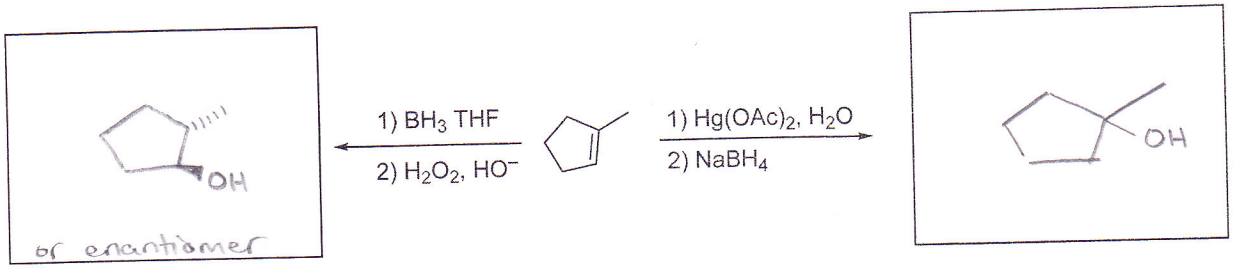
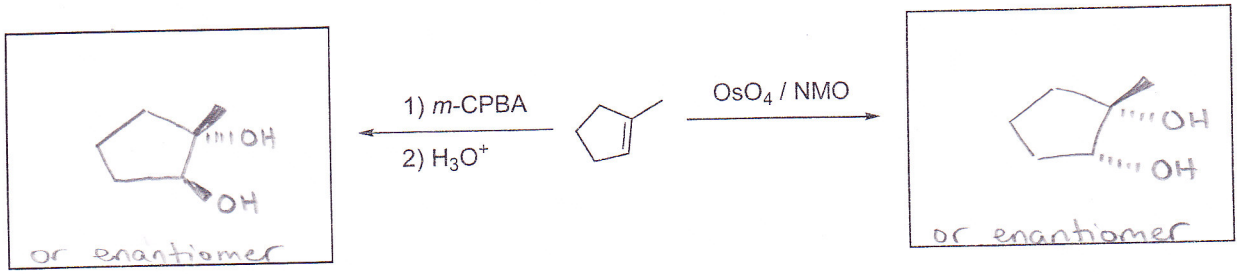
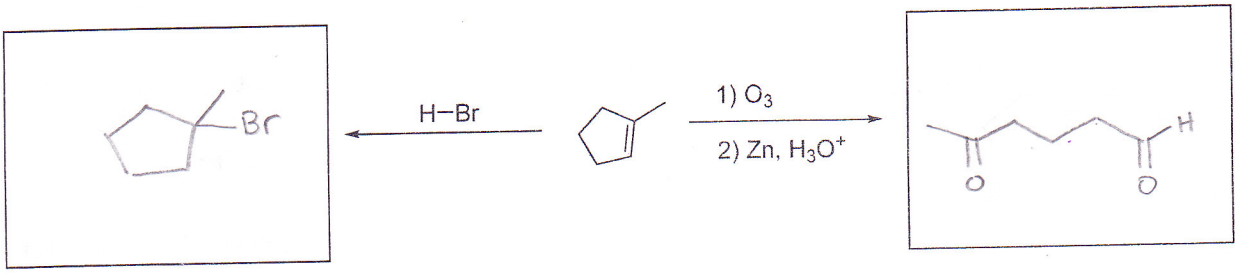
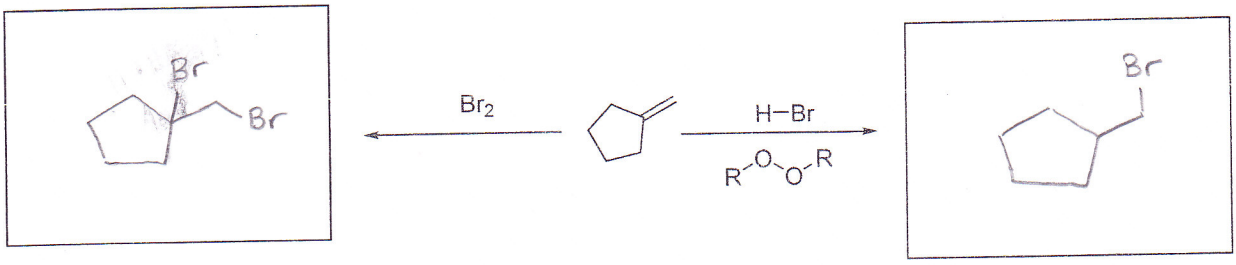
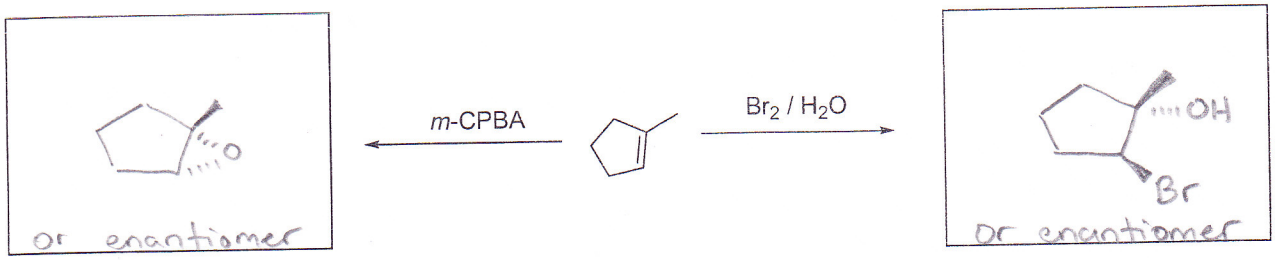
1) Draw the MAJOR (most abundant) product made in the reaction. IF NEW STEREOCENTER(S) IS/ARE MADE, DRAW ONLY ONE ENANTIOMER. (3 pts each, 30 points total)





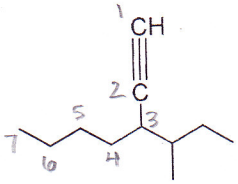






NAME_____

2) Name the following structure (IUPAC). USE sec-, tert, OR neo in naming, if necessary. (2 pts)



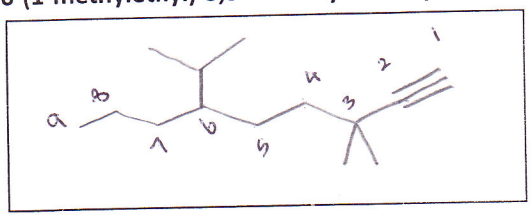
hept-1-yne

3-sec-butyl-1-heptyne

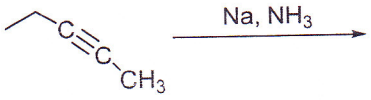
both accepted!

3) Draw the structure. (2 pts)

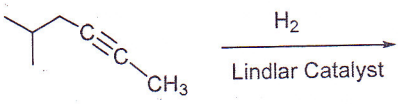
6-(1-methylethyl)-3,3-dimethyl-1-nonyne



4) Predict the products of the following reaction. (3 pts per box, 6 pts total)



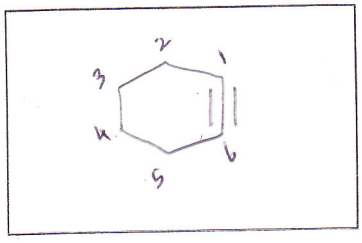
(trans)

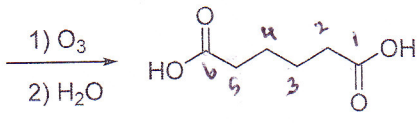


(cis)

show stereochemistry

5) Draw the alkyne reactant. (3 pts)





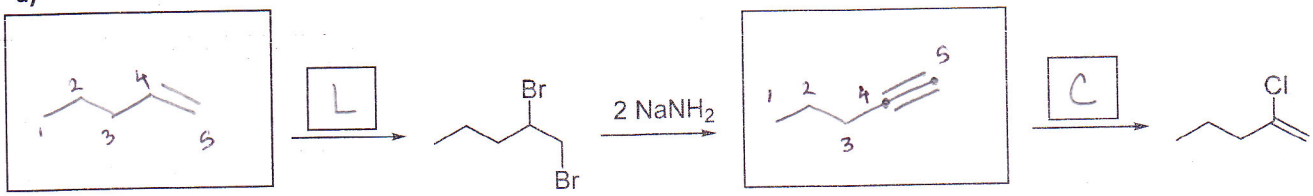
NAME_____

(A) HBr	**(B)** Na, NH_3 (liquid)	**(C)** 1 mol HCl	**(D)** 2 mol HCl
(E) 1) $Hg(OAc)_2$, H_2O 2) $NaBH_4$	**(F)** $KMnO_4$, NaOH (**cold**)	**(G)** H_2, Pd/C **or** H_2, Pt/C **or** H_2, Ni	**(H)** 2 mol Br_2 (in CH_2Cl_2 solvent)
(I) 1) OsO_4 2) $NaHSO_3$, H_2O	**(J)** 1) O_3 2) DMS (required!!) (DMS -= dimethylsufide) **(compare K)**	**(K)** 1) O_3 2) H_2O (no DMS required) dimethylsufide	**(L)** 1 mol Br_2 (in CH_2Cl_2 solvent)
(M) 1) BH_3, THF 2) $HO^{\ominus}$, H_2O_2, H_2O	**(N)** $CHCl_3$, KOH (base)	**(O)** Tosyl Cl (TsCl), pyridine	**(P)** 1 mol $NaNH_2$
(Q) HIO_4	**(R)** Br_2, excess H_2O	**(S)** 1) $HgSO_4$, H_2O, H_2SO_4,	**(T)** $H_3O^{\oplus}$ (23 °C) **(mild addition cond'ns)**
(U) *m*-chloroperoxybenzoic acid (*m*CPBA)	**(V)** H_2O, conc. H_2SO_4, Heat	**(W)** CH_3Br	**(X)** NBS, *hv* *N*-bromosuccinimide
(Y) 1) *m*-chloroperoxybenzoic acid (*m*CPBA) 2) $H_3O^{\oplus}$	**(Z)** HBr, ROOR (peroxides)	**(AA)** (*t*-BuOK) **OR** DBU **OR** DBN	**(BB)** 1 mol Cl_2 (in CH_2Cl_2 solvent)
(CC) 1) BH_3, THF 2) $HO^{\ominus}$, H_2O_2, H_2O	**(DD)** Na^+Br^- in DMSO	**(EE)** 1) disiamylborane **OR** 9-BBN 2) $HO^{\ominus}$, H_2O_2, H_2O	**(FF)** Cl_2 (in CH_2Cl_2 solvent)
(GG) ($NaOCH_3$) **OR** (NaOEt)	**(HH)** Br_2, excess CH_3OH	**(II)** H_2O	**(JJ)** H_2, Lindlar catalyst
(KK) 2 mol Cl_2 (in CH_2Cl_2 solvent)			

6) Synthesis: Complete the following synthetic schemes using the table above (**25 points**).
Fill in the **small boxes (1 point each; 7 points total)** with a letter corresponding to a reagent (Table above)
Fill in the **larger rectangles (2 points each; 18 points total)** with organic reactant

NEXT PAGE

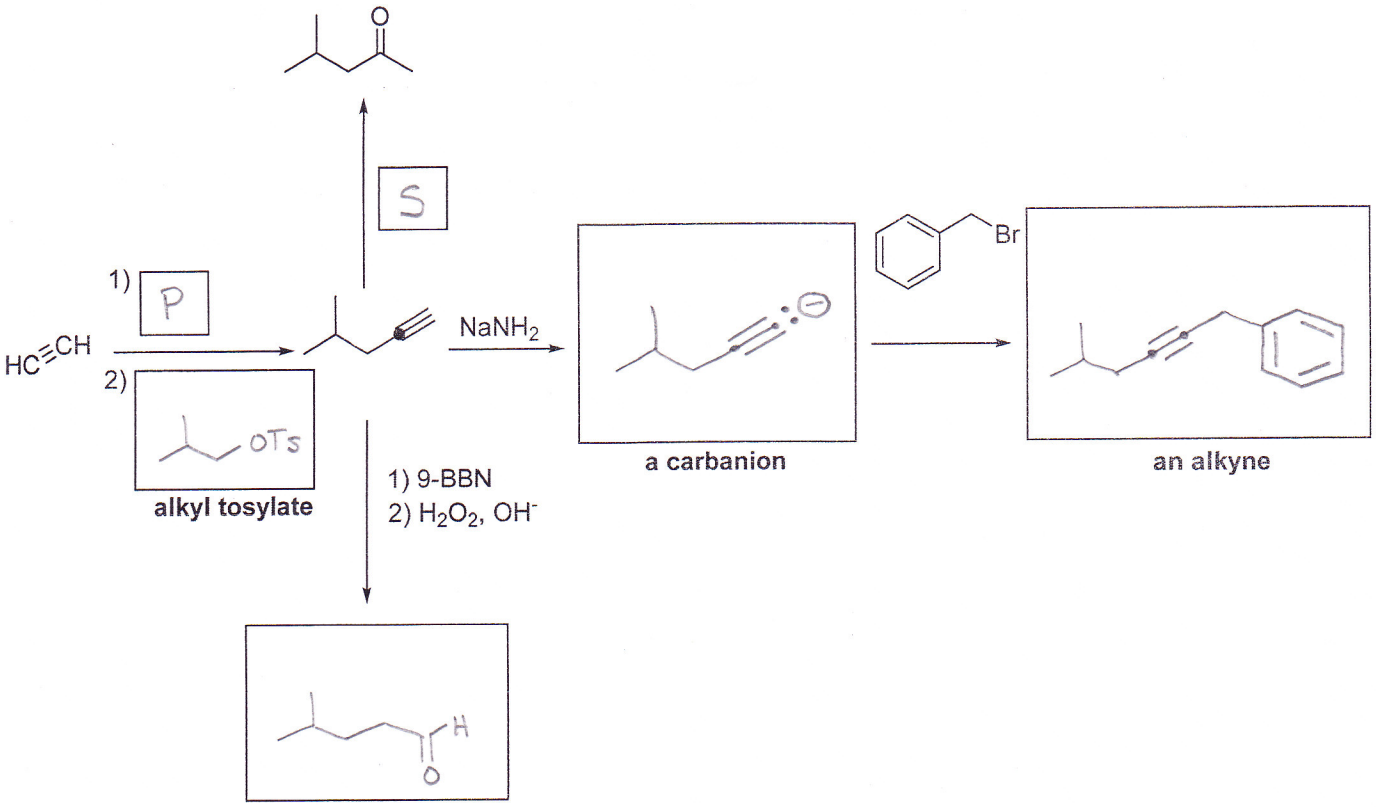
a)



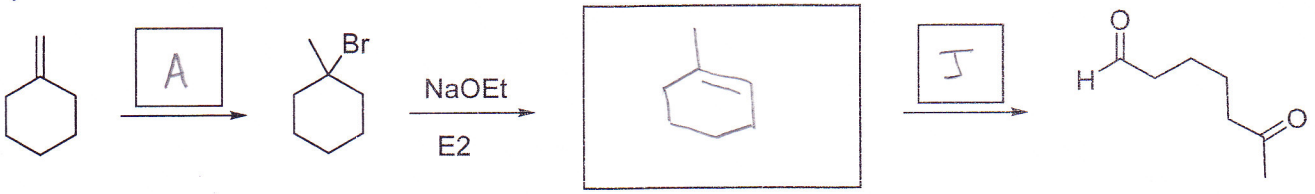
An alkene

NAME_____

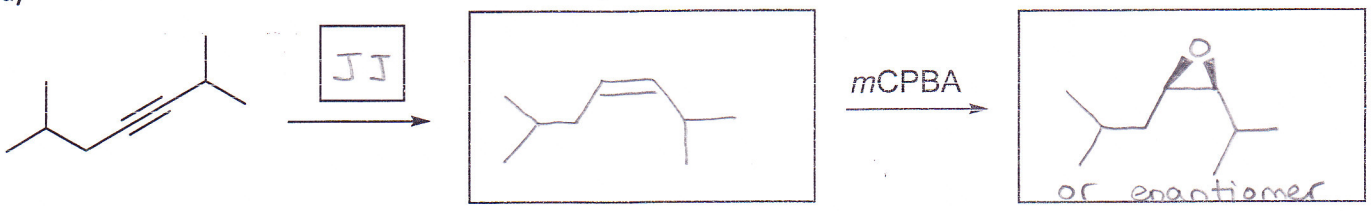
b)



c)



d)

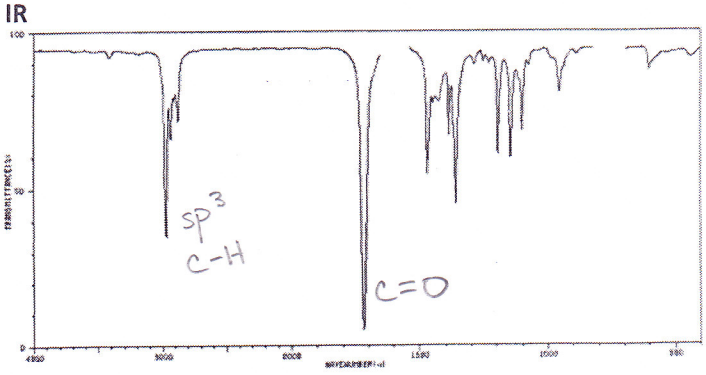


C9 cis alkene

NAME_____

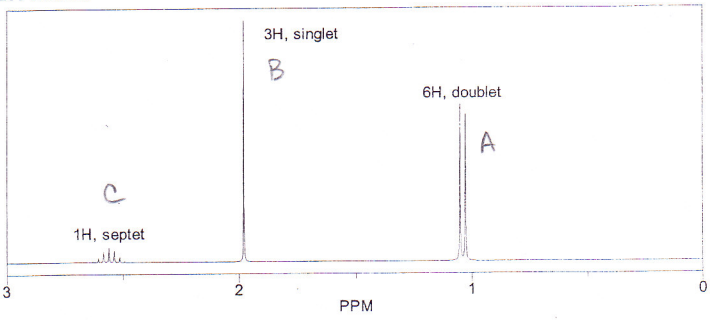
$C_5H_{10}O$ (Dous?) 1 (1 pt)

IR

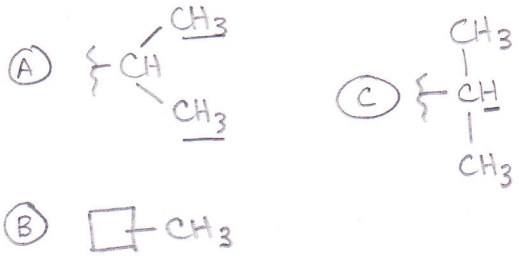


(2 pts)

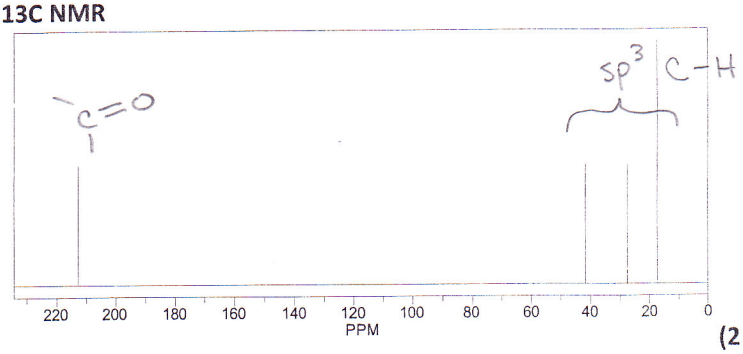
1H NMR



(2 pts)



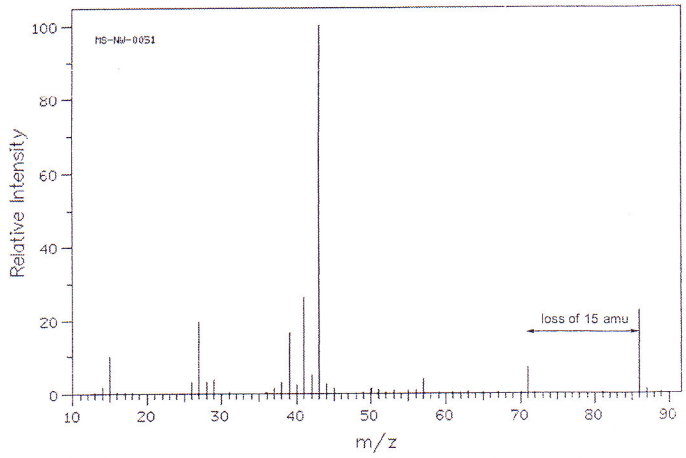
13C NMR



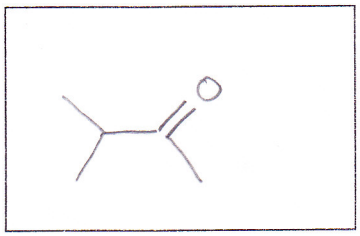
(2 pts)

need radical (+1)

Mass Spect. Draw structure of fragment lost from M corresponding to 15 mass units •CH3 (2 pts)



Structure Here



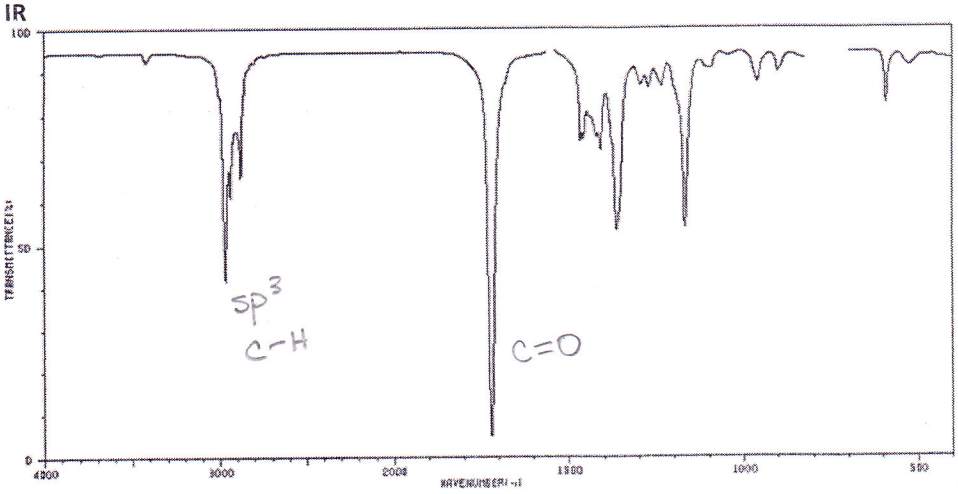
all or nothing

(3 pts)

NAME_____

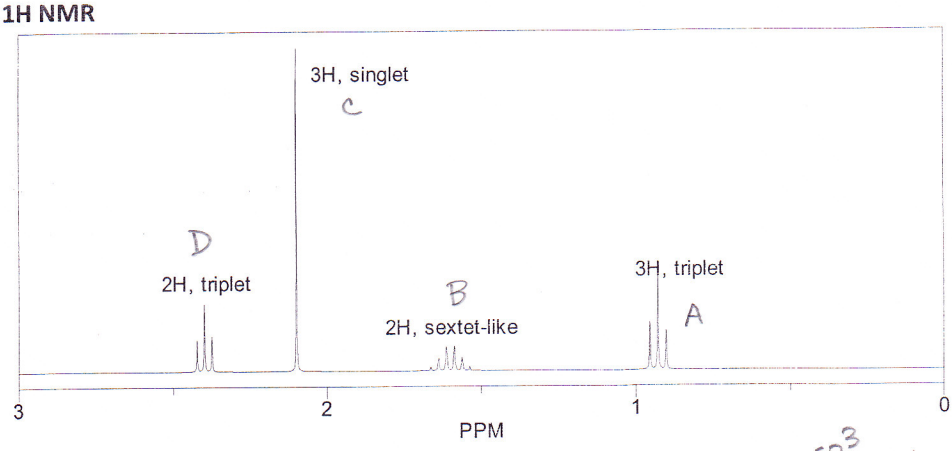
$C_5H_{10}O$ (Dous?) 1 (1 pt)

IR



(2 pts)

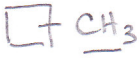
1H NMR

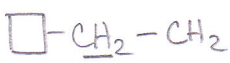
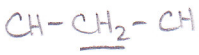


(2 pts)

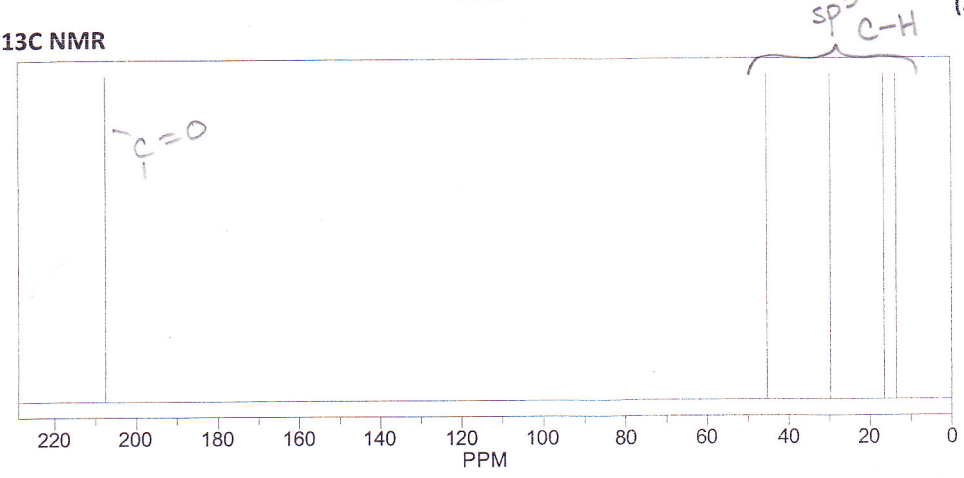
(A) CH_3-CH_2

(B) $CH_2-CH_2-CH_3$

(C) 

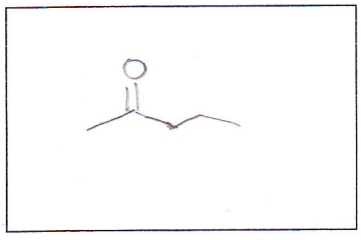
(D) 
or


13C NMR



(2 pts)

Structure Here



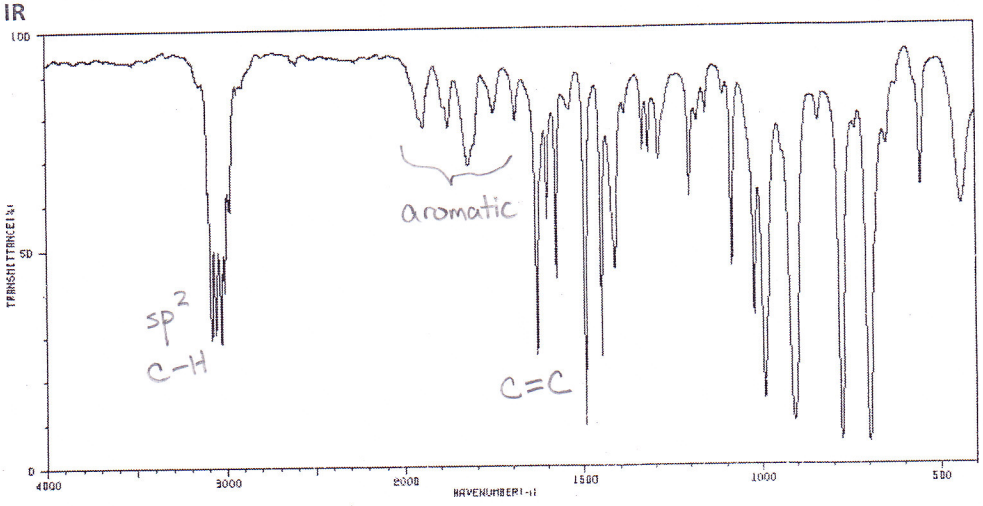
all or nothing

(3 pts)

NAME_____

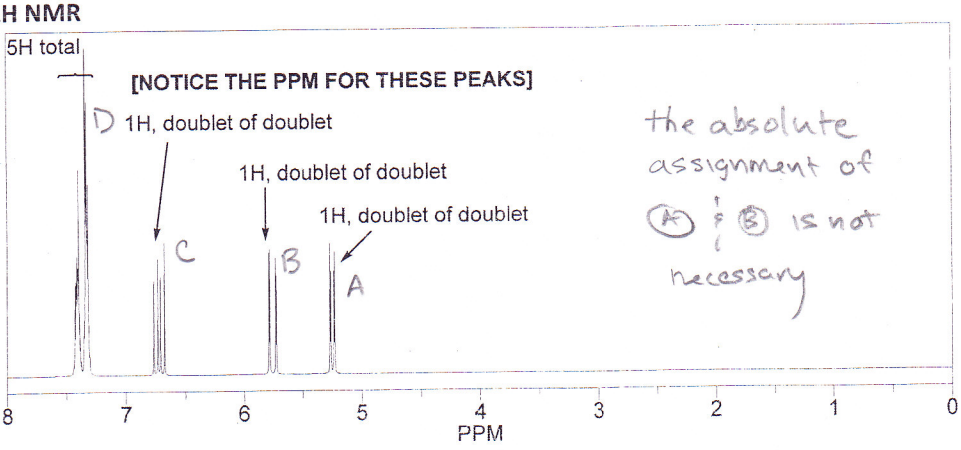
C_8H_8 5 Dous **(1 pt)**

IR

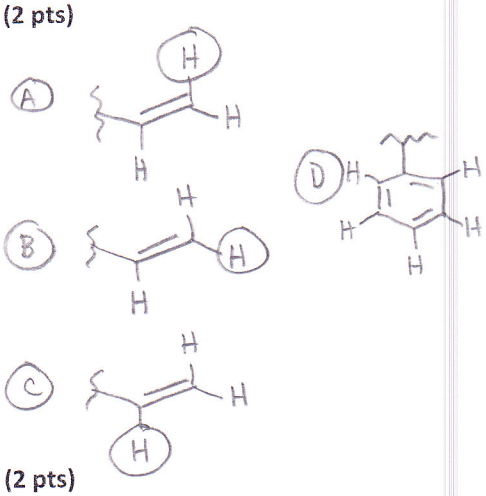


(2 pts)

1H NMR

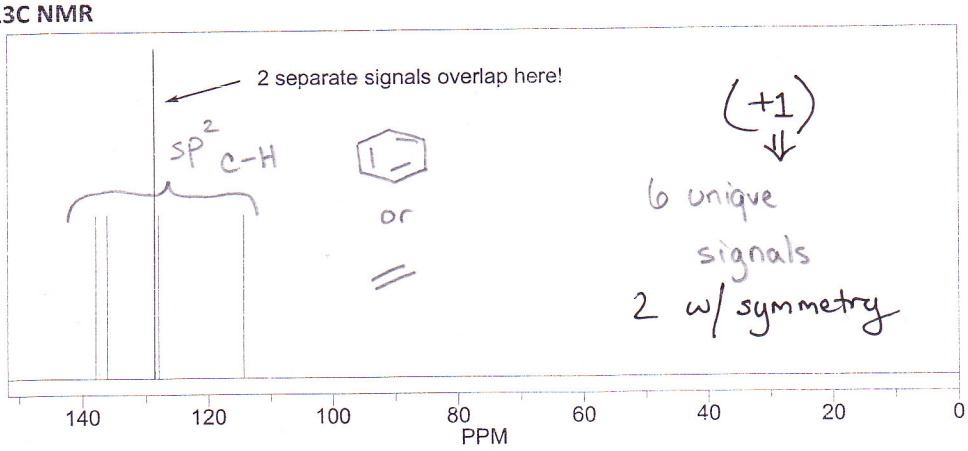


the absolute assignment of (A) & (B) is not necessary



(2 pts)

13C NMR



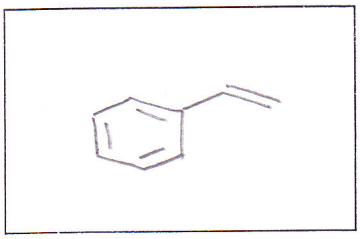
(+1)

6 unique signals

2 w/ symmetry

(2 pts)

Structure Here



- ring = +1

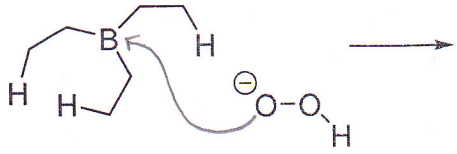
- no points for straight chain

(3 pts)

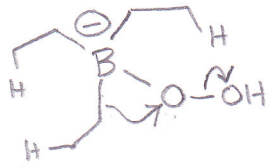
NAME_____

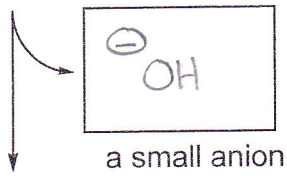
BONUS (MUST BE EXACTLY CORRECT FOR CREDIT!)
5 POINTS

Draw curved mechanism arrow
to show how the deborylation reaction begins

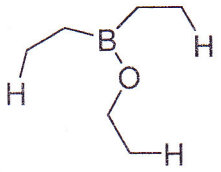


Draw anion intermediate below line





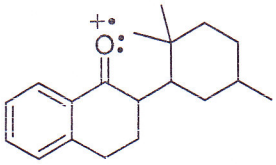
a small anion

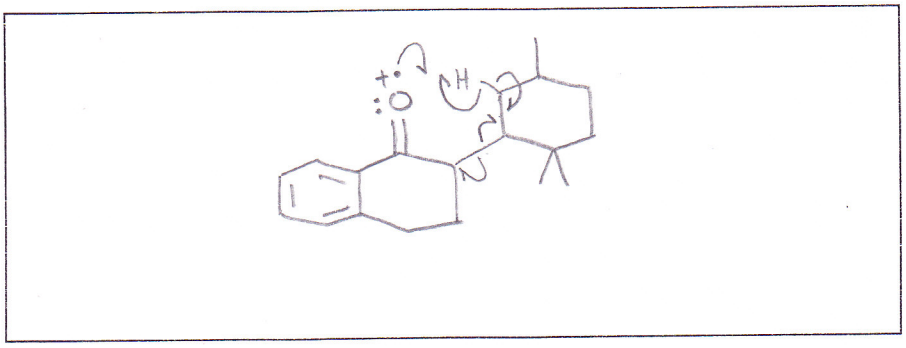


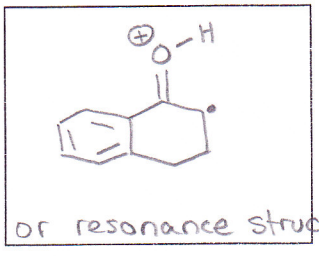
DRAW CURVED MECHANISM ARROW ON ANION INTERMEDIATE TO SHOW FORMATION OF PRODUCTS ABOVE

BONUS (SHOW THE MECHANISM AND PRODUCTS OF THE MCLAFFERTY REARRANGEMENT BELOW) 5 POINTS

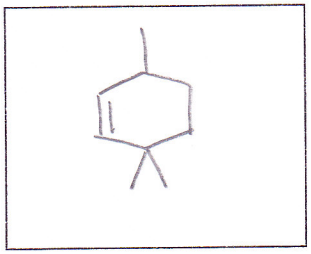
MECHANISM HERE







CHARGED FRAGMENT



NEUTRAL FRAGMENT

NAME_____