Supporting information

Development and characterization of novel and selective inhibitors of cytochrome P450 CYP26A1, the human liver retinoic acid hydroxylase

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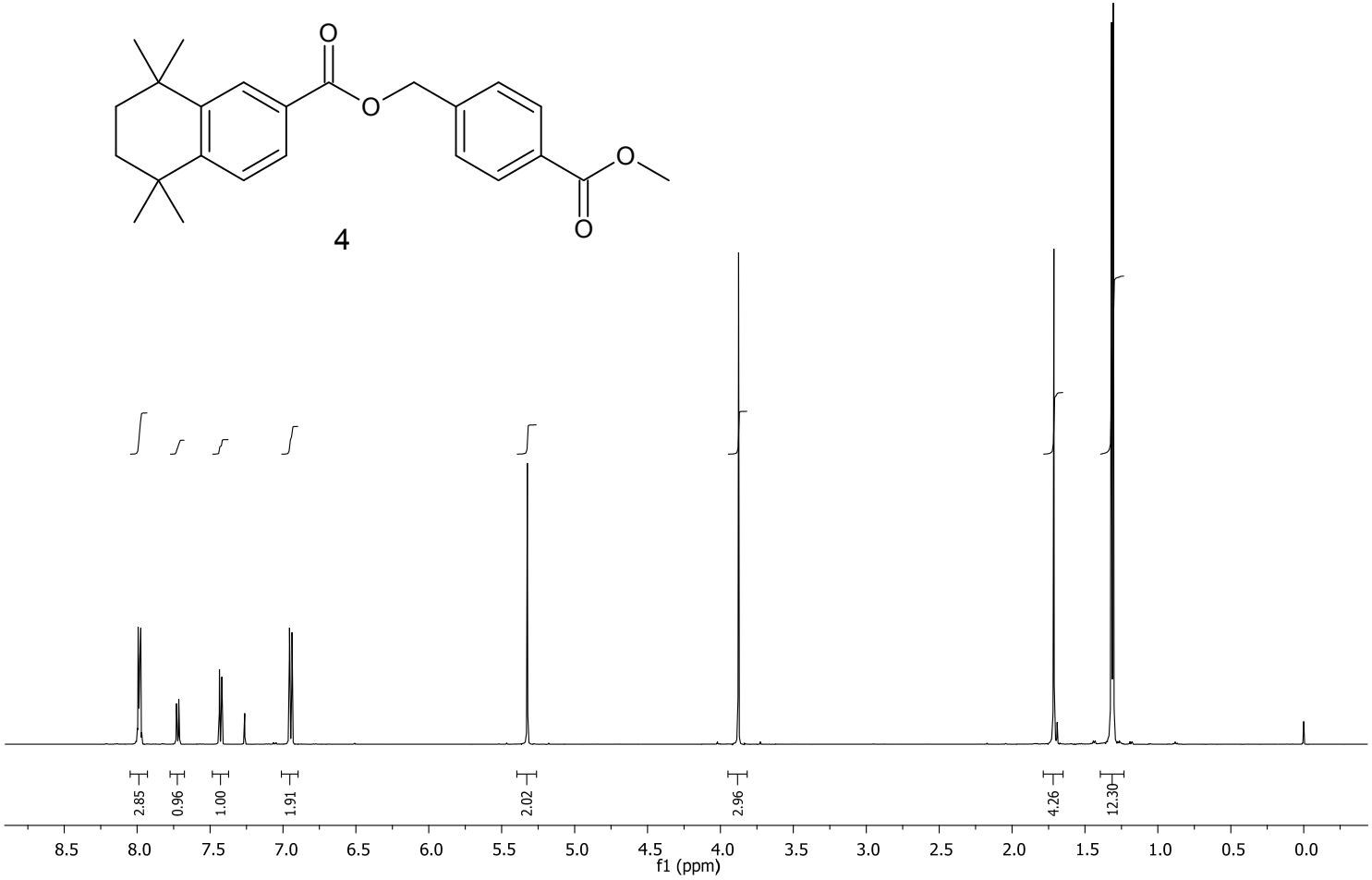
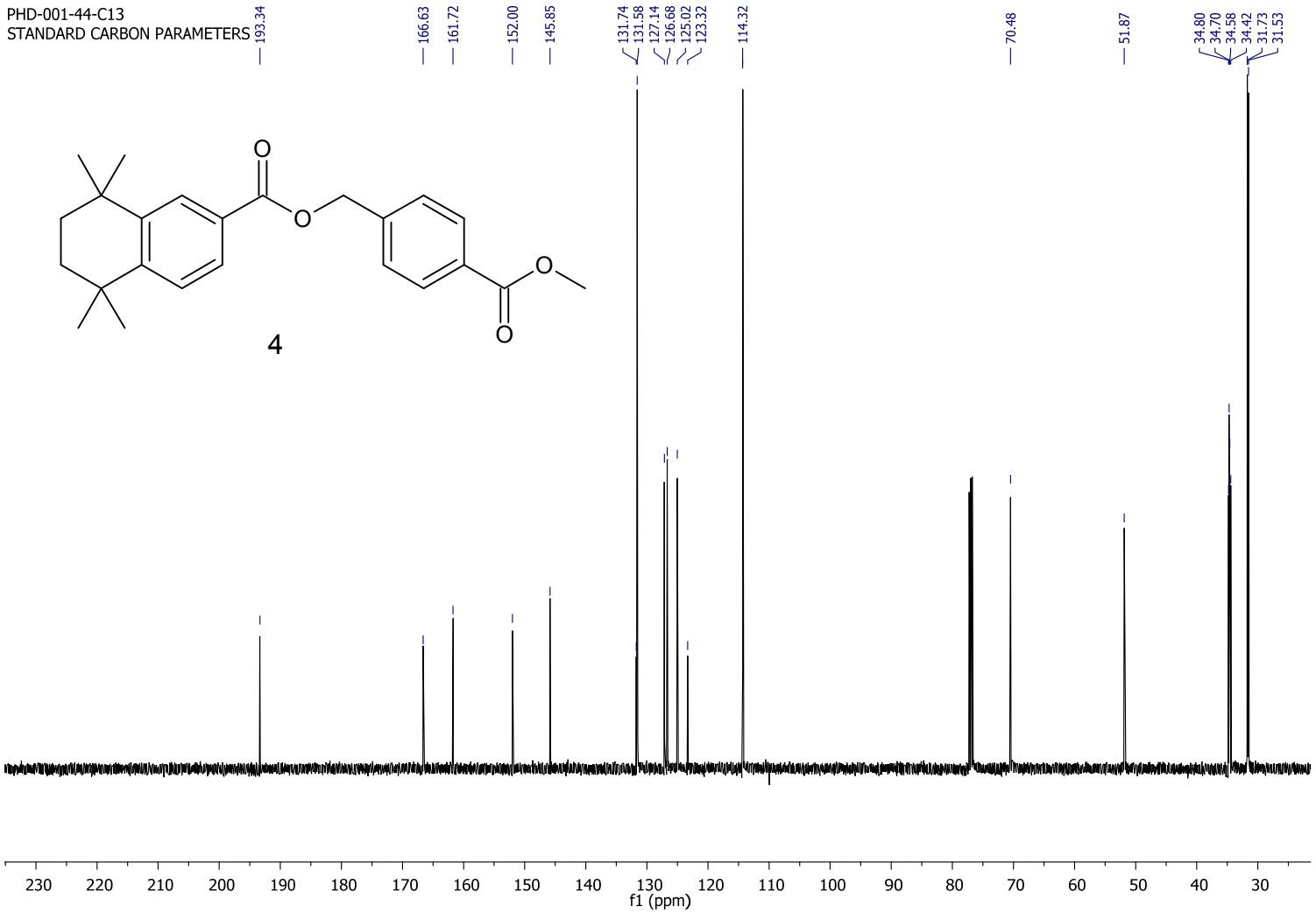
500 MHz 1H-NMR of compound 4 in CDCl3

PHD-001-44
STANDARD PROTON PARAMETERS



125 MHz ^{13}C-NMR of compound 4 in $CDCl_3$



400 MHz ^{1}H-NMR of compound 5 in $CDCl_3$

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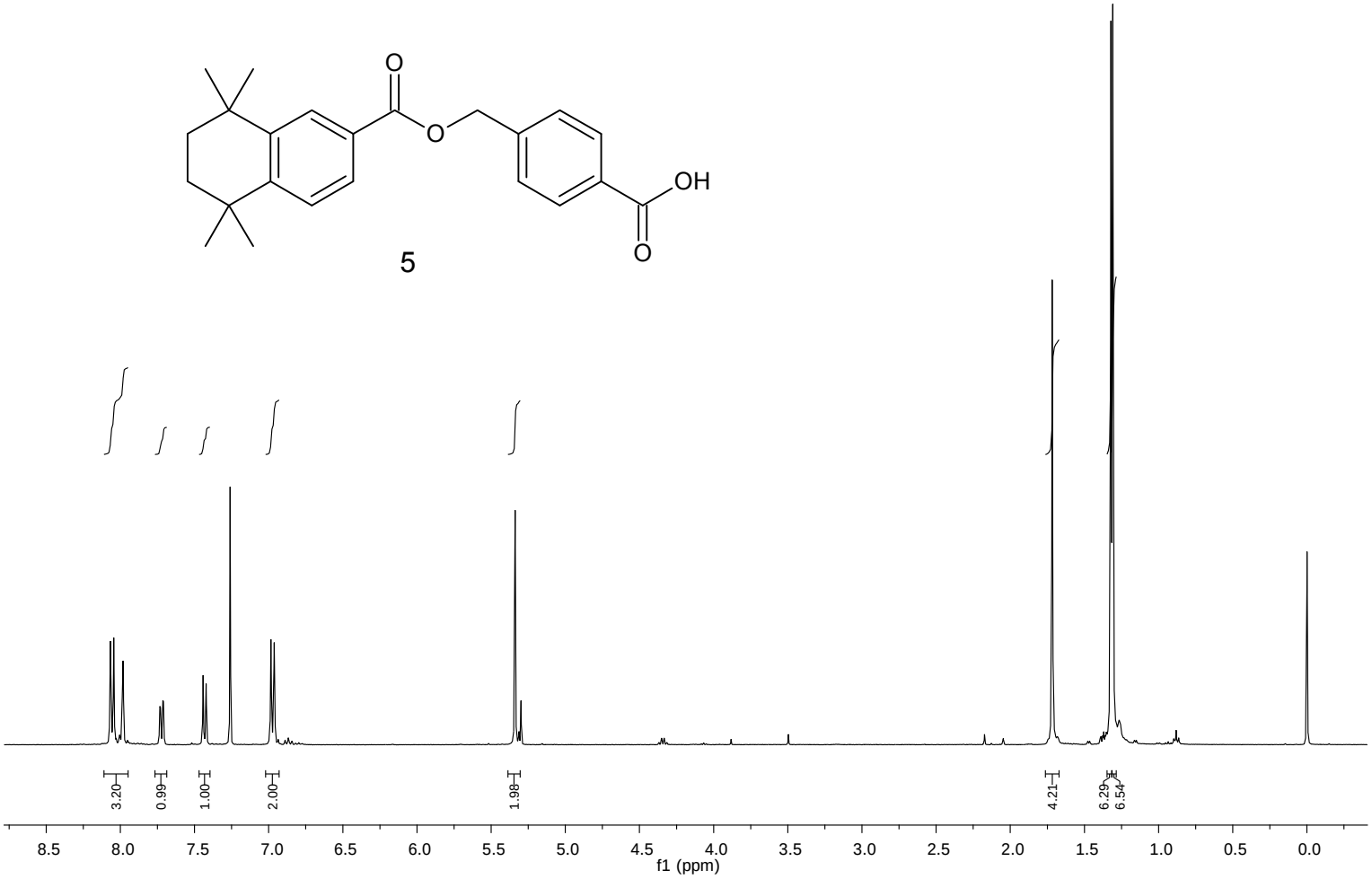

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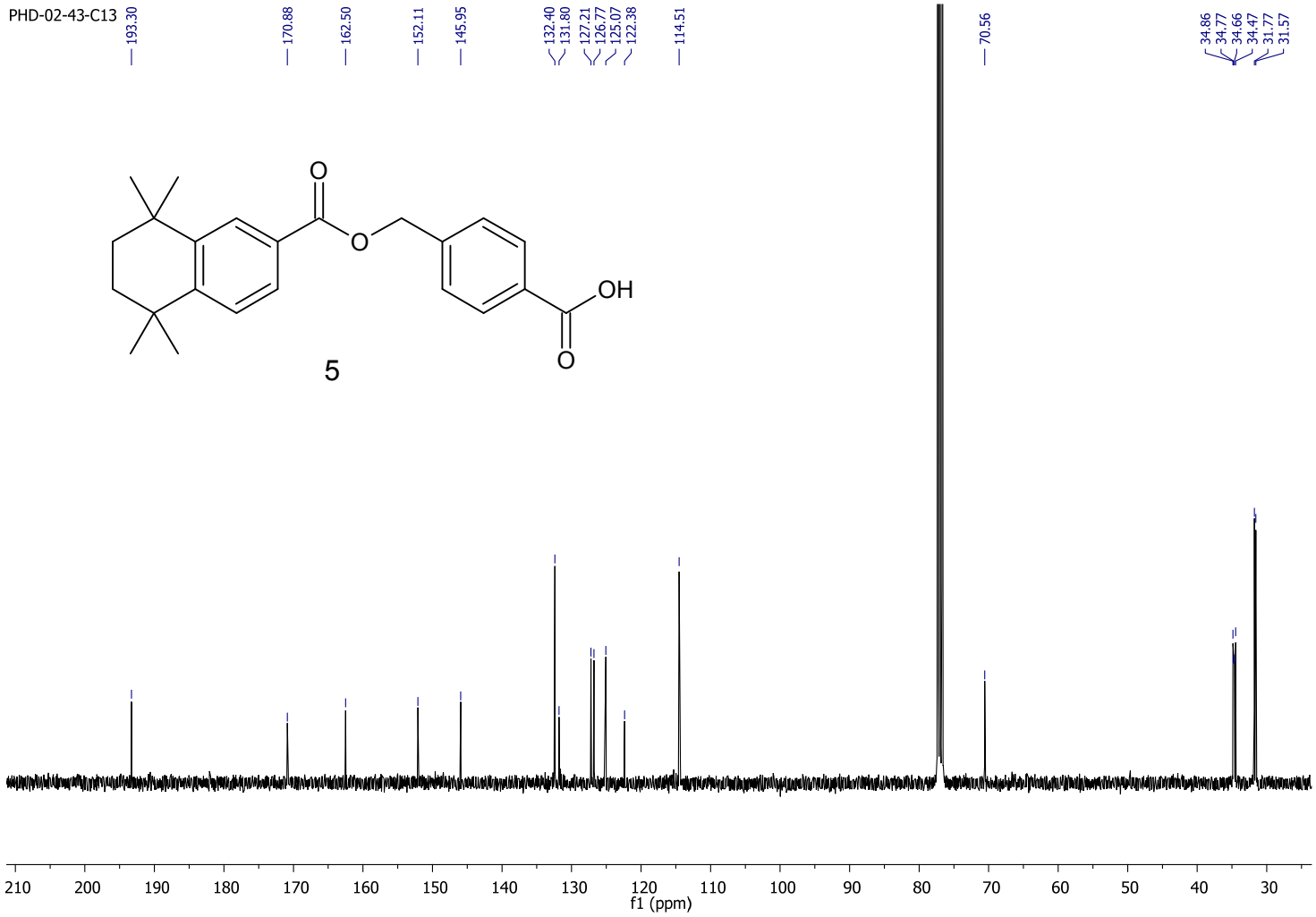

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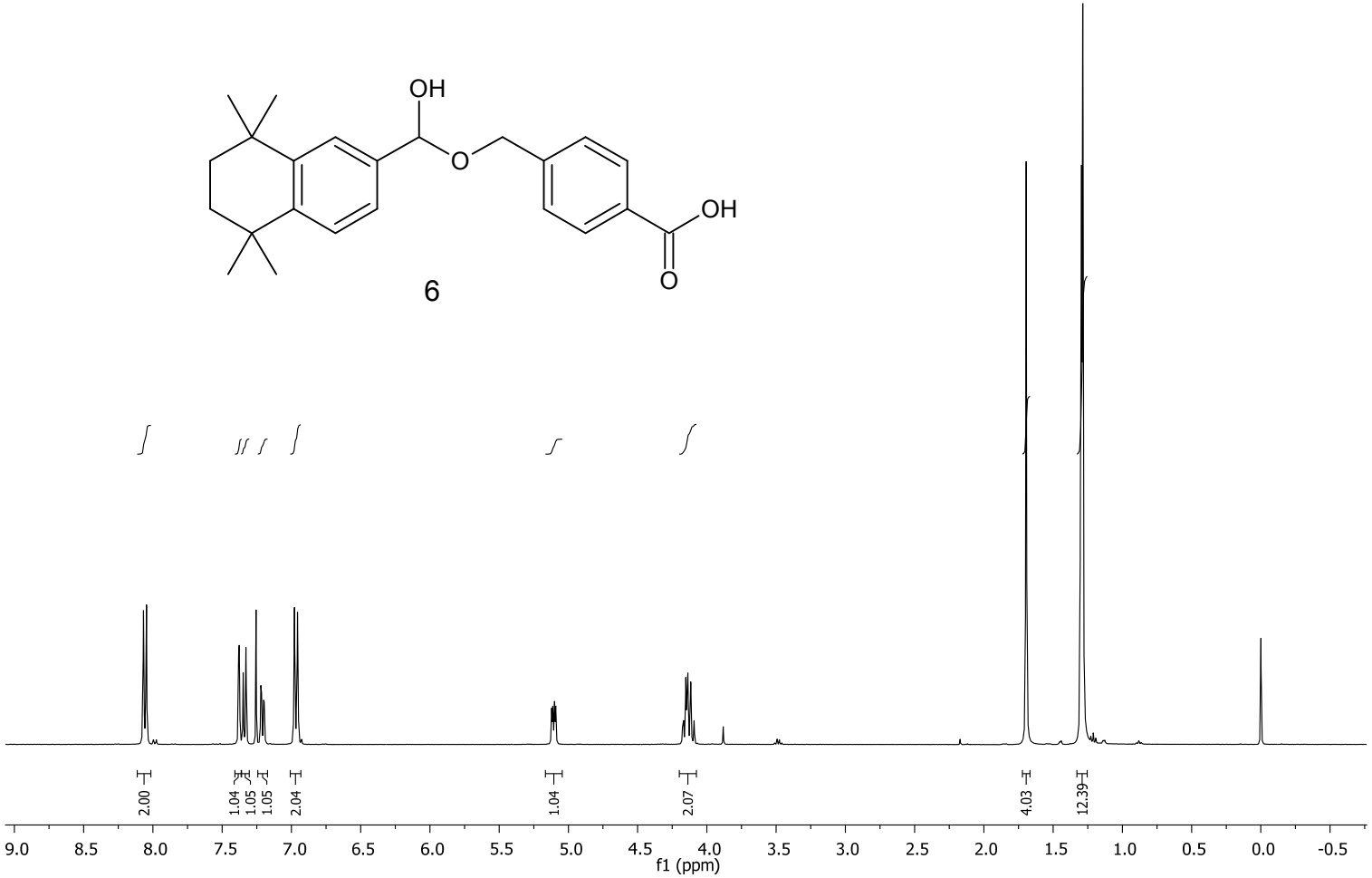

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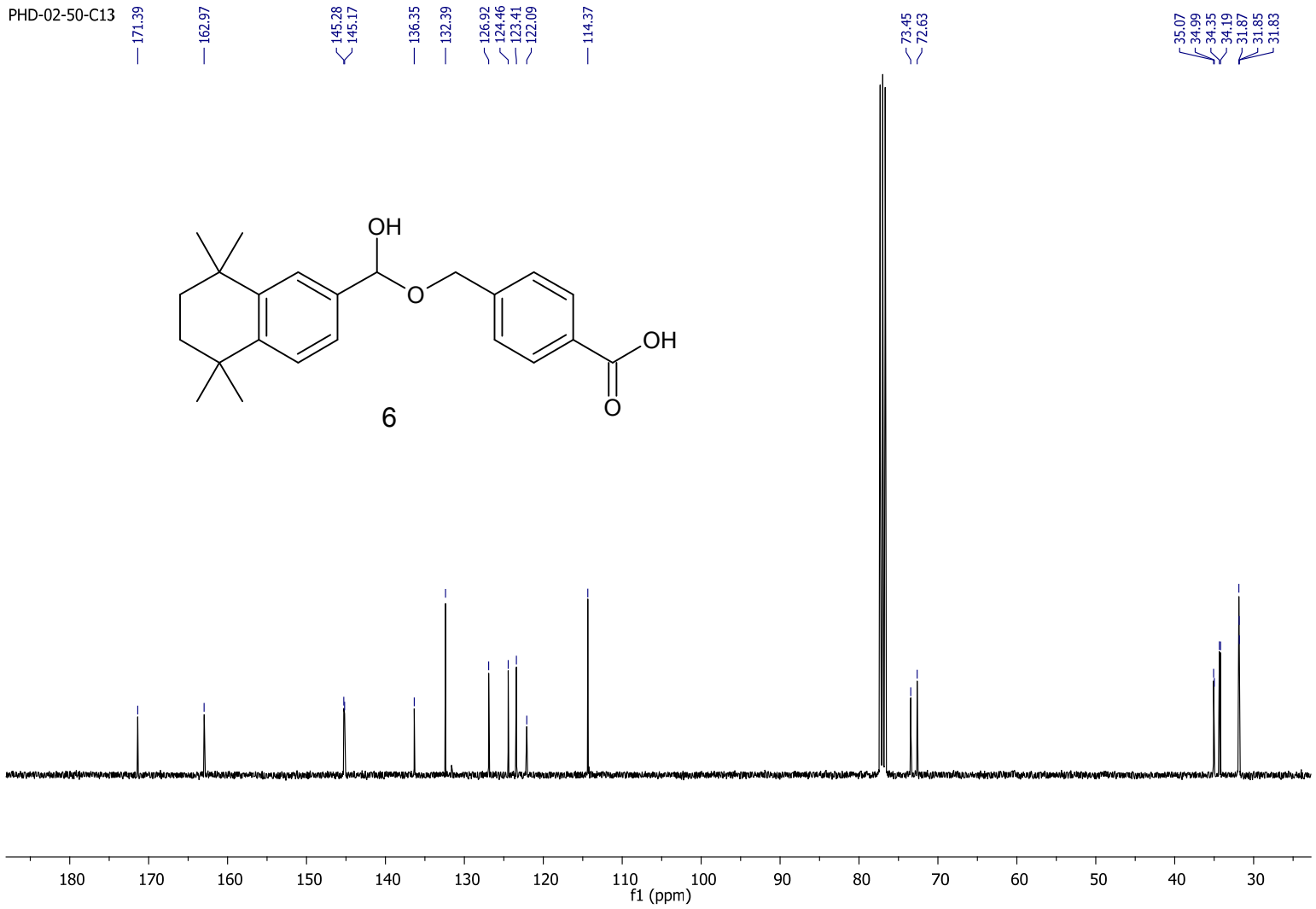

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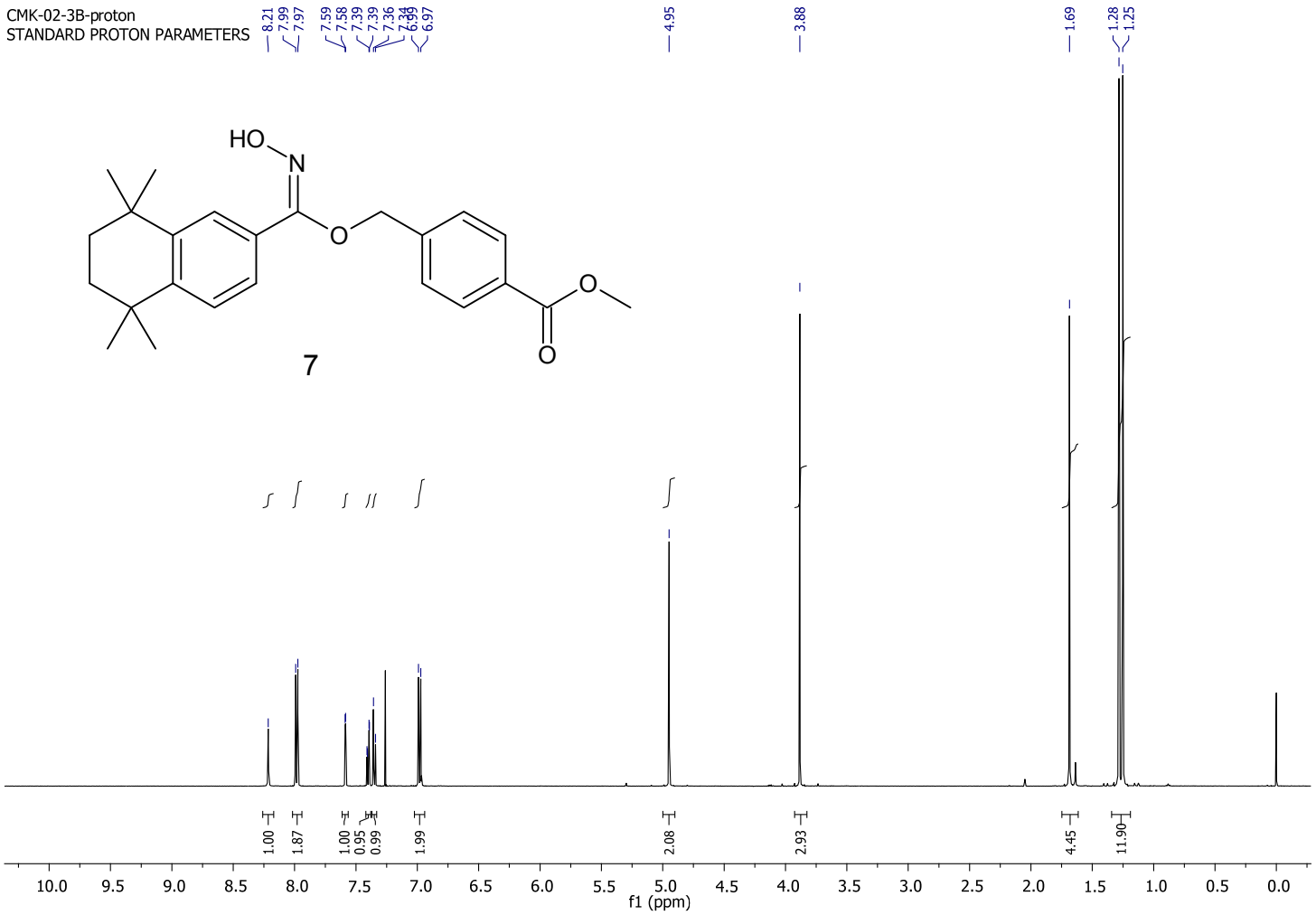

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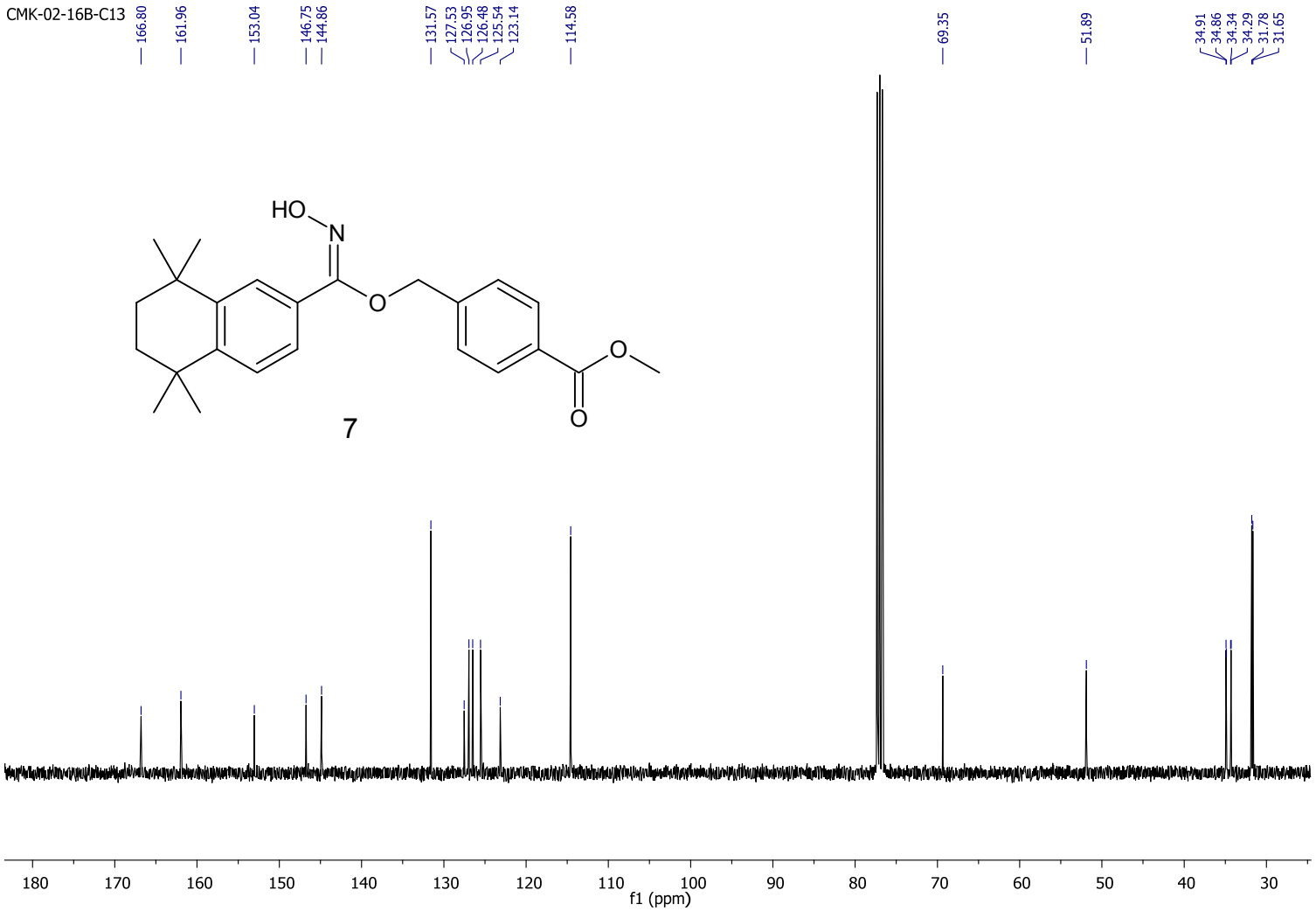

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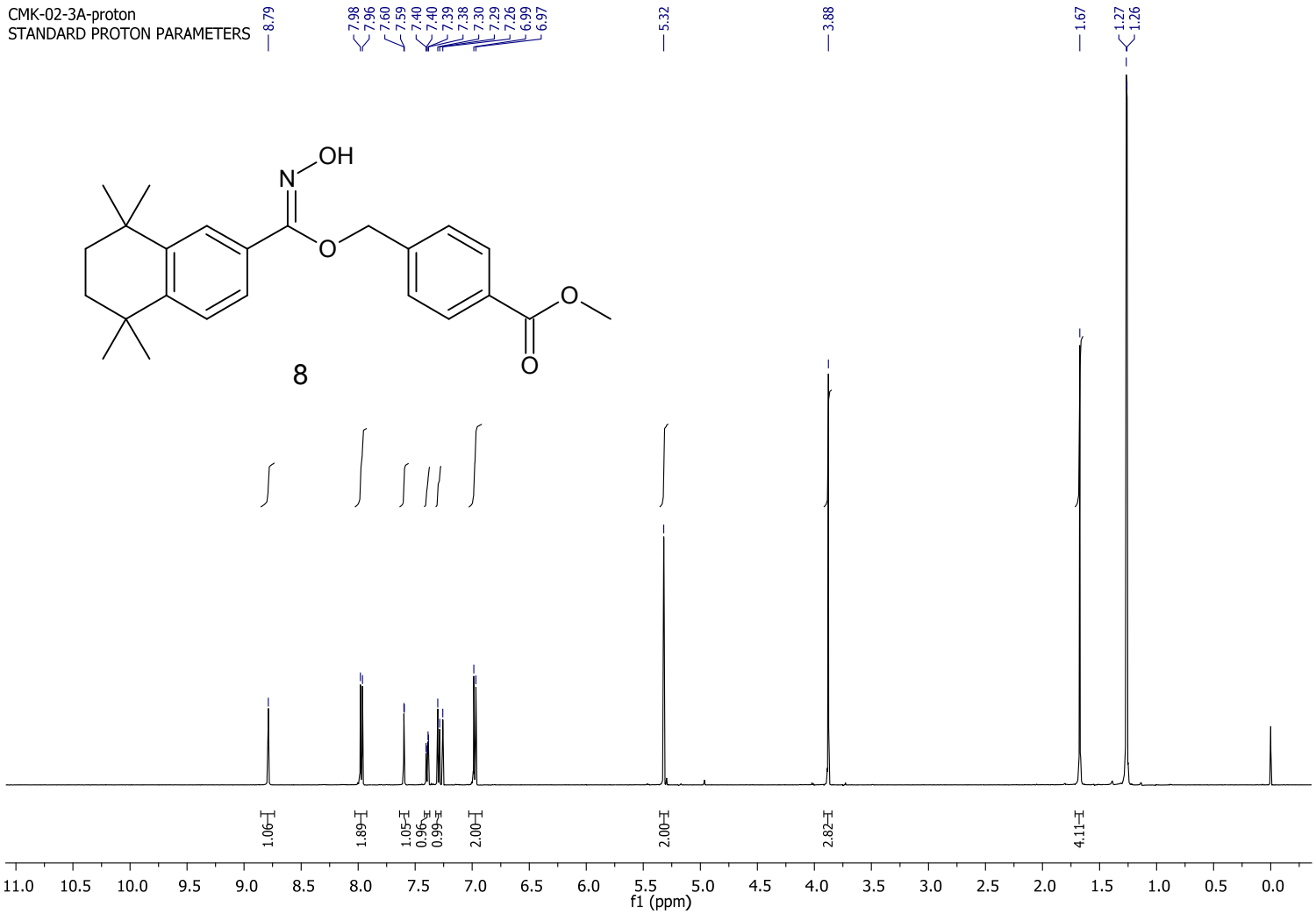

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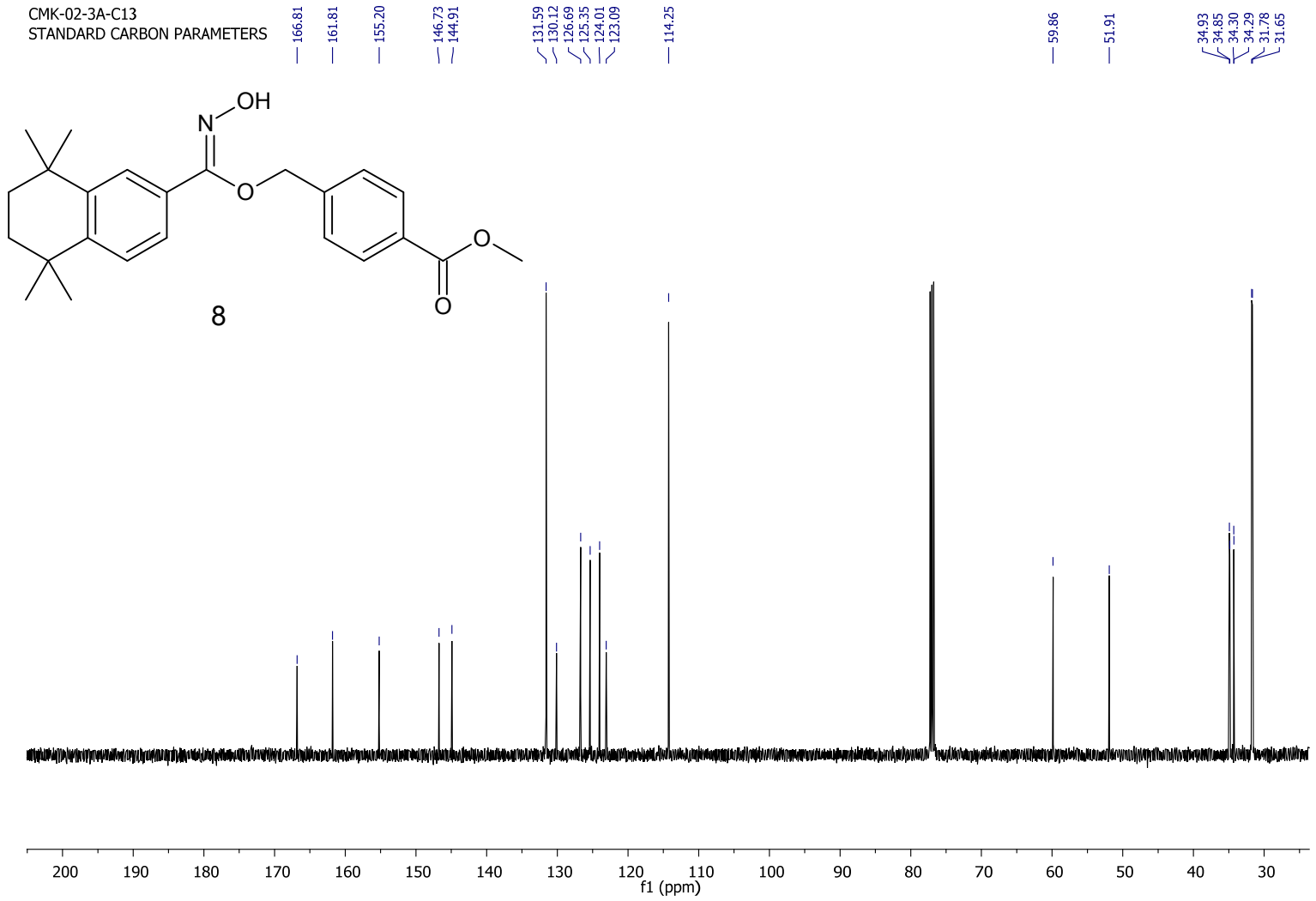
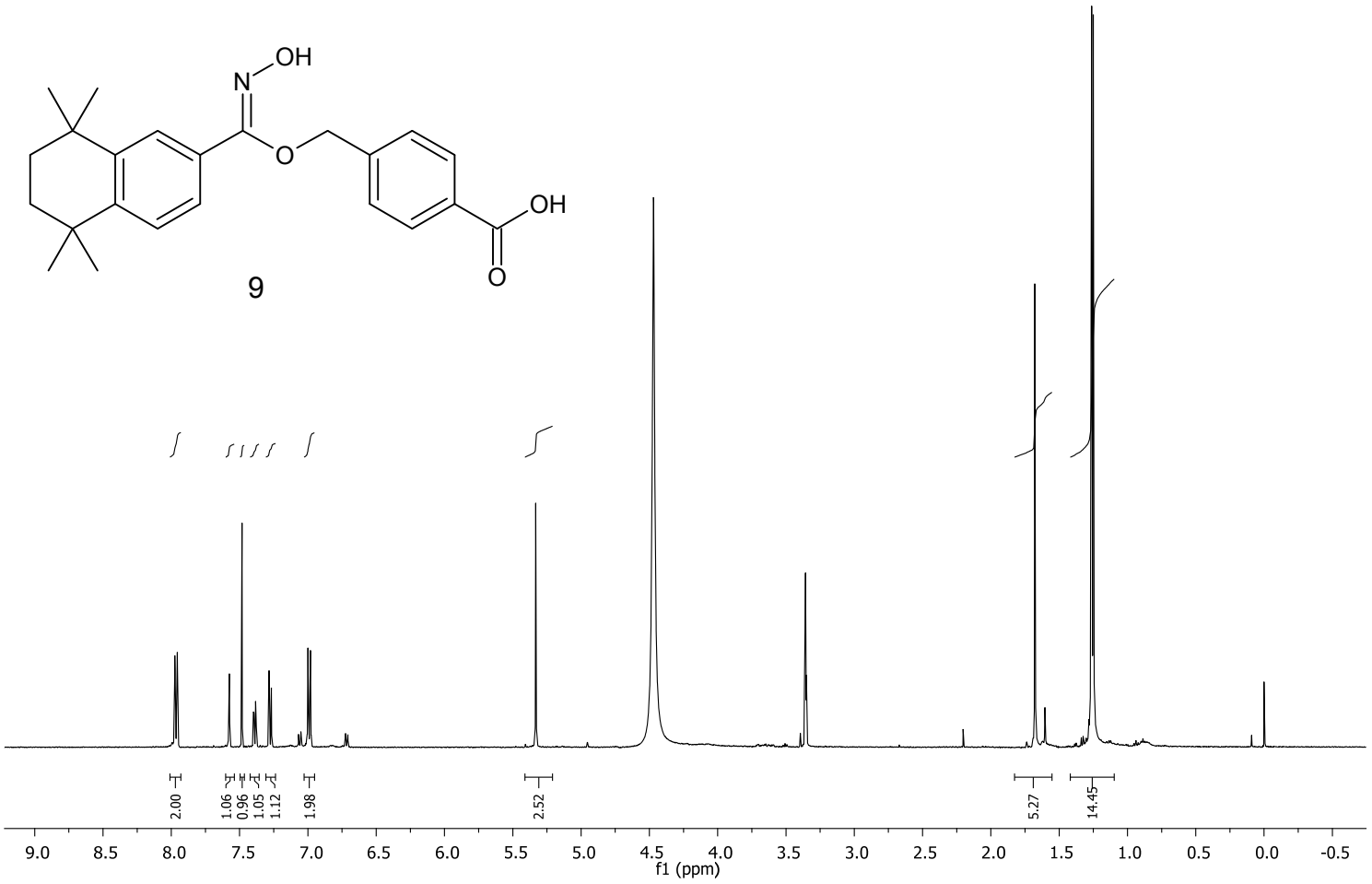


500 MHz ^{1}H-NMR of compound 9 in $CDCl_3/CD_3OD$

CMK-02-2c-proton
STANDARD PROTON PARAMETERS



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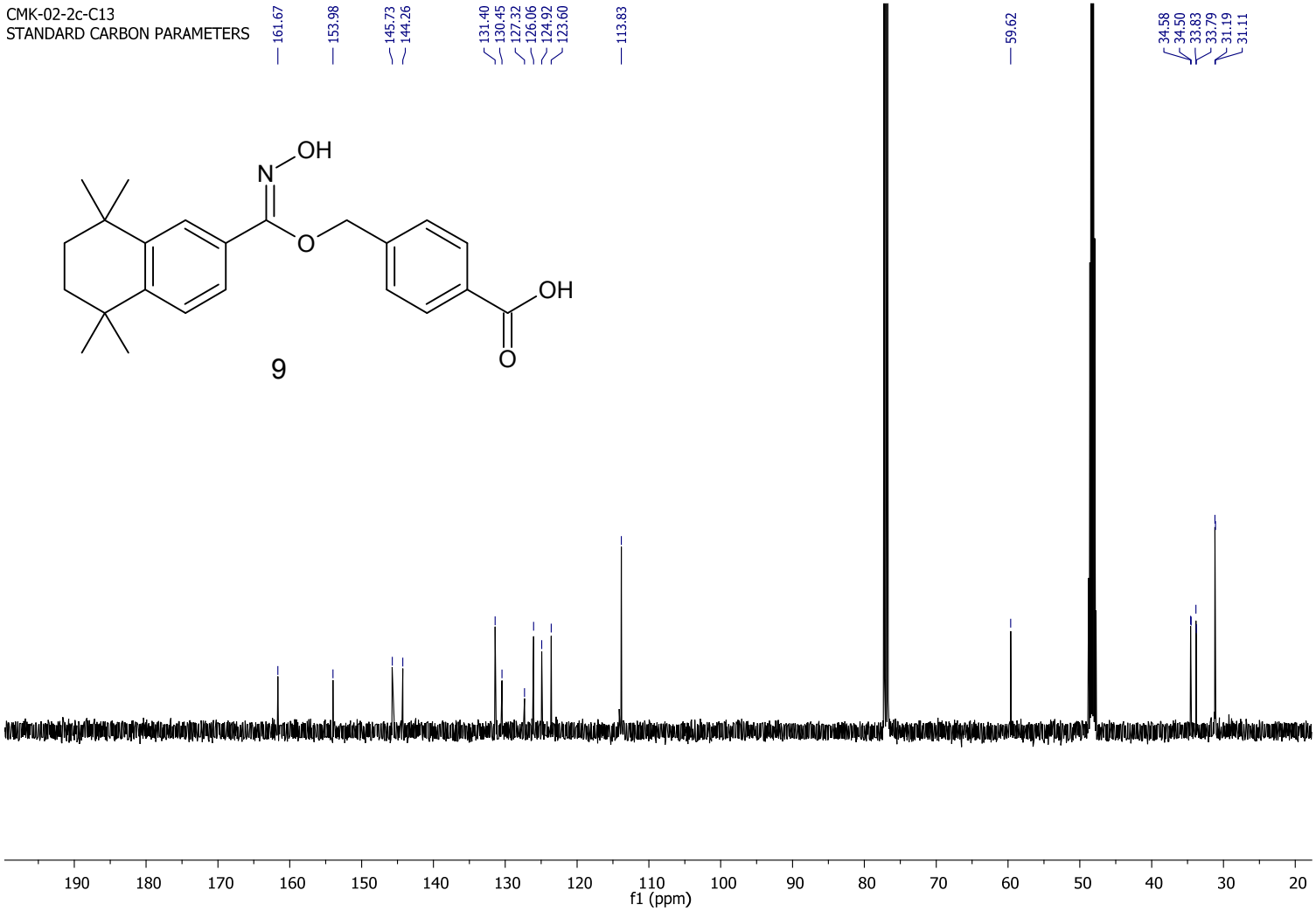

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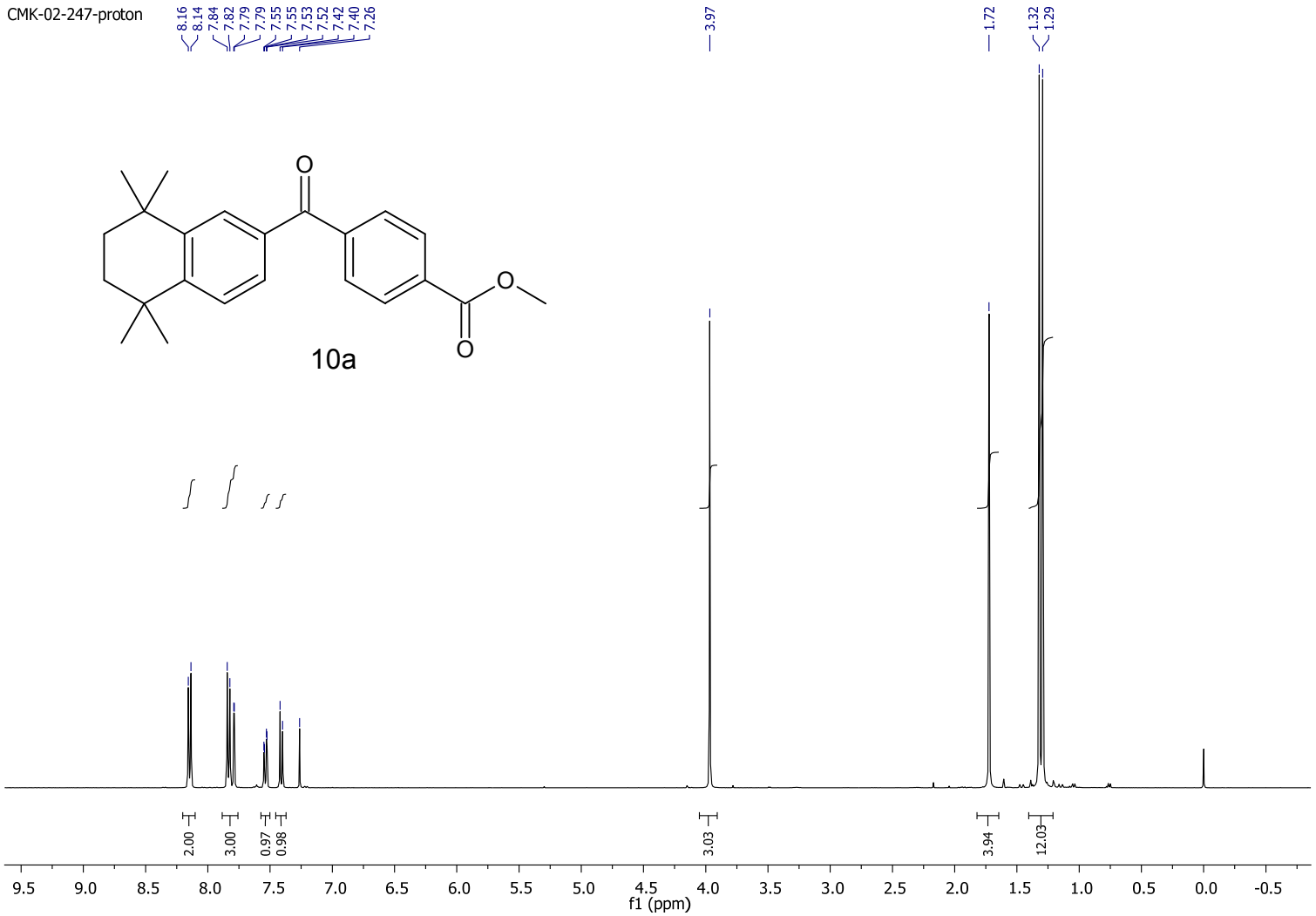

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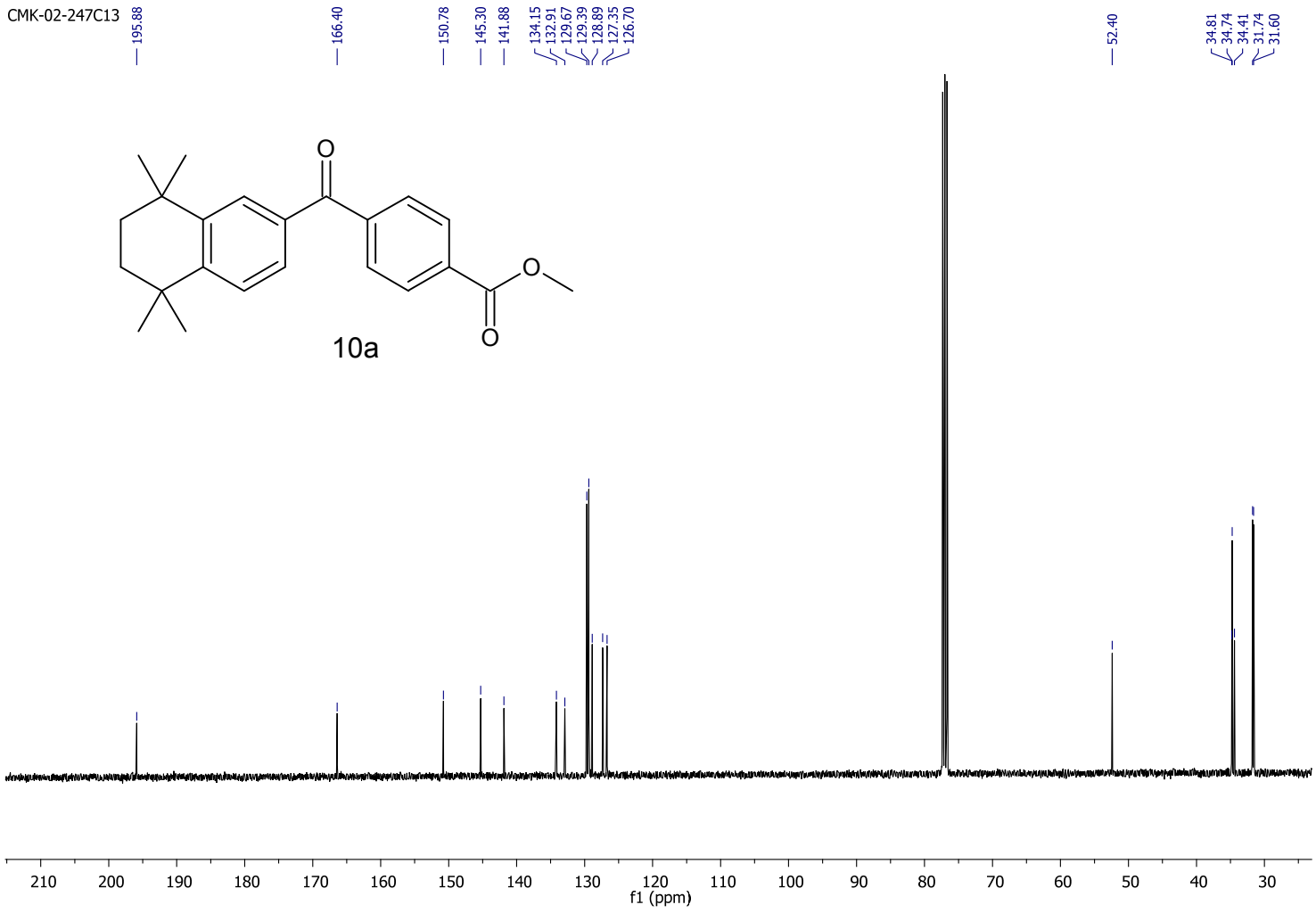

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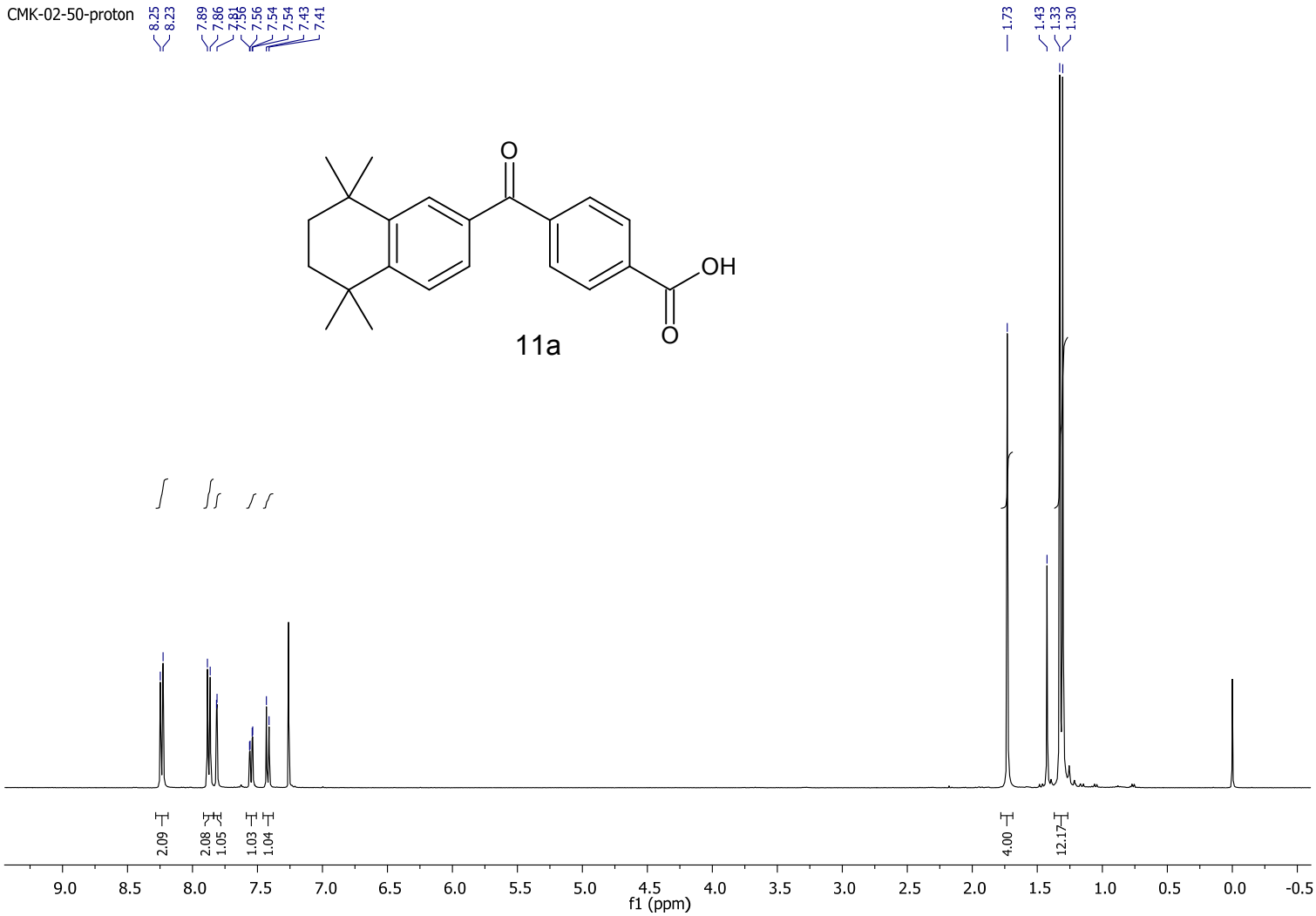

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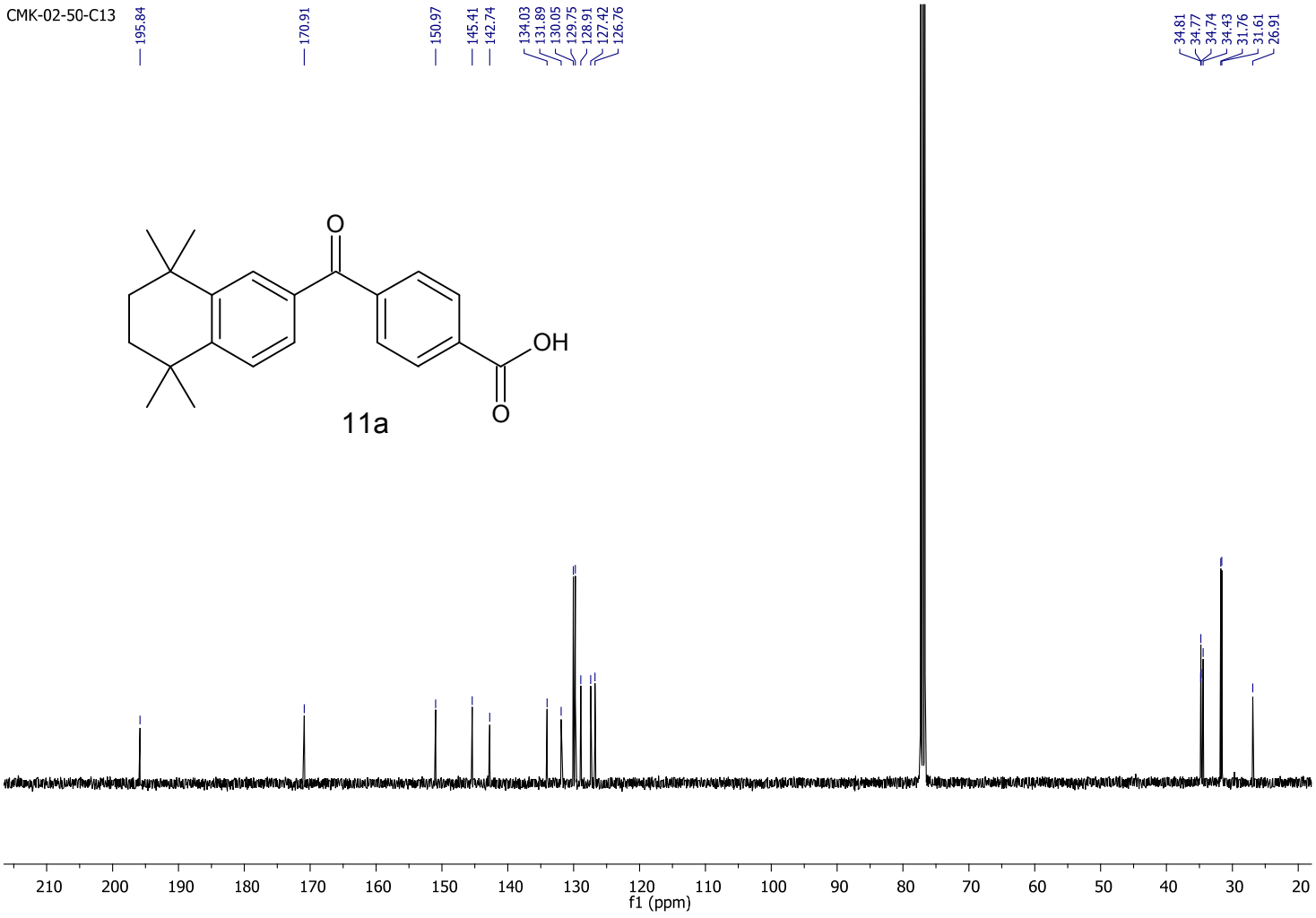

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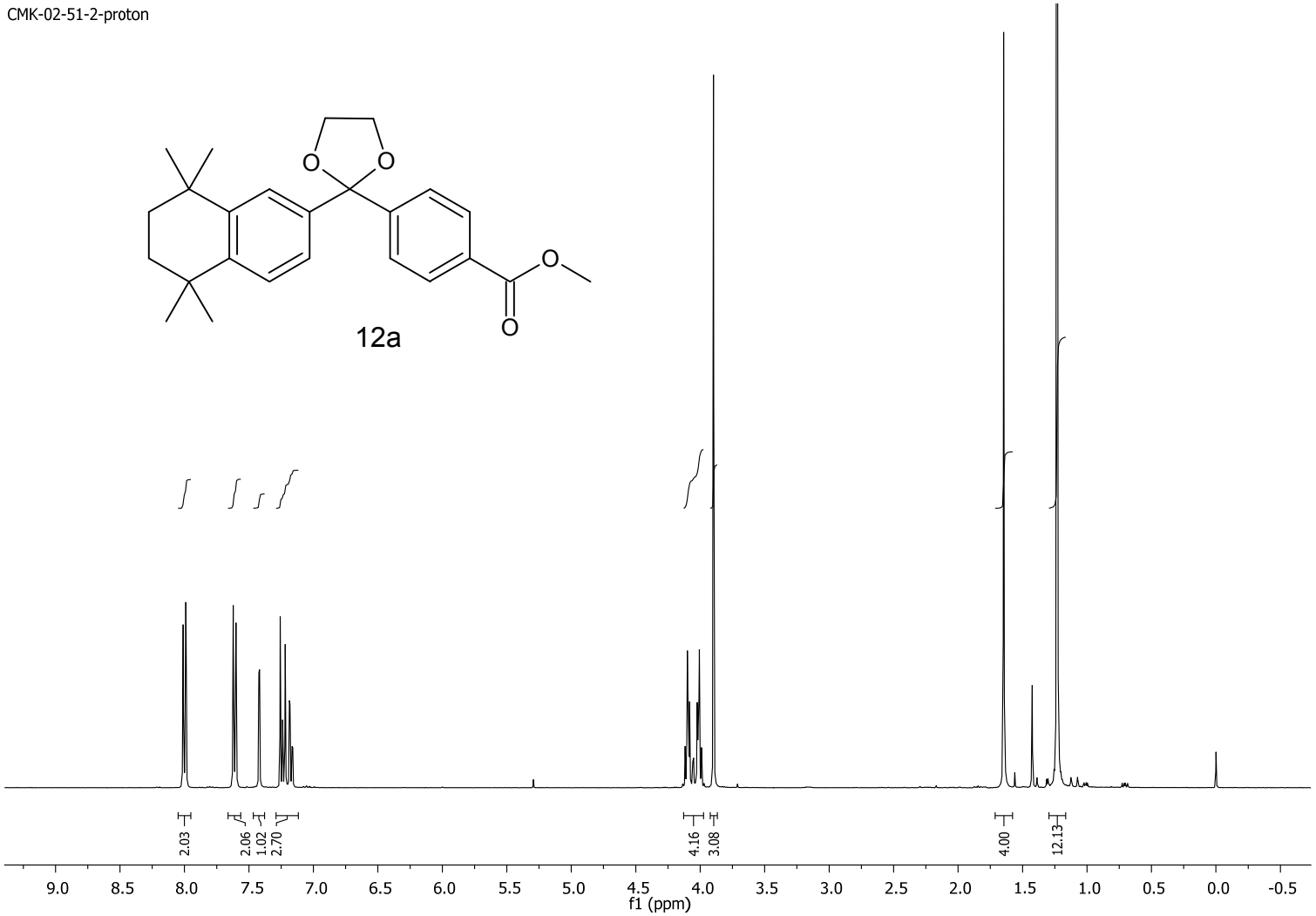

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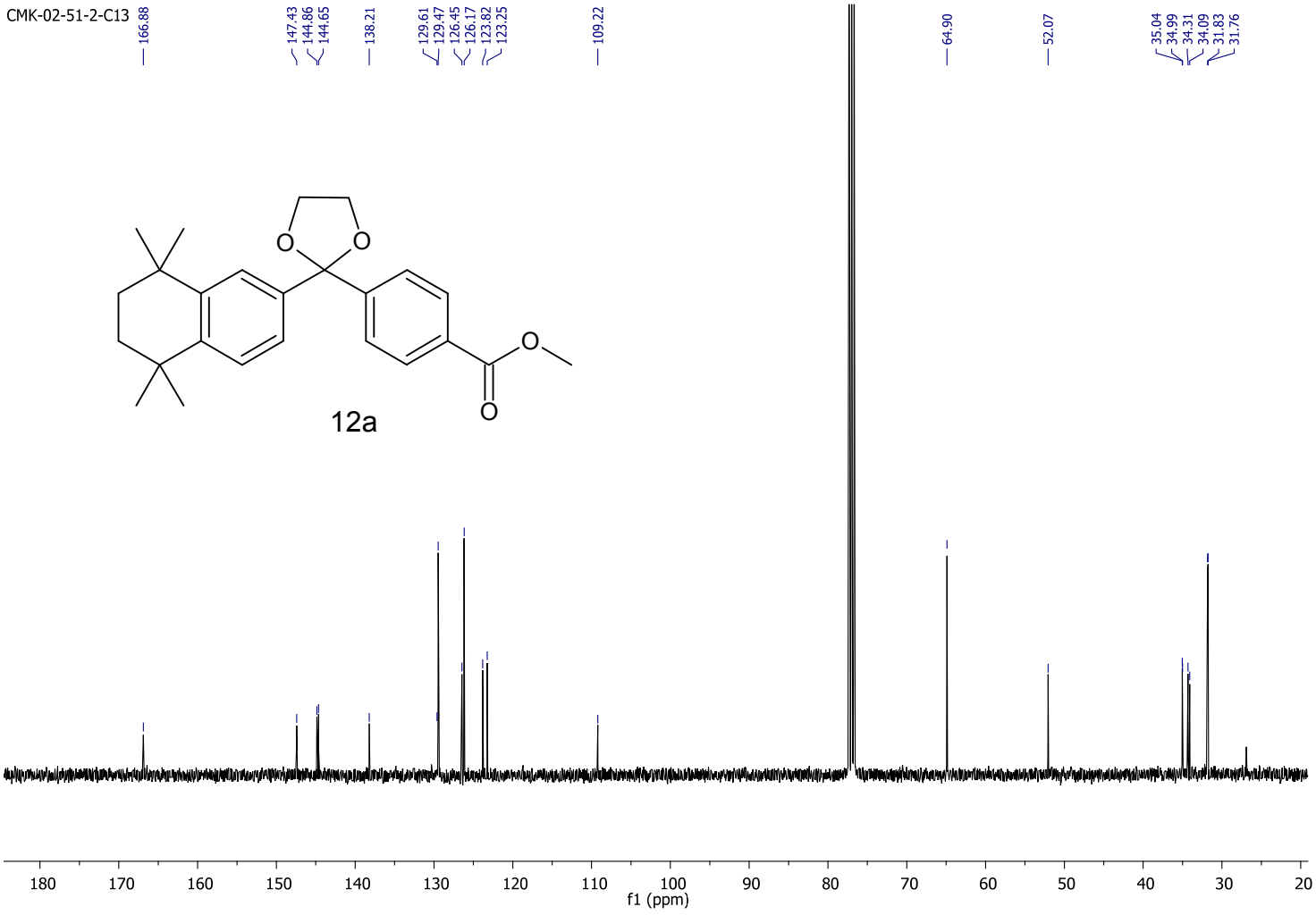

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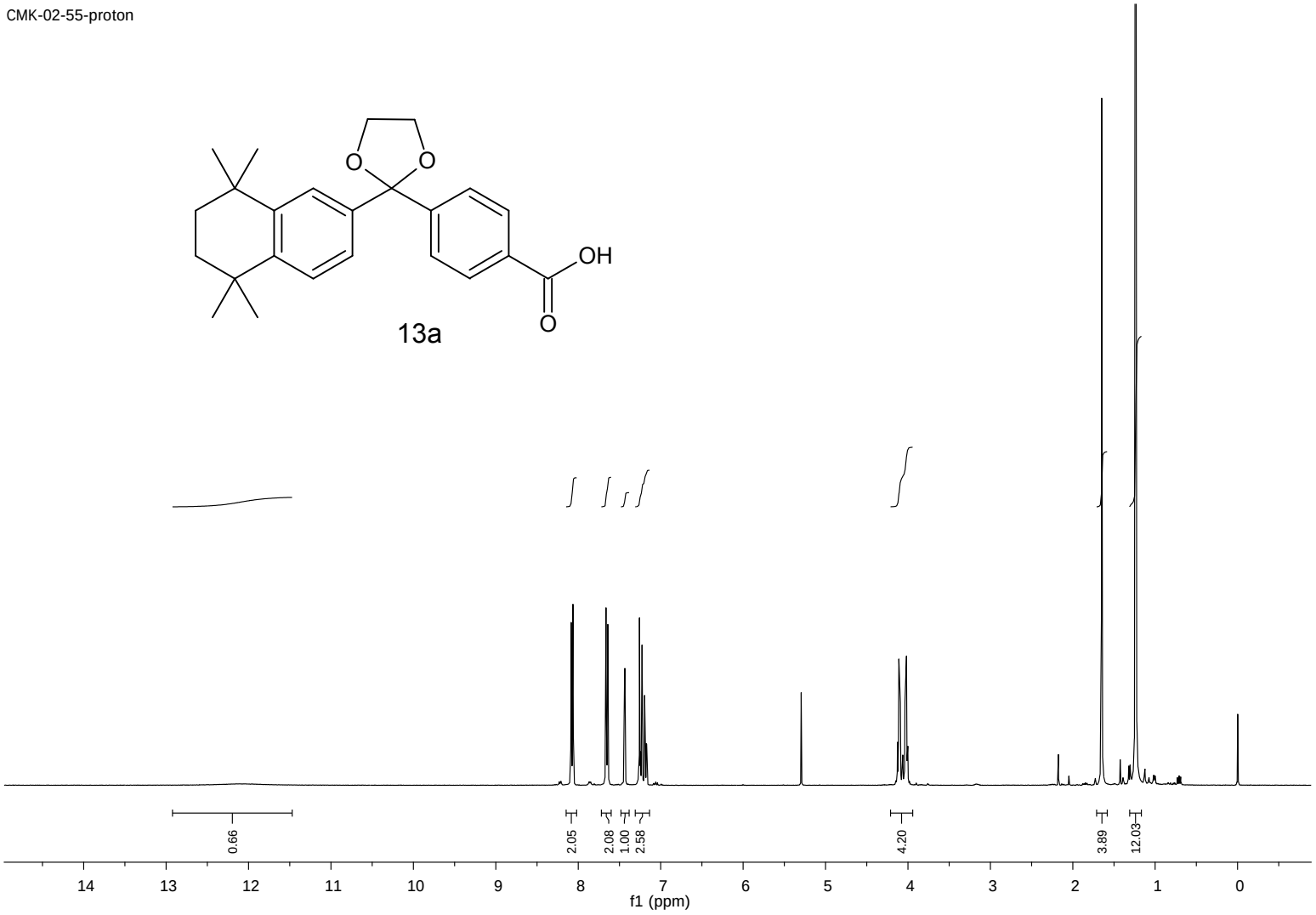

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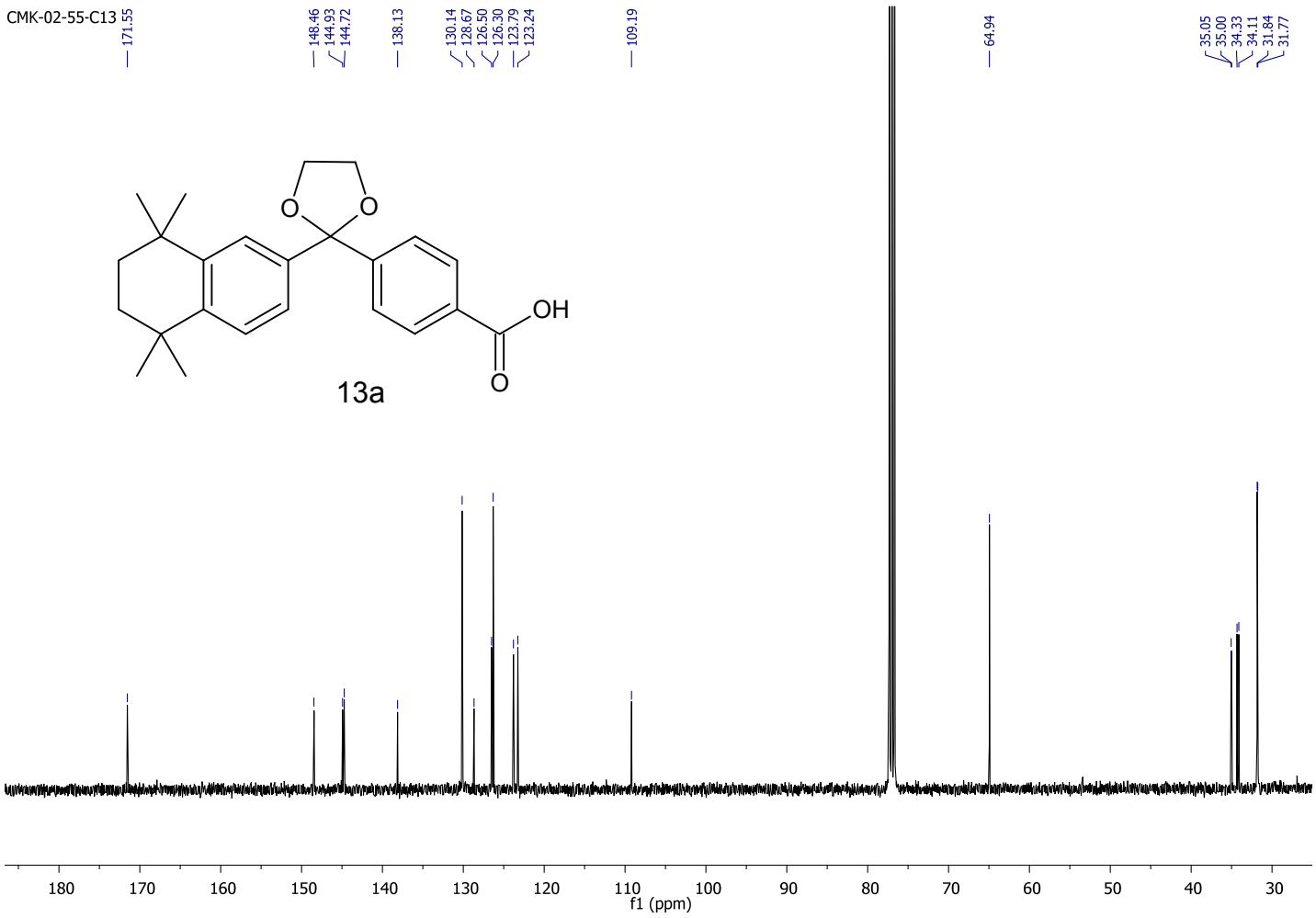
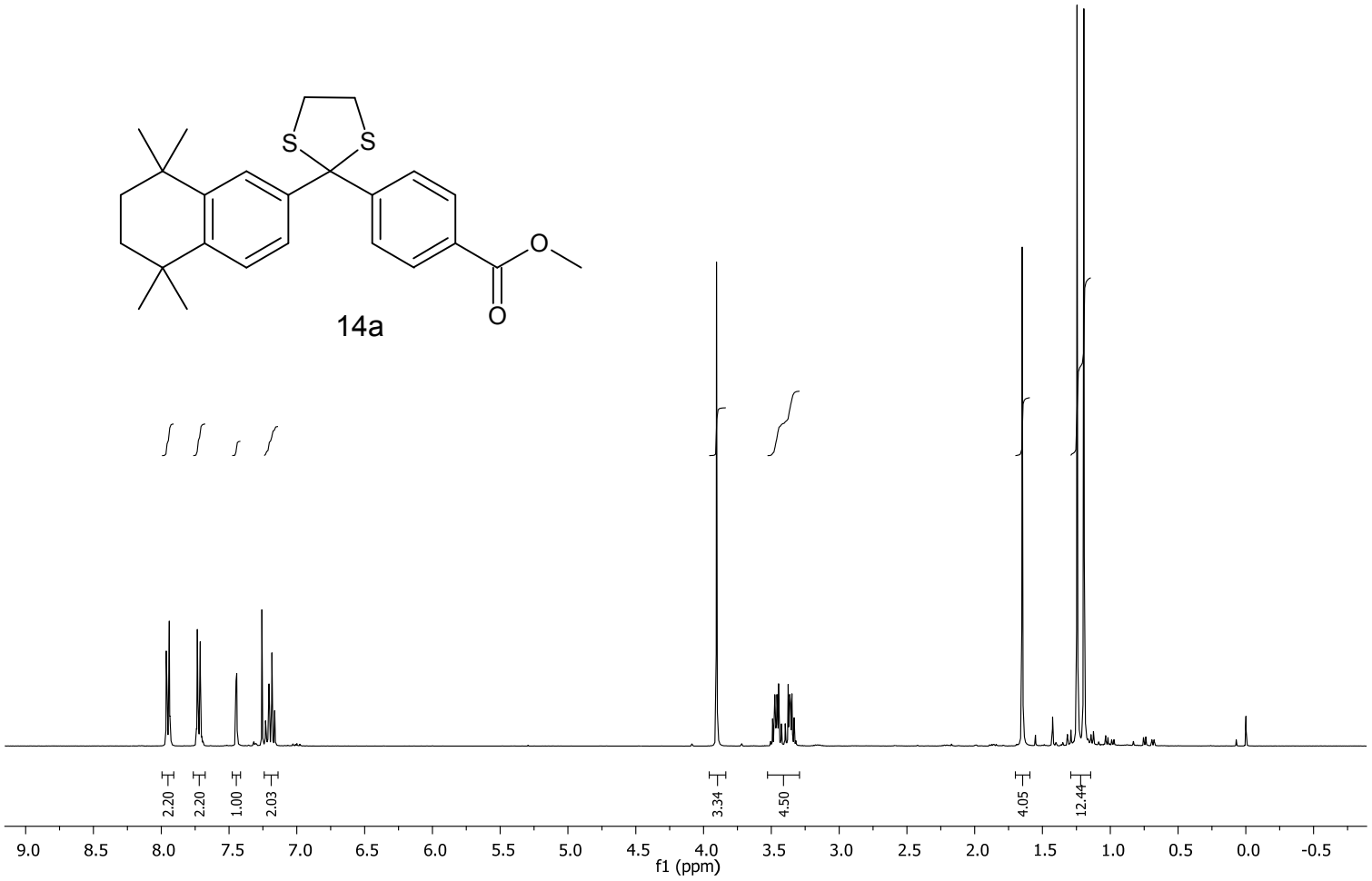


400 MHz ^{1}H-NMR of compound 14a in $CDCl_3$

CMK-02-53-proton



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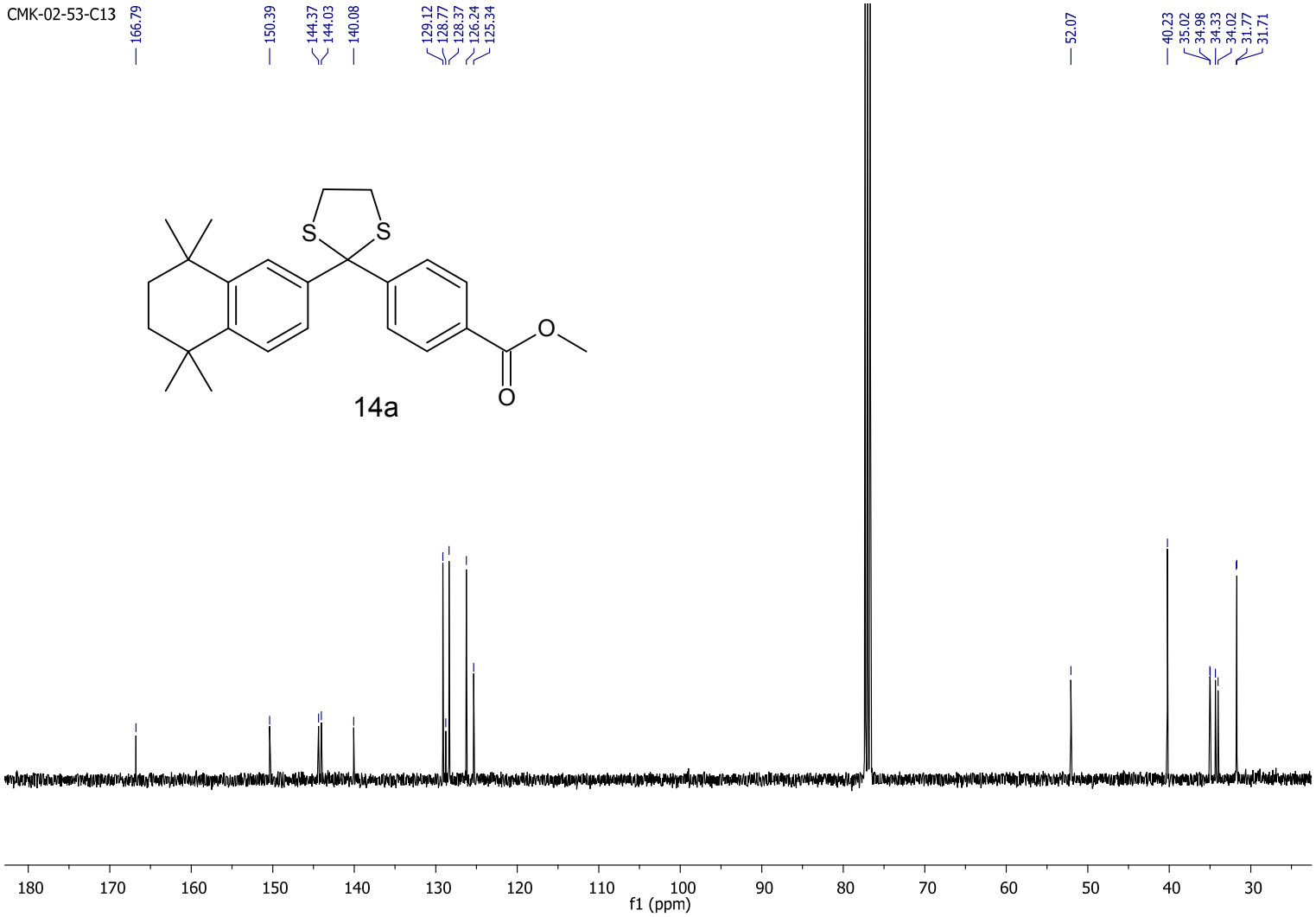
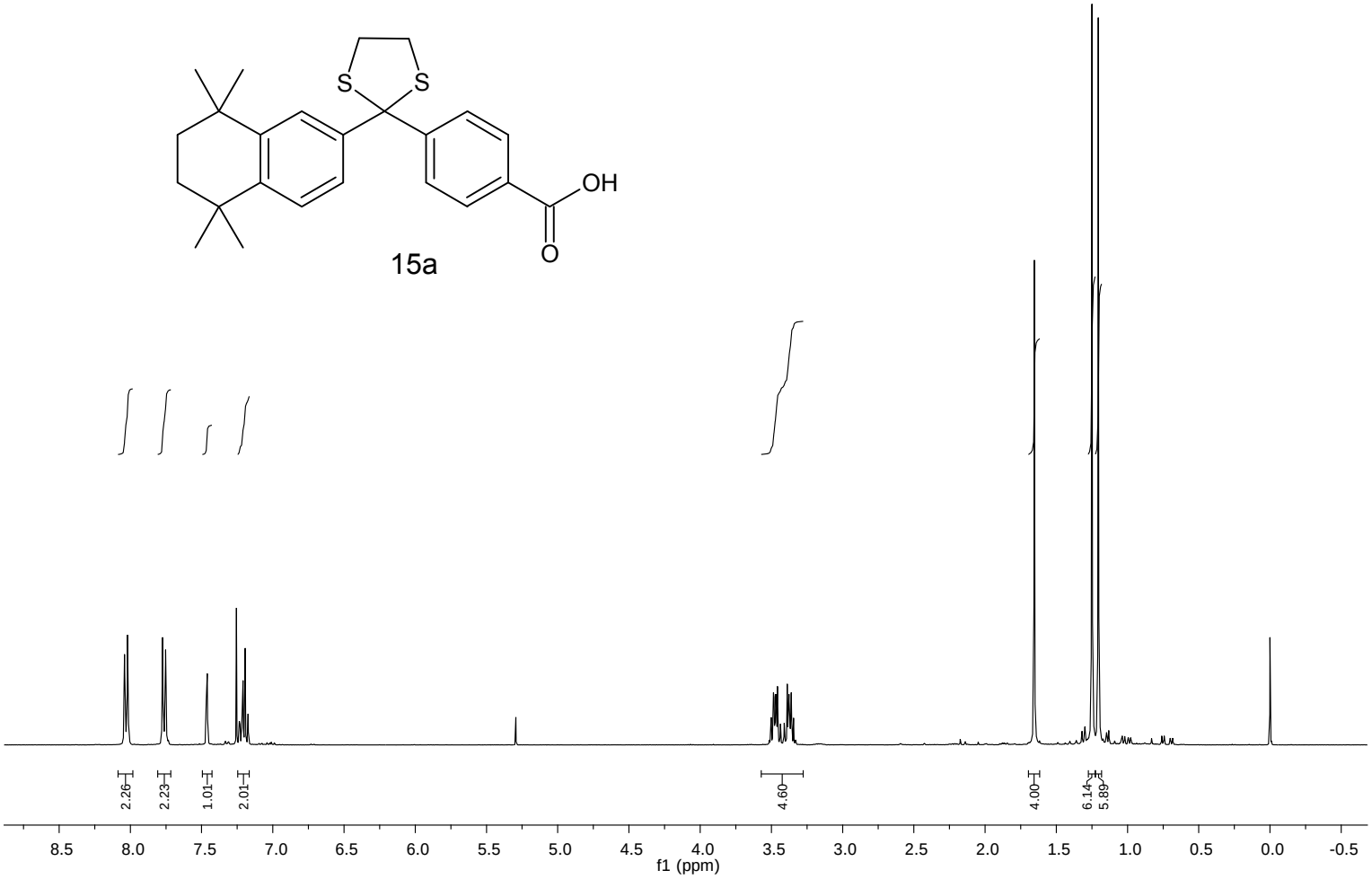


400 MHz ^{1}H-NMR of compound 15a in $CDCl_3$

CMK-02-54-proton



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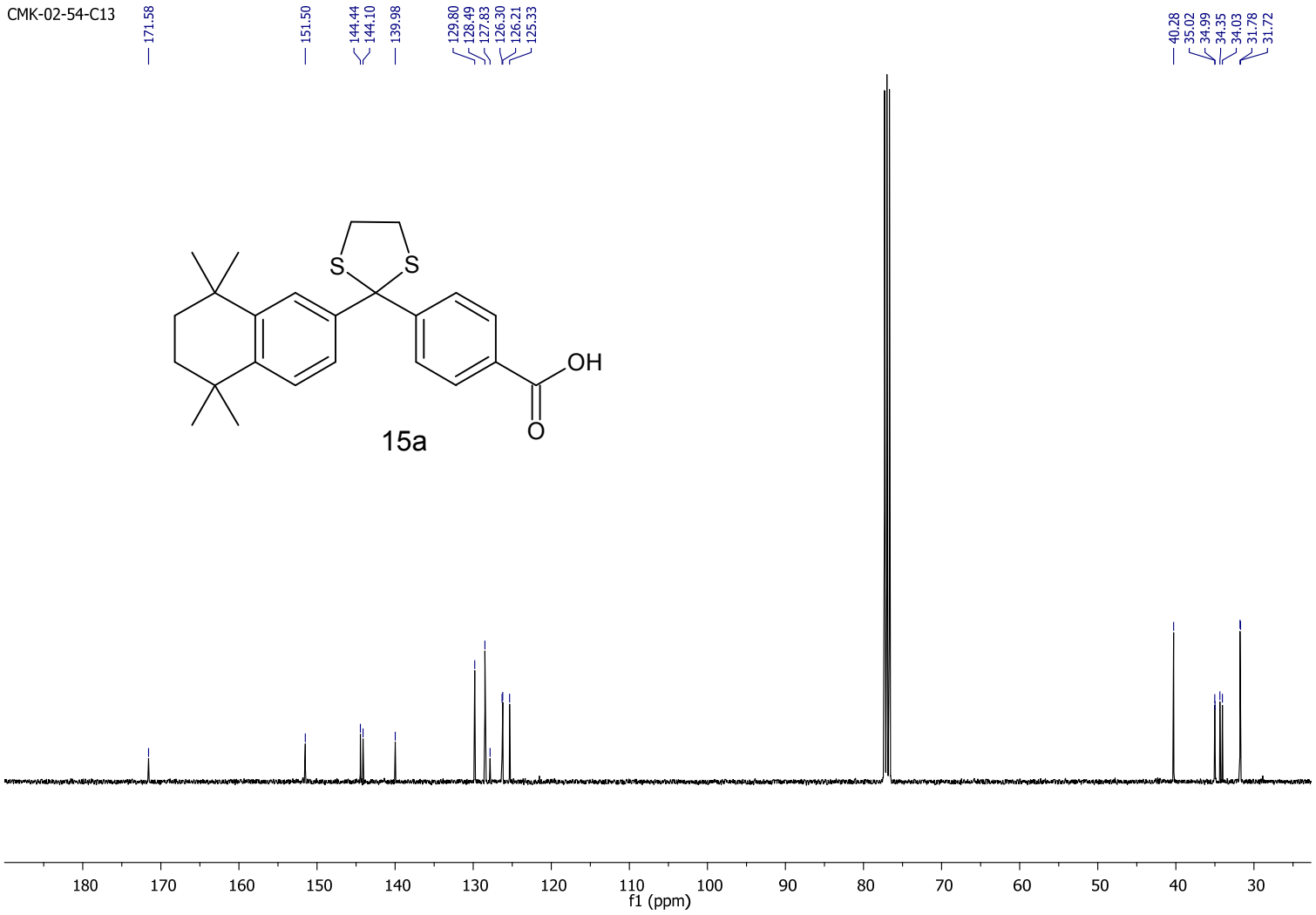

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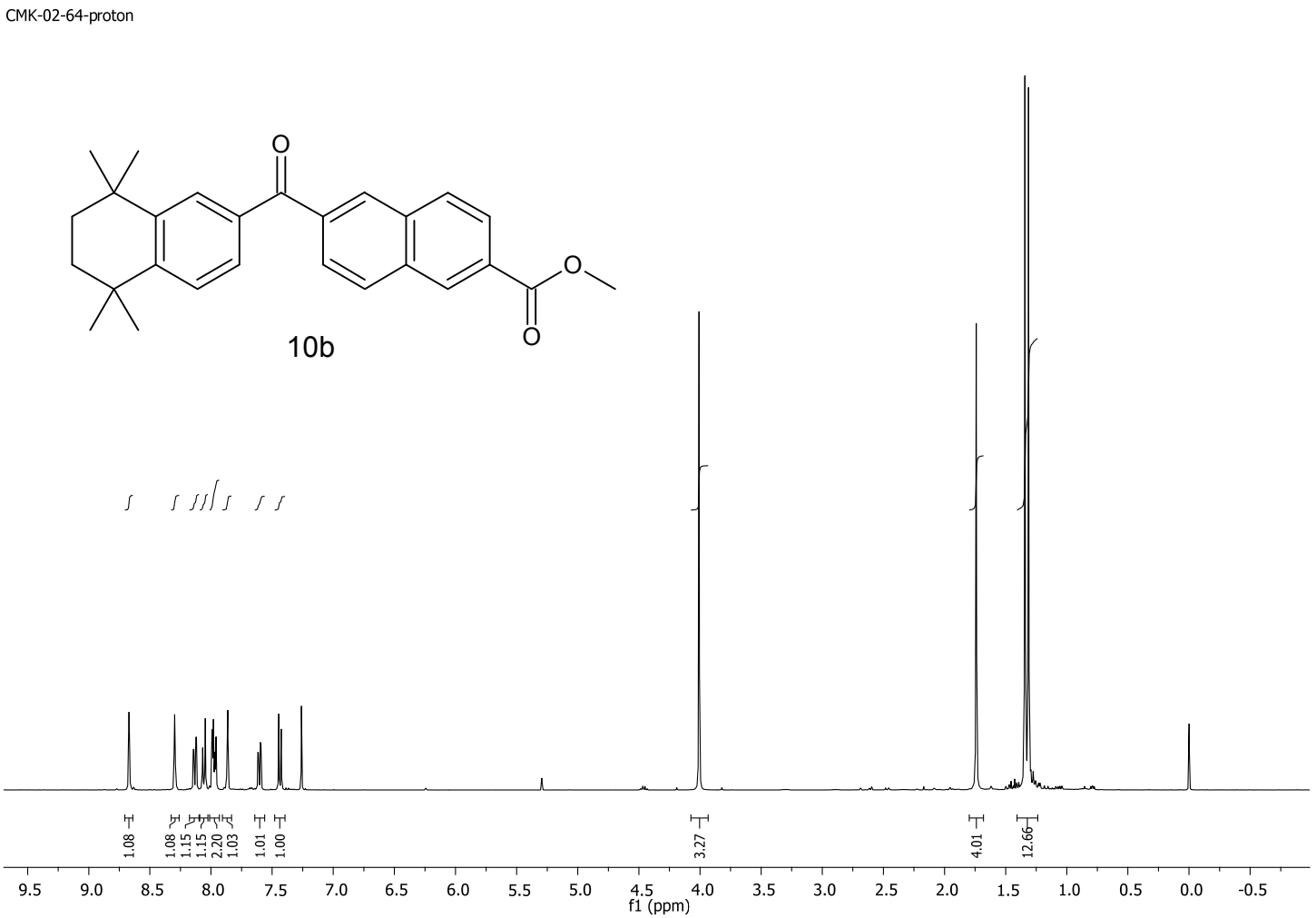

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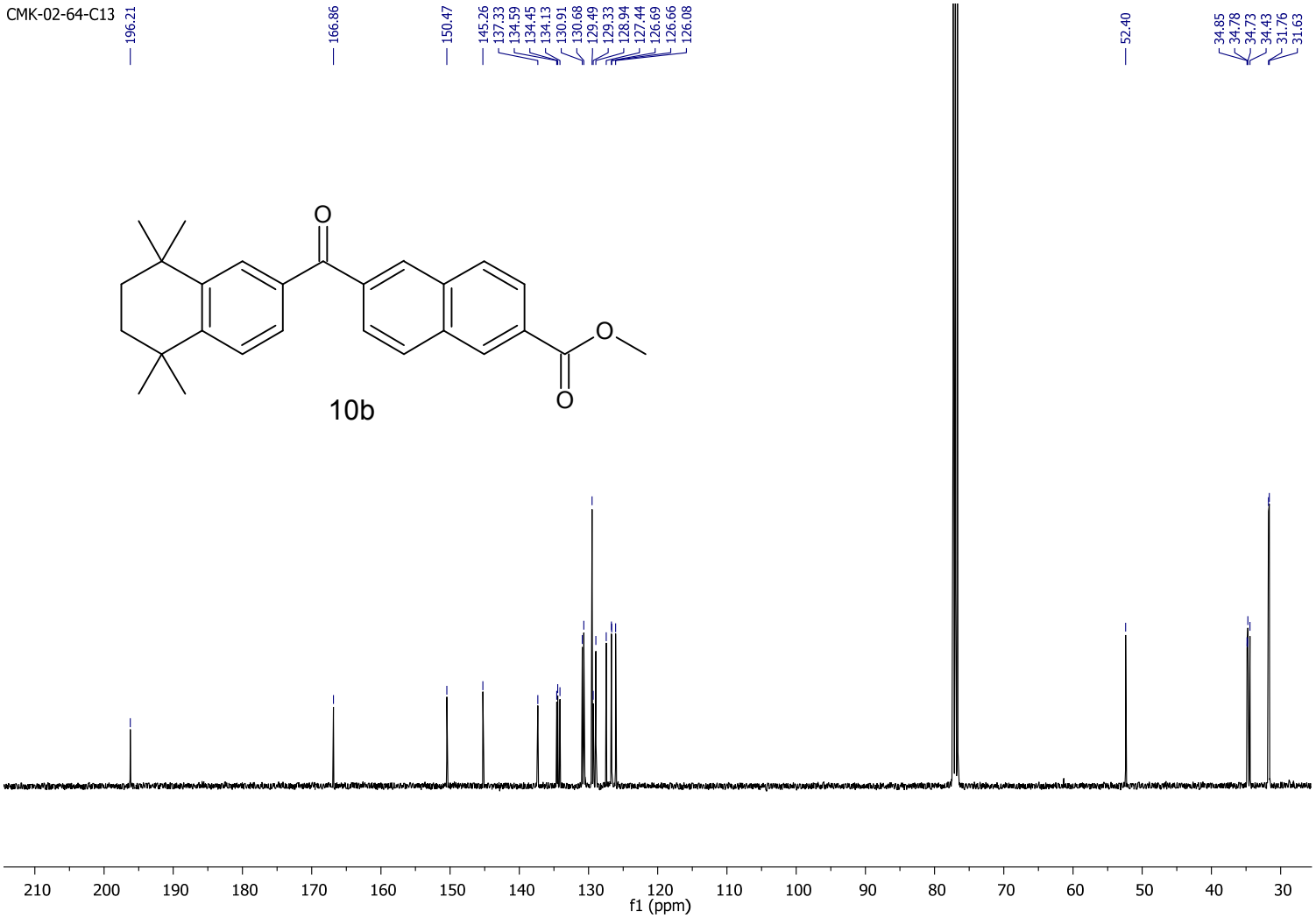
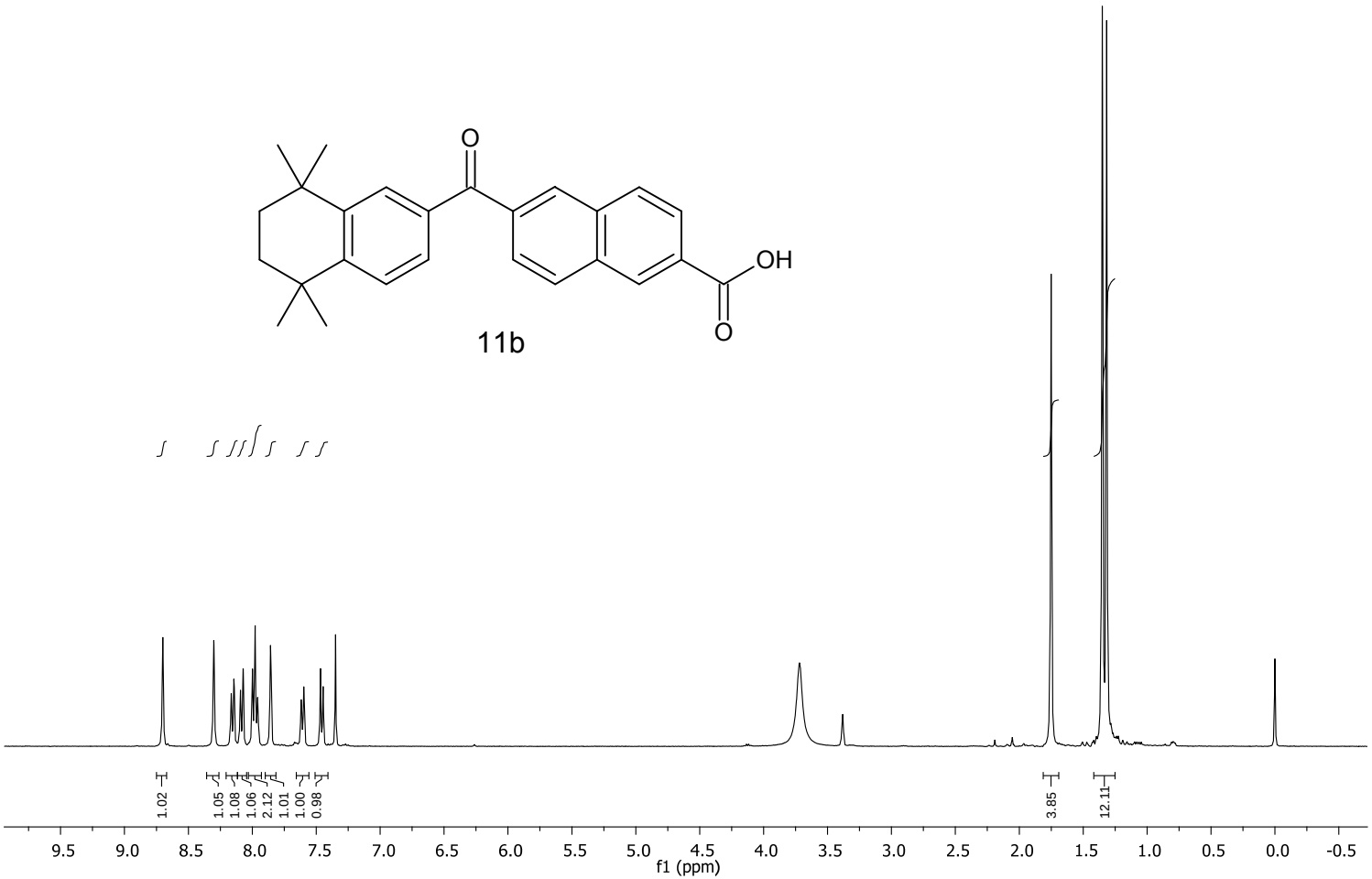
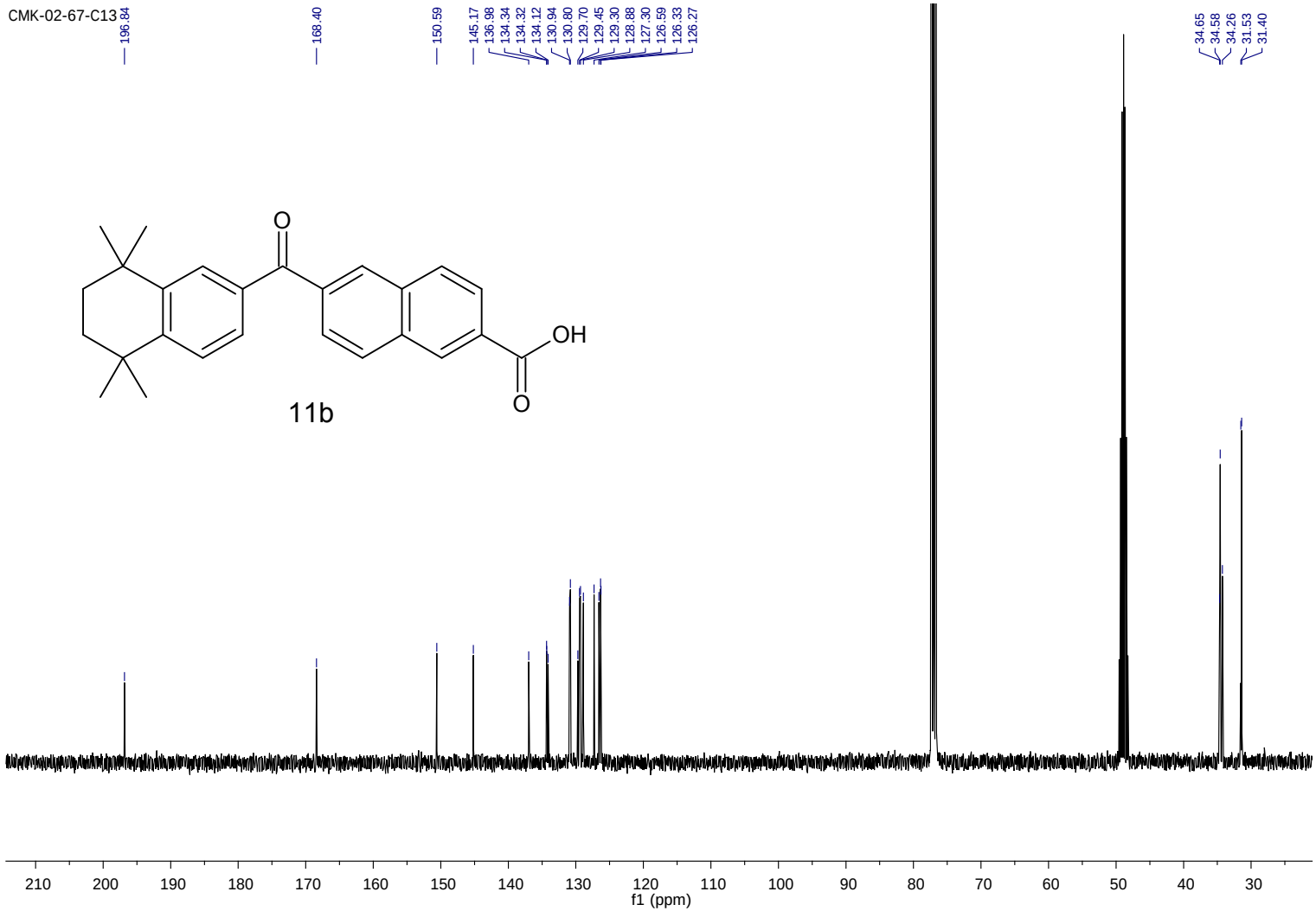


400 MHz ^{1}H-NMR of compound 11b in $CDCl_3/CD_3OD$ mixture

CMK-02-67-proton

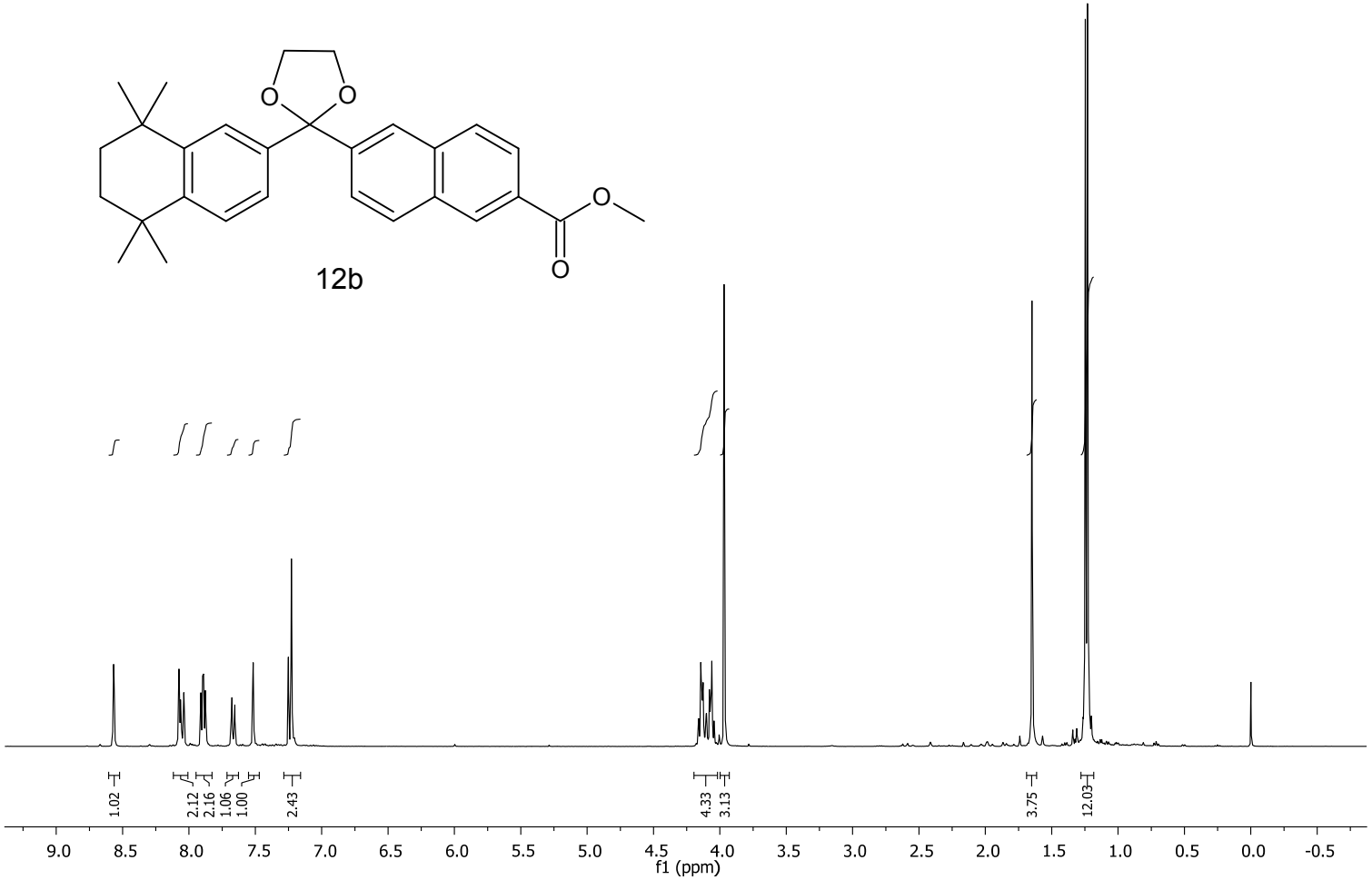


100 MHz ^{13}C-NMR of compound 11b in $CDCl_3/CD_3OD$ mixture

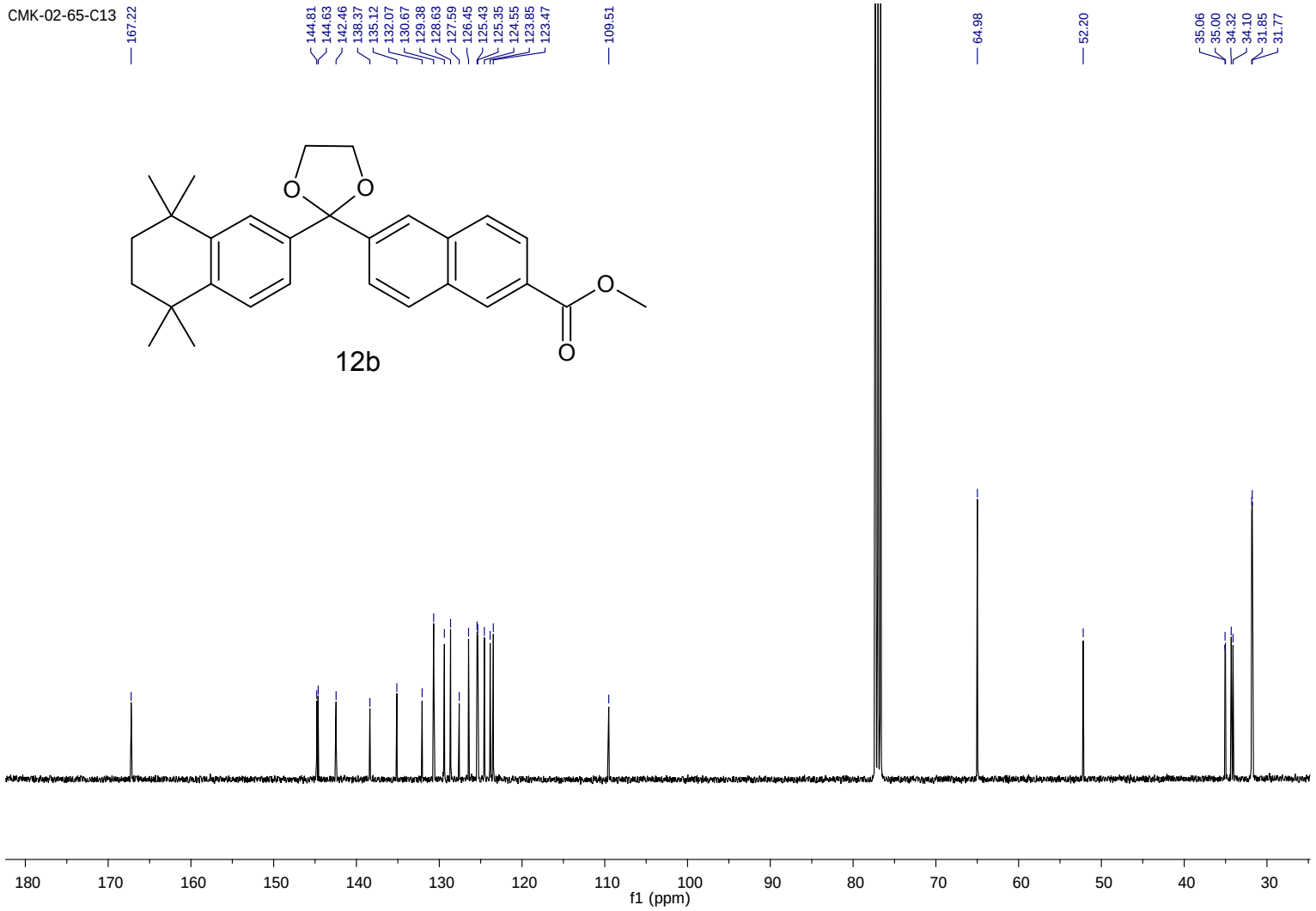


400 MHz ^{1}H-NMR of compound 12b in $CDCl_3$

CMK-02-65-proton

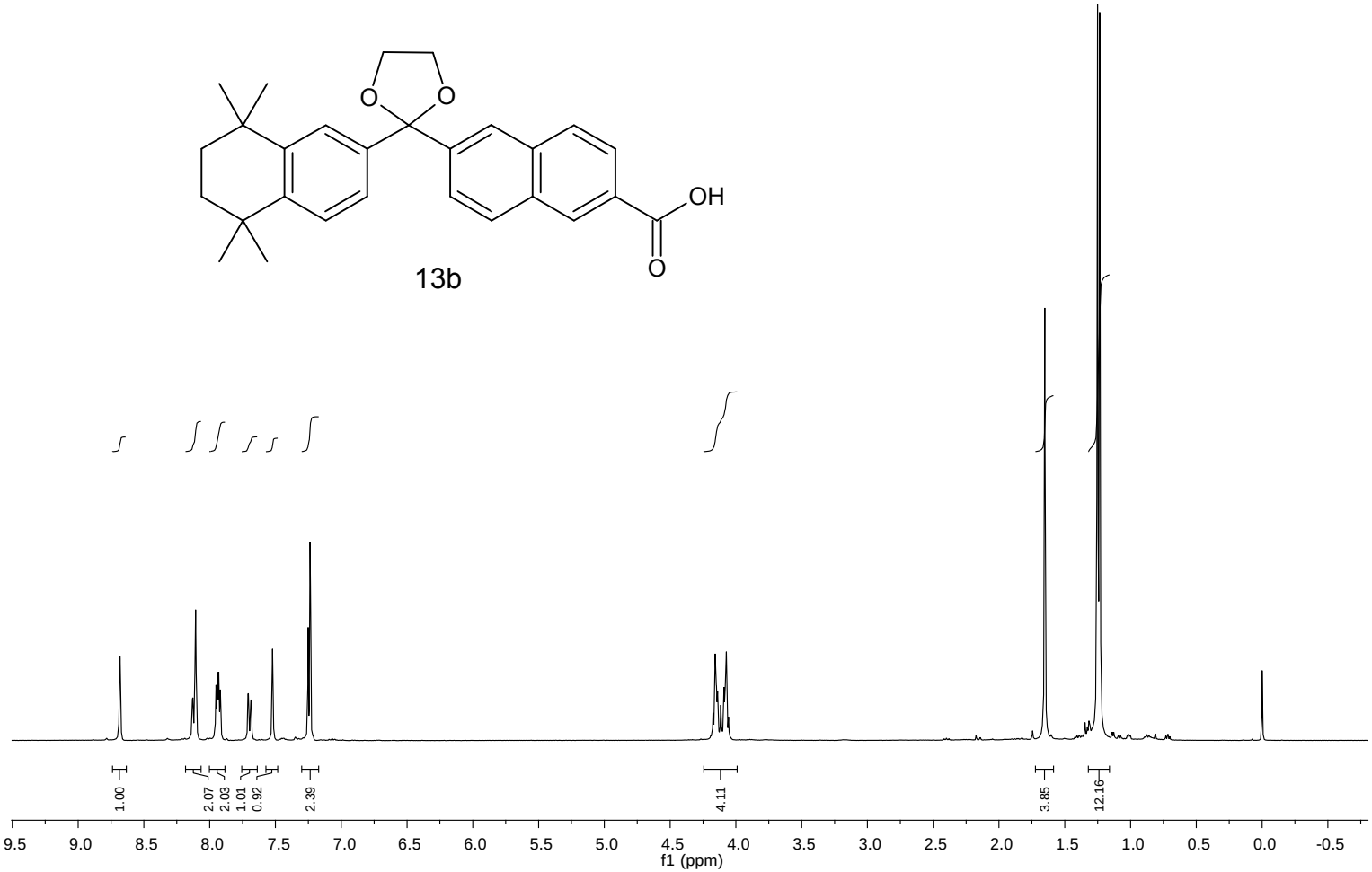


100 MHz ^{13}C-NMR of compound 12b in $CDCl_3$

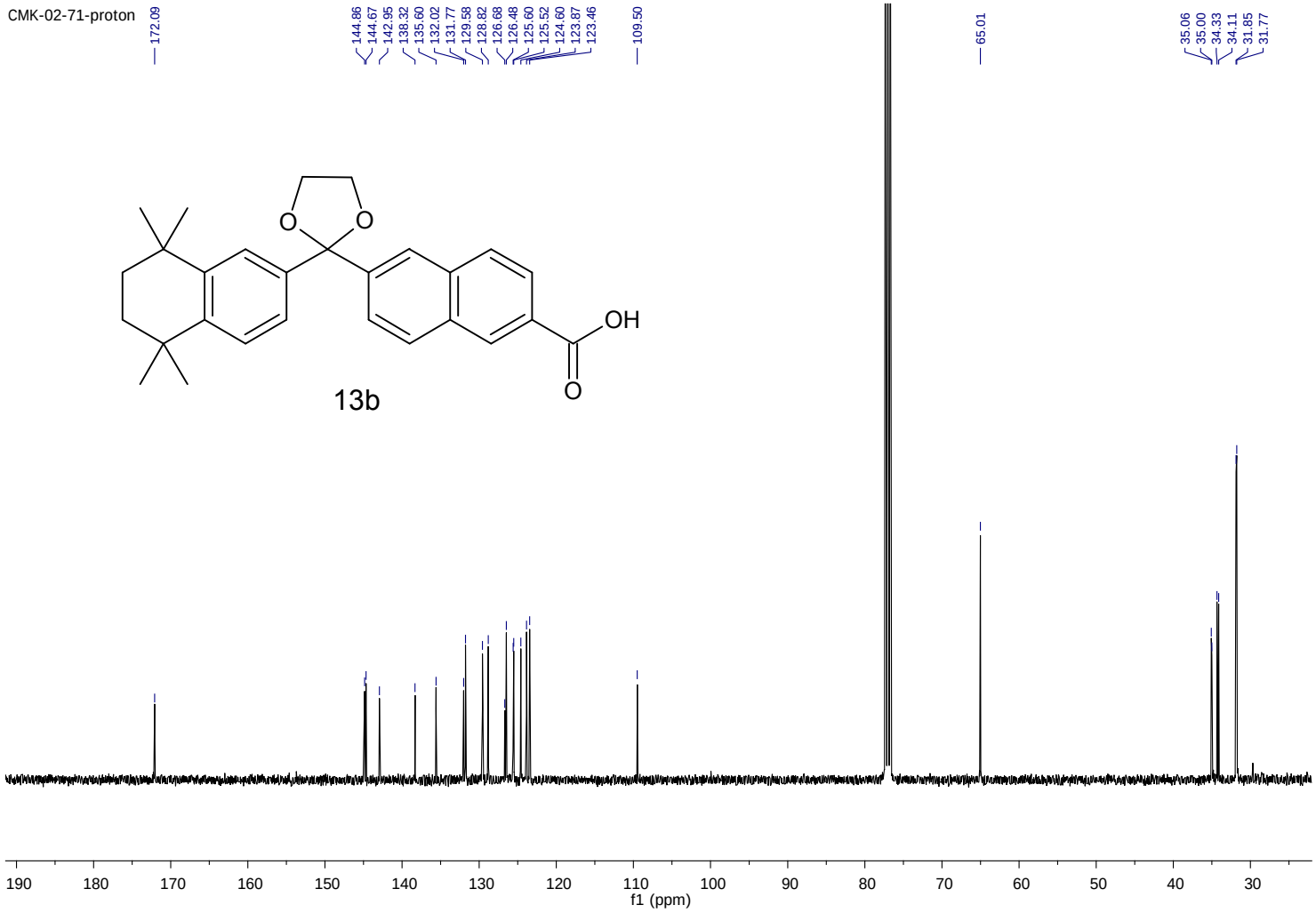


400 MHz ^{1}H-NMR of compound 13b in $CDCl_3$

CMK-02-71-proton



100 MHz ^{13}C-NMR of compound 13b in $CDCl_3$



400 MHz ^{1}H-NMR of compound 14b in $CDCl_3$

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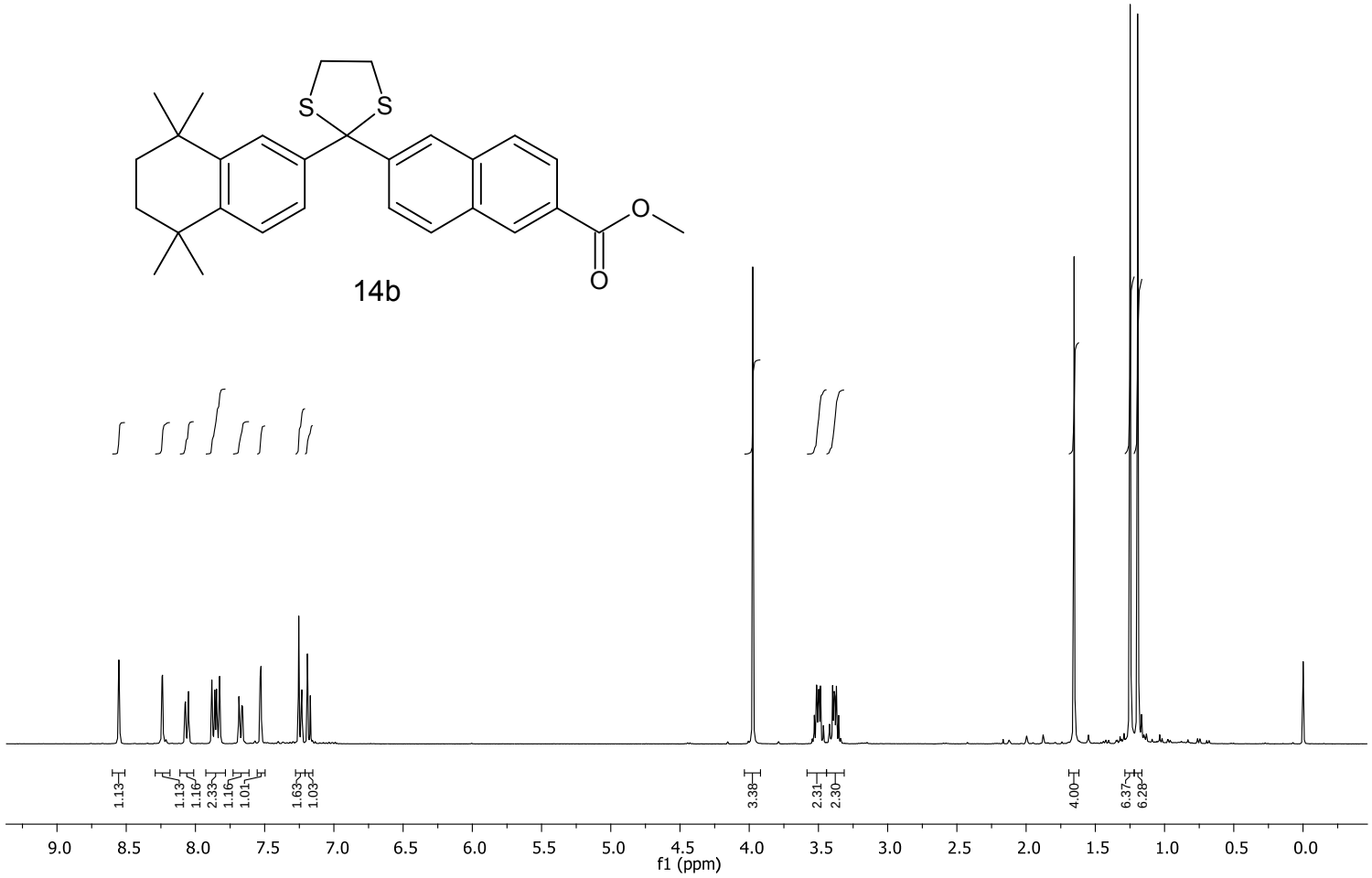

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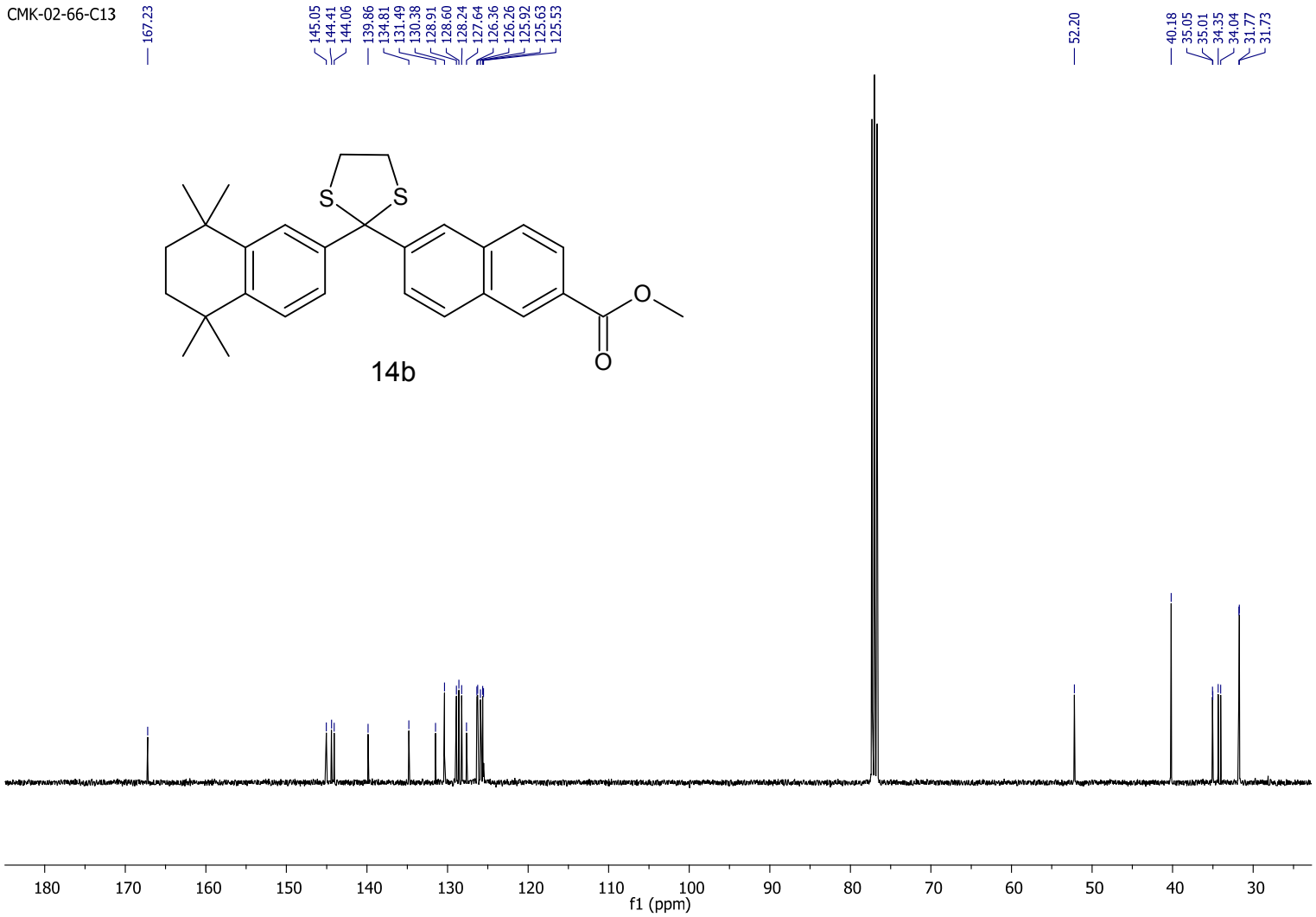

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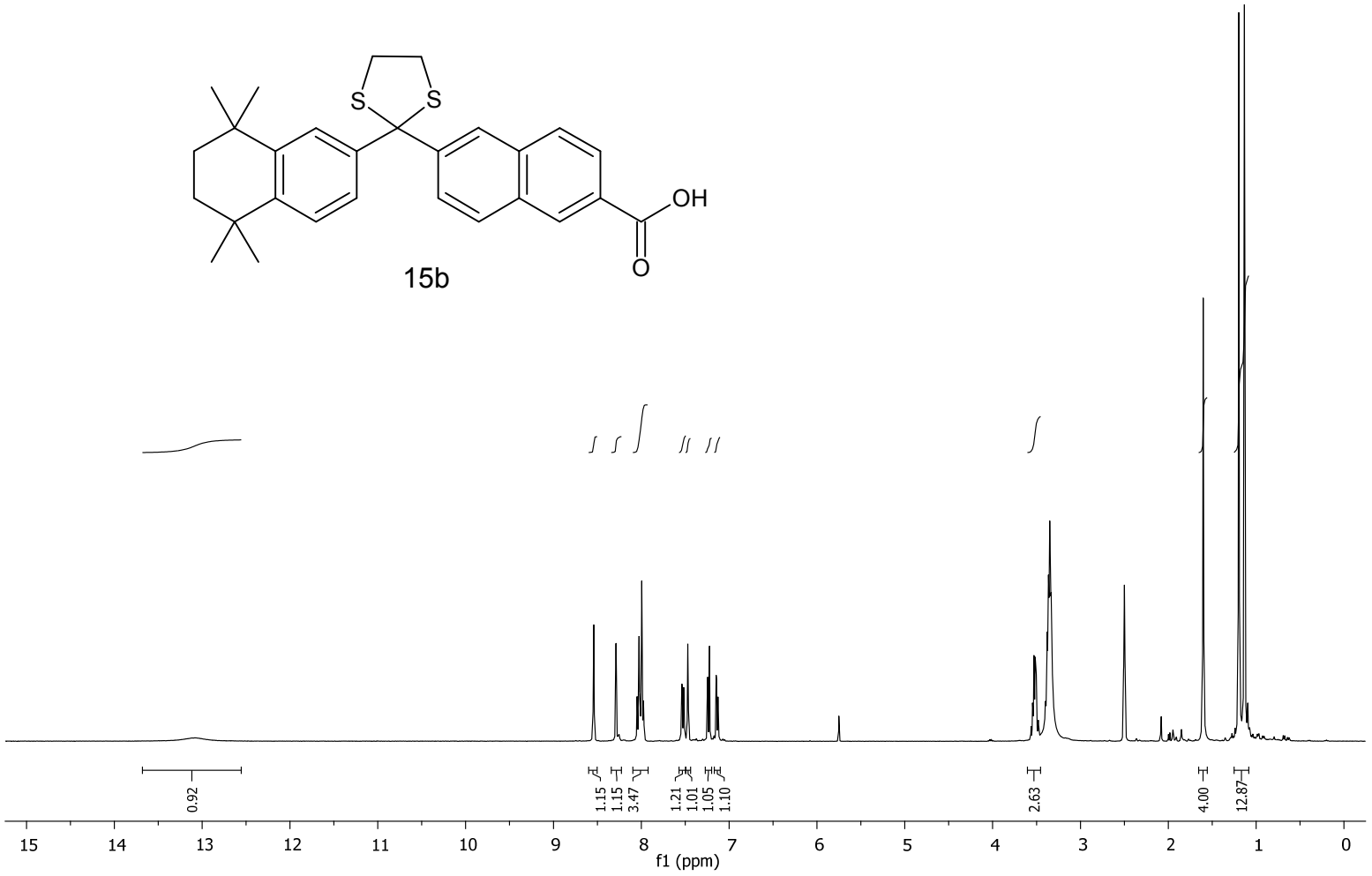

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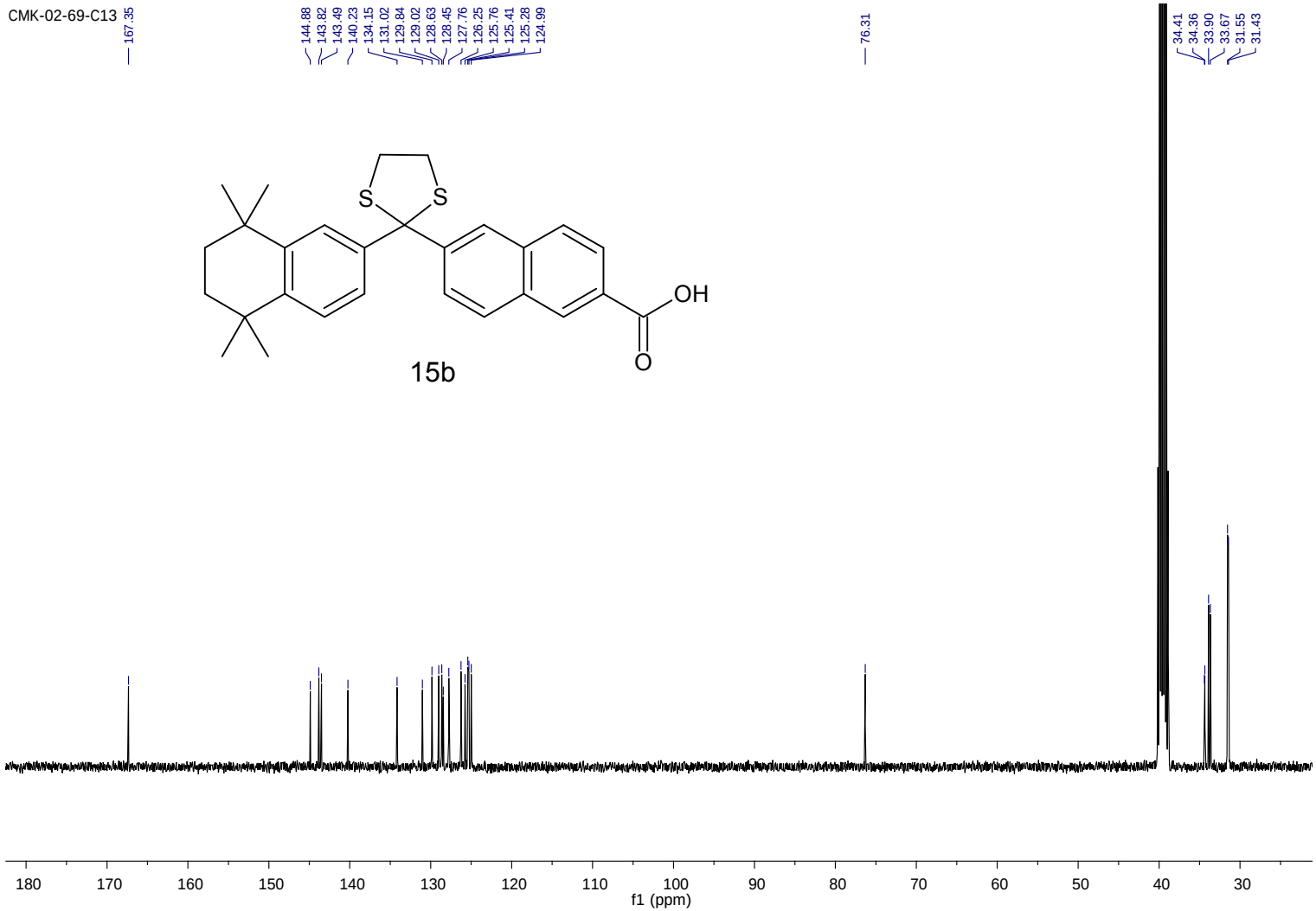

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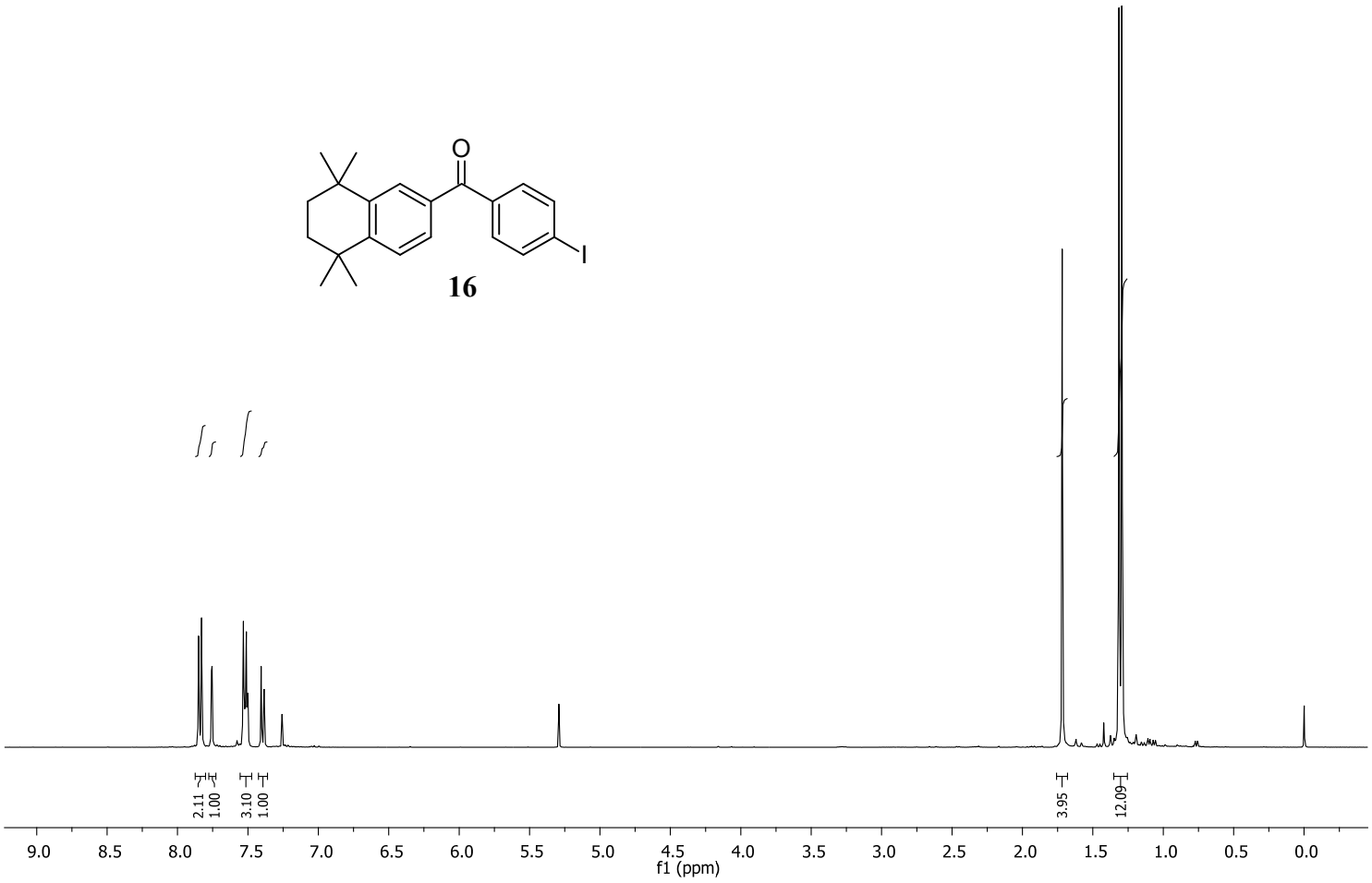

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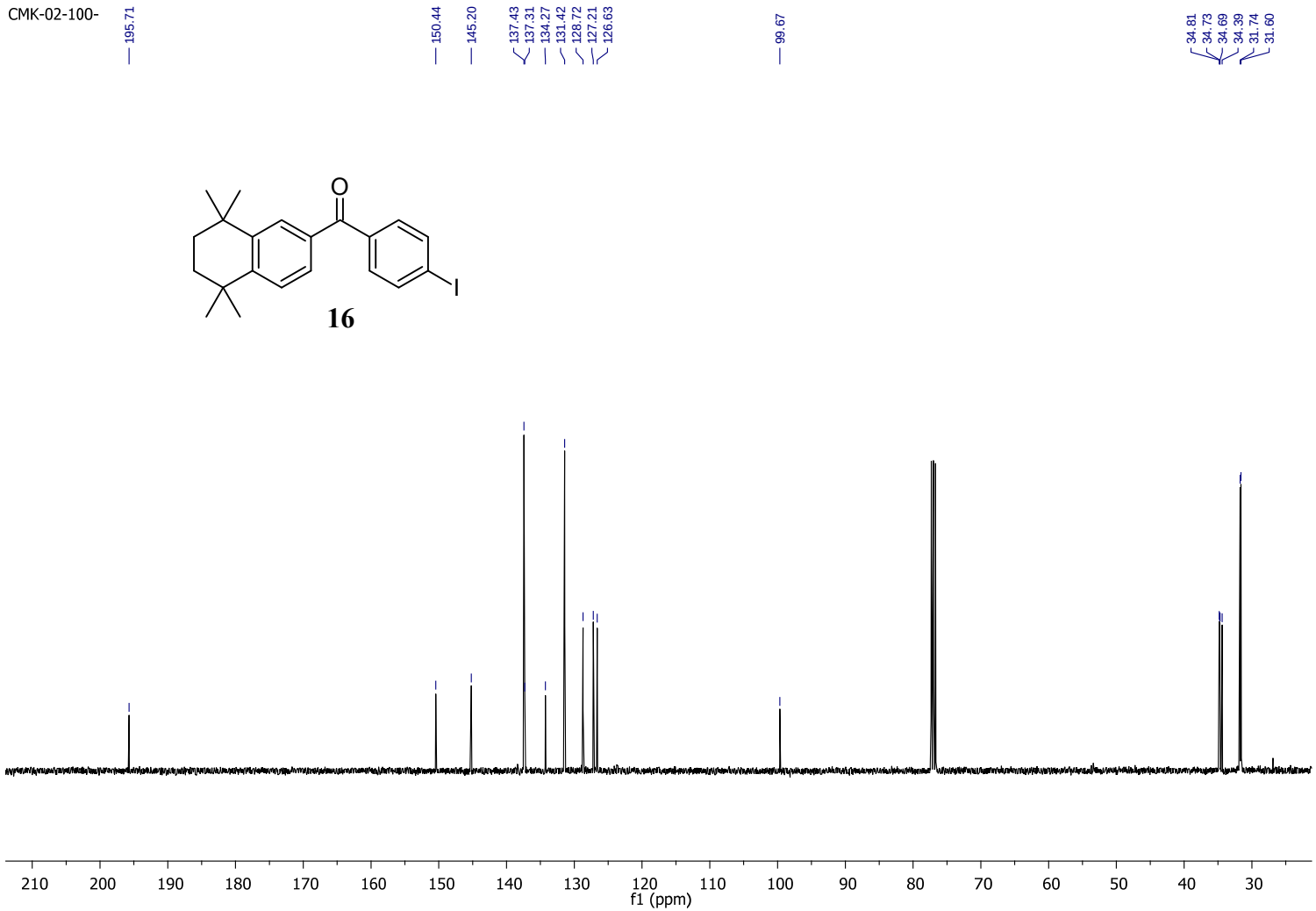

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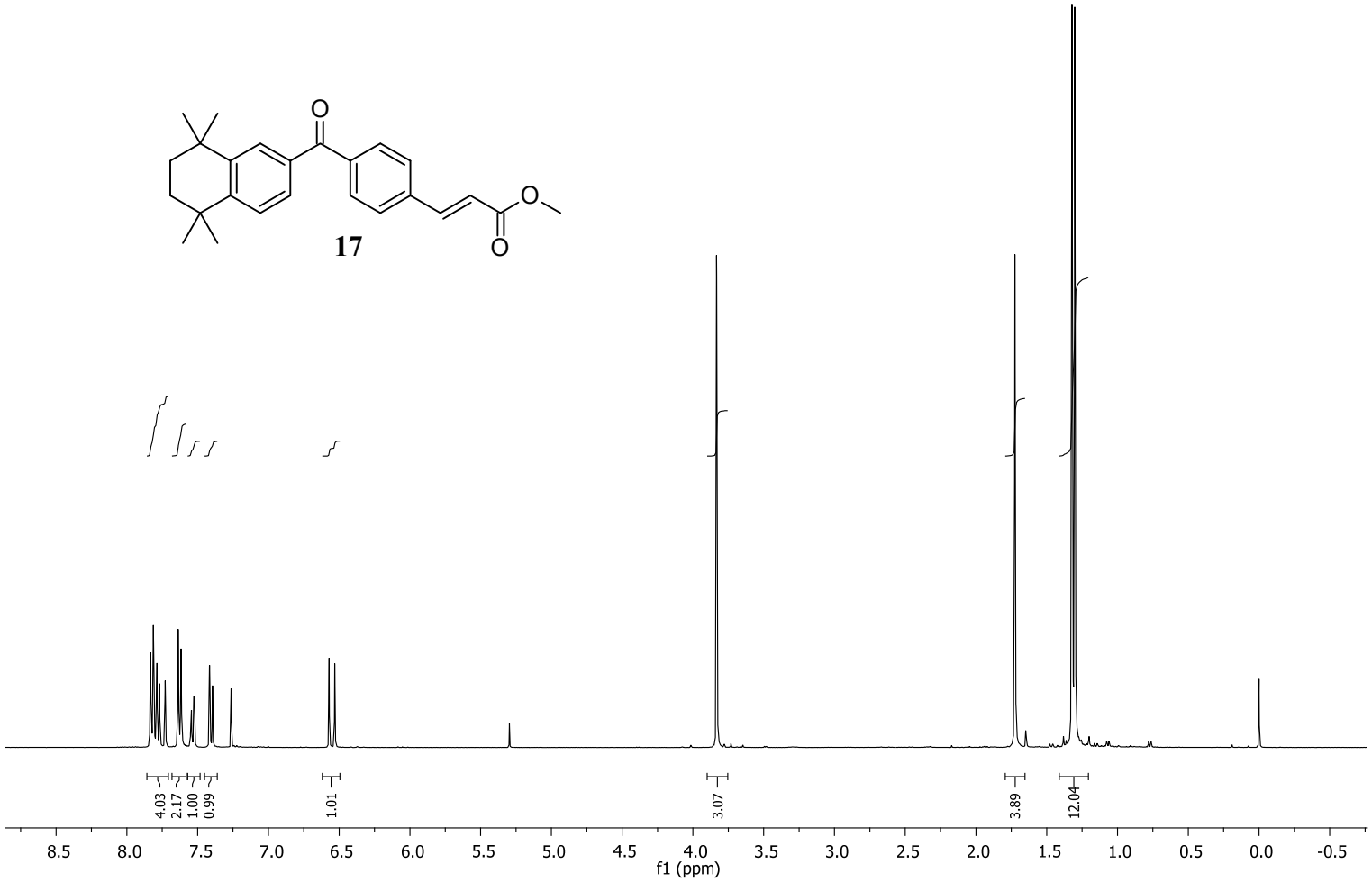

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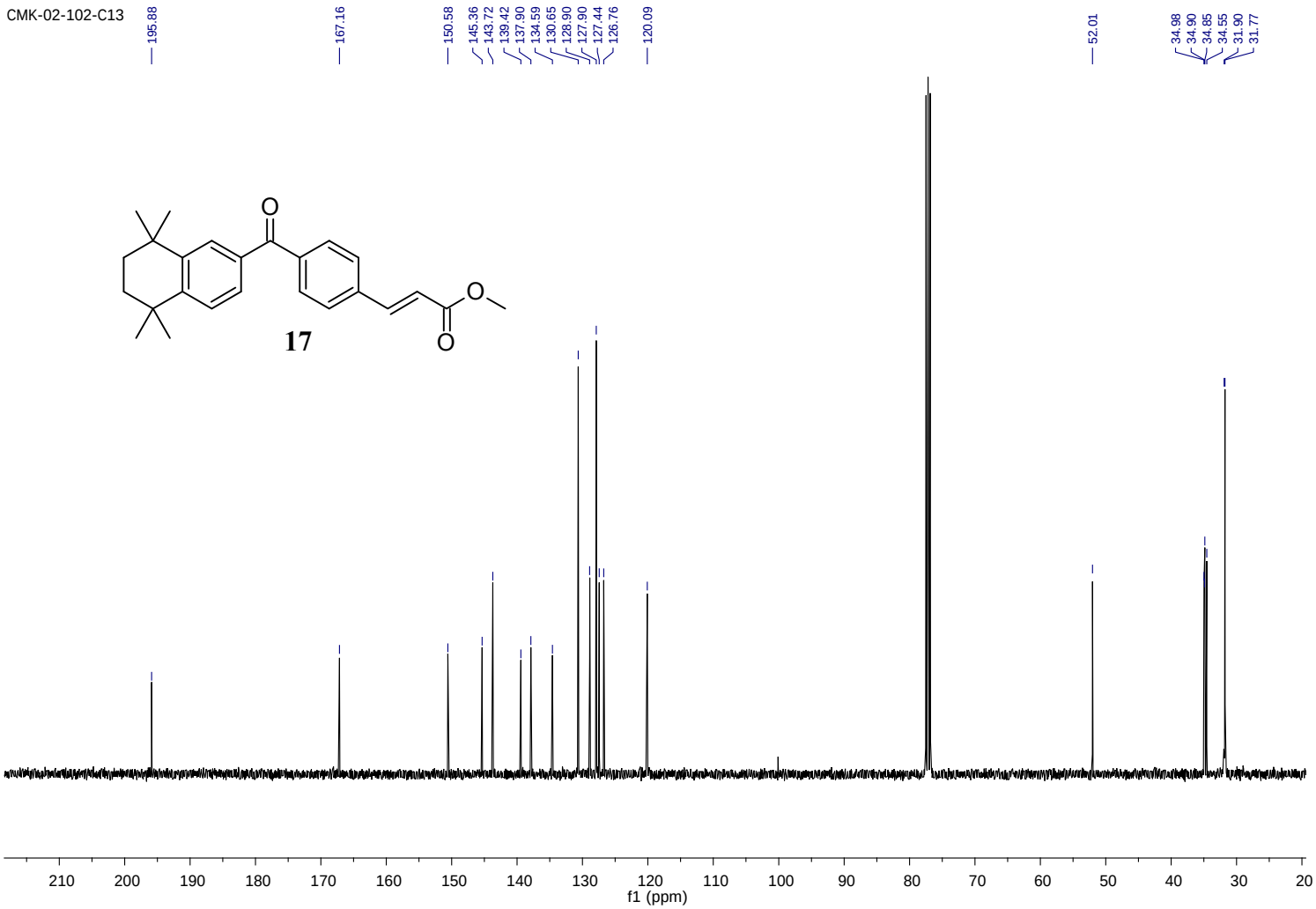

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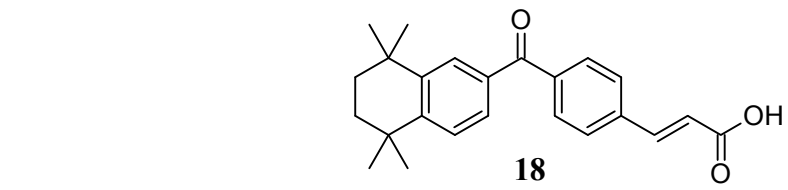

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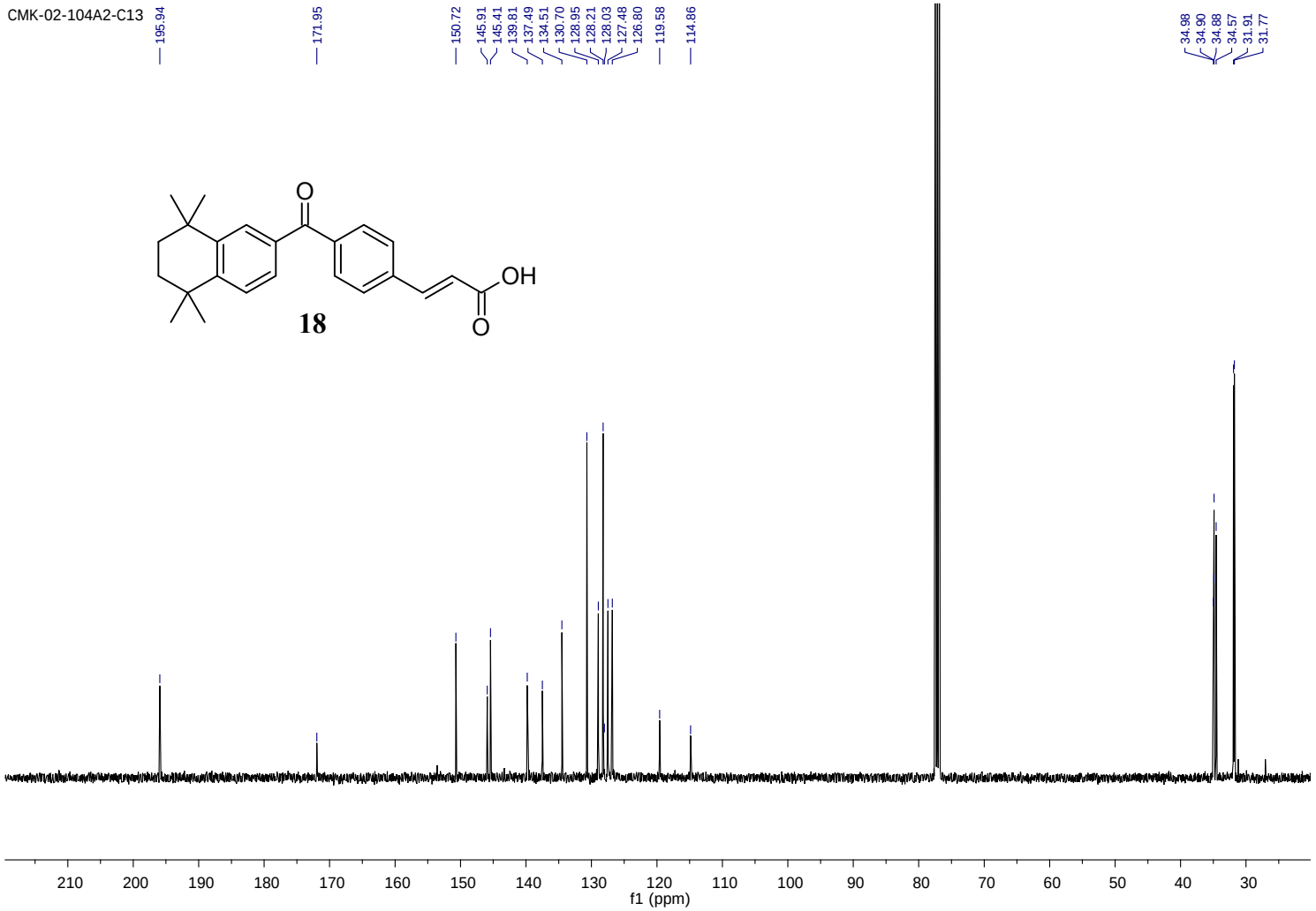

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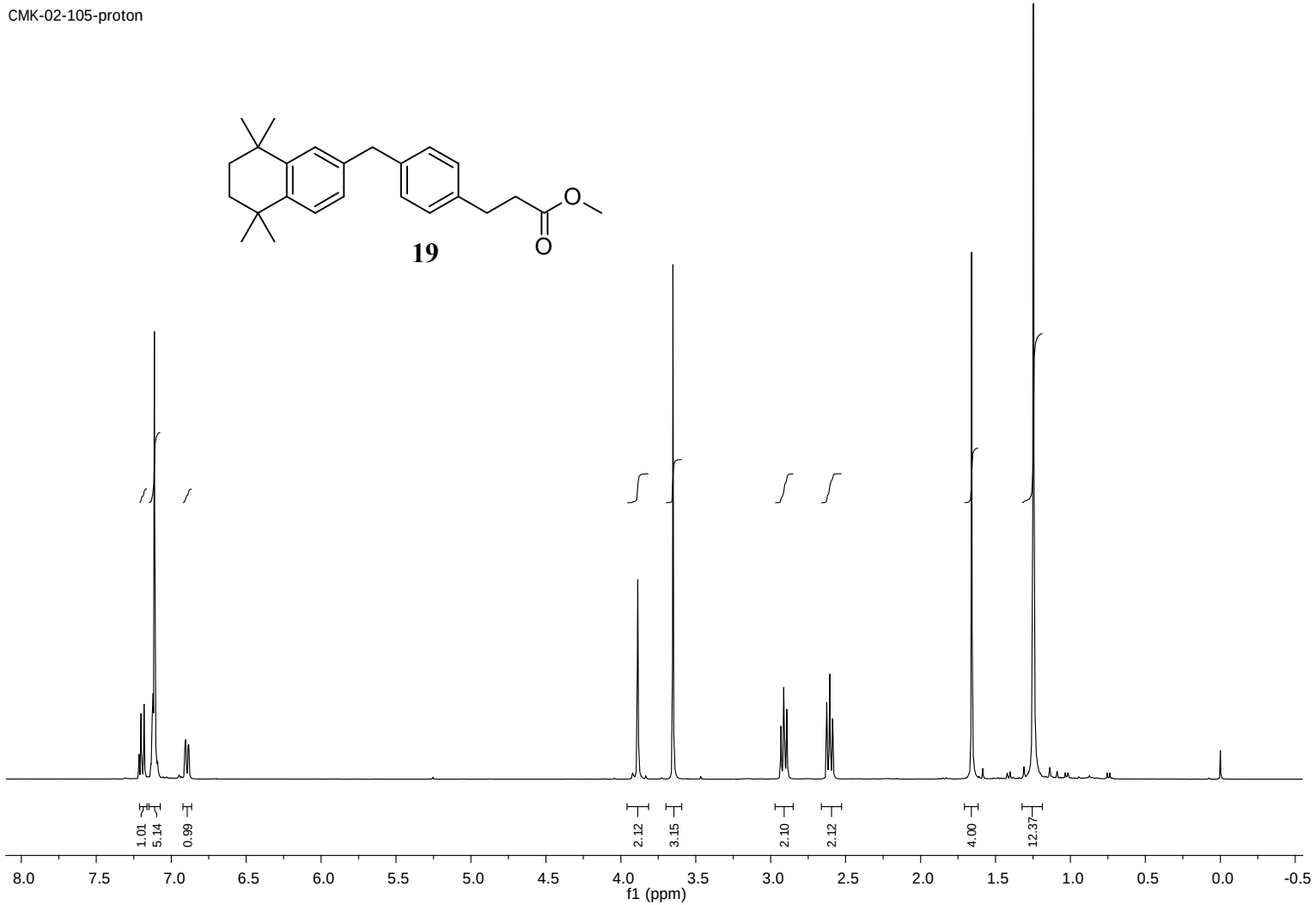

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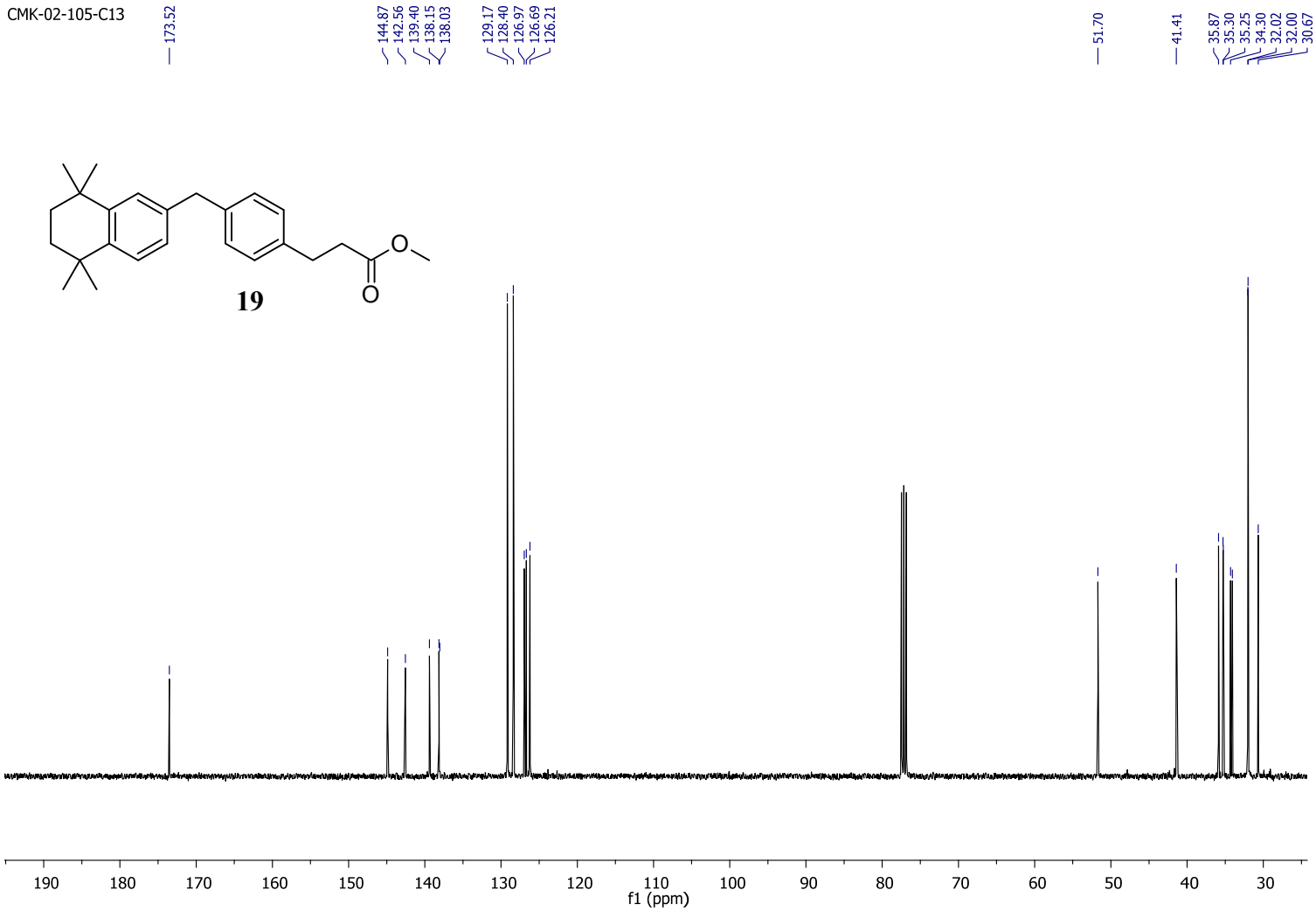

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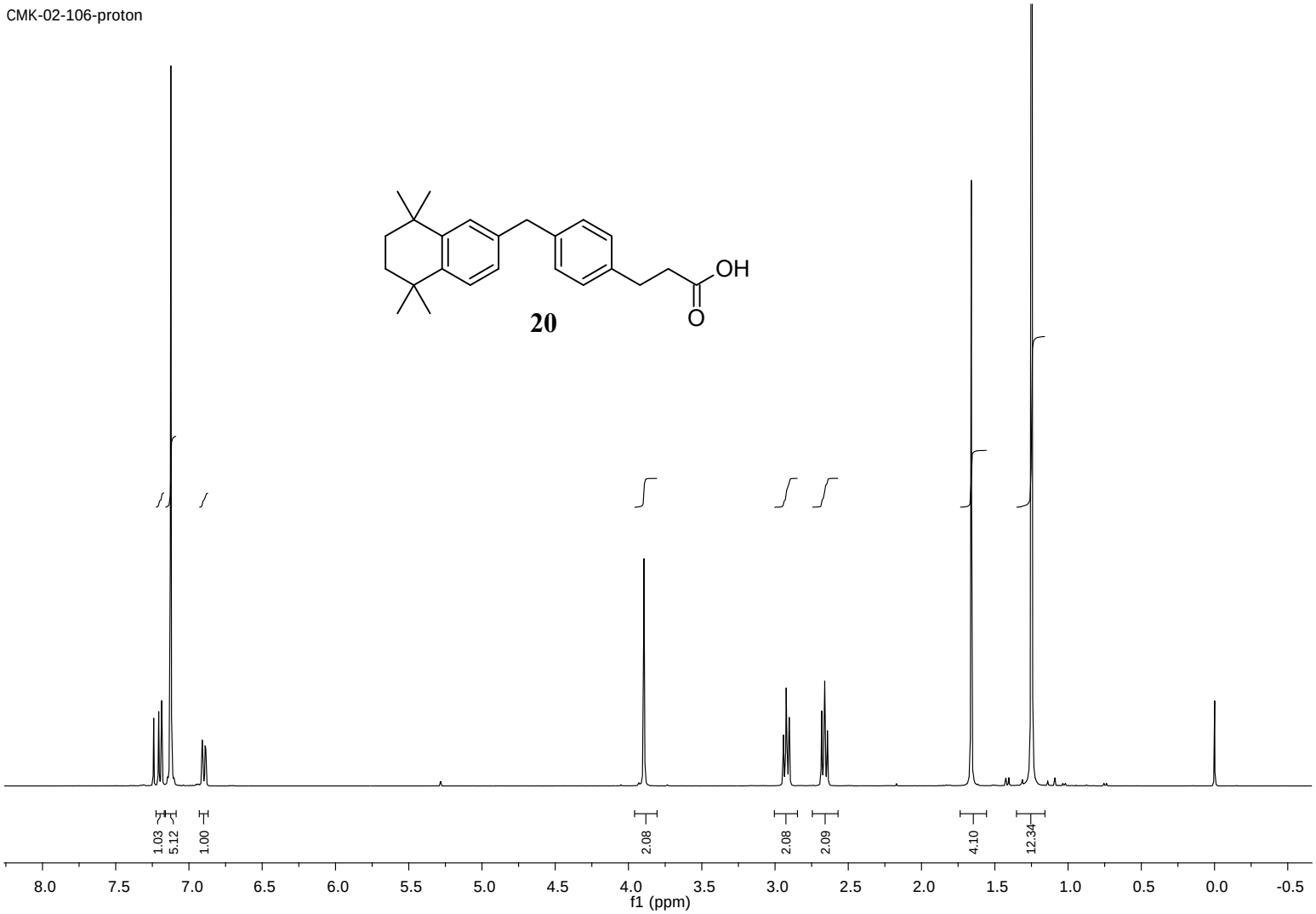

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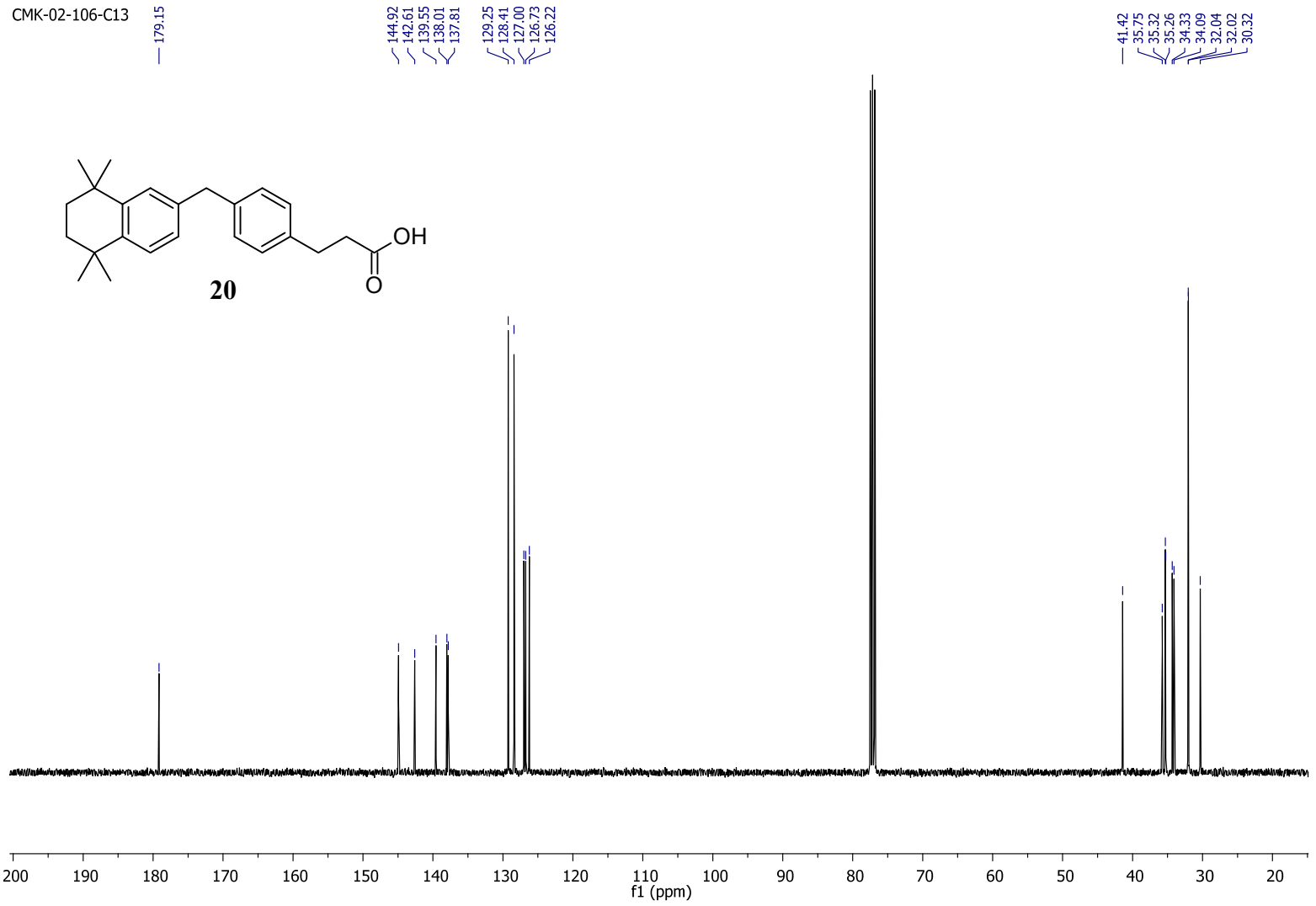

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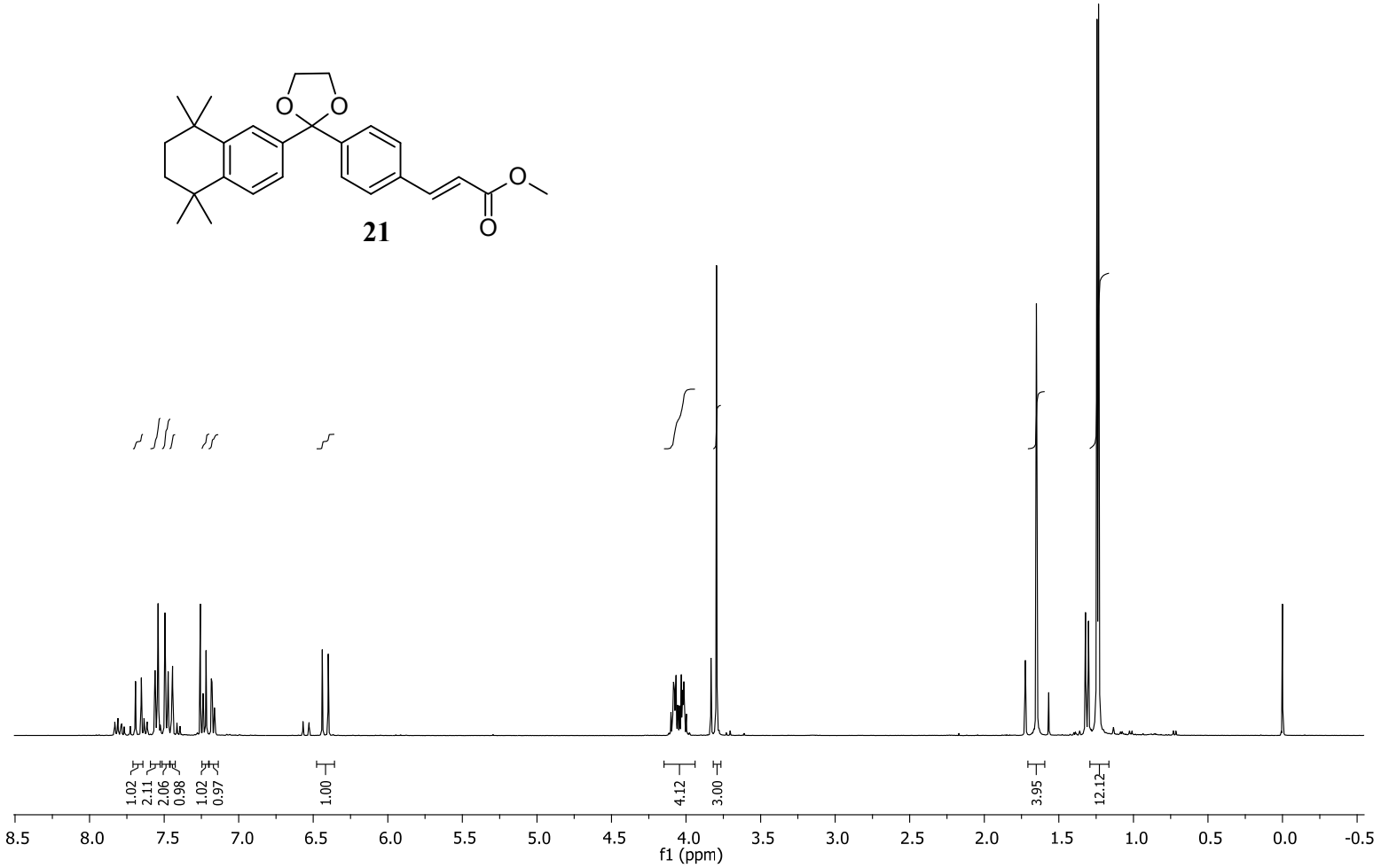

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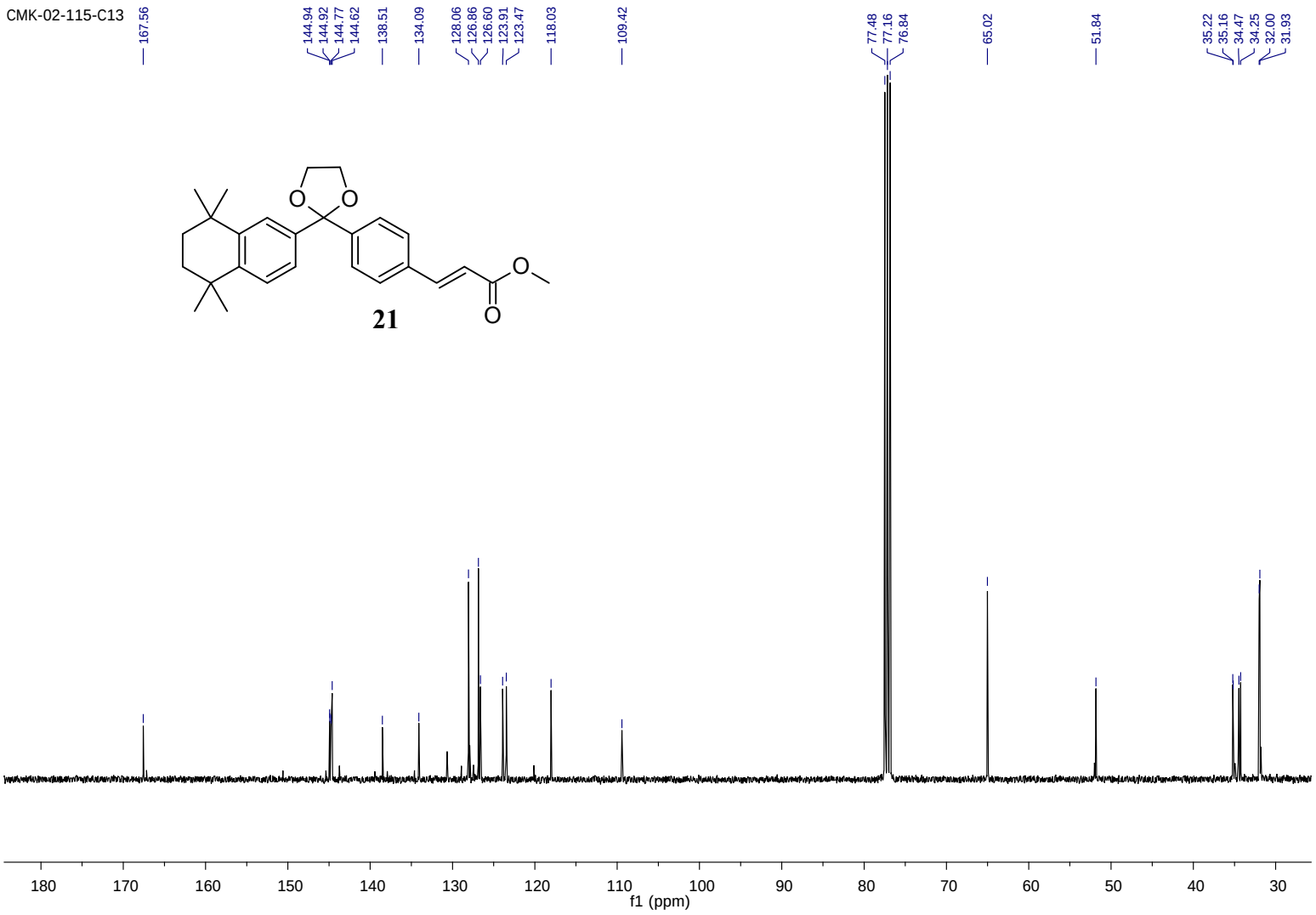

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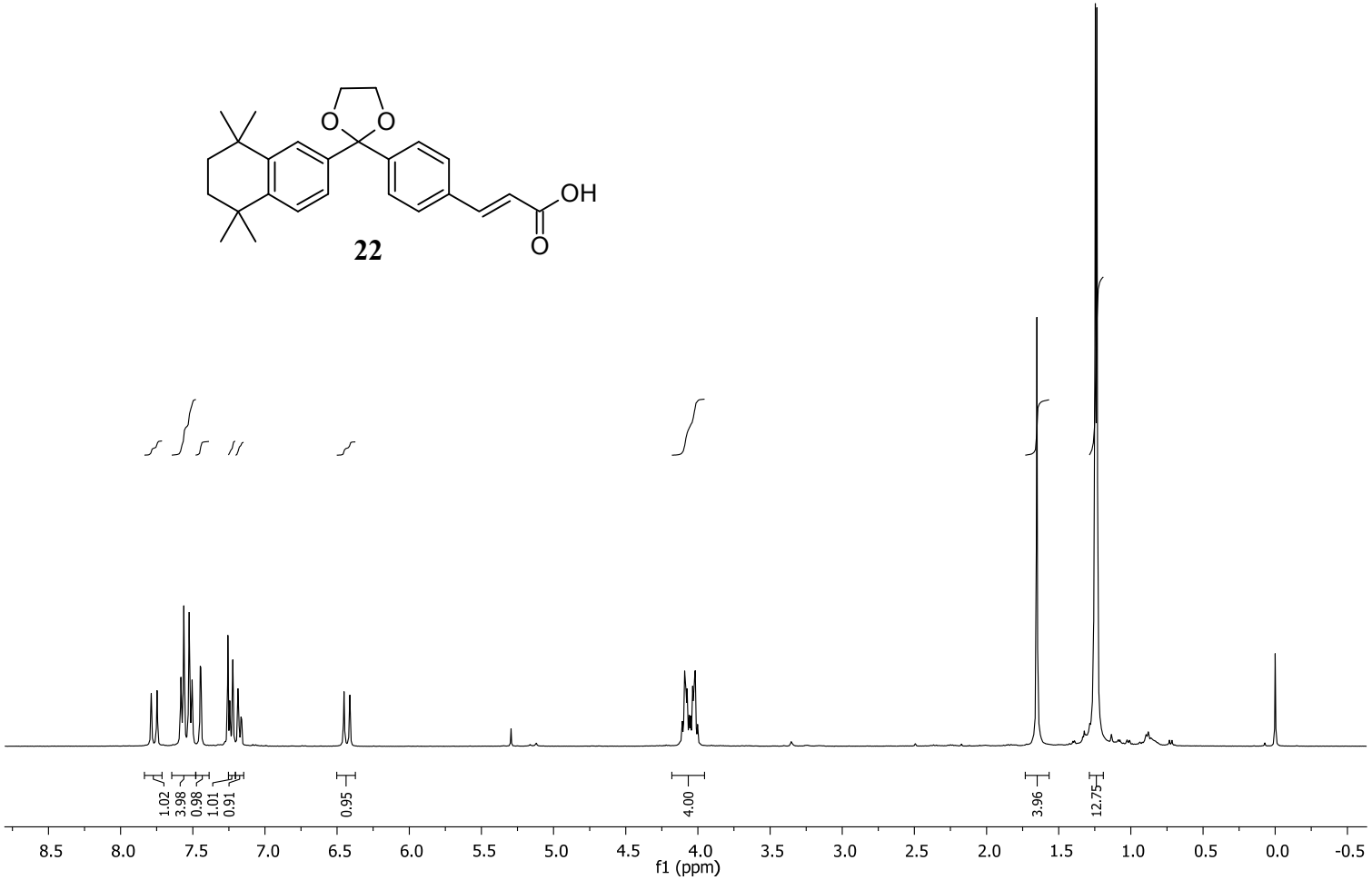

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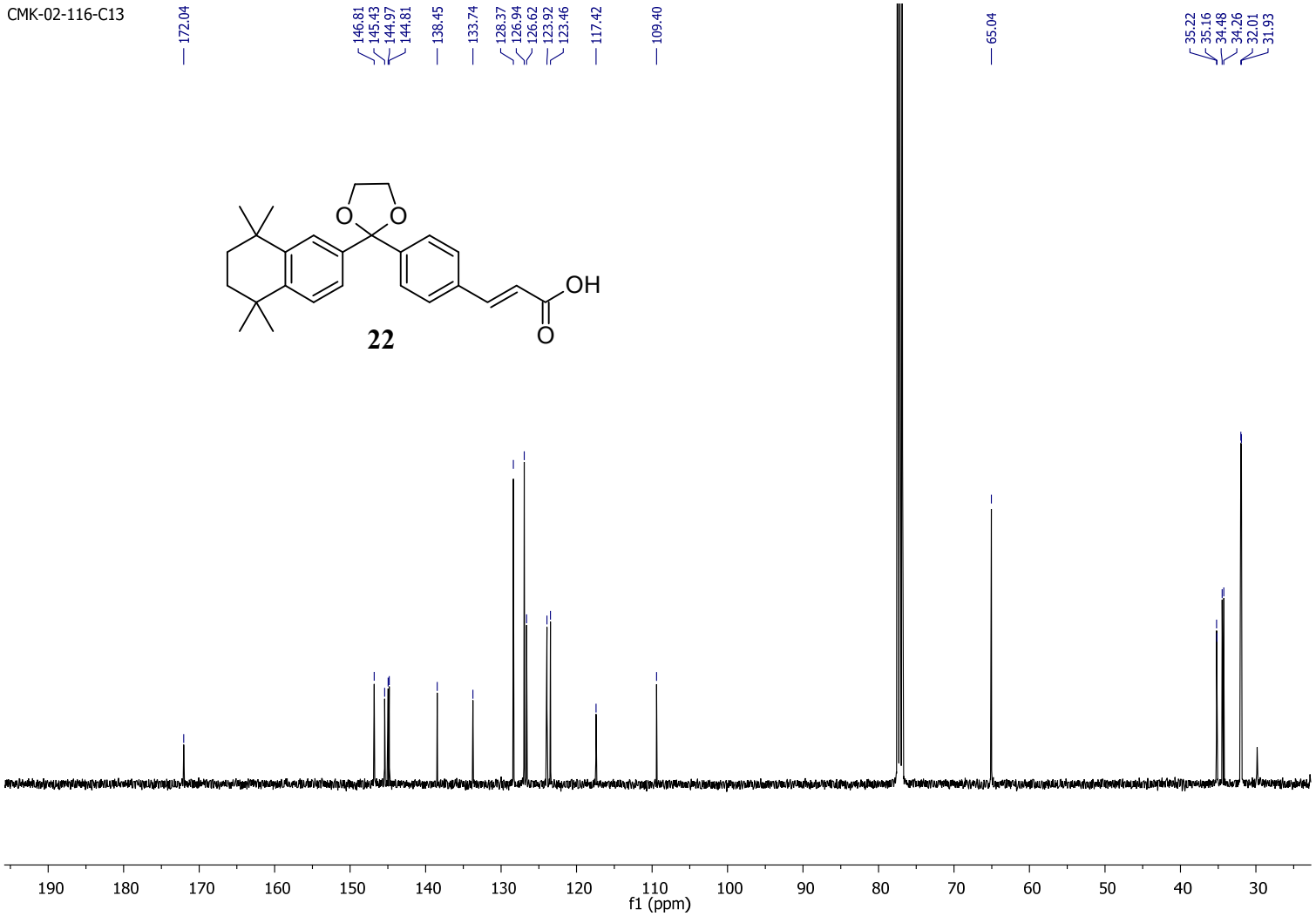

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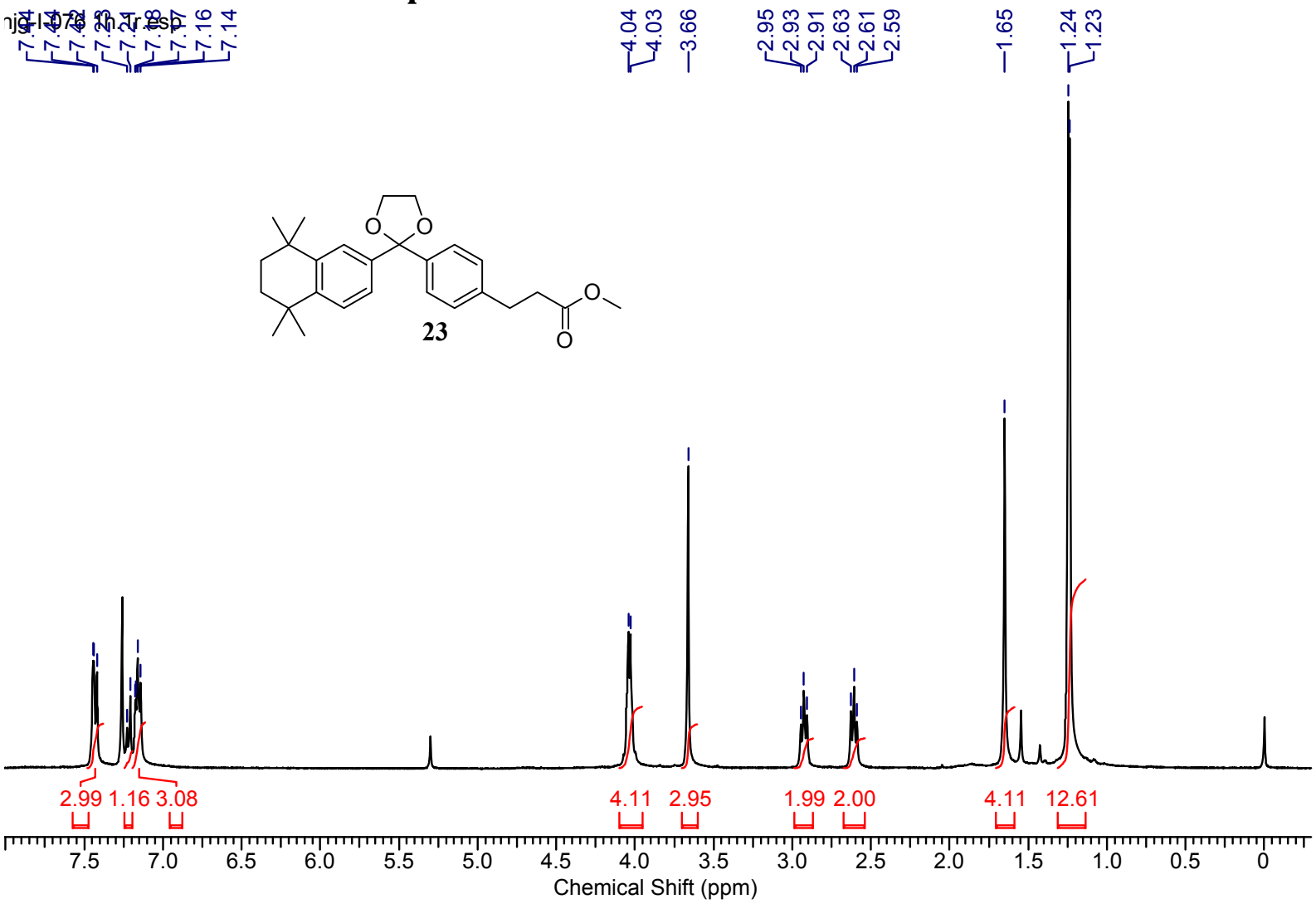
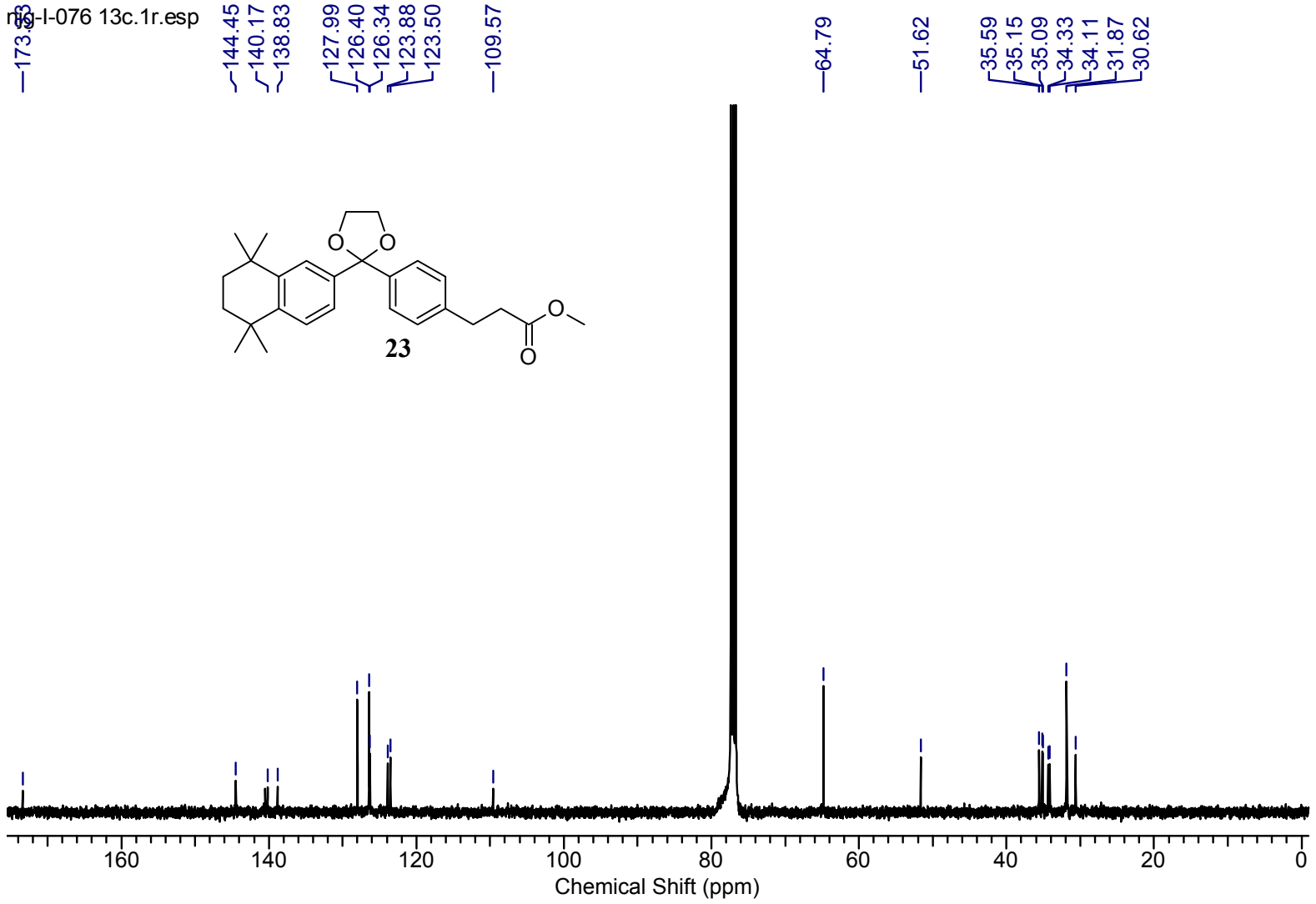


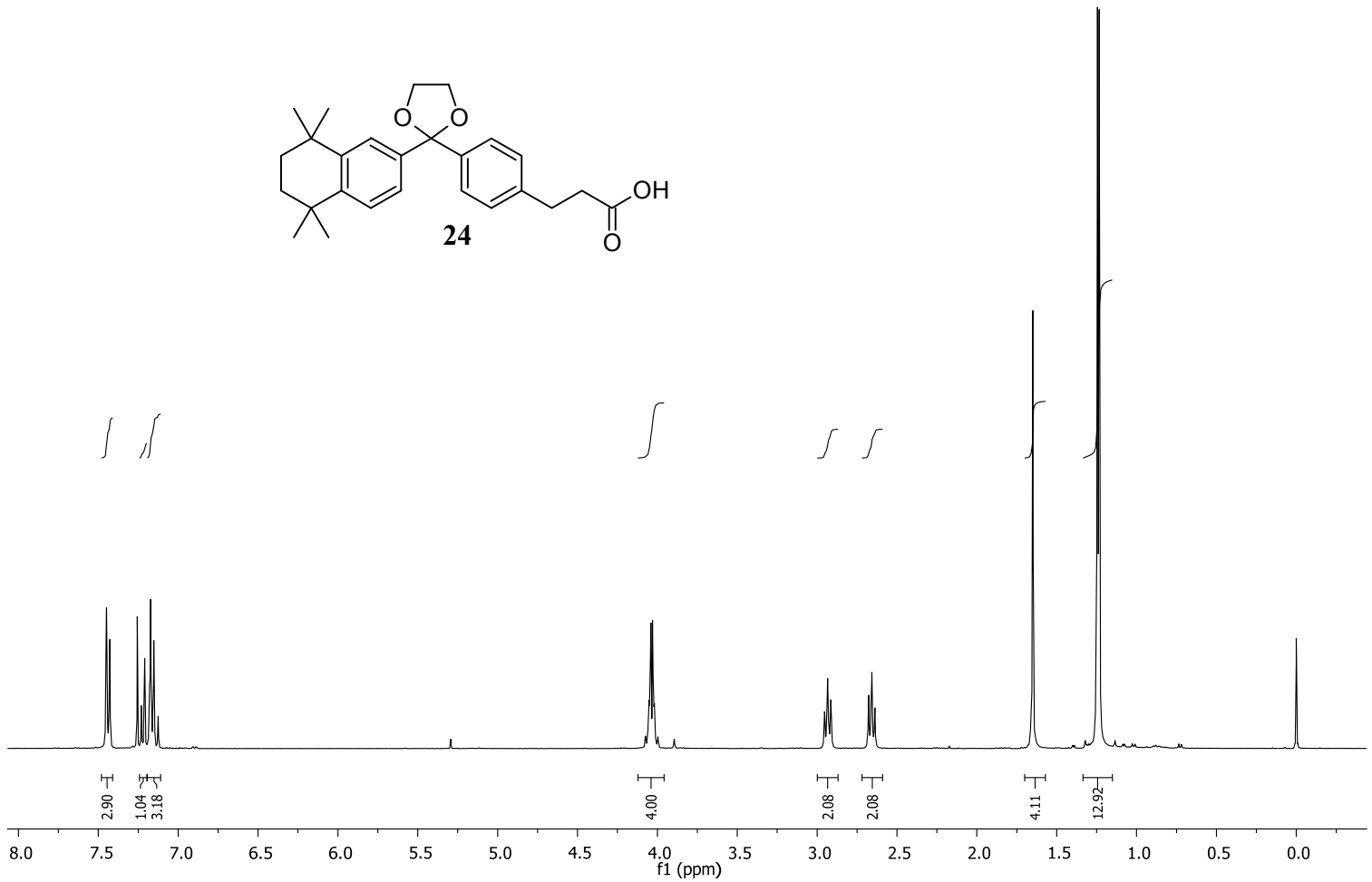
100 MHz ^{13}C-NMR of compound 23 in $CDCl_3$



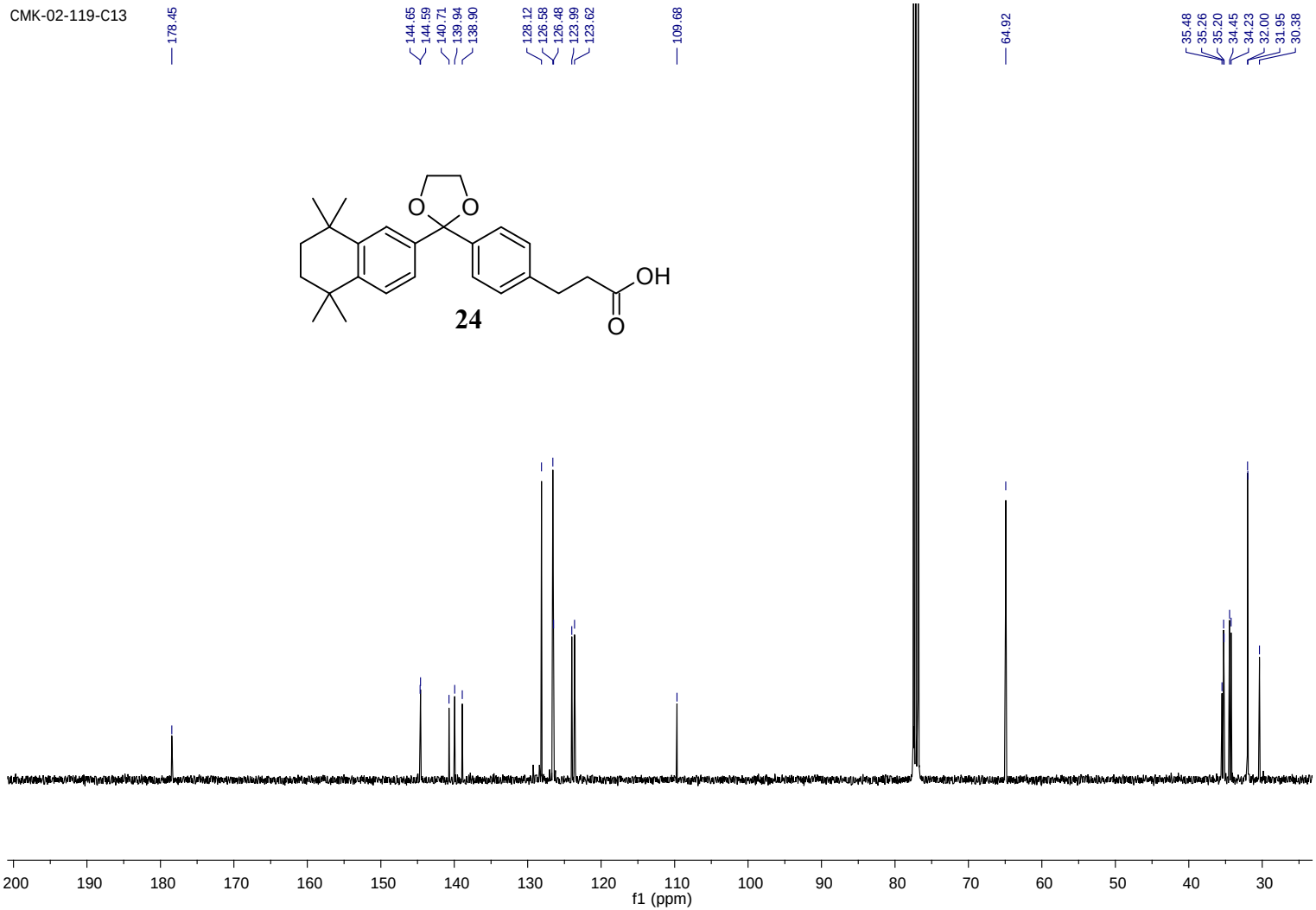
23

400 MHz ^{1}H-NMR of compound 24 in $CDCl_3$

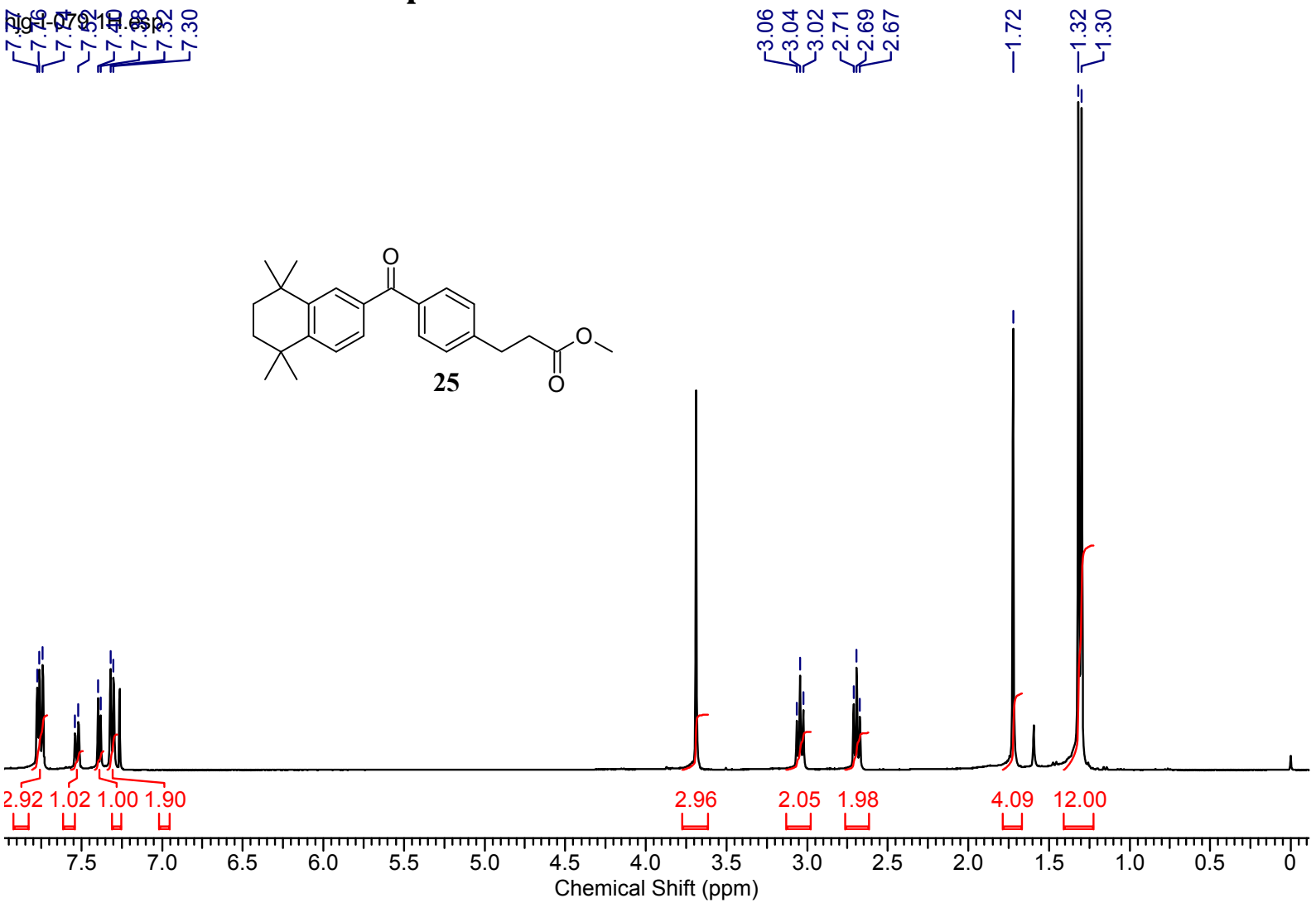
CMK-02-119-proton



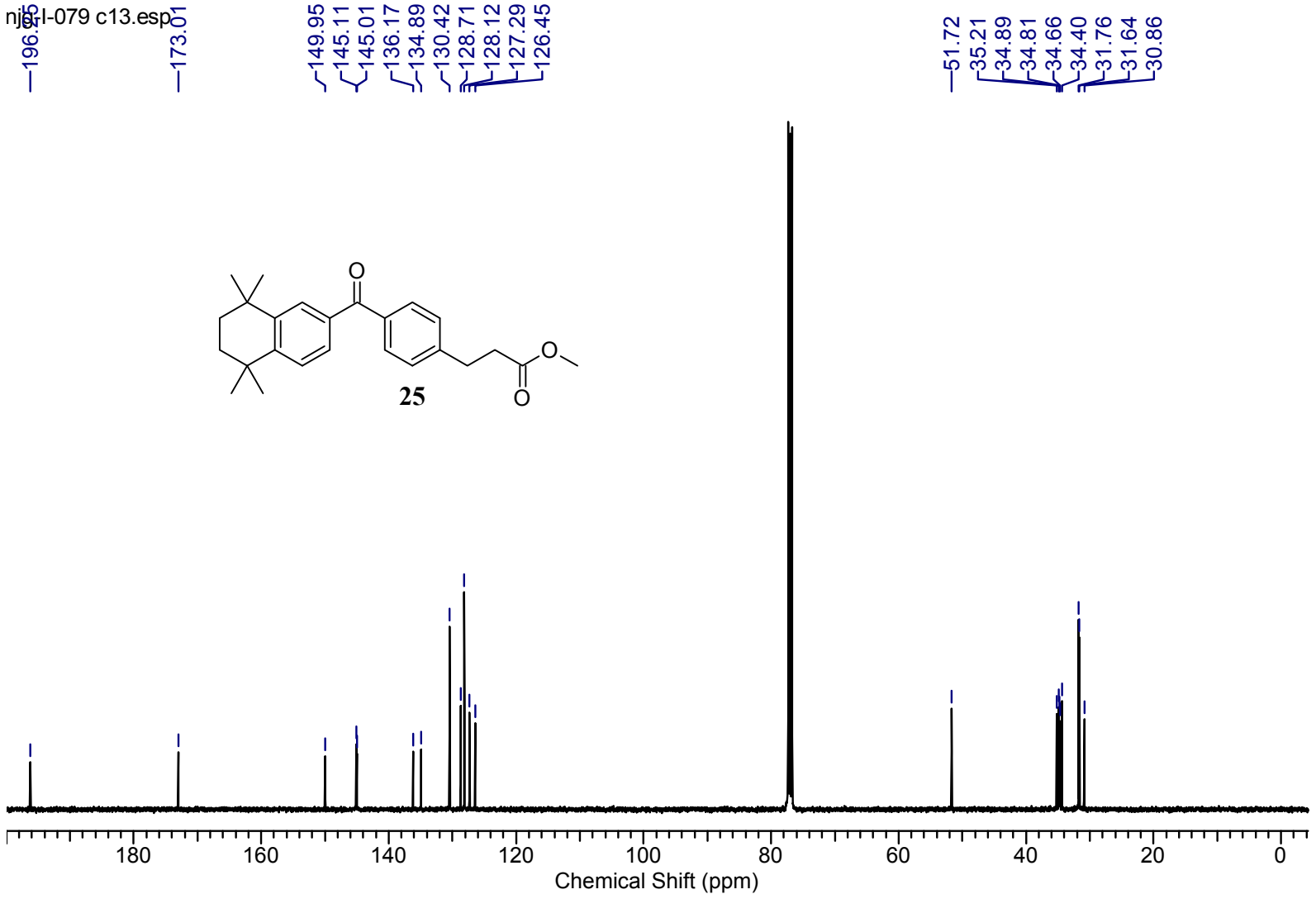
100 MHz ^{13}C-NMR of compound 24 in $CDCl_3$



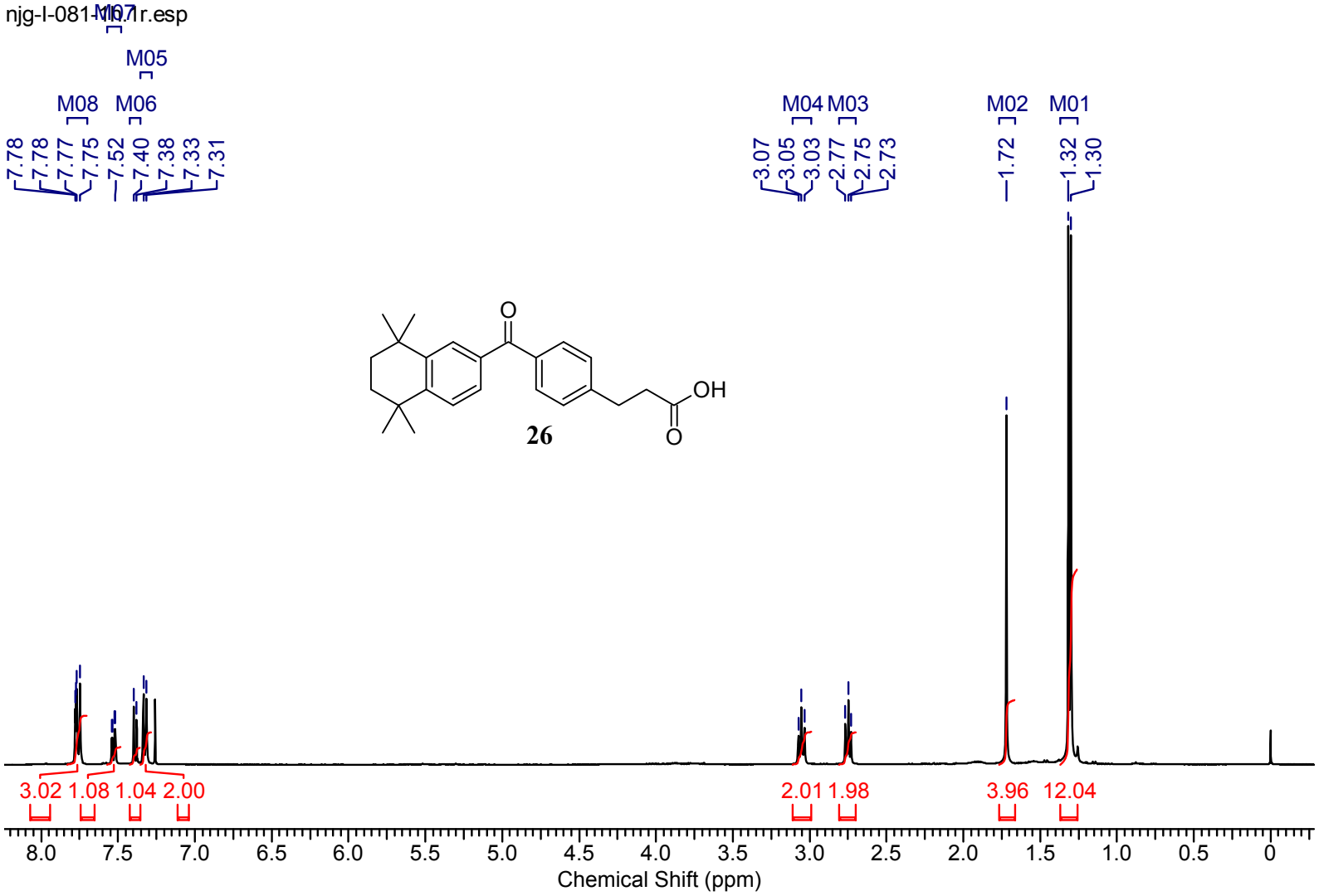
400 MHz 1H-NMR of compound 25 in CDCl3



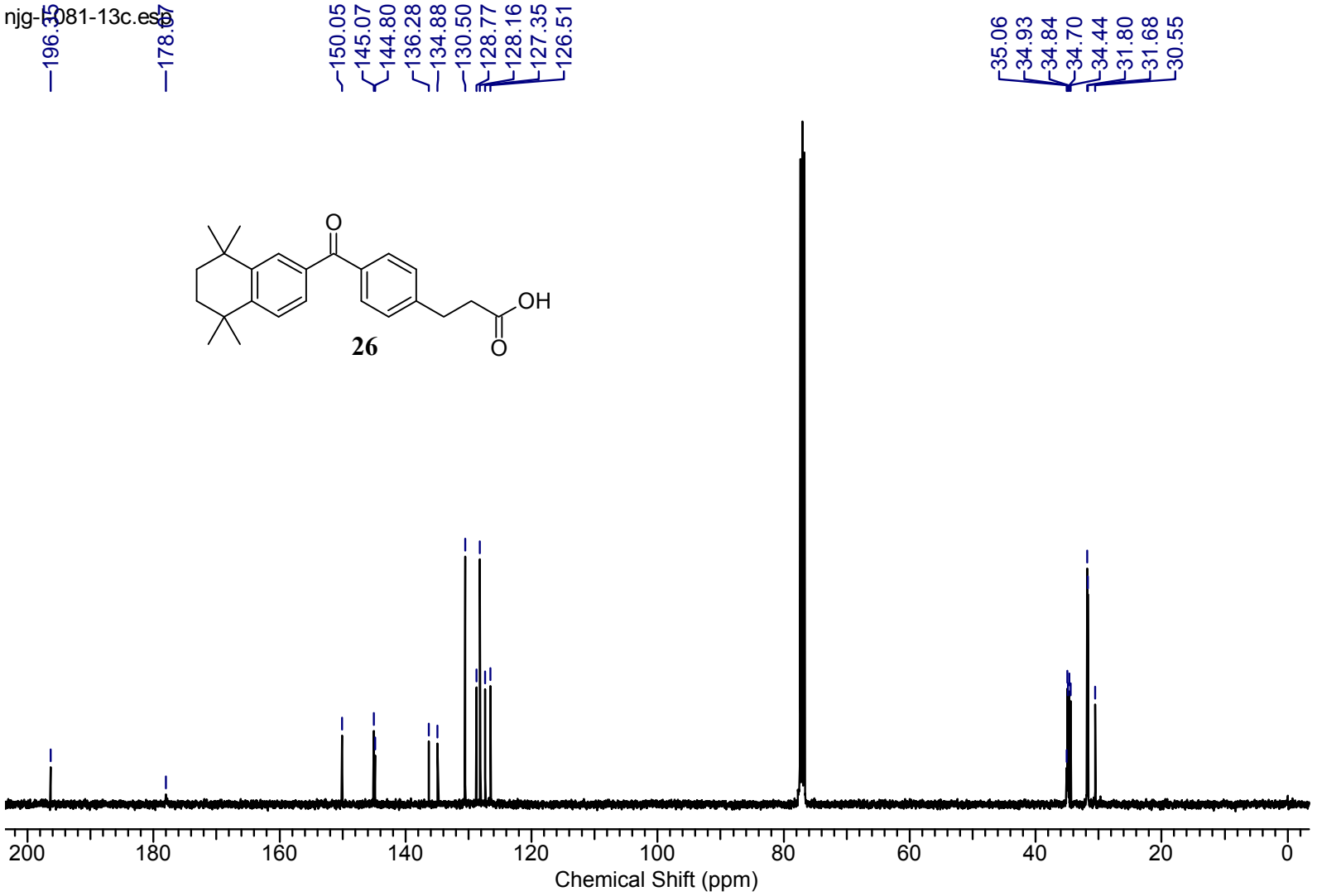
100 MHz ^{13}C-NMR of compound 25 in $CDCl_3$



400 MHz 1H-NMR of compound 26 in CDCl3

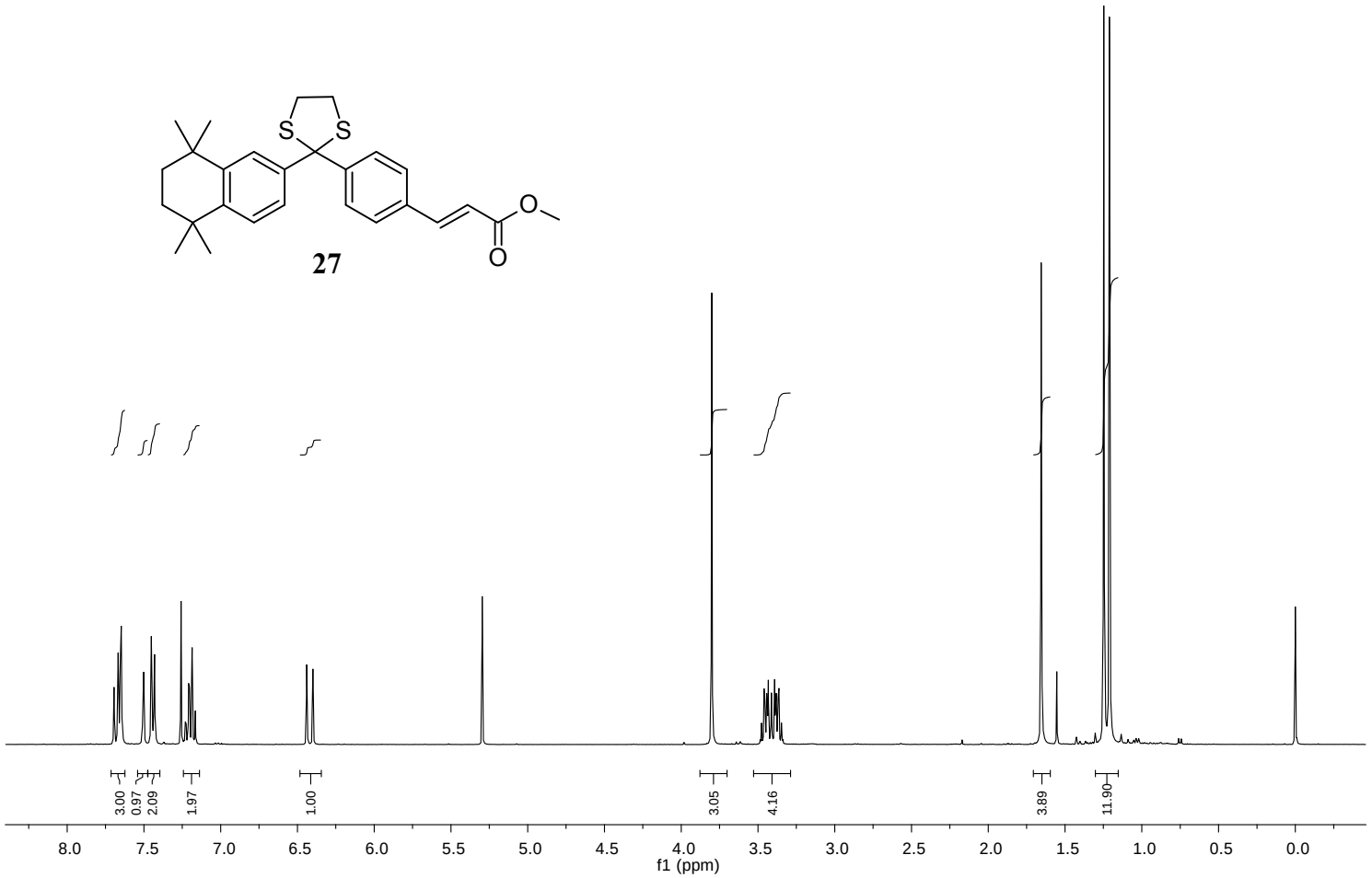


100 MHz 13C-NMR of compound 26 in CDCl3

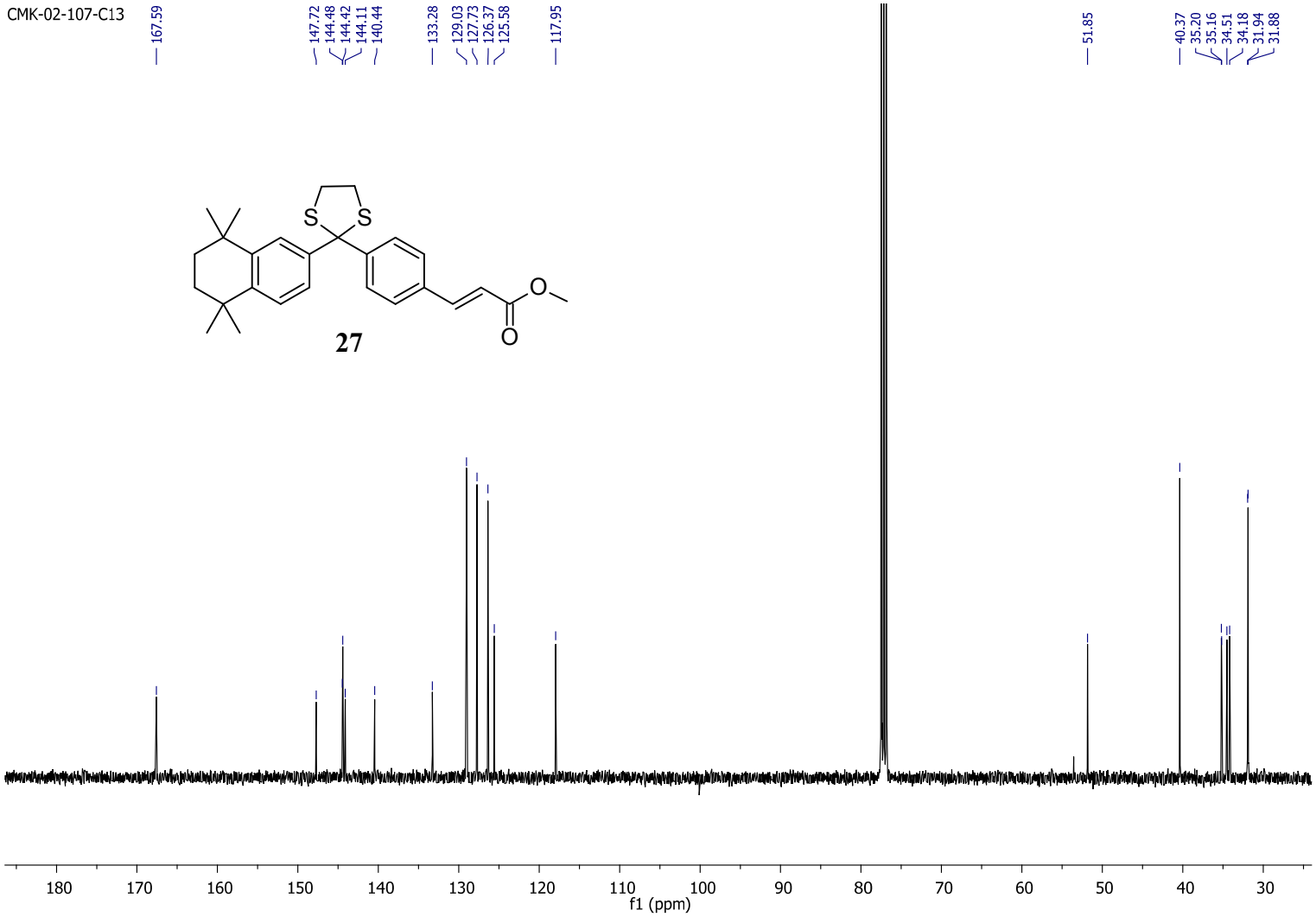


400 MHz ^{1}H-NMR of compound 27 in $CDCl_3$

CMK-02-107-proton



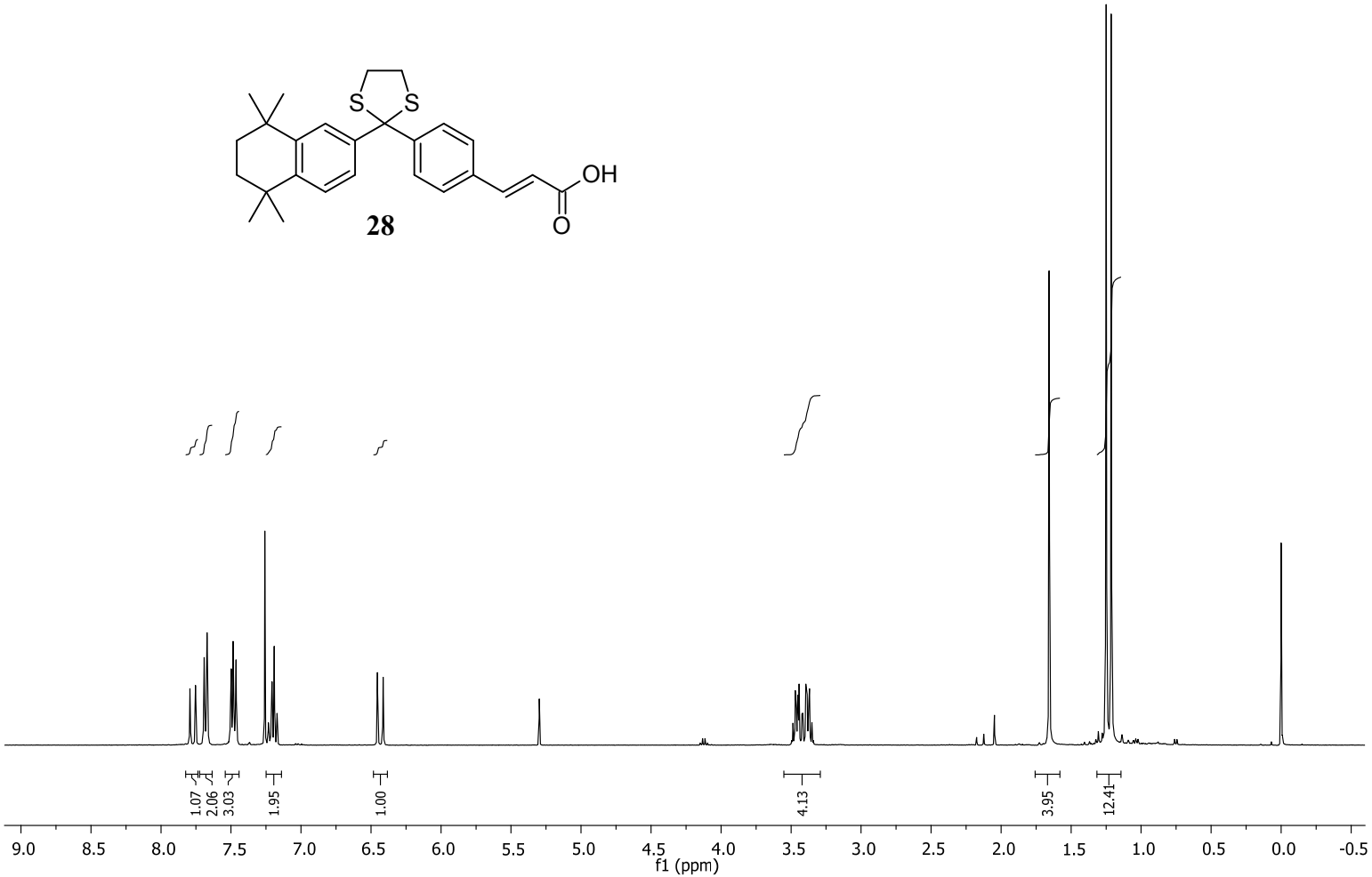
100 MHz ^{13}C-NMR of compound 27 in $CDCl_3$



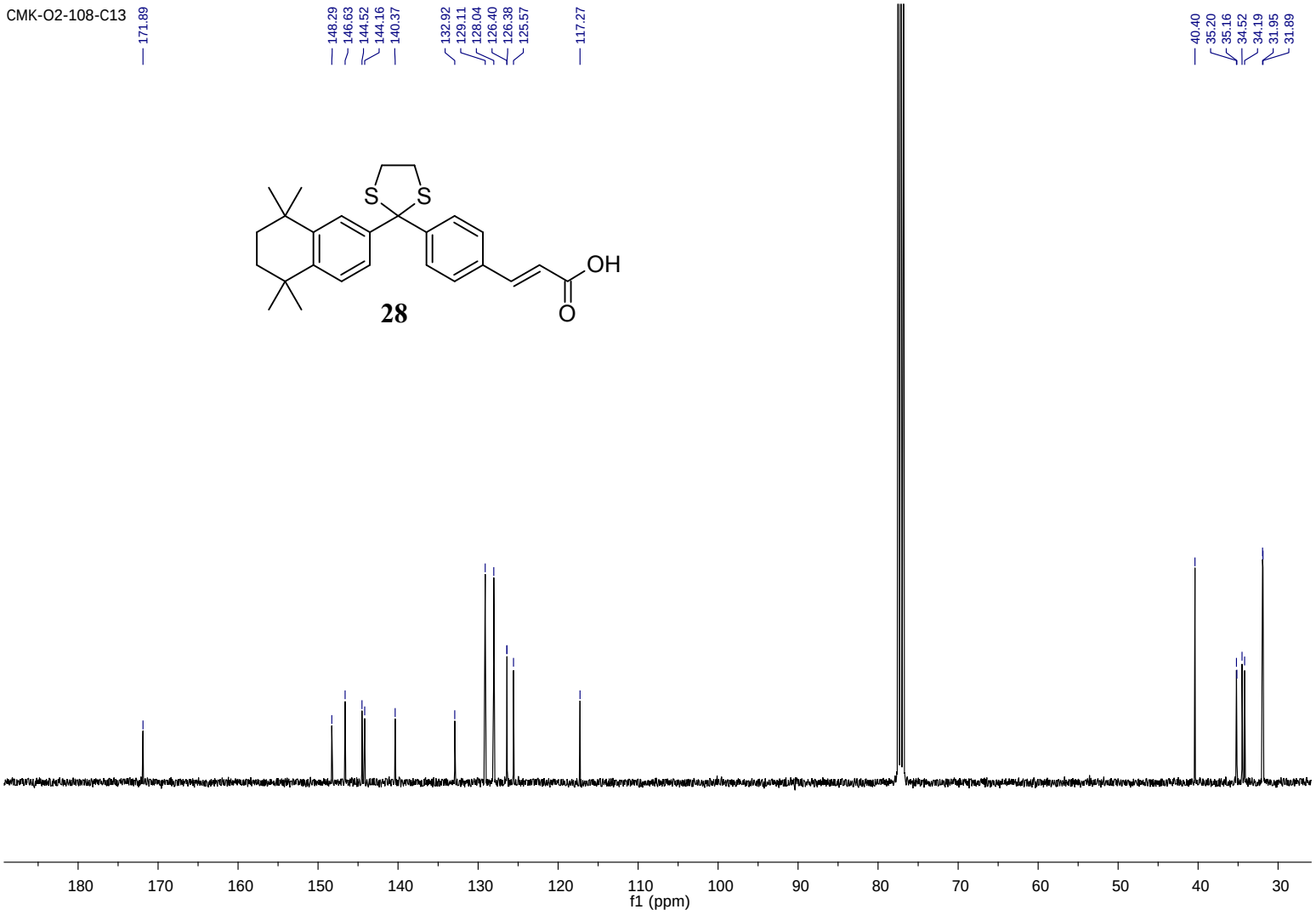
27

400 MHz ^{1}H-NMR of compound 28 in $CDCl_3$

CMK-O2-108-proton

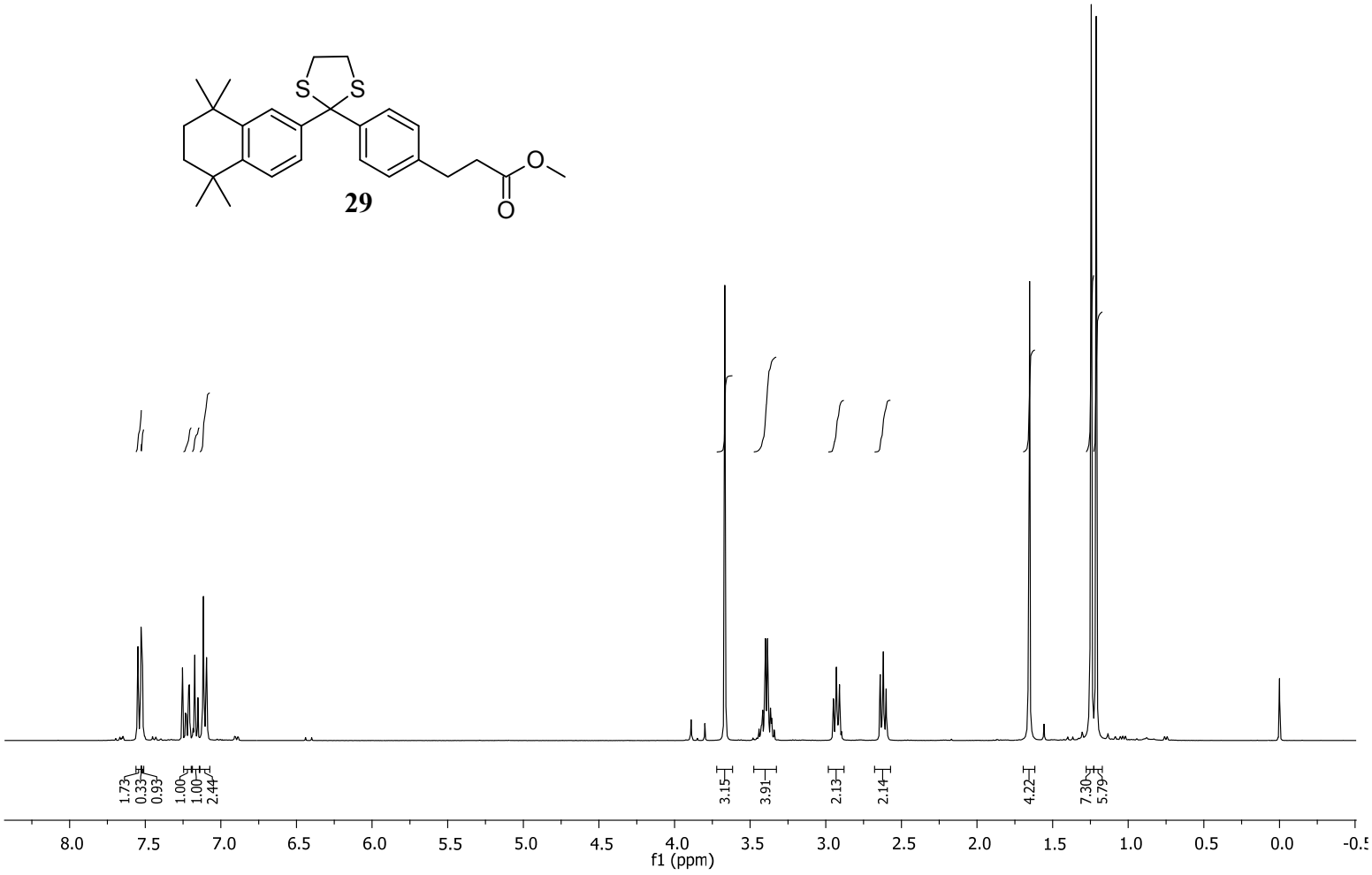


100 MHz ^{13}C-NMR of compound 28 in $CDCl_3$

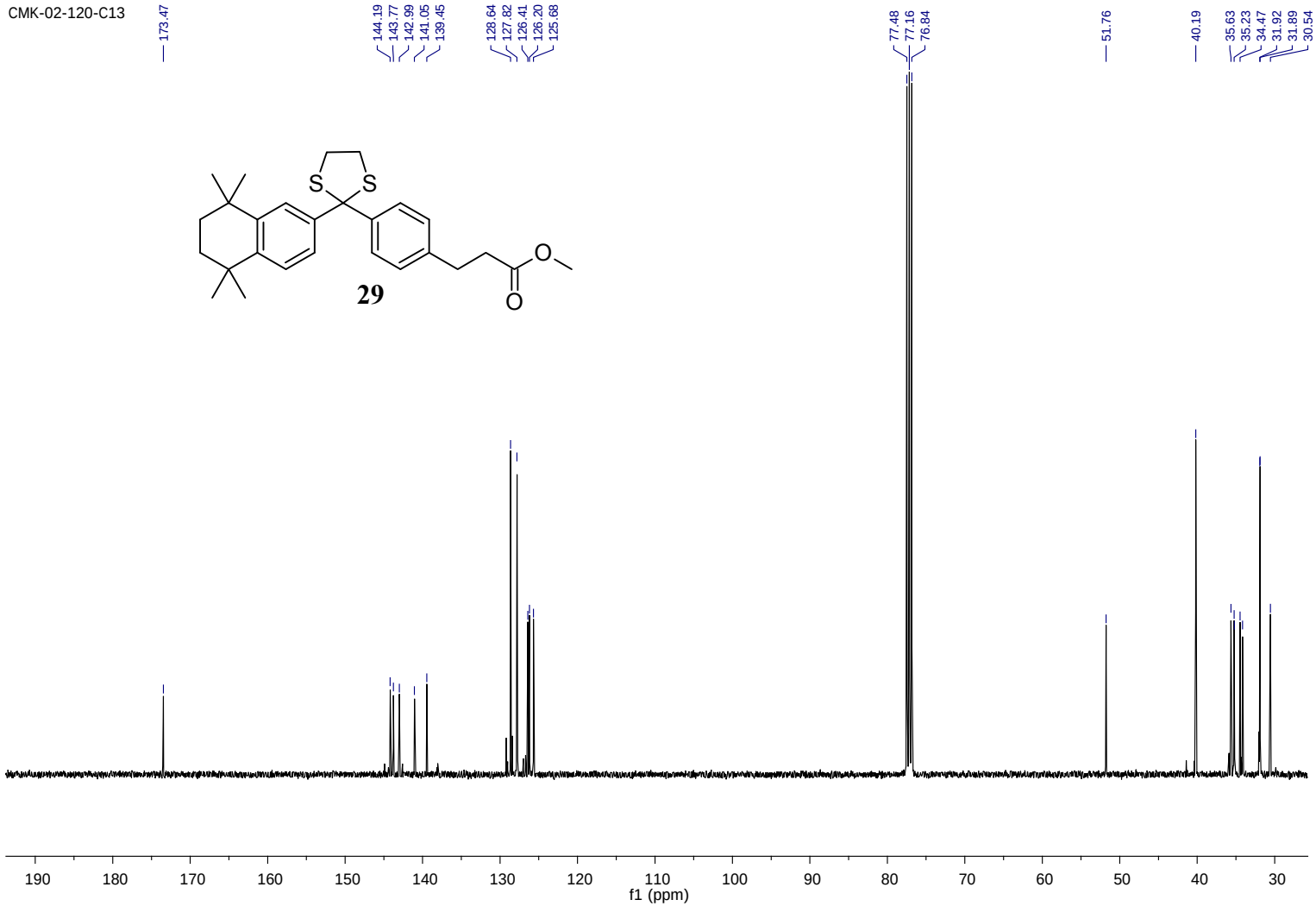


400 MHz ^{1}H-NMR of compound 29 in $CDCl_3$

CMK-02-120-proton

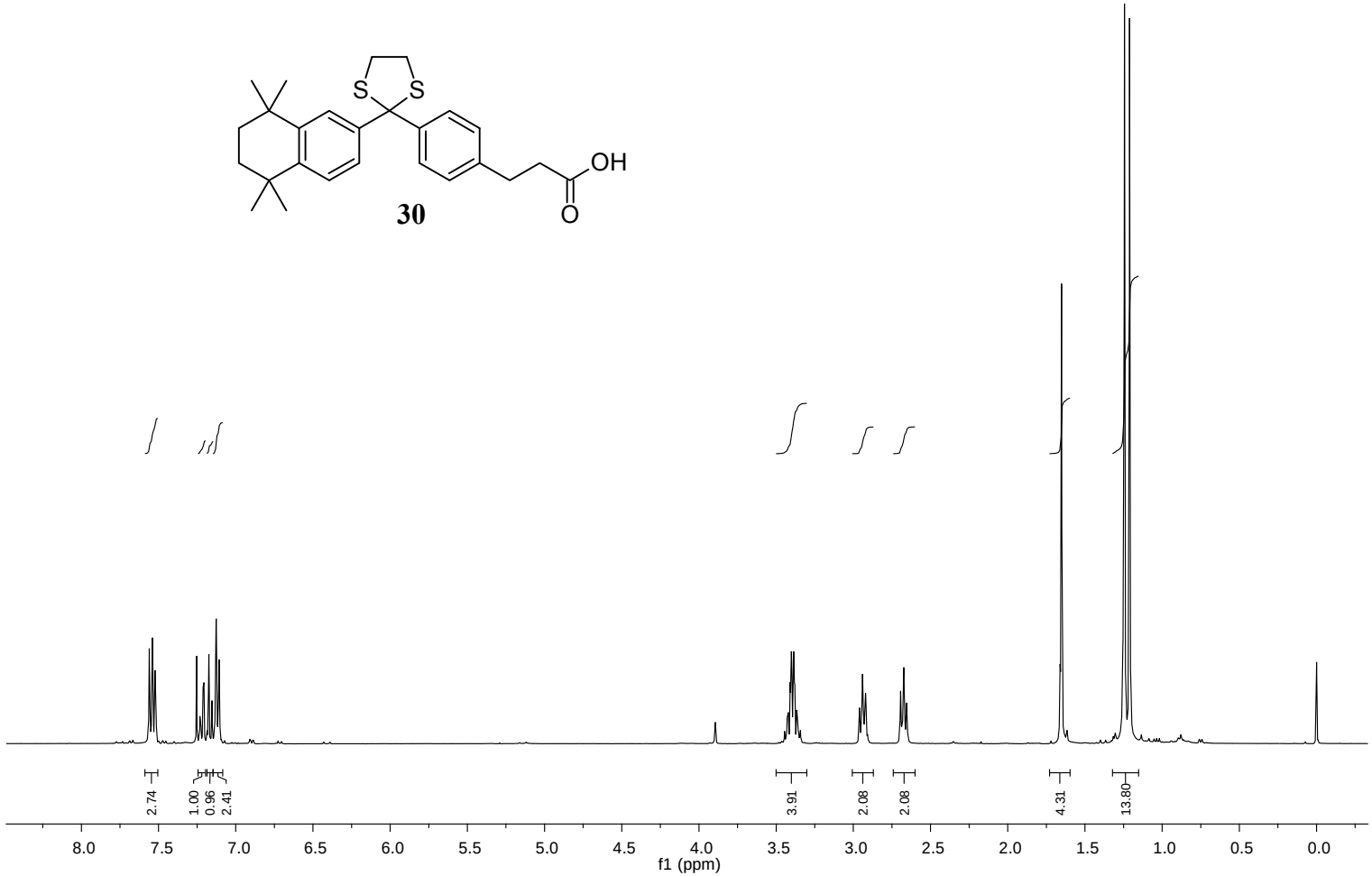


100 MHz ^{13}C-NMR of compound 29 in $CDCl_3$

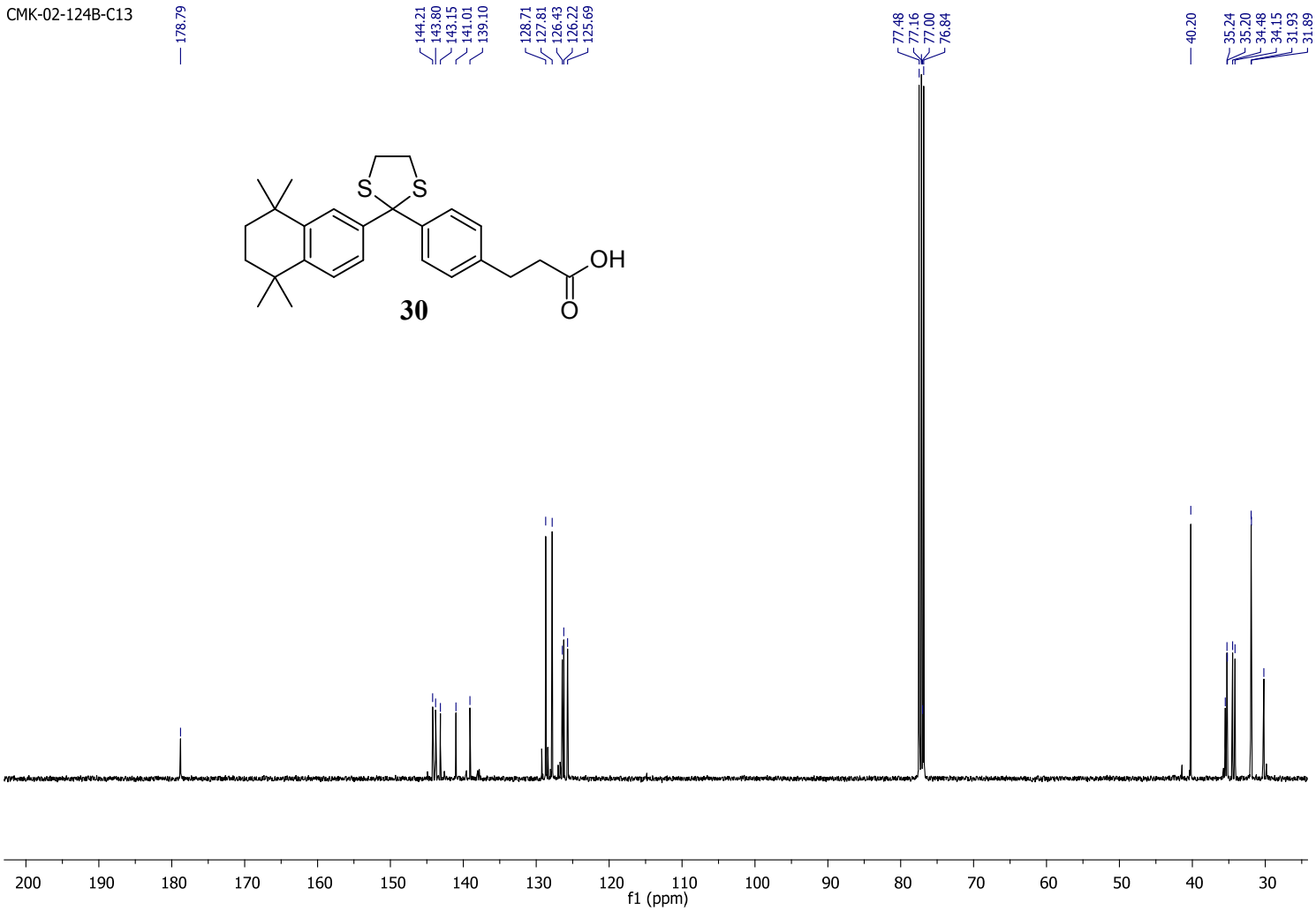


400 MHz ^{1}H-NMR of compound 30 in $CDCl_3$

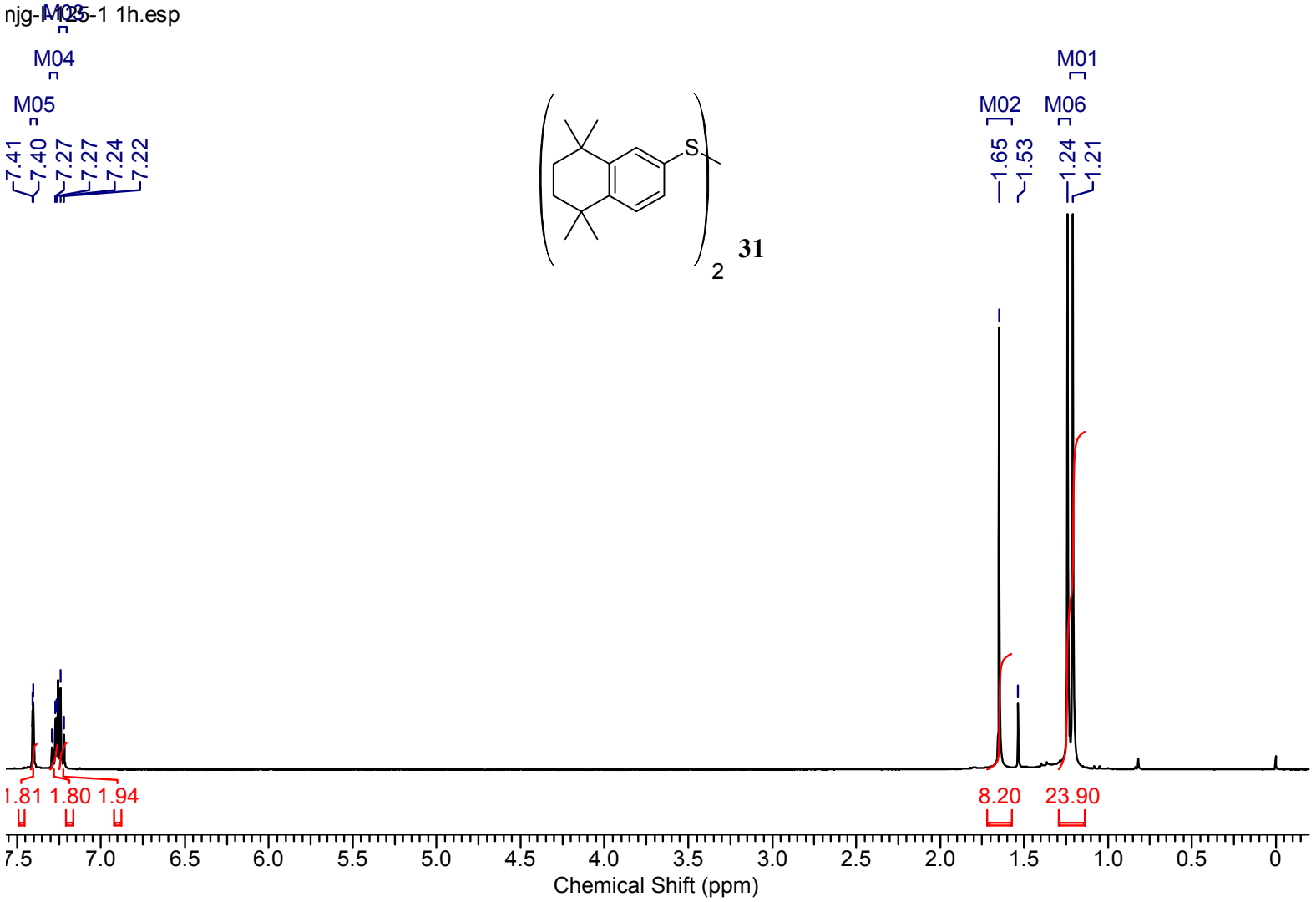
CMK-02-124B-proton



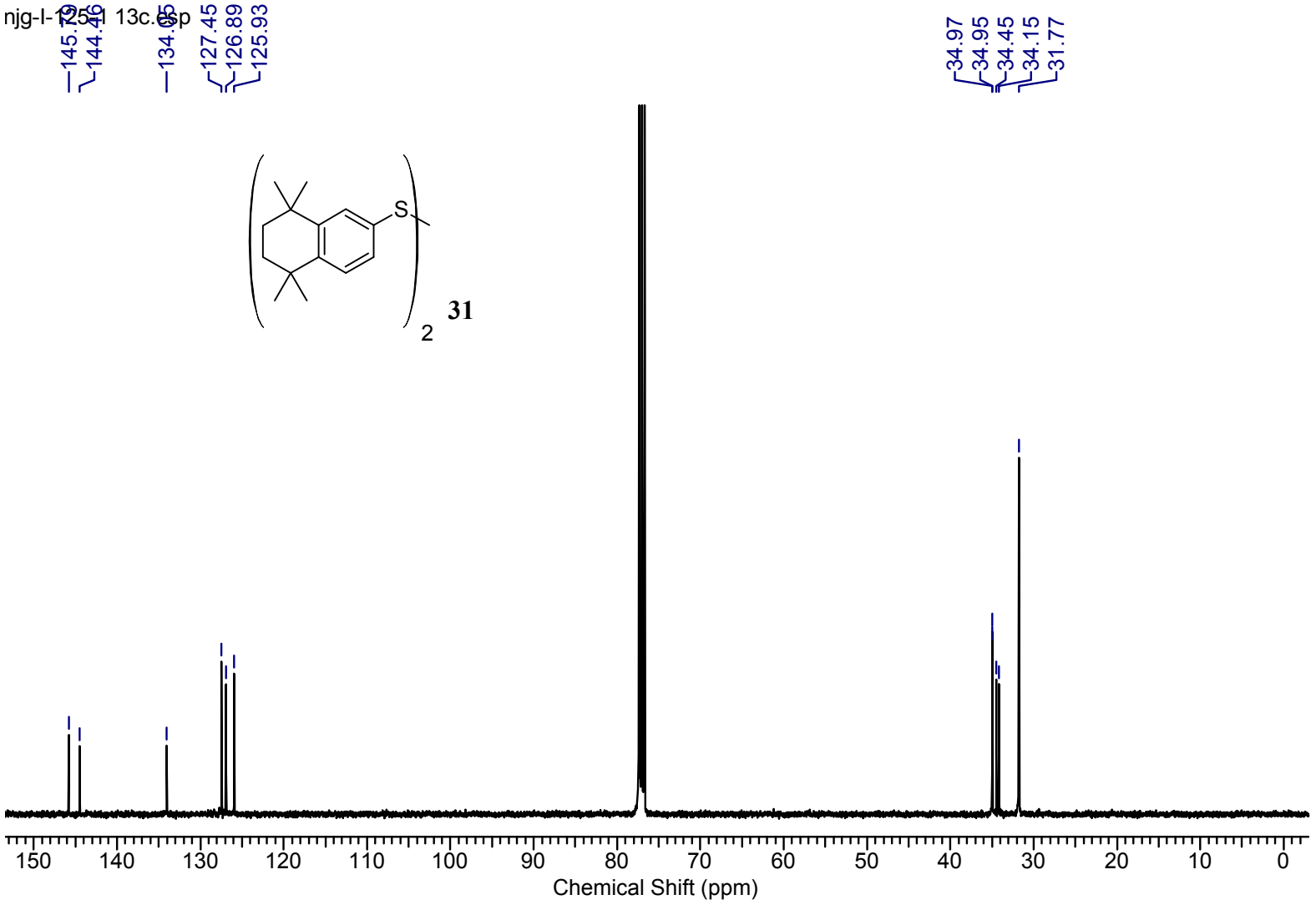
100 MHz ^{13}C-NMR of compound 30 in $CDCl_3$



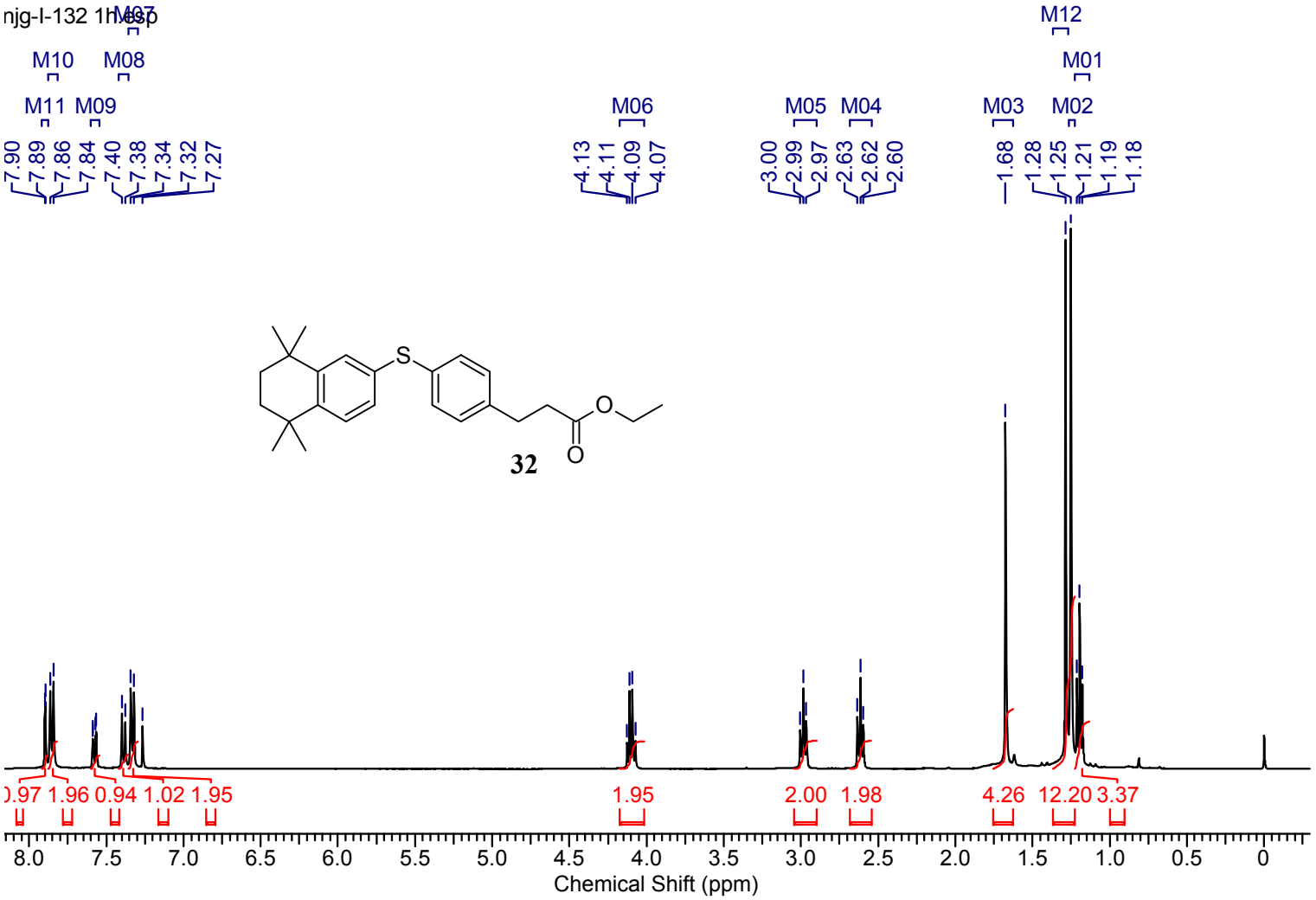
400 MHz 1H-NMR of compound 31 in $CDCl_3$



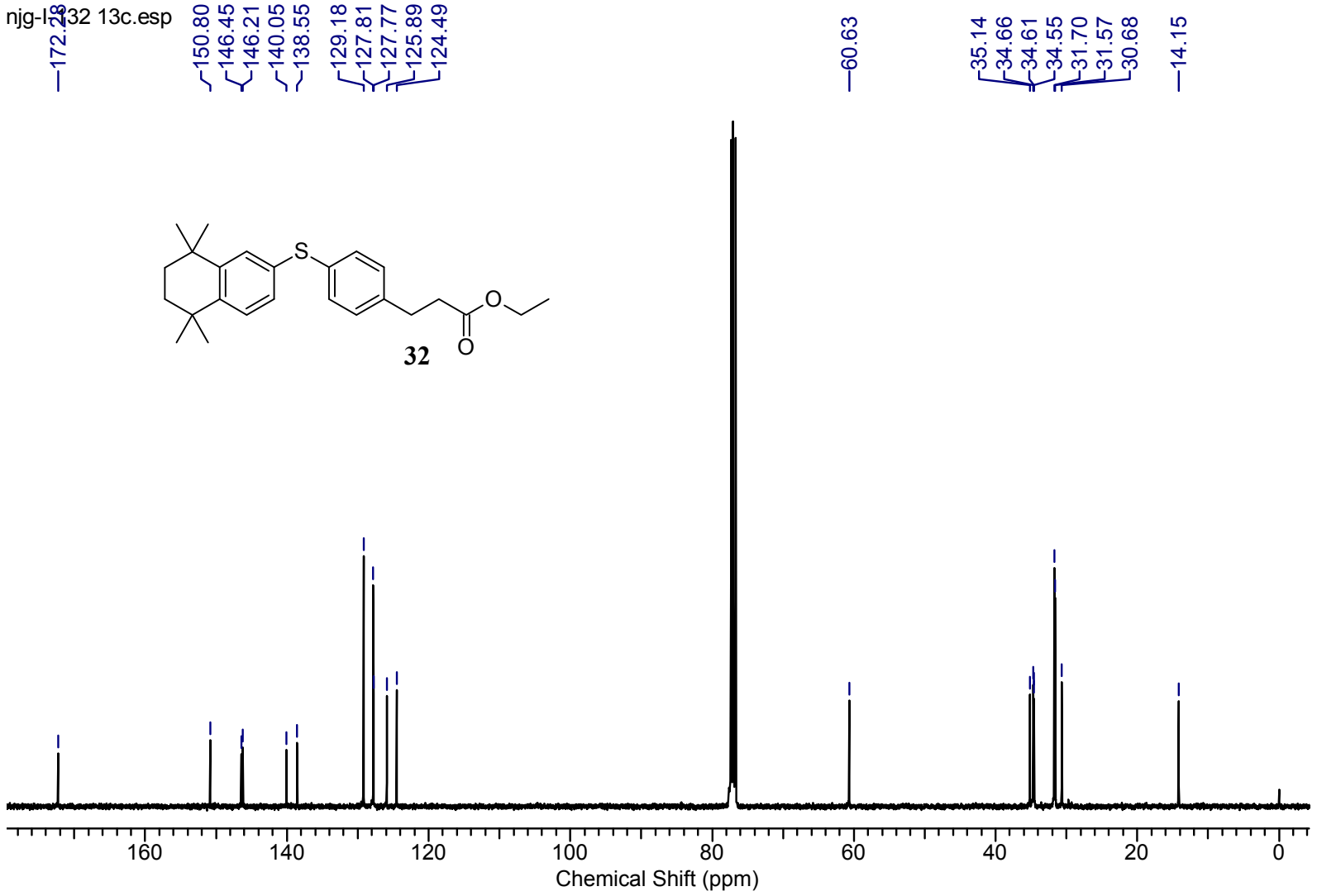
100 MHz ^{13}C-NMR of compound 31 in CDCl3



400 MHz ^{1}H-NMR of compound 32 in CDCl3

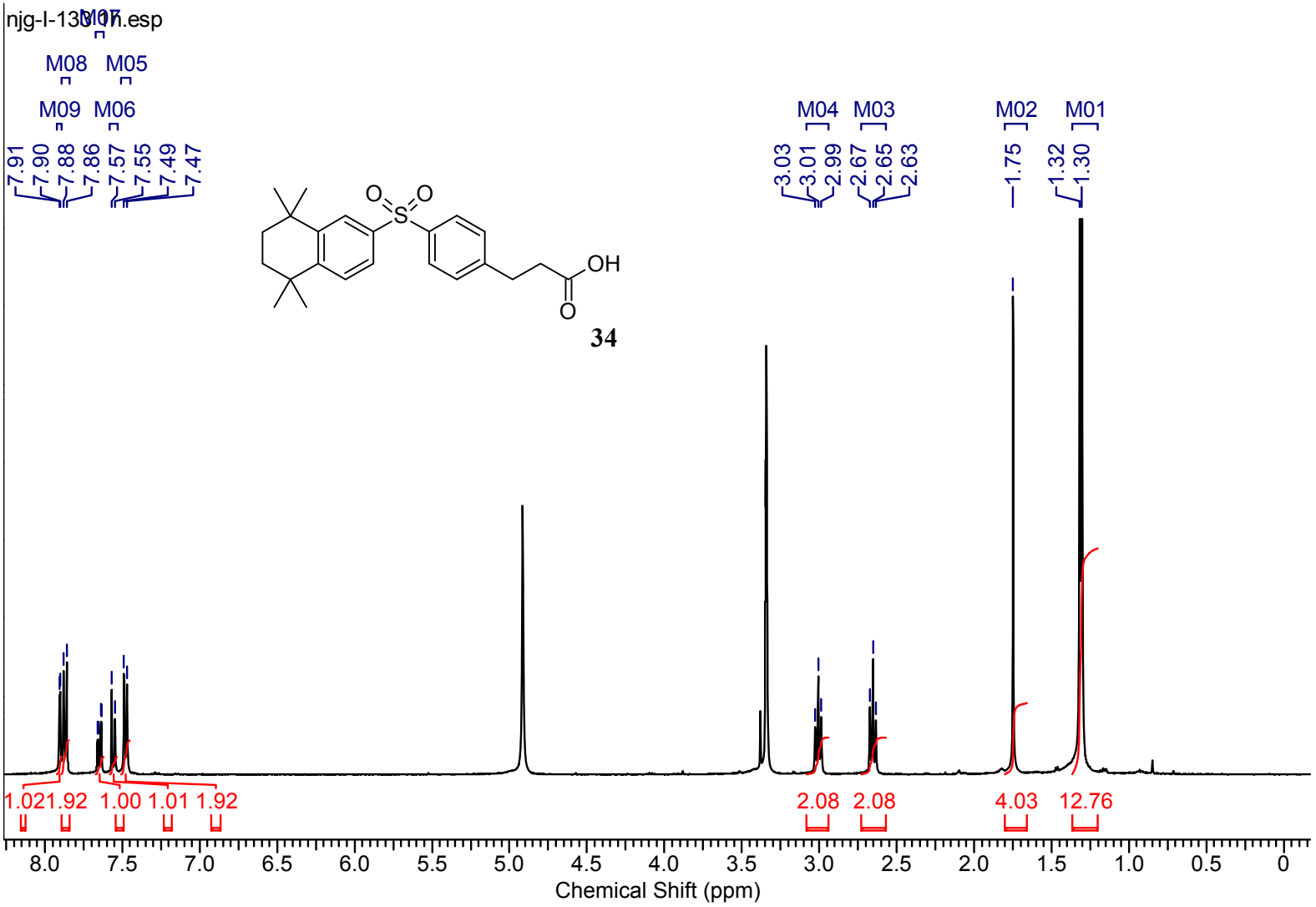


100 MHz ^{13}C-NMR of compound 32 in CDCl3

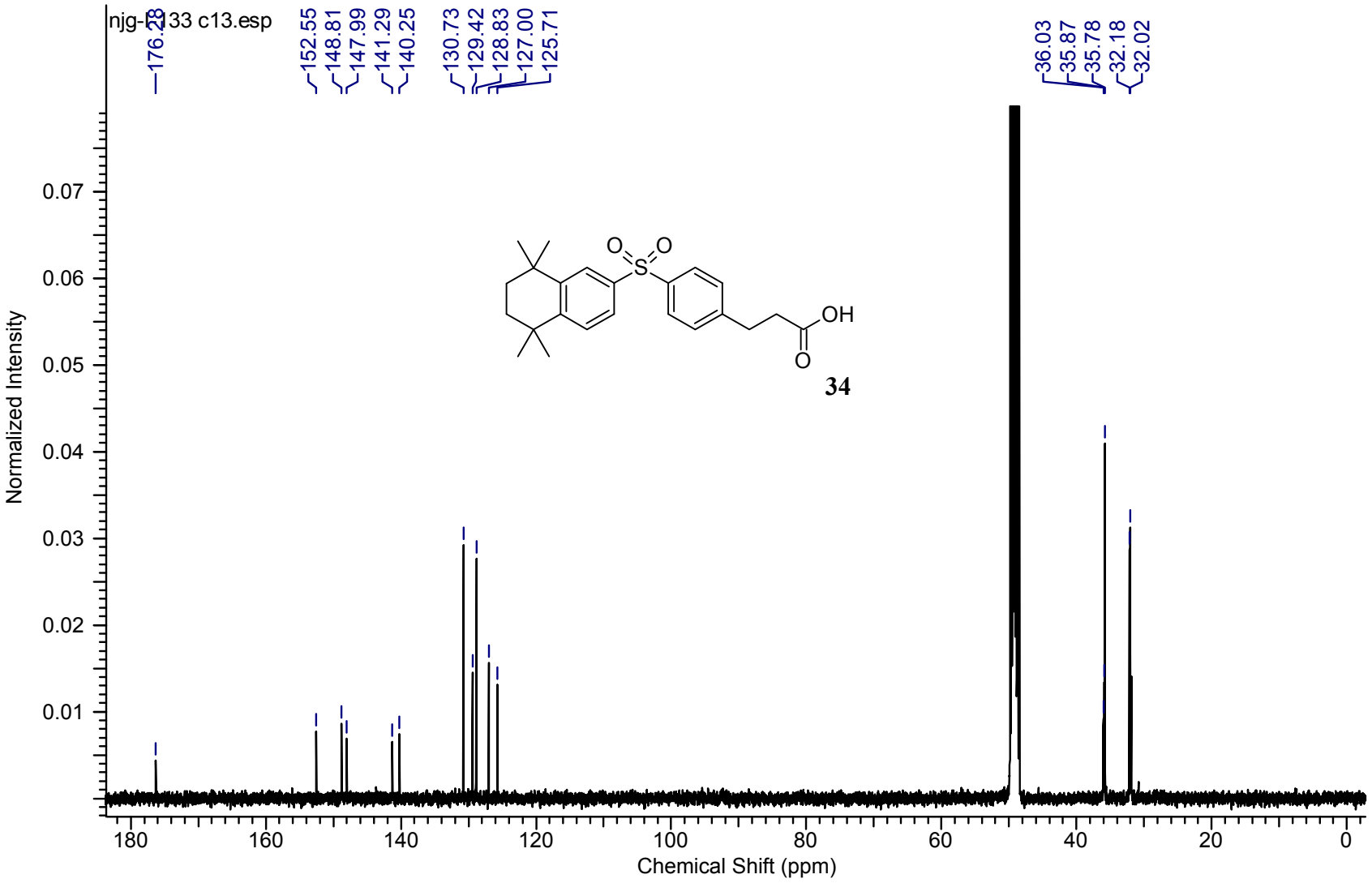


32

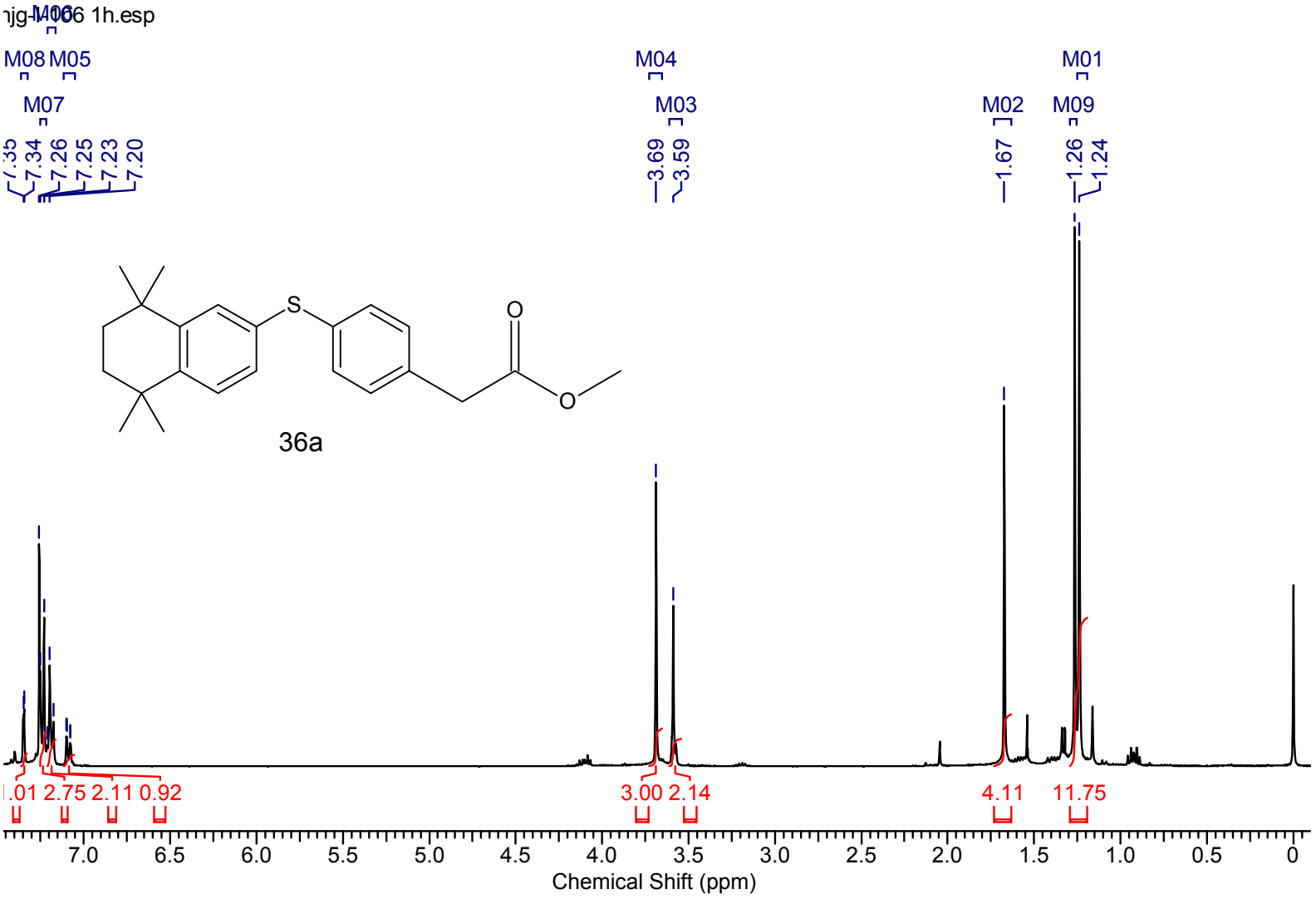
400 MHz ^{1}H-NMR of compound 34 in CDCl3



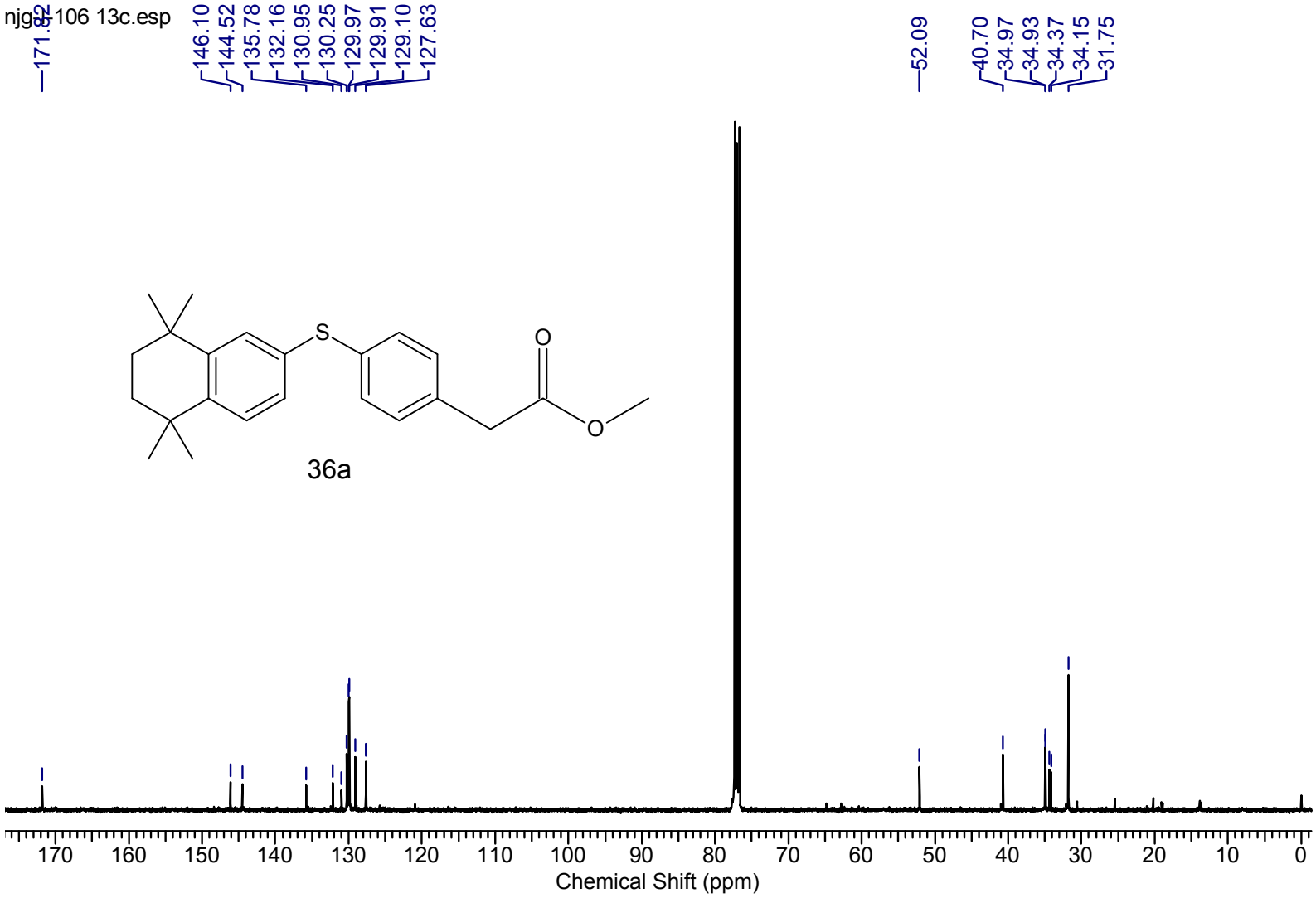
100 MHz ^{13}C-NMR of compound 34 in CDCl3



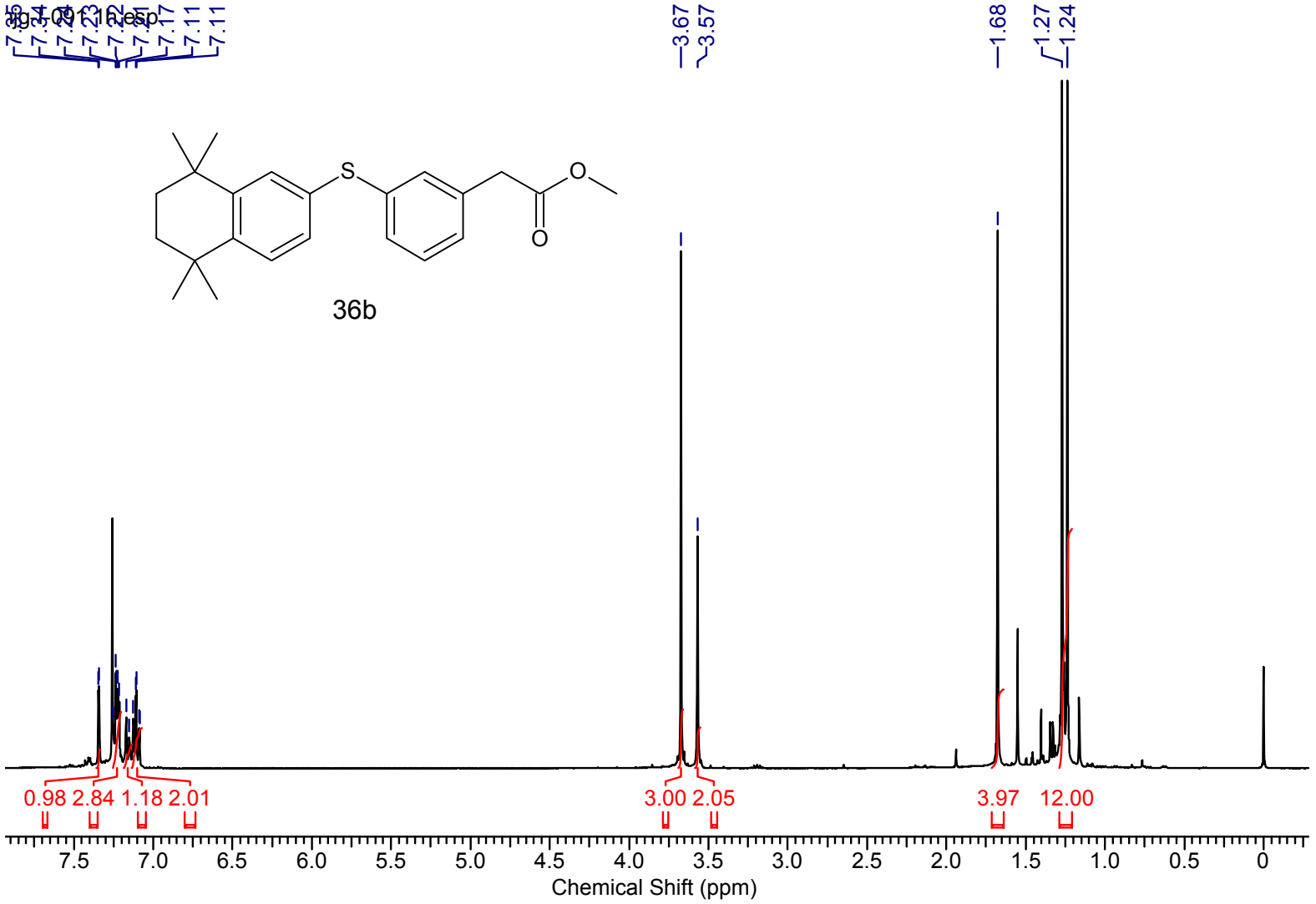
400 MHz ^{1}H-NMR of compound 36a in CDCl3



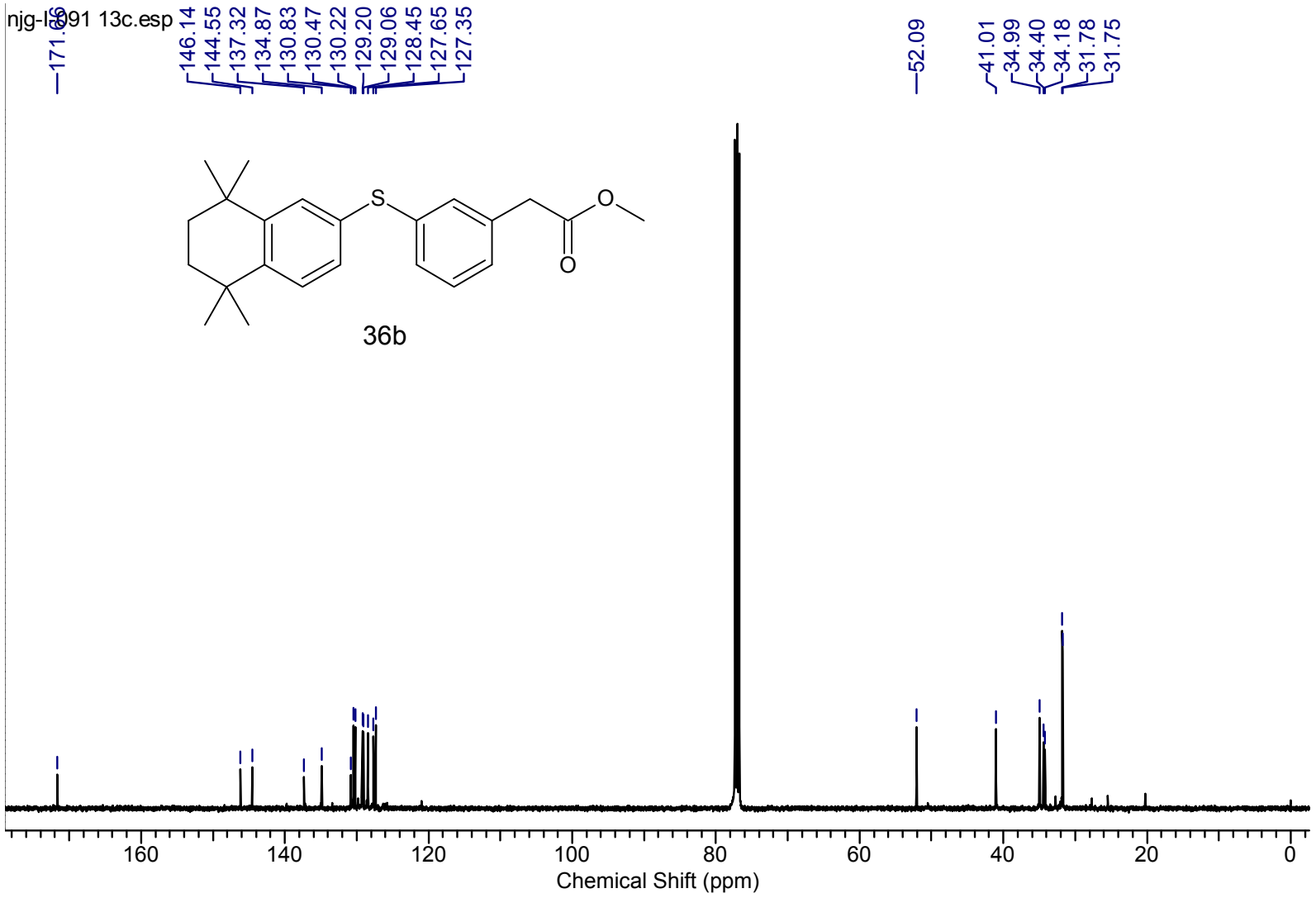
100 MHz ^{13}C-NMR of compound 36a in $CDCl_3$



400 MHz ^{1}H-NMR of compound 36b in $CDCl_3$

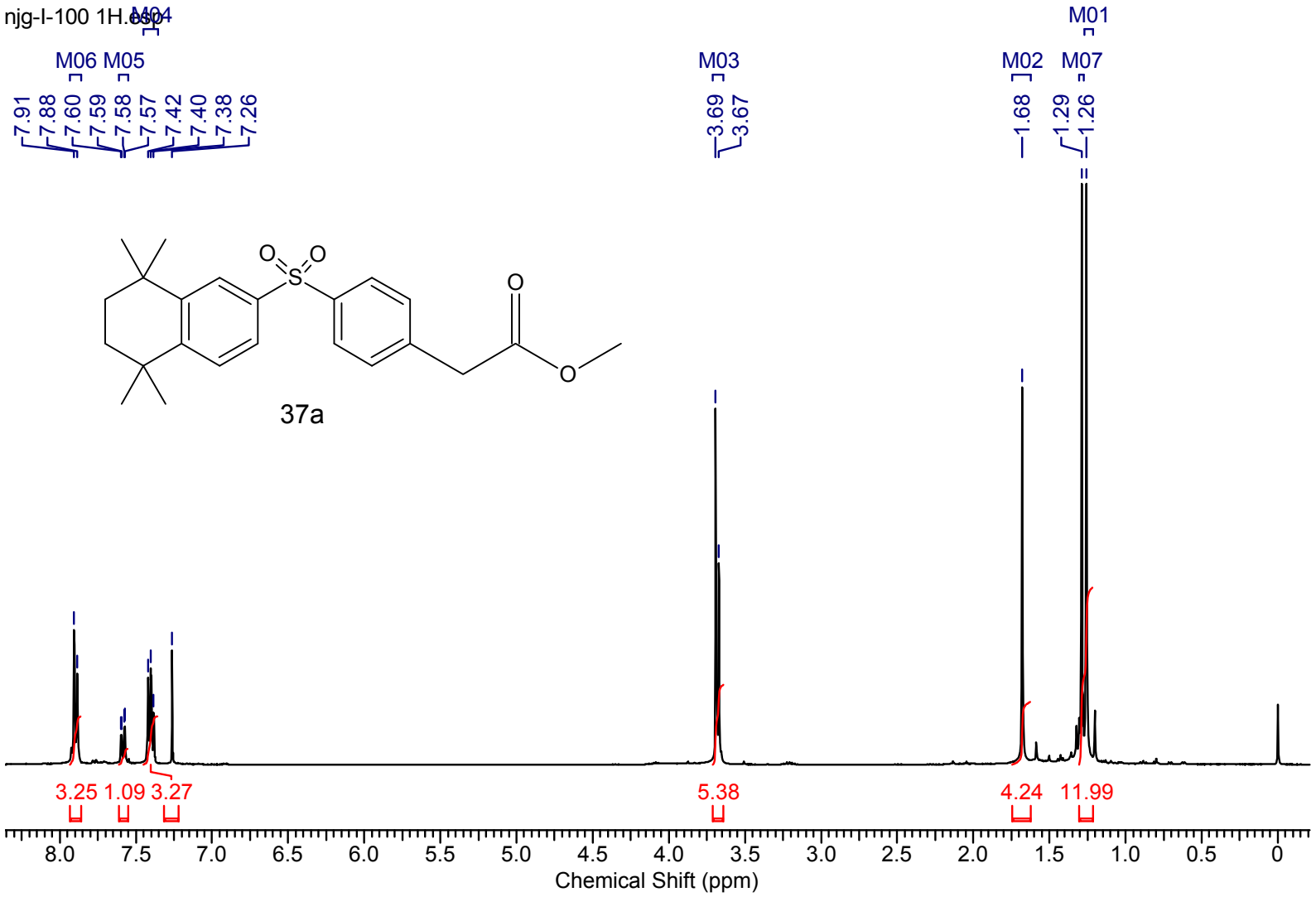


100 MHz ^{13}C-NMR of compound 36b in $CDCl_3$

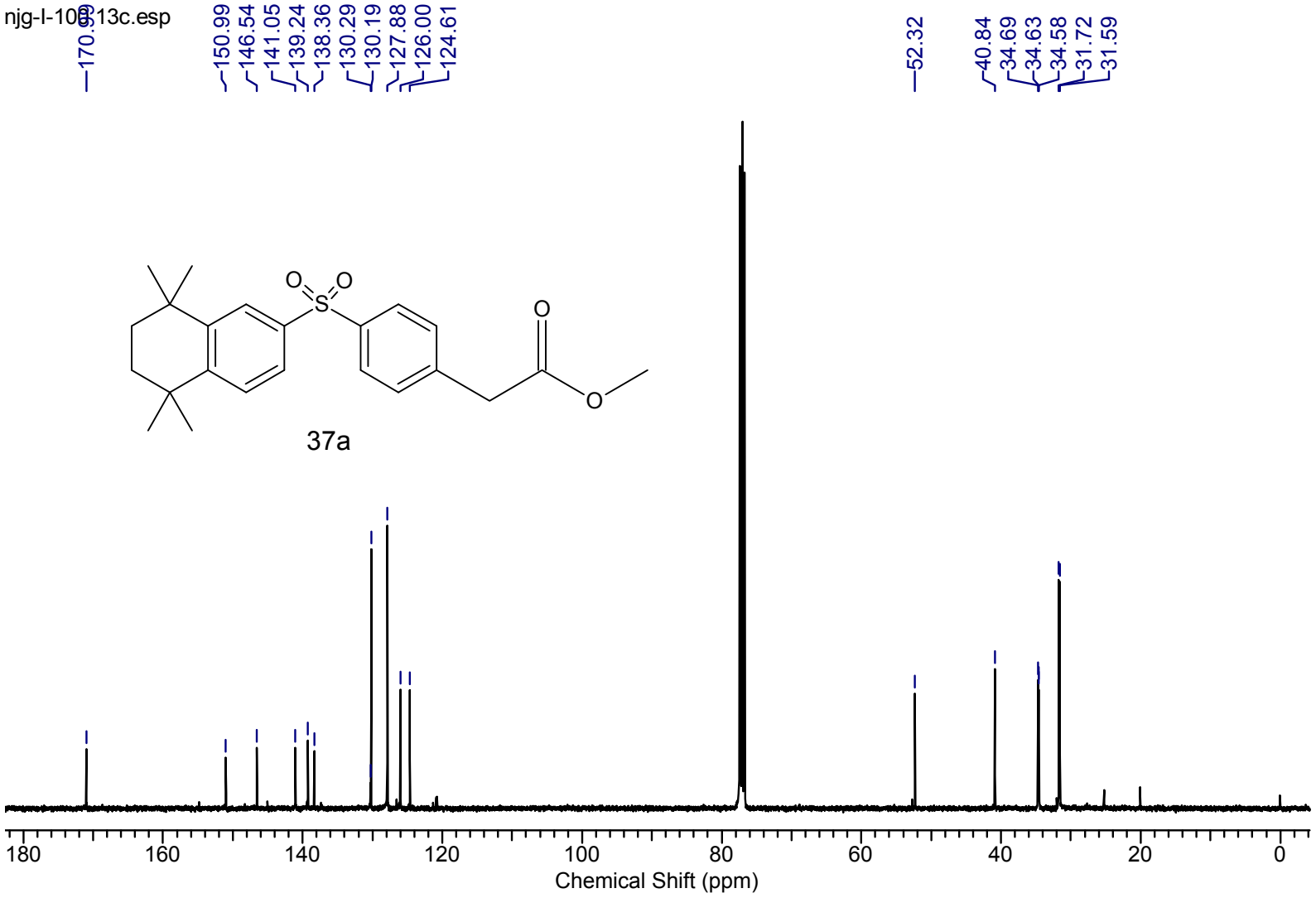


36b

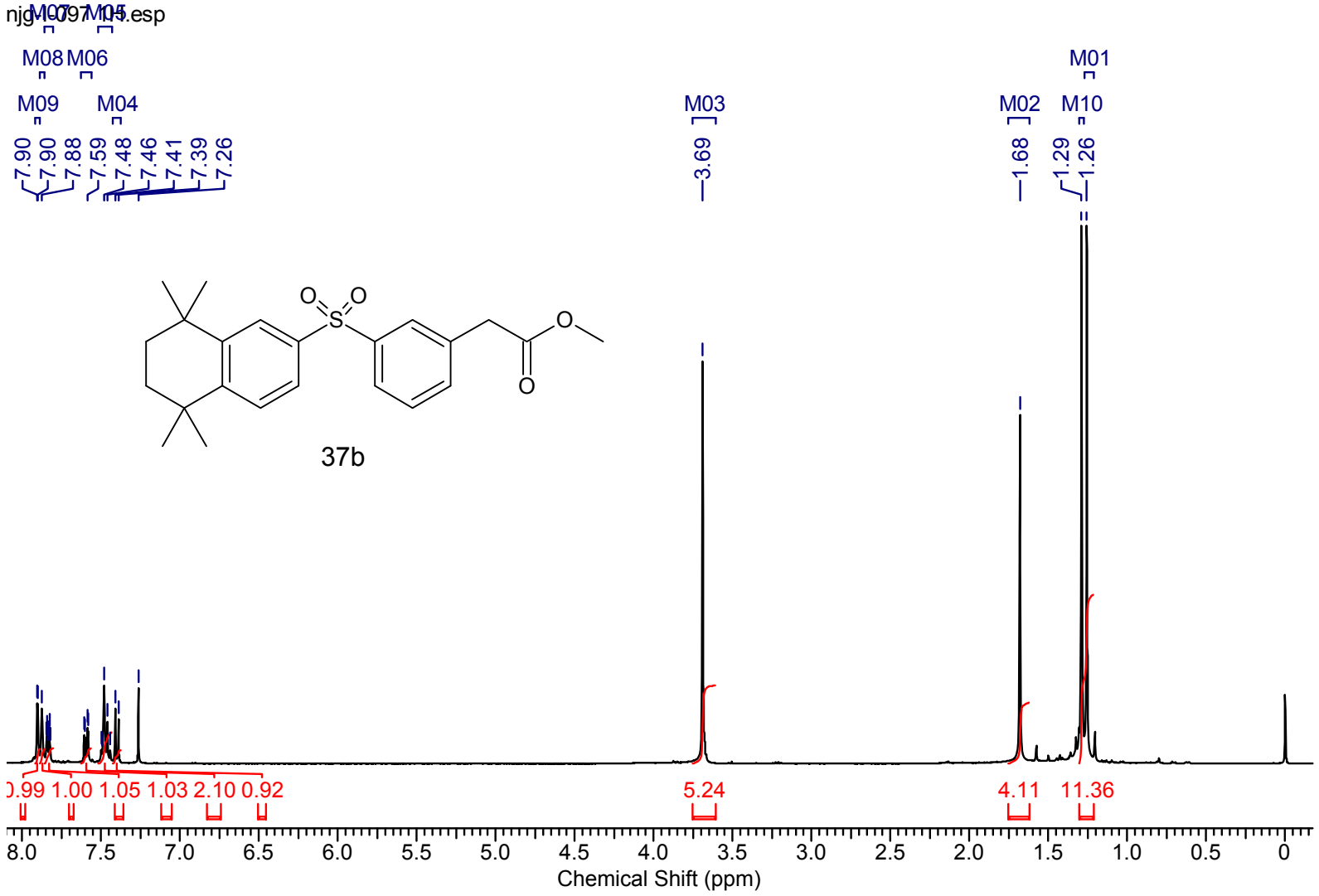
400 MHz ^{1}H-NMR of compound 37a in $CDCl_3$



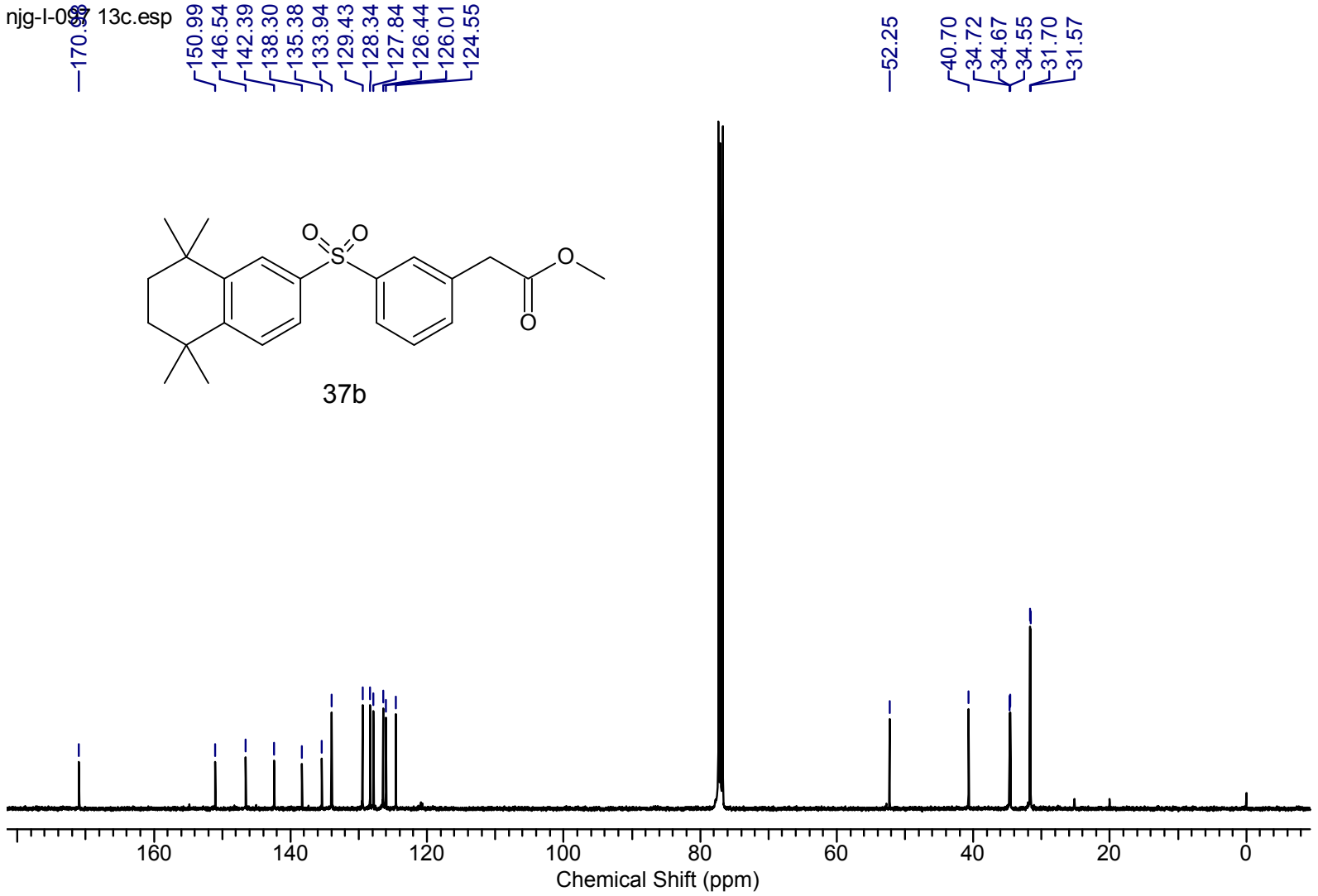
100 MHz ^{13}C-NMR of compound 37a in $CDCl_3$



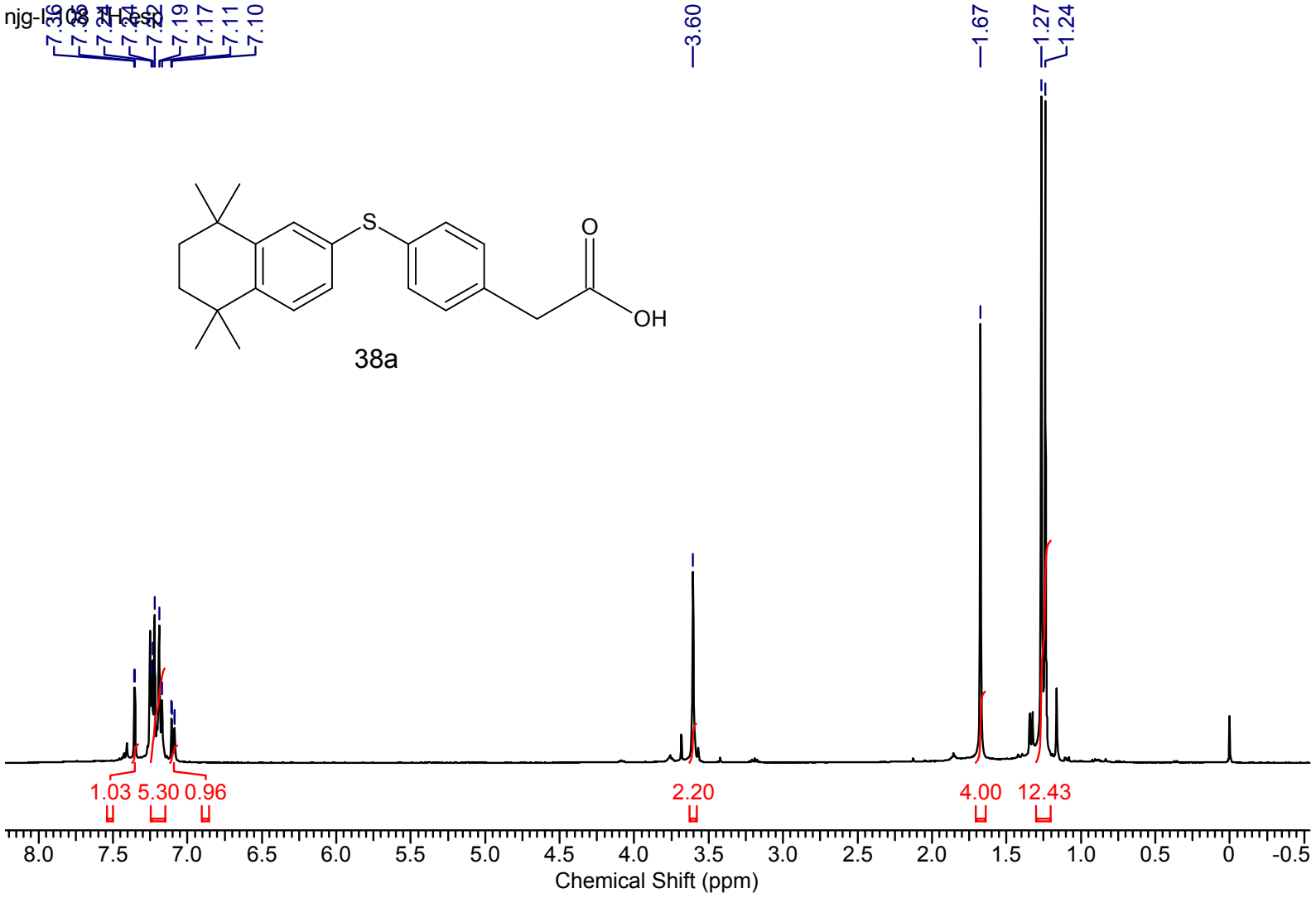
400 MHz ^{1}H-NMR of compound 37b in $CDCl_3$



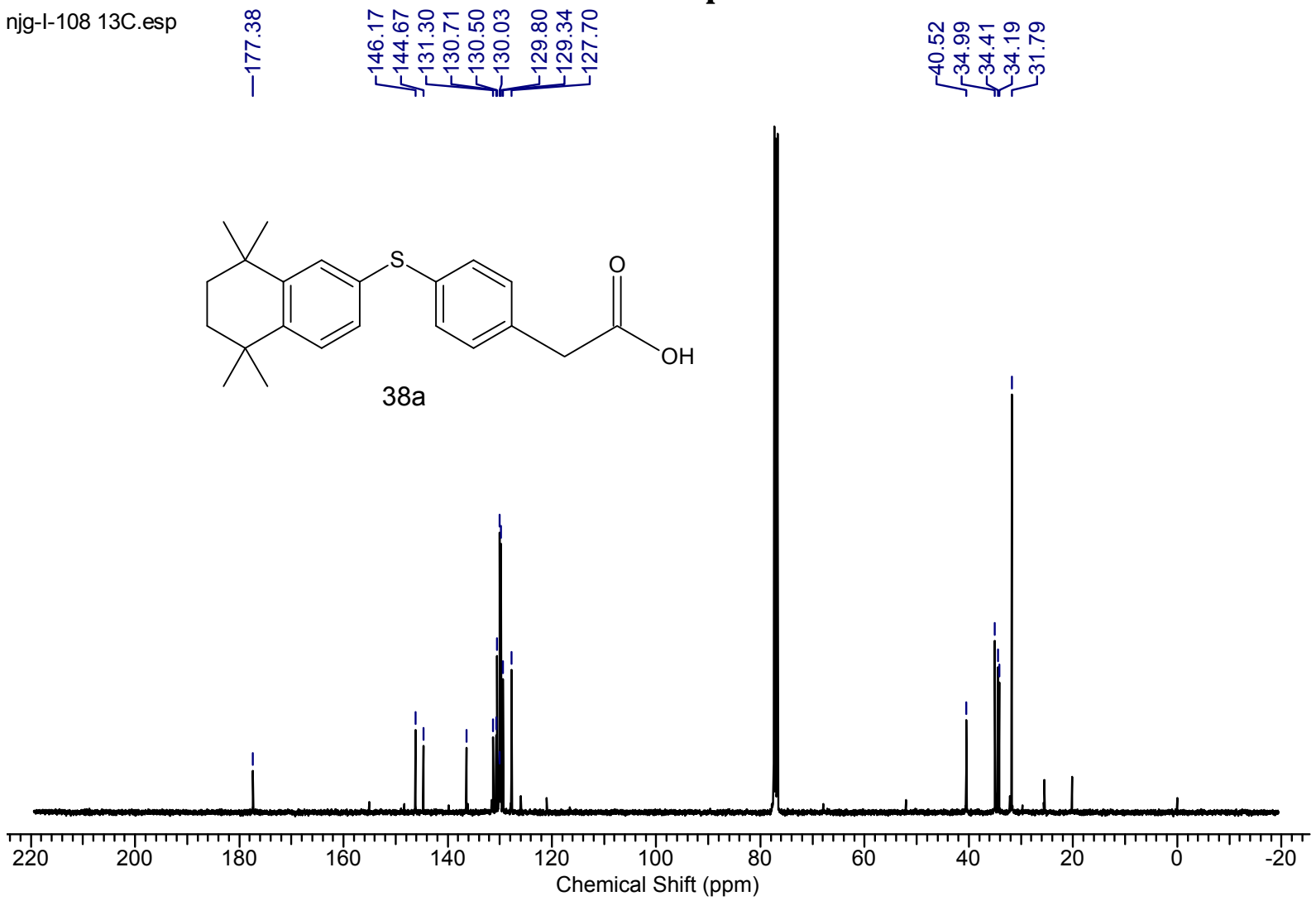
100 MHz ^{13}C-NMR of compound 37b in $CDCl_3$



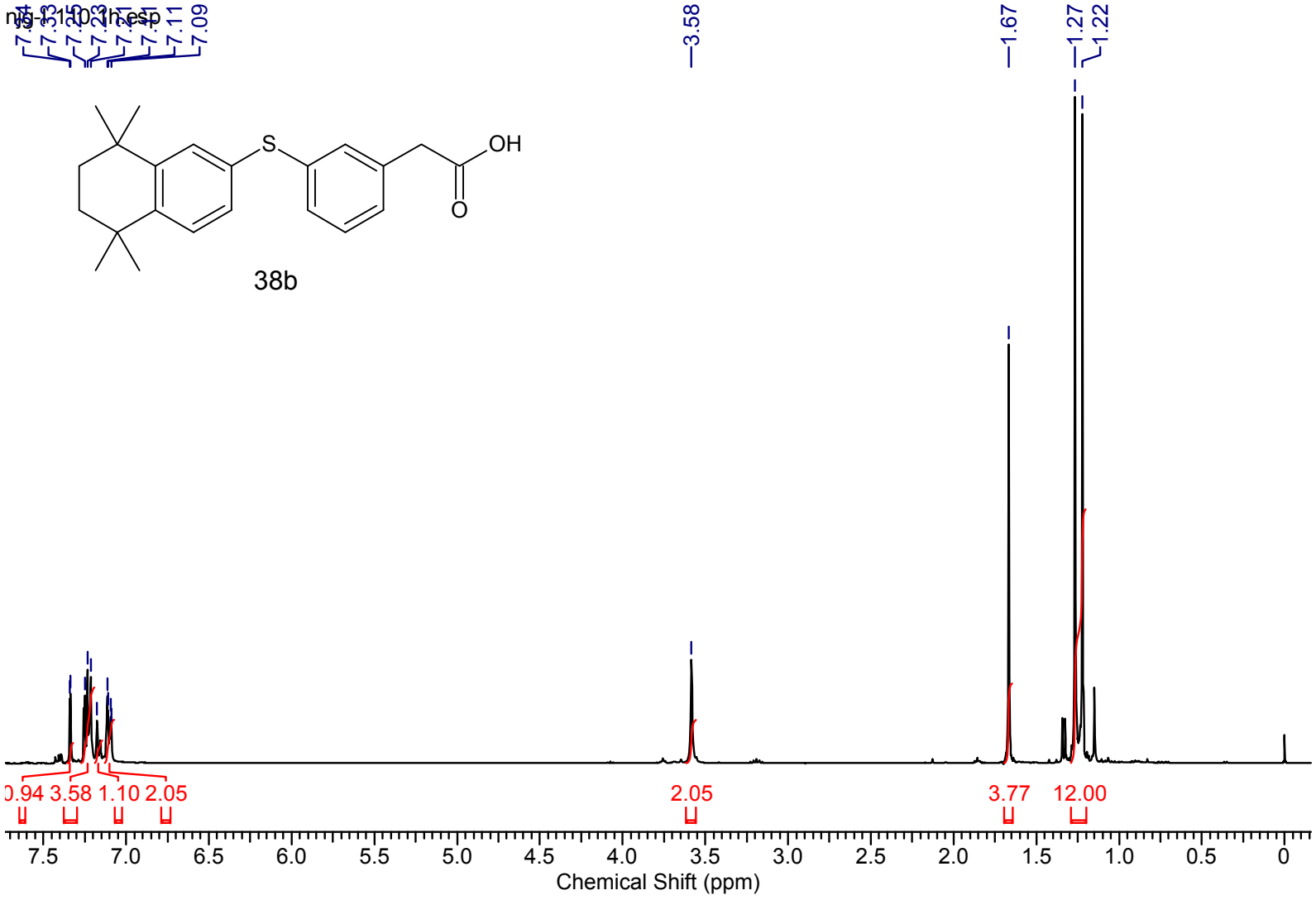
400 MHz ^{1}H-NMR of compound 38a in $CDCl_3$



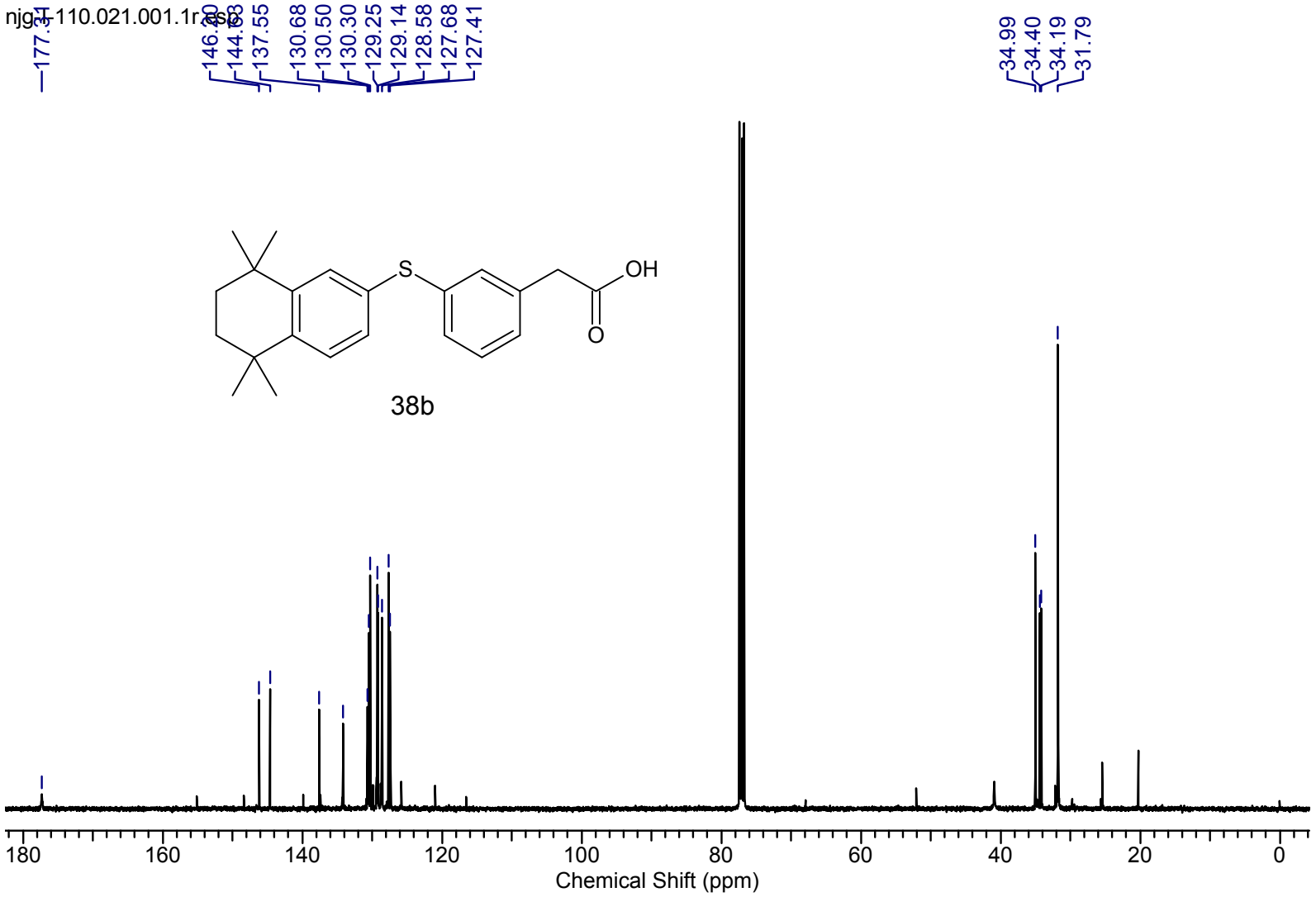
100 MHz ^{13}C-NMR of compound 38a in $CDCl_3$



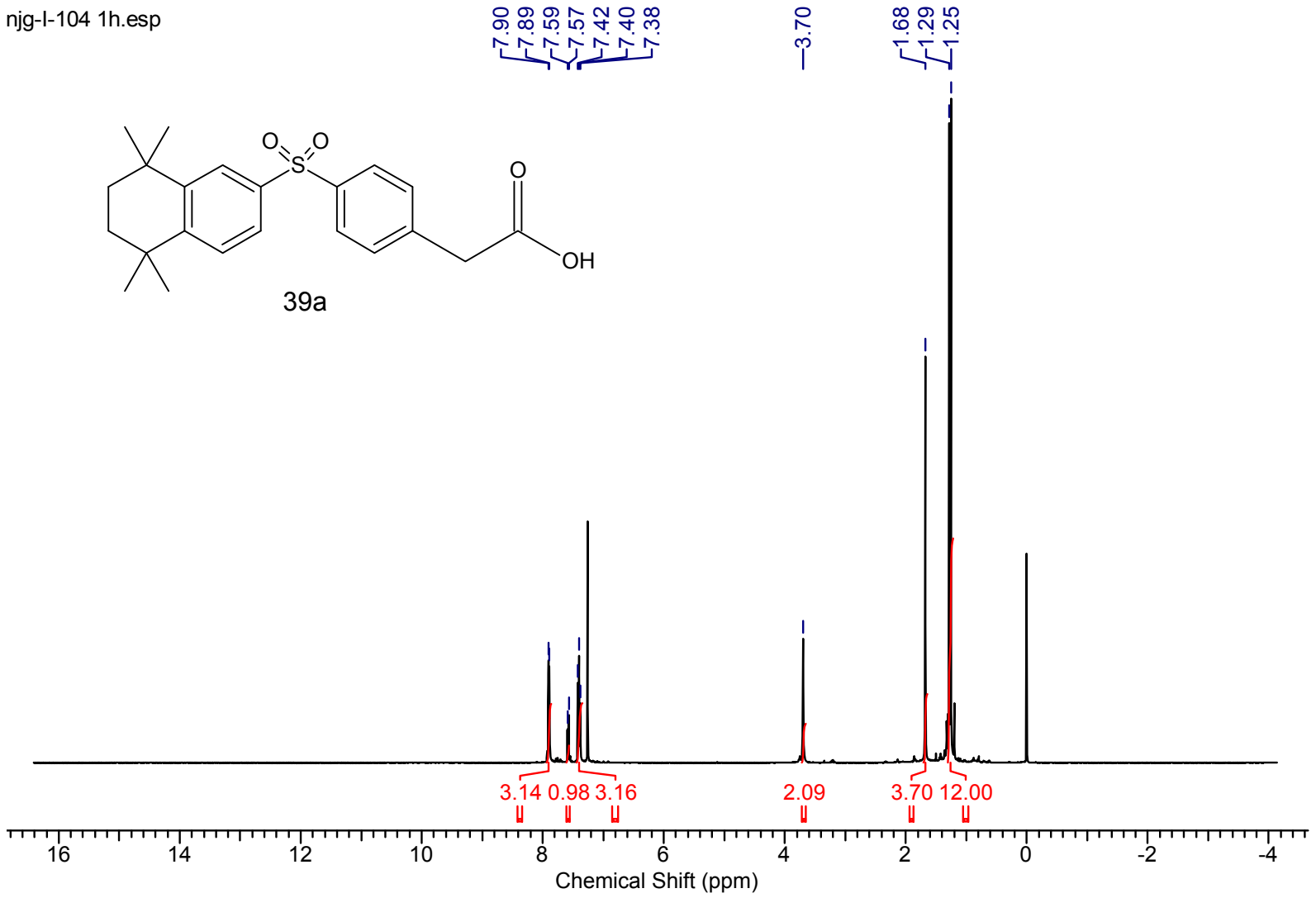
400 MHz ^{1}H-NMR of compound 38b in $CDCl_3$



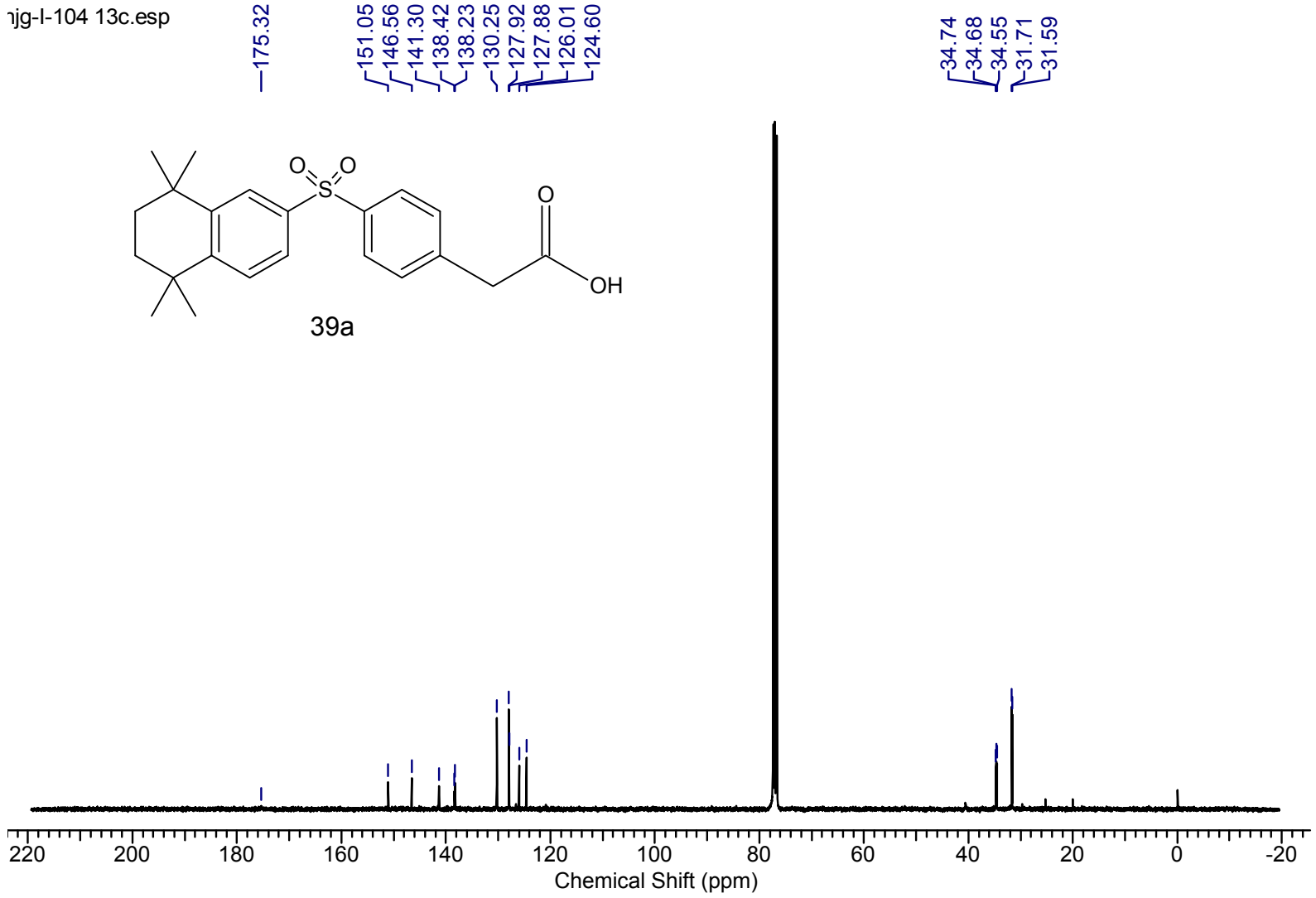
100 MHz ^{13}C-NMR of compound 38b in $CDCl_3$



400 MHz 1H-NMR of compound 39a in CDCl3

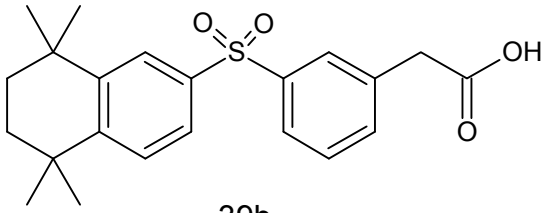


100 MHz 13C-NMR of compound 39a in CDCl3



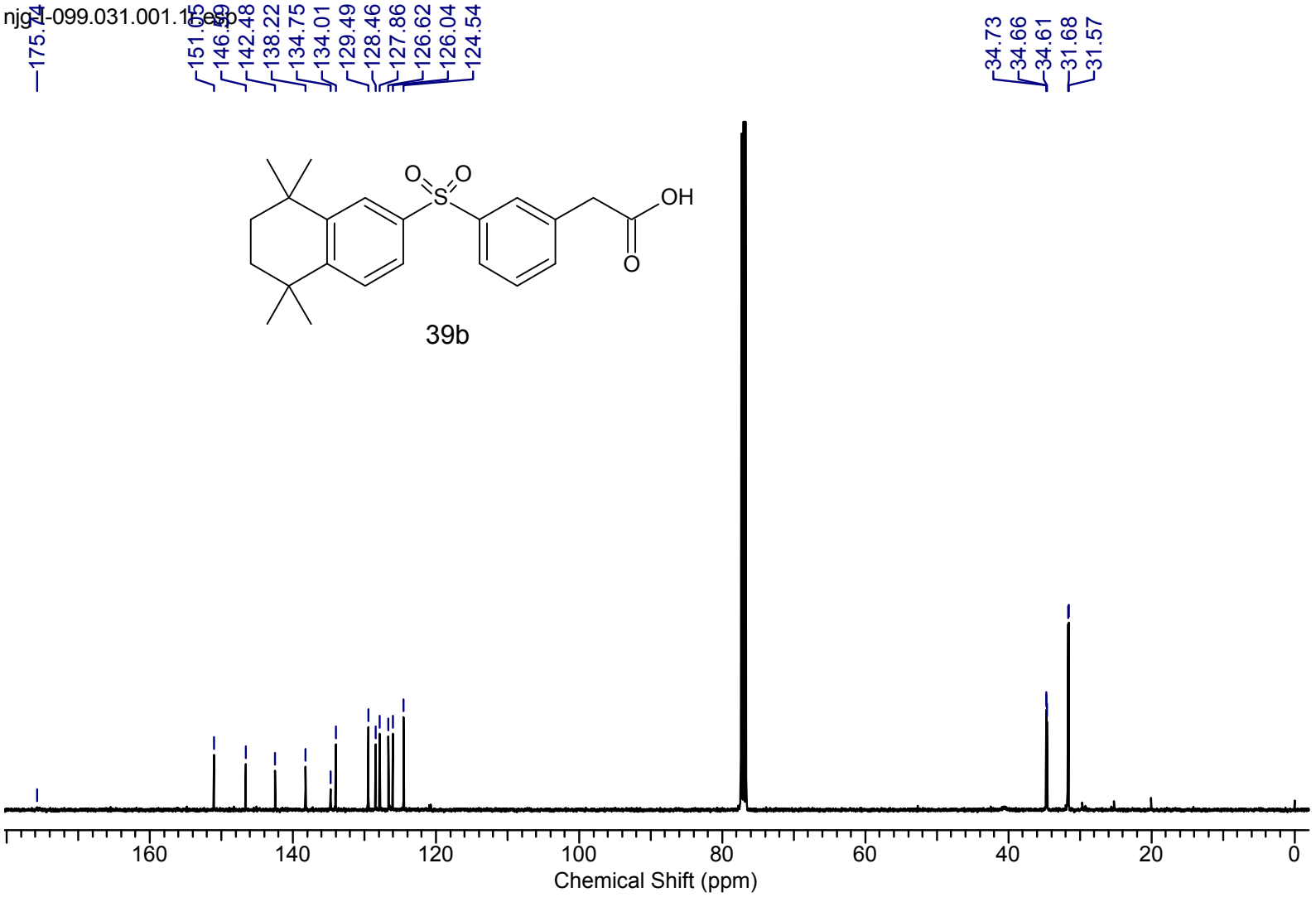
400 MHz ^{1}H-NMR of compound 39b in $CDCl_3$

njg-I-099 1h.esp



39b

100 MHz ^{13}C-NMR of compound 39b in $CDCl_3$



LC/MS analyses

LC/MS and HRMS analyses were obtained on a Waters ACQUITY UPLC-series liquid chromatography system equipped with a diode array detector and coupled to a LCT PREMIER XE^{TM} time of flight (TOF) mass spectrometer with electrospray ionization (ESI). The liquid chromatrography conditions were as follows: a Phenomenex column (NX, 3u, C18, 110A, 50.0x4.60 mm) was used, and it was eluted with the following gradient over 15 minutes at a rate of 0.4mL/min: solvent A: water (0.1% formic acid), solvent B: acetonitrile.

Time (min)	Flow (mL/min)	%A	%B
0.00	0.400	90.0	10.0
6.60	0.400	2.0	98.0
13.00	0.400	2.0	98.0
14.00	0.400	90.0	10.0
15.00	0.400	90.0	10.0

Compound purity was assigned on the basis of 254-nM detection data assessed by comparing relative peak areas of the signals.

Compound	Retention Time (min)	Purity (%)
5	8.12	96
6	8.34	97
9	8.14	95
11a	8.82	100
13a	8.85	98
15a	9.35	95
11b	9.40	95
13b	7.74	95
15b	9.97	94
18	10.06	80
20	9.83	93
22	9.60	100
24	9.13	99
26	8.96	99
28	10.02	100
30	9.67	99
34	8.44	99
38a	9.50	95
38b	9.45	95
39a	8.32	99
39b	8.27	99