First Exam

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LAST, First

Chemistry 3332

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February 19, ~~2009~~ 2010

ID# 00000000

PLEASE CIRCLE CLASS TIME!

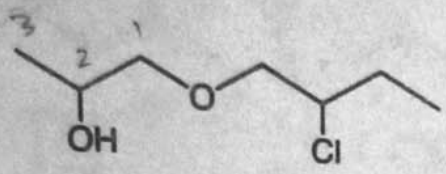
Page #	Score	-
1. 16 pt	1.	6
2. 18 pt	1.	8
3. 18 pt	1.	8
4. 12 pt	1.	2
5. 12 pt	1.	2
6. 12 pt	1.	2
7. 12 pt	1	2

Total: 100 ✓

NOTE: Present your ID when you return the exam booklet.

ive an acceptable name for each of the following compounds. Be sure to indicate the stereochemistry where appropriate.

1.



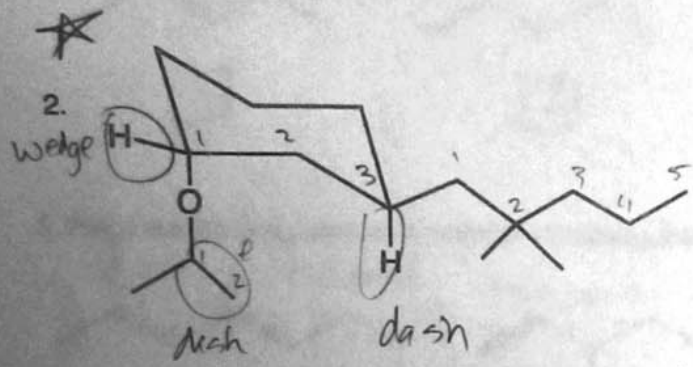
1-(2-chlorobutoxy) propan-2-ol

propan-2-ol

1-(2-chlorobutoxy)

4

2.



trans-1-(1-methylethoxy)-3-(2,2-dimethylpentyl)cyclohex

Cyclohexane

1- (1-methylethoxy)

3- (2,2, dimethylpentyl)

alphabetical

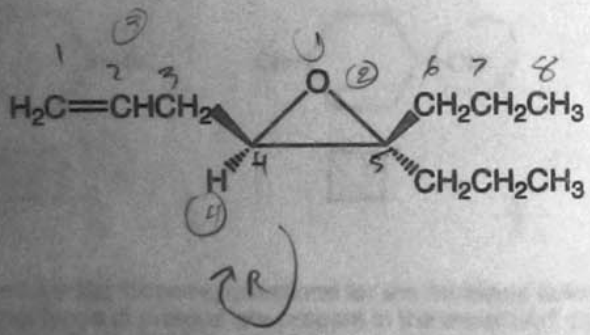
or

~~1-(2,2-dimethyl pentyl)~~

~~3-(1-methyl ethoxy)~~

4

3.



(4R)-4,5-epoxy-5-propyloct-1-ene

oct-1-ene

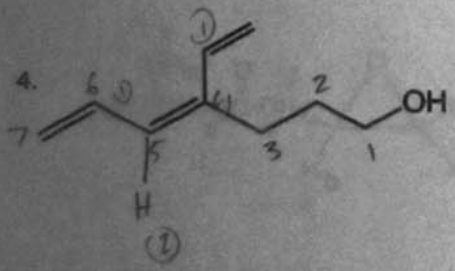
4,5-epoxy

(R vs E)

5-propyl

4

4.



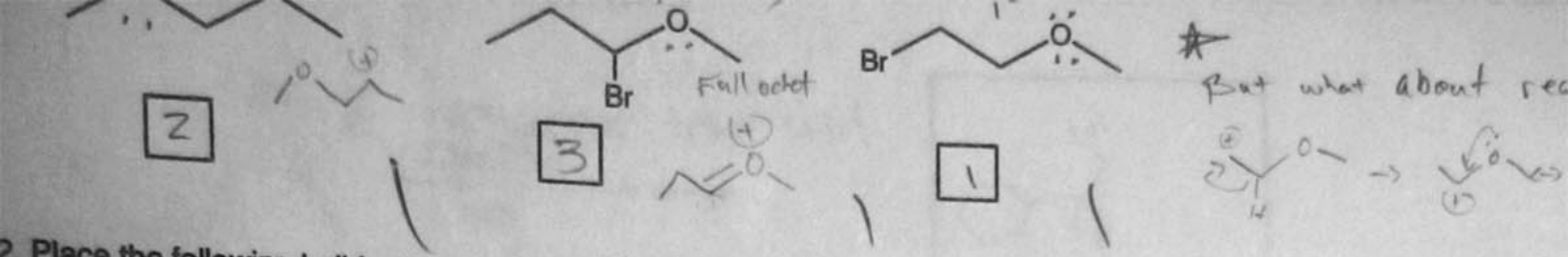
(4Z)-4-ethenylhepta-4,6-dien-1-ol

hepta-4,6-dien-1-ol

4-ethenyl

4

16

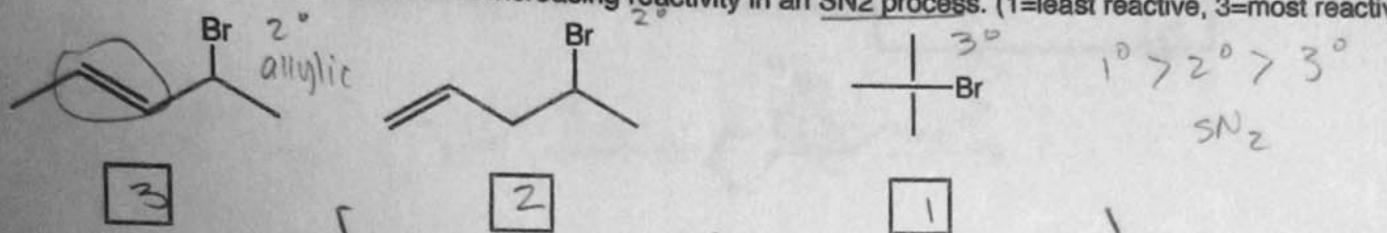


2

3

1

2. Place the following halides in order of increasing reactivity in an SN2 process. (1=least reactive, 3=most reactive) (3 pts.)

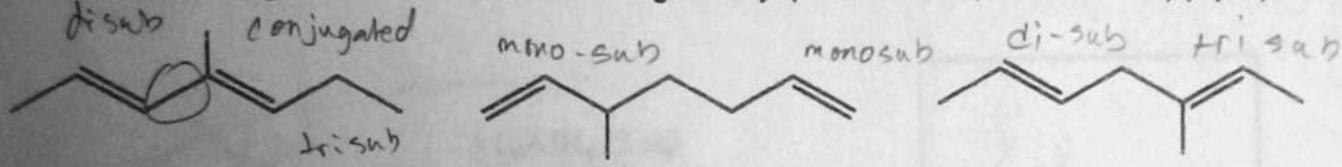


3

2

1

3. Place the following alkenes in order of increasing stability. (1=least stable, 3=most stable) (3 pts.)

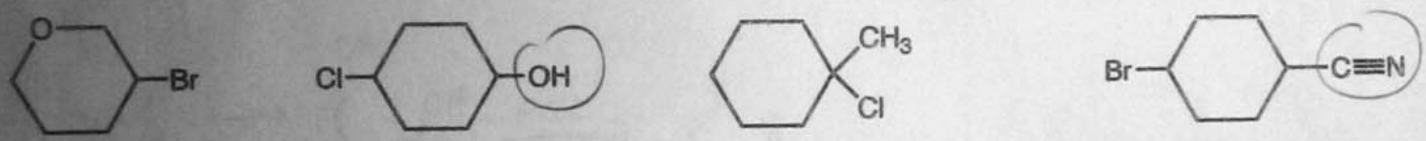


3

1

2

4. Place a Y in the box below any halide that will form a useful Grignard reagent and an N below any that will not. (4 pts.)



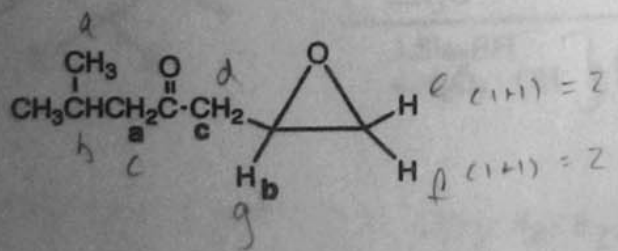
Y

N

Y

N

5. Answer the following questions for the molecule below and place the answers in the appropriate boxes. (i) How many distinct types of protons are present in the molecule? (ii) How many distinct carbons are present? (iii) and (iv)What are the theoretically predicited multiplicities (splitting patterns) of the signals for protons a and b? (v) What is the multiplicity of the signal for carbon c in the proton-coupled ^{13}C NMR? (5 pts.)



(1+1)

(i) # of proton types 7

(ii) # of carbon types 7

(iii) multiplicity of Ha 2

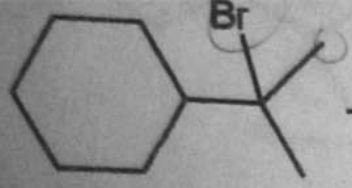
(iv) multiplicity of Hb 12

(v) multiplicity of Cc 3

(1+1)(1+1)(2+1)

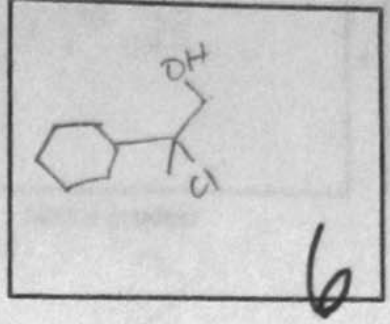
(2)(2)(3)

4 × 3 = 12

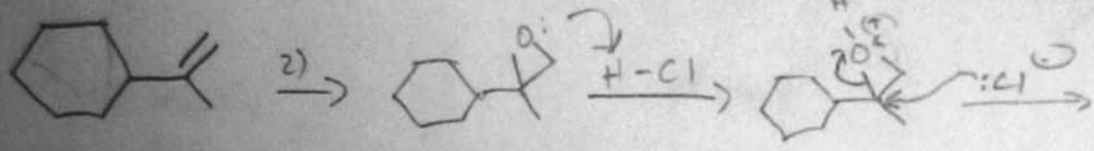
1. 

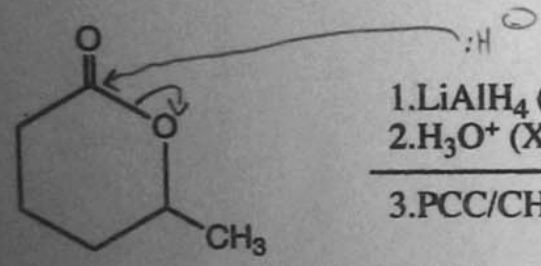
1. $(CH_3)_3CO^-K^+$ least sub!
2. MCPBA
3. HCl

Note: MCPBA = m-chloroperbenzoic acid



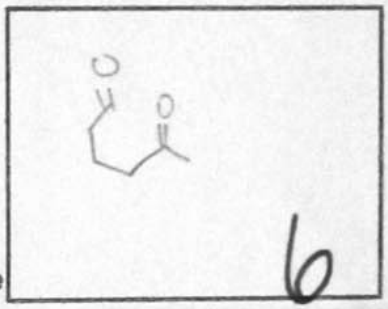
6



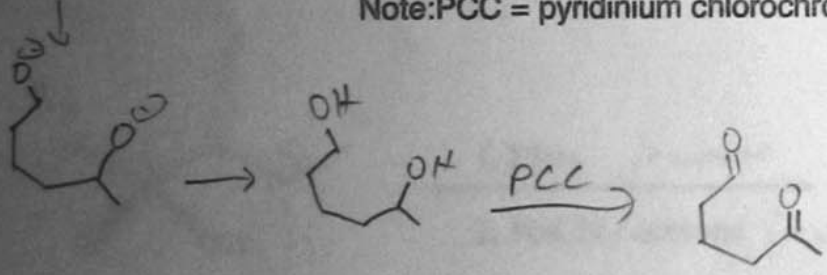
2. 

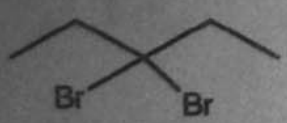
1. $LiAlH_4$ (2 eq)
2. H_3O^+ (XS)
3. PCC/CH_2Cl_2 aldehyde + ketone

Note: PCC = pyridinium chlorochromate



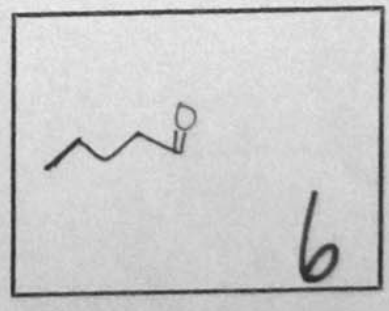
6



3. 

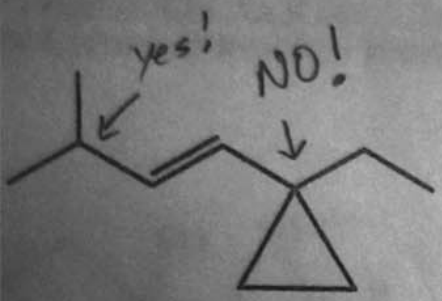
1. $NaNH_2$ / 150°C
2. H_3O^+
3. Sia_2BH
4. H_2O_2 / OH^-

} Aldehyde

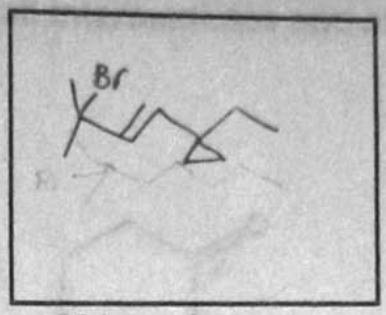


6

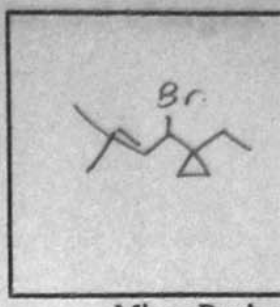
$CH_3CH_2CH_2C{\equiv}CH \rightarrow CH_3CH_2CH_2CH_2-\overset{O}{\overset{\|}{C}}-H$



Kinetic control
NBS /Light/ 0°C
most stable TS



+



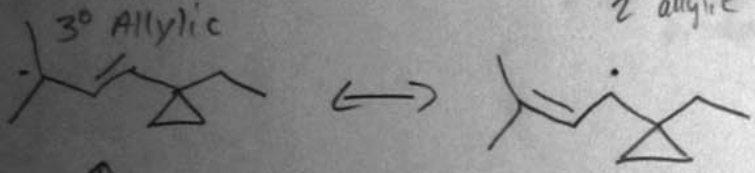
Note: NBS = N-bromosuccinimide

Major product

Minor Produc

3

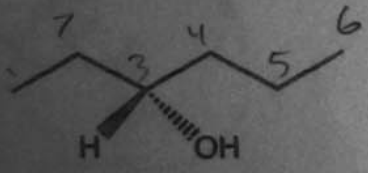
3



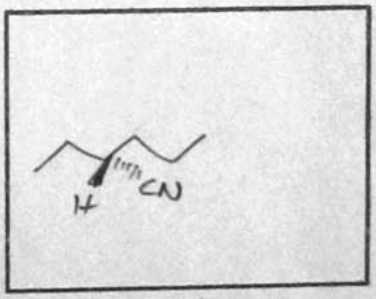
↑ more stable TS

↑ more stable final product (trisub)

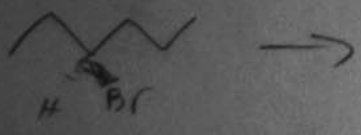
5.

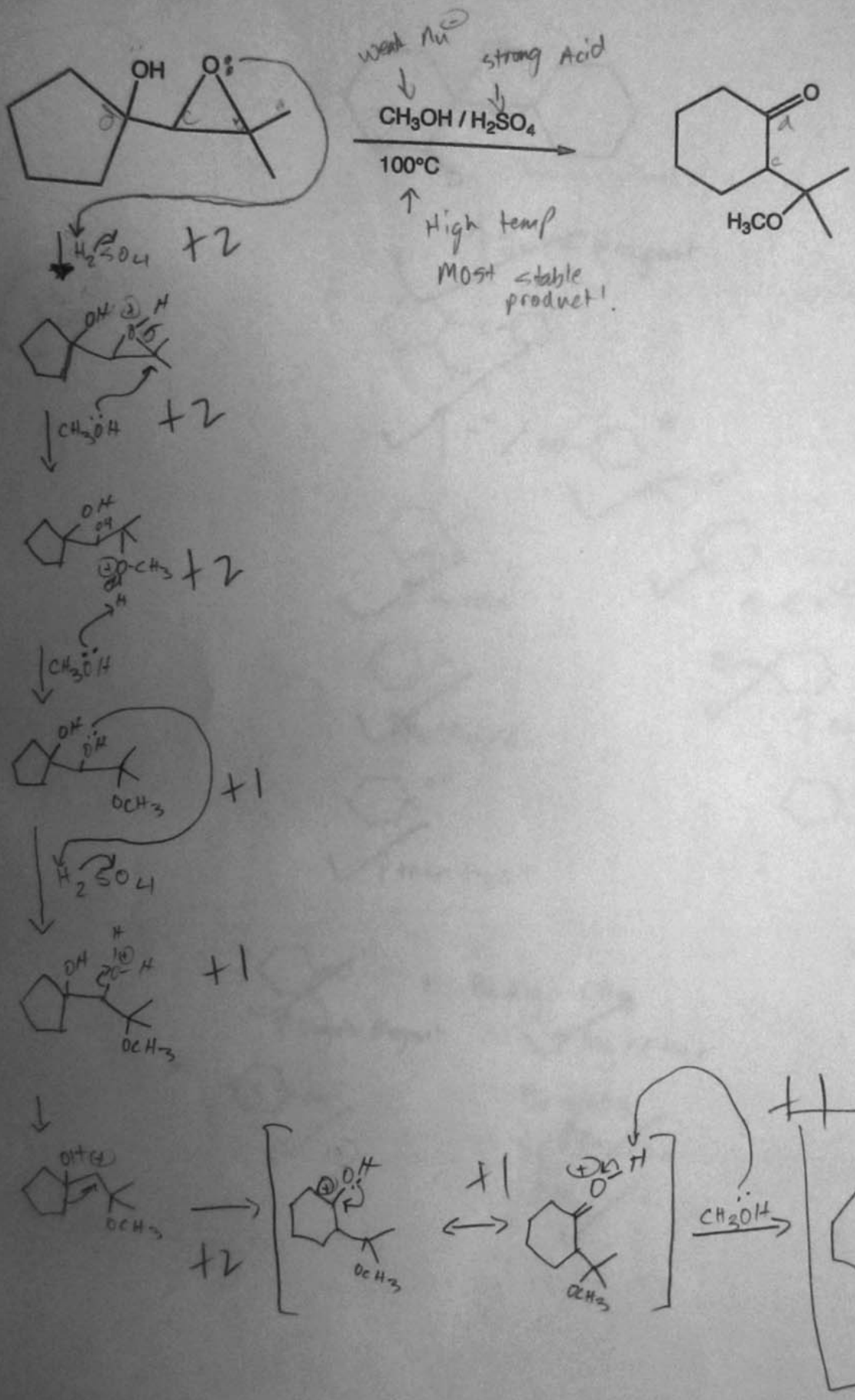


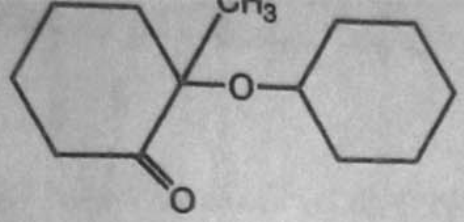
1. PBr_3 inversion
2. NaCN / acetone inversion



6

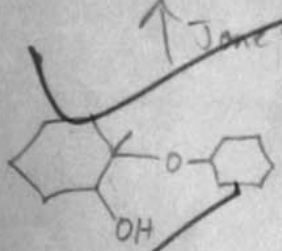



OH
O
weak Nu⊖
strong Acid
CH3OH / H2SO4
100°C
High temp
Most stable product!
H3CO
H2SO4
+2
CH3OH
+2
+2
+1
H2SO4
+1
+2
+1
OCH3



(12)

Jones Reagent



H^+ / HO

H_3O^+

MCPBA

$\ominus O$

H_2SO_4/Δ

$Br_2/h\nu$

then H_3O^+

+ $BrMg-CH_3$

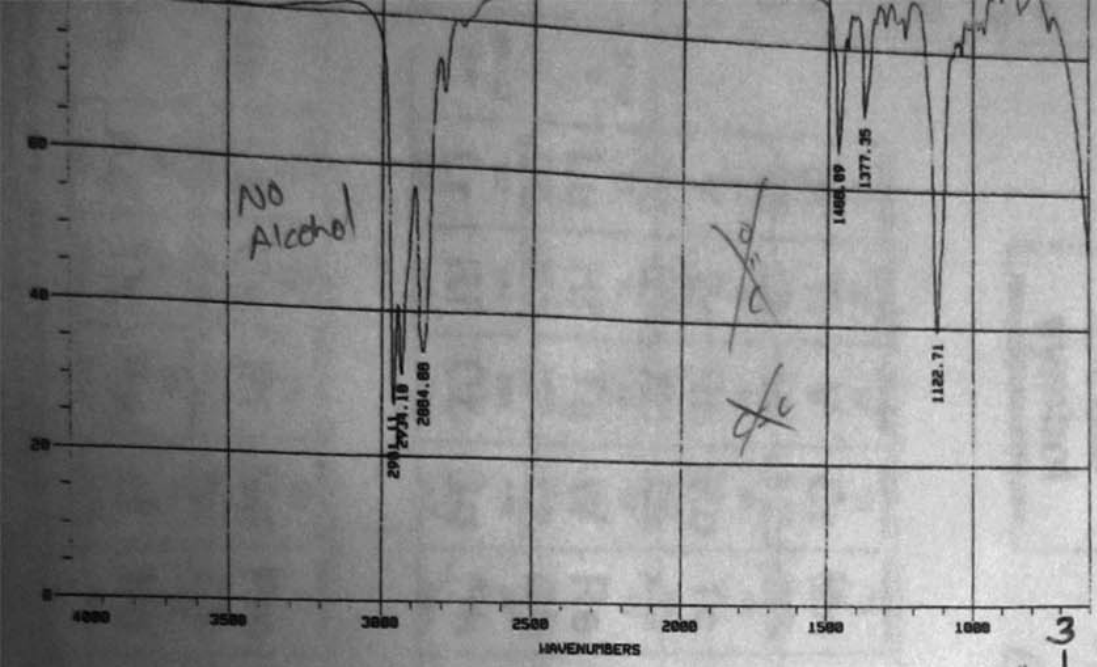
Jones Reagent

Mg / Ether

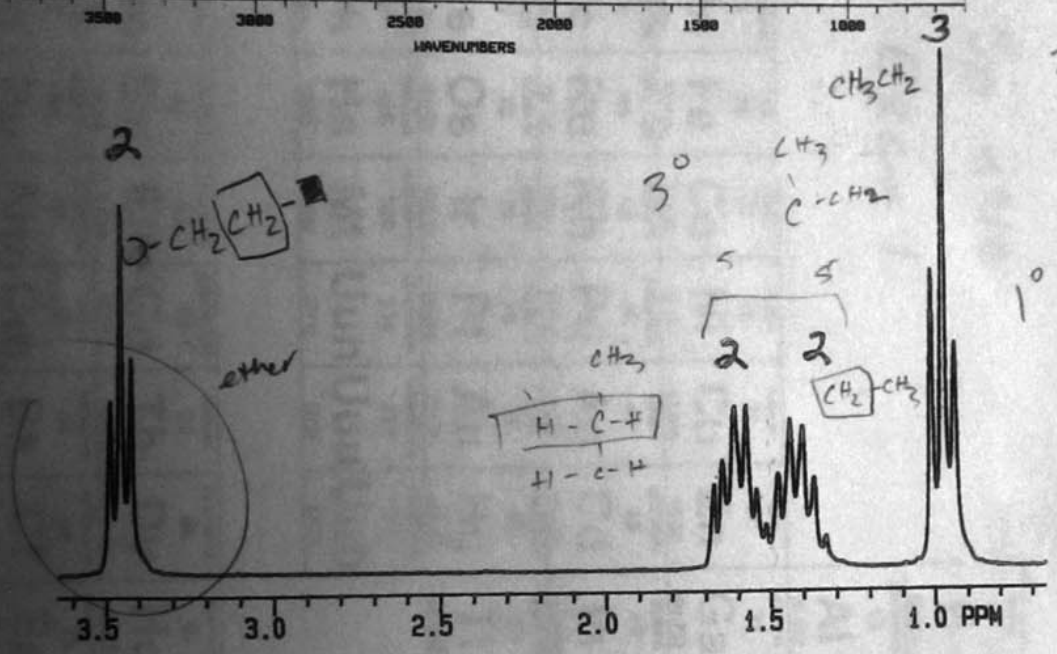
$Br-CH_3$

$Br_2/h\nu$

CH_4

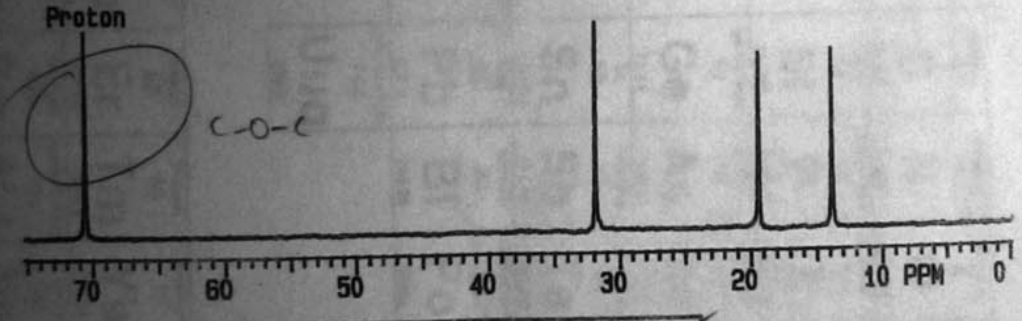


$\frac{16+2-18}{2} = 0$

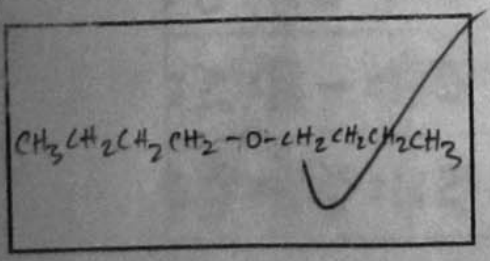


2:2:2:3 = 9

4:4:4:6



Carbon 13



$O-CH_2CH_2-CH_2CH_3$

12