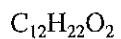


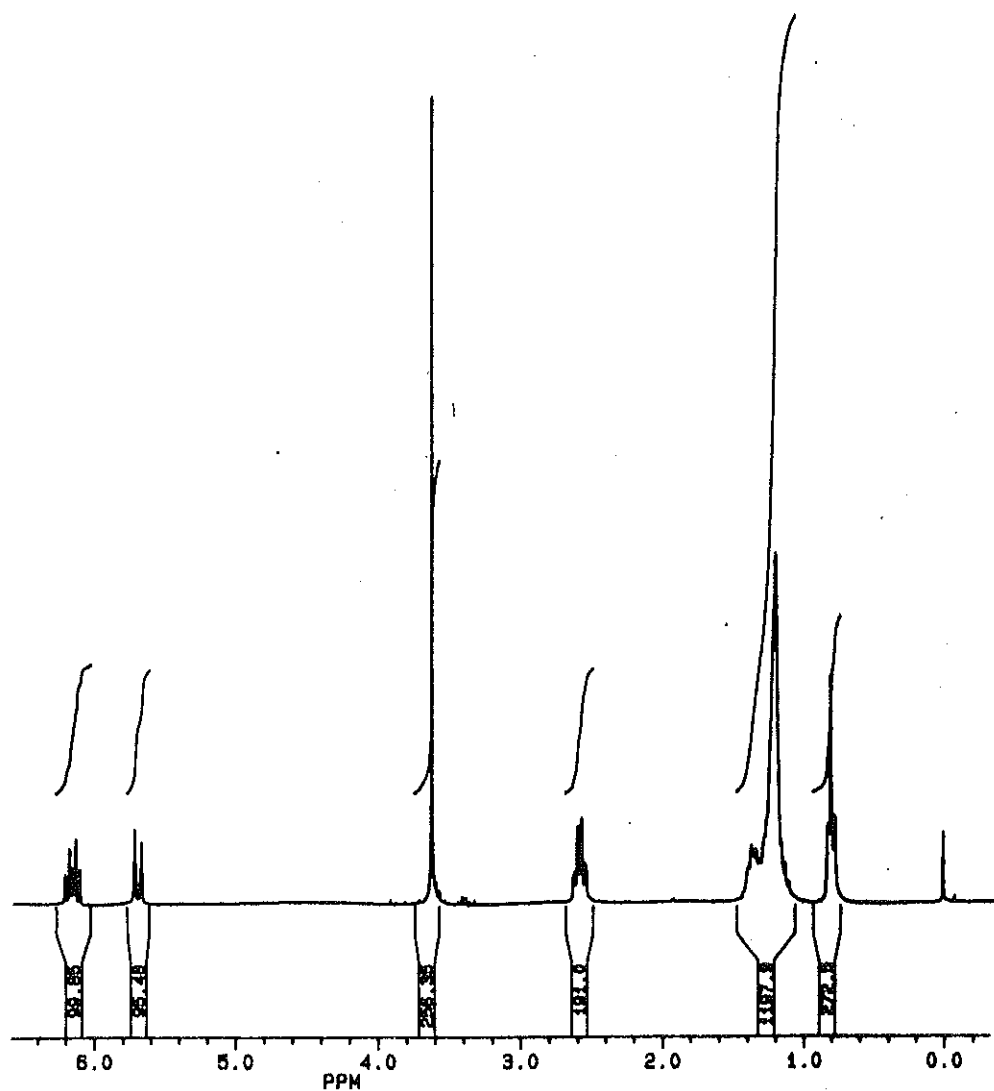
PROBLEM 14.1

IR: 2926, 2856, 1728, 1645, 1436, 1197, 1175, 819 cm^{-1} MS: 198 (M^+ , 2), 167 (7), 124 (9), 113 (100), 100 (33), 87 (47), 74 (43) ^{13}C NMR

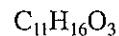
166.5, s	29.0, t
150.7, d	28.9, t
119.0, d	28.8, t
50.6, q	22.5, t
31.7, t	13.9, q
29.3, t	
29.1, t	

 1H NMR

6.14, dt, 1H, $J = 7.5, 11.5$ Hz
5.68, d, 1H, $J = 11.5$ Hz
3.61, s, 3H
2.57, dq, 2H, $J = 1.4, 7.4$ Hz
1.35, m, 2H
1.18, m, 10H
0.80, m, 3H



PROBLEM 14.2

IR (film) 2982, 1732, 1377, 1183, 1023 cm^{-1} MS: 196 (M^+ , 2), 150 (20), 122 (35), 108 (36), 107 (28), 104 (36), 81 (100) ^{13}C NMR

193.8, d

173.0, s

146.3, d

142.1, d

132.0, d

127.5, d

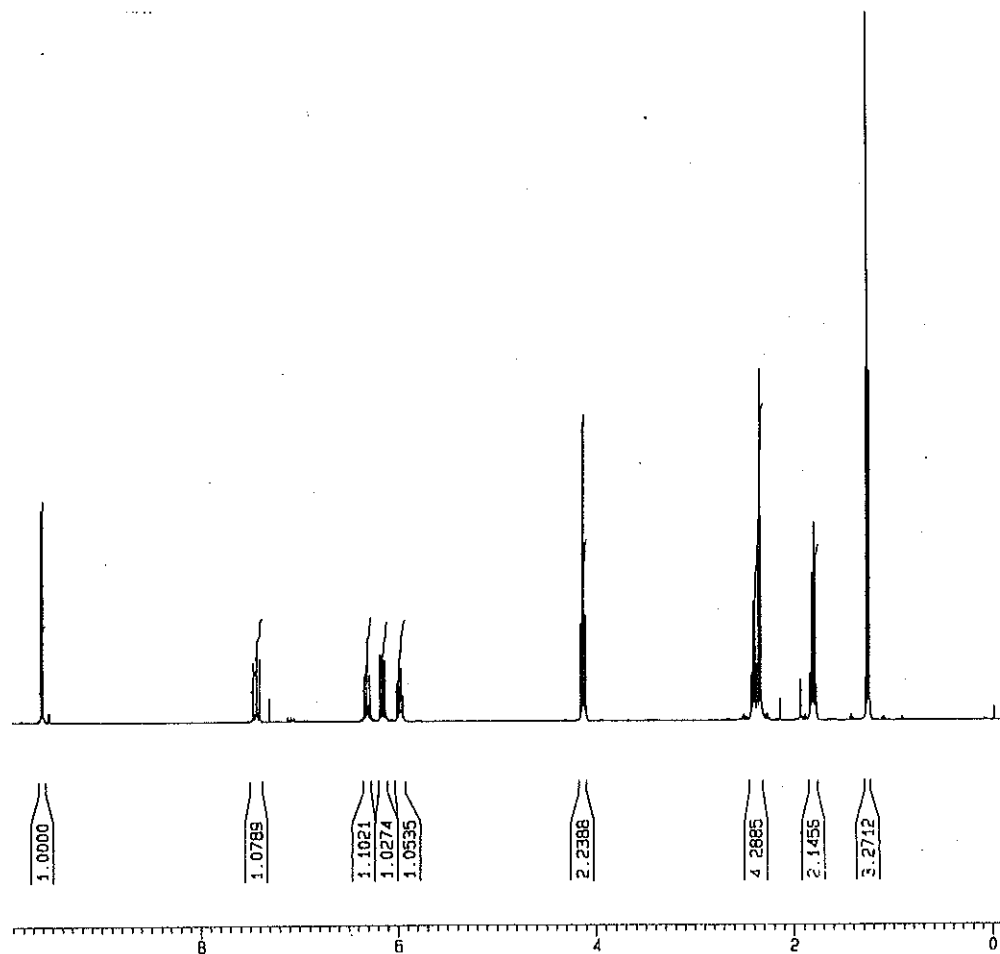
60.3, t

33.3, t

27.5, t

24.2, t

14.1, q

 1H NMR9.61, d, 1H, $J = 7.9$ Hz7.44, ddd, 1H, $J = 0.9, 11.1,$ and 15.2 Hz6.32, t, 1H, $J = 11.1$ Hz6.16, dd, 1H, $J = 7.9$ and 15.2 Hz5.99, dt, 1H, $J = 7.9$ and 11.1 Hz)4.14, q, 2H, $J = 7.1$ Hz2.41, q, 2H, $J = 7.9$ Hz2.36, t, 2H, $J = 7.3$ Hz1.81, quint, 2H, $J = 7.3$ Hz1.26, t, 3H, $J = 7.1$ Hz

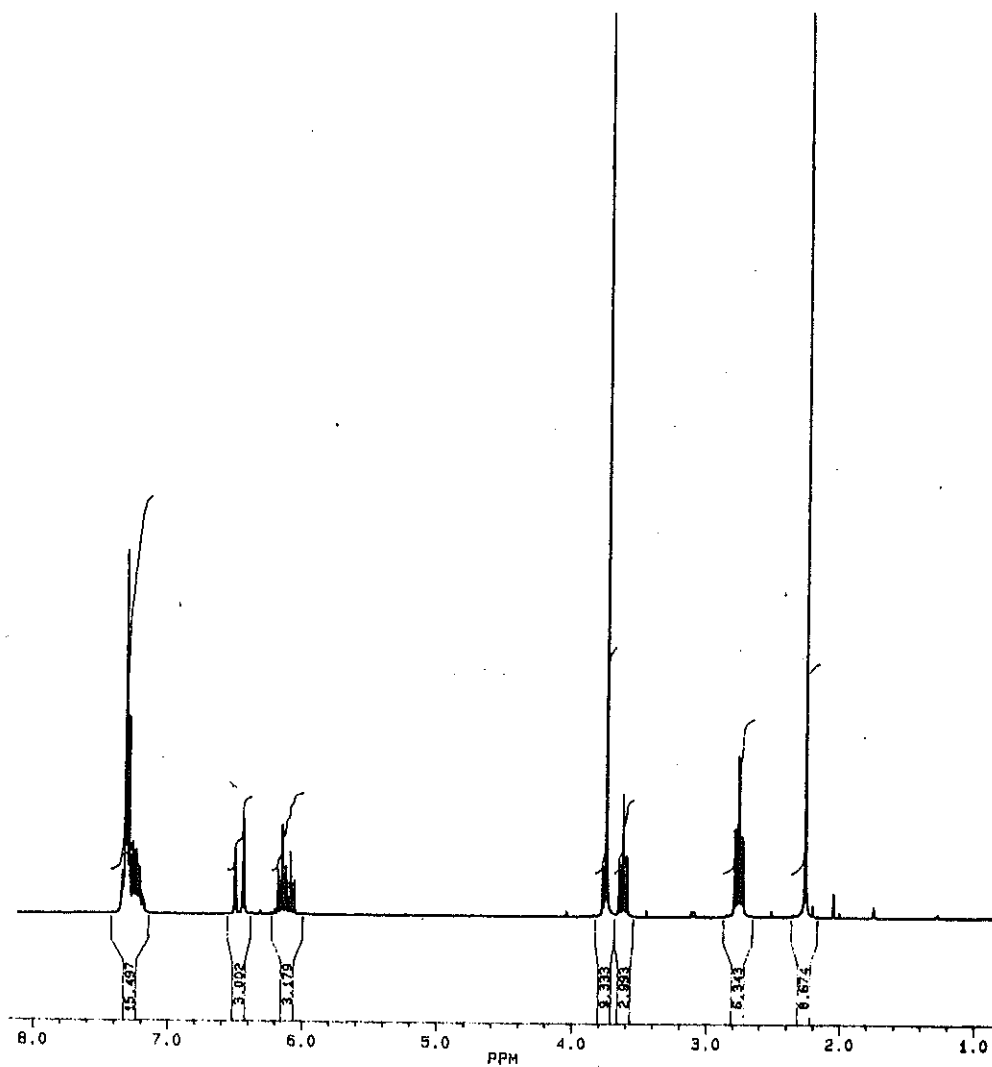
PROBLEM 14.3

 $C_{14}H_{16}O_3$ IR: 2926, 2855, 1743, 1718, 1644, 1466, 1358, 1242, 1151, 1120 cm^{-1} MS: 232 (M^+ , 34), 190 (26), 189 (51), 168 (33), 156 (100), 131 (54), 130 (39), 119 (69), 116 (56), 104 (18), 91 (88), 77 (18) ^{13}C NMR

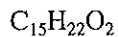
202.1, s	57.3, q
169.6, s	52.3, d
136.9, s	31.5, t
132.7, d	29.2, q
128.4, d (2)	
127.3, d	
126.1, d (2)	
125.6, d	

 1H NMR

7.31, m, 5H
6.46, d, 1H, $J = 15.8$ Hz
6.12, dt, 1H, $J = 7.1, 15.8$ Hz
3.74, s, 3H
3.62, t, 1H, $J = 7.4$ Hz
2.76, t, 2H, $J = 7.3$ Hz
2.26, s, 3H



PROBLEM 14.4

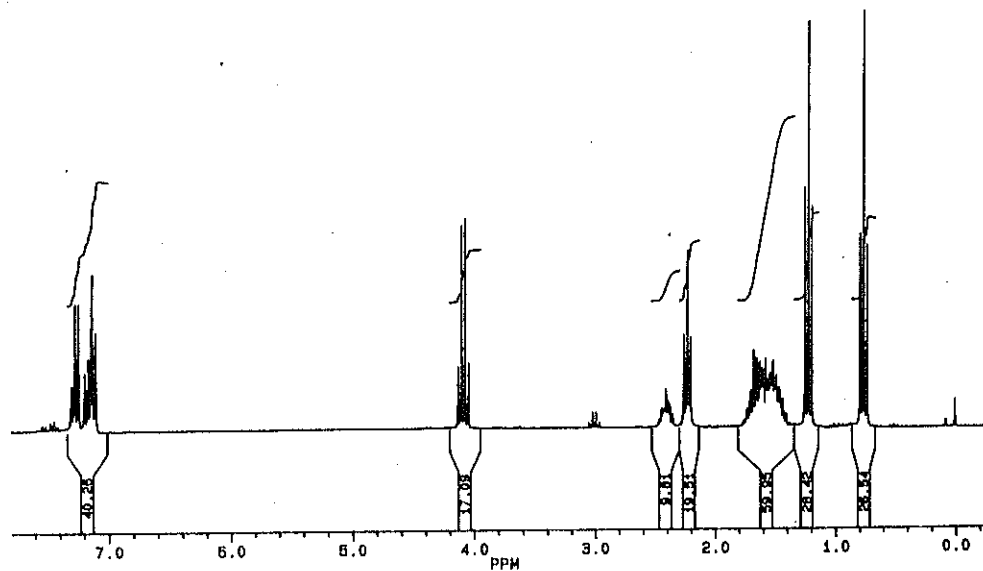

 IR: 2931, 1733, 1692, 1452, 1373, 1155, 1036, 757 cm^{-1}

 MS: 234 (M^+ , 10), 206 (63), 188 (30), 156 (26), 131 (21), 117 (100)
 ^{13}C NMR

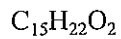
173.6, s	35.8, t
145.3, s	34.4, t
128.2, d (2)	29.6, t
127.7, d	23.1, t
125.9, d (2)	14.2, q
60.1, t	12.1, q
47.6, d	

 ^1H NMR

7.2, m, 5H
4.09, 2H, q, $J = 7.1$ Hz
2.40, 1H, m
2.22, 2H, t, $J = 7.5$ Hz
1.60, 6H, m
1.21, 3H, t, $J = 7.1$ Hz
0.76, 3H, t, $J = 7.4$ Hz



PROBLEM 14.5



IR : 2931, 2872, 1713, 1455, 1414, 1367, 1102, 738, 697 cm^{-1}

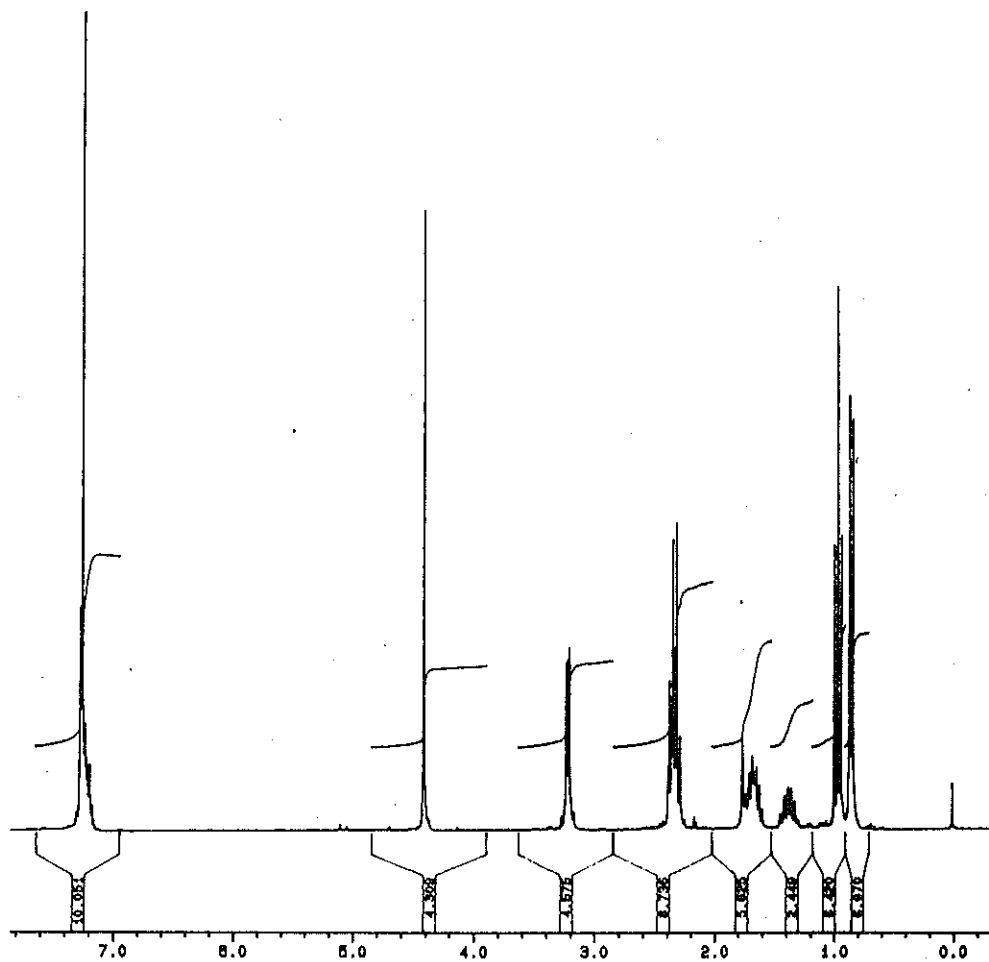
MS: 234 (0.28), 143 (28), 128 (24), 127 (26), 107 (24), 99 (23), 97 (12), 91 (100),

 ^{13}C NMR

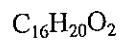
212.1, s	36.1, t
138.5, s	32.1, d
129.2, d (2)	27.5, t
128.2, d	15.5, q
127.5, d (2)	9.5, q
75.7, t	
72.8, t	
39.0, t	

 ^1H NMR

7.30, 5H, m
4.49, 2H, s
3.29, 2H, dd, $J = 1.8, 6.0$ Hz
2.38, 4H, m
1.74, 2H, m
1.42, 1H, m
0.98, 3H, t, $J = 7.3$ Hz
0.93, 3H, d, $J = 6.6$ Hz



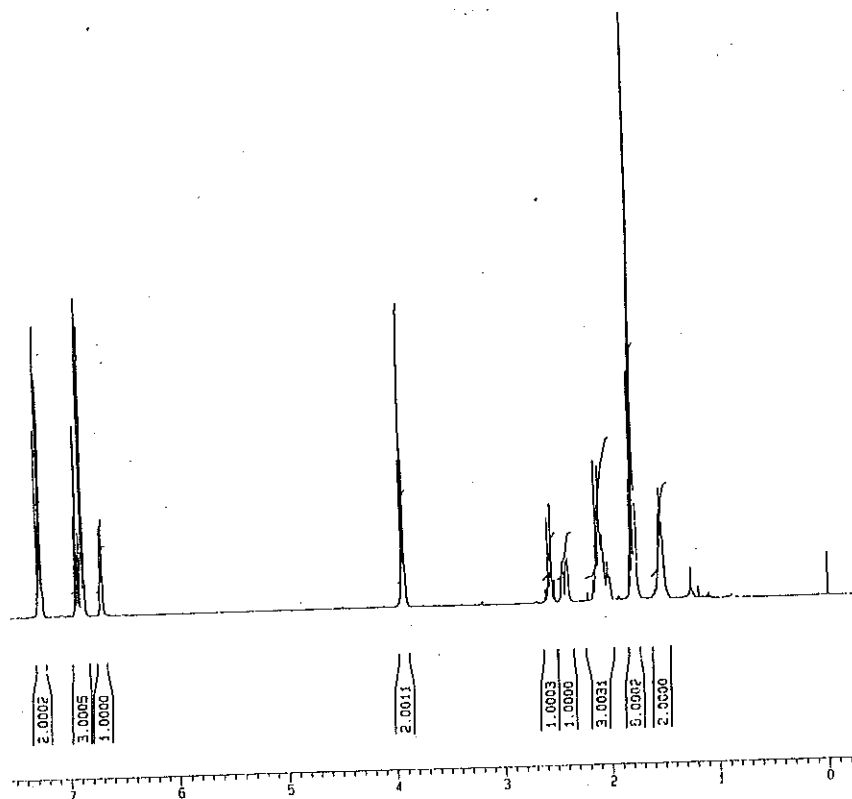
PROBLEM 14.6

IR: 2922, 1673, 1245, 755, 692 cm^{-1} MS: 244 (M^+ , 43), 151 (42), 121 (16), 109 (100) ^{13}C NMR

199.8, s	32.3, t
158.7, s	32.1, t
144.6, d	26.2, t
135.4, s	15.6, q
129.3, d (2)	
120.5, d	
114.2, d (2)	
67.4, t	
44.4, t	
35.3, d	

 1H NMR

7.24–7.29, 2H, m
6.86–6.94, 3H, m
6.70, 1H, t, $J = 4.5$ Hz
3.93, 2H, t, $J = 6.2$ Hz
2.55, 1H, dd, $J = 11.4, 8.2$ Hz
2.44, 1H, m
2.10, 3H, m
1.80, 2H, m
1.77, 3H, s
1.52, 2H, m



PROBLEM 14.7

 $C_{13}H_{18}O$ IR: 3075, 2963, 1640, 1600 cm^{-1} MS: 190 (M^+ , 24), 94 (100), 81 (24) ^{13}C NMR

159.0, s

136.6, d

129.4, d (2)

120.4, d

116.4, t

114.5, d (2)

69.7, t

39.4, d

35.2, t

23.5, t

11.2, q

 1H NMR

7.27, 2H, m

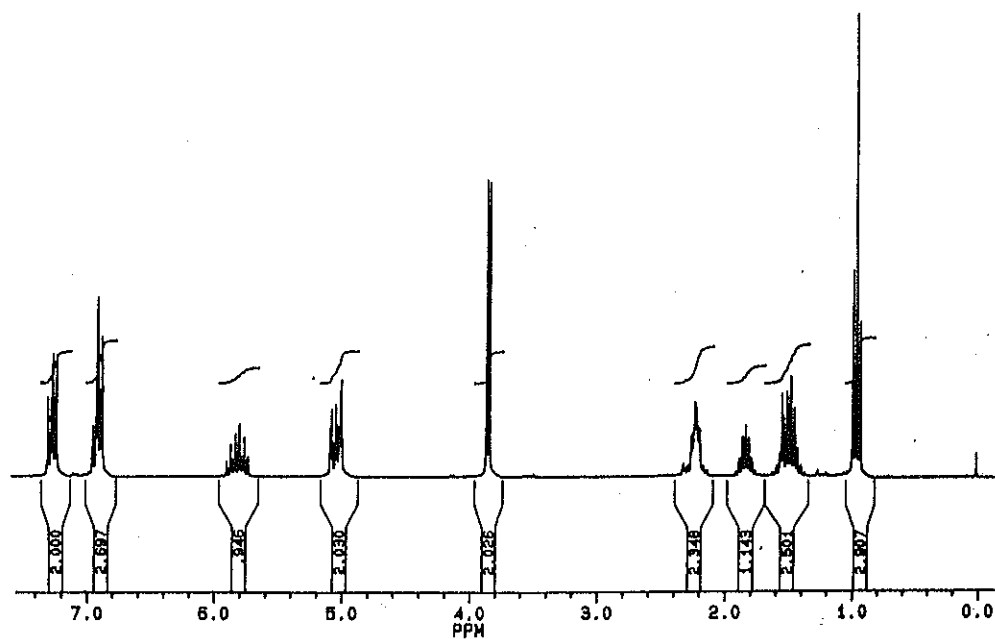
6.91, 3H, m

5.80, 1H, ddt, $J = 16.2, 10.4, 6.8$ Hz5.10, 1H, d, $J = 16.2$ Hz4.98, 1H, d, $J = 10.4$ Hz3.84, 2H, d, $J = 5.8$ Hz

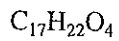
2.23, 2H, m

1.82, 1H, m

1.48, 2H, m

0.95, 3H, t, $J = 7.4$ Hz

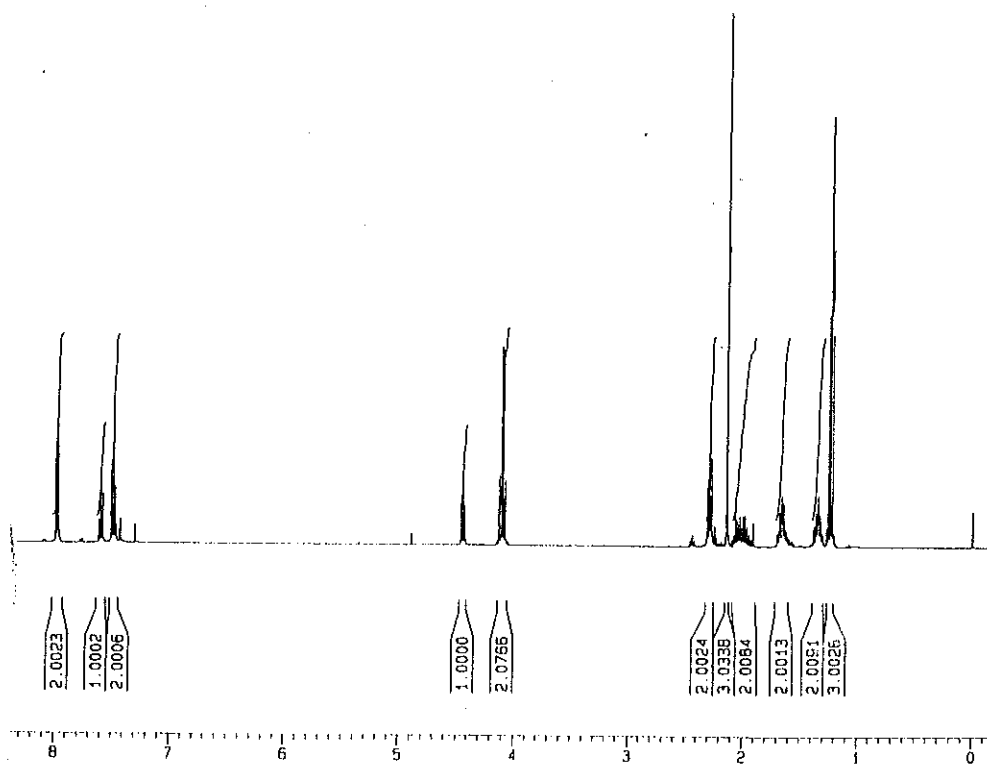
PROBLEM 14.8

IR: 2938, 1731, 1681, 1596, 1448, 1359, 1182, 1096, 1031, 972, 773, 695 cm^{-1} MS: 291 ($M^+ + 1$, 100), 275 (33), 249 (39), 204 (11), 187 (26), 163 (15), 157 (11), 141 (12), 105 (41) ^{13}C NMR

204.1, s	33.8, t
196.2, s	28.5, t
173.3, s	27.8, q
136.3, s	27.0, t
133.7, d (2)	24.6, t
128.8, d	14.1, q
128.6, d (2)	
63.1, d	
60.2, t	

 1H NMR

8.00, 2H, d, $J = 8.5$ Hz
7.61, 1H, m
7.45, 2H, m
4.44, 1H, t, $J = 7.0$ Hz
4.10, 2H, q, $J = 7.1$ Hz
2.29, 2H, t, $J = 7.4$ Hz
2.13, 3H, s
2.05, 2H, m
1.78, 2H, m
1.40, 2H, m
1.23, 3H, t, $J = 7.1$ Hz



PROBLEM 14.9

 $C_{17}H_{18}O$ IR: 1665 cm^{-1} MS: 258 (M^+), 143, 115 ^{13}C NMR

199.7, s

137.6, s (2)

133.5, s (2)

133.4, s (2)

130.3, d (2)

129.4, d (2)

129.1, d (2)

19.7, q (2)

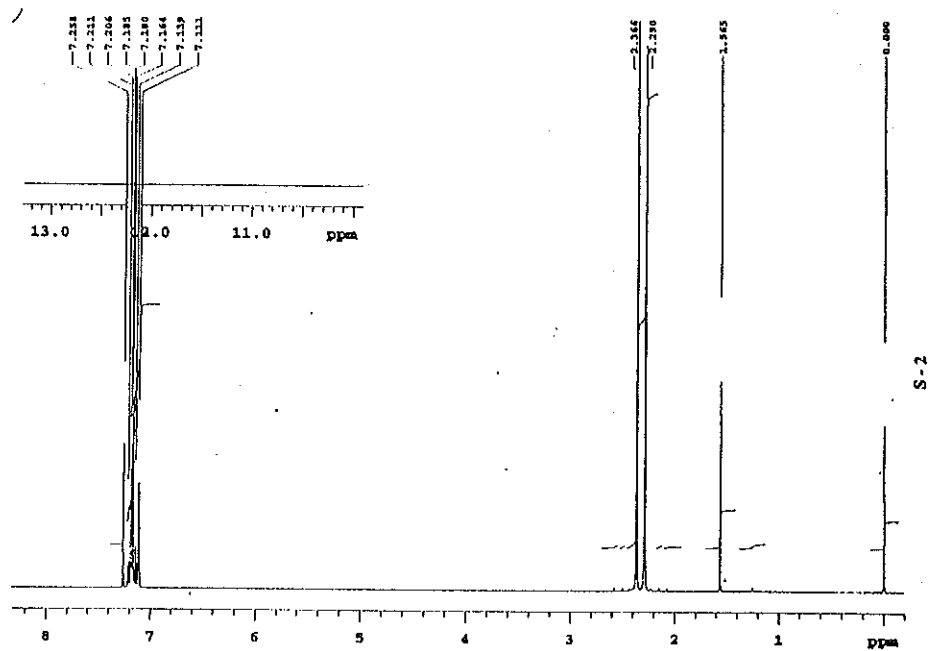
18.5, q (2)

 1H NMR

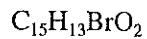
7.2, 6H, m

2.37, 6H, s

2.29, 6H, s



PROBLEM 14.10

IR: 1666 cm^{-1} MS: 306 (M^+), 304 (M^+), 185, 183, 157, 155, 149, 121 ^{13}C NMR

194.1, s	128.5, d
153.8, s	126.5, s
135.3, s	126.4, s
131.2, d	110.0, d
130.0, d (2)	54.2, q
129.7, d (2)	18.8, q
128.6, s	

 1H NMR

7.67, 2H, d, $J = 8.6$ Hz
7.57, 2H, d, $J = 8.6$ Hz
7.25, 1H, dd, $J = 2.06, 8.44$ Hz
7.17, 1H, d, $J = 2.06$ Hz
6.89, 1H, d, $J = 8.44$ Hz
3.68, 3H, s
2.33, 3H, s

