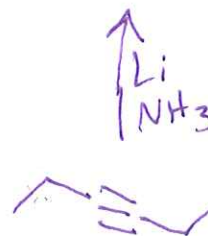
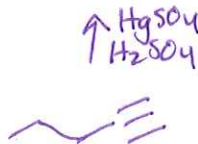
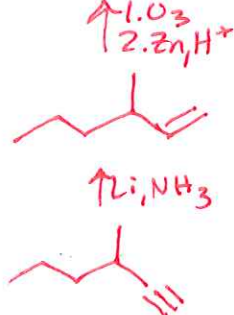
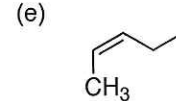
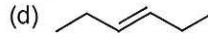
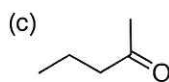
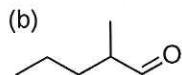
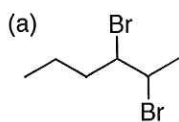
Repeat the same reactions (reagents a-q) for the following compounds

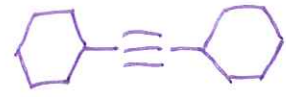
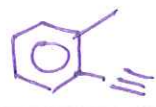


4. Fill in the missing reagents over the arrows






5. Draw the alkyne and reagents needed to synthesize the following compounds. There may be more than one possible answer.

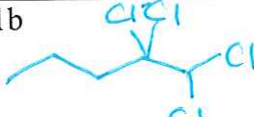

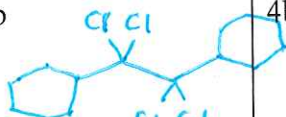




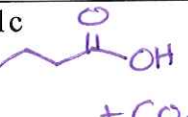
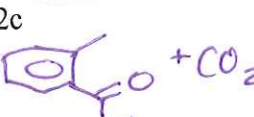
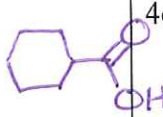
HBr

1a 	2a 	3a 	4a
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Cl<sub>2</sub>

1b 	2b 	3b 	4b
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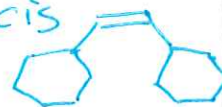
O<sub>3</sub>

1c  + CO <sub>2</sub>	2c  + CO <sub>2</sub>	3c  2x	4c
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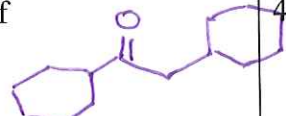
H<sub>3</sub>PO<sub>4</sub>  
KI

1d 	2d 	3d 	4d
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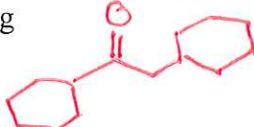
H<sub>2</sub>  
Lind

1e 	2e 	3e  cis	4e
--	--	---	----




BH<sub>3</sub>

1f 	2f 	3f 	4f
---	---	--	----




HgSO<sub>4</sub>


1g 	2g 	3g 	4g
--	--	---	----



Li  
NH<sub>3</sub>


1h 	2h 	3h 	4h
--	--	---	----

H<sub>2</sub>  
Pd/C

1i 	2i 	3i 	4i
--	--	---	----

1. NaNH<sub>2</sub>  
2. 

1j 	2j 	3j NR	4j
--	--	-------	----

1. NaNH<sub>2</sub>  
2. 

1k NR	2k NR	3k NR	4k
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"no reaction"



(a) then 2KOH



(2l)



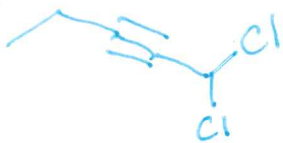
(3l)



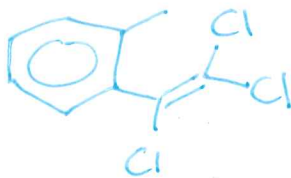
OR acceptable

(b) then NaNH<sub>2</sub>

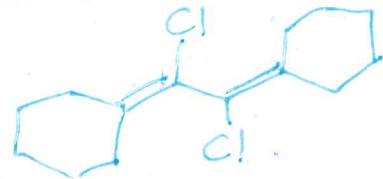
(1m)



(2m)

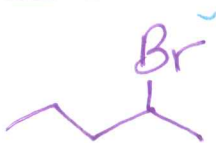


(3m)

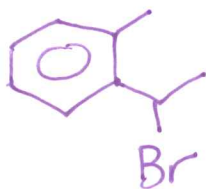


(c) then HBr

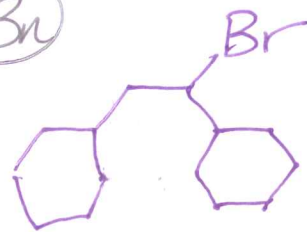
(1n)



(2n)

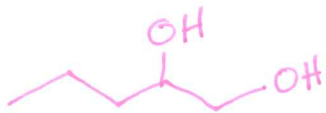


(3n)

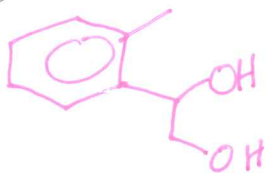


(e) then OSO<sub>4</sub>

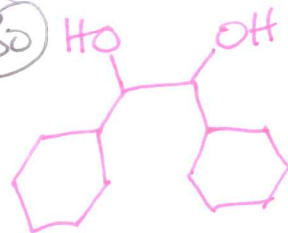
(1o)



(2o)

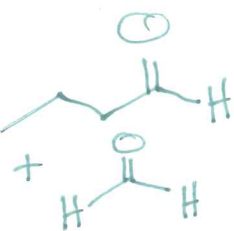


(3o)

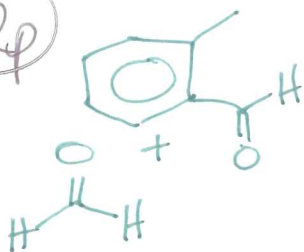


(h) then (c) O<sub>3</sub>...

(1p)



(2p)



(3p)

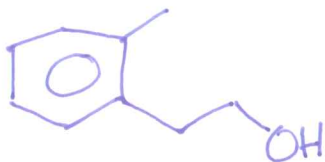


(h) then (F)BH<sub>3</sub>...

(1q)



(2q)



(3q)

