

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. O_3 ; 2. $\text{Zn}, \text{H}_3\text{O}^+$ (d) $\text{H}_3\text{PO}_4, \text{KI}$

(e) H_2 , Lindlar cat. (f) 1. BH_3, 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) Li, NH_3 (i) $\text{H}_2, \text{Pd/C}$ (j) 1. NaNH_2 ; 2. Ethylbromide

(k) 1. NaNH_2 ; 2. 2-bromopropane. *SKIP, all "NR"*

see attached

(l) reagent (a) then 2KOH

(m) reagent (b) then 2NaNH₂, NH₃

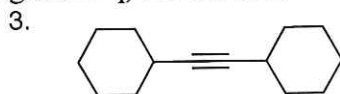
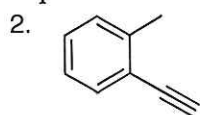
(n) reagent (e) then HBr

(o) reagent (e) then OsO₄, NMO

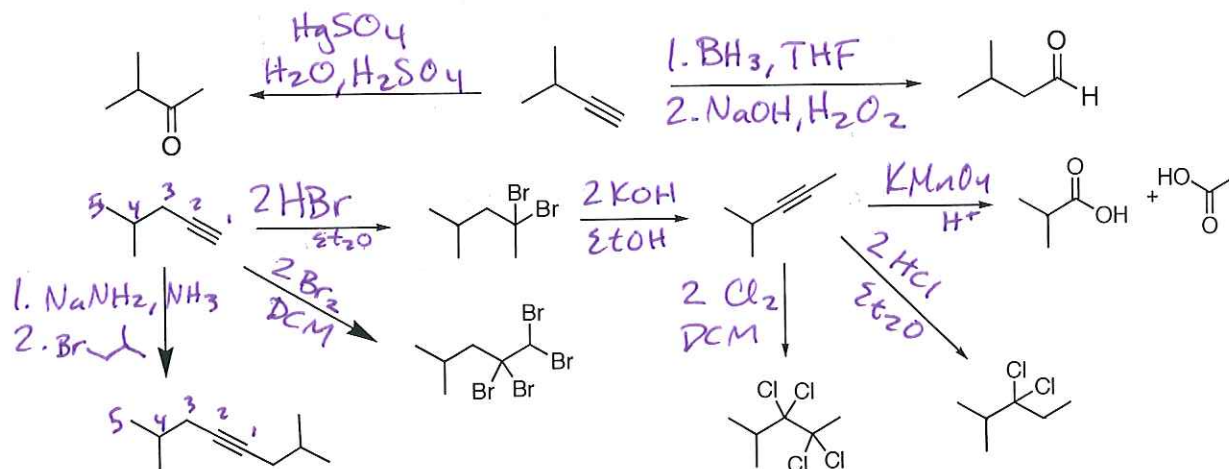
(p) reagent (h) then reagent (c)

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

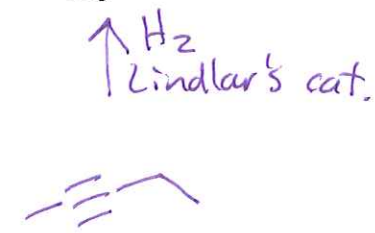
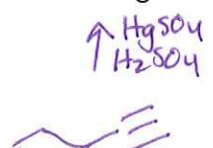
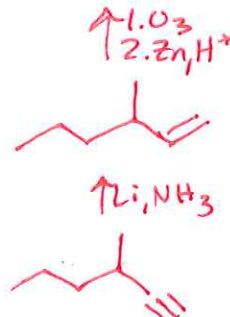
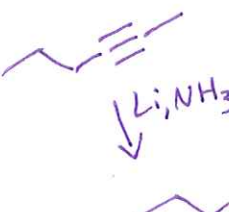
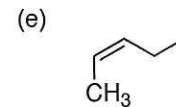
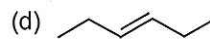
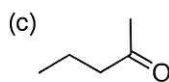
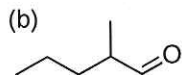
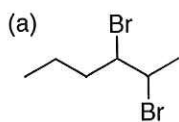
Repeat the same reactions (reagents a-q) for the following compounds

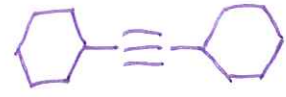
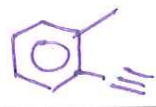


4. Fill in the missing reagents over the arrows



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





HBr

1a	<chem>CCC(C)(Br)Br</chem>	2a	<chem>Cc1ccccc1C(C)(Br)Br</chem>	3a	<chem>C1CCCCC1C(C)(Br)BrC2CCCCC2</chem>	4a	
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Cl₂

1b	<chem>CCC(Cl)(Cl)CCl</chem>	2b	<chem>Cc1ccccc1C(Cl)(Cl)CCl</chem>	3b	<chem>C1CCCCC1C(Cl)(Cl)CClC2CCCCC2</chem>	4b	
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O₃

1c	<chem>CCC(=O)O + CO2</chem>	2c	<chem>Cc1ccccc1C(=O)O + CO2</chem>	3c	<chem>2 * C1CCCCC1C(=O)O</chem>	4c	
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H₃PO₄
KI

1d	<chem>CCC(I)(I)C</chem>	2d	<chem>Cc1ccccc1C(I)(I)C</chem>	3d	<chem>C1CCCCC1C(I)(I)CC2CCCCC2</chem>	4d	
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H₂
Lind

1e	<chem>CCC=C</chem>	2e	<chem>Cc1ccccc1C=C</chem>	3e	<chem>C1CCCCC1C=C(C1CCCCC2)C2</chem>	4e	
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BH₃

1f	<chem>CCCC=O</chem>	2f	<chem>Cc1ccccc1C=O</chem>	3f	<chem>C1CCCCC1C(=O)CC2CCCCC2</chem>	4f	
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HgSO₄

1g	<chem>CCC(=O)C</chem>	2g	<chem>Cc1ccccc1C(=O)C</chem>	3g	<chem>C1CCCCC1C(=O)CC2CCCCC2</chem>	4g	
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Li
NH₃

1h	<chem>CCC=C</chem>	2h	<chem>Cc1ccccc1C=C</chem>	3h	<chem>C1CCCCC1C=C(C1CCCCC2)C2</chem>	4h	
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H₂
Pd/c

1i	<chem>CCCC</chem>	2i	<chem>Cc1ccccc1CC</chem>	3i	<chem>C1CCCCC1CC2CCCCC2</chem>	4i	
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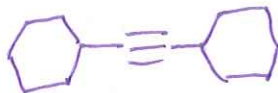
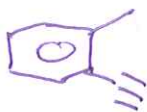
1. NaNH₂
2. CC(Br)C

1j	<chem>CCC#CC</chem>	2j	<chem>Cc1ccccc1C#CC</chem>	3j	NR	4j	
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1. NaNH₂
2. CC(Br)C

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



(a)
then
KOH

11	21	31	41
<chem>CCCC#C</chem> more sub'd favored	11 get the same alkyne back	11 get the same alkyne back	

(b)
then
NaNH₂

1m

2m

3m

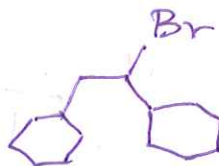
Same as 1 above (elimination to alkyne)

(c)
then
HBr

1n

2n

3n

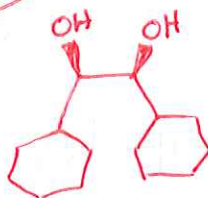
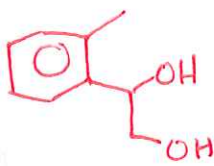
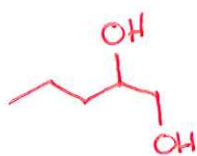


(e)
then
OsO₄

1o

2o

3o



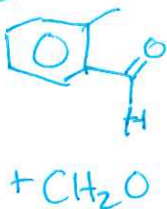
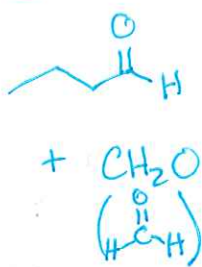
meso

(h)
then
(c) O₃

1p

2p

3p



(h)
then
(f) BH₃

1q

2q

3q

