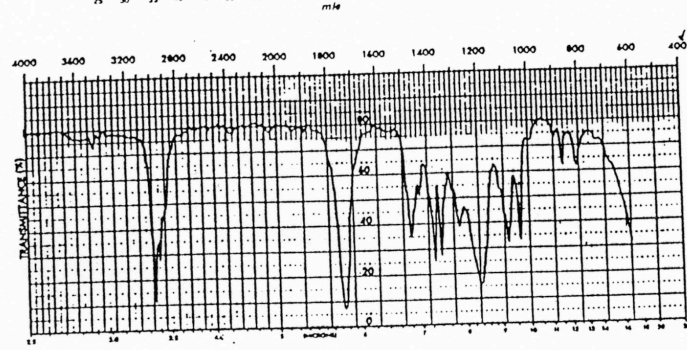
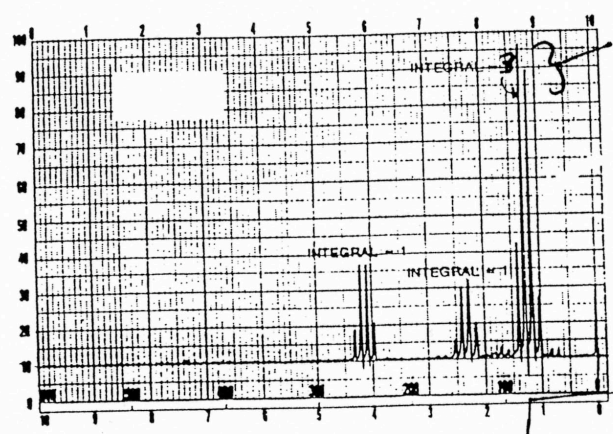


even mass  $\Rightarrow$  No Nitrogen  
 $M^+ : m/z = 102$  (19%)  
 $M+1 : m/z = 103$  (1.1%)  
 $\# \text{ of C} = \frac{.011}{(.19)(.011)} = 5$

IR  $1730 \text{ cm}^{-1} = \text{C=O}$   
 $^{13}\text{C NMR } \delta = 175 = \text{ester}$  }  $\text{O}_2$

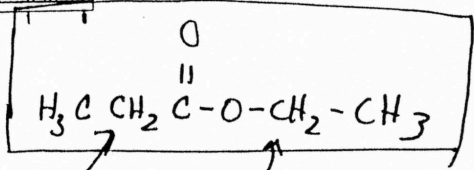


Formula  $\text{C}_5\text{H}_{10}\text{O}_2 \Rightarrow \text{H}_{10}$   
 $\text{C}_5\text{H}_{10}\text{O}_2 \Rightarrow$  1 degree of unsaturation (ester)



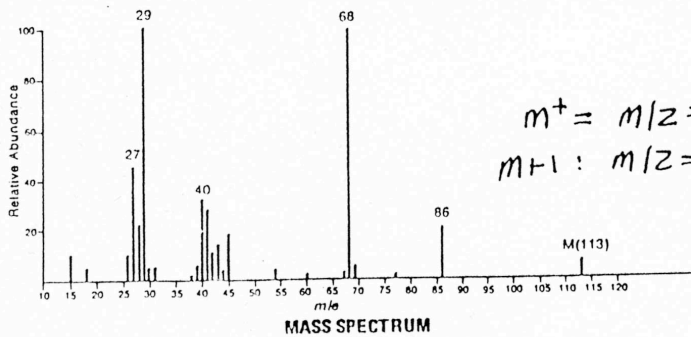
2 overlapping triplets  
 $^1\text{H NMR}$ :  
 $\delta = 4.1$  2 2H }  $-\text{CH}_2-\text{CH}_3$   
 $1.3$  2 2H }  $-\text{CH}_2-\text{CH}_3$   
 $1.3$  6 3H }  
 $1.2$  6 3H }

$^{13}\text{C NMR}$ : 174, 60, 28, 16, 12 PPM

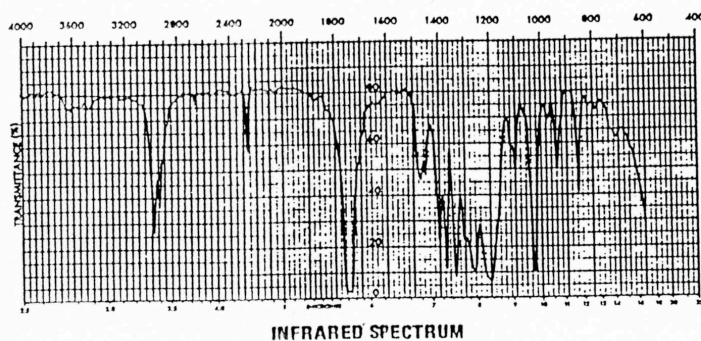


.23 C  
 1.55  $-\text{O}-\text{C}$   
 .47  $-\text{CH}_3$   
 -----  
 2.25 calc'd  
 2.30 observed

.23 C  
 3.13  $-\text{O}-\text{C}$   
 .47  $-\text{CH}_3$   
 -----  
 3.83 calc'd  
 4.10 observed



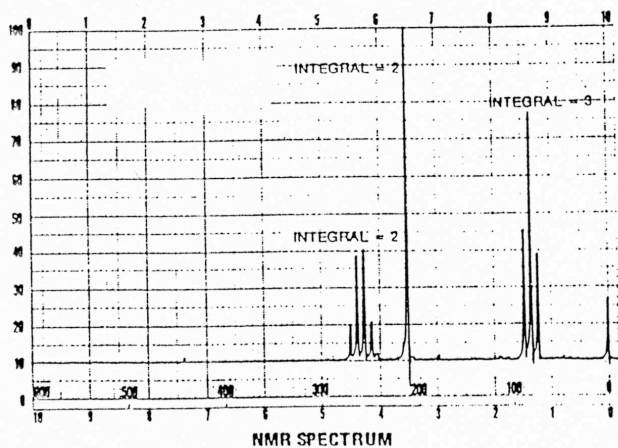
$m^+ = m/z = 113$  (10%) odd mass  $\Rightarrow N_1$   
 $m+1 : m/z = 114$  (0.55%)  
 # of C's  $\frac{0.0055}{(0.10)(0.11)} = C_5$



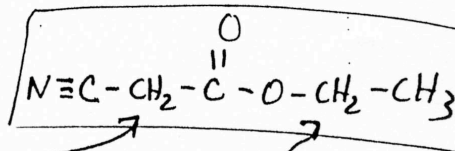
IR:  $1725\text{ cm}^{-1}$  } ester or amide  
 $^{13}\text{C NMR}: \delta = 165$  } (1 degree of unsat)  
 IR:  $2250\text{ cm}^{-1}$  }  
 $\text{C}\equiv\text{N}$  or  $\text{C}\equiv\text{C}$  } 2 degrees of unsaturation

$C_5NO_2 \Rightarrow H_7$

$C_5H_7NO_2 = 3$  degrees of unsaturation

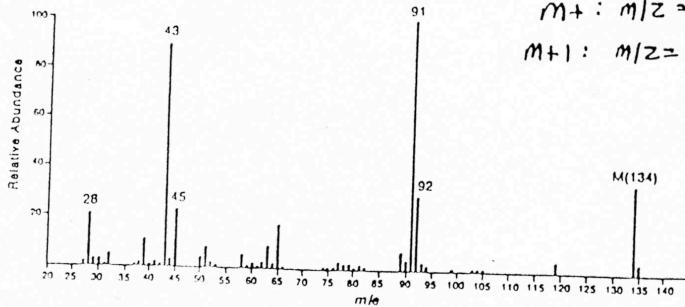


$^1\text{H NMR}:$   
 $\delta = 4.2, q, 2H$  -  $\boxed{\text{CH}_2}$ - $\text{CH}_3$   
 $3.6, s, 2H$  -  $\text{CH}_2$ -  
 $1.20, t, 3H$  -  $\text{CH}_2$ - $\boxed{\text{CH}_3}$



$^{13}\text{C}: 165, 115, 64, 24, 16$  PPM

.23	0	.23	0
1.55	$\text{N}\equiv\text{C}$	3.13	$-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}$
1.70	$-\text{C}\equiv\text{N}$	.47	$-\text{CH}_3$
<u>3.40</u>	calc'd	<u>3.93</u>	calc'd
3.60	observed	4.20	observed

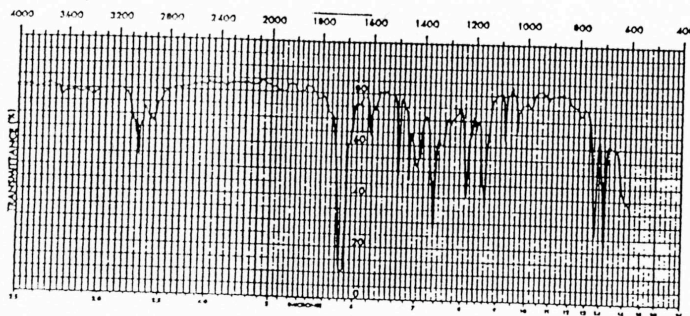


$m+ : m/z = 134 (38\%)$  even mass  $\Rightarrow N_0$   
 $m+1 : m/z = 135 (3.8\%)$

$$\# \text{ of C's} = \frac{0.38}{(0.38)(0.11)} = 9$$

IR:  $1710 \text{ cm}^{-1}$  C=O

$^{13}\text{C NMR } \delta = 215$  ketone or aldehyde



$\text{C}_9\text{O} \Rightarrow \text{H}_{10}$

$\text{C}_9\text{H}_{10}\text{O} \Rightarrow 5$  degrees of unsaturation

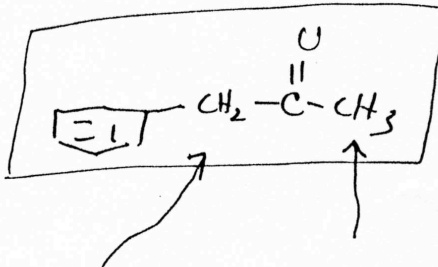
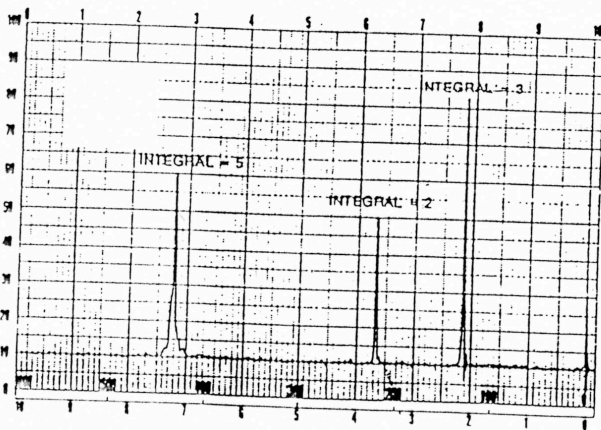
$^1\text{H NMR}$

$\delta = 7.5, 5\text{H} = \boxed{=1}$

4 degrees of unsaturation

$= 3.7 \text{ 1H s } \text{O}-\text{CH}_2-$

$= 2.1 \text{ 3H s } \text{C}=\text{CH}_3$



$^{13}\text{C NMR}: 215, 135, 130, 128, 124, 52, 28 \text{ ppm}$

0.23		0.23
1.95	$\boxed{=1}$	1.70 $\overset{\text{O}}{\parallel}{\text{C}}$
1.70	$\overset{\text{O}}{\parallel}{\text{C}}$	1.93 calcd
<u>3.78</u>	calcd	2.10 observed
3.70	observed	