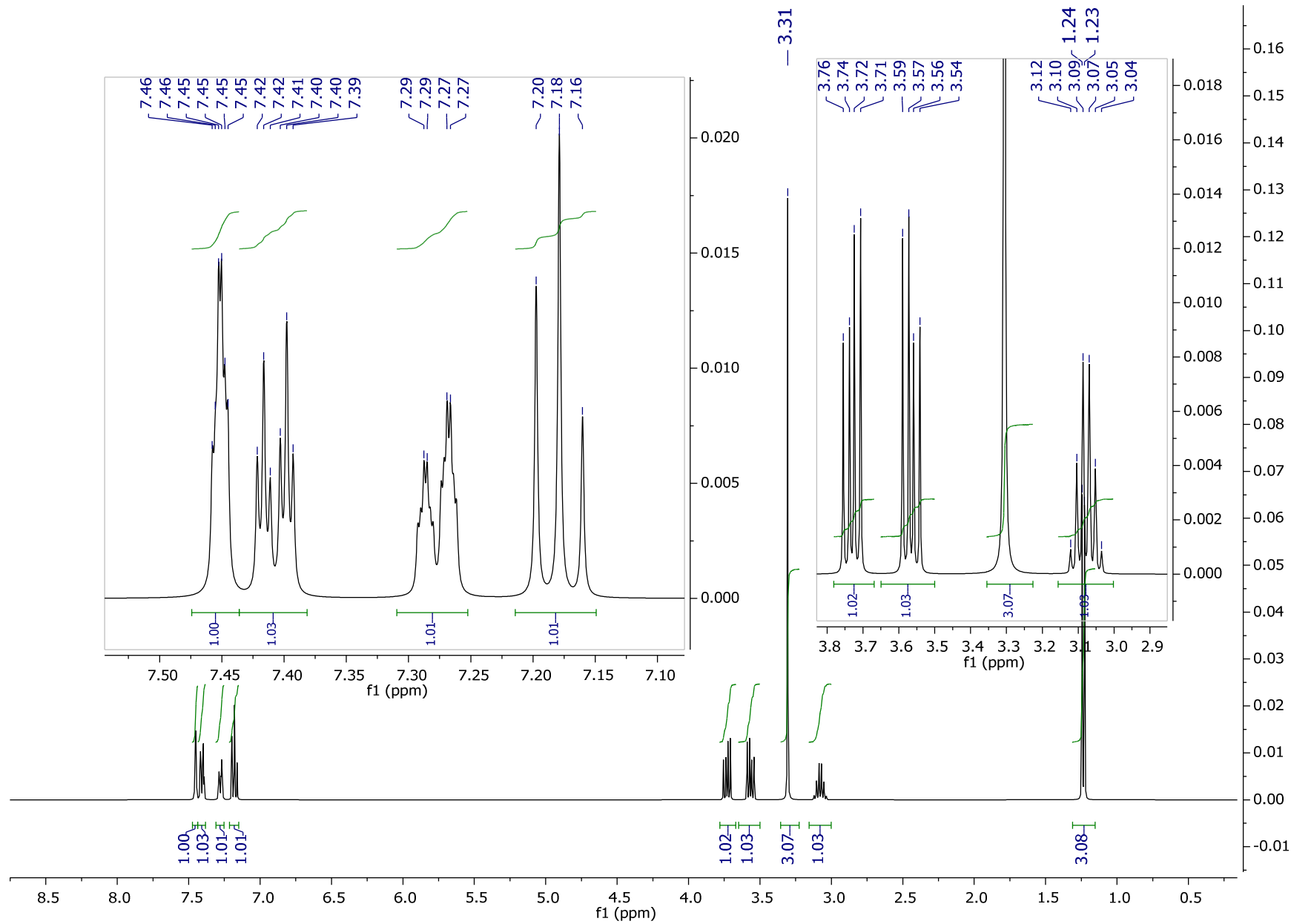
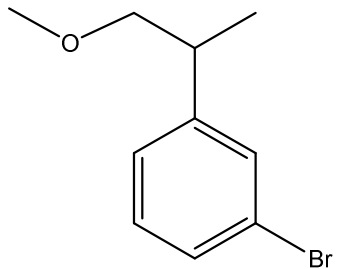


**Zadanie 1.** Na podstawie widm  $^1\text{H}$  (400 MHz),  $^{13}\text{C}\{^1\text{H}\}$  NMR (100 MHz) oraz ewentualnie  $^{19}\text{F}\{^1\text{H}\}$  (375 MHz) zmierzonych na aparacie Bruker ( $\text{CDCl}_3$ ) określ strukturę związku chemicznego.

(a)

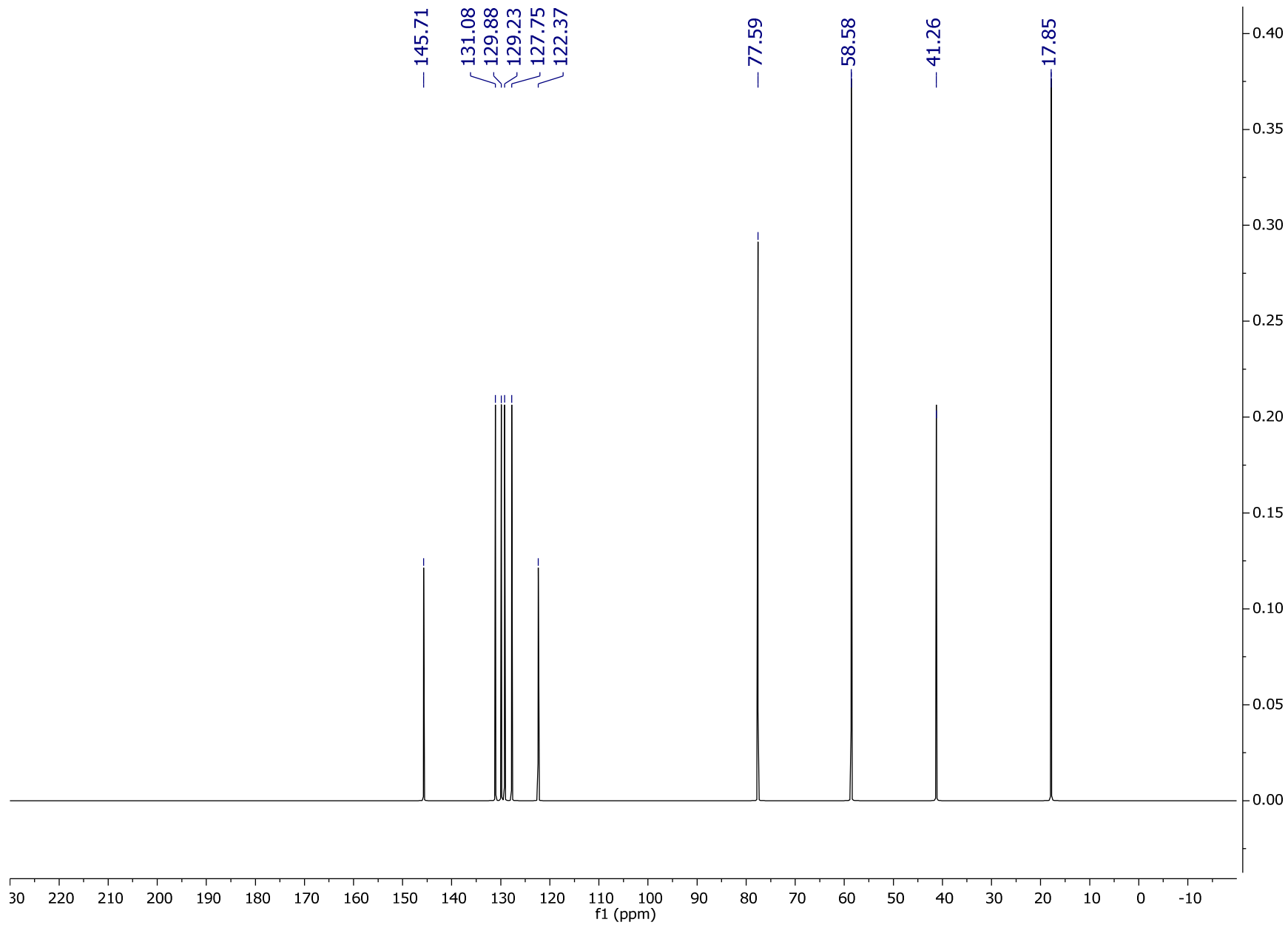
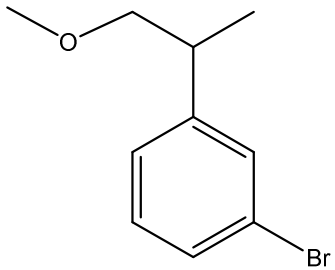
$C_{10}H_{13}BrO$

Cząsteczka jest chiralna

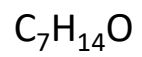


(a)

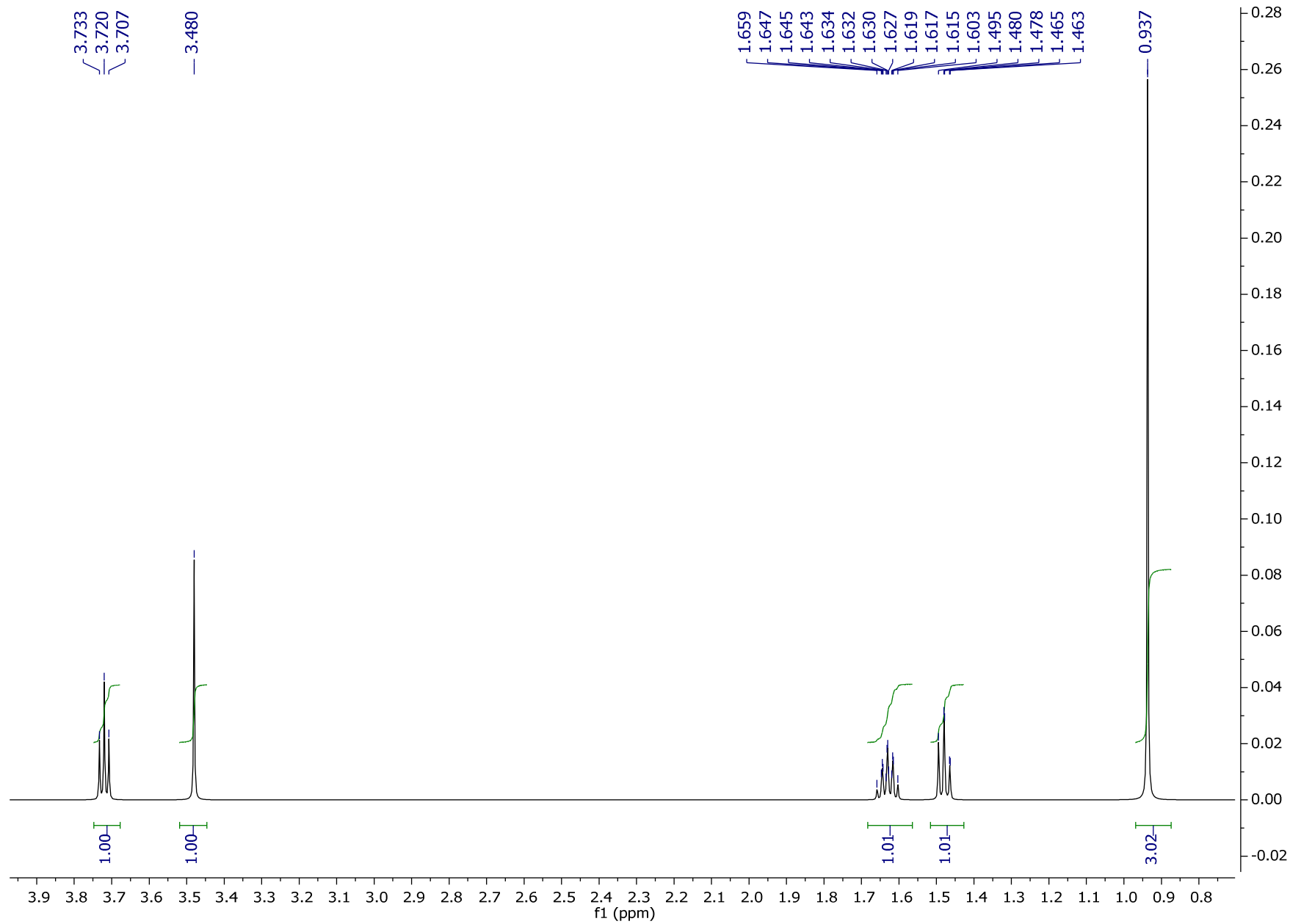
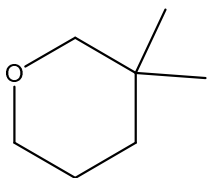
$C_{10}H_{13}BrO$

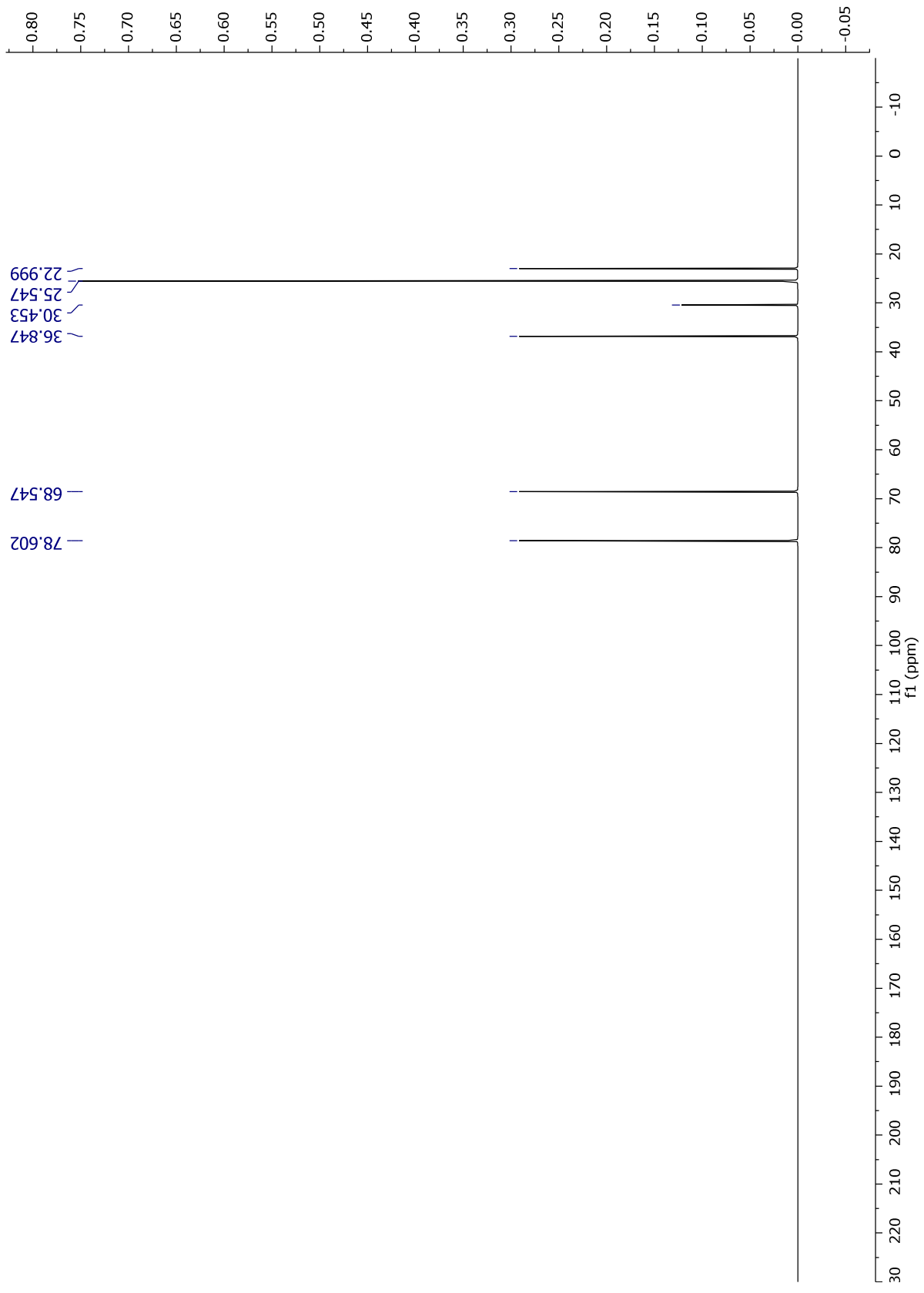


(b)

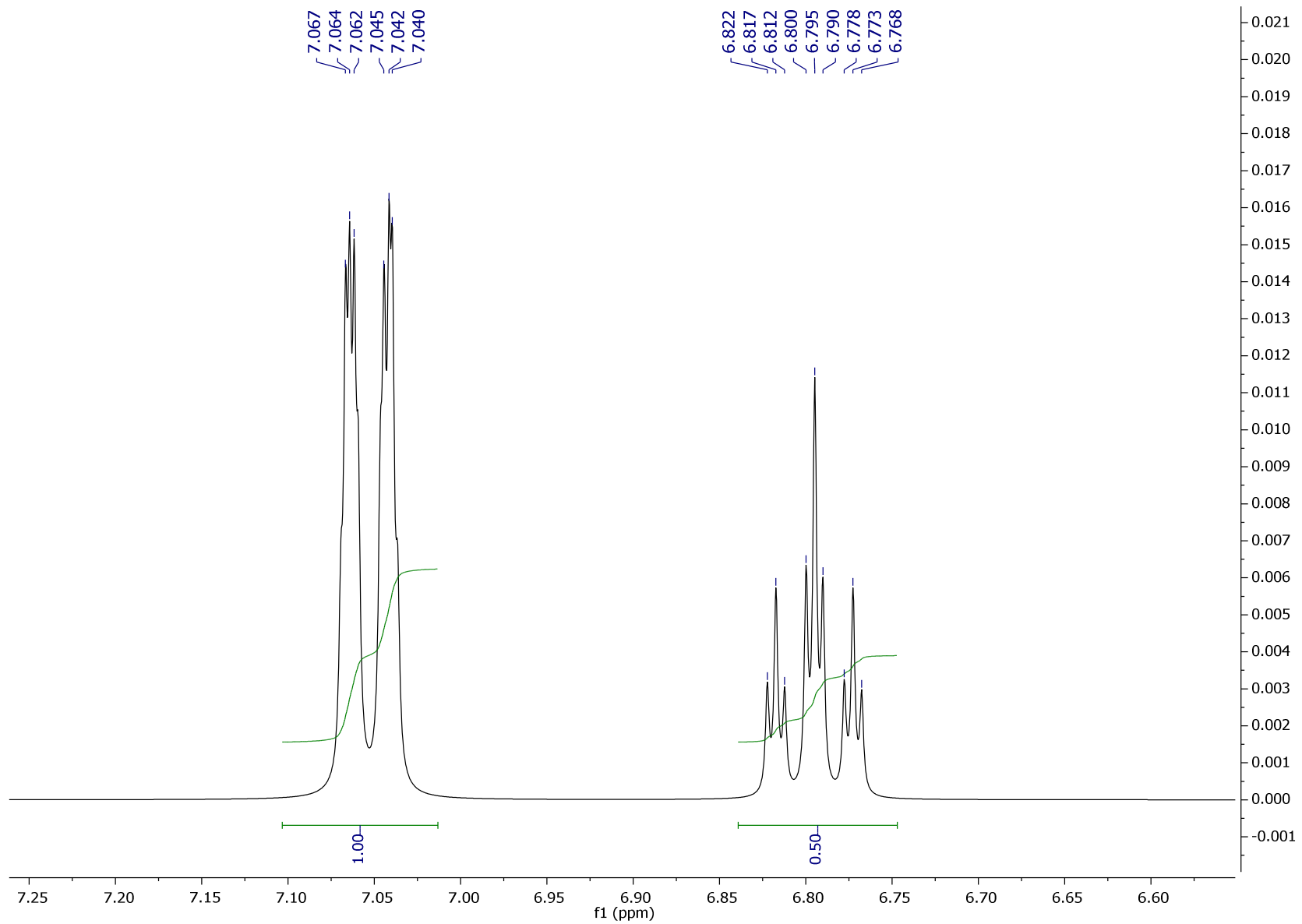
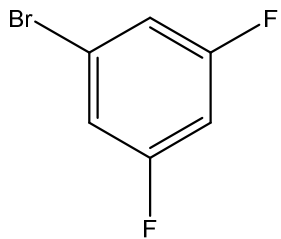
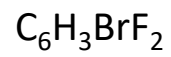


Cykliczny eter

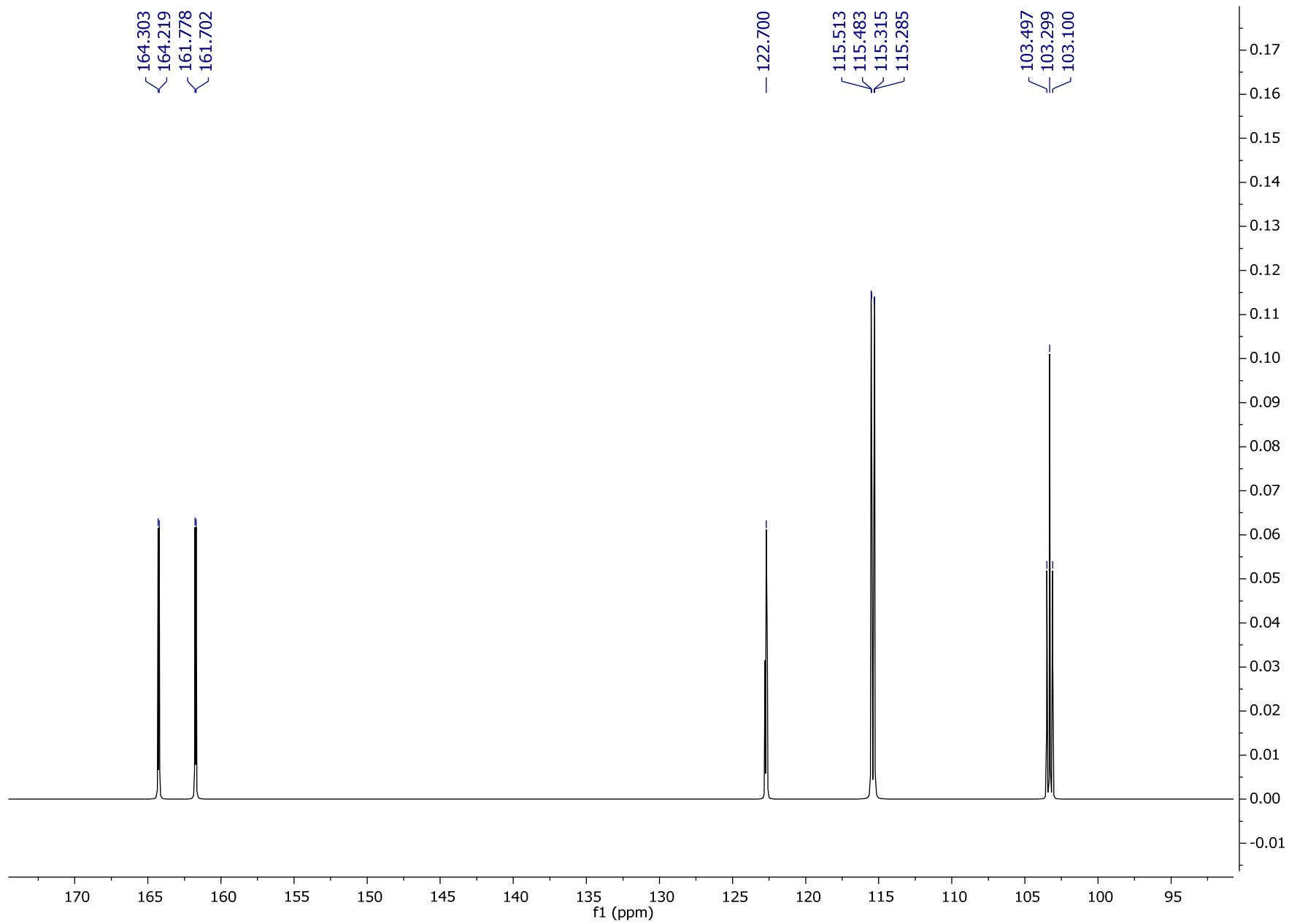




(c)

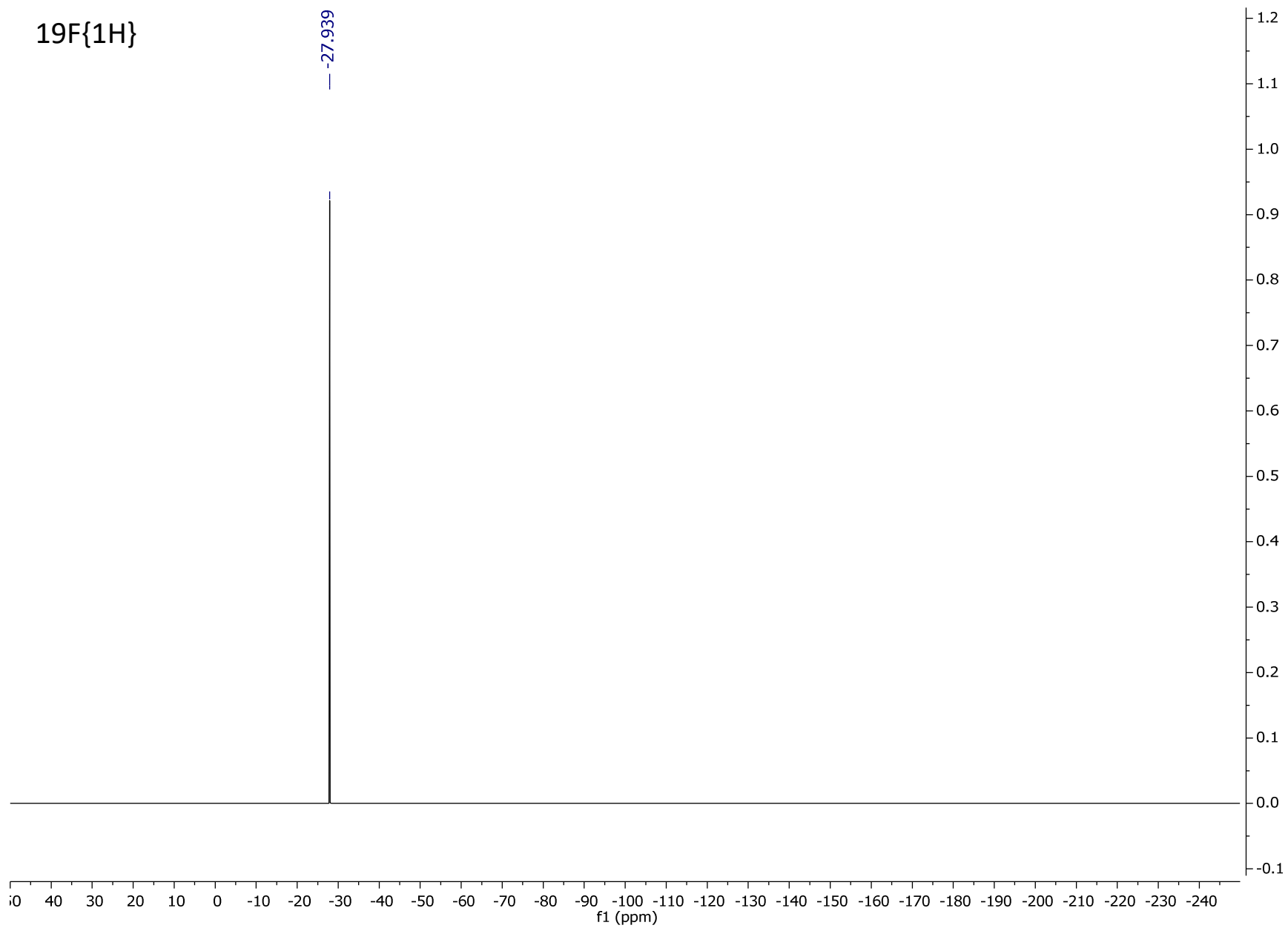


(c)



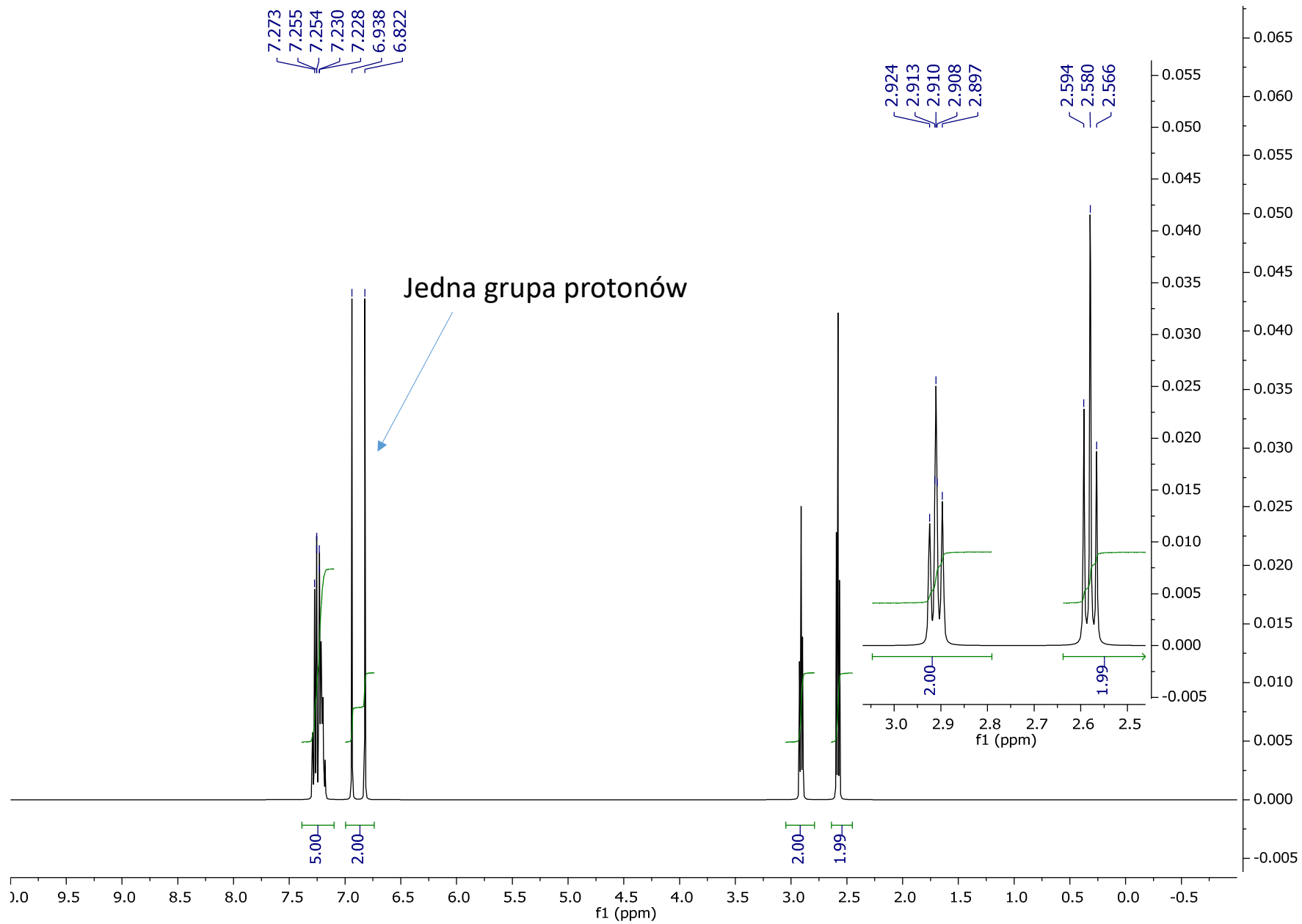
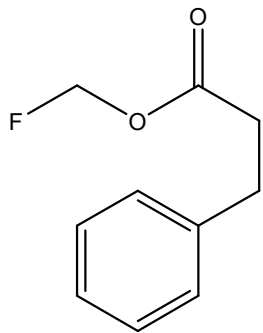
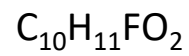
(c)

$^{19}\text{F}\{^1\text{H}\}$

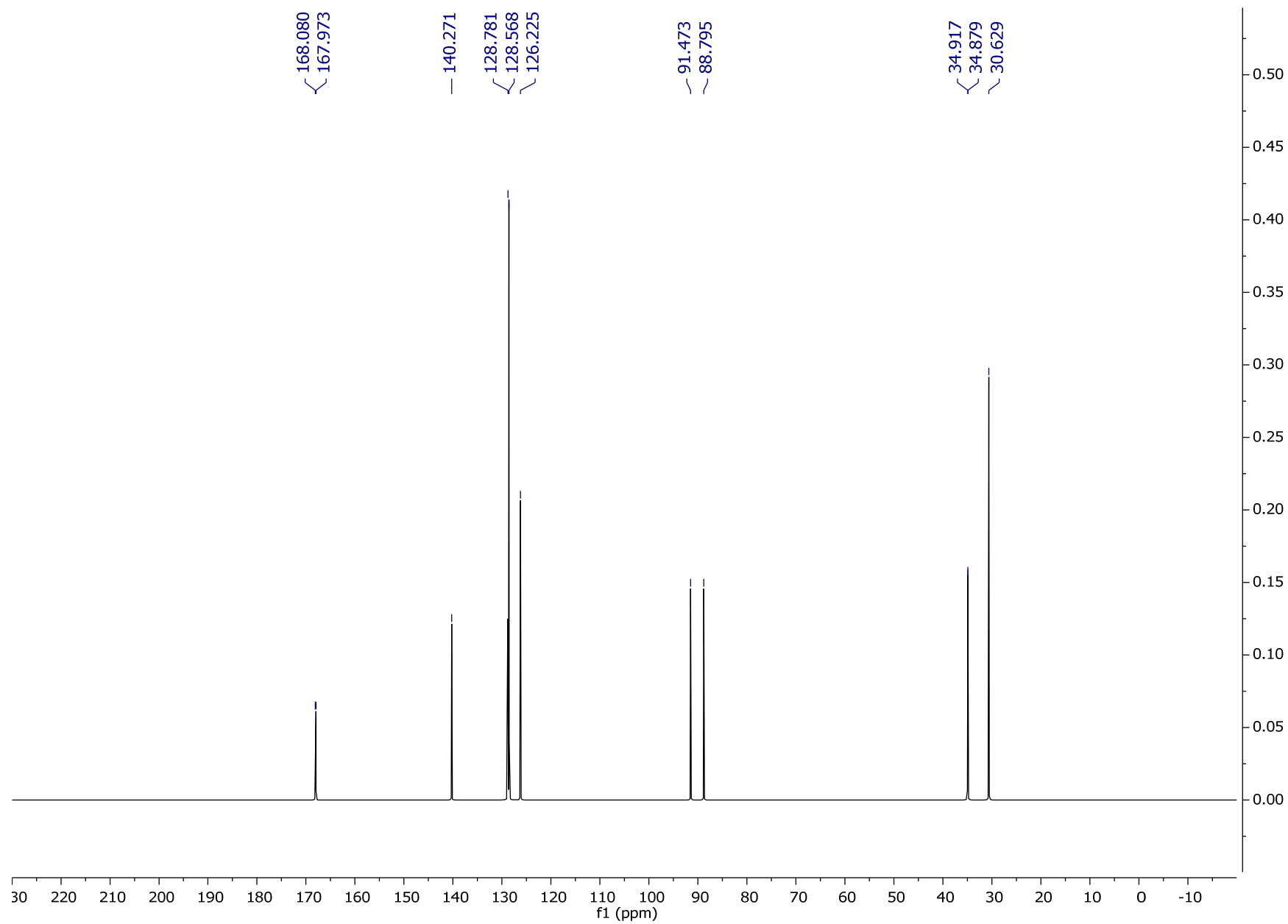


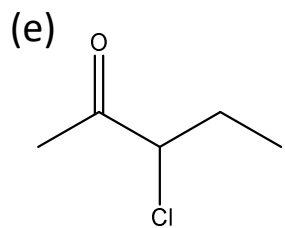


(d)



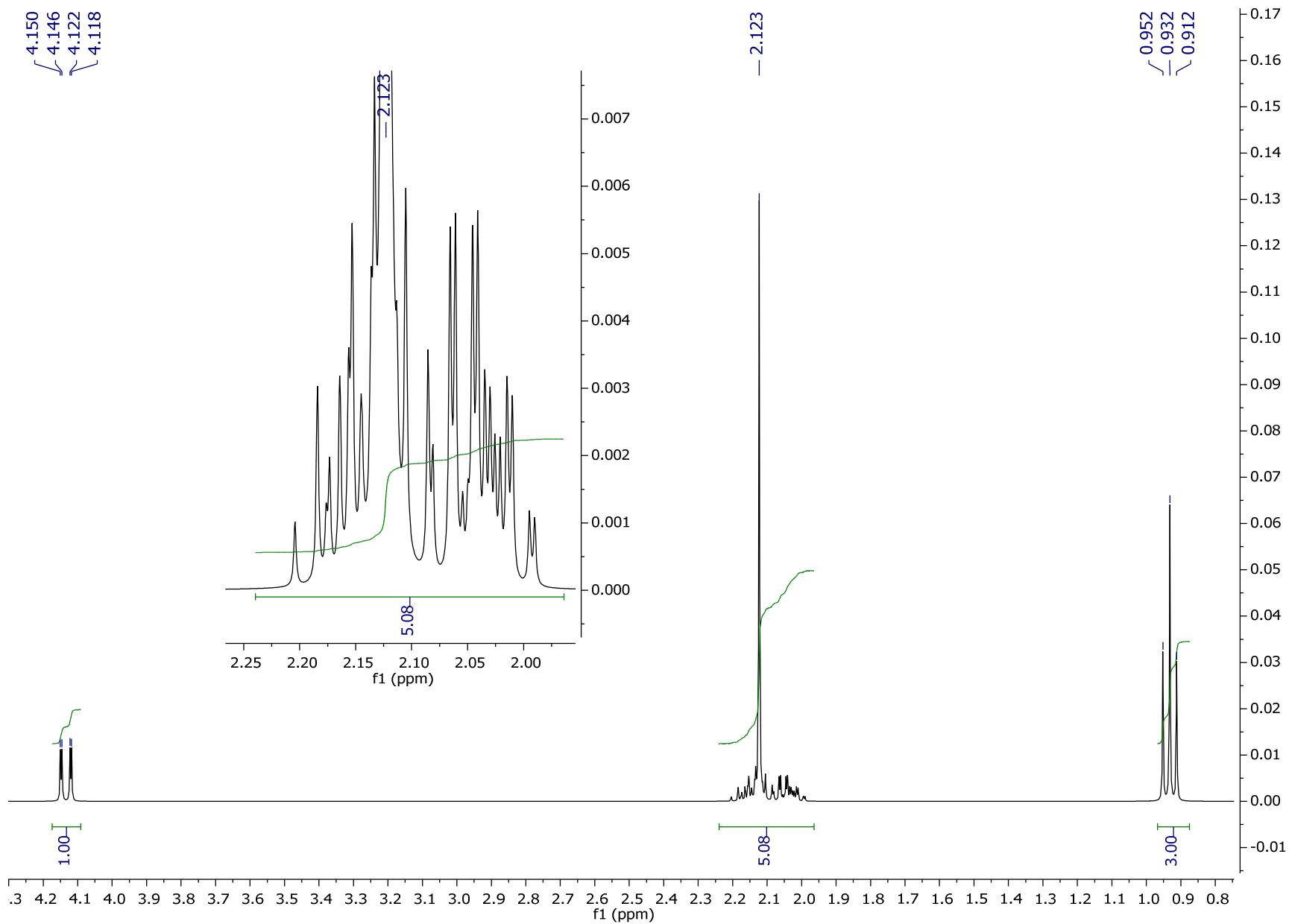
(d)



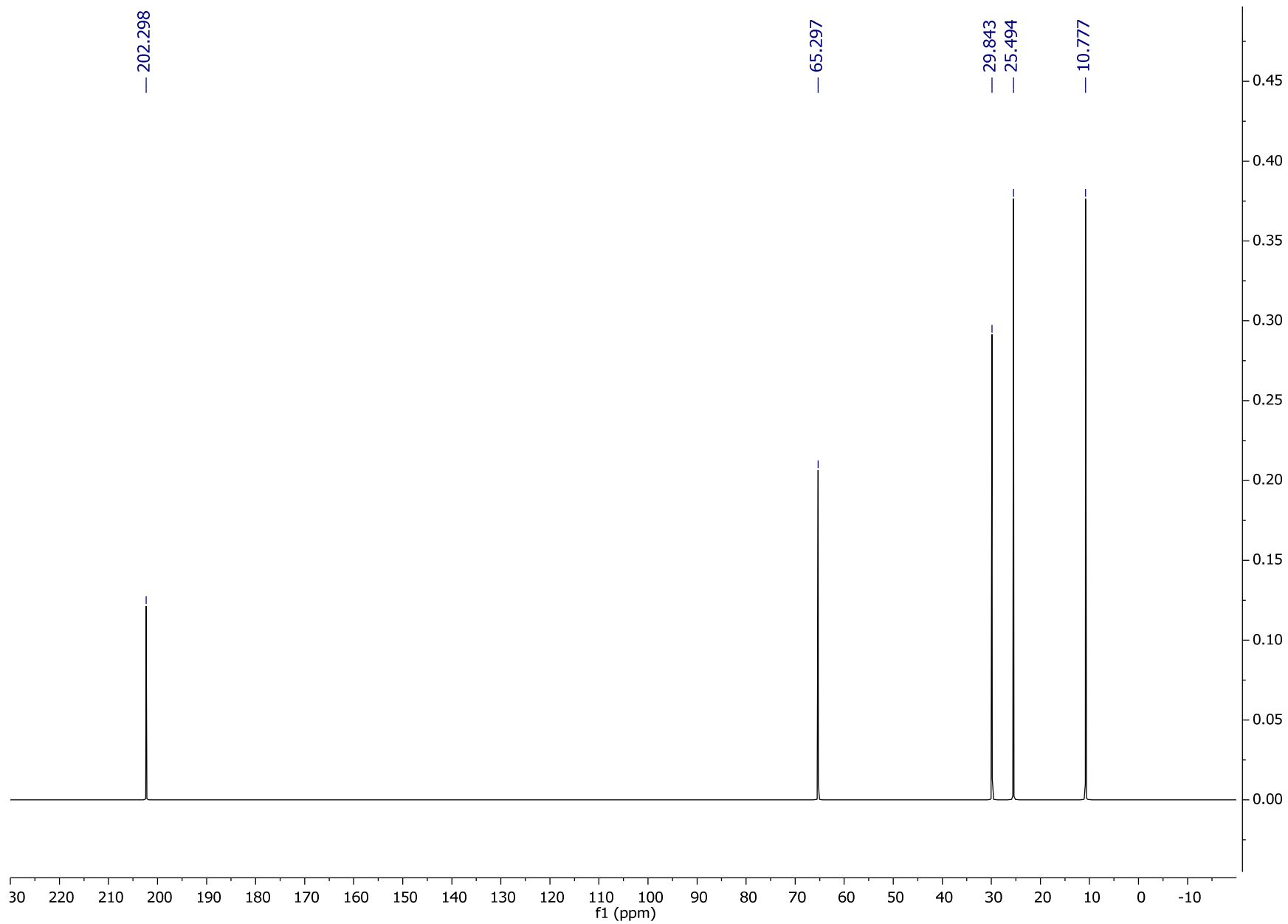


$C_5H_9ClO$

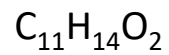
Cząsteczka jest chiralna



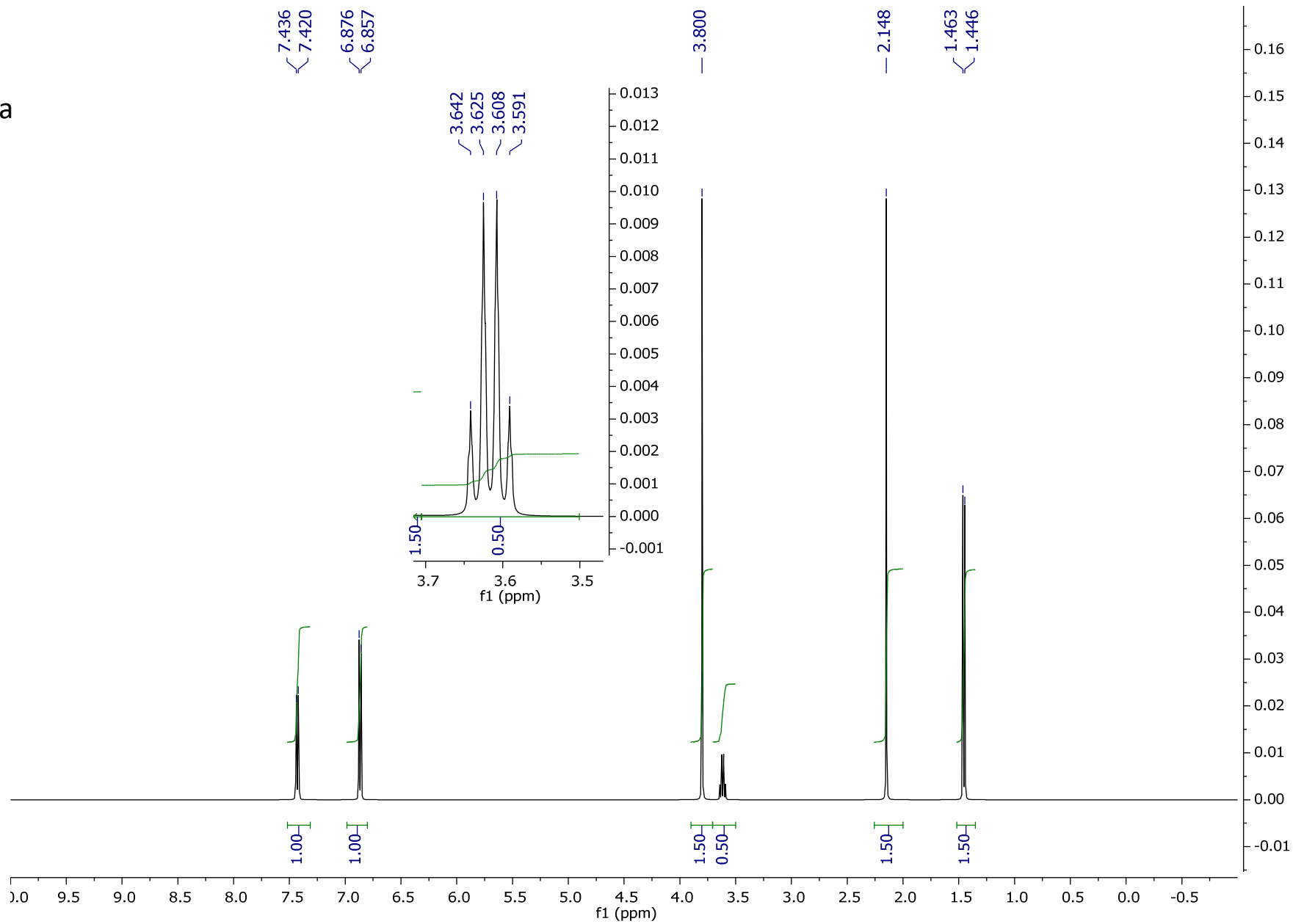
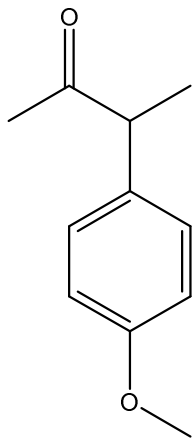
(e)



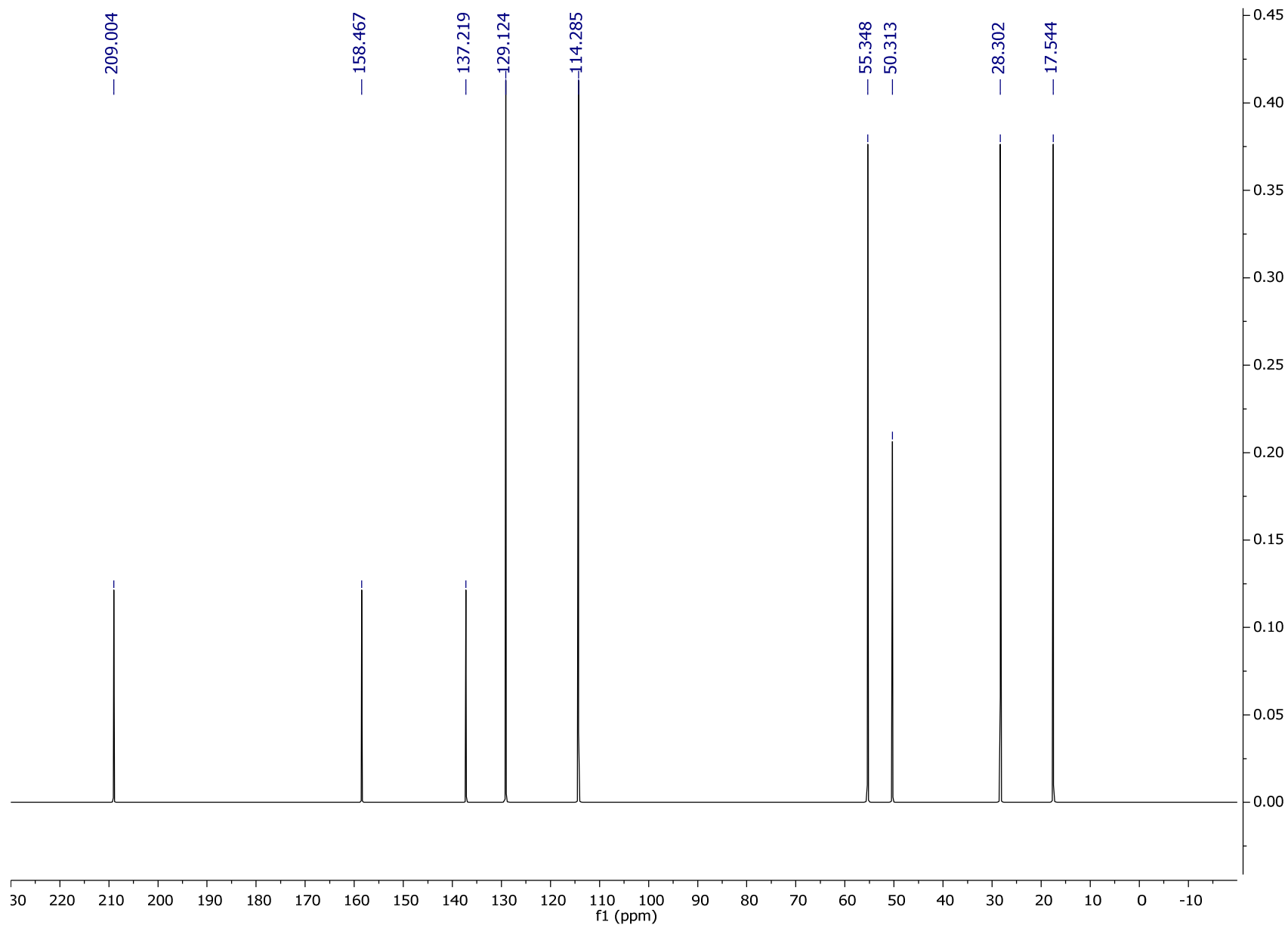
(f)



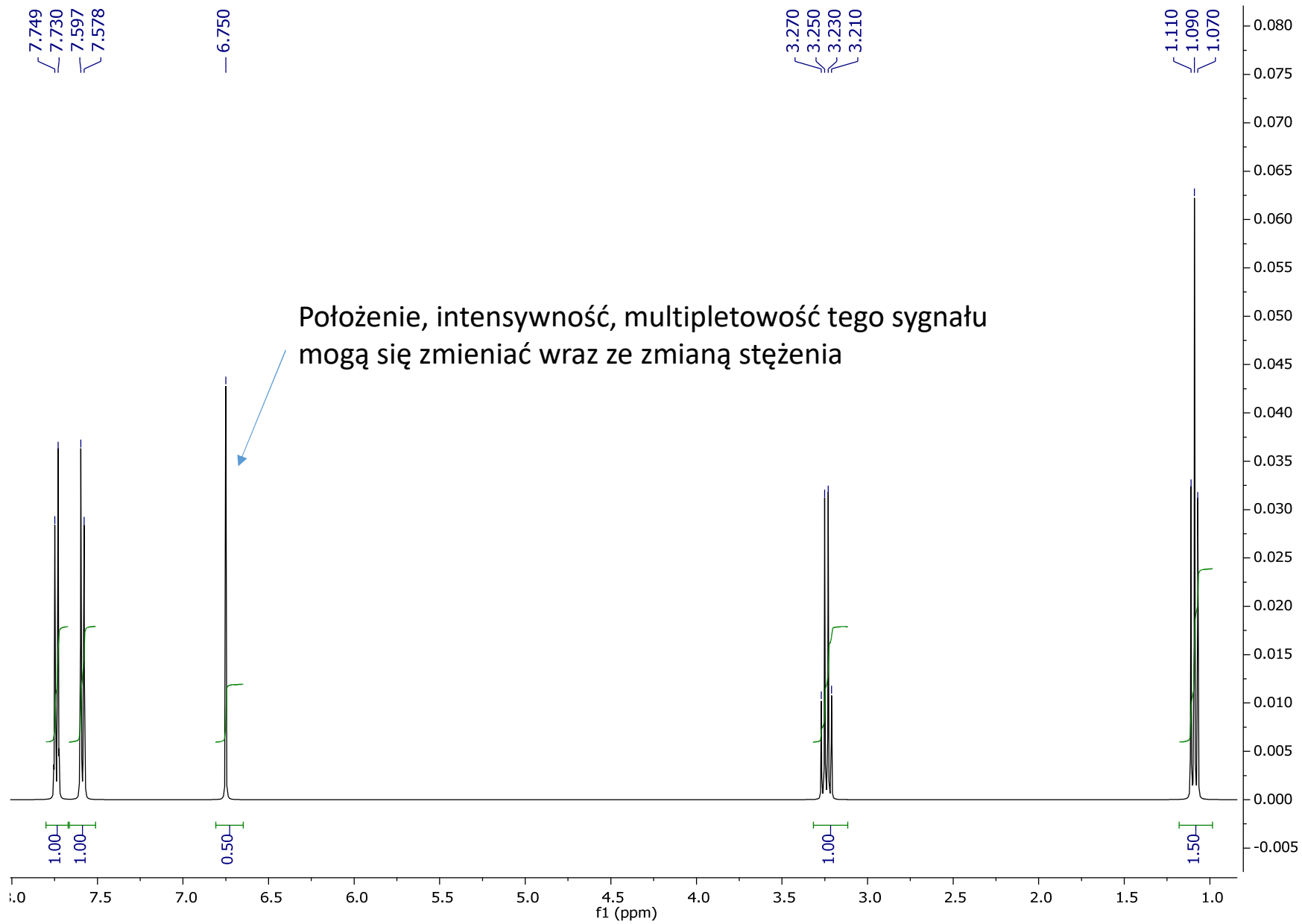
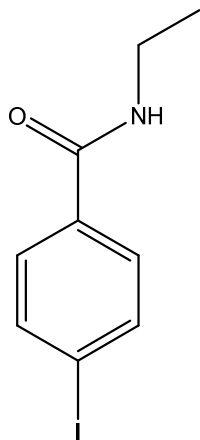
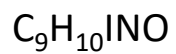
Cząsteczka jest chiralna



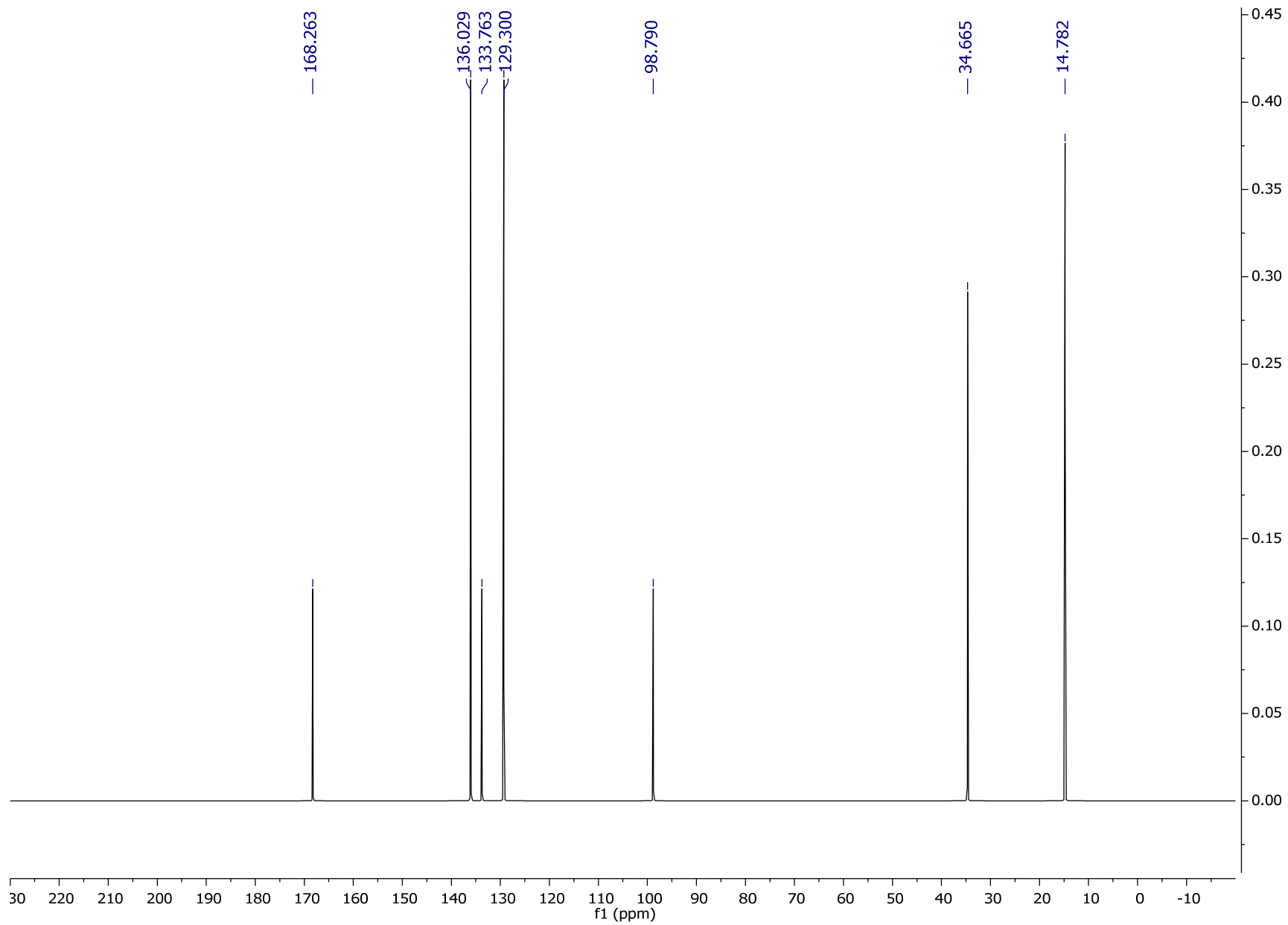
(f)



(g)

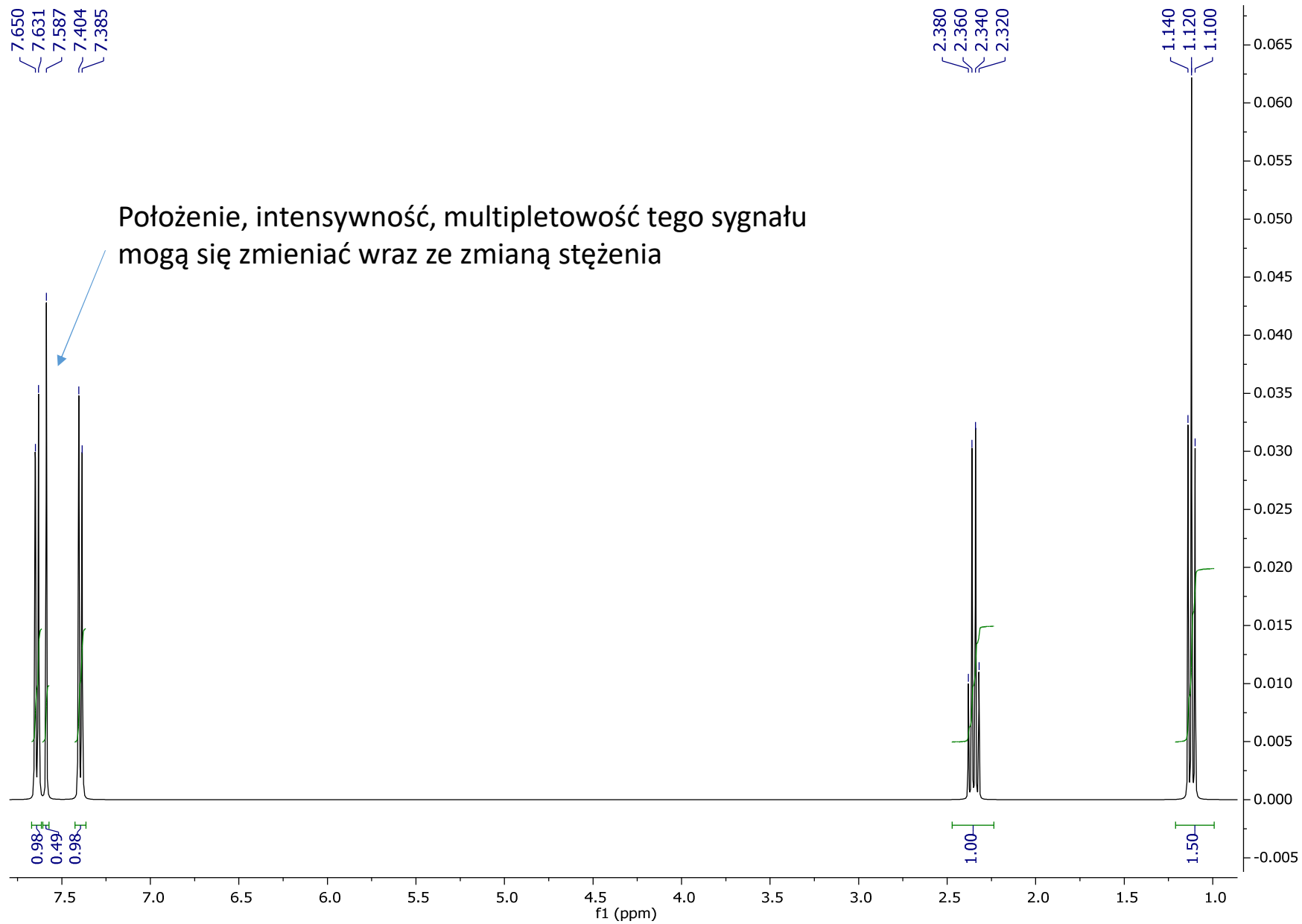
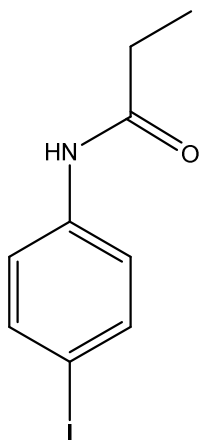
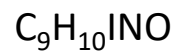


(g)

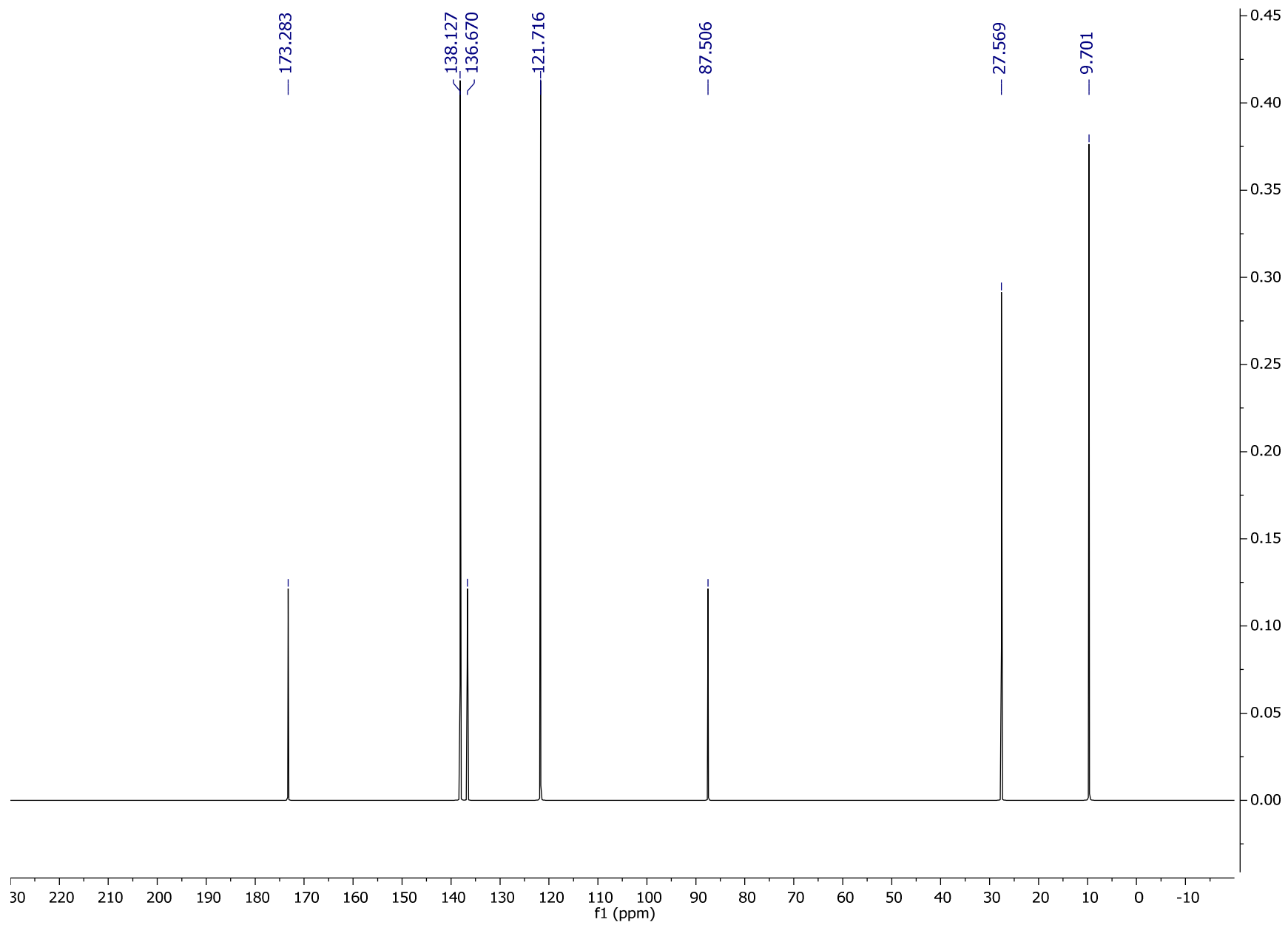




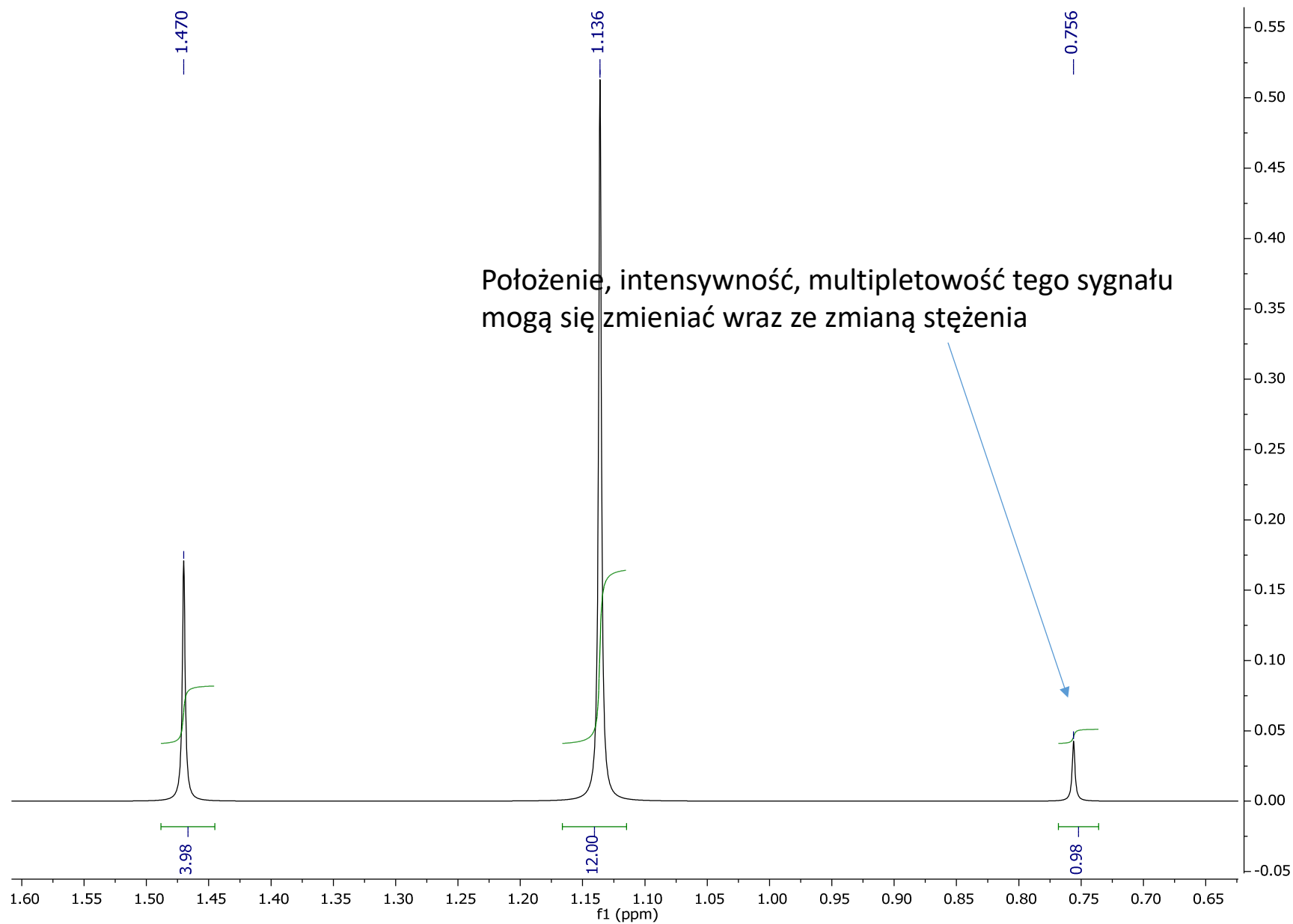
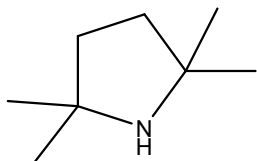
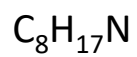
(h)



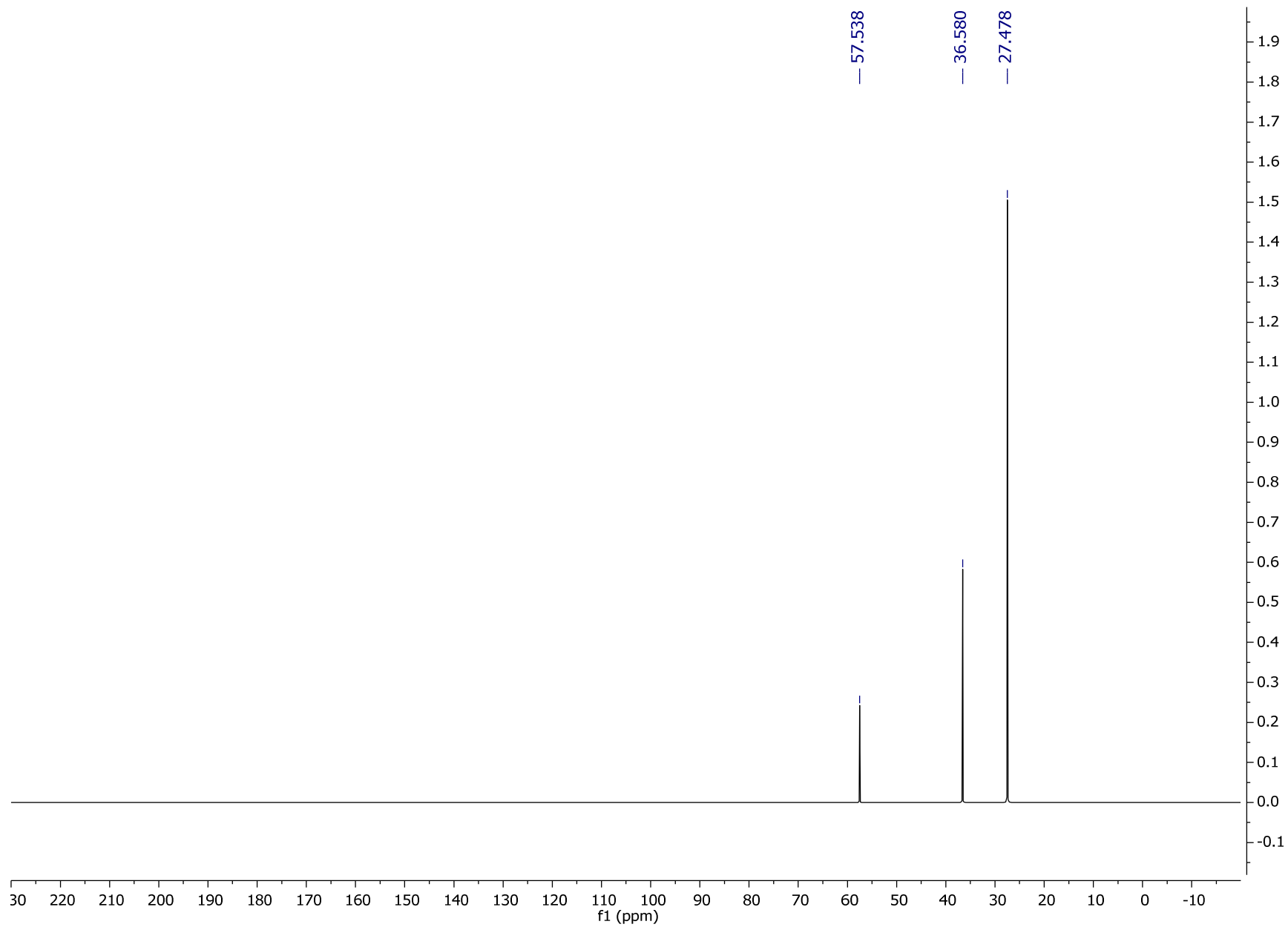
(h)



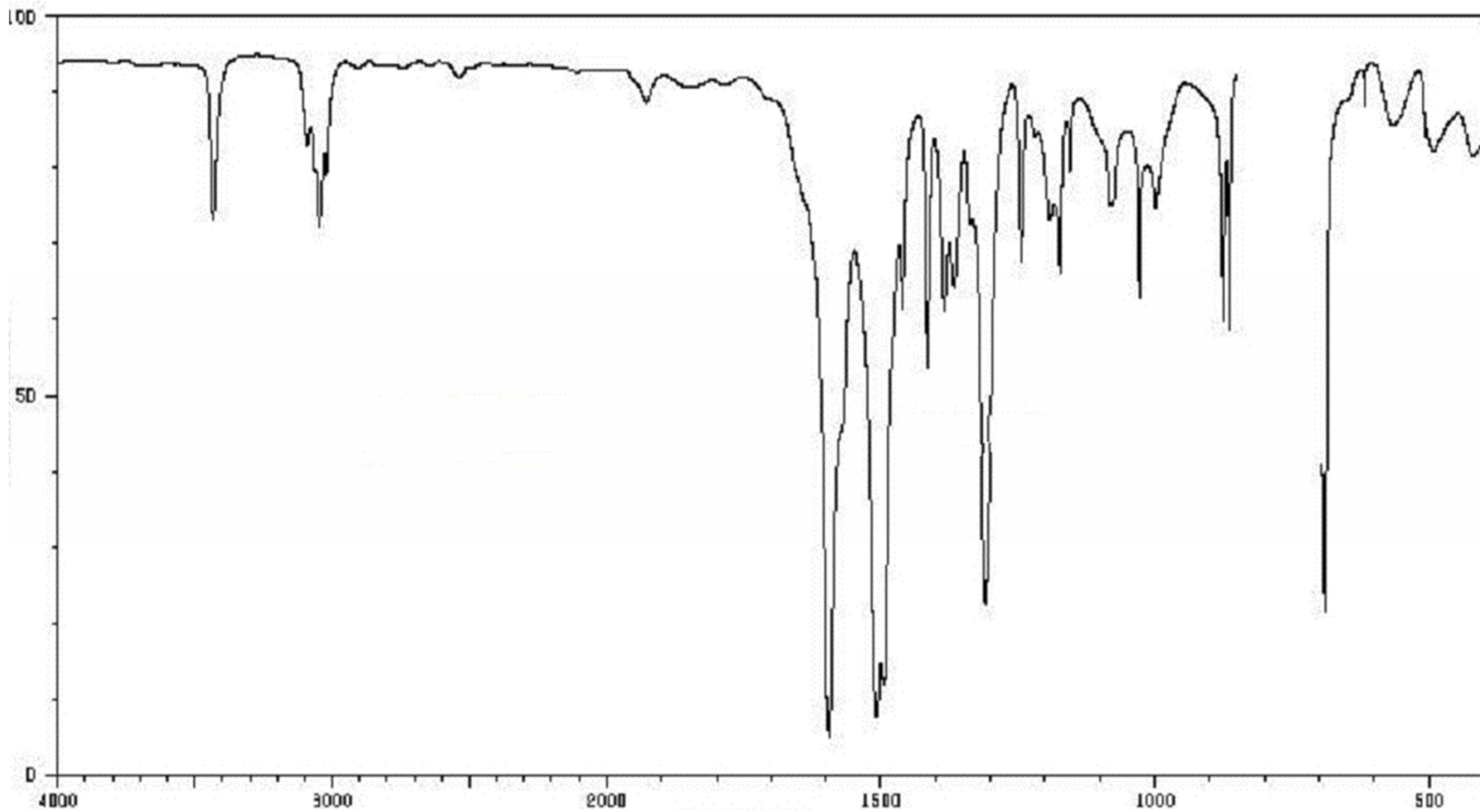
(i)



(i)

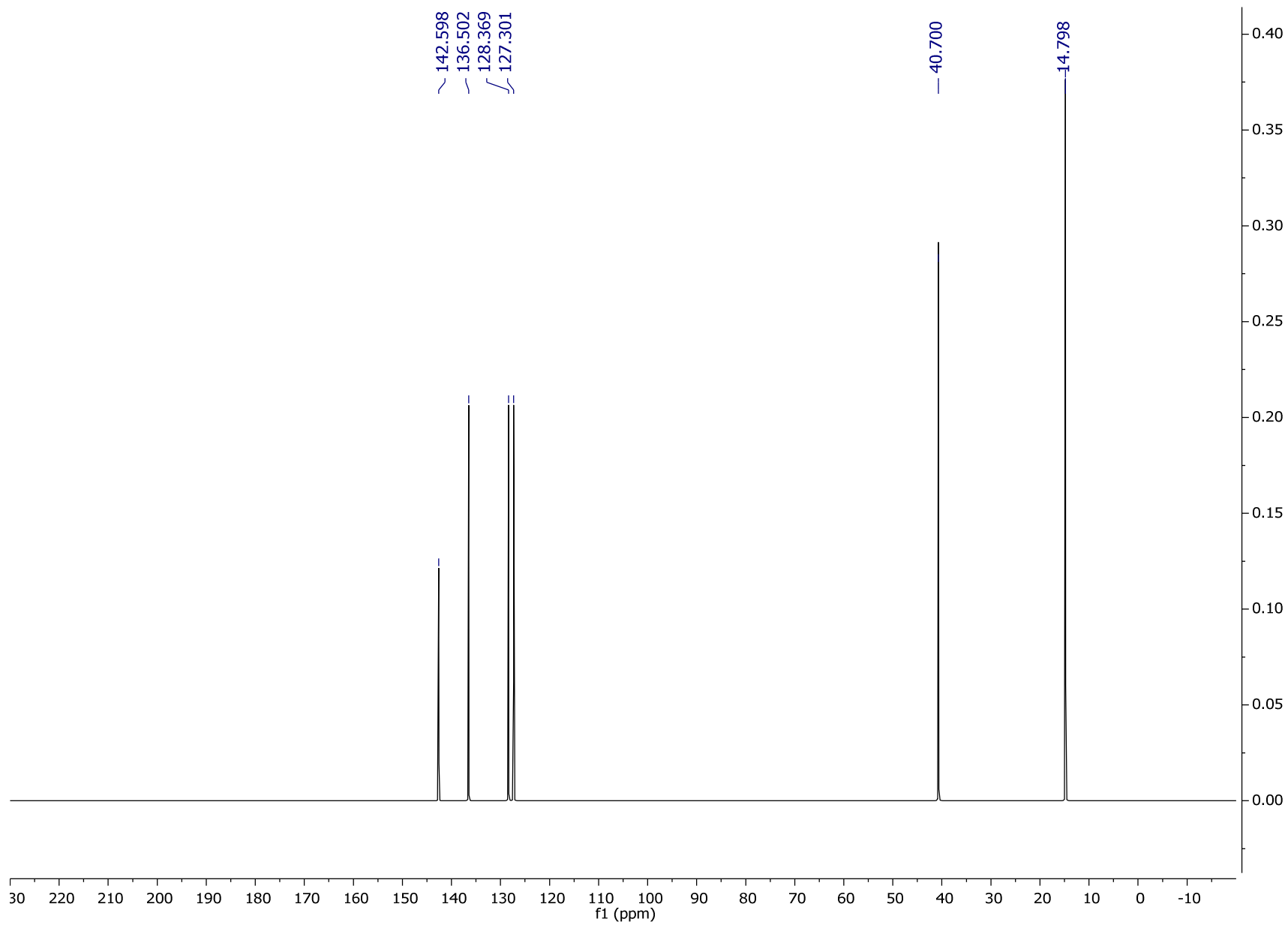


(i)

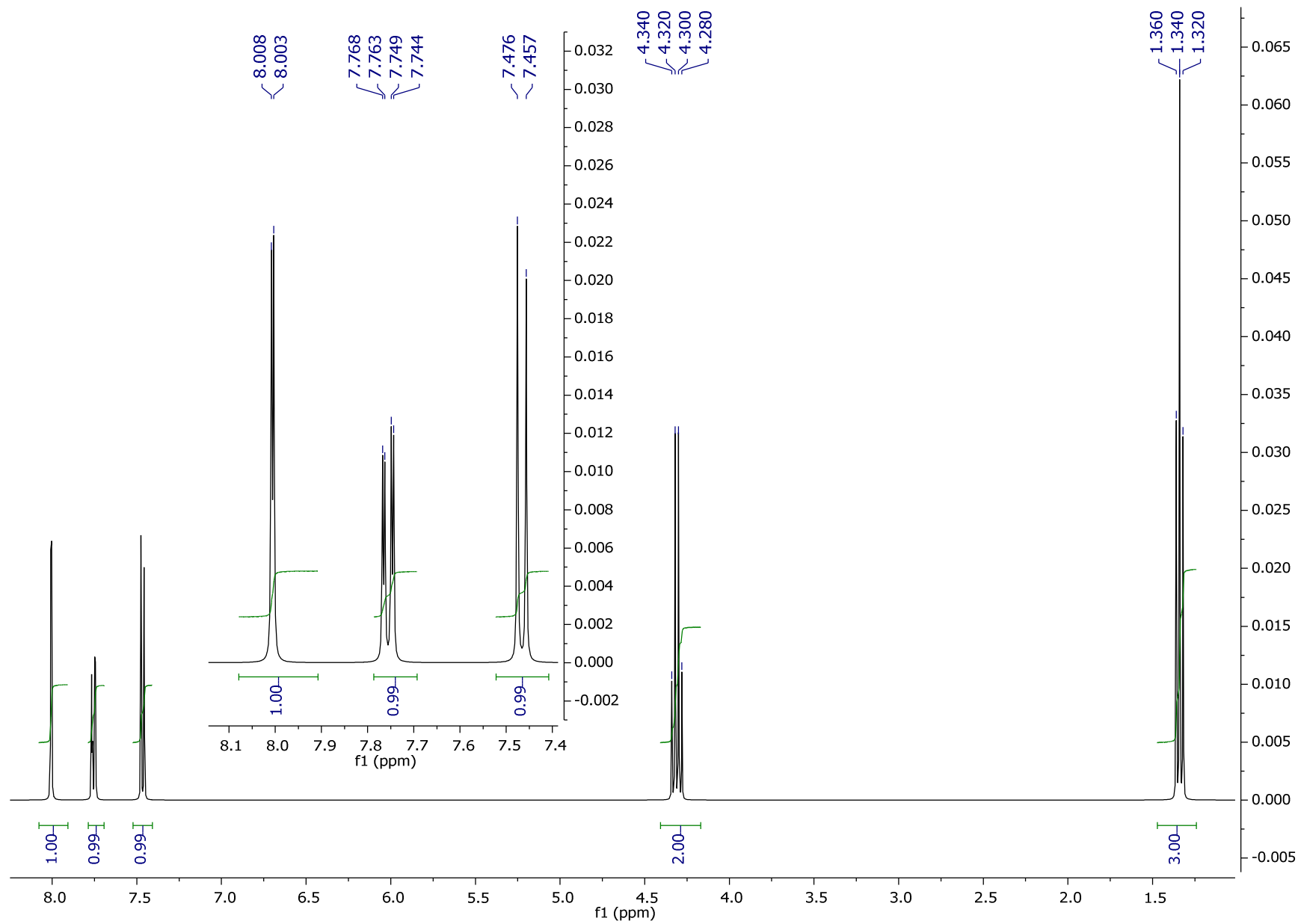
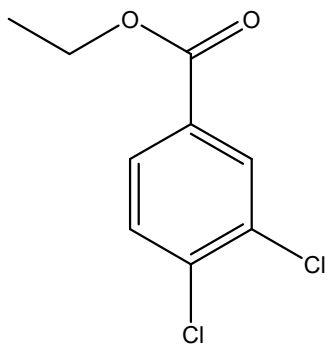
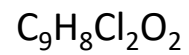




(j)

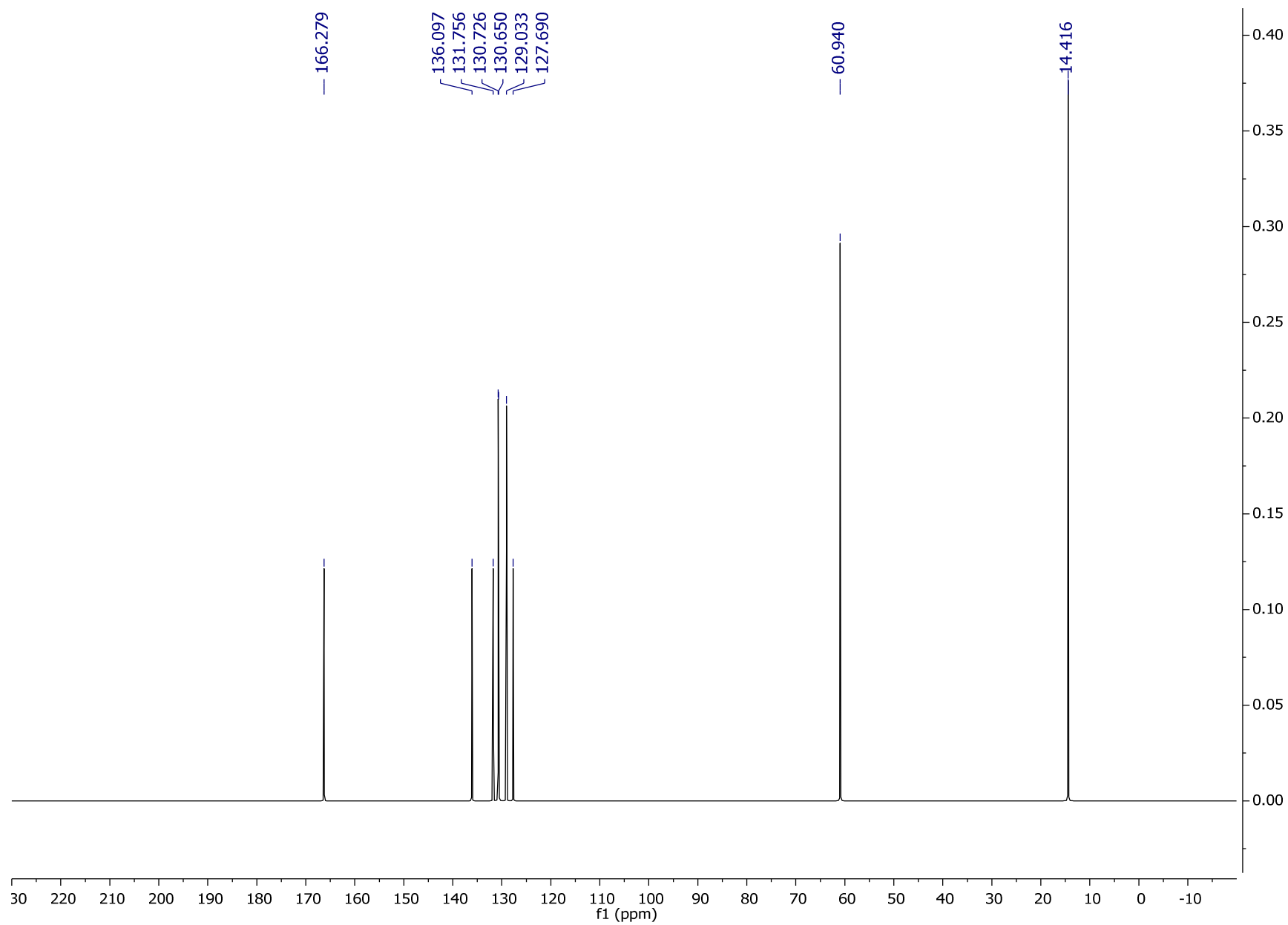


(k)

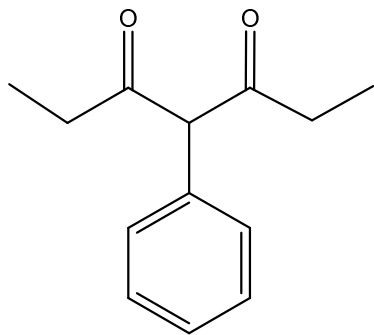
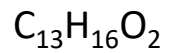




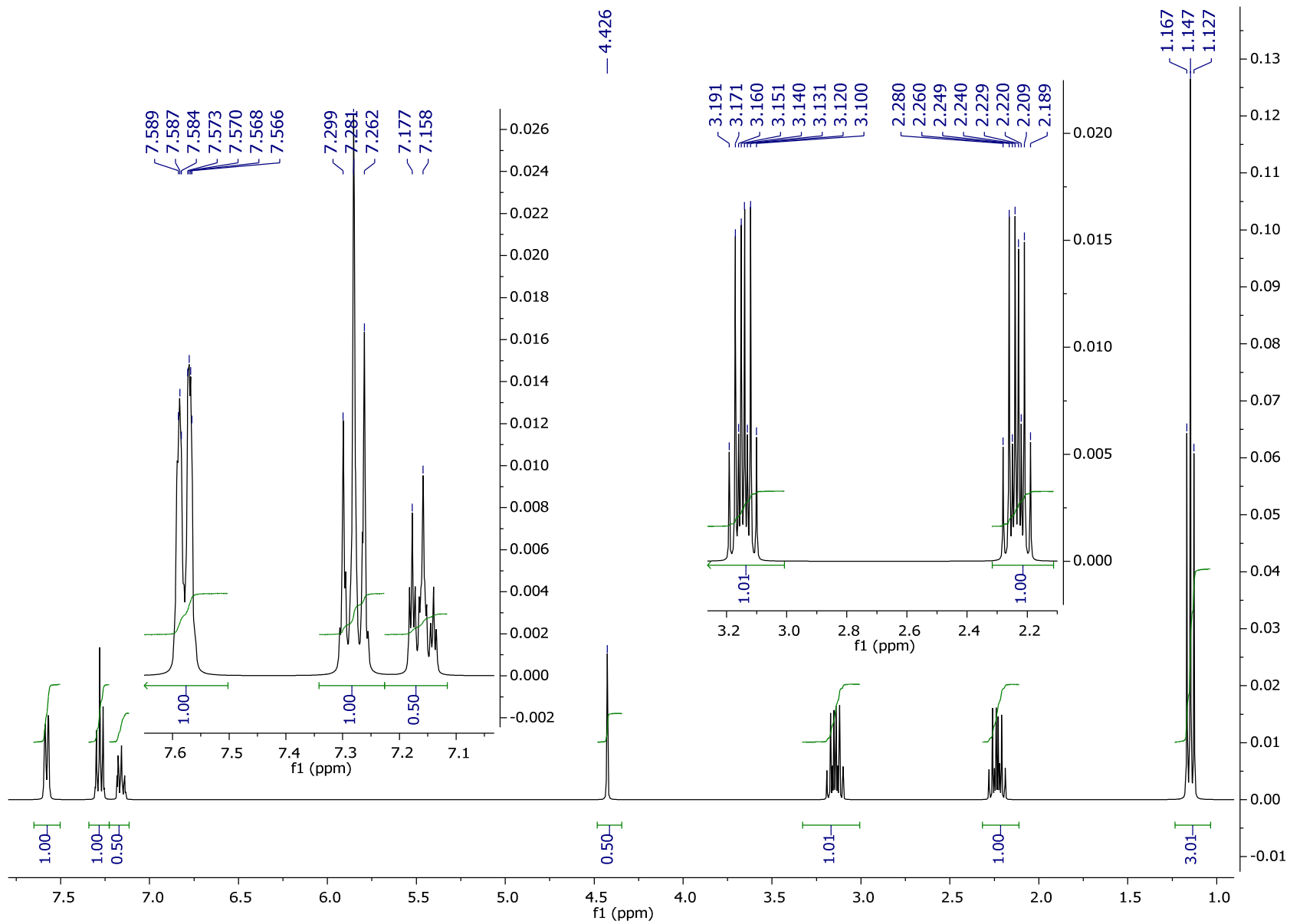
(I)



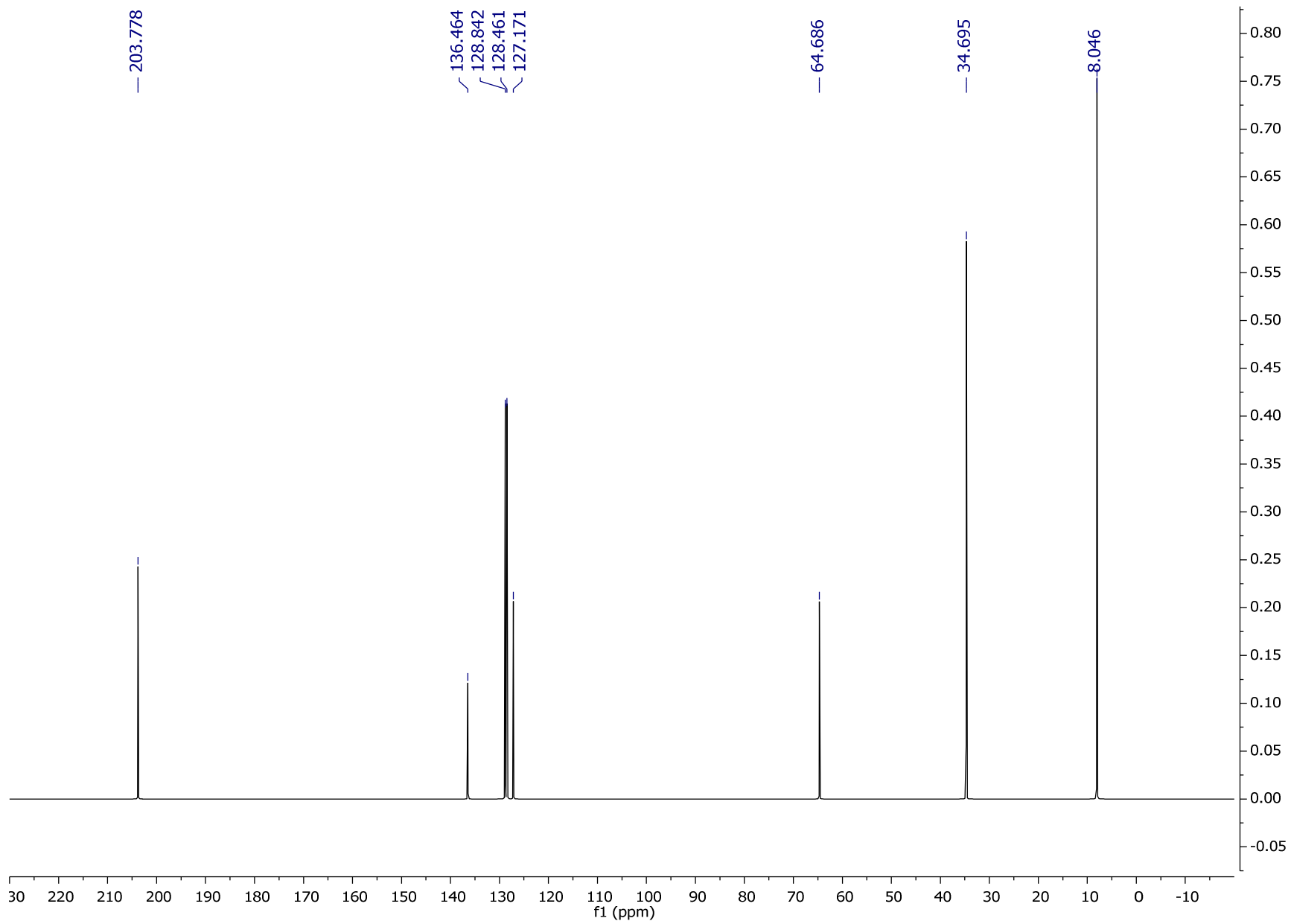
(I)



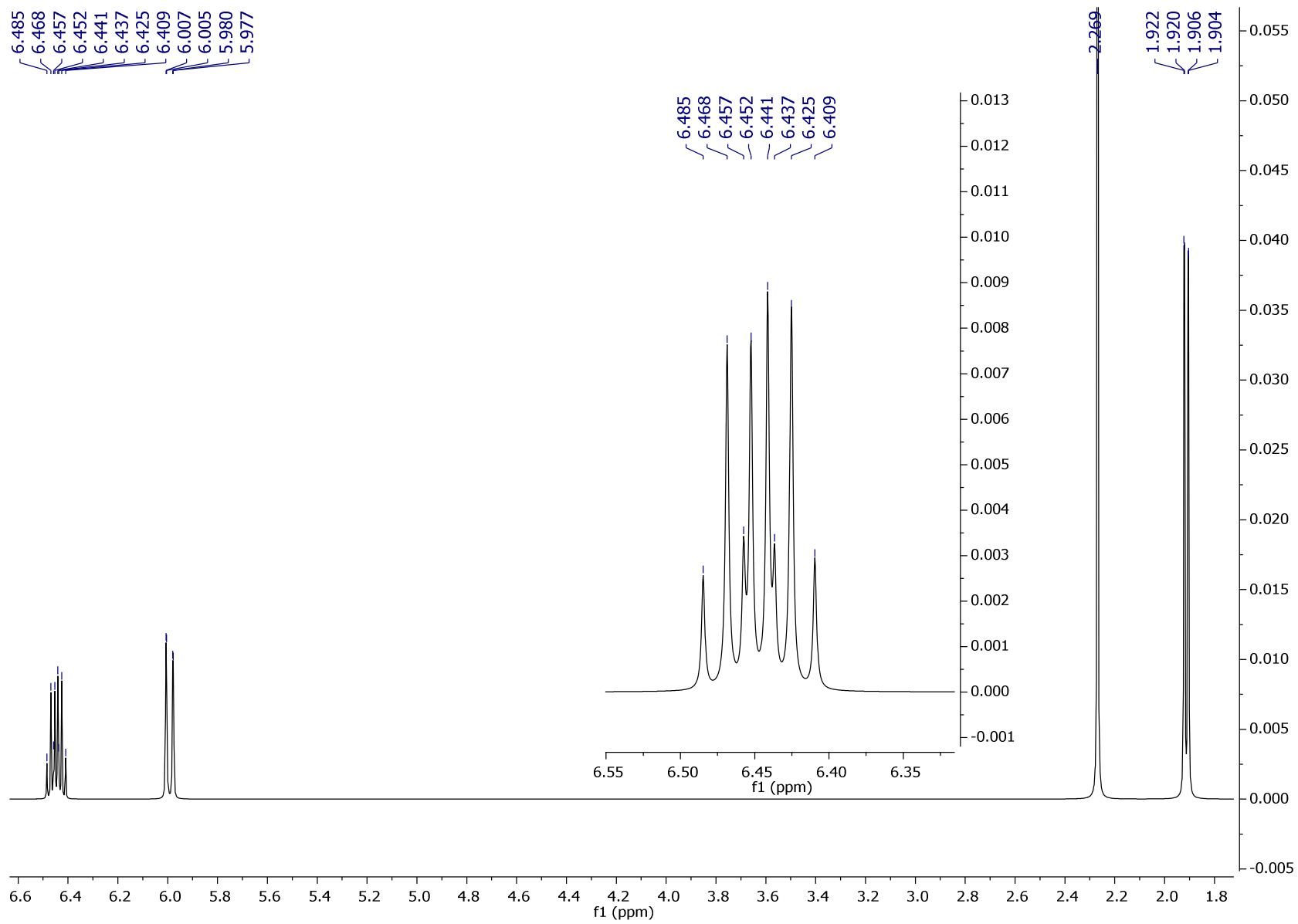
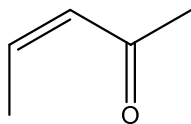
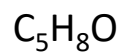
Związek jest achiralny



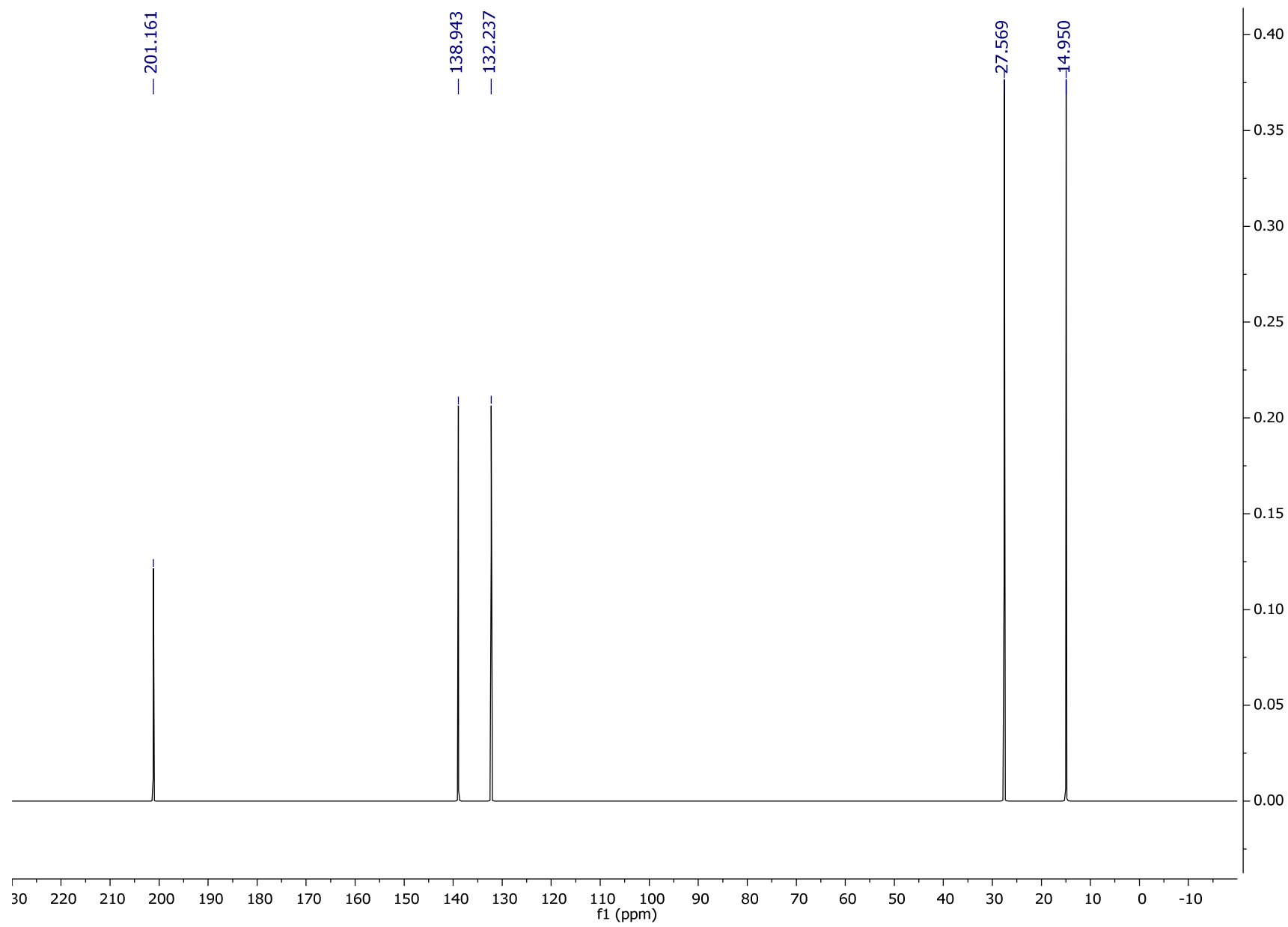
(I)



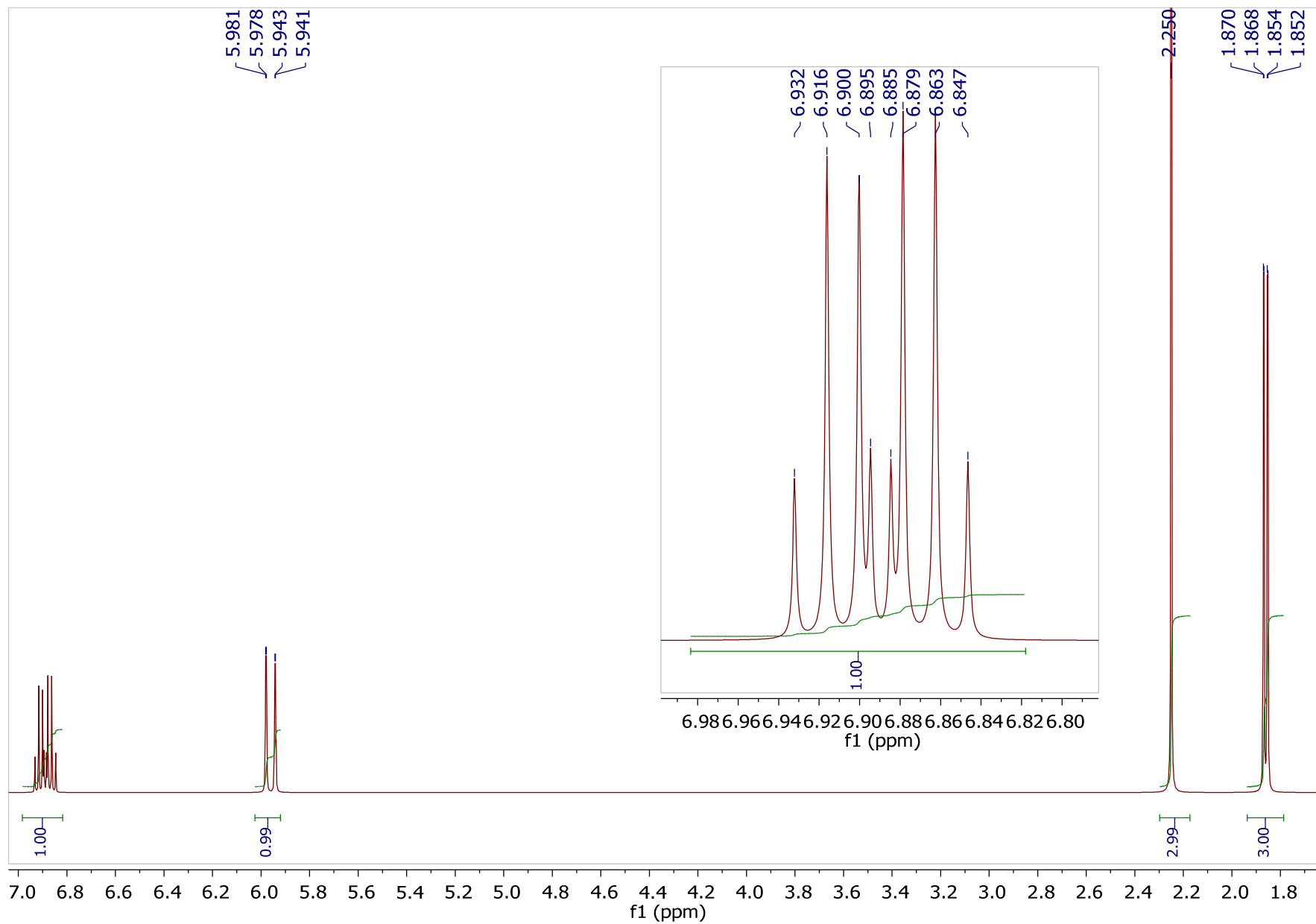
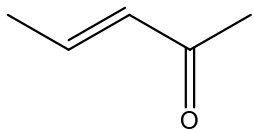
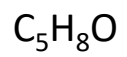
(m)



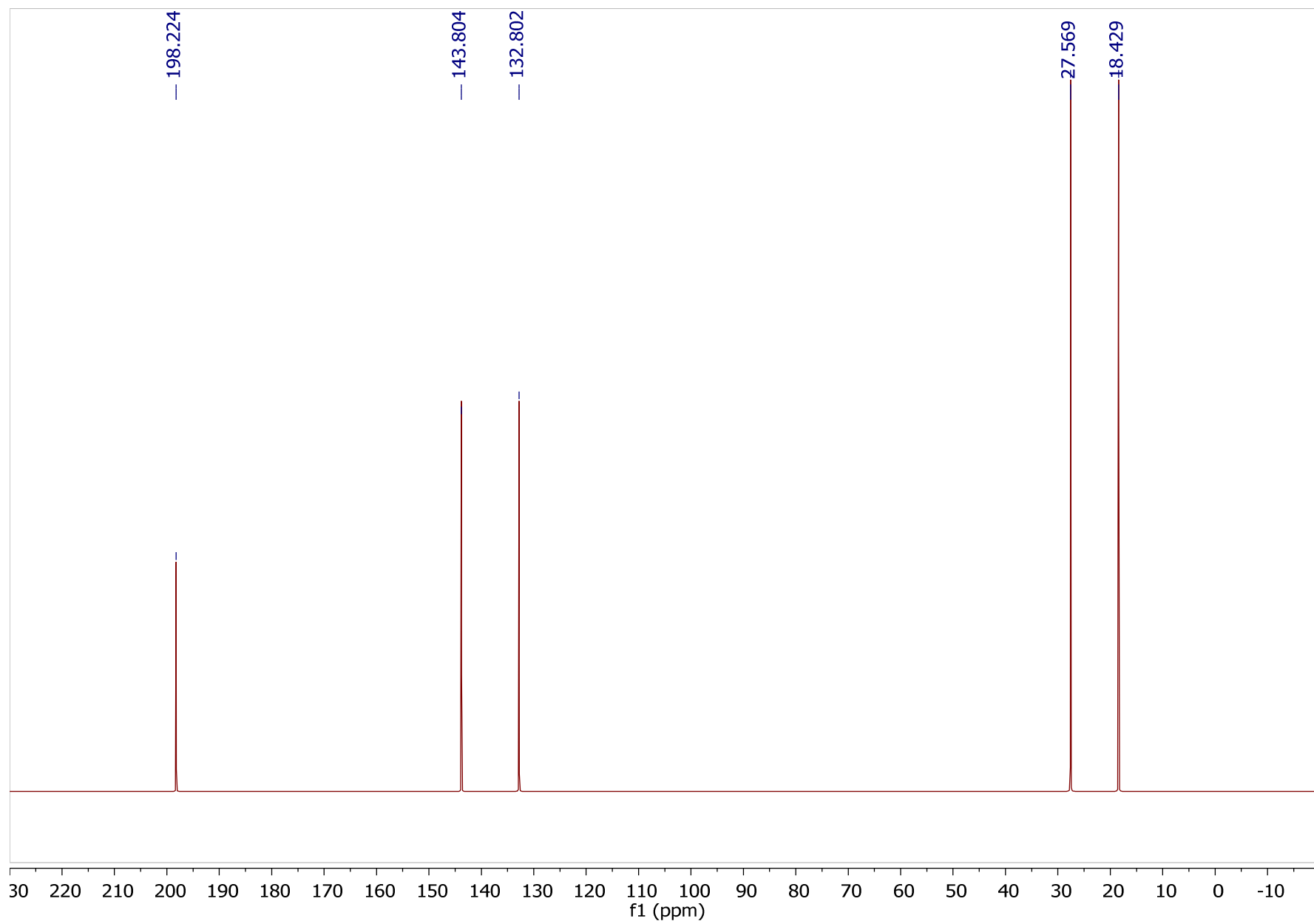
(m)



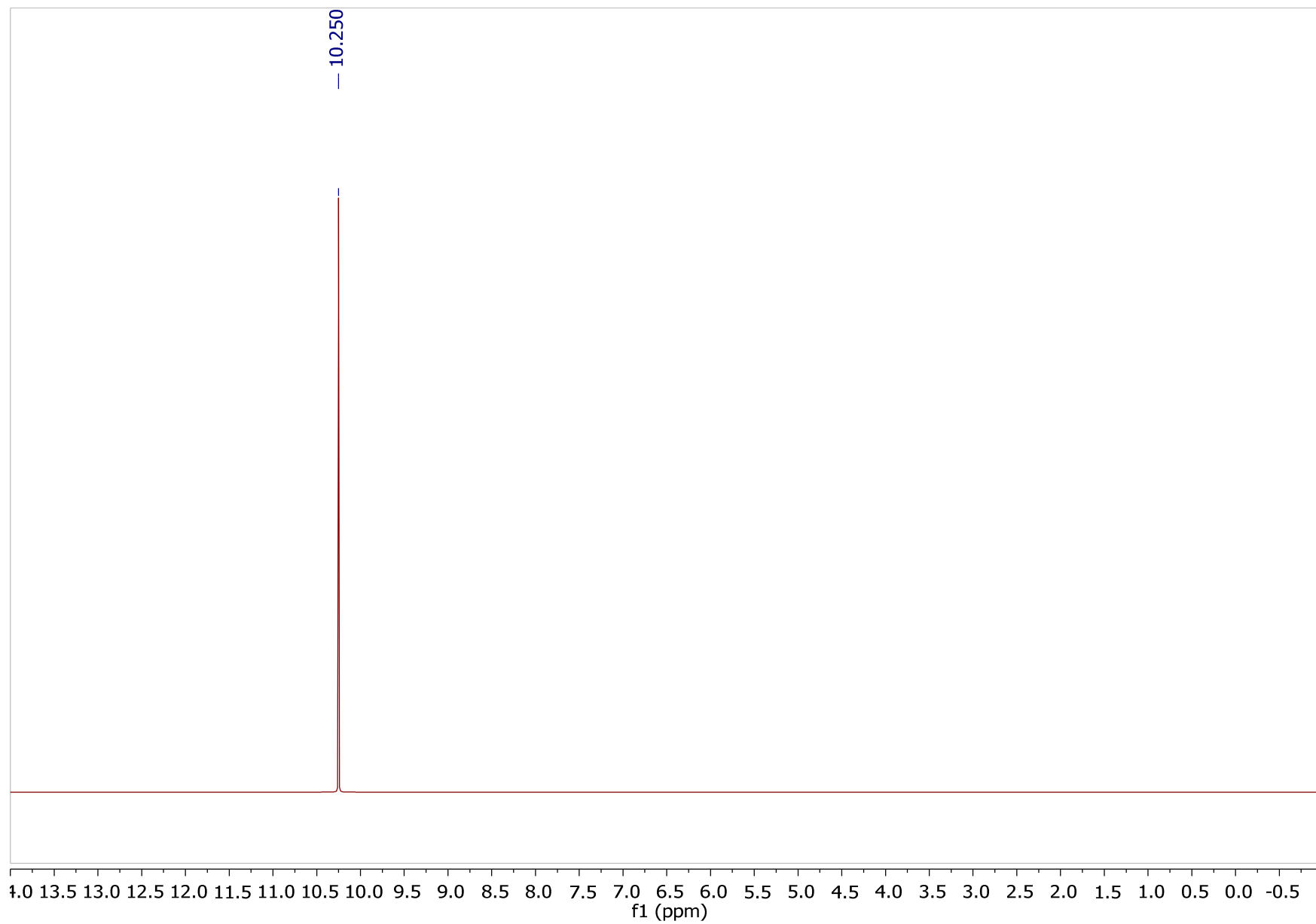
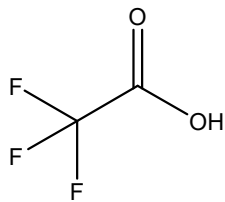
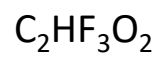
(n)



(n)

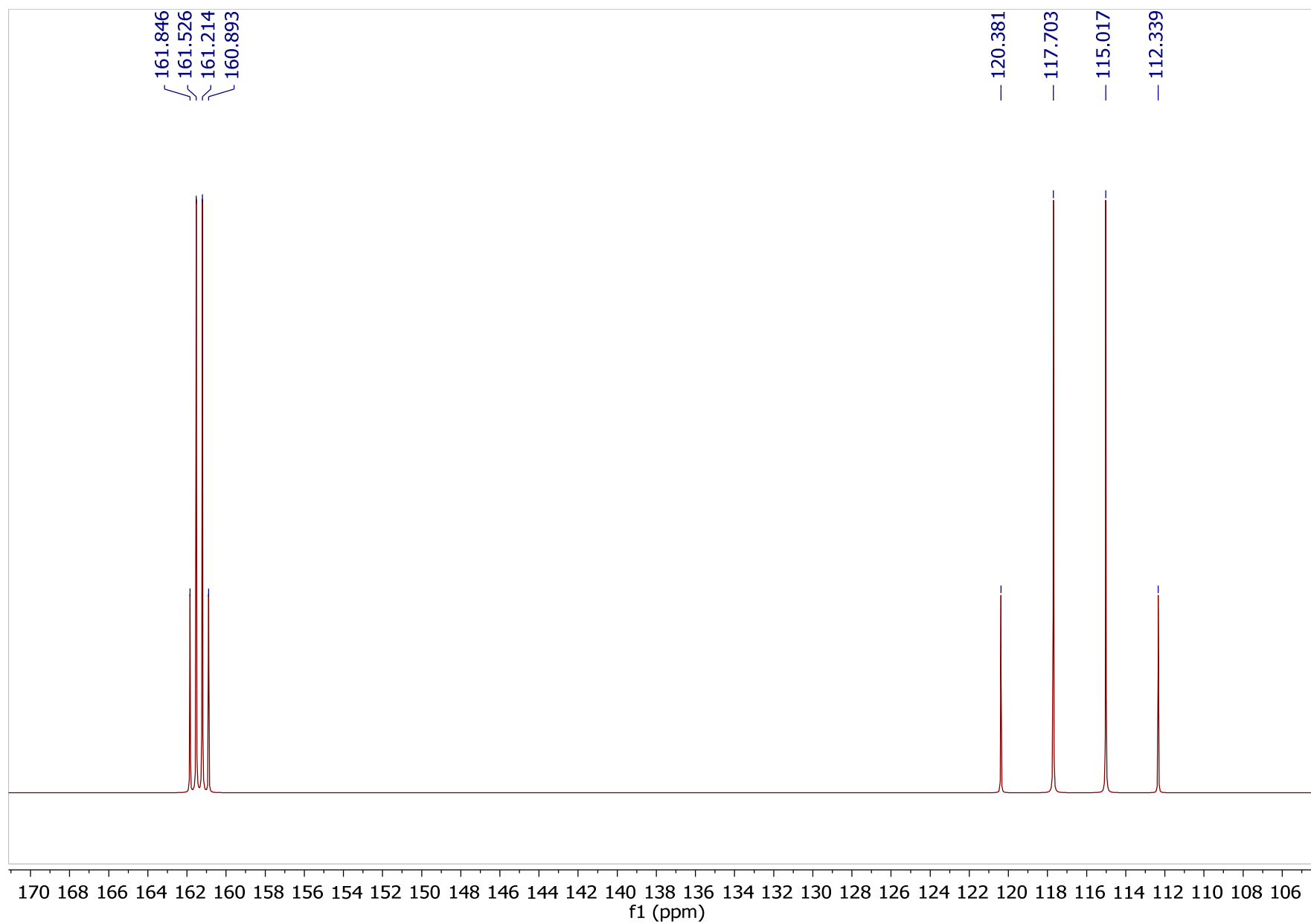


(o)

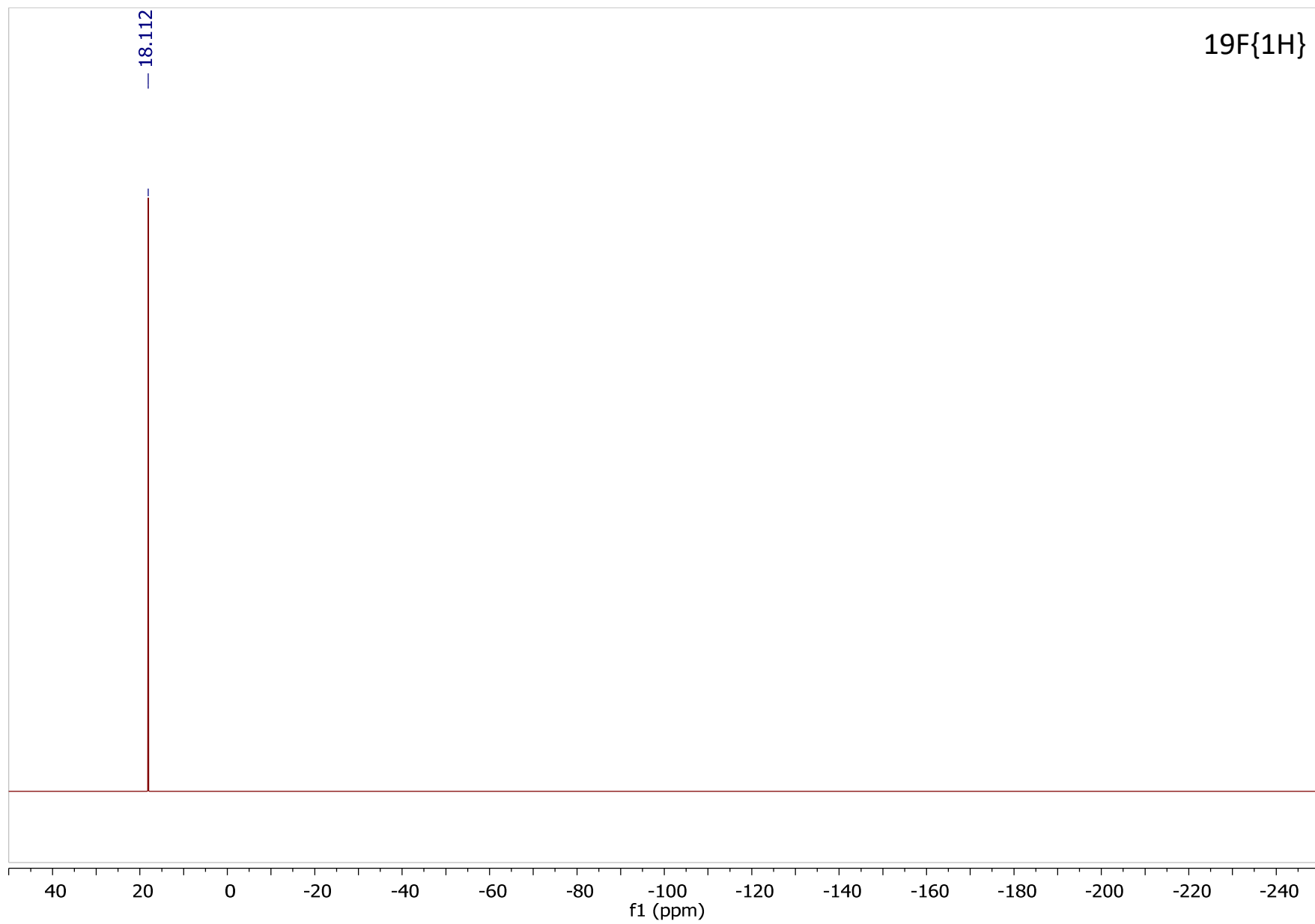




(o)



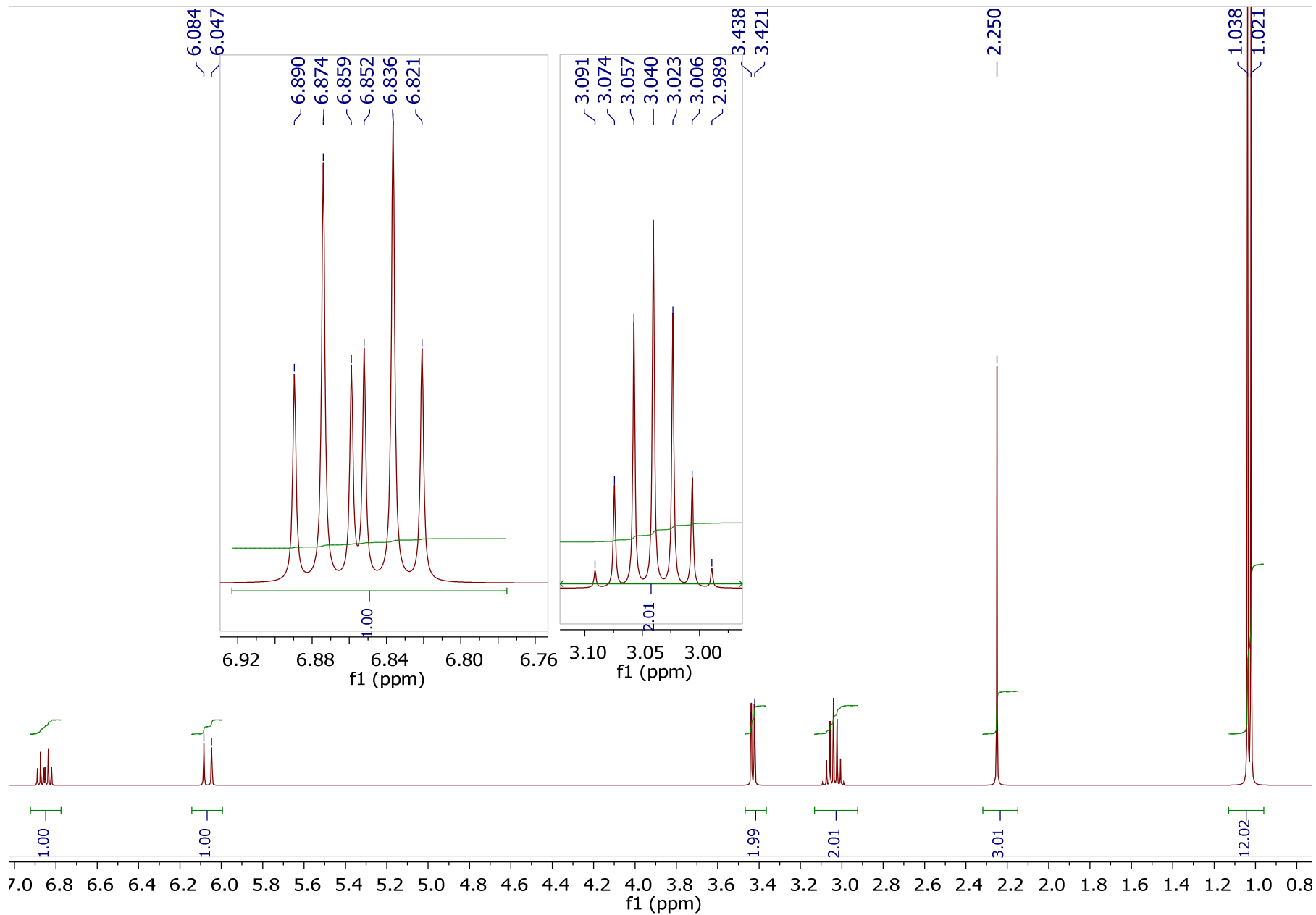
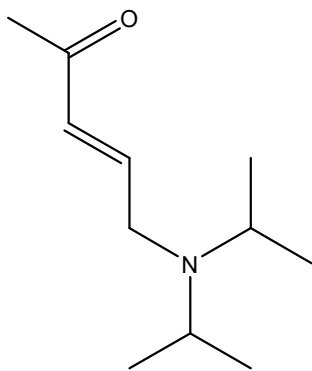
(o)



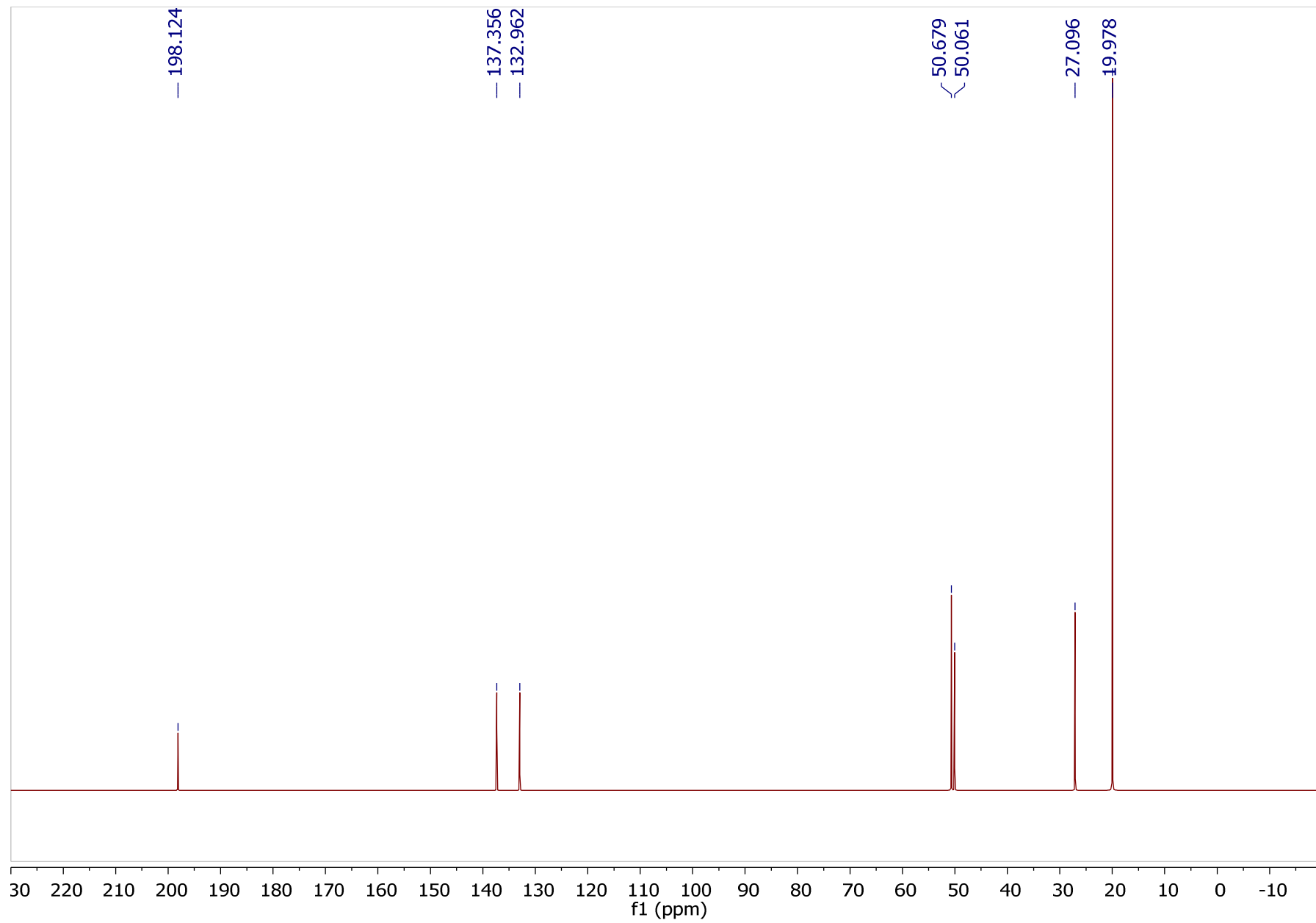
(p)

$C_{11}H_{21}NO$

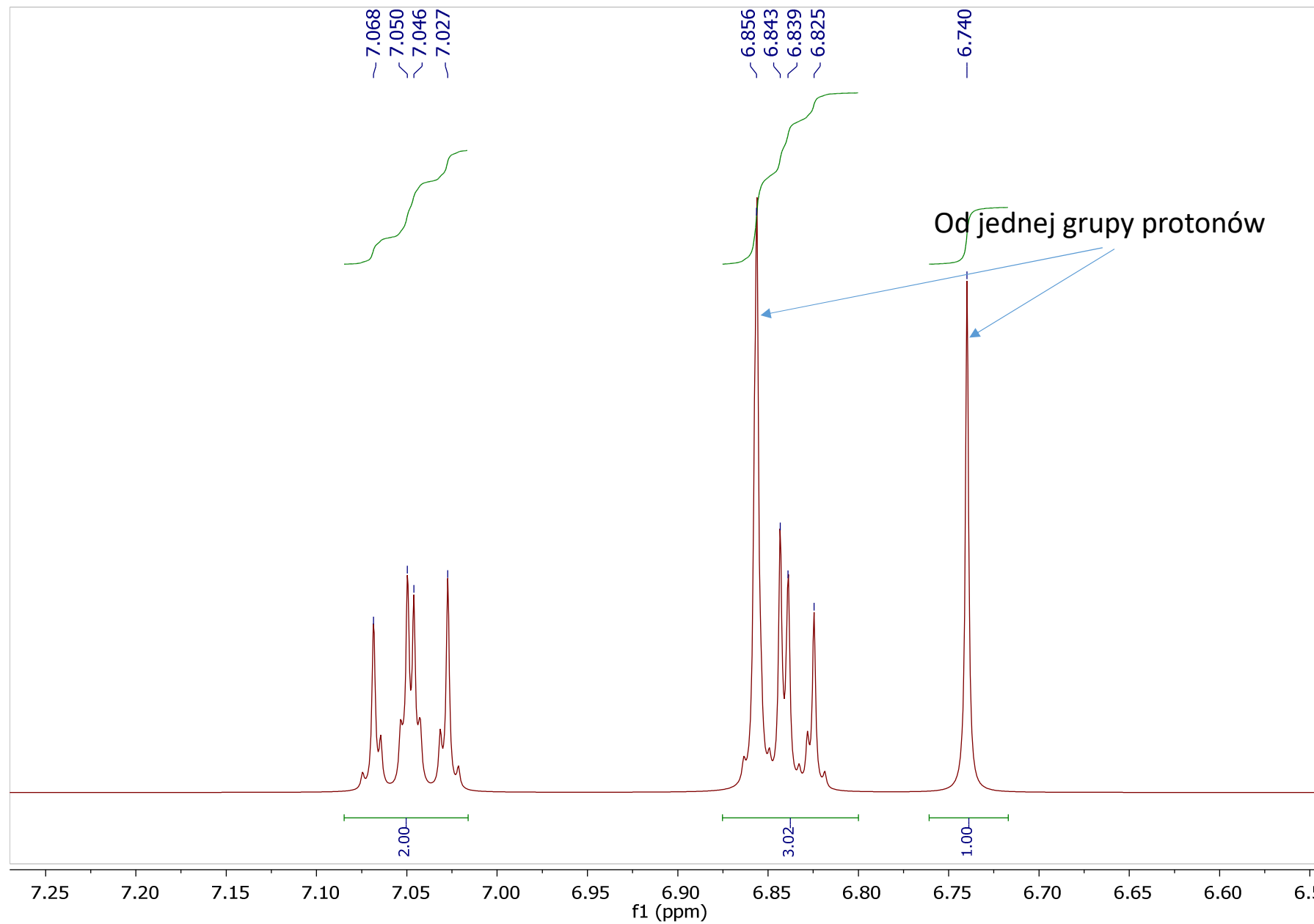
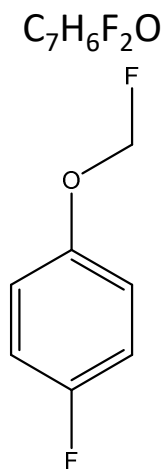
3-rzędowa amina



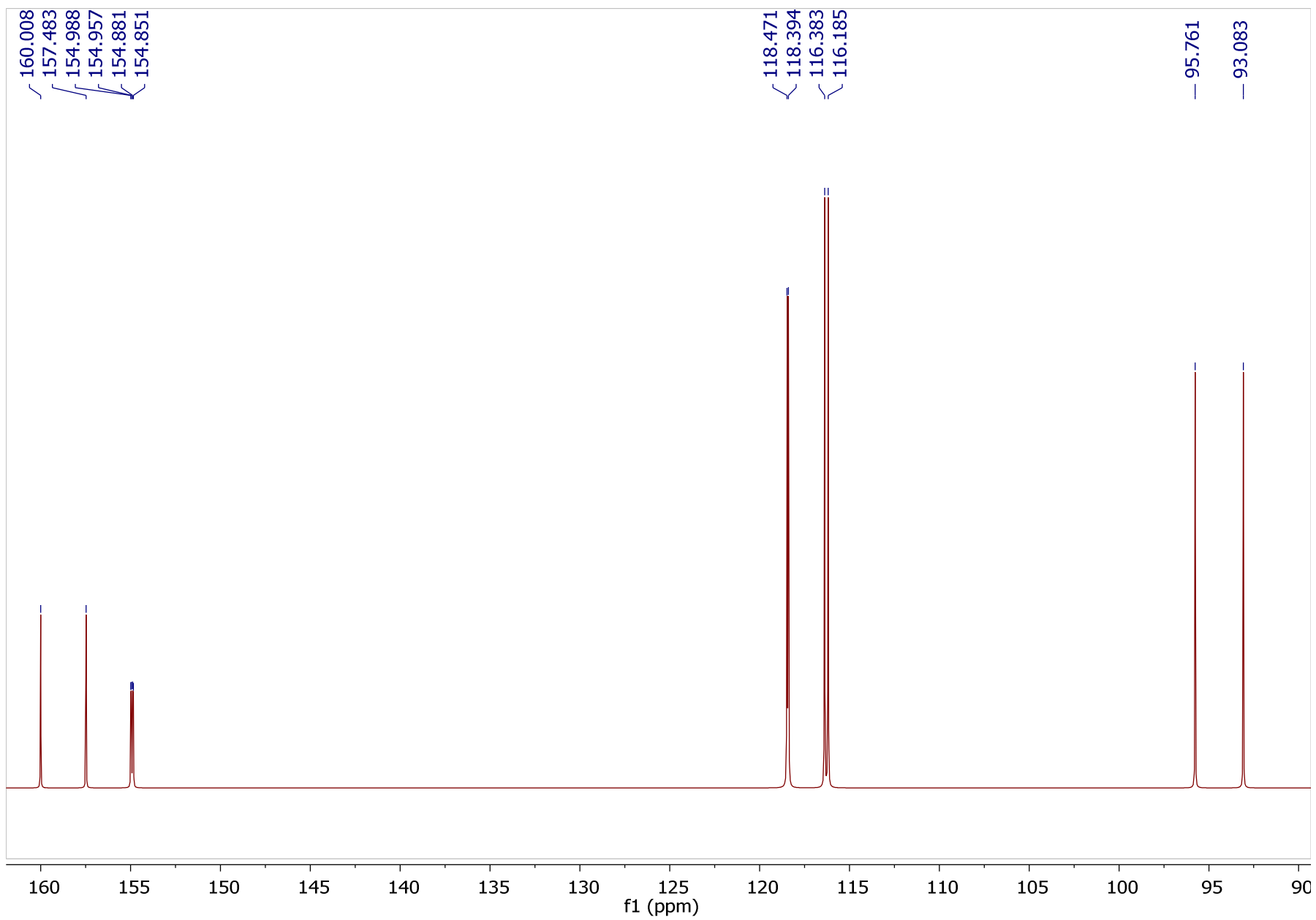
(p)



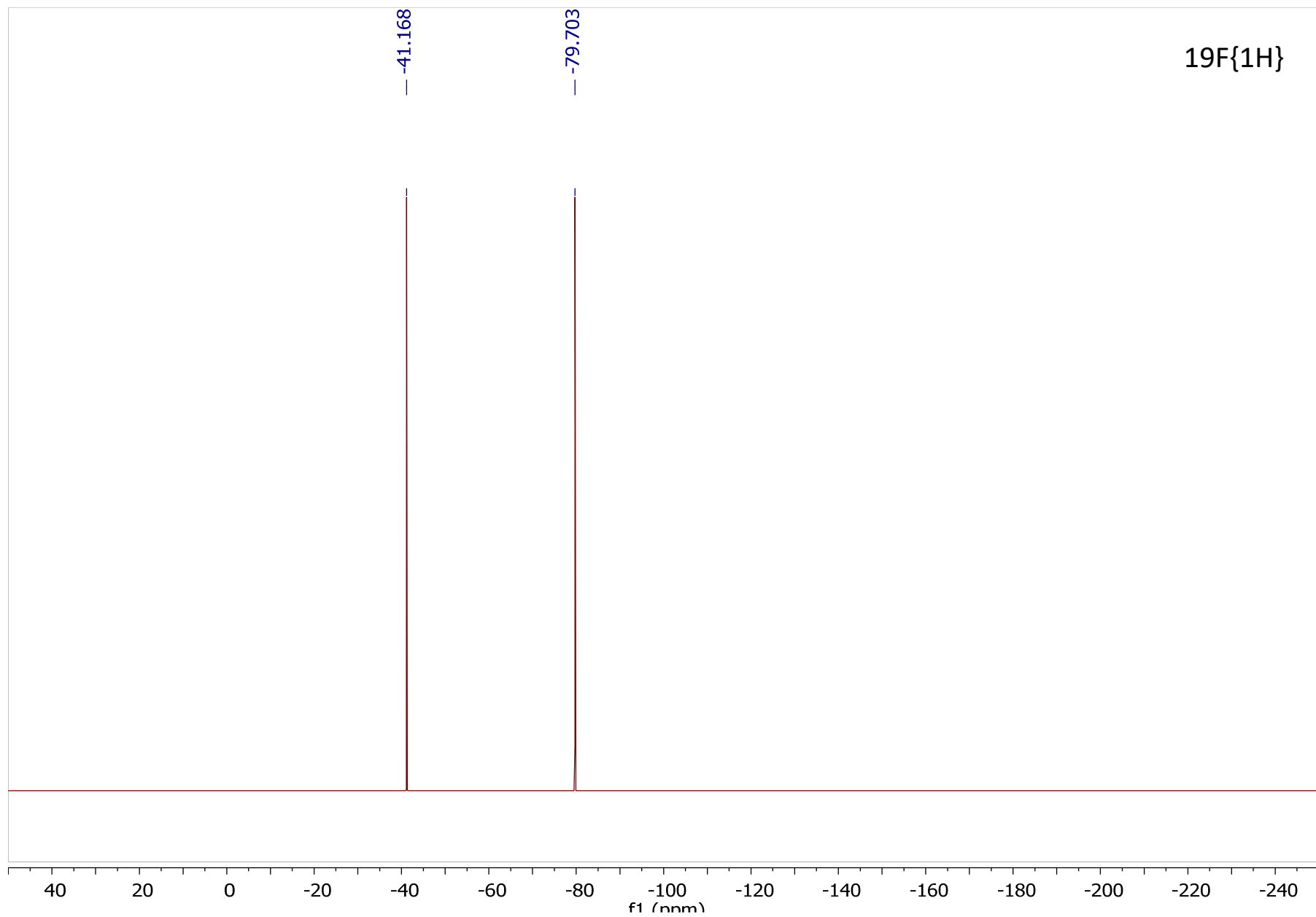
(r)



(r)

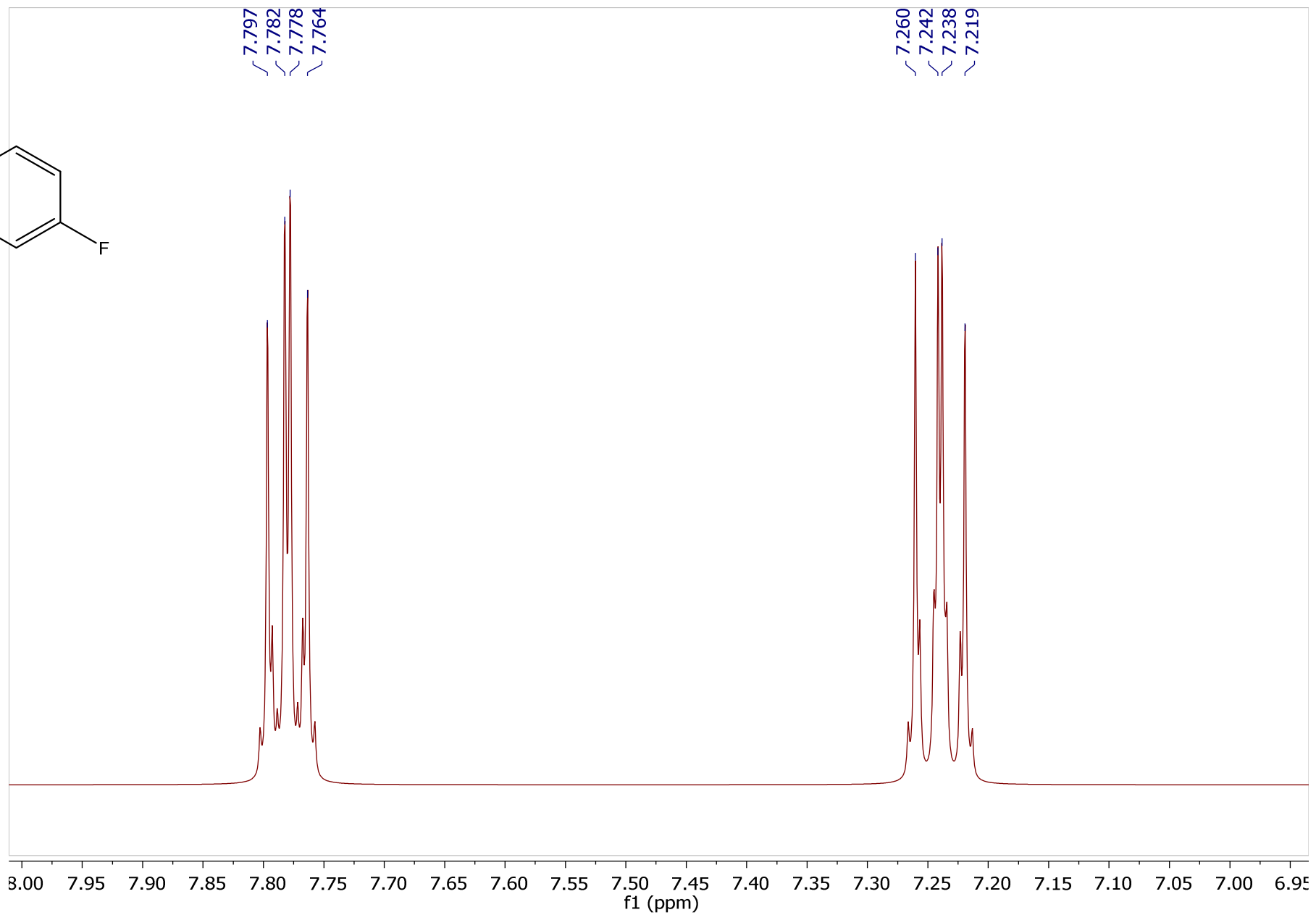
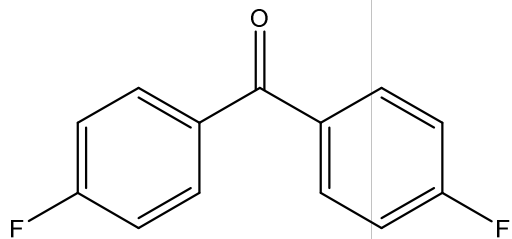


(r)



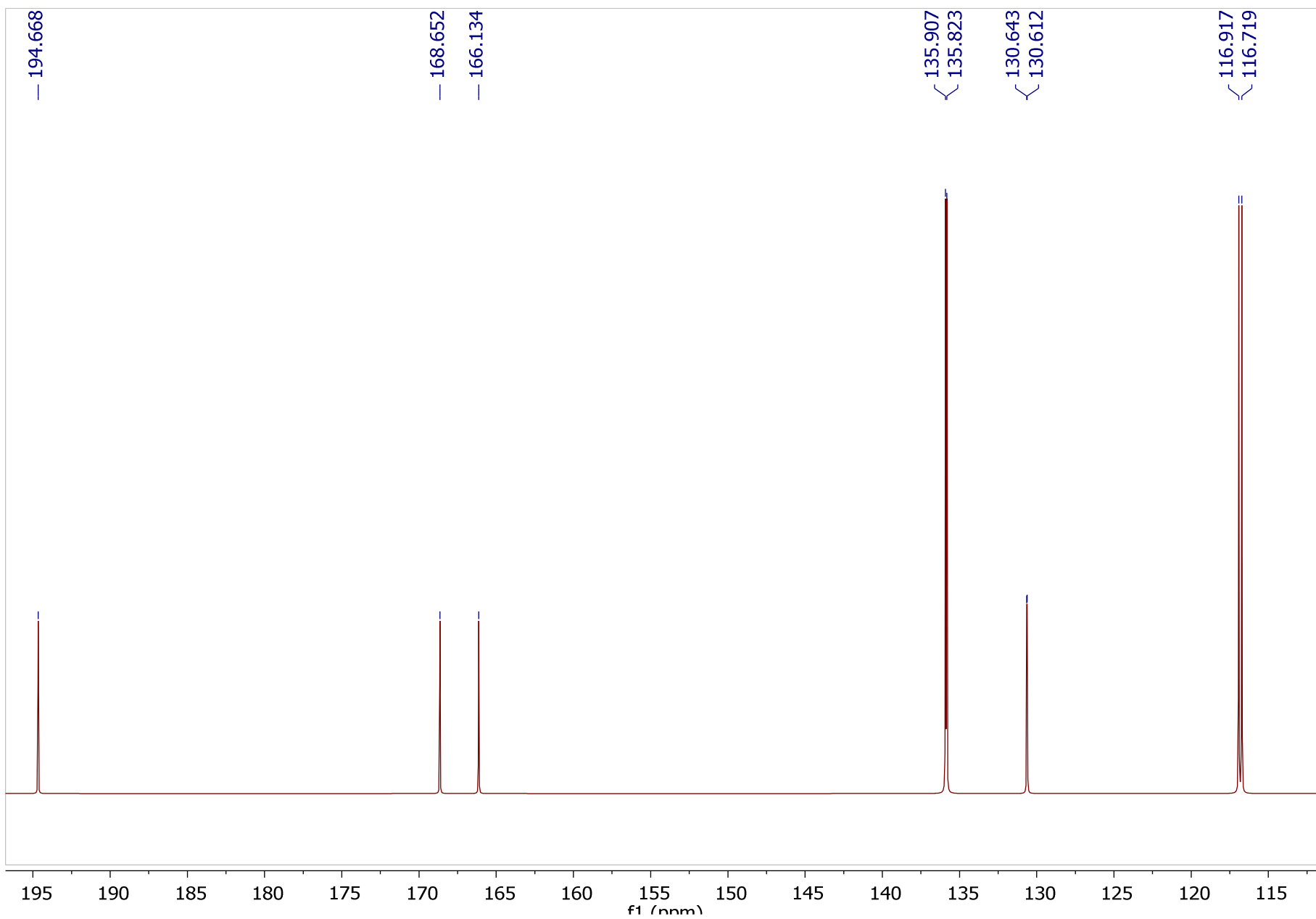
(s)

$C_{13}H_8F_2O$

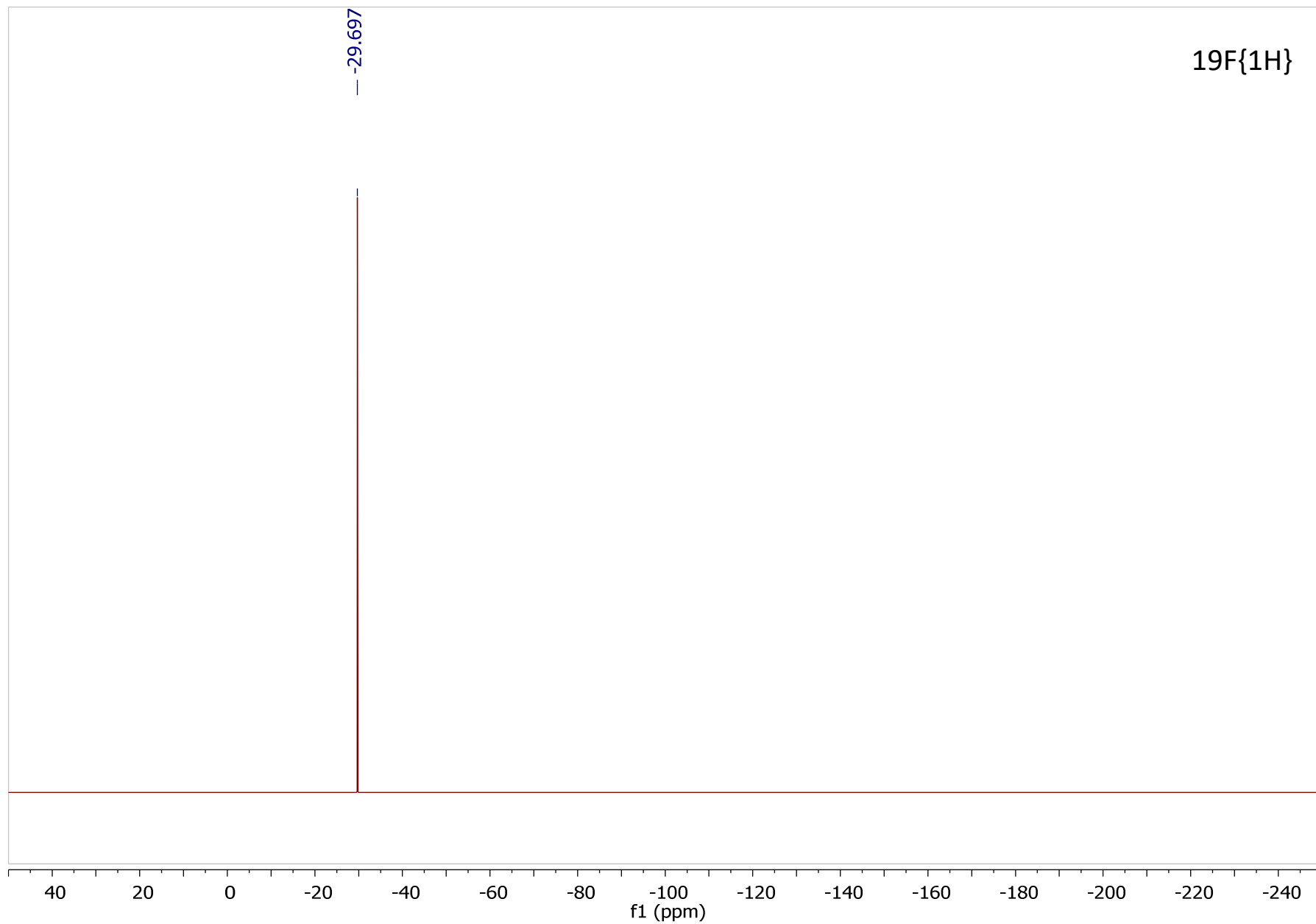




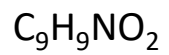
(s)



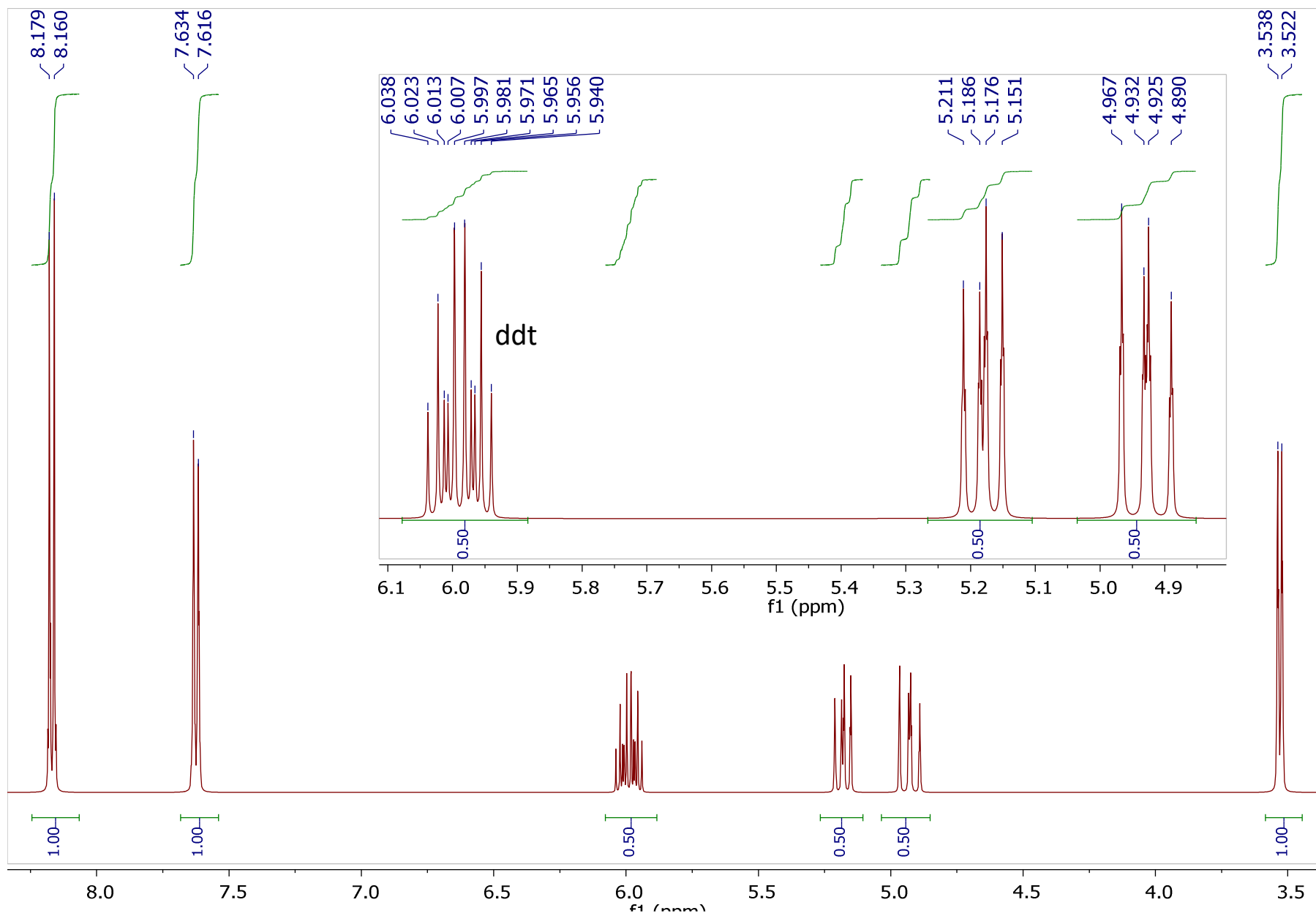
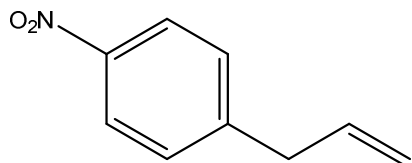
(s)



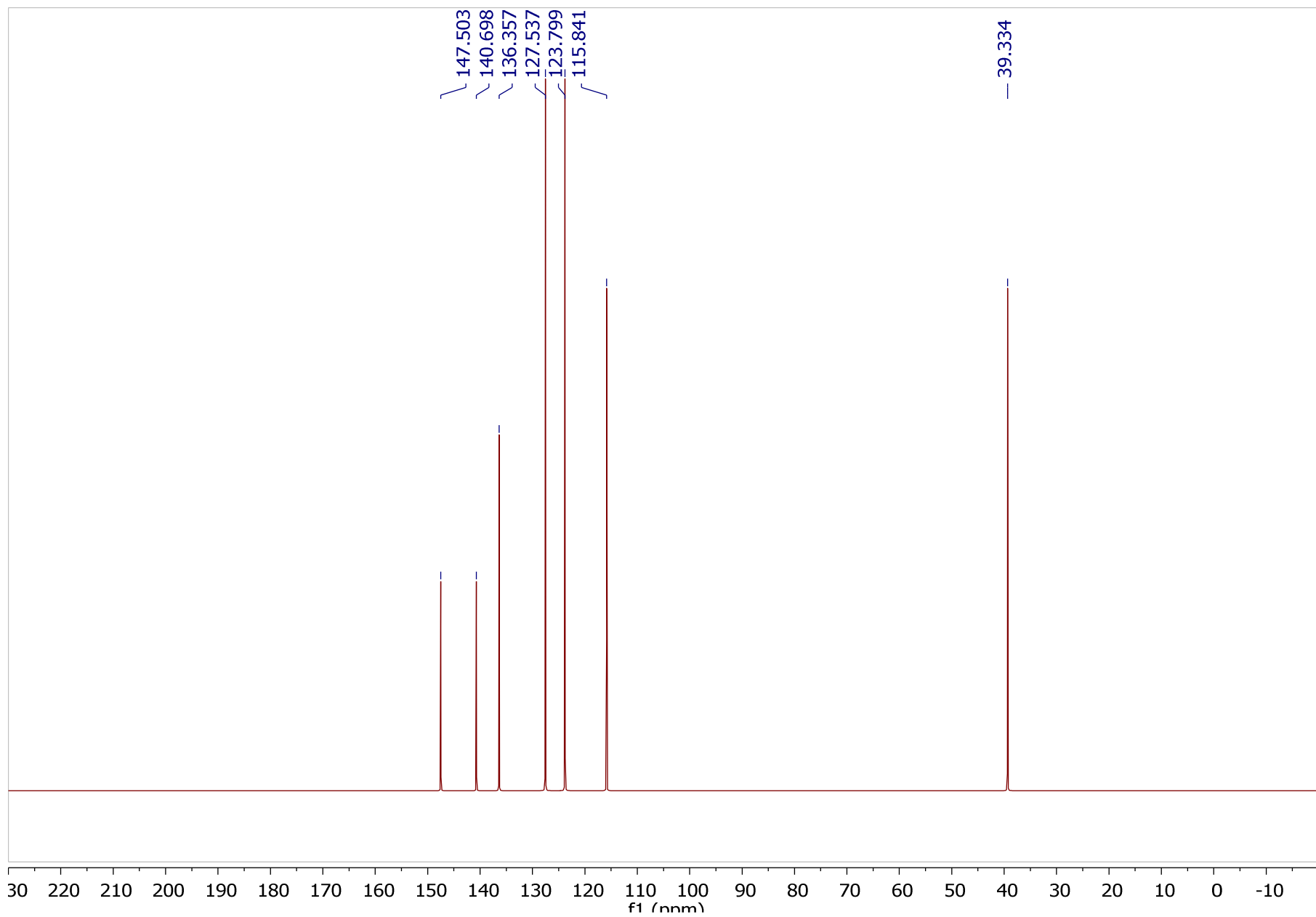
(t)



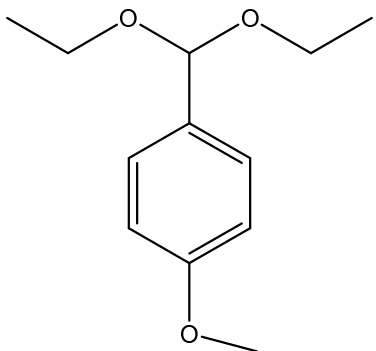
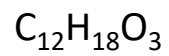
IR: Intensywne pasma  
 $1650\text{ cm}^{-1}$ ,  $1535\text{ cm}^{-1}$ ,  
 $1350\text{ cm}^{-1}$



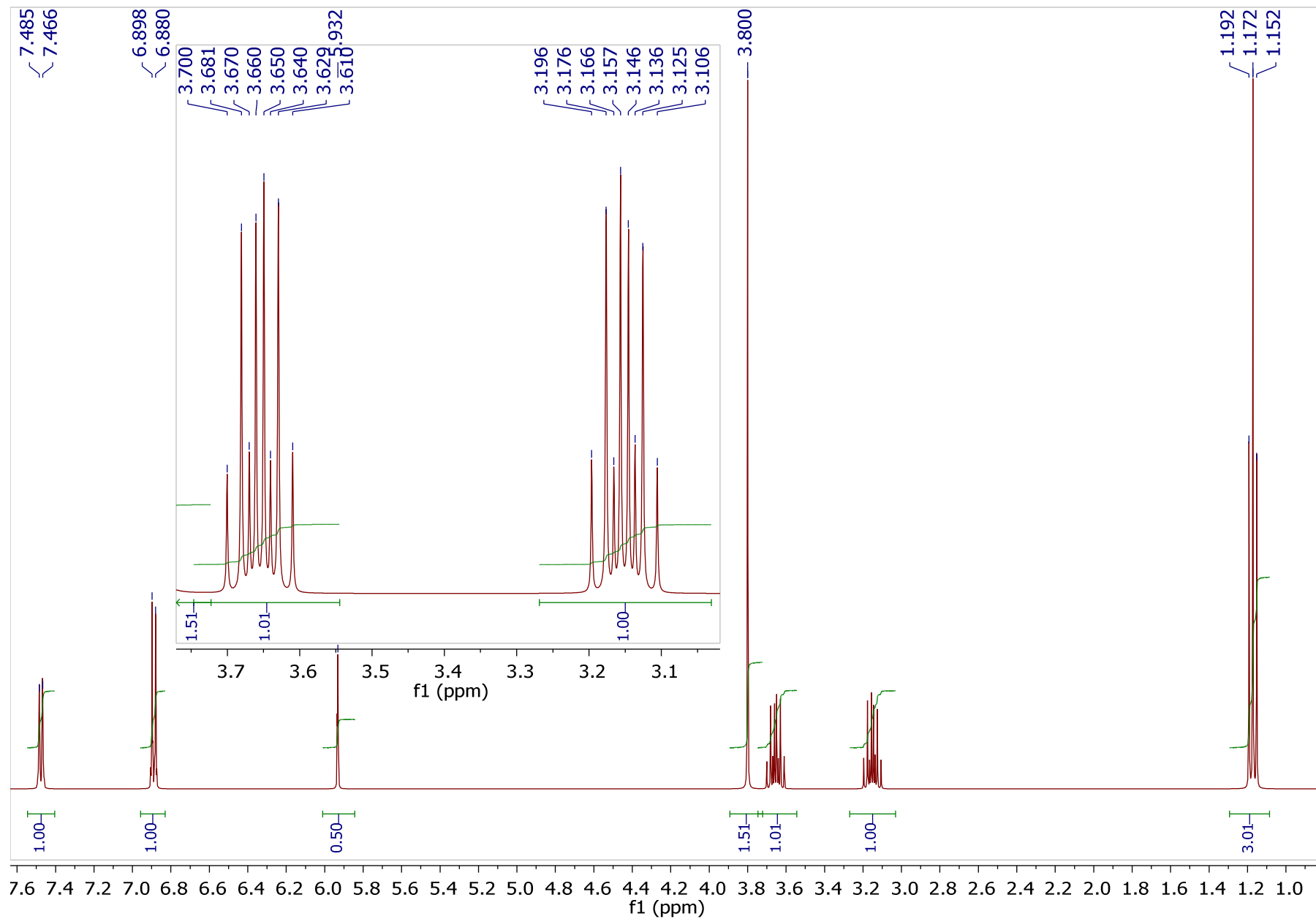
(t)



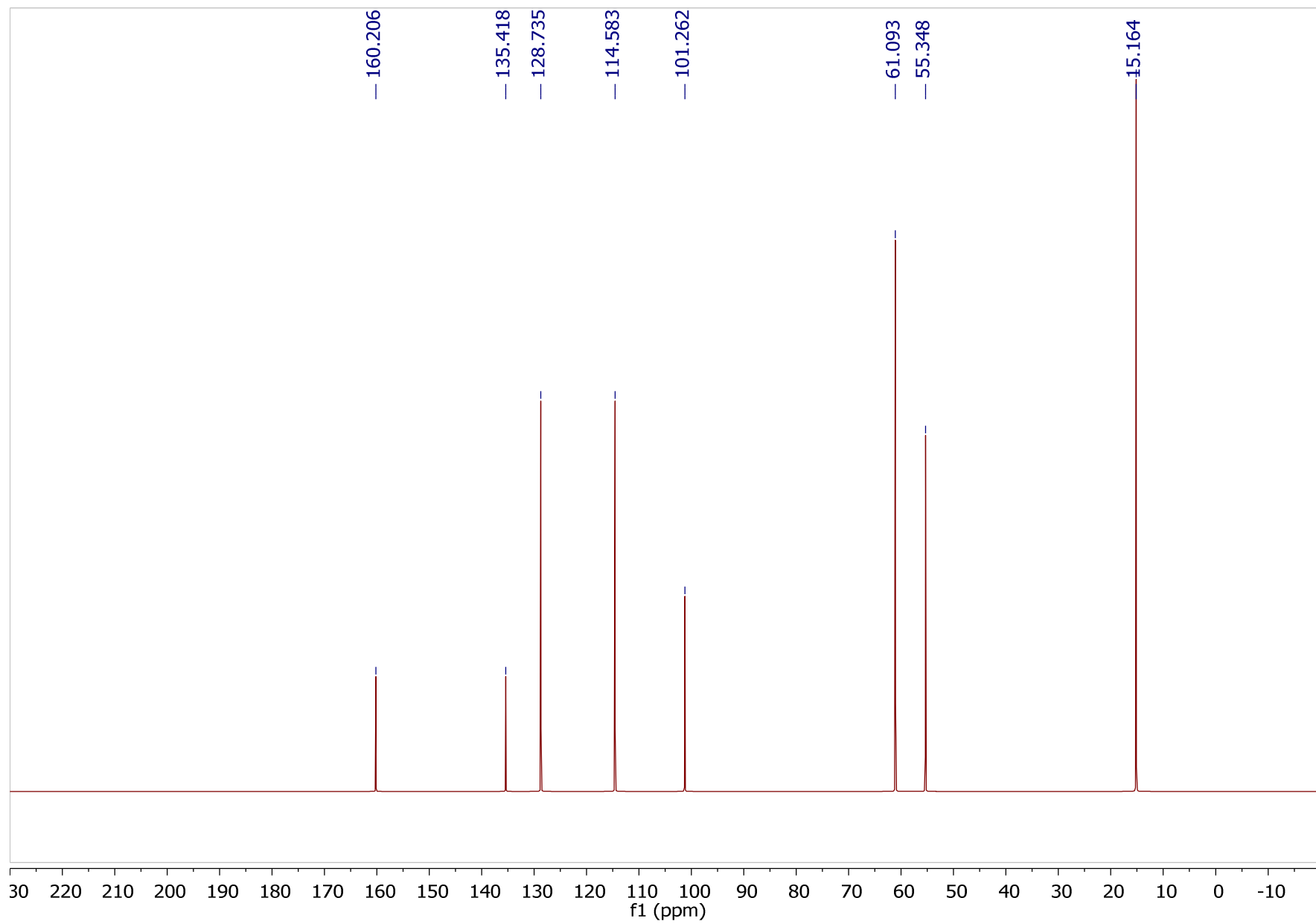
(u)



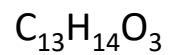
Związek jest achiralny



(u)

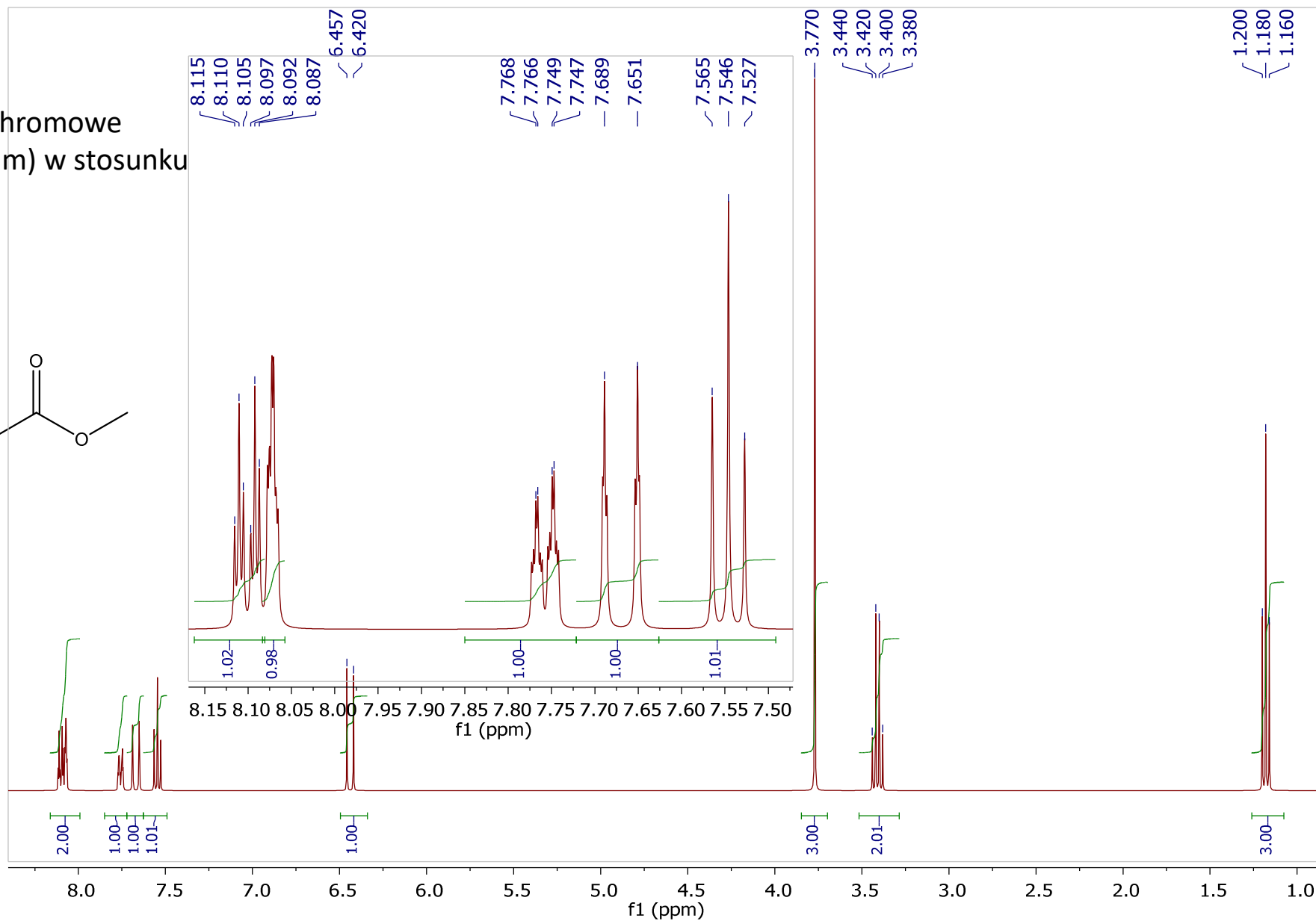
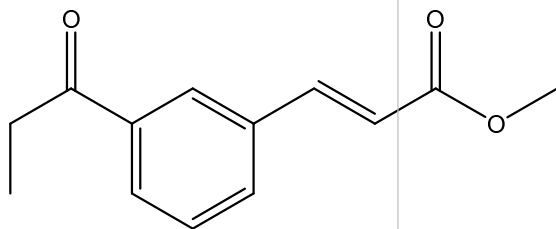


(w)

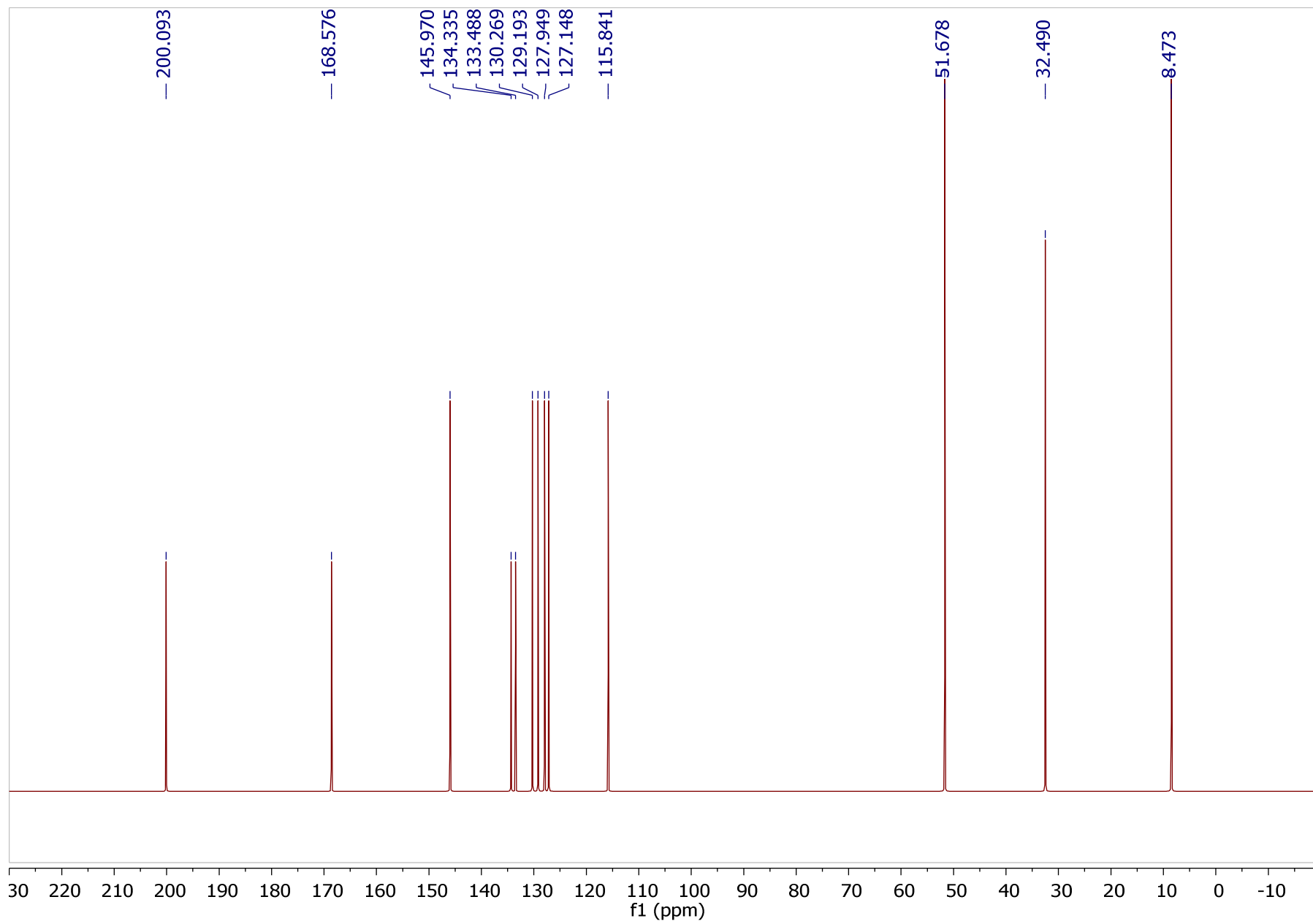


Silne przesunięcie batochromowe  
W widmie UV-Vis (380 nm) w stosunku  
Do benzenu

o, m, p?



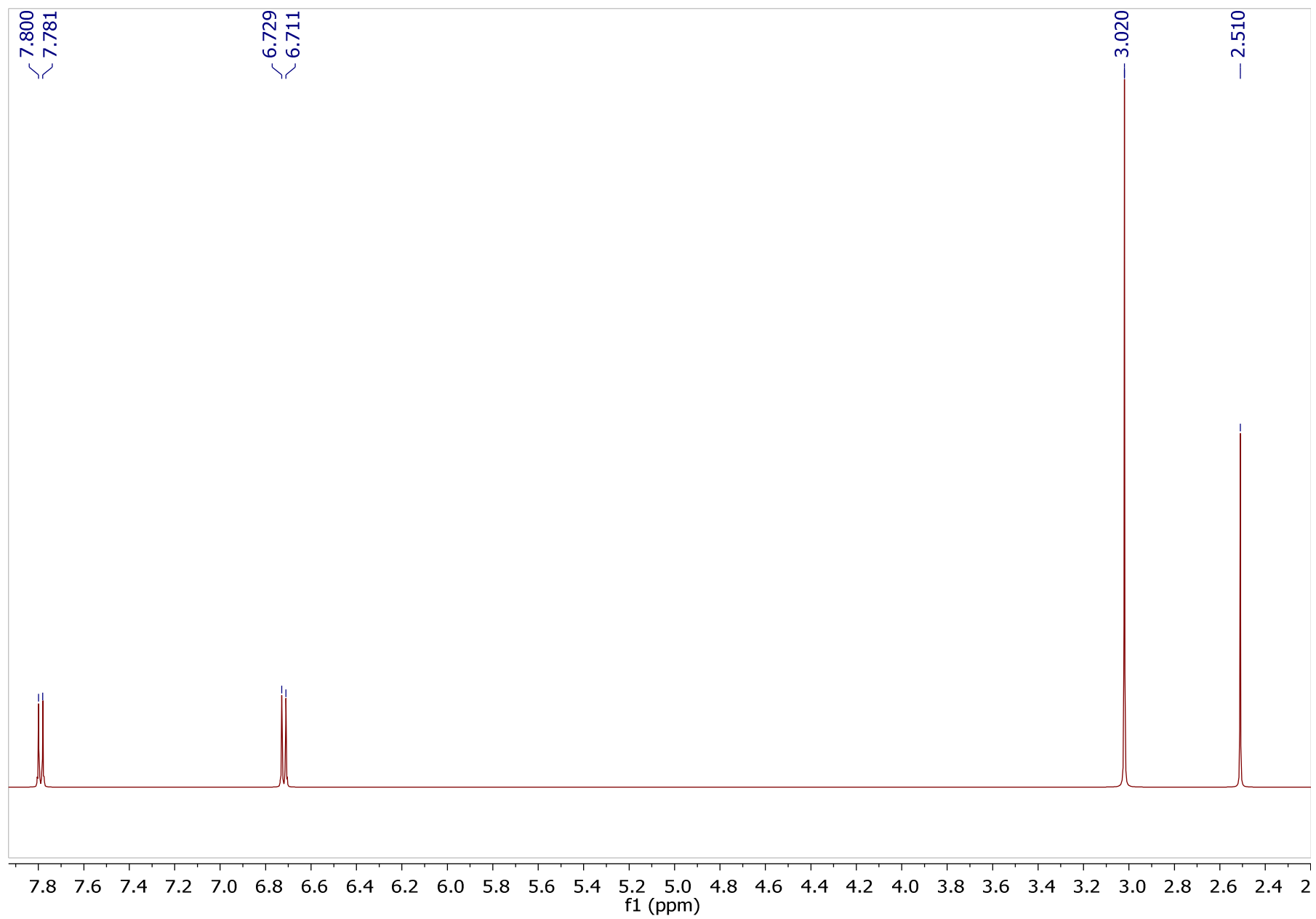
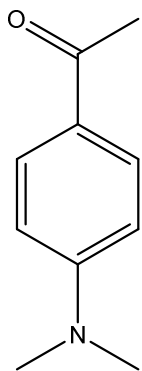
(w)



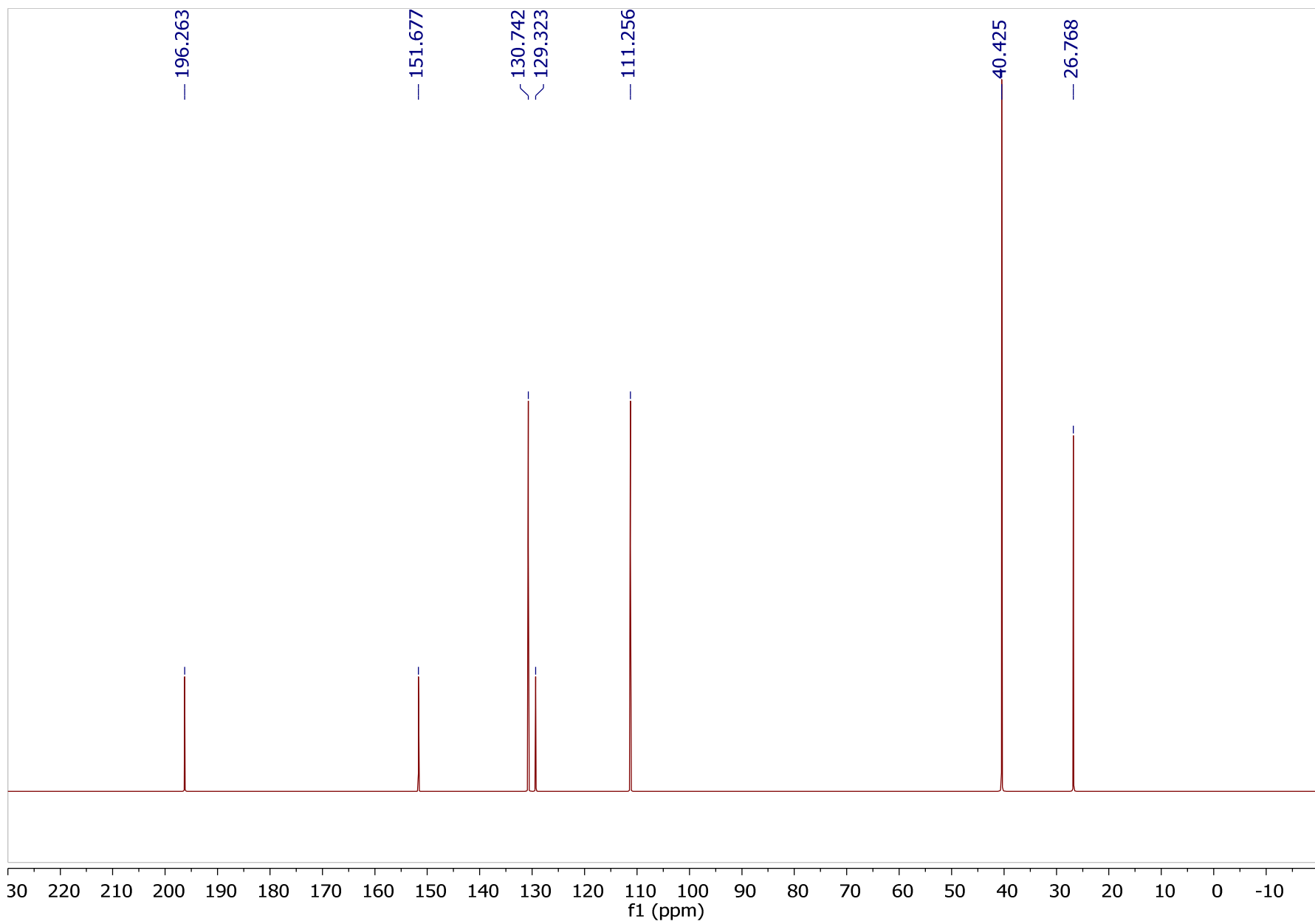


(x)

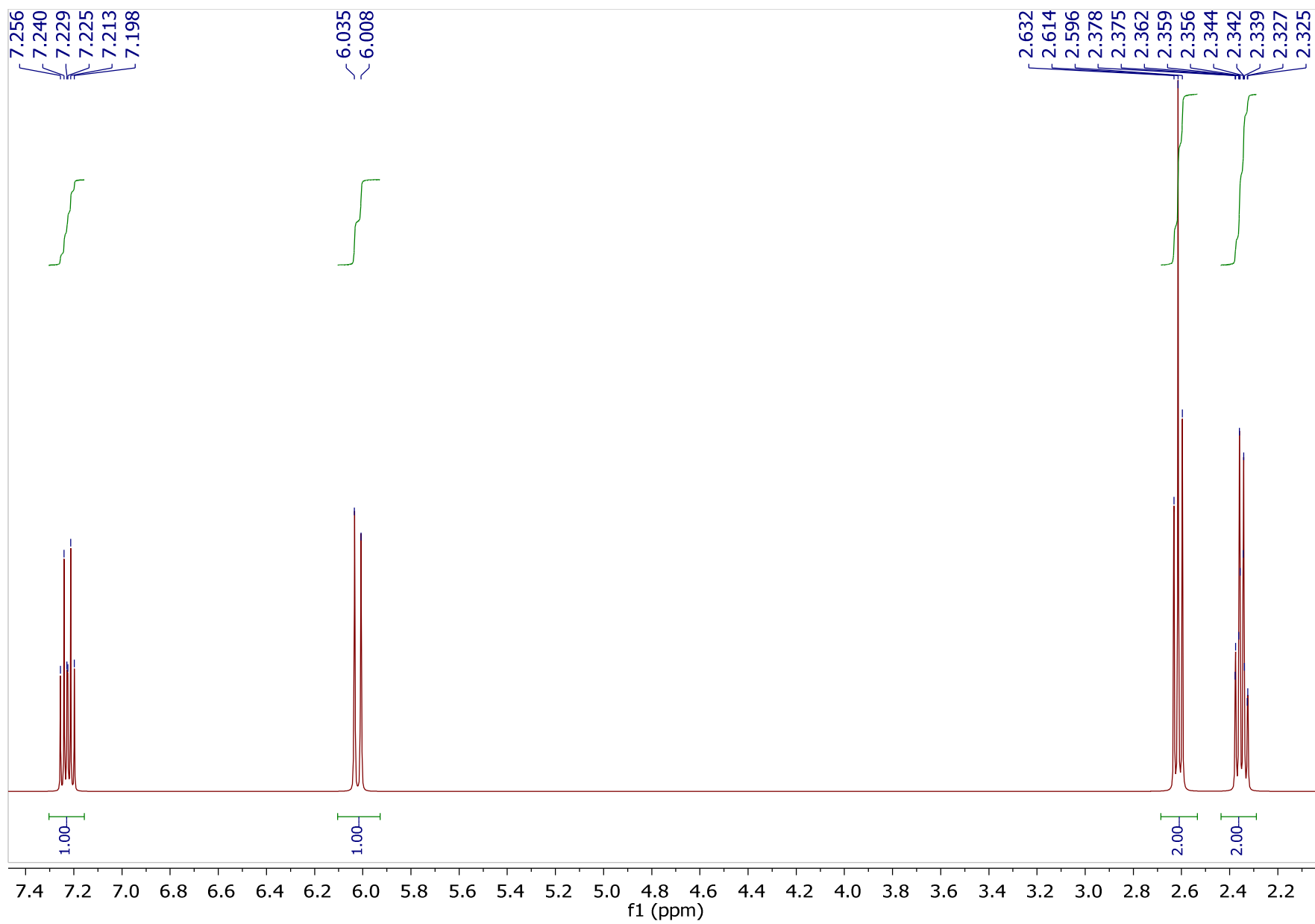
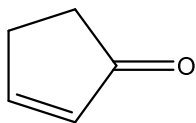
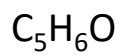
$C_{10}H_{13}NO$



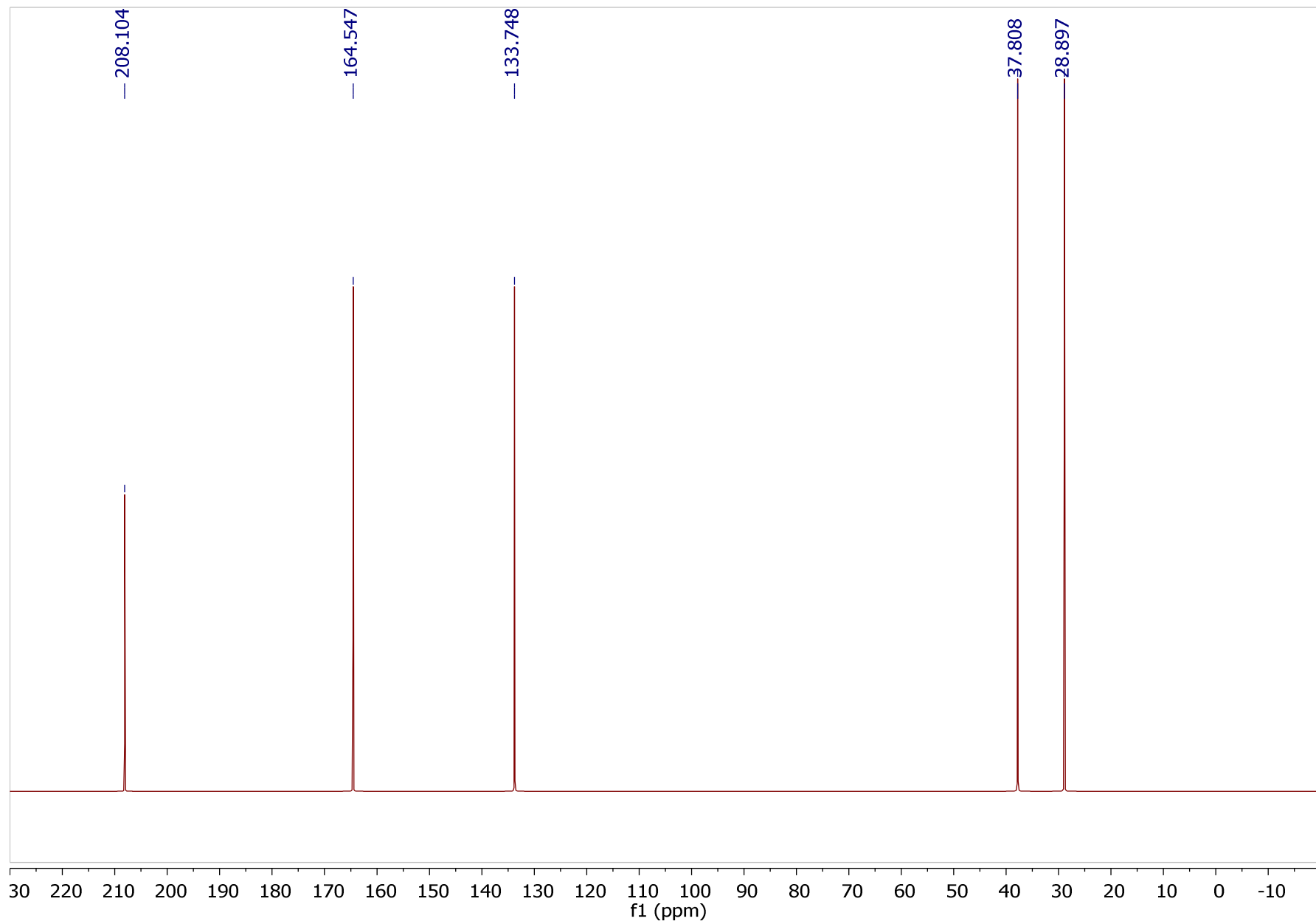
(x)



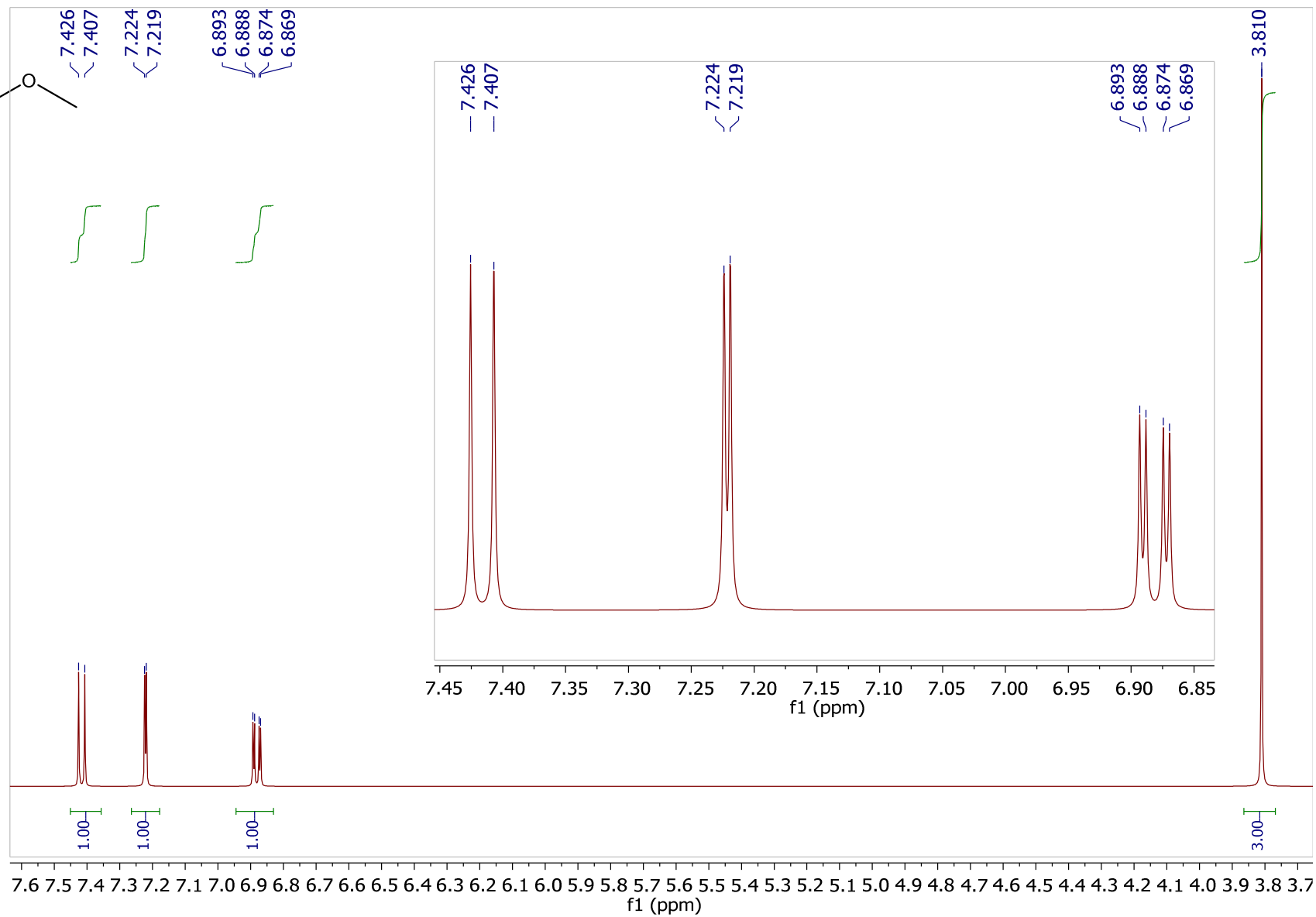
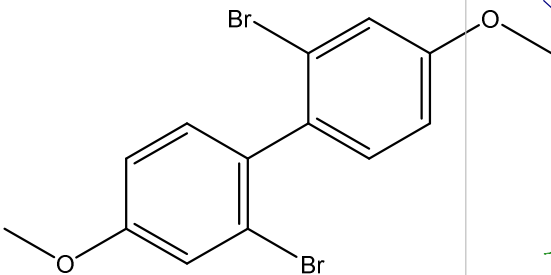
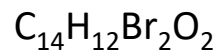
(y)



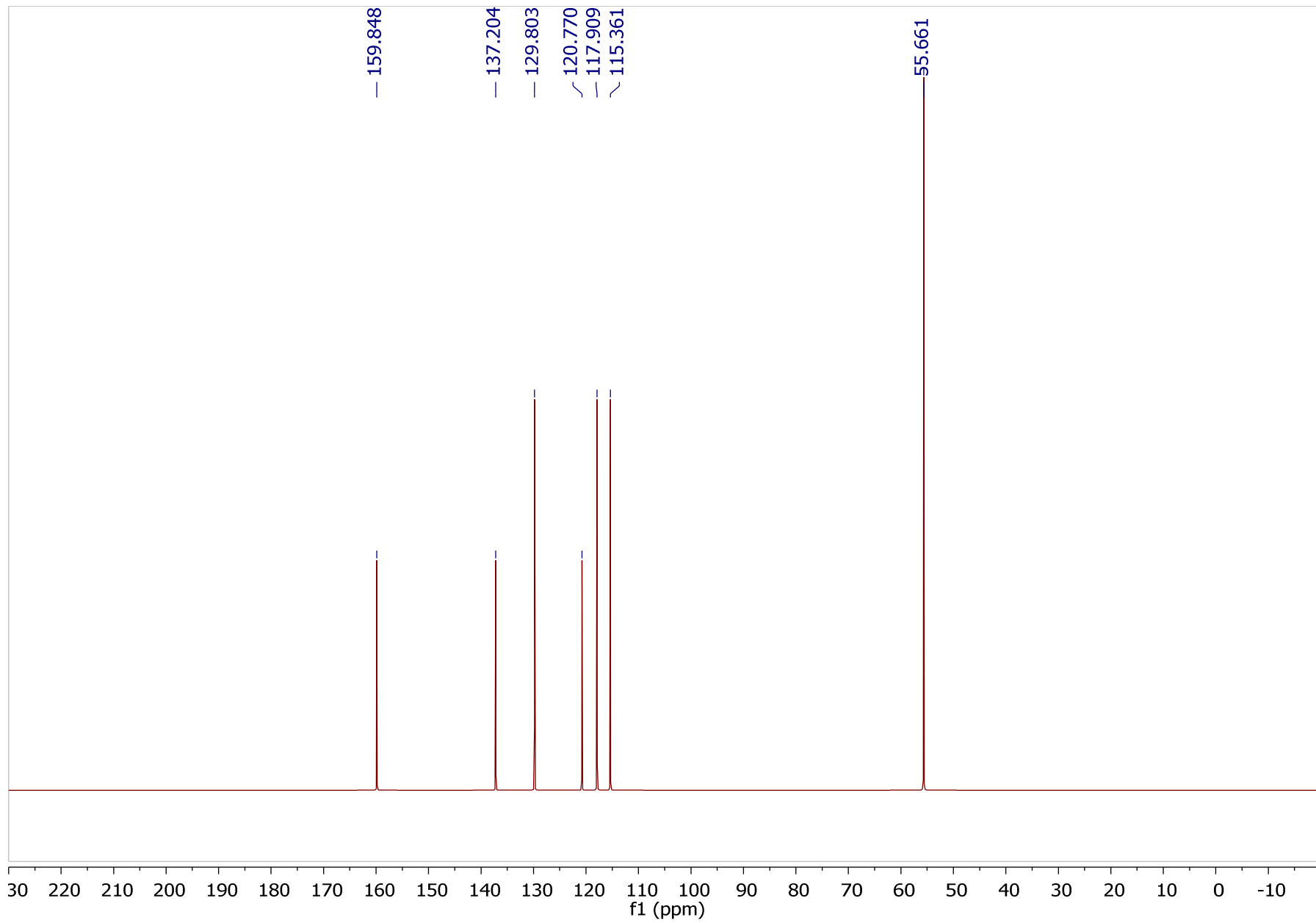
(y)



(z)

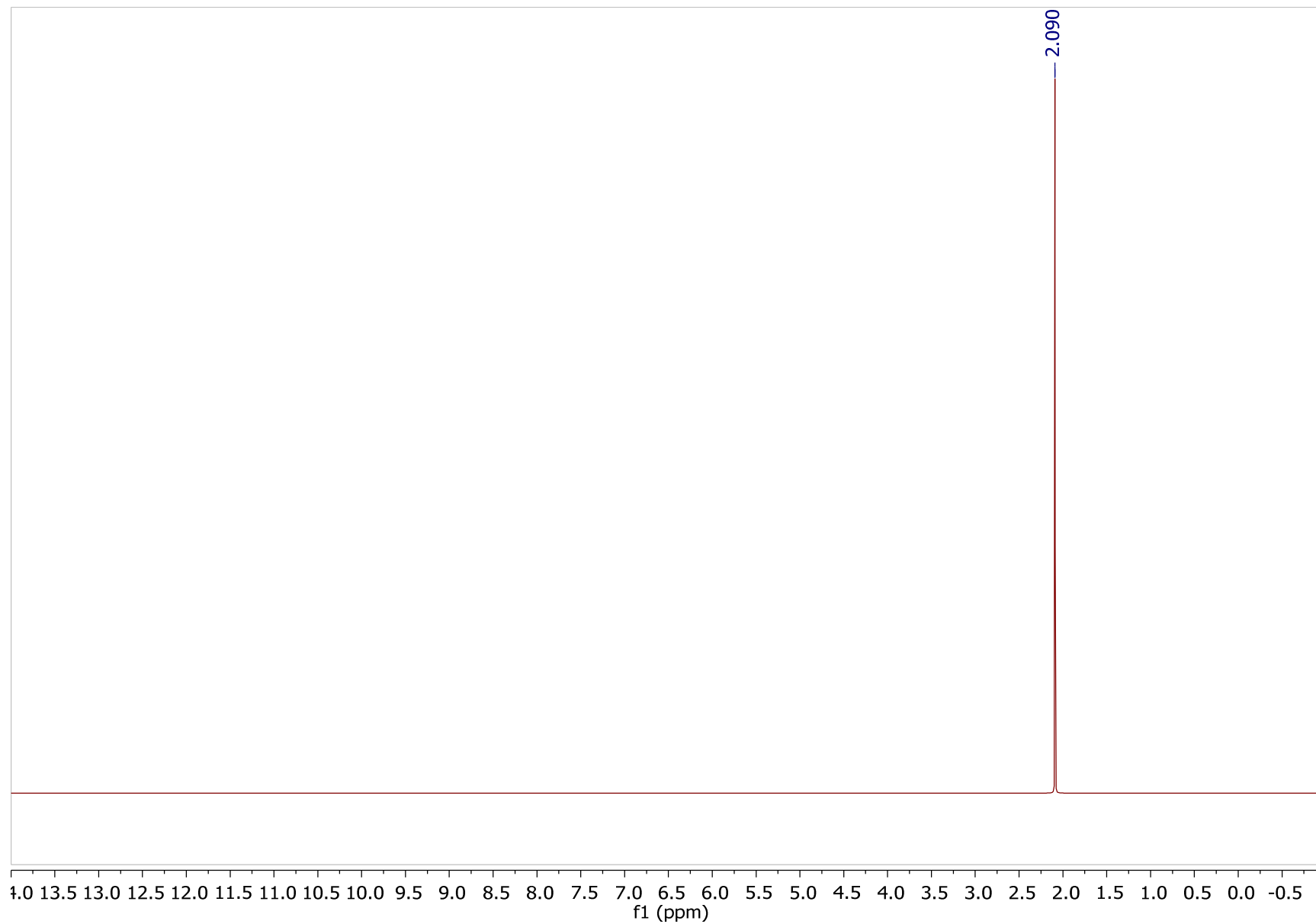


(z)



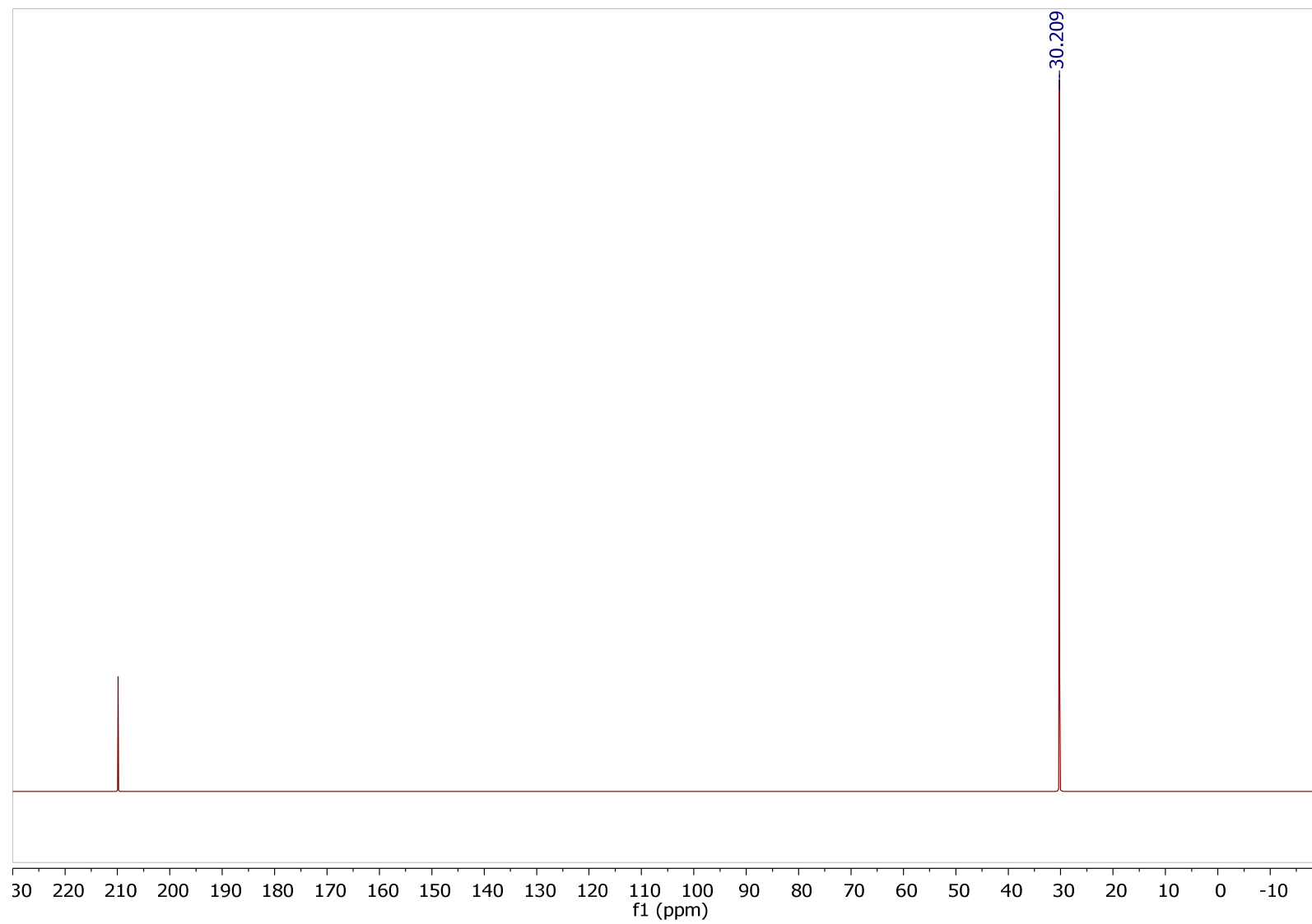
**Zadanie 2.** Na podstawie widm  $^1\text{H}$  (400 MHz),  $^{13}\text{C}\{^1\text{H}\}$  NMR (100 MHz) określ struktury izomerycznych związków chemicznych o wzorze sumarycznym  $\text{C}_3\text{H}_6\text{O}$ . Przypisz sygnały odpowiednim grupą protonów, określ stosunek intensywności sygnałów, oraz intensywność sygnałów w multiplicie, zapisz skrótową wersję widma. Widma zmierzono na aparacie Agilent 400 MHz.

I

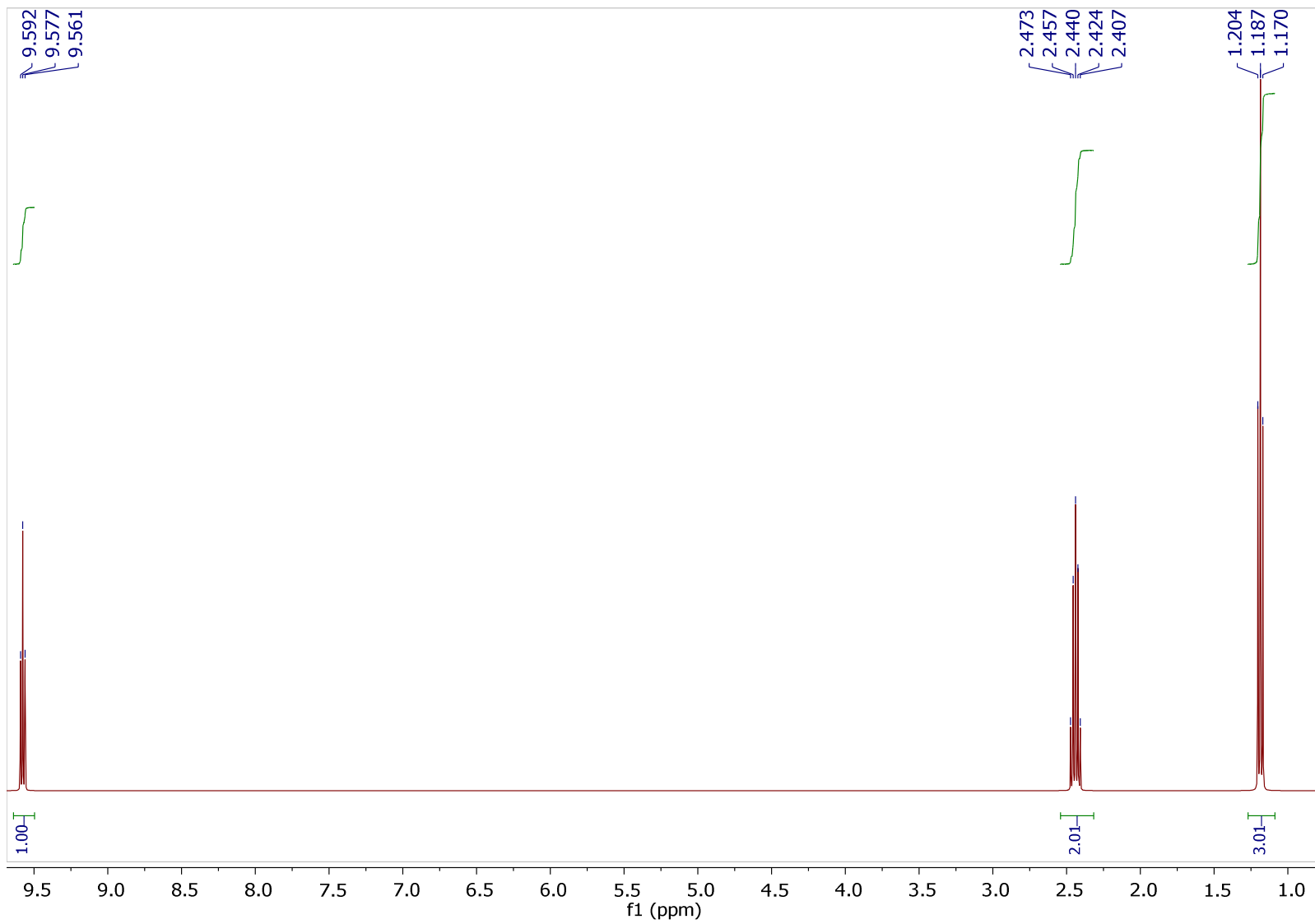




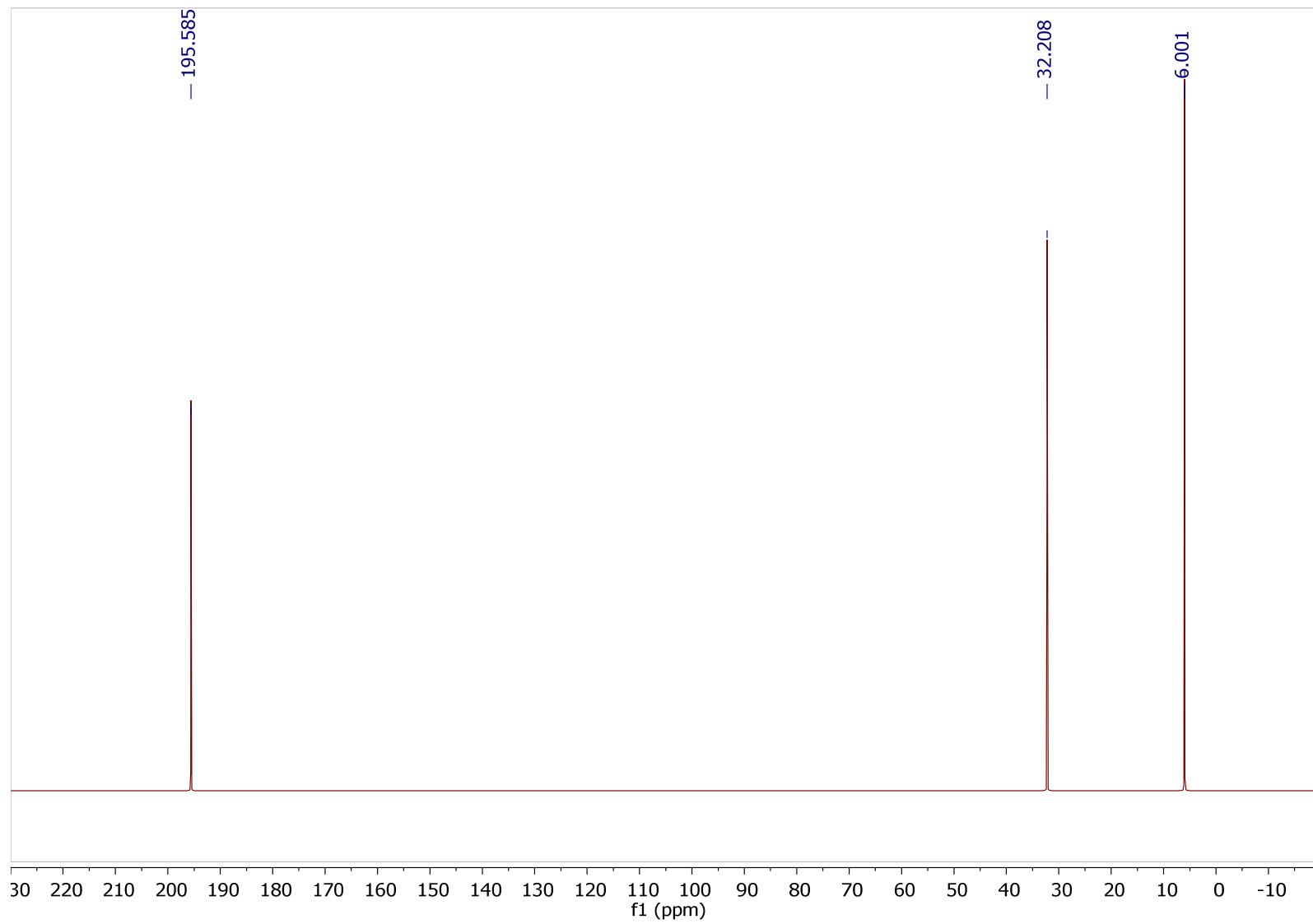
I



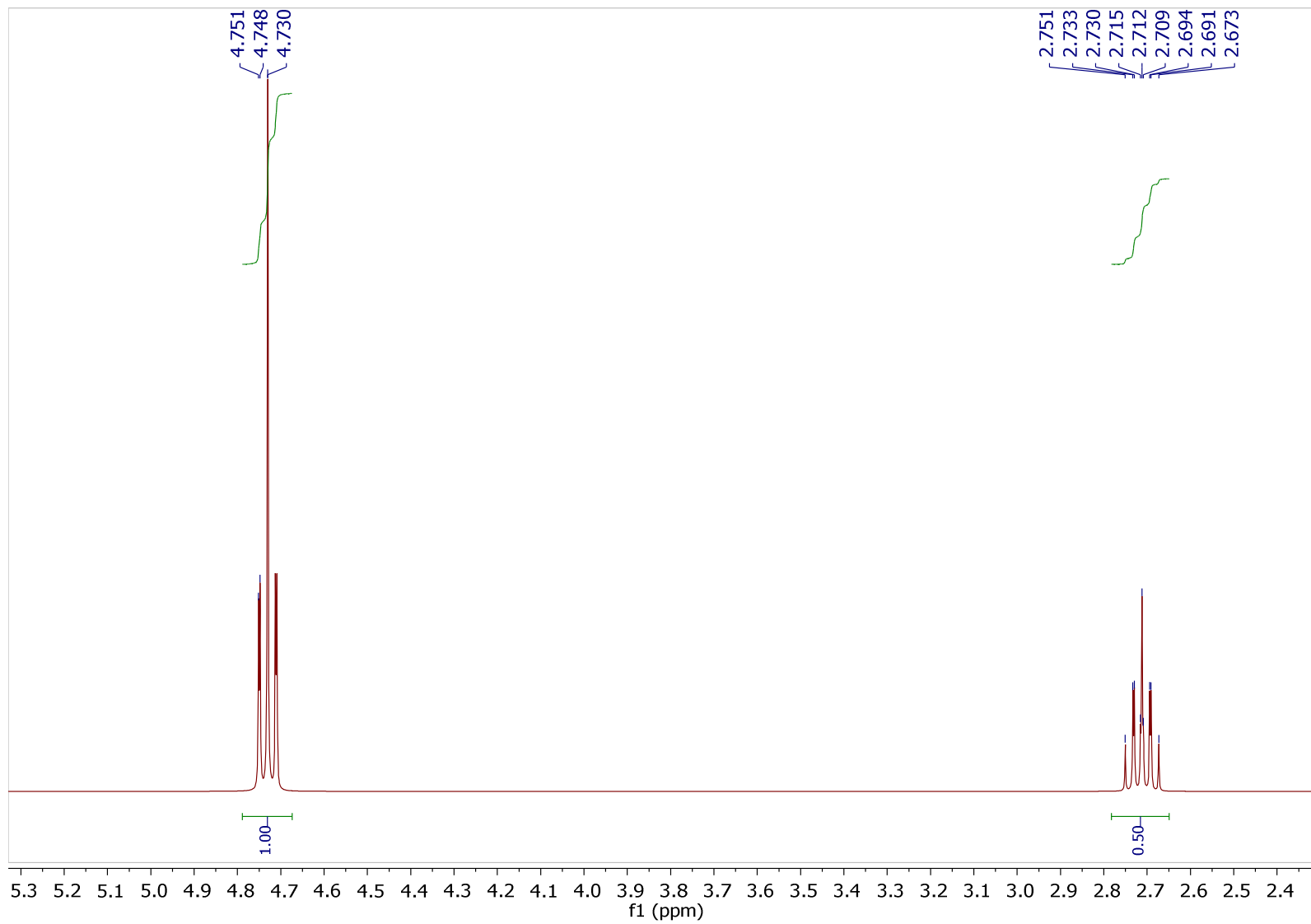
II



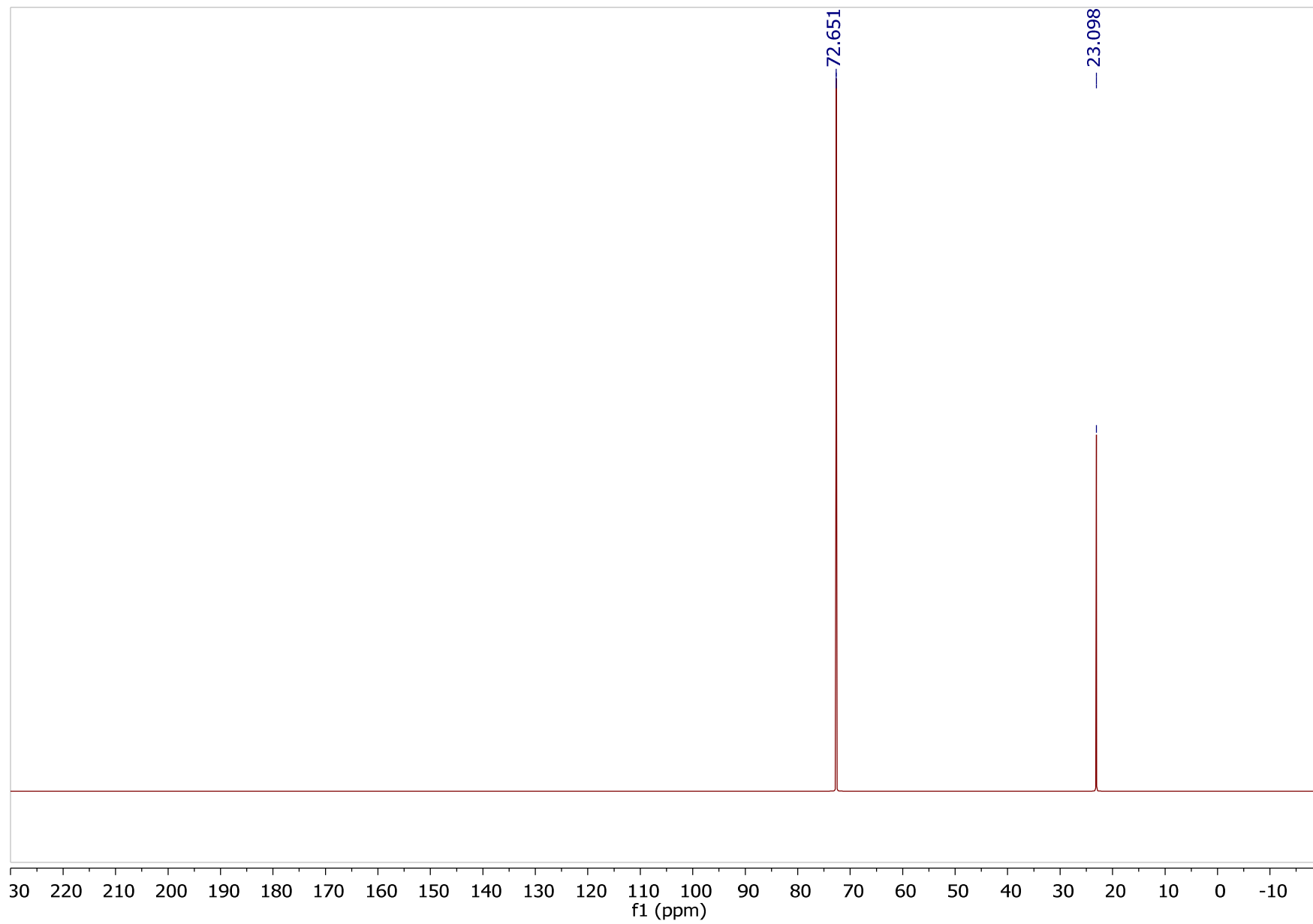
II



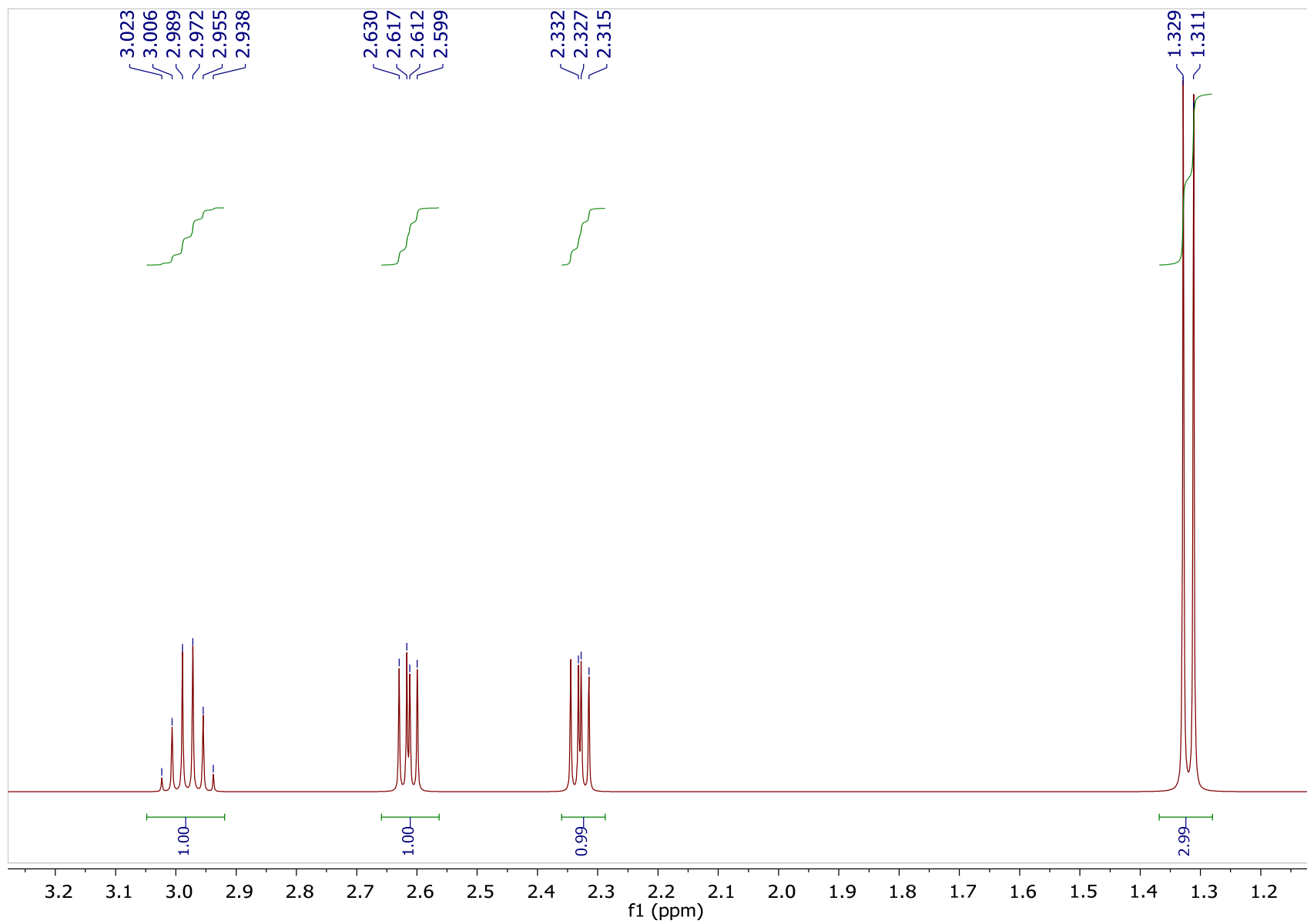
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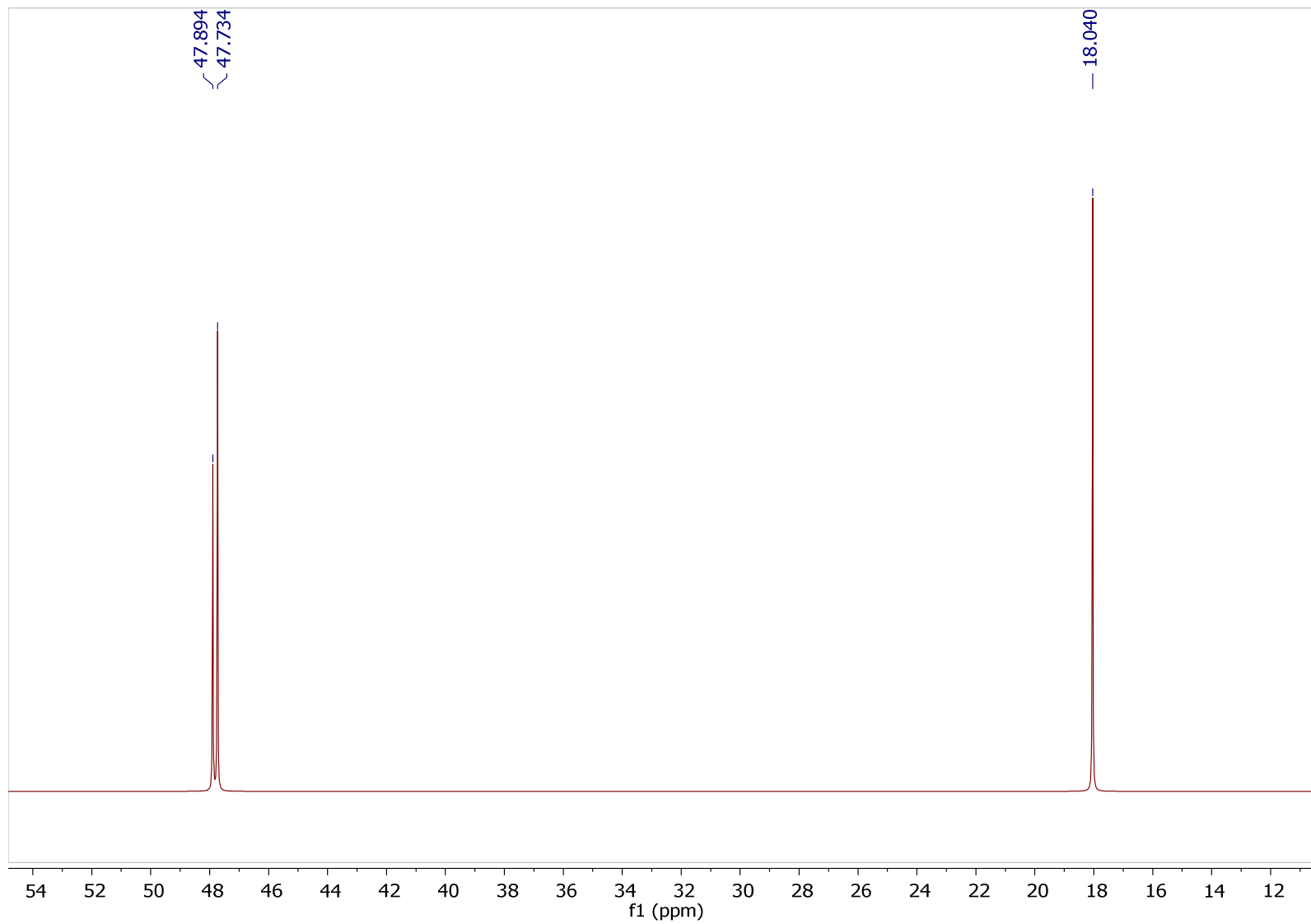
III



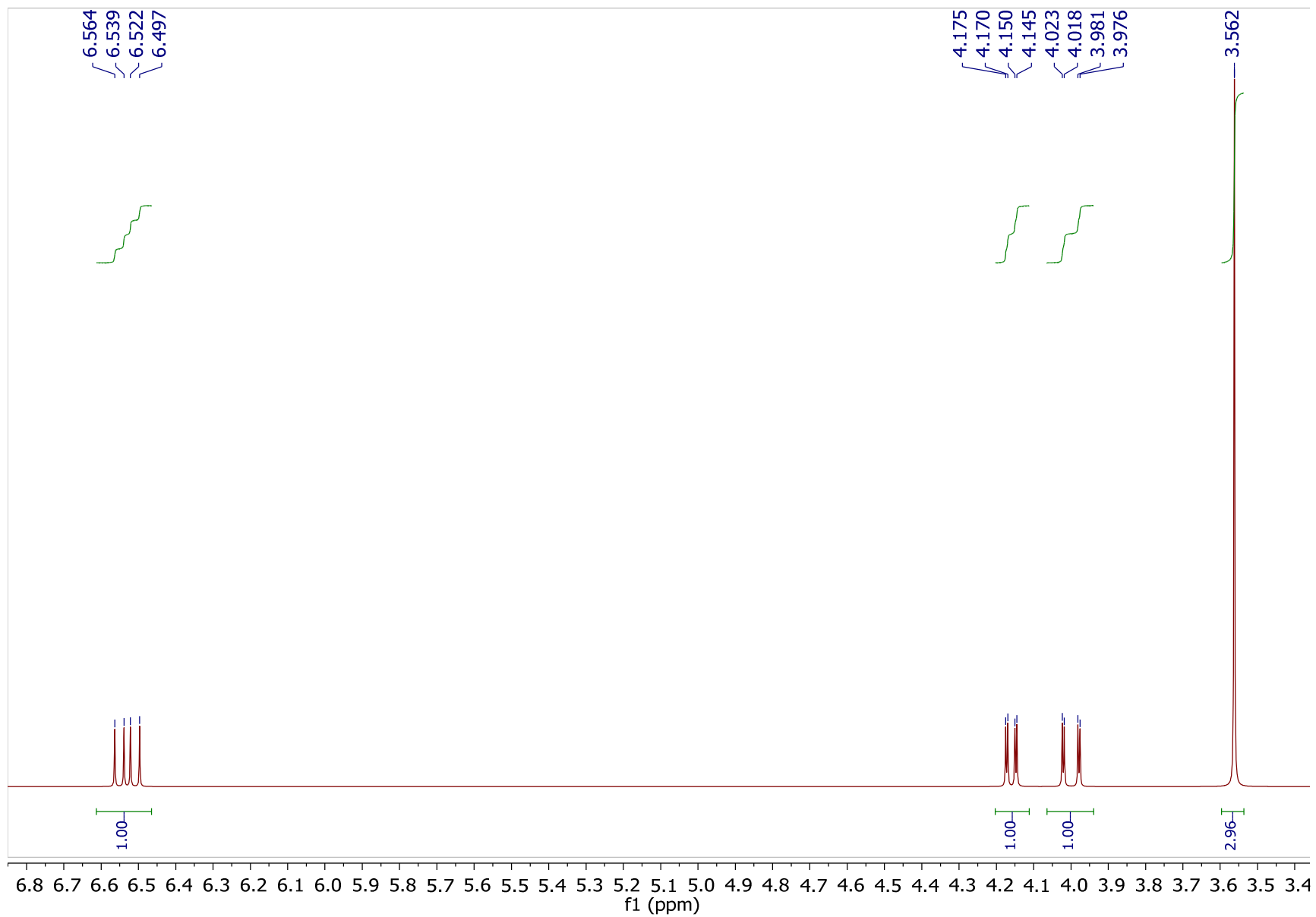
IV



IV



V





V

