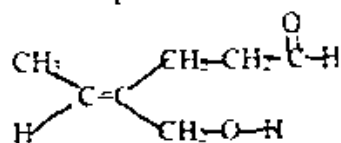


Sign Name \_\_\_\_\_ Print Name \_\_\_\_\_

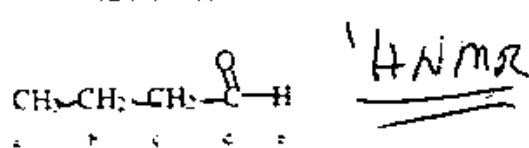
(This worksheet is for your own study only & has no points associated with turning in the completed sheet.)

1. Given the following molecule, find at least 2 IR peaks expected. You should use the IR chart to come up with these numbers.

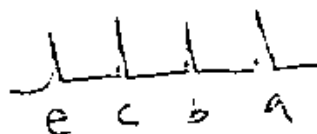


$C=O$  1730  $C=O$  of aldehyde  
 $C=C$  1640-1680 from  
 $O-H$  3400-3650 Chart p. 439  
 in book.

2. Given the following molecule, assign proton NMR spectra by (a) giving an approximate relative chemical shift for all non equivalent protons (I am not looking for actual NMR ppm numerical values but just relative chemical shifts.) (b) integrated peak areas (c) coupling information using the equation  $(2nI + 1)$ . Please show all work using the labels which I already wrote for the individual protons



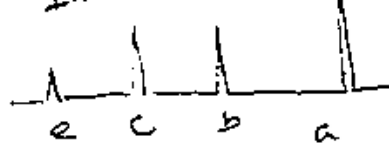
(a) Chemical shift ( $\delta$ )



(b) approximate integrated peak area

ratio:

1H : 2H : 2H : 3H



(c) coupling

(e)  $\rightarrow n=2, 2(2)\frac{1}{2} + 1 = 3$

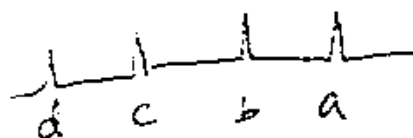
(c)  $\rightarrow n=3, 2(3)\frac{1}{2} + 1 = 4$

(b)  $\rightarrow n=5, 2(5)\frac{1}{2} + 1 = 6$

(a)  $\rightarrow n=2, 2(2)\frac{1}{2} + 1 = 3$

$^{13}C$  NMR

(a) f



(b) peak areas are inaccurate because of NOE - but with correct pulse sequence  $\sim 1:1:1:1$

(c) Couples to  $^1H$

(d)  $n=1H \rightarrow 2(1)\frac{1}{2} + 1 = 2$

(c)  $n=2H \rightarrow 2(2)\frac{1}{2} + 1 = 3$

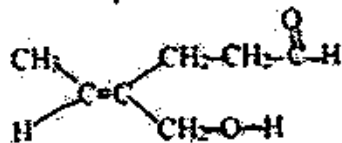
(b)  $n=2H \rightarrow 2(2)\frac{1}{2} + 1 = 3$

(a)  $n=3H \rightarrow 2(3)\frac{1}{2} + 1 = 4$

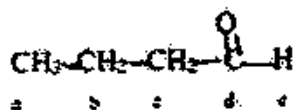
Sign Name \_\_\_\_\_ Print Name \_\_\_\_\_

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(a) Chemical shift

(b) approximate integrated peak area

(c) coupling