Supplementary Information

Cornulacin: A New Isoflavone from *Cornulaca monacantha* Isolation, Structure Elucidation and Cytotoxicity through EGFR-Mediated apoptosis

Ahmed M. Badawy[a-†], Enas E. Eltamany[b-†], Rodina M. Hussien[a], Osama G. Mohamed[c,d], Mayada M. El-Ayouty[a], Mohamed S. Nafie[e,f], Ashootosh Tripathi[d,g], and Safwat A. Ahmed[b,*]

[a]*Department of Pharmacognosy, Faculty of Pharmacy, Sinai University, El-Arish 45511, Egypt;* ahmed.badawy@su.edu.eg (A.M.B.); Rodina.atia@su.edu.eg (R.M.H.); miada.mohamed@su.edu.eg (M.M.E.)
[b]*Department of Pharmacognosy, Faculty of Pharmacy, Suez Canal University, Ismailia 41522, Egypt;* enas_mostafa@pharm.suez.edu.eg, Enastamany@gmail.com (E.E.E.)

[c]*Pharmacognosy Department, Faculty of Pharmacy, Cairo University, Kasr el Aini St., Cairo 11562, Egypt;* osama.mohamed@pharma.cu.edu.eg (O.G.M.)
[d]*Natural Products Discovery Core, Life Sciences Institute, University of Michigan, Ann Arbor, MI 48109, USA,*

[e]*Chemistry Department, College of Sciences, University of Sharjah, Sharjah (P. O. Box 27272), United Arab Emirates;*
[f]*Chemistry Department (Biochemistry program), Faculty of Science, Suez Canal University, Ismailia, 41522, Egypt;* mohamed_nafie@science.suez.edu.eg (M.S.N.)
[g]*Department of Medicinal Chemistry, College of Pharmacy, University of Michigan, Ann Arbor, MI 48109, USA*; ashtri@umich.edu (A.T.)
Correspondence: safwat_aa@yahoo.com or safwat_ahmed@pharm.suez.edu.eg (S.A.A.); *Tel.: +20-010-92638387; Fax: +20-064-32307*

List of figures

List of tables:

Fragmentor Voltage	Collision Energy	Ionization Mode
200	0	ESI

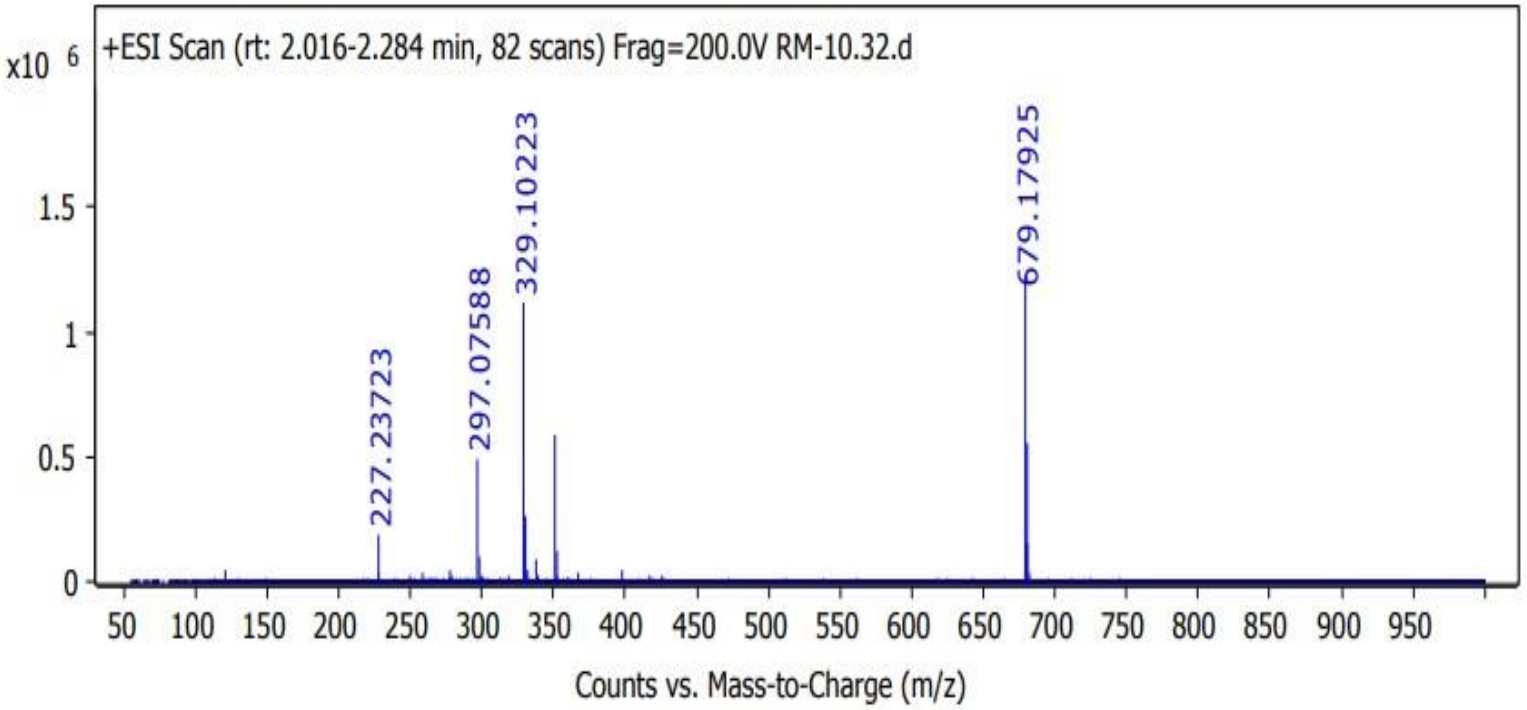

Figure. S 1 HRMS of compound 1

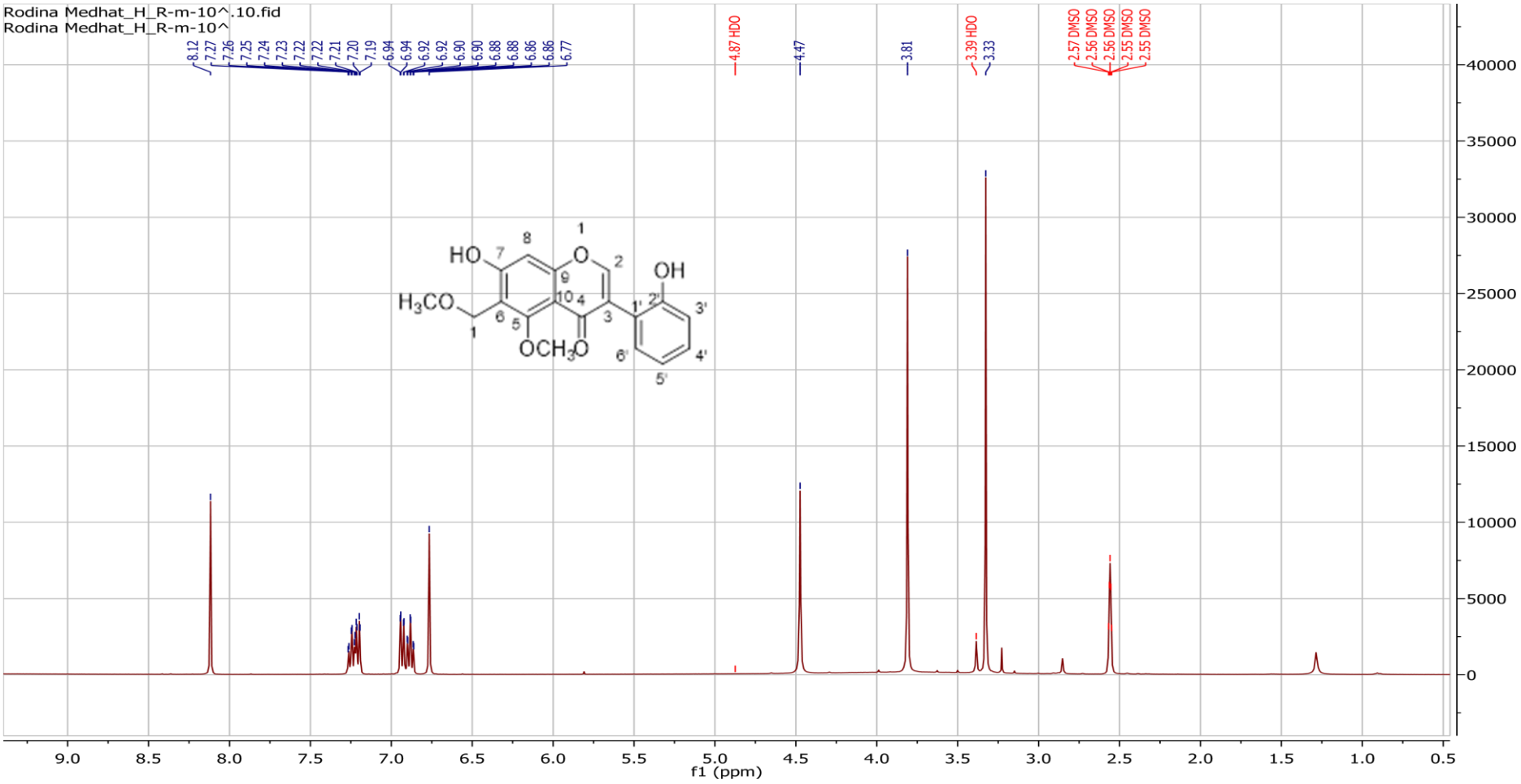

Figure. S 2 [1] H-NMR spectrum of compound 1 (400 MHz, DMSO-*d6*)

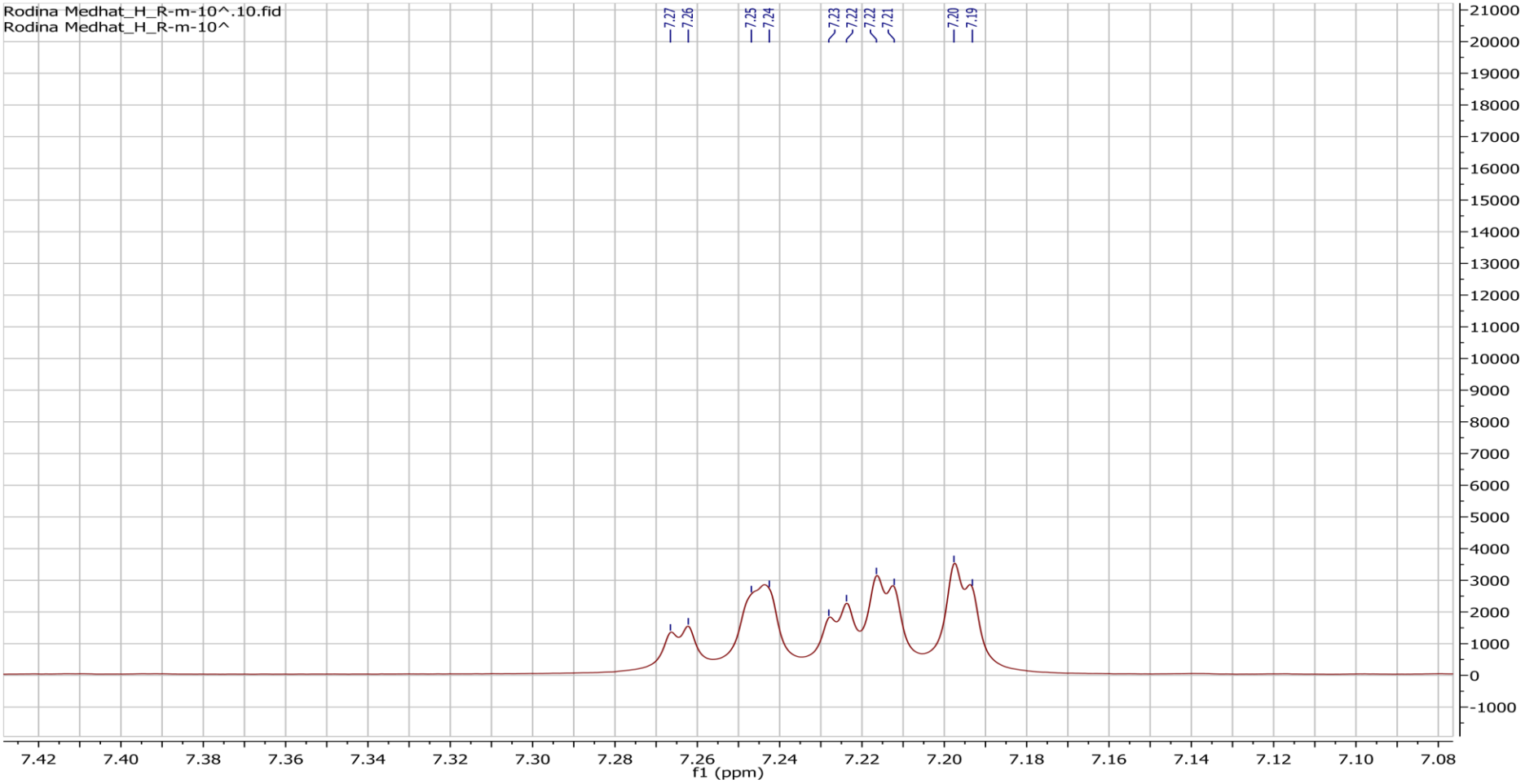

Figure. S 3 Partial expansion of [1] H-NMR spectrum of compound 1 (400 MHz, DMSO-*d6*)

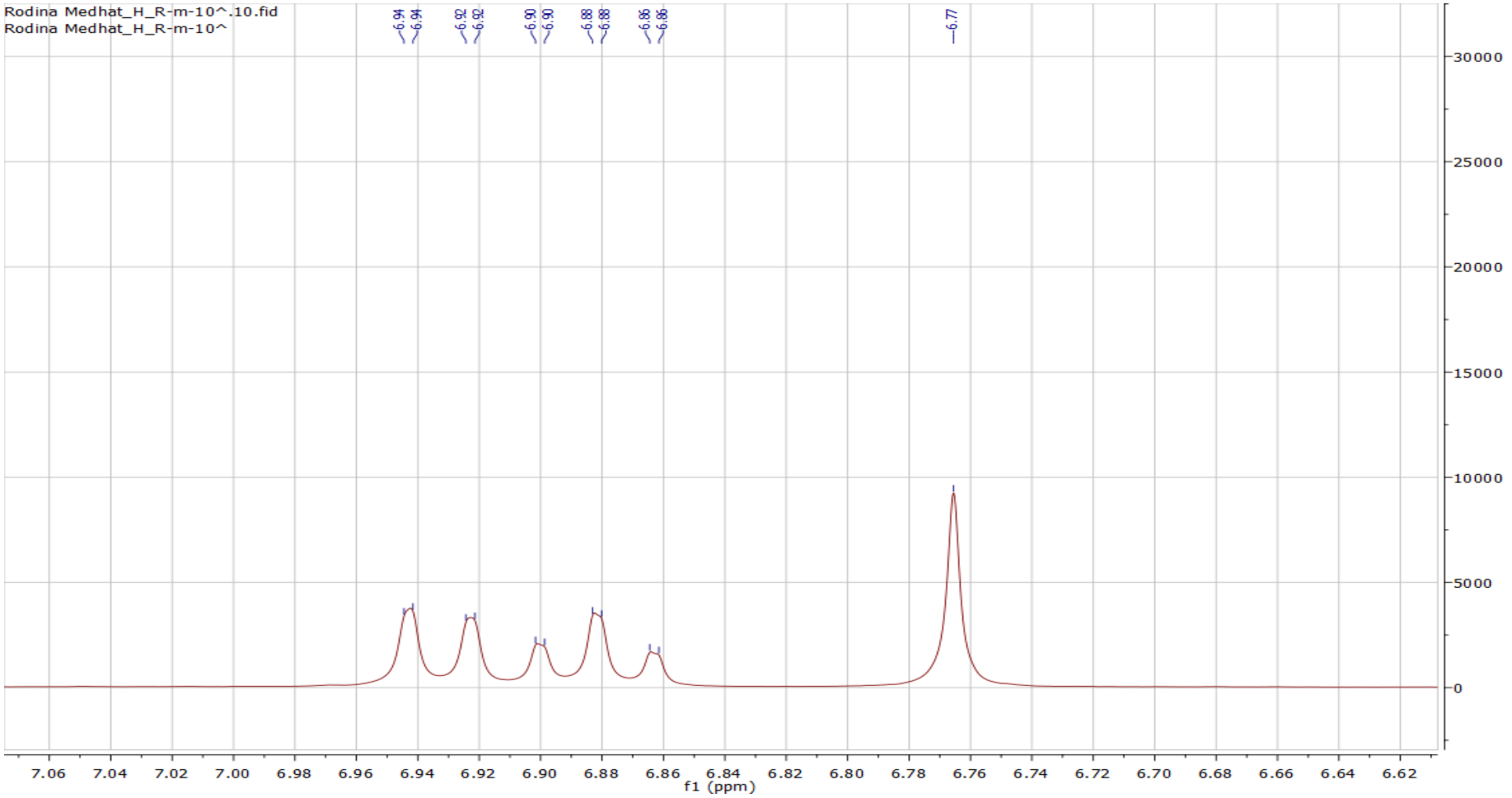

Figure. S 4 Partial expansion of [1] H-NMR spectrum of compound 1 (400 MHz, DMSO-*d6*)

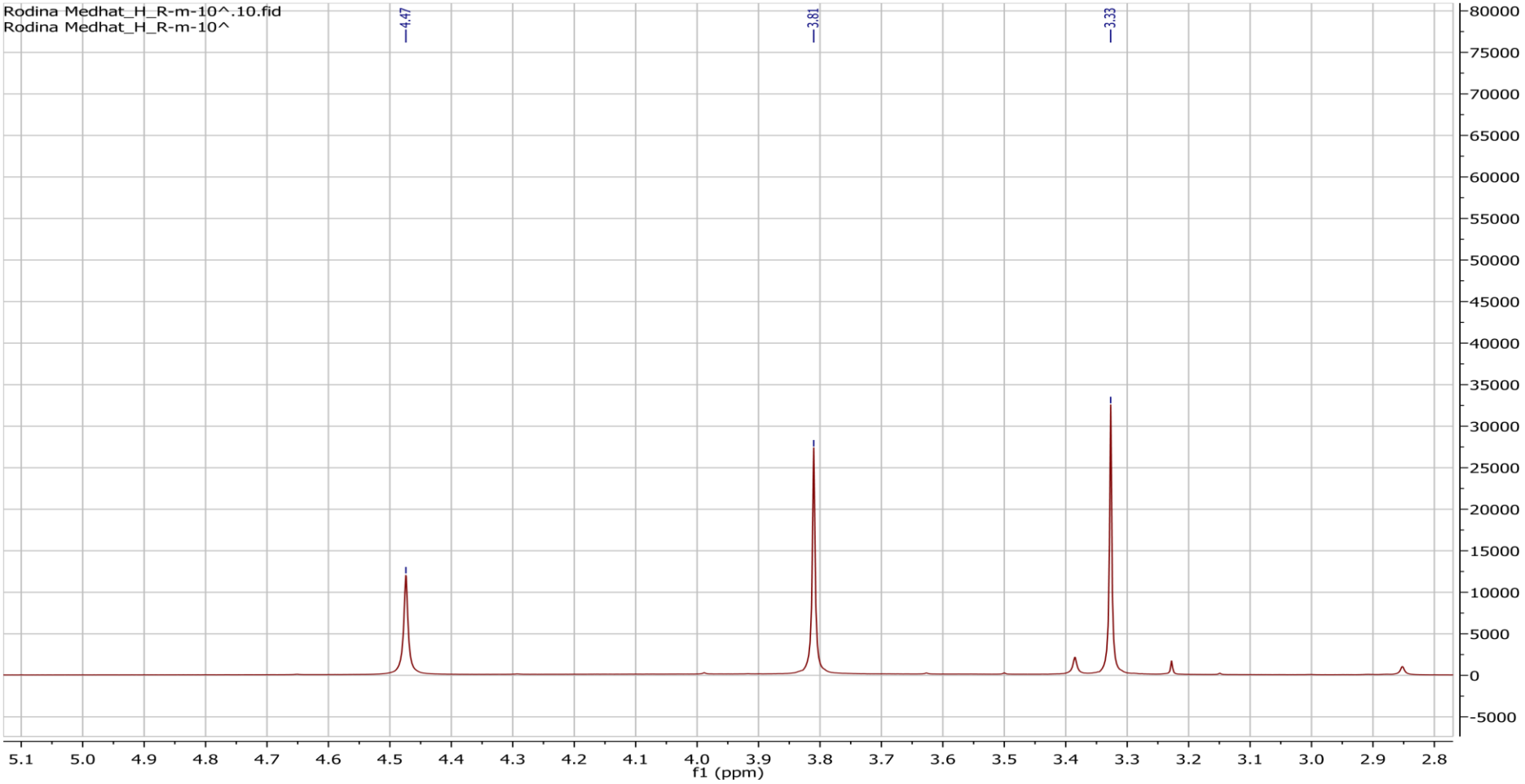

Figure. S 5 Partial expansion of [1] H-NMR spectrum of compound 1 (400 MHz, DMSO-*d6*)

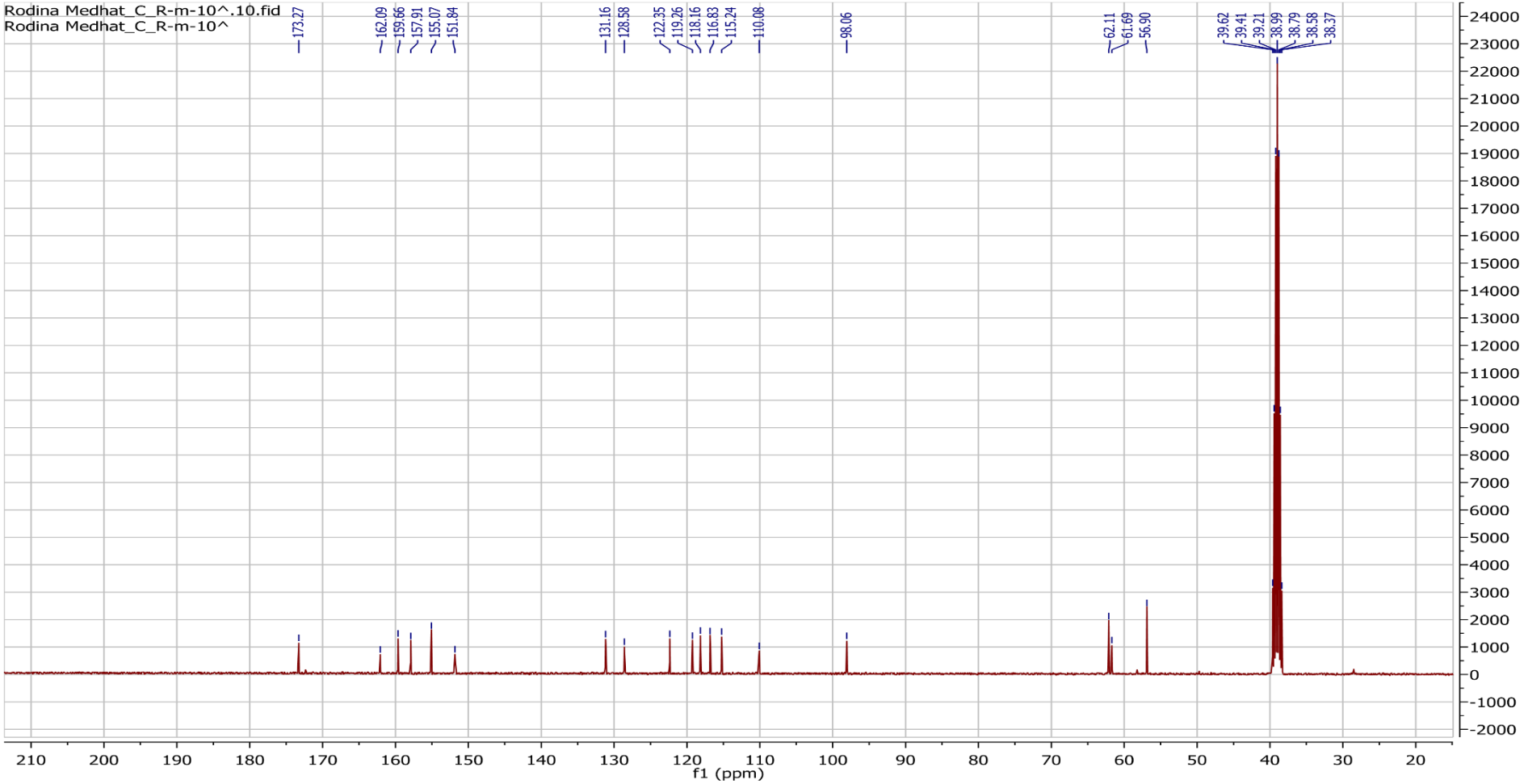

Figure. S 6 [13] C-NMR spectrum of compound 1 (100MHz, DMSO-*d6*)

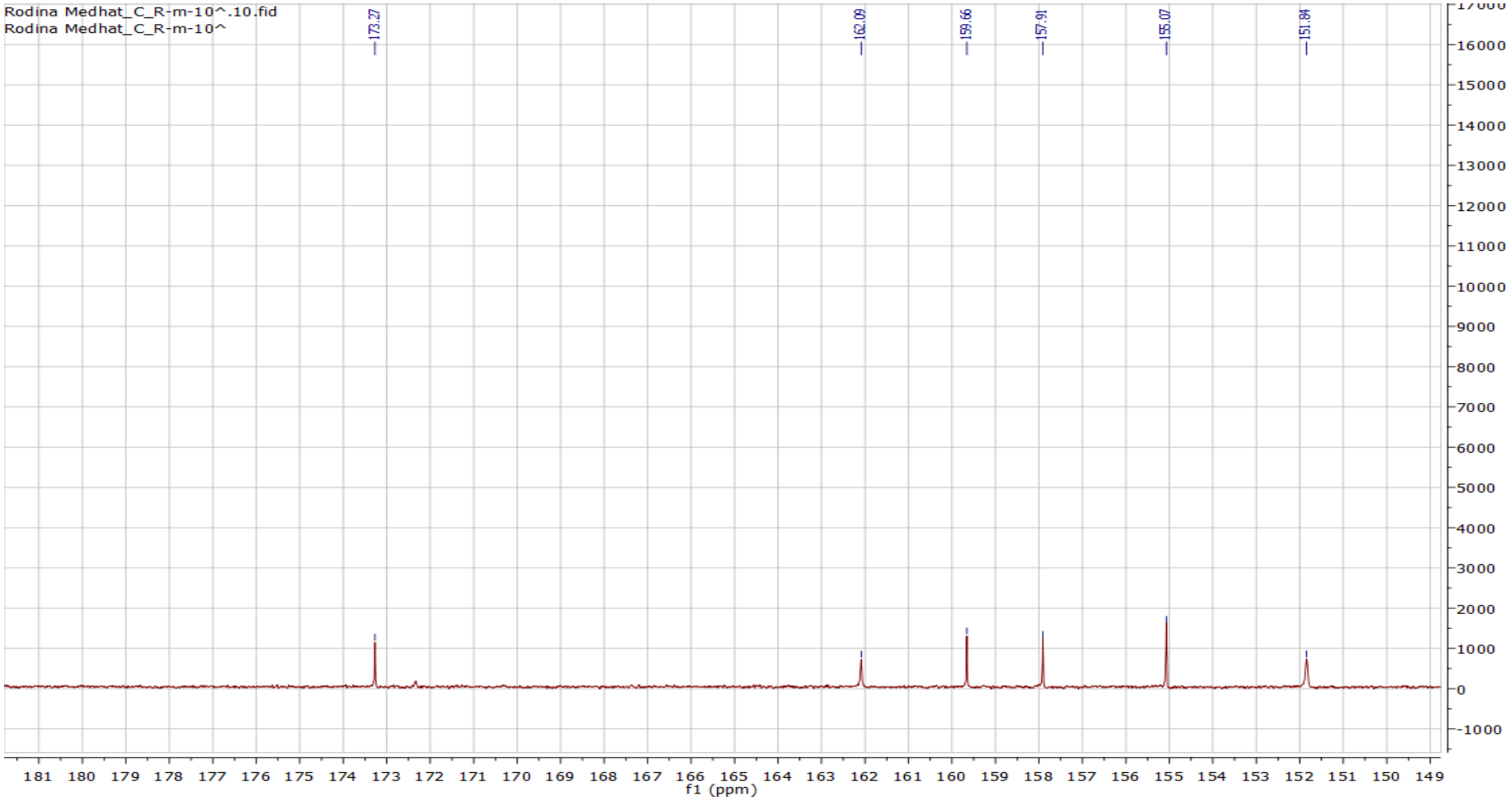

Figure. S 7 Partial expansion of ^{13} C-NMR spectrum of compound 1 (100MHz, DMSO-*d6*)

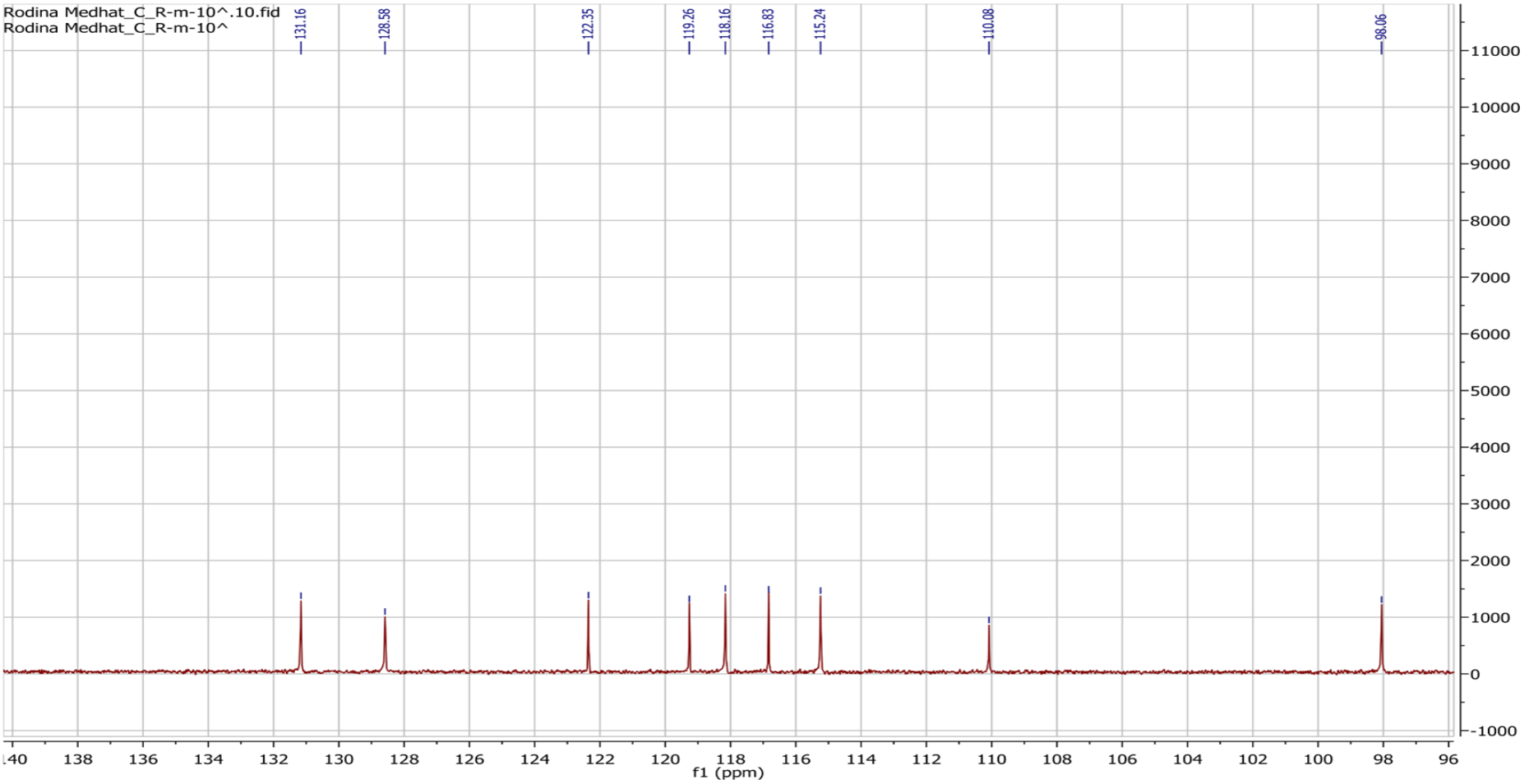

Figure. S 8 Partial expansion of ^{13} C-NMR spectrum of compound 1 (100MHz, DMSO-*d6*)

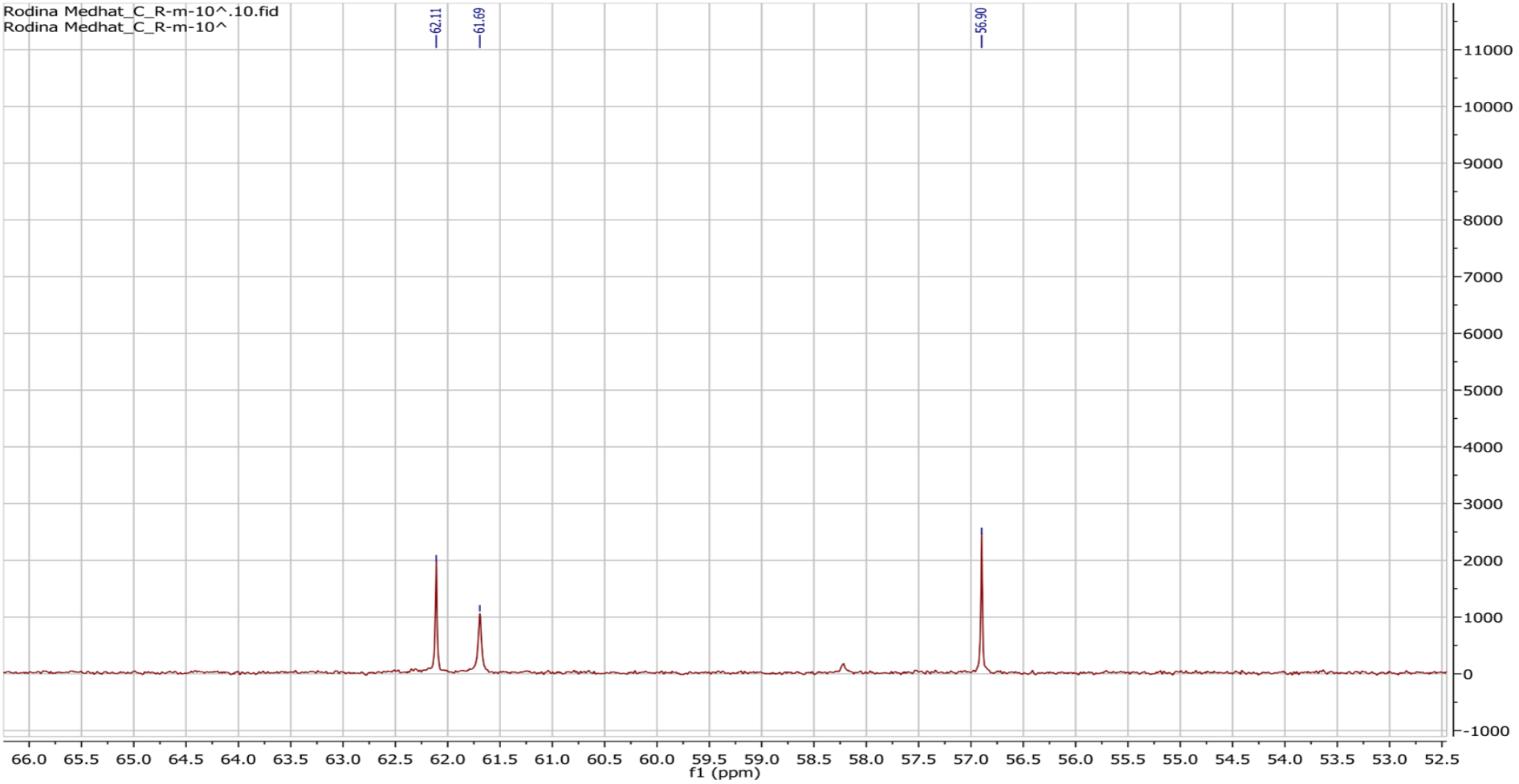

Figure. S 9 Partial expansion of ^{13} C-NMR spectrum of compound 1 (100MHz, DMSO-*d6*)

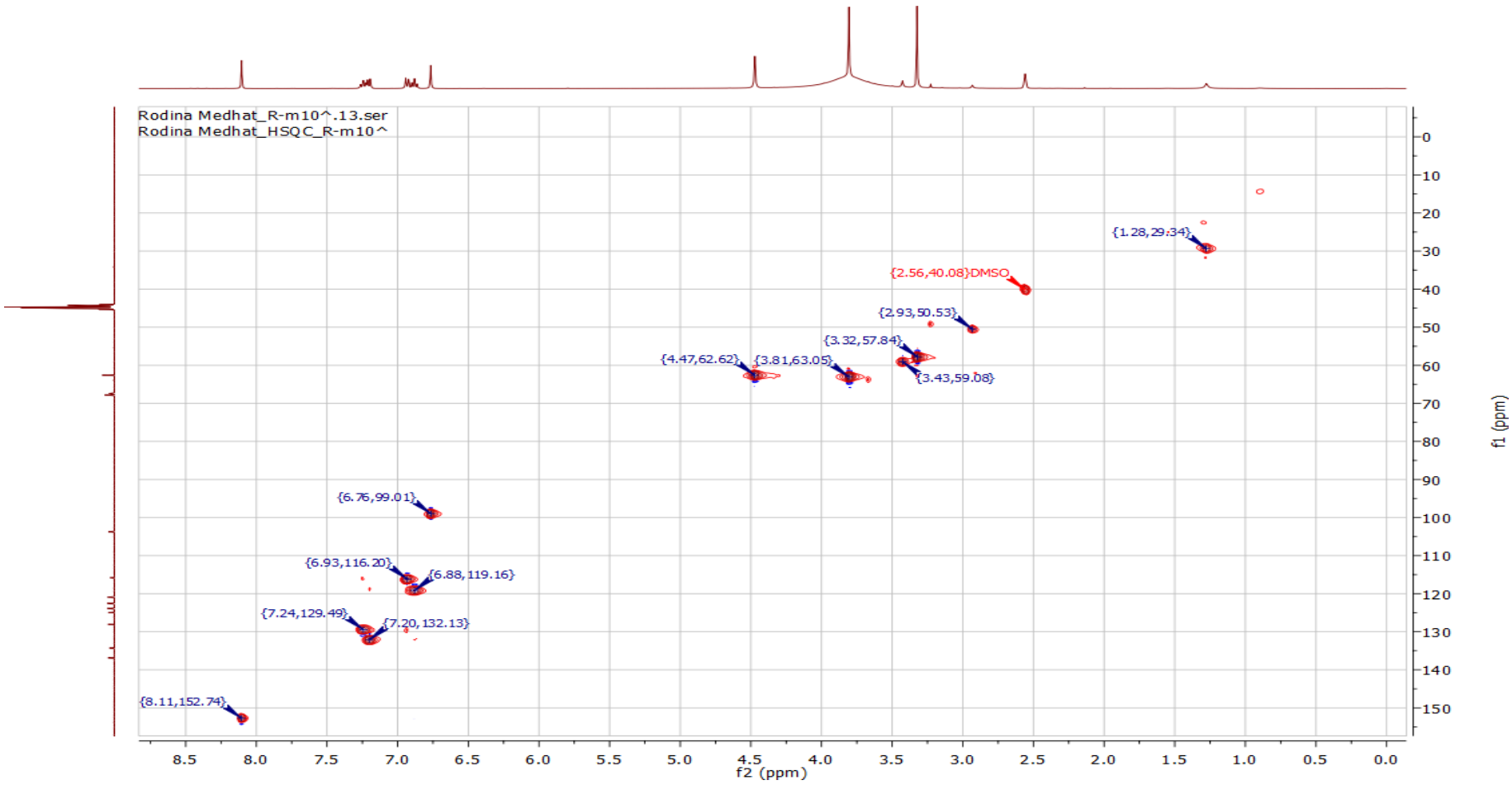

Figure. S 10 HSQC of compound 1

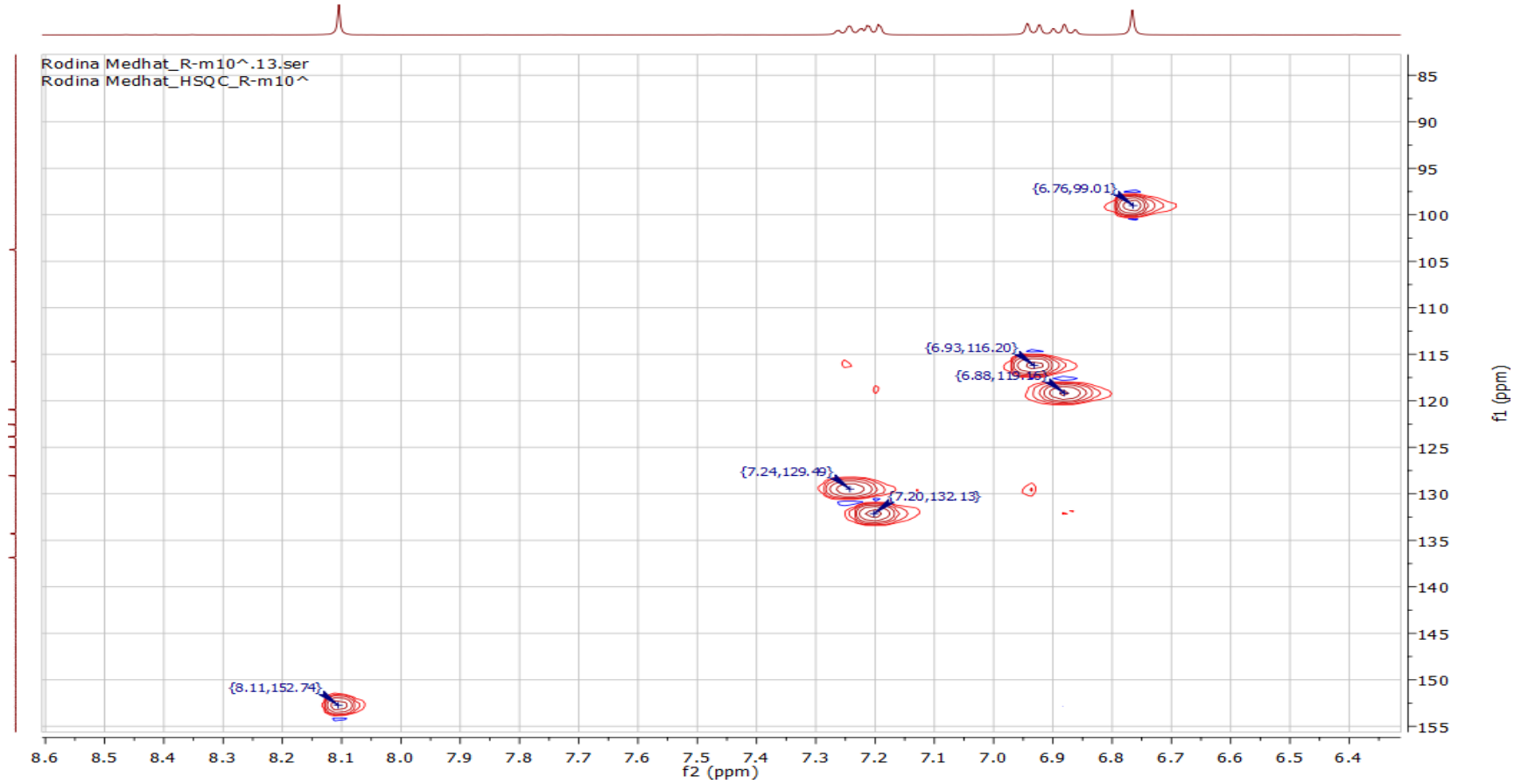

Figure. S 11 Partial expansion of HSQC of compound 1

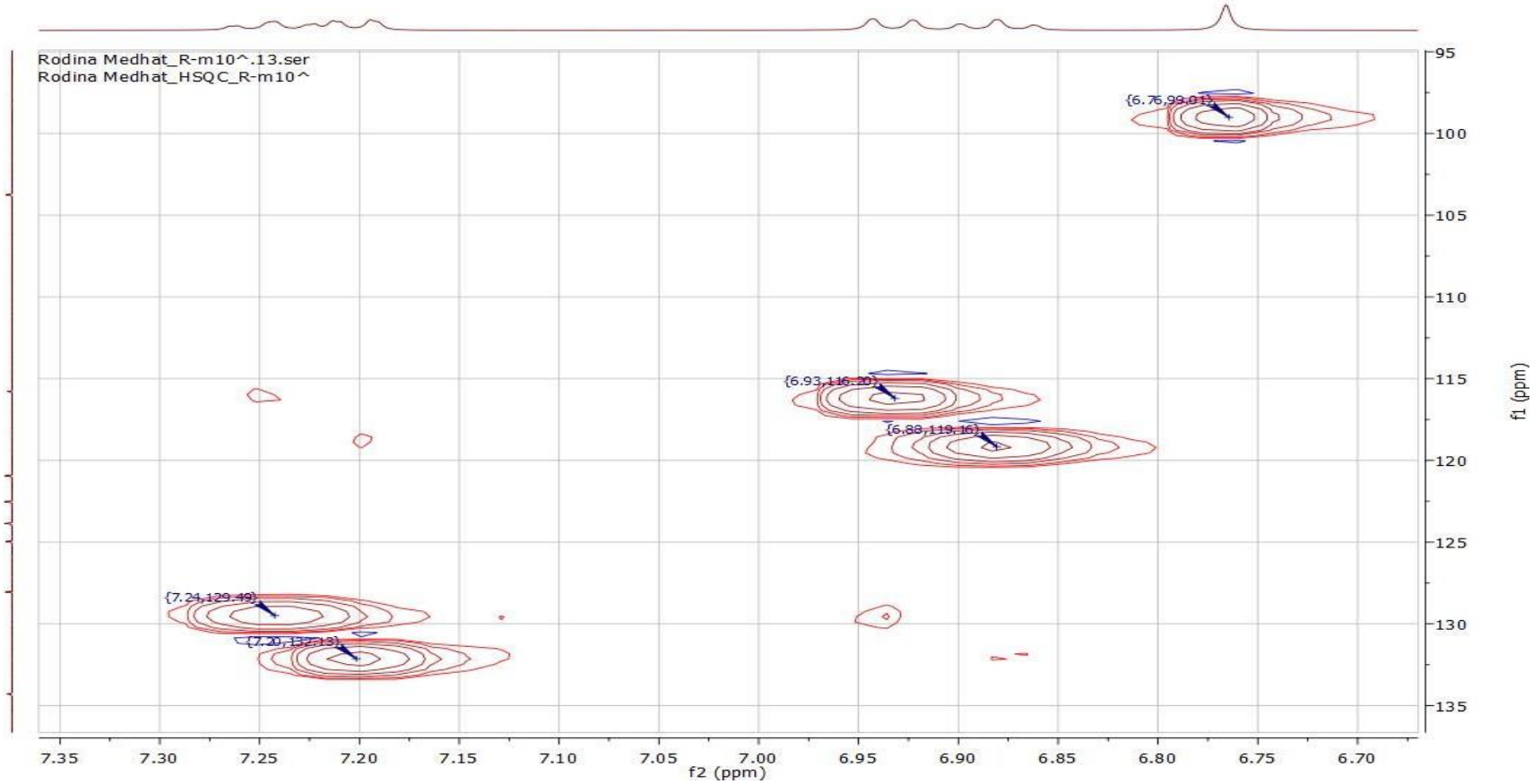

Figure. S 12 Partial expansion of HSQC of compound 1

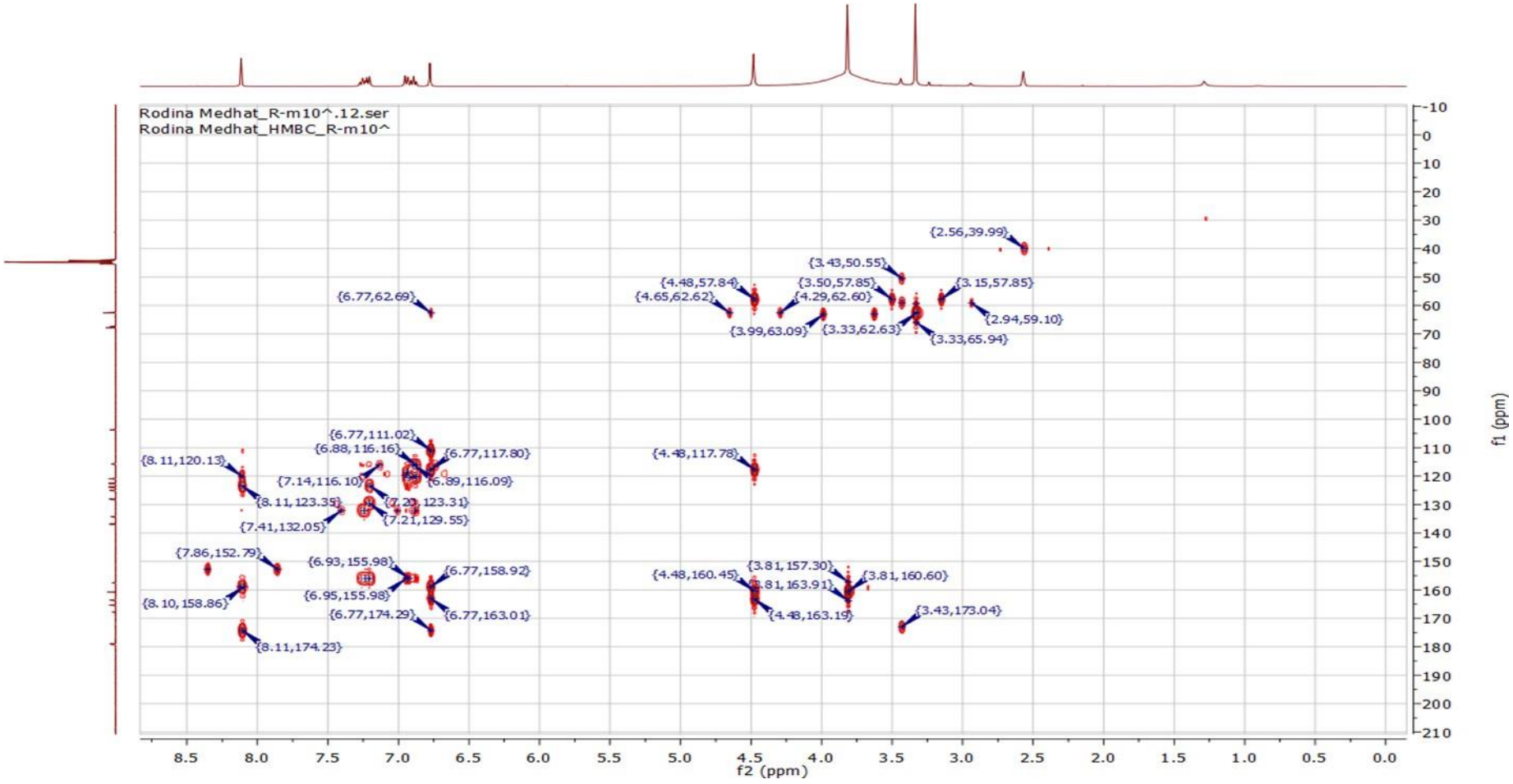

Figure. S 13 HMBC of compound 1

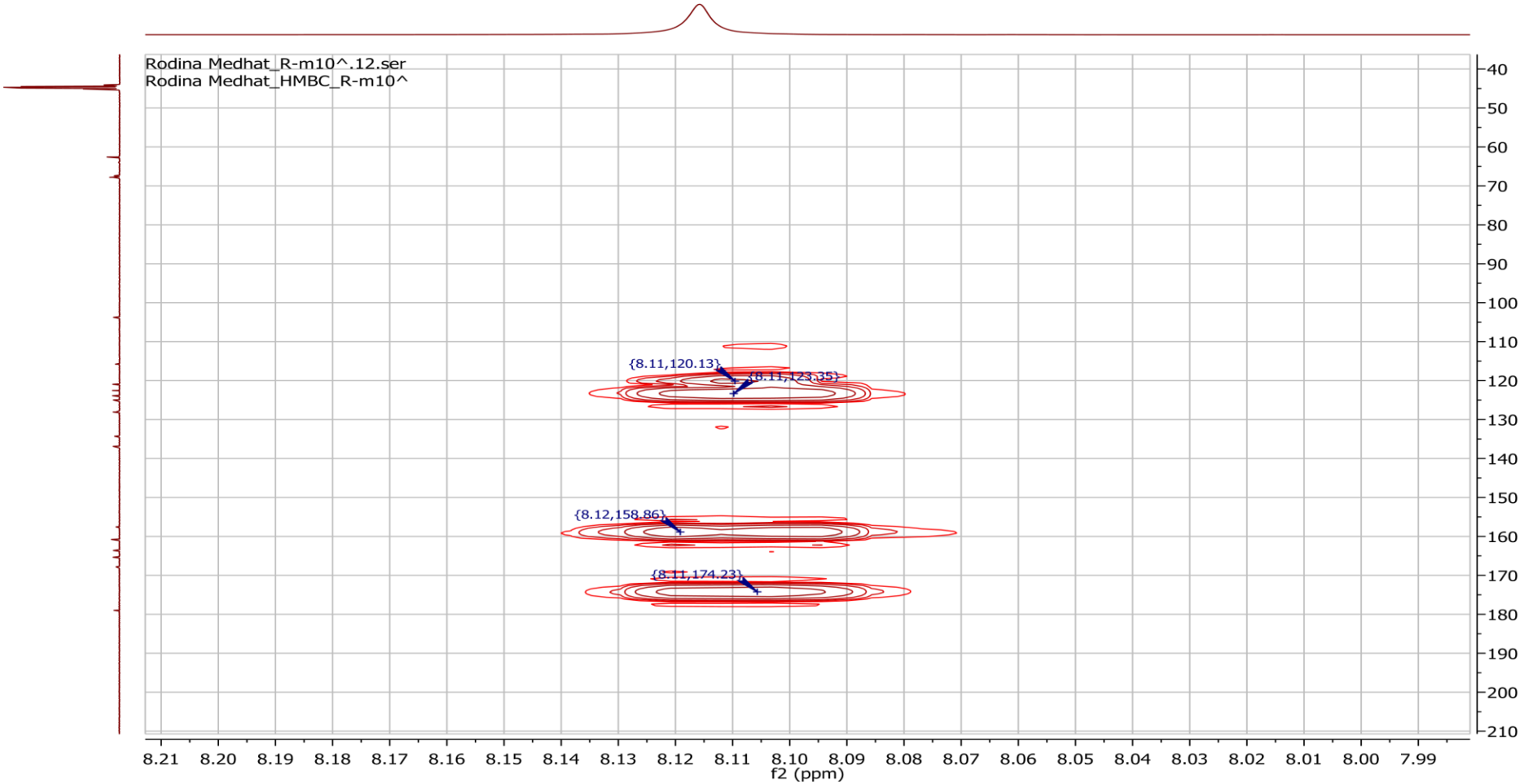

Figure. S 14 Partial expansion of HMBC of compound 1

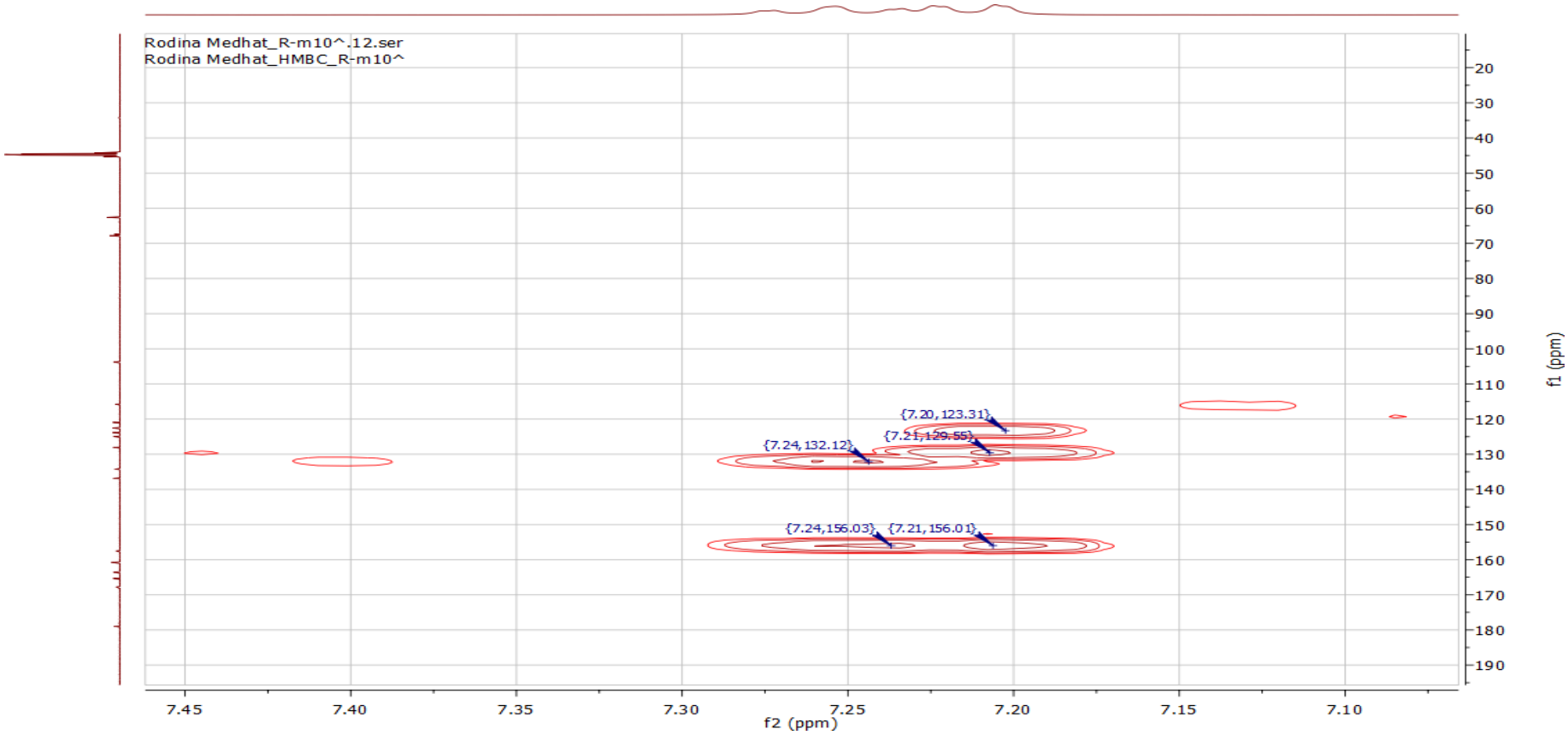

Figure. S 15 Partial expansion of HMBC of compound 1

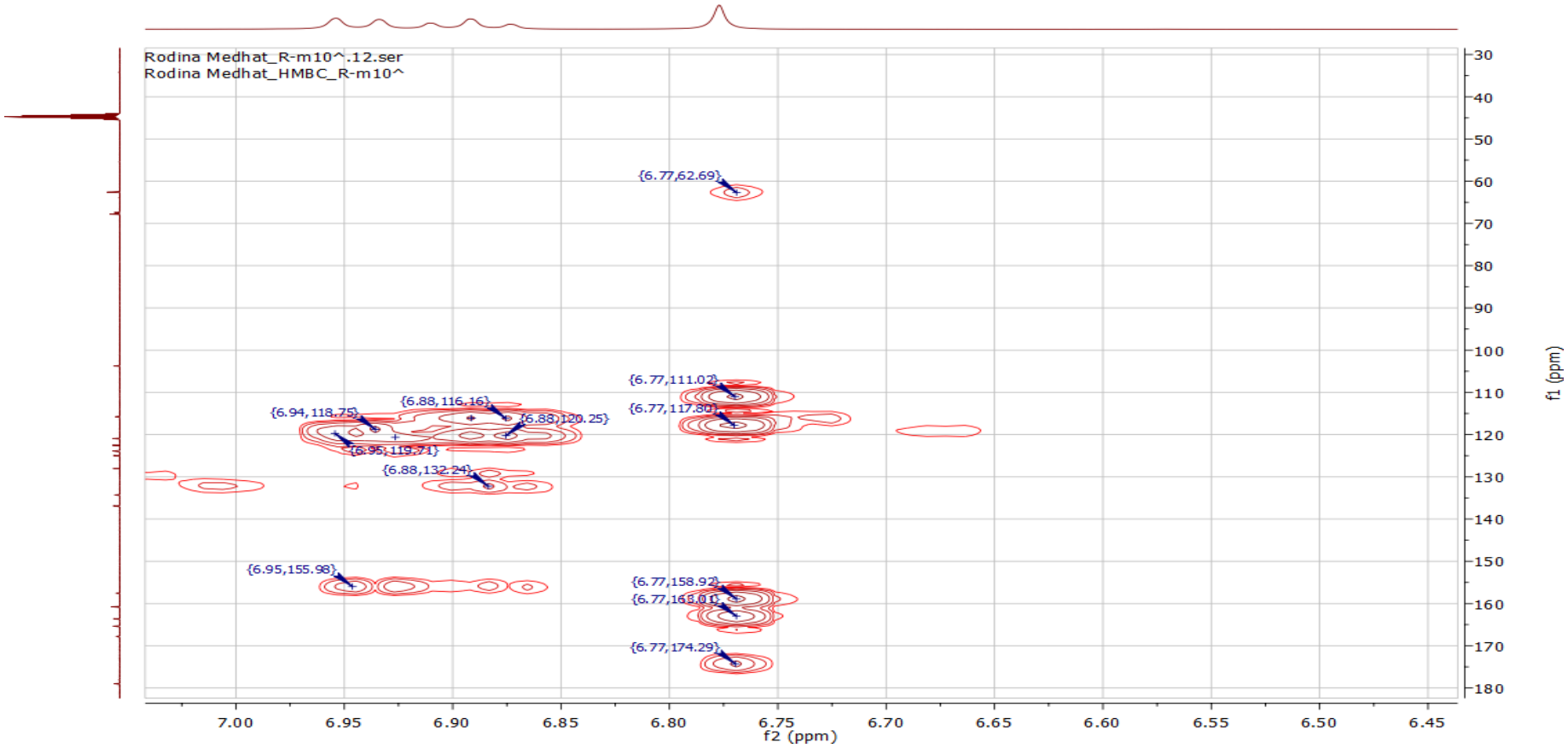

Figure. S 16 Partial expansion of HMBC of compound 1

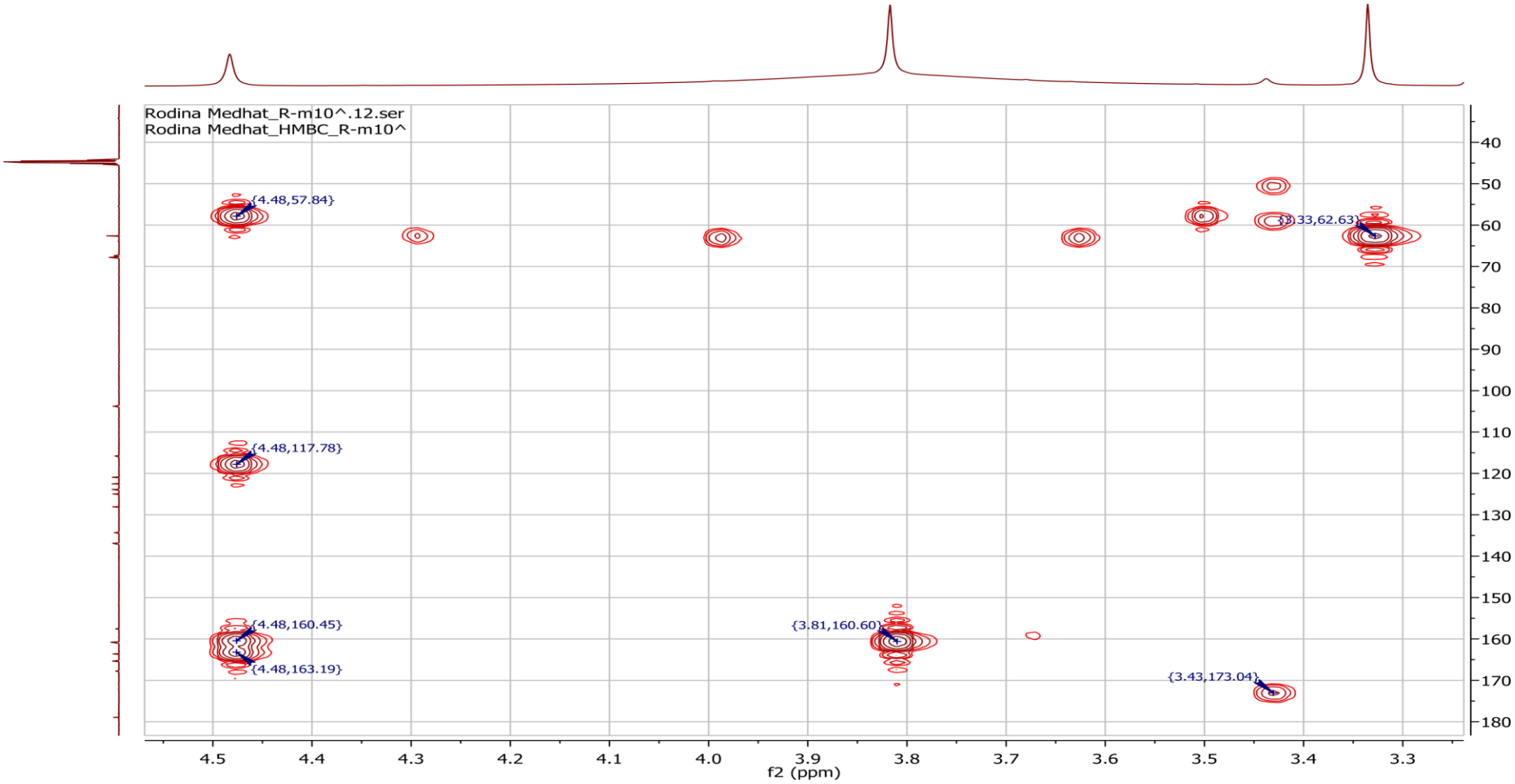

Figure. S 17 Partial expansion of HMBC of compound 1

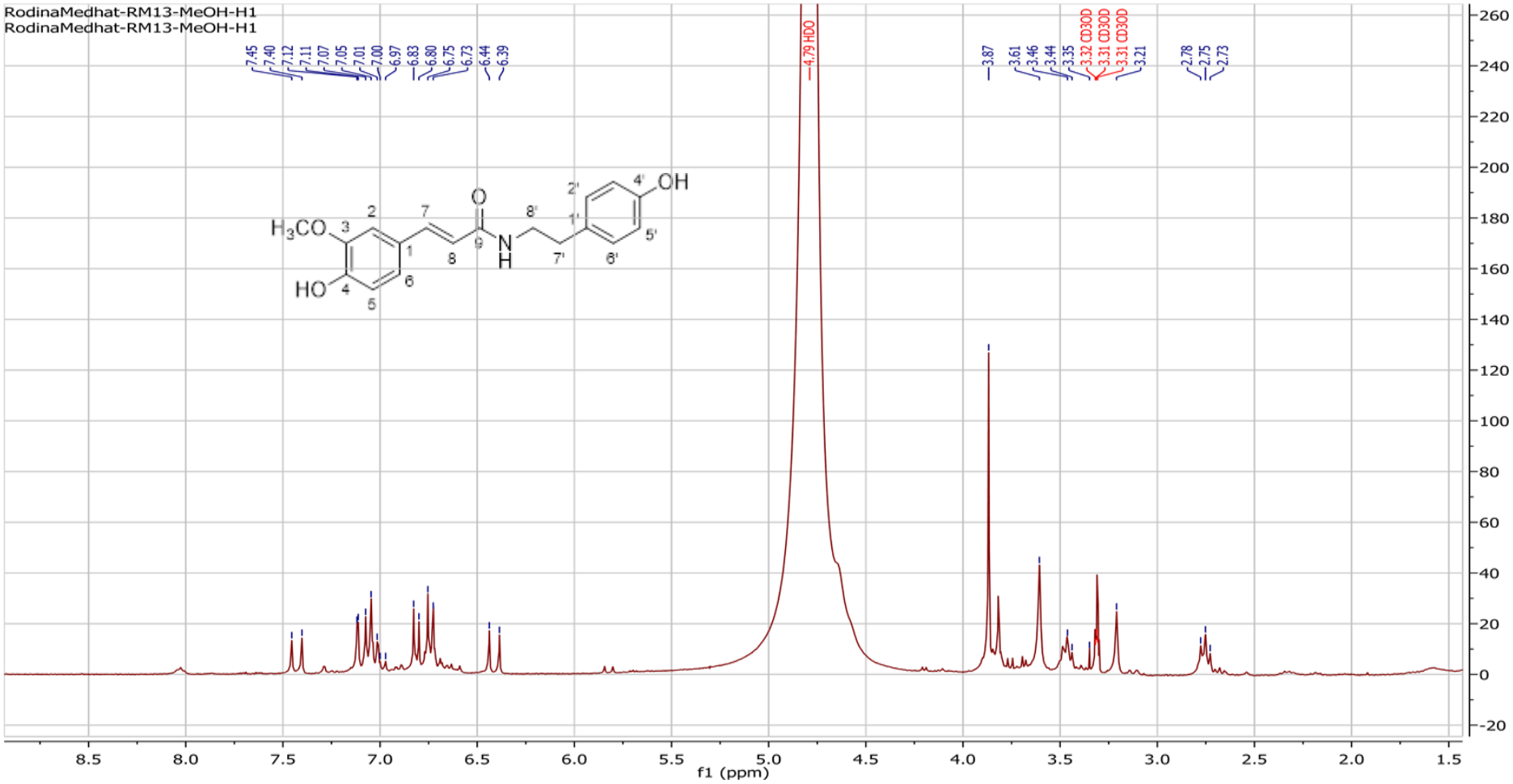

Figure. S 18 [1] H-NMR spectrum of compound 2 (600 MHz, CD_3OD)

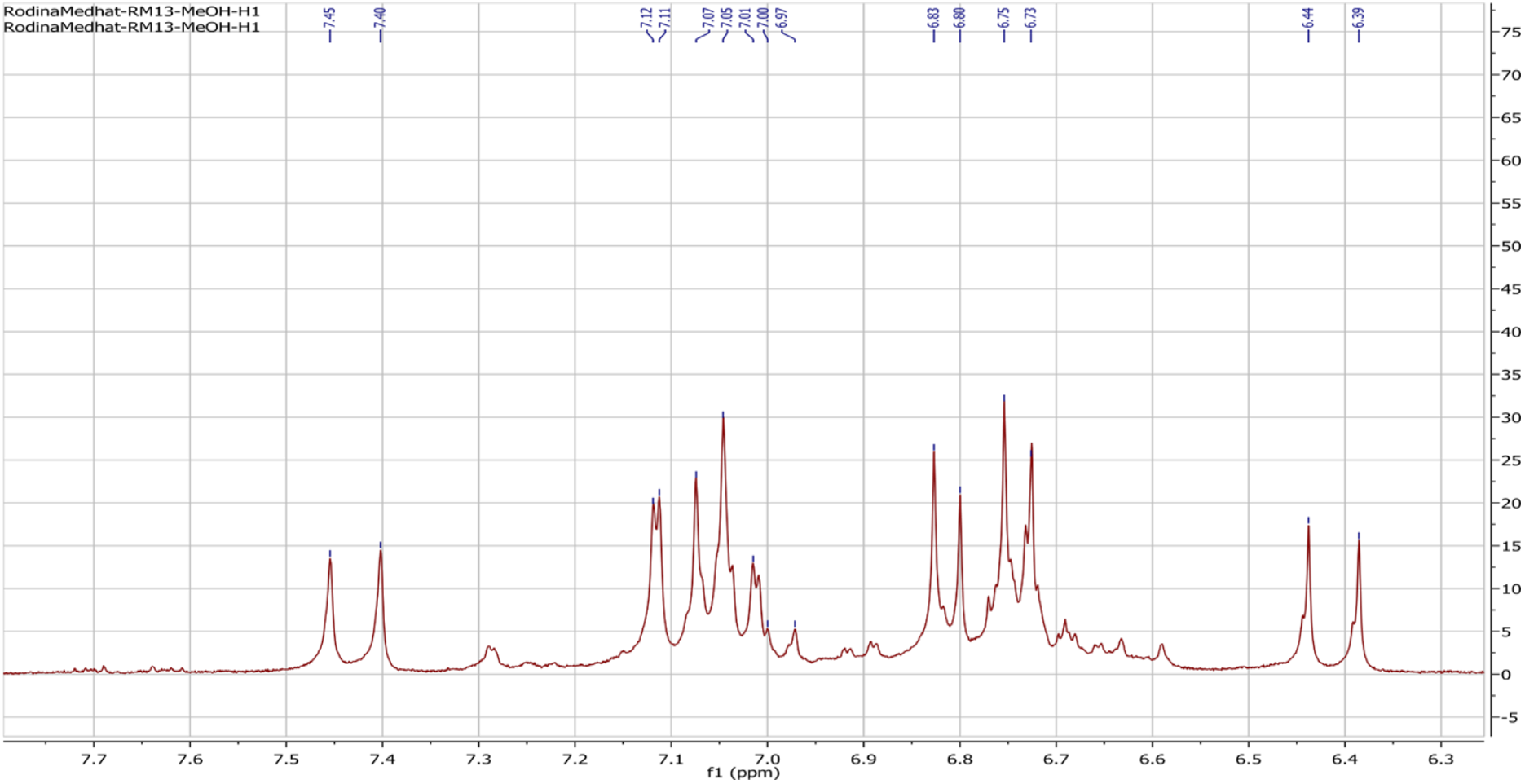

Figure. S 19 Partial expansion of [1] H-NMR spectrum of compound 2 (600 MHz, CD_3OD)

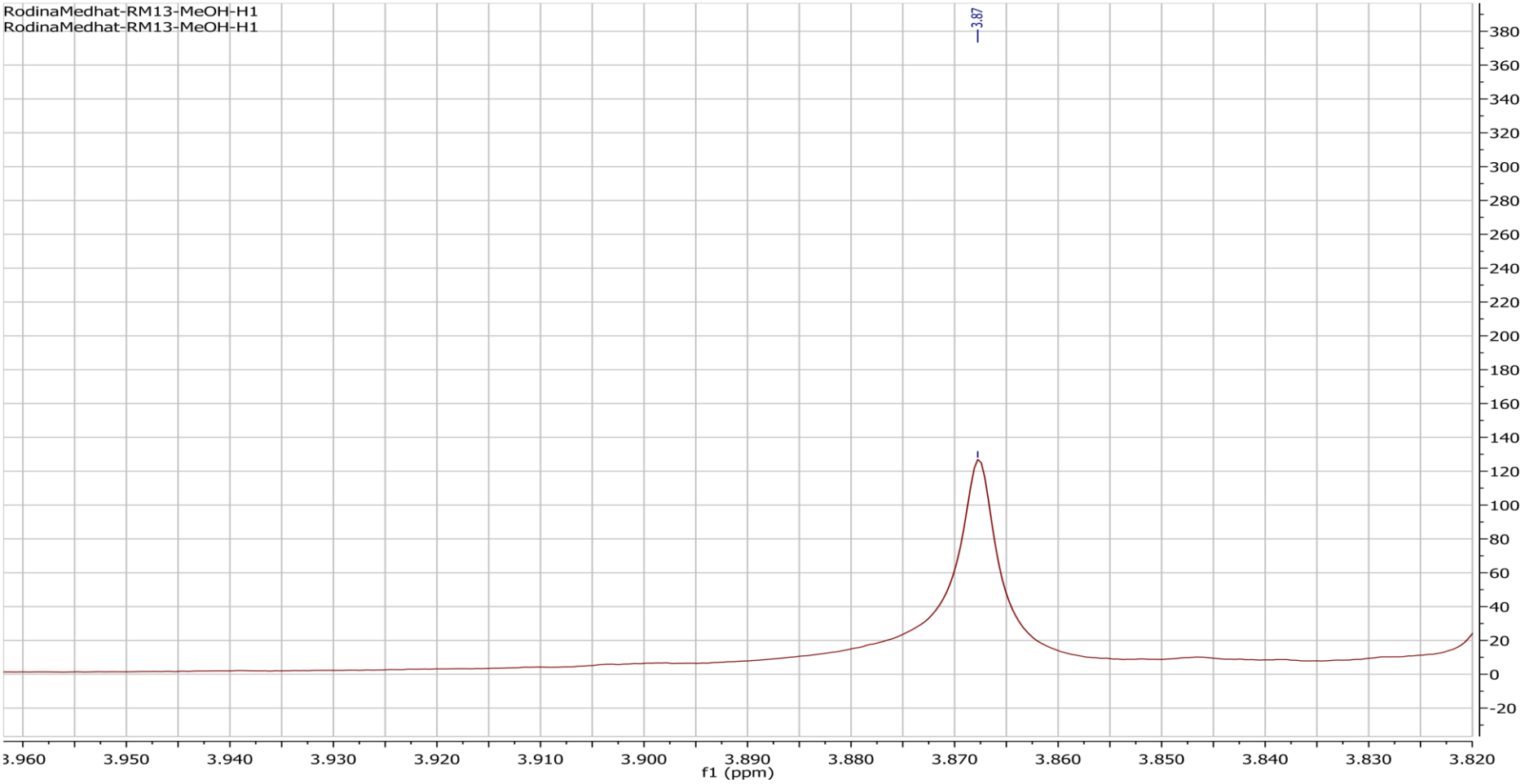

Figure. S 20 Partial expansion of ^{1} H-NMR spectrum of compound 2 (600 MHz, CD_3OD)

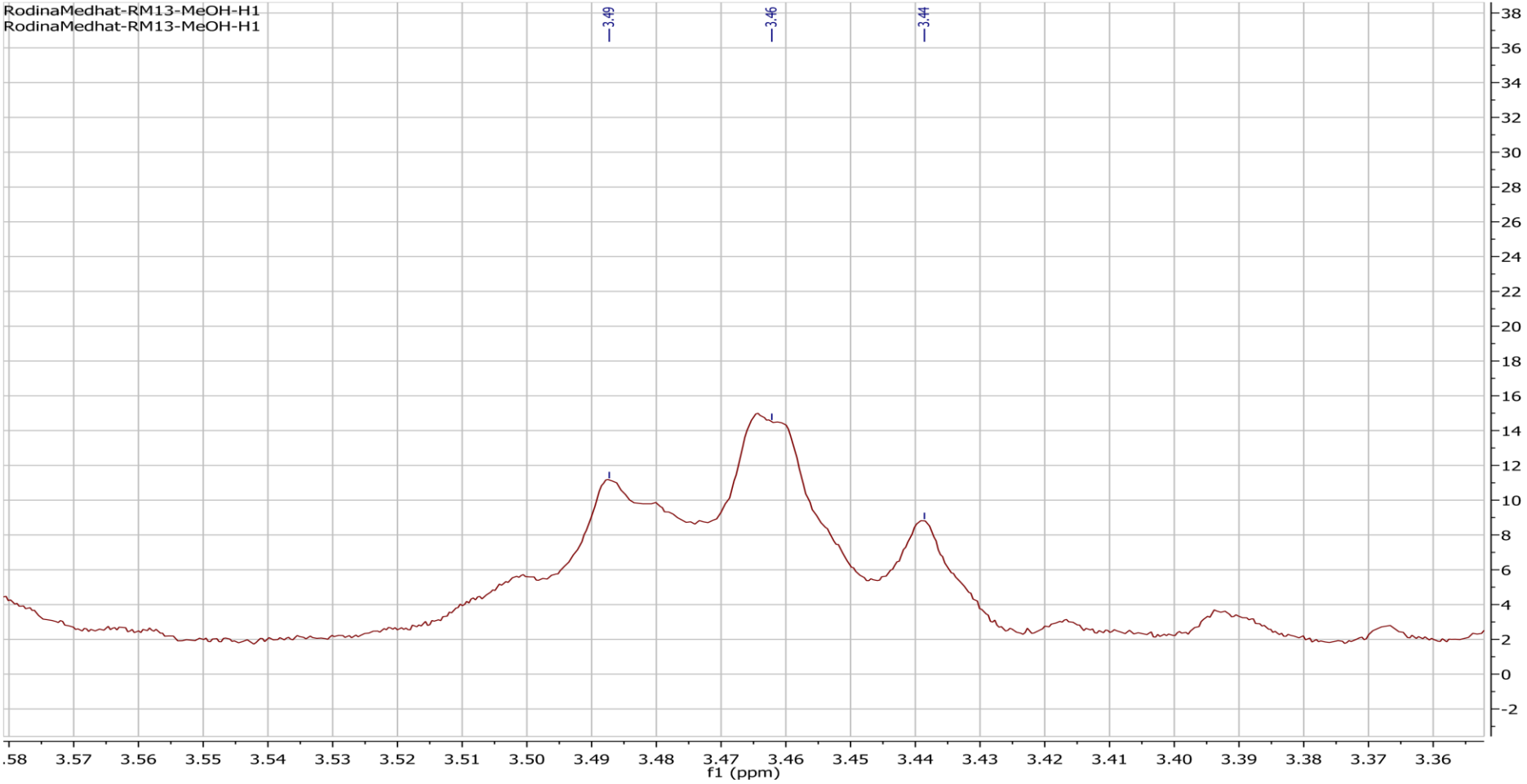

Figure. S 21 Partial expansion of ^{1} H-NMR spectrum of compound 2 (600 MHz, CD_3OD)

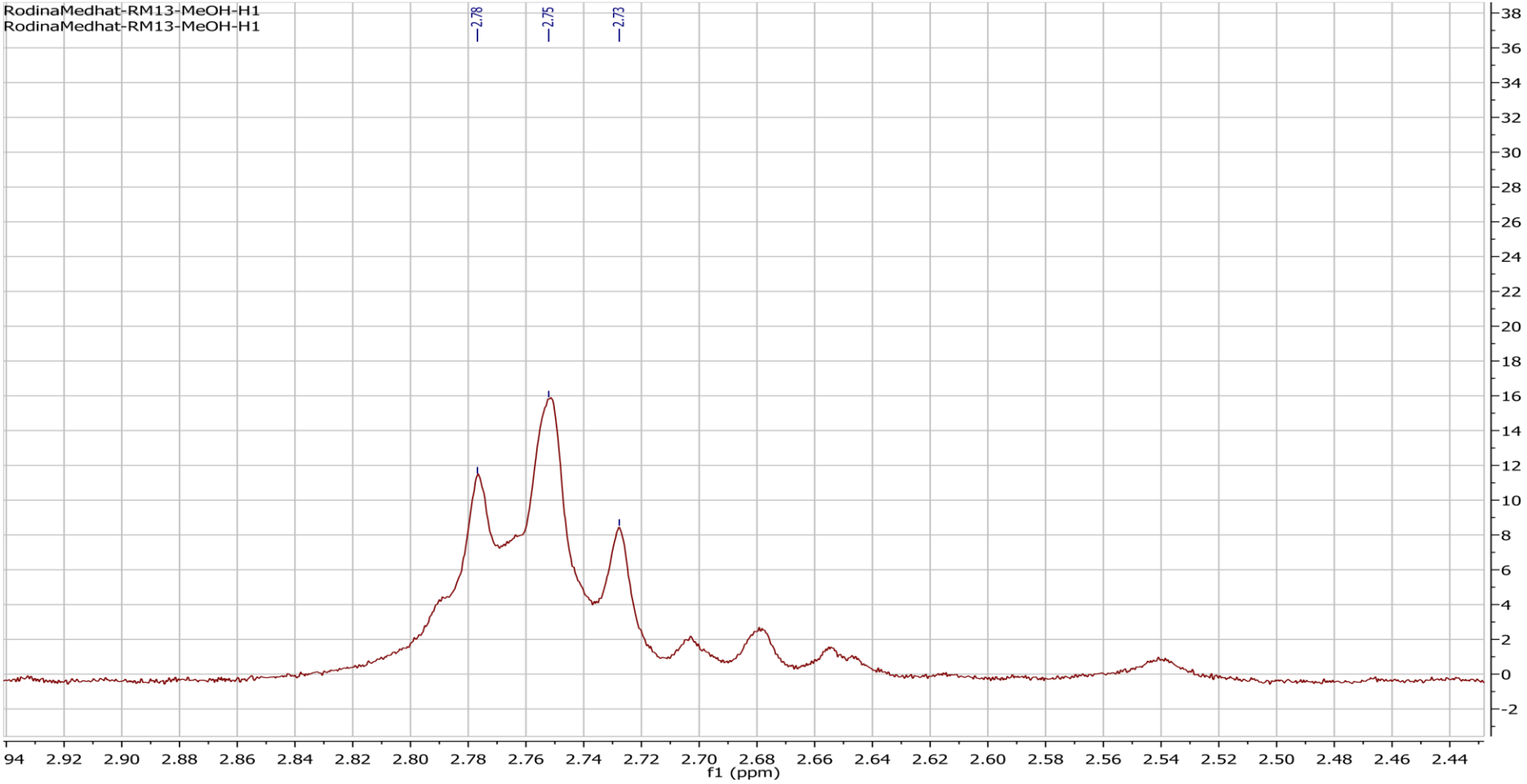

Figure. S 22 Partial expansion of [1] H-NMR spectrum of compound 2 (600 MHz, CD_3OD)

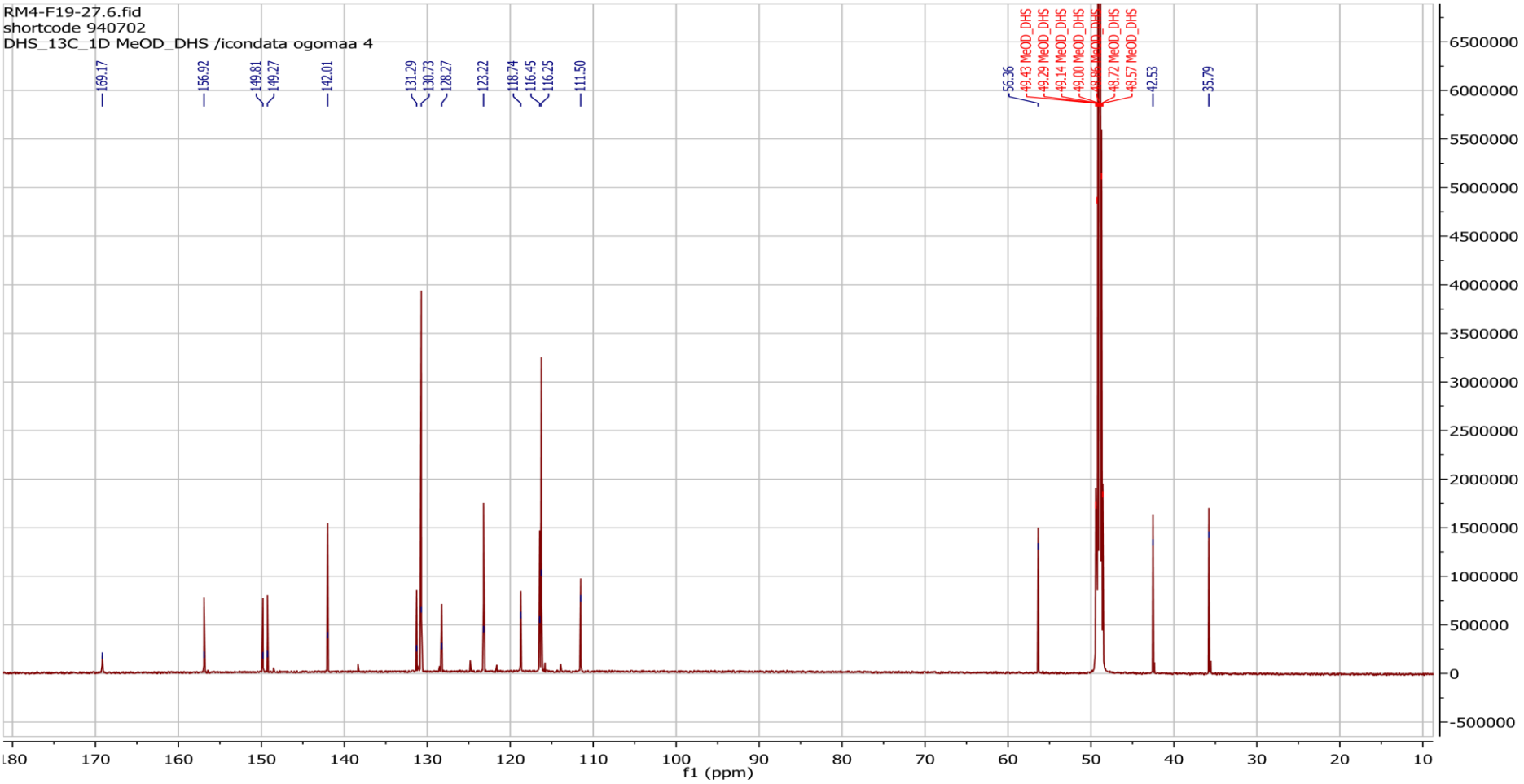

Figure. S 23 [13] C-NMR spectrum of compound 2 (600 MHz, CD_3OD)

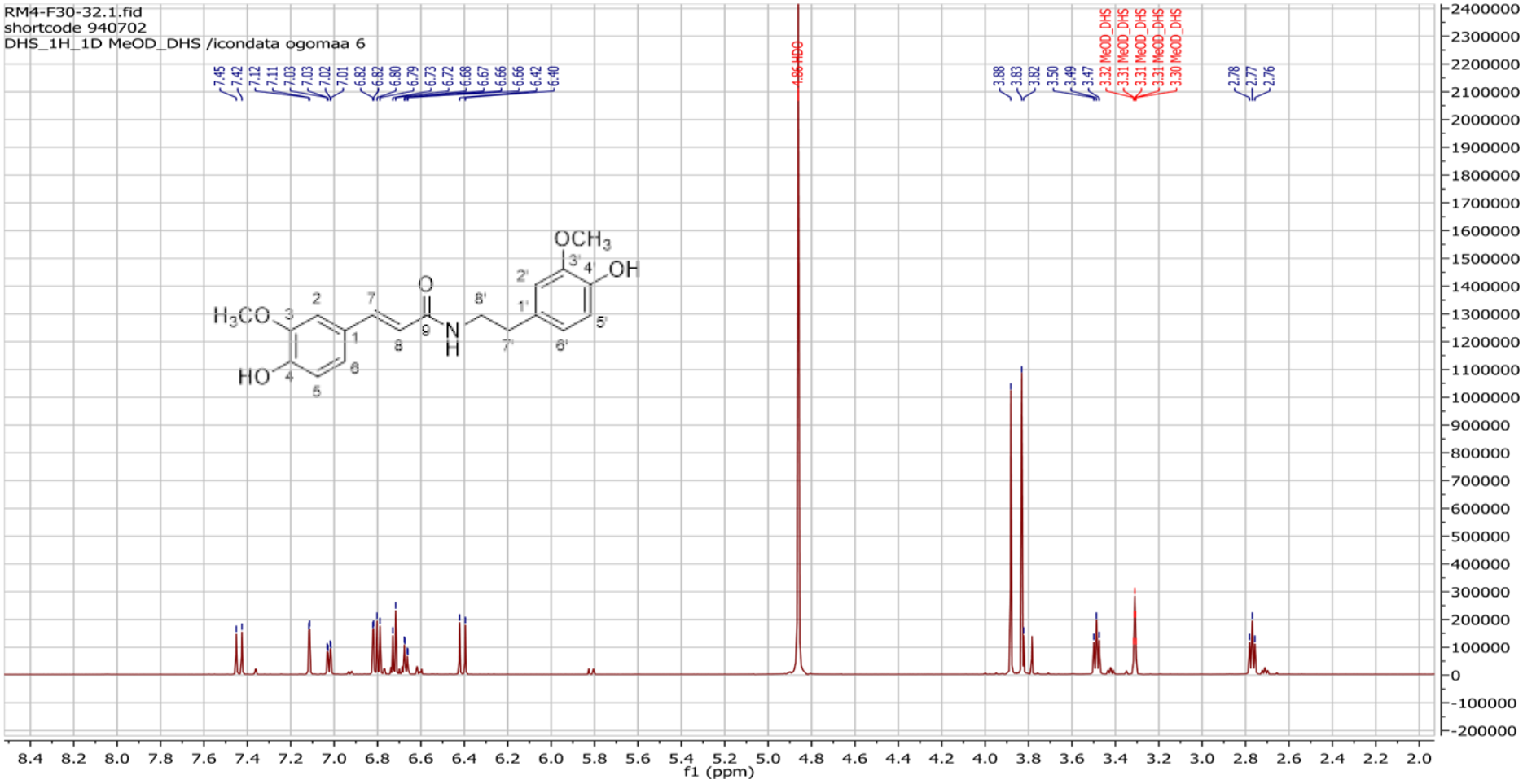

Figure. S 24 [1] H-NMR spectrum of compound 3 (600 MHz, CD_3OD)

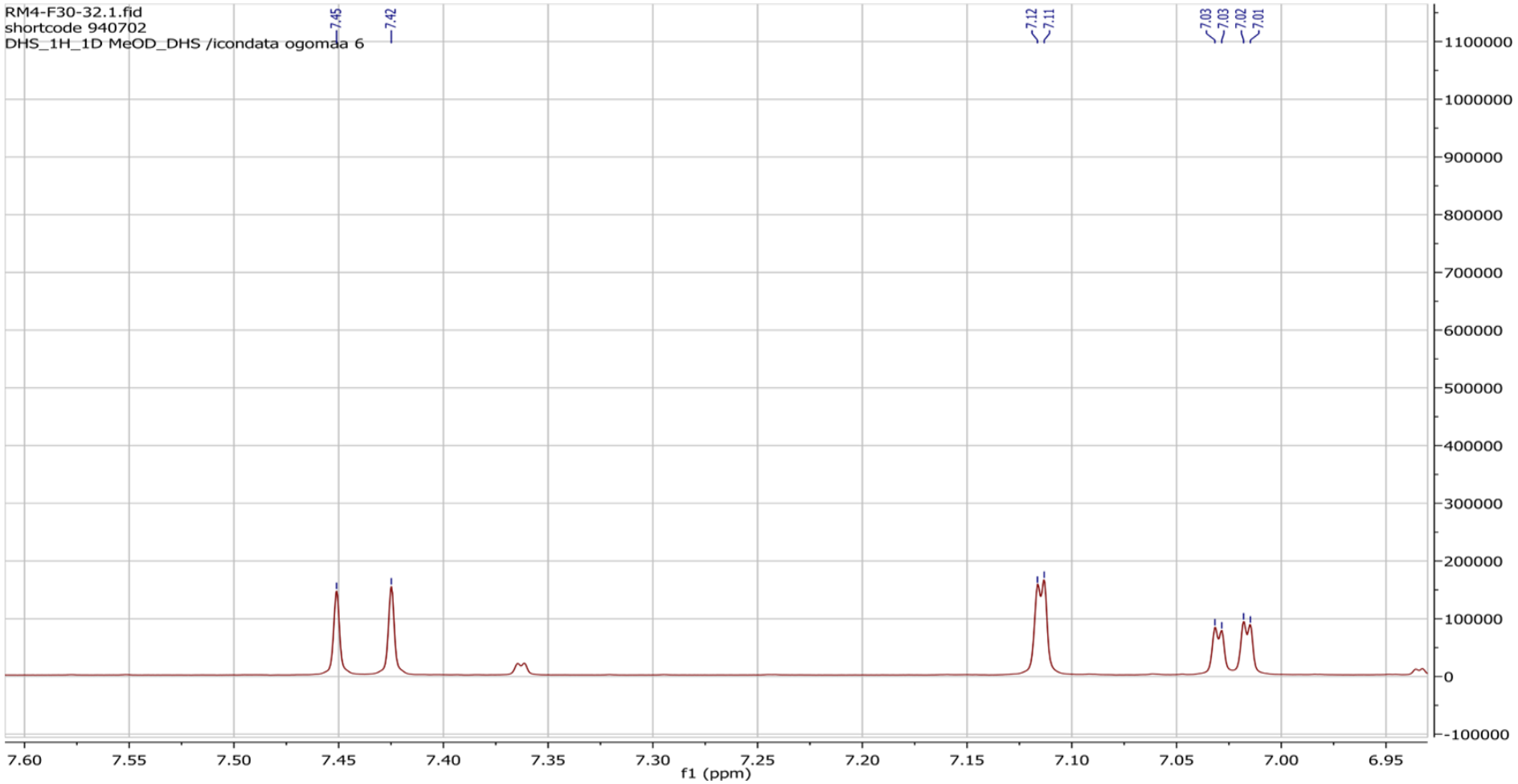

Figure. S 25 Partial expansion of [1] H-NMR spectrum of compound 3 (600 MHz, CD_3OD)

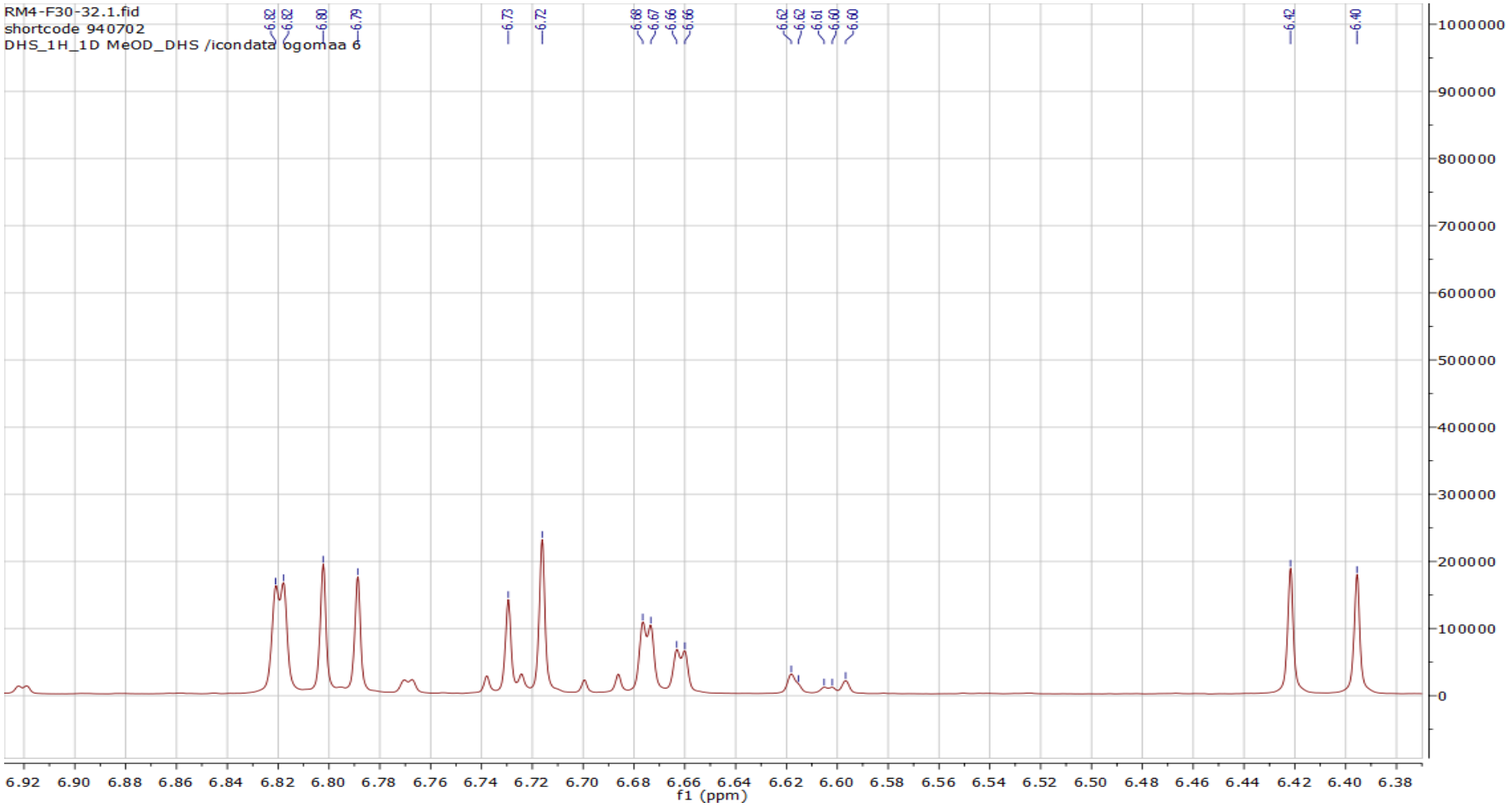

Figure. S 26 Partial expansion of ^{1} H-NMR spectrum of compound 3 (600 MHz, CD_3OD)

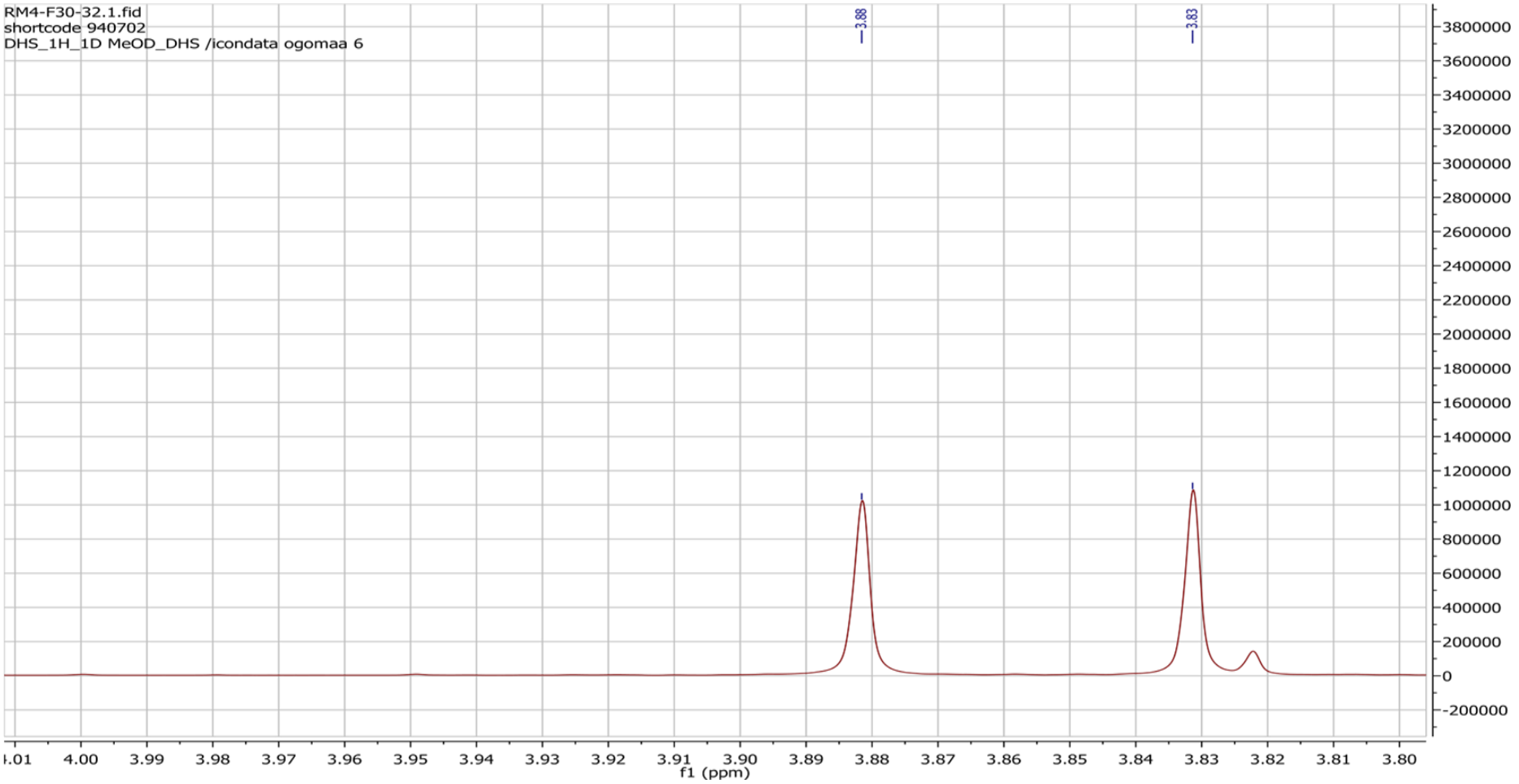

Figure. S 27 Partial expansion of [1] H-NMR spectrum of compound 3 (600 MHz, CD_3OD)

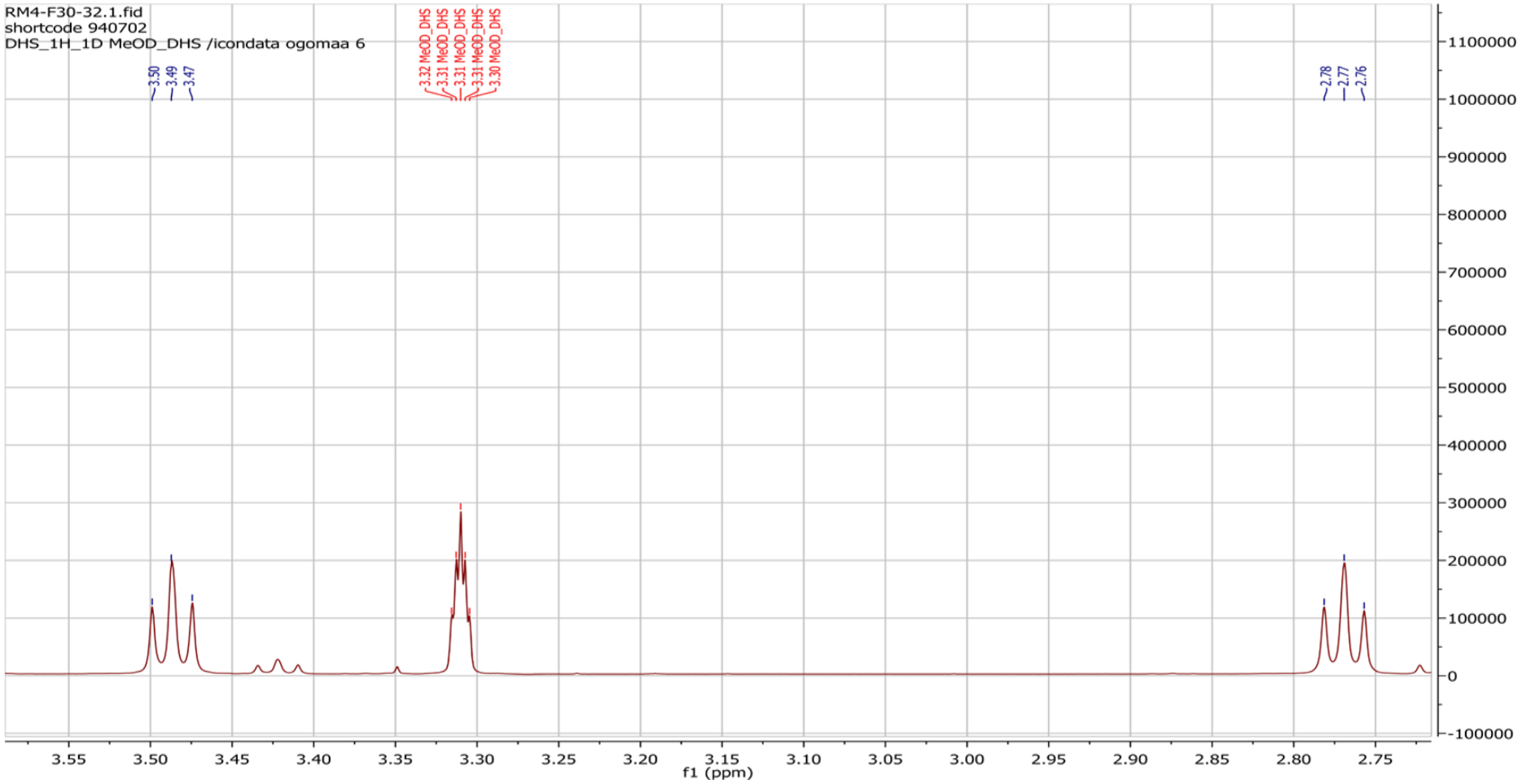

Figure. S 28 Partial expansion of ^{1} H-NMR spectrum of compound 3 (600 MHz, CD_3OD)

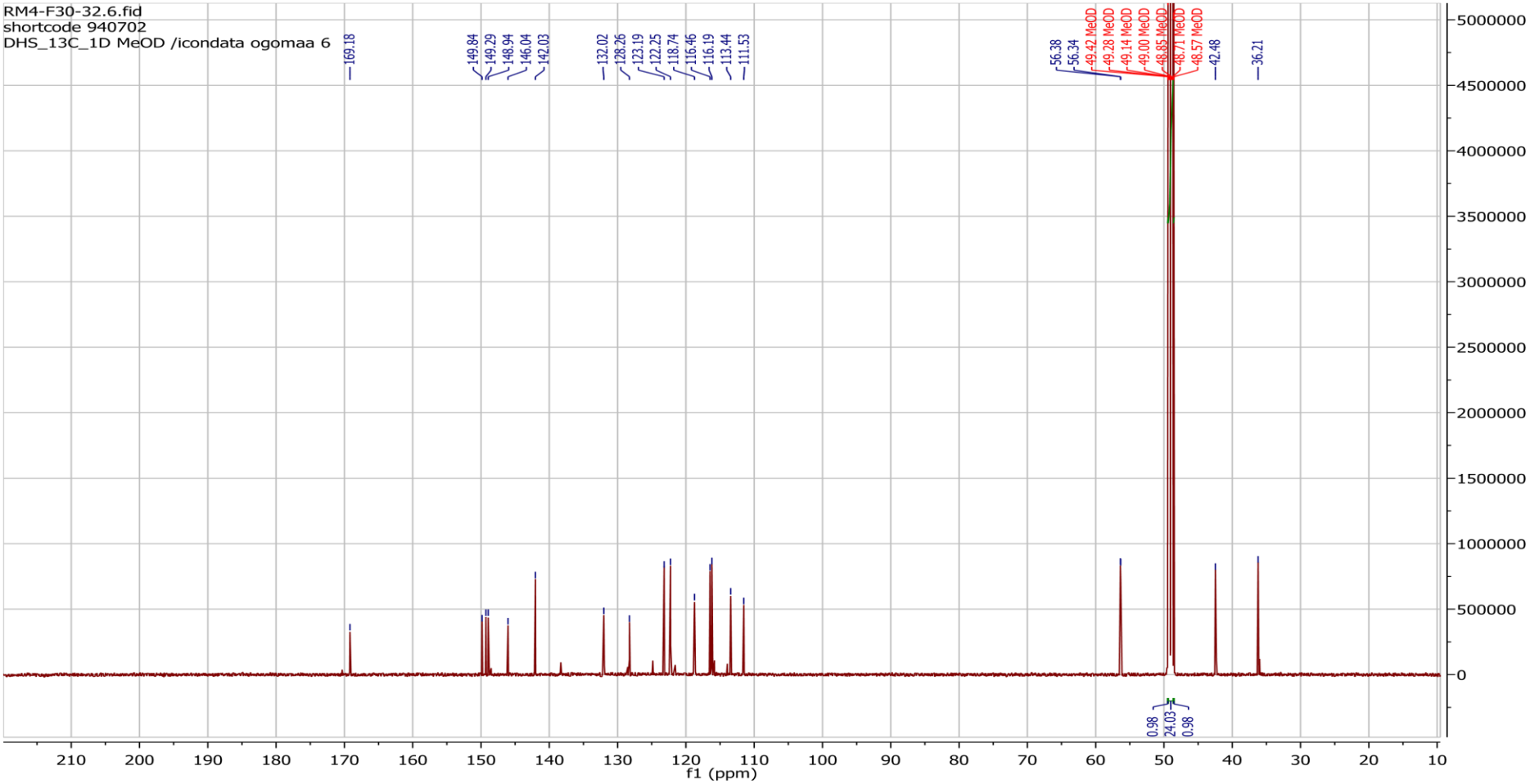

Figure. S 29 ^{13}C-NMR spectrum of compound 3 (150 MHz, CD_3OD)

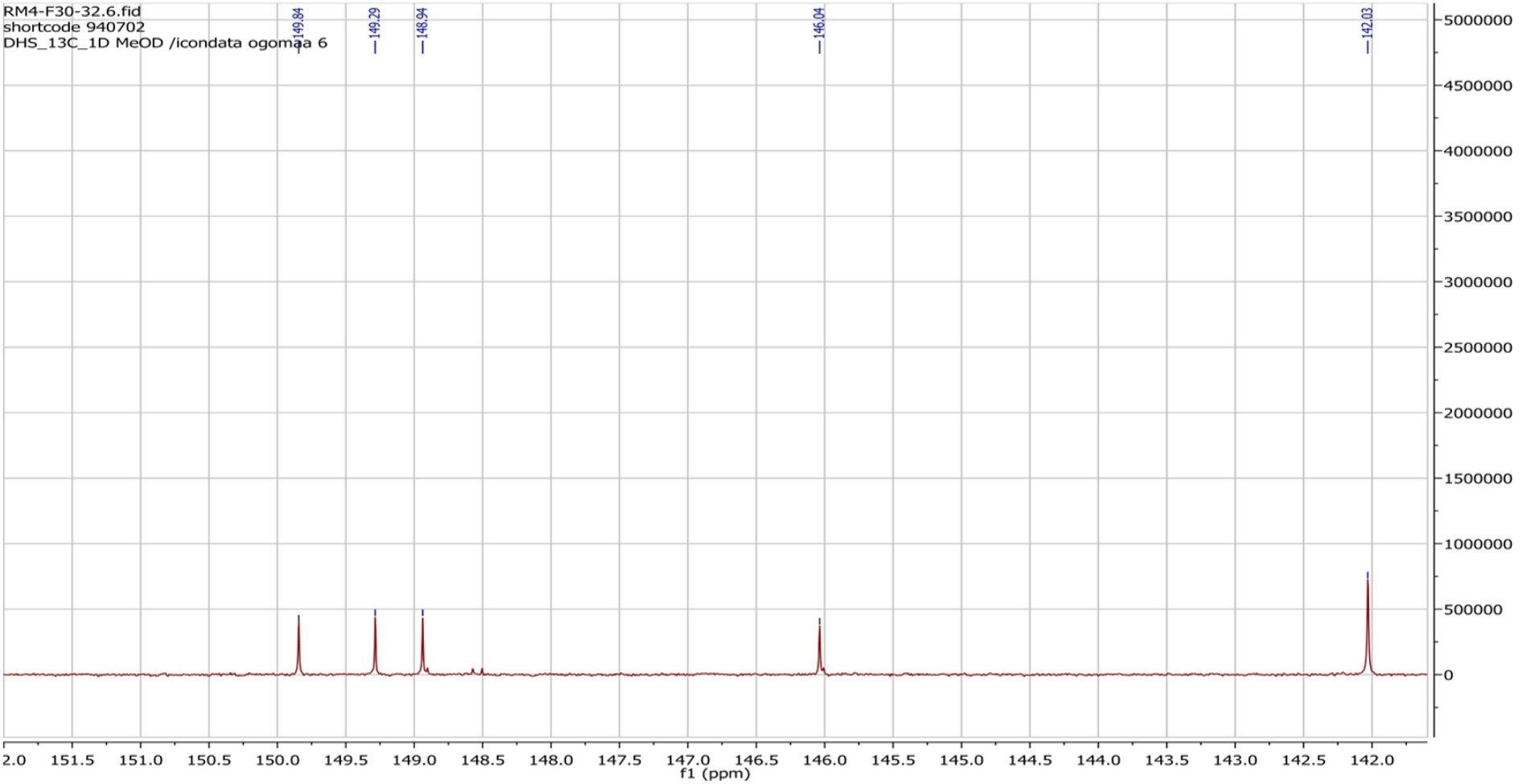

Figure. S 30 Partial expansion of ^{13}C-NMR spectrum of compound 3 (150 MHz, CD_3OD)

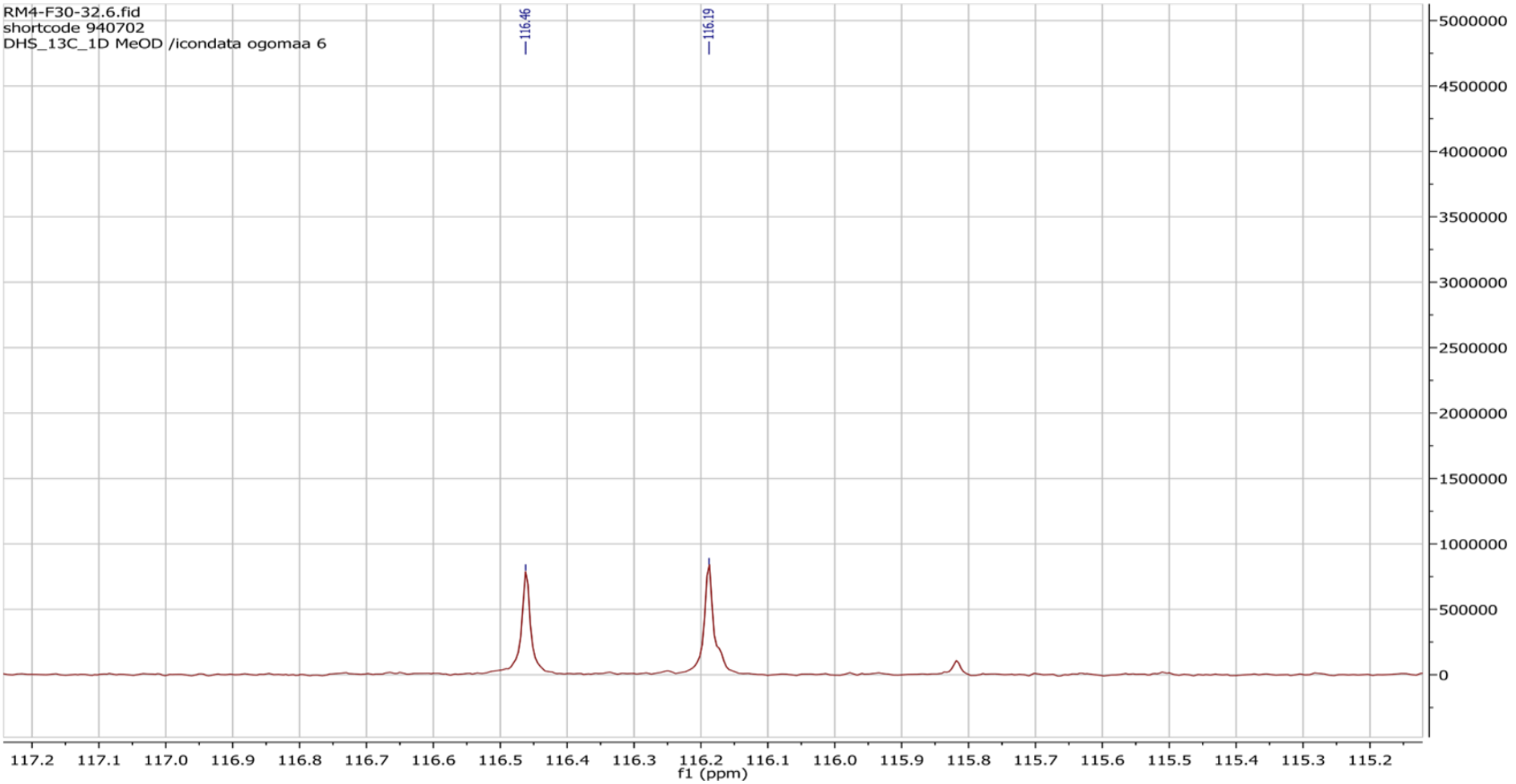

Figure. S 31 Partial expansion of ^{13}C-NMR spectrum of compound 3 (150 MHz, CD_3OD)

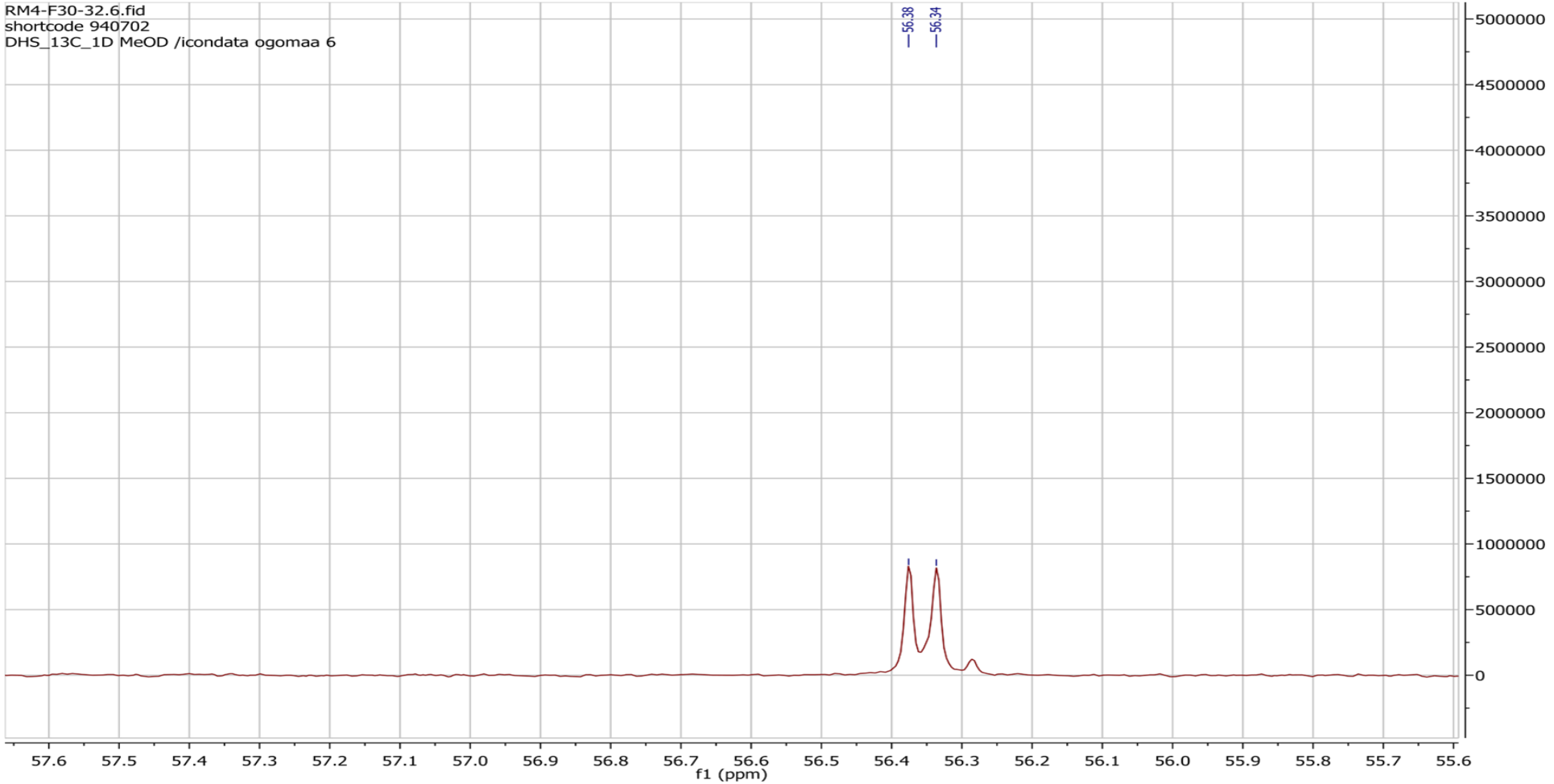

Figure. S 32 Partial expansion of ^{13}C-NMR spectrum of compound 3 (150 MHz, CD_3OD)

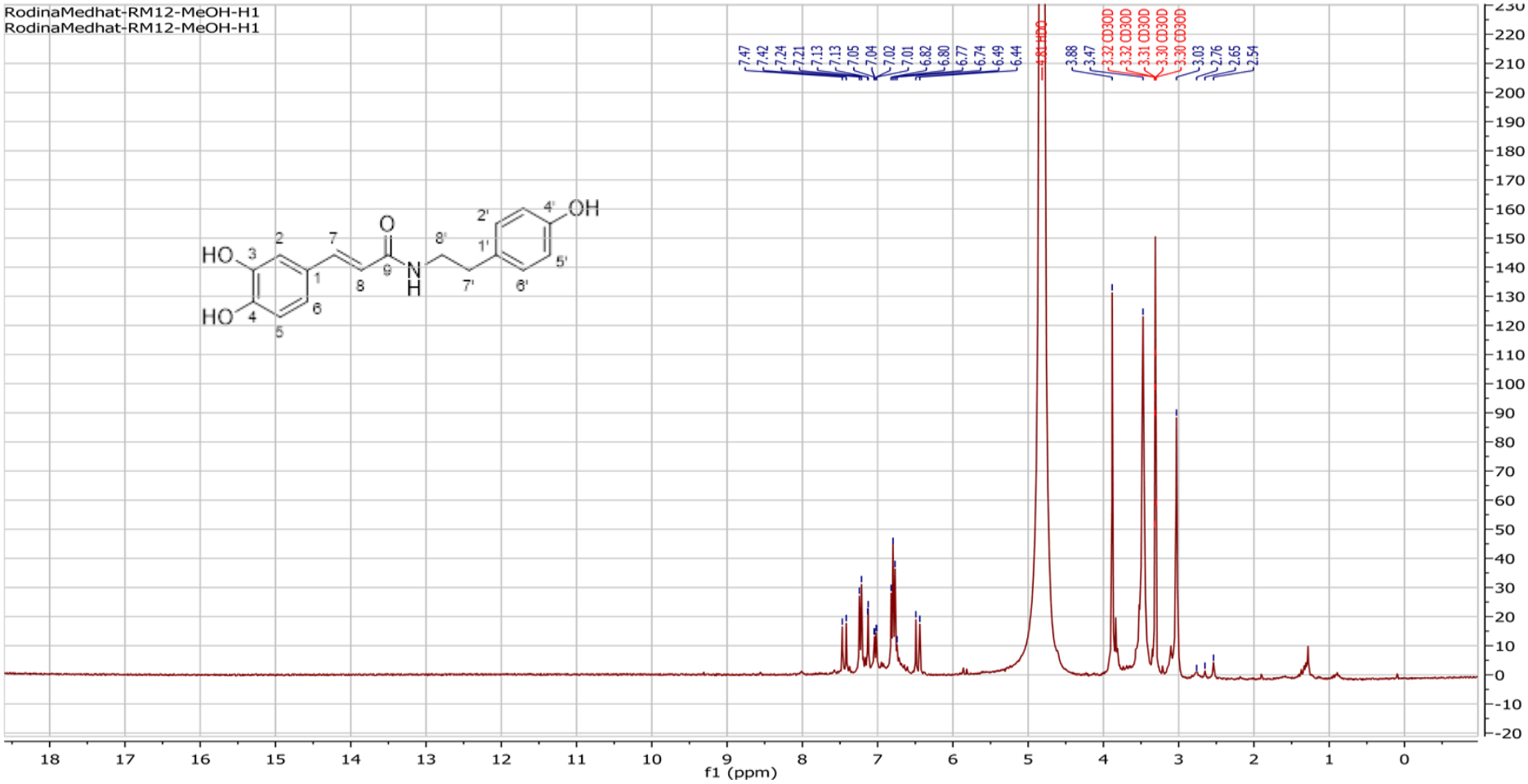

Figure. S 33 [1] H-NMR spectrum of compound 4 (300 MHz, CD_3OD)

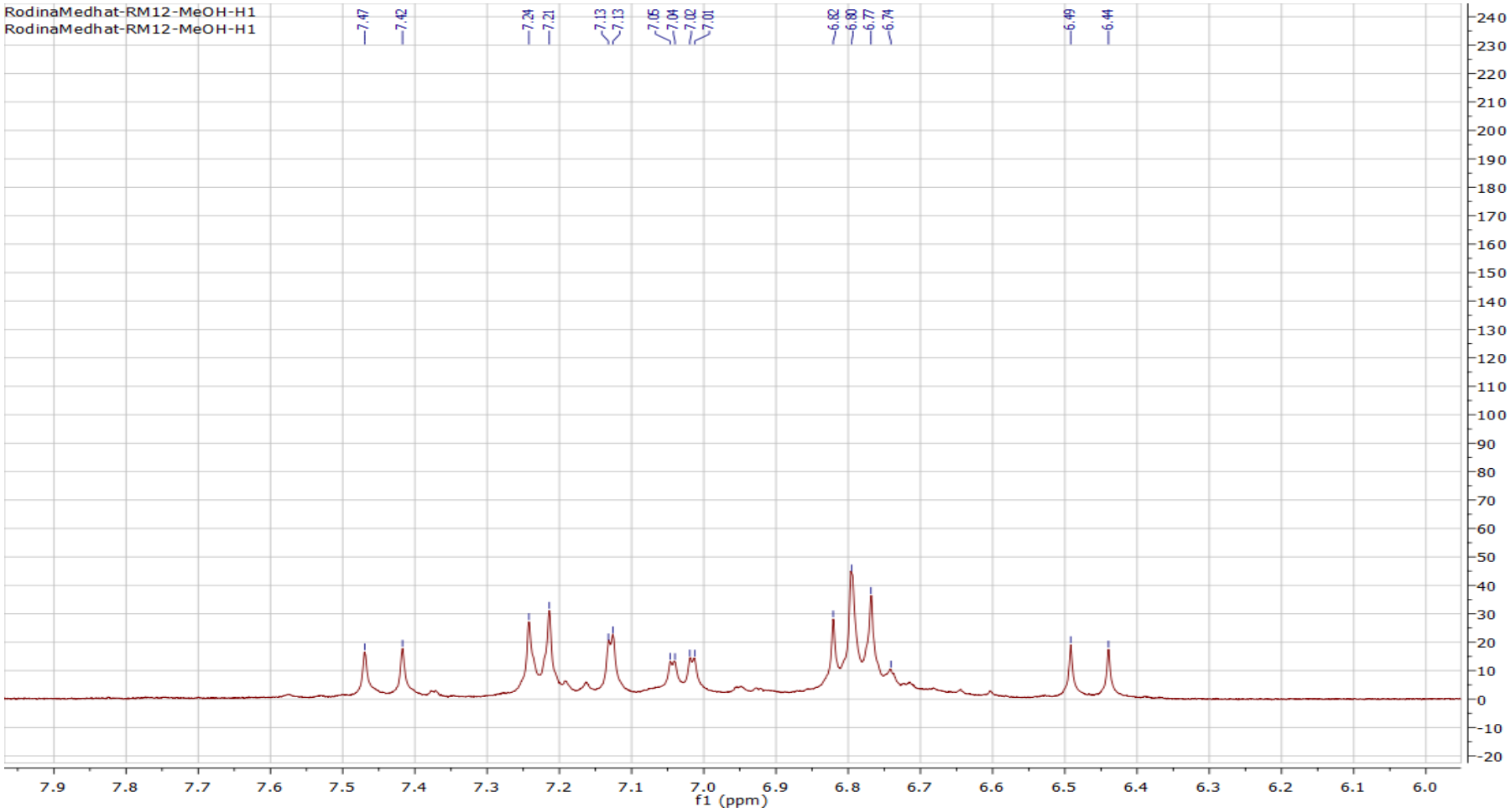

Figure. S 34 Partial expansion of [1] H-NMR spectrum of compound 4 (300 MHz, CD_3OD)

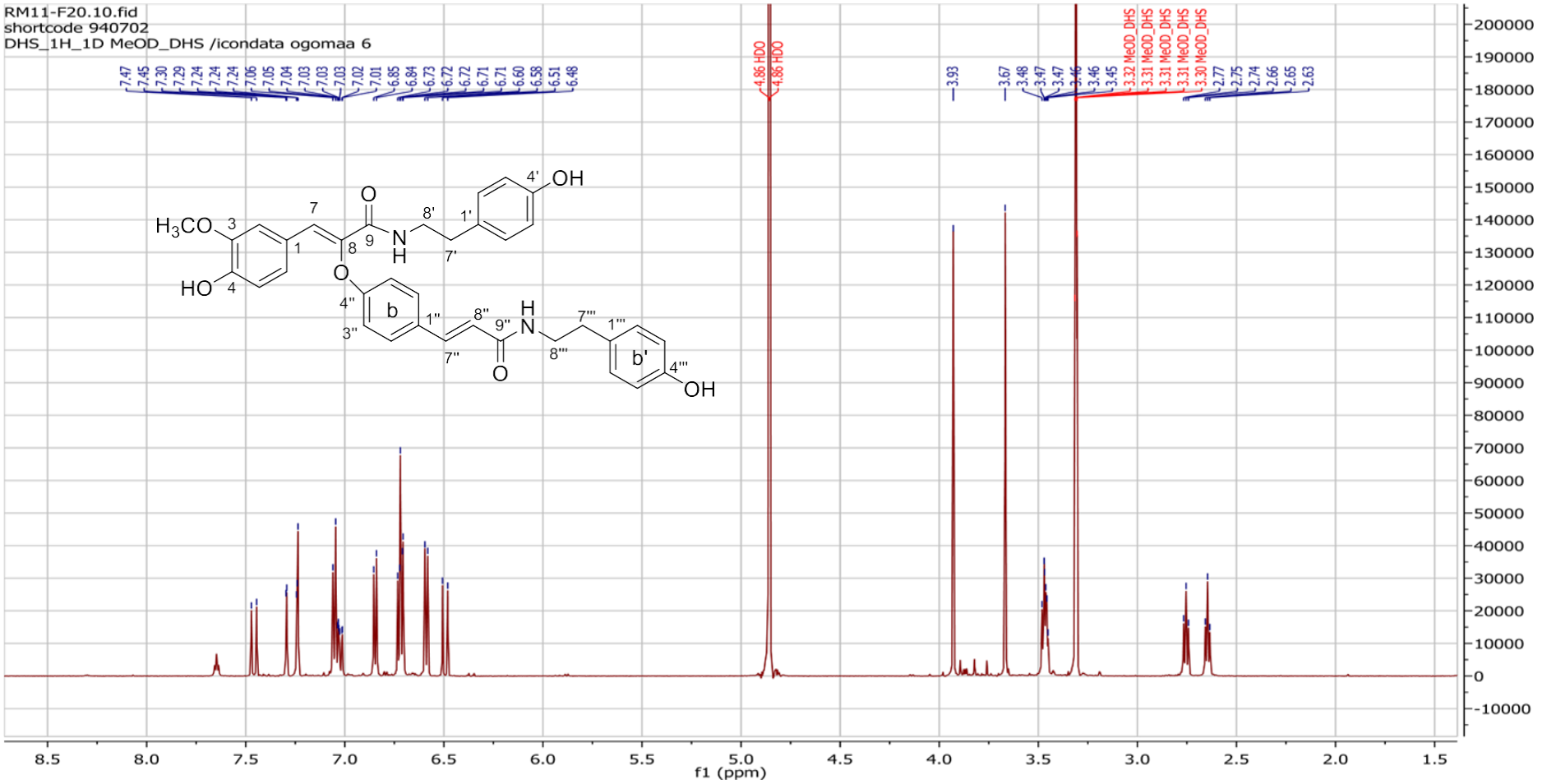

Figure. S 35 ^{1}H-NMR spectrum of compound 5 (600 MHz, CD_3OD)

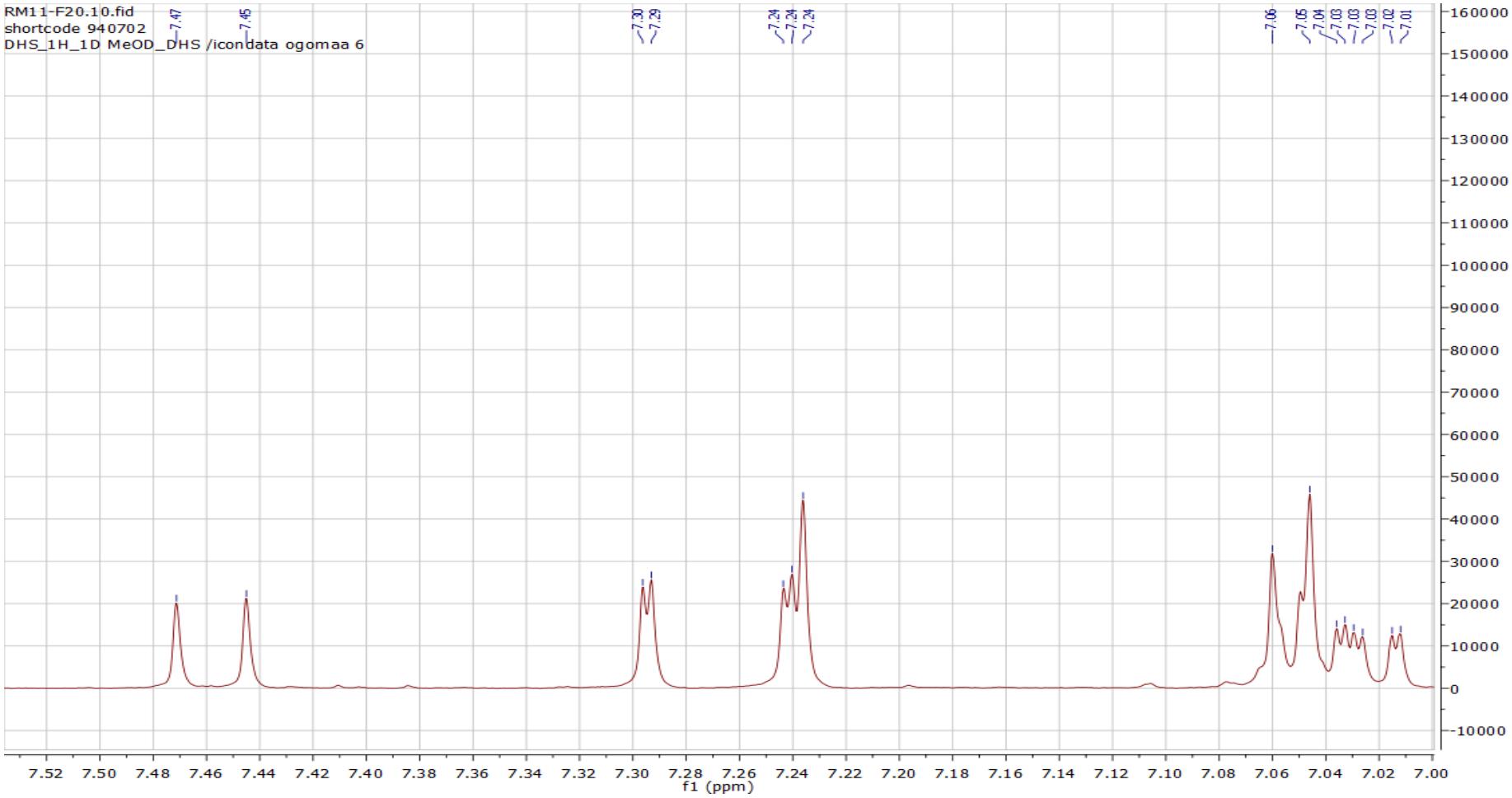

Figure. S 36 Partial expansion of ^{1} H-NMR spectrum of compound 5 (600 MHz, CD_3OD)

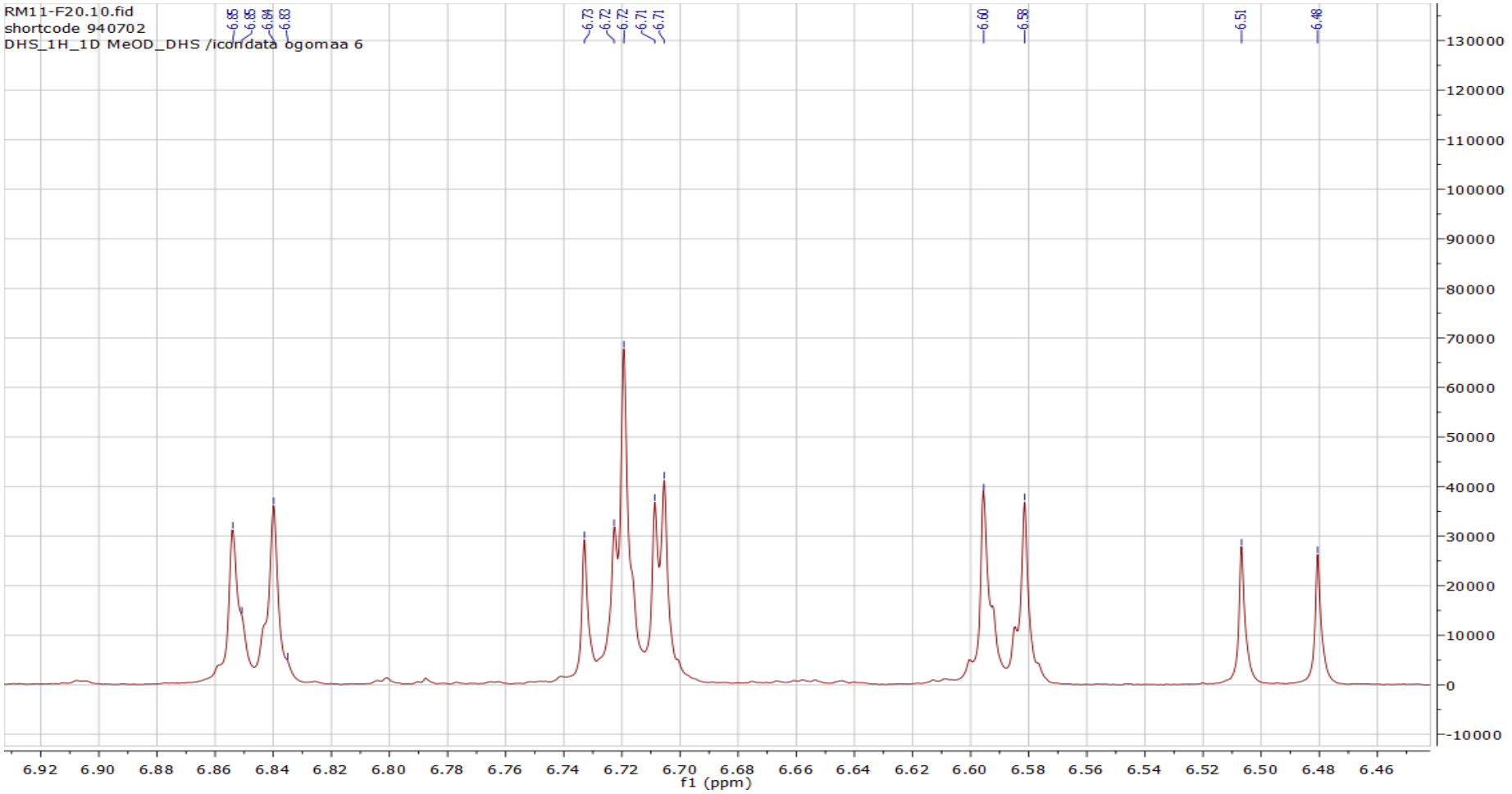

Figure. S 37 Partial expansion of ^{1} H-NMR spectrum of compound 5 (600 MHz, CD_3OD)

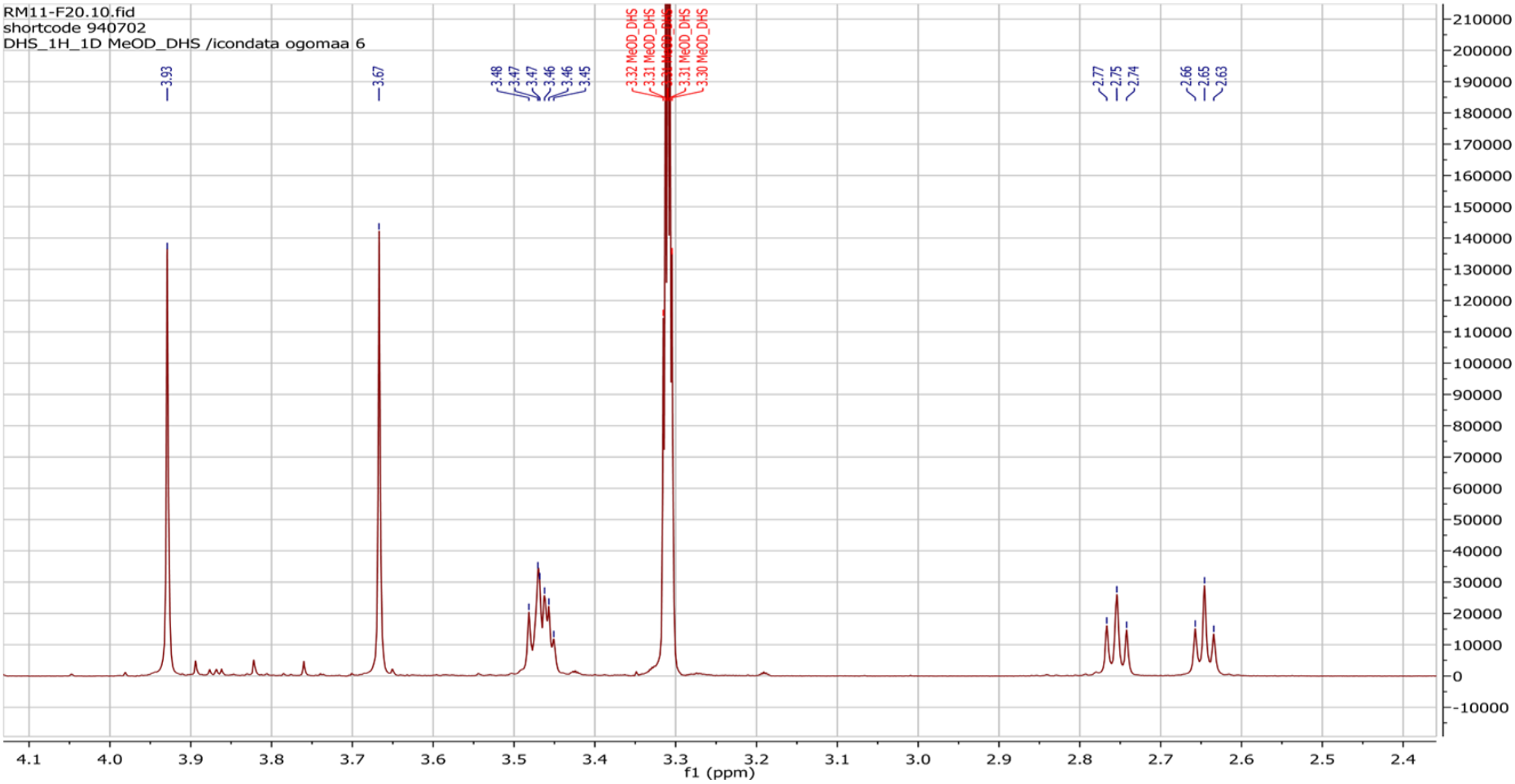

Figure. S 38 Partial expansion of [1] H-NMR spectrum of compound 5 (600 MHz, CD_3OD)

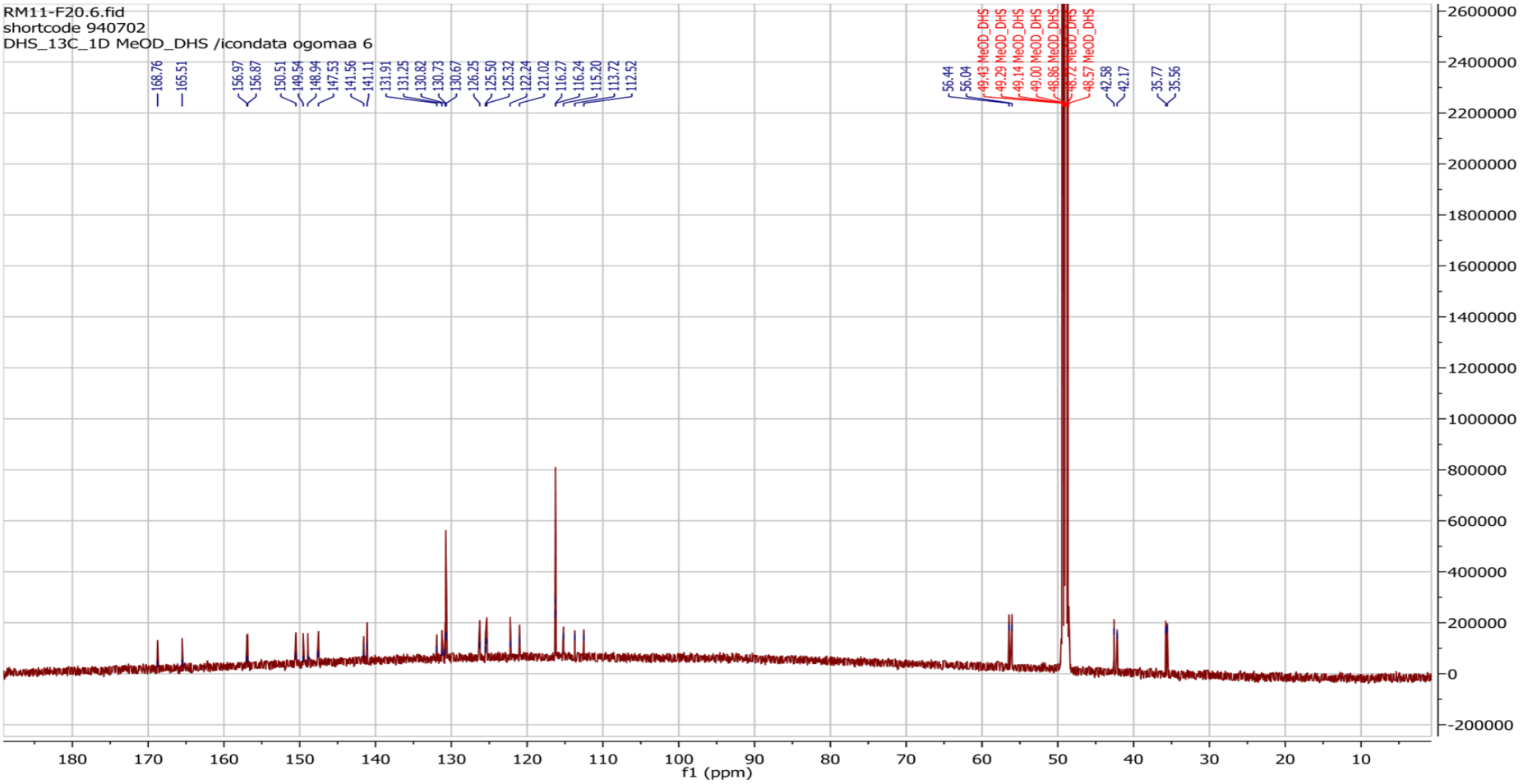

Figure. S 39 ^{13}C-NMR spectrum of compound 5 (150 MHz, CD_3OD)

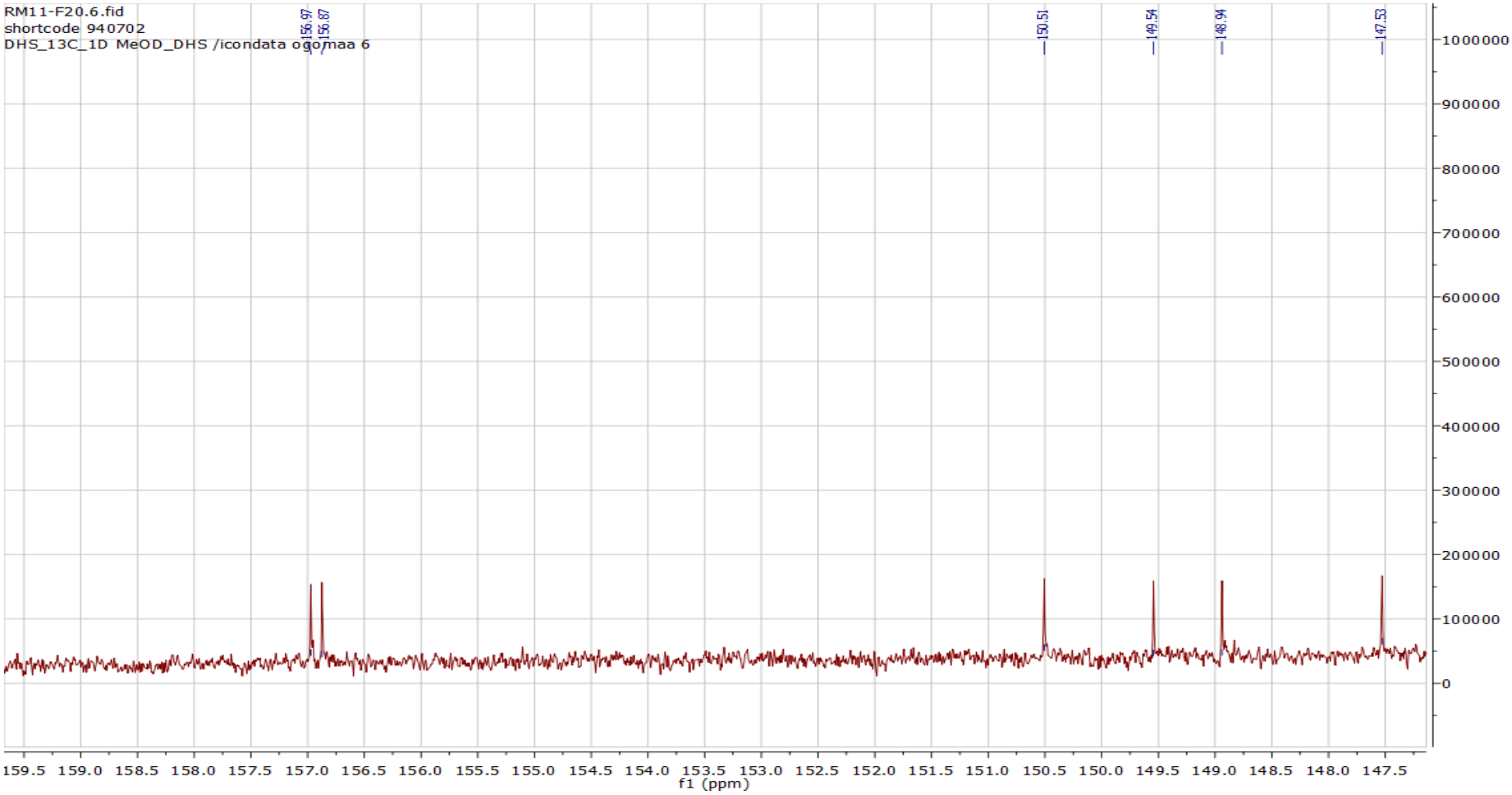

Figure. S 40 Partial expansion of ^{13}C-NMR spectrum of compound 5 (150 MHz, CD_3OD)

Figure. S 41 Partial expansion of ^{13}C-NMR spectrum of compound 5 (150 MHz, CD_3OD)

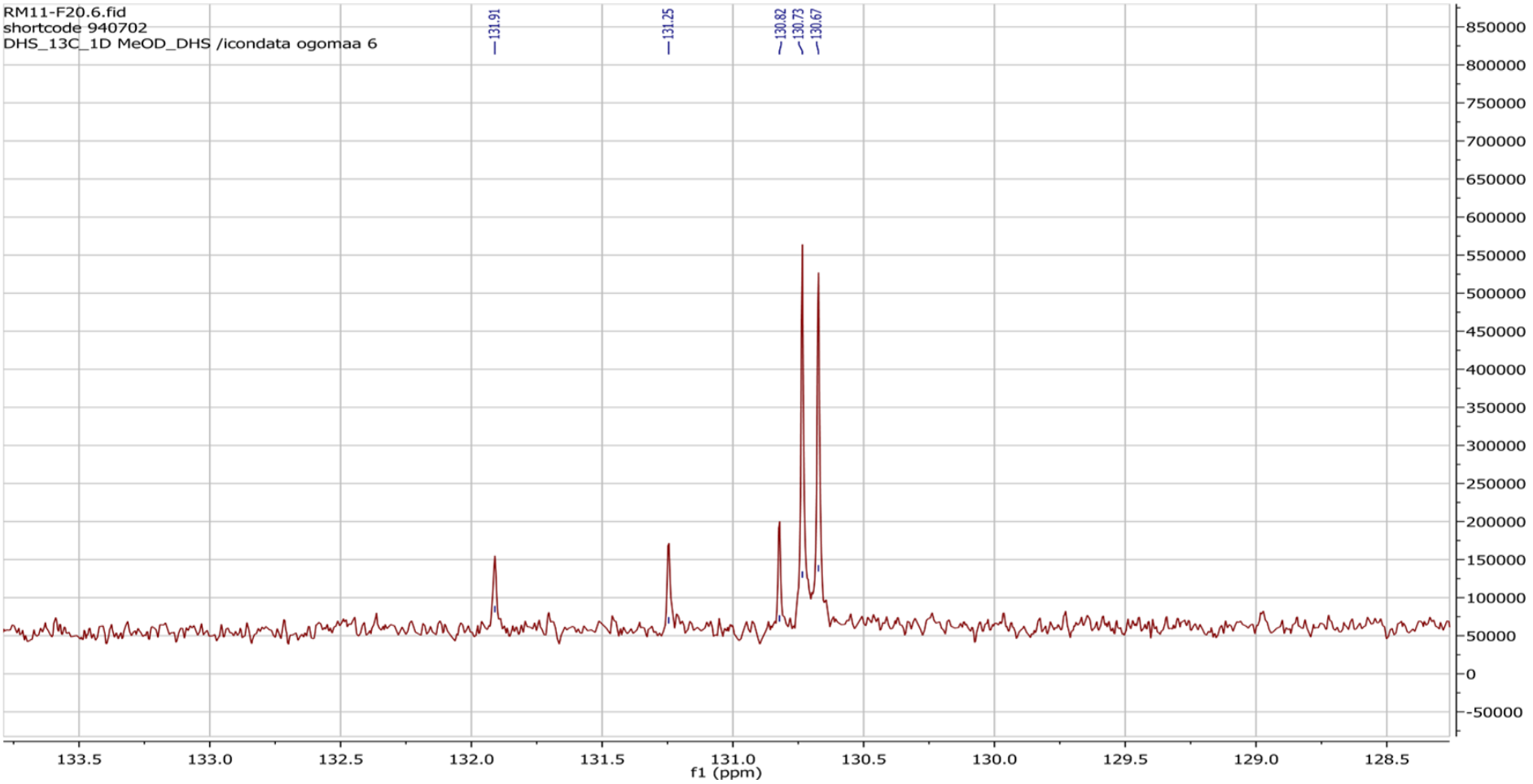

Figure. S 42 Partial expansion of ^{13}C-NMR spectrum of compound 5 (150 MHz, CD_3OD)

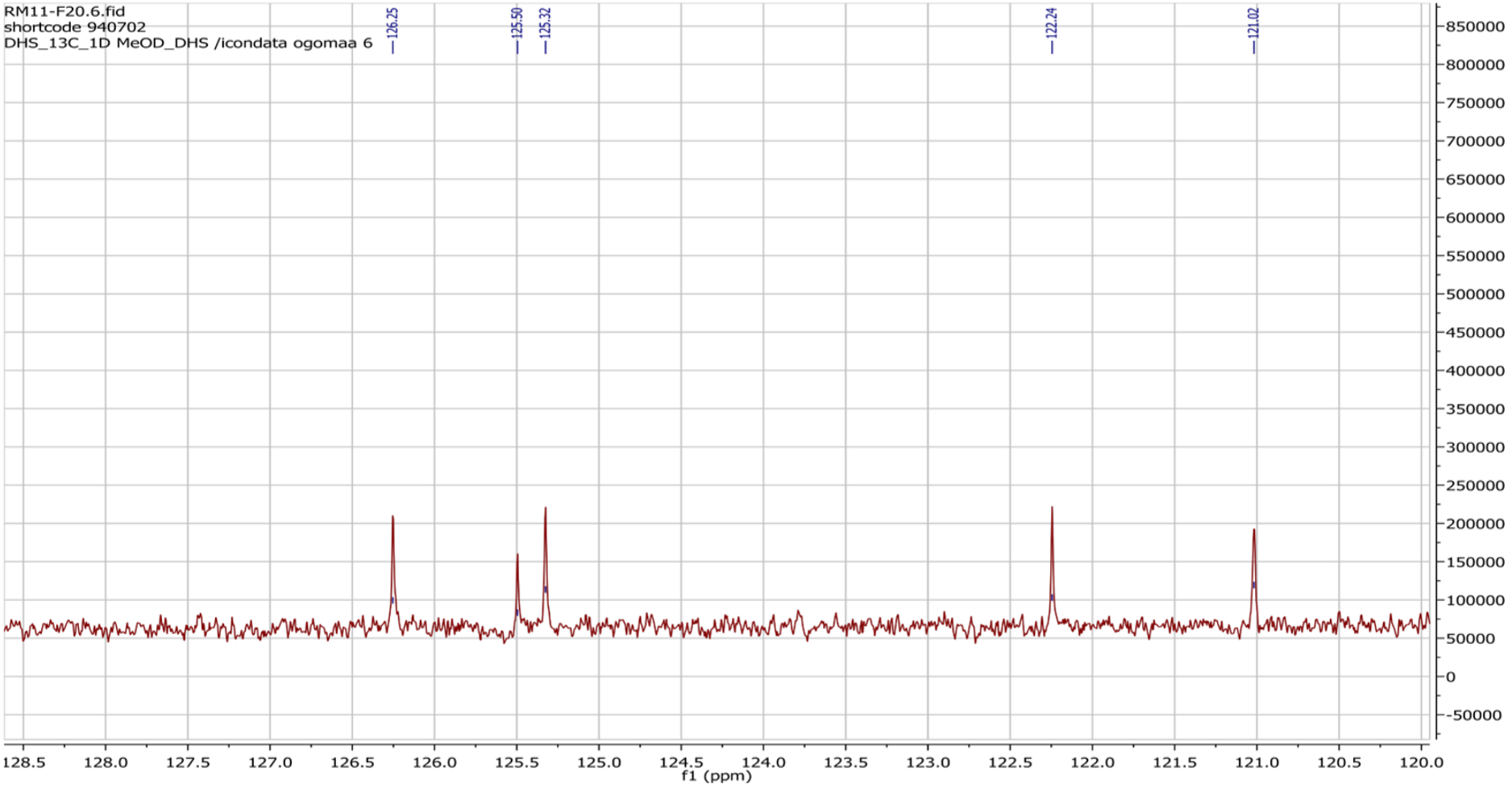

Figure. S 43 Partial expansion of ^{13}C-NMR spectrum of compound 5 (150 MHz, CD3OD)

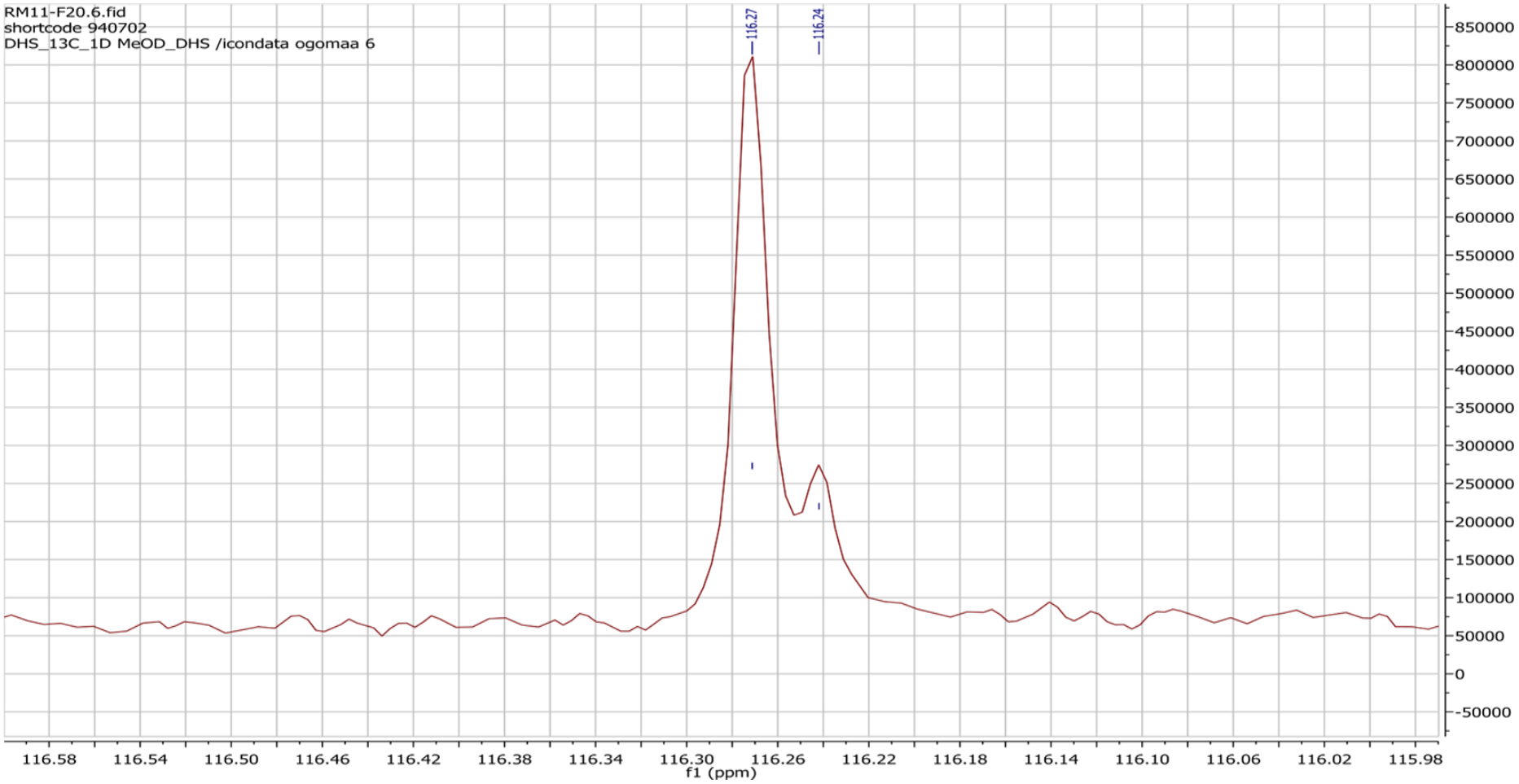

Figure. S 44 Partial expansion of ^{13}C-NMR spectrum of compound 5 (150 MHz, CD_3OD)

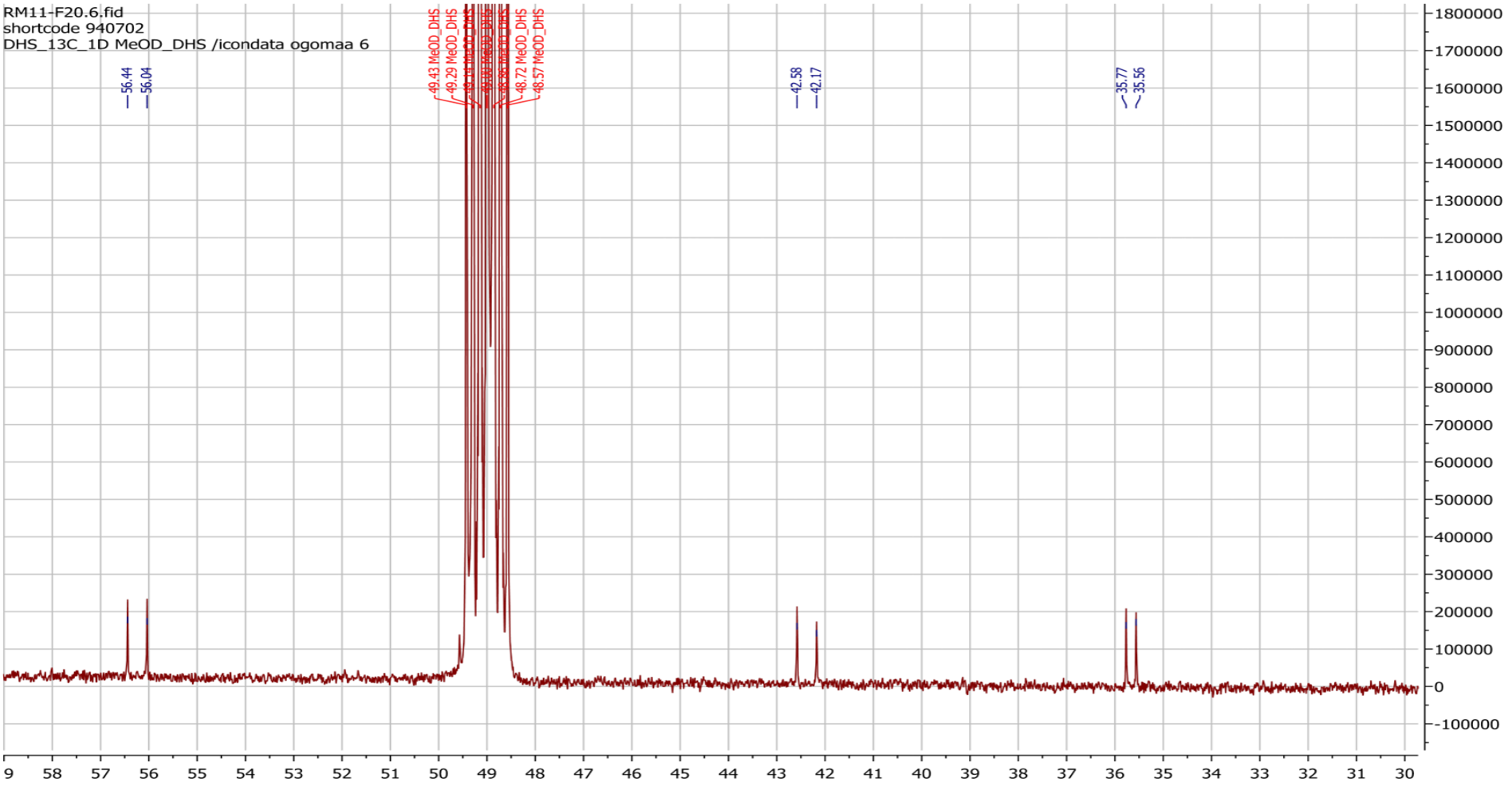

Figure. S 45 Partial expansion of ^{13}C-NMR spectrum of compound 5 (150 MHz, CD_3OD)

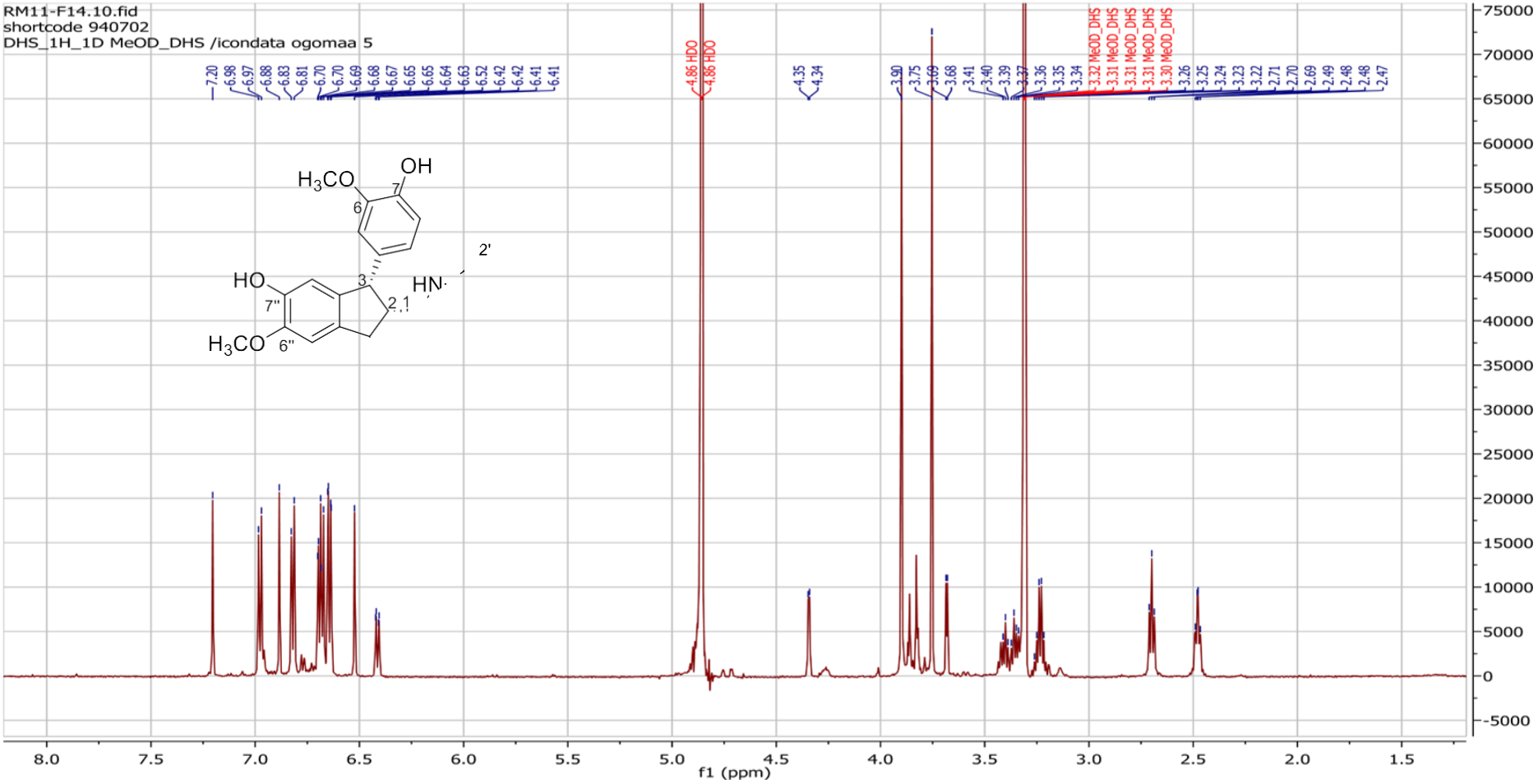

Figure. S 46 [1] H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

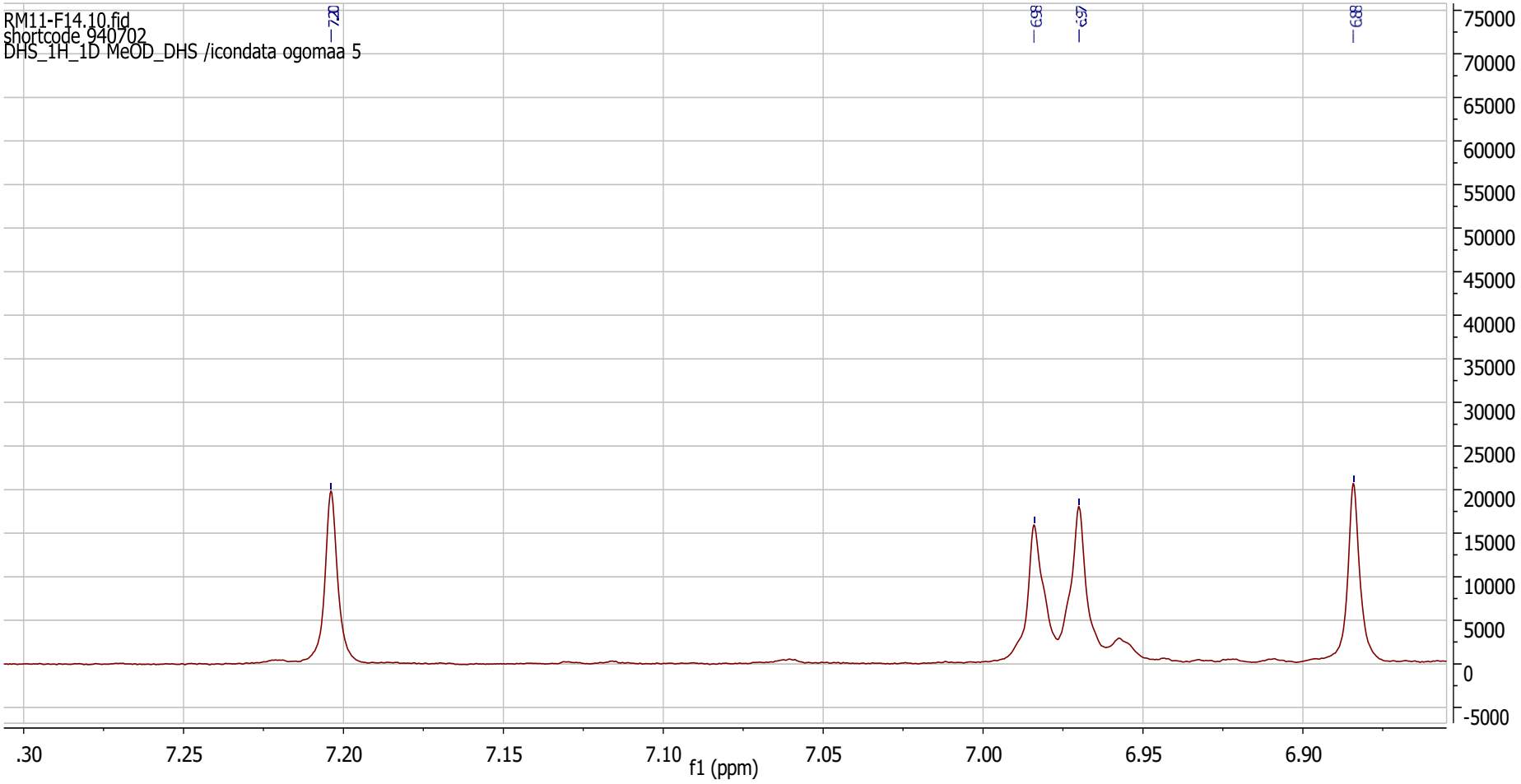

Figure. S 47 Partial expansion of ^{1} H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

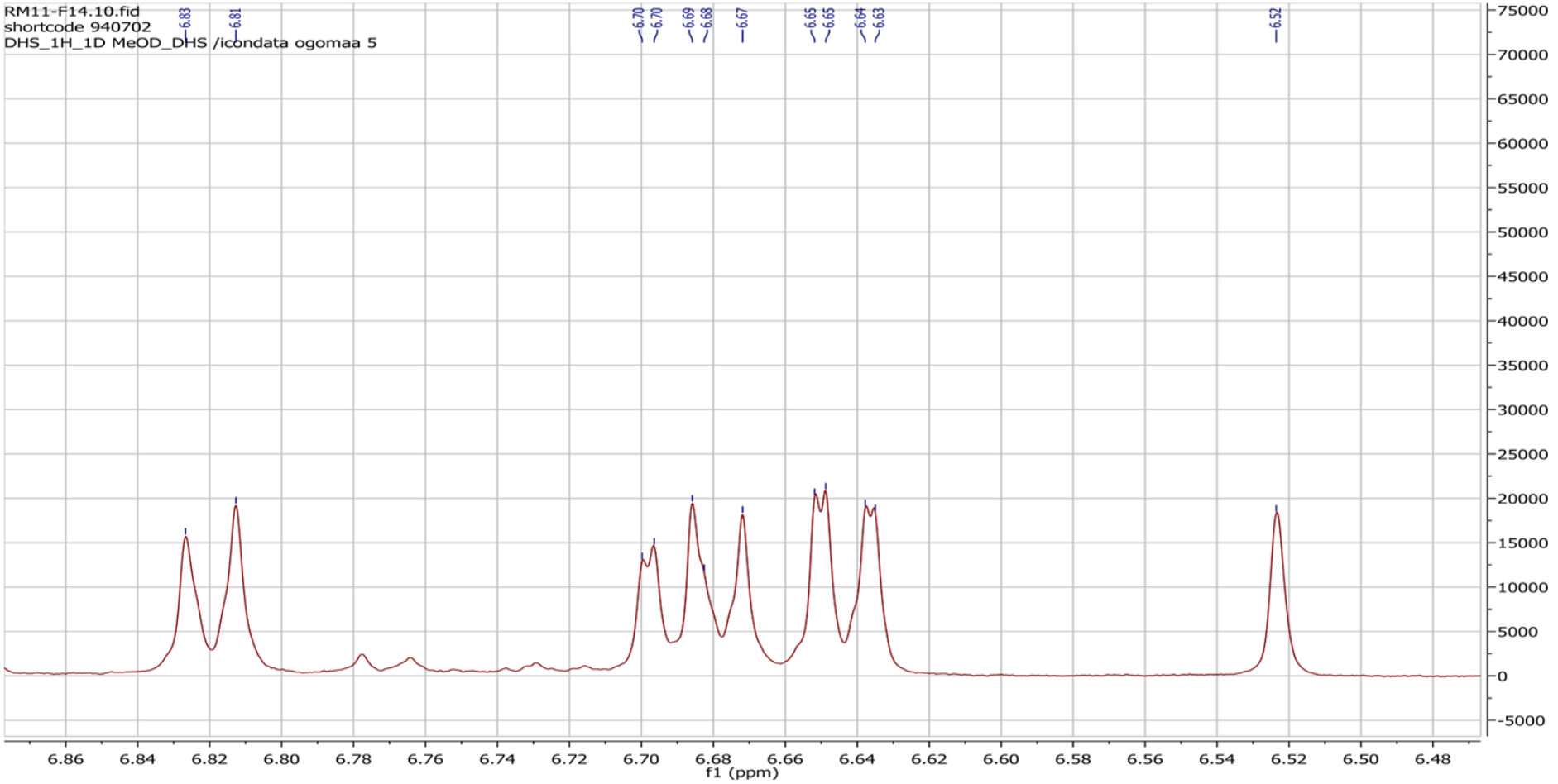

Figure. S 48 Partial expansion of ^{1}H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

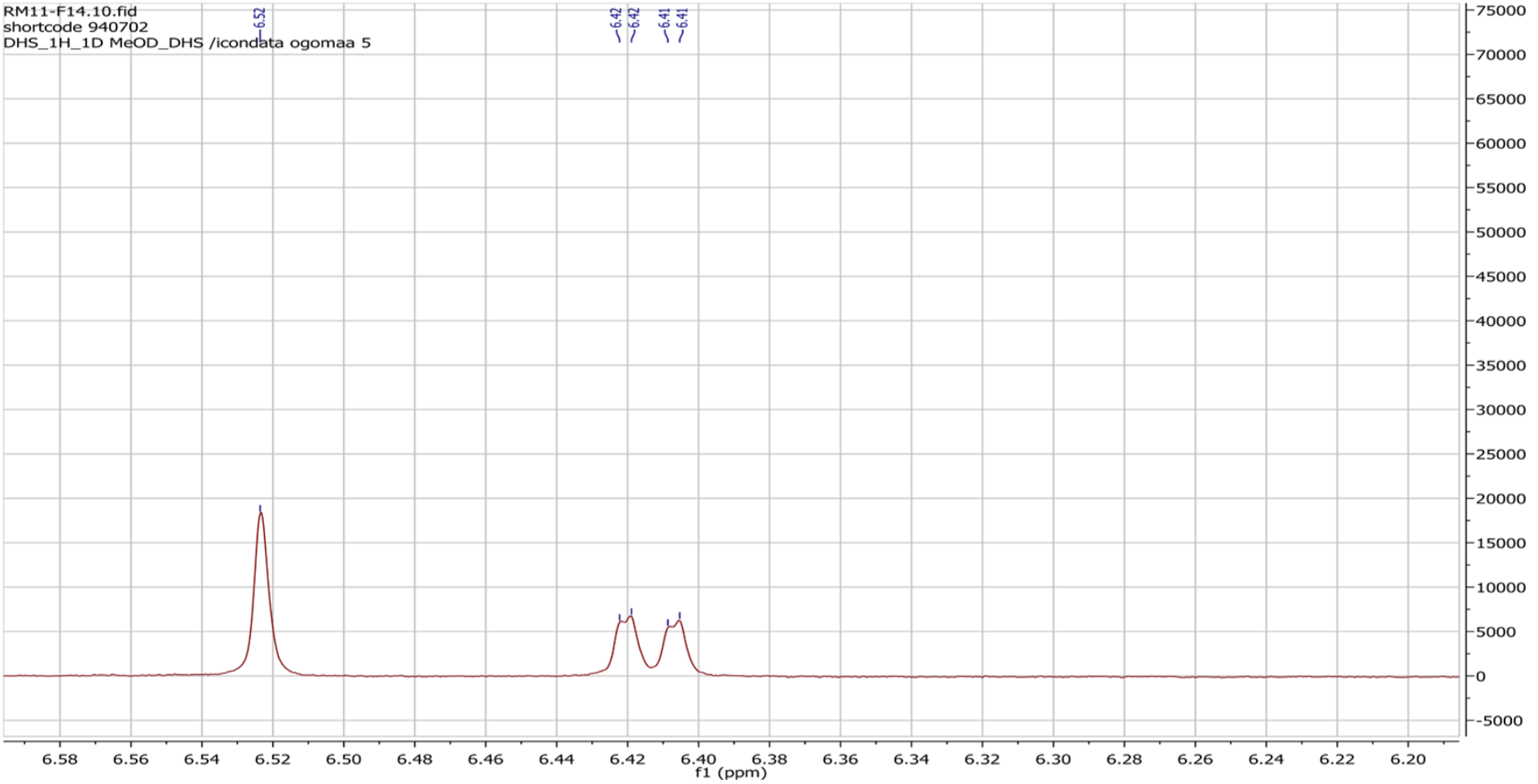

Figure. S 49 Partial expansion of ^{1} H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

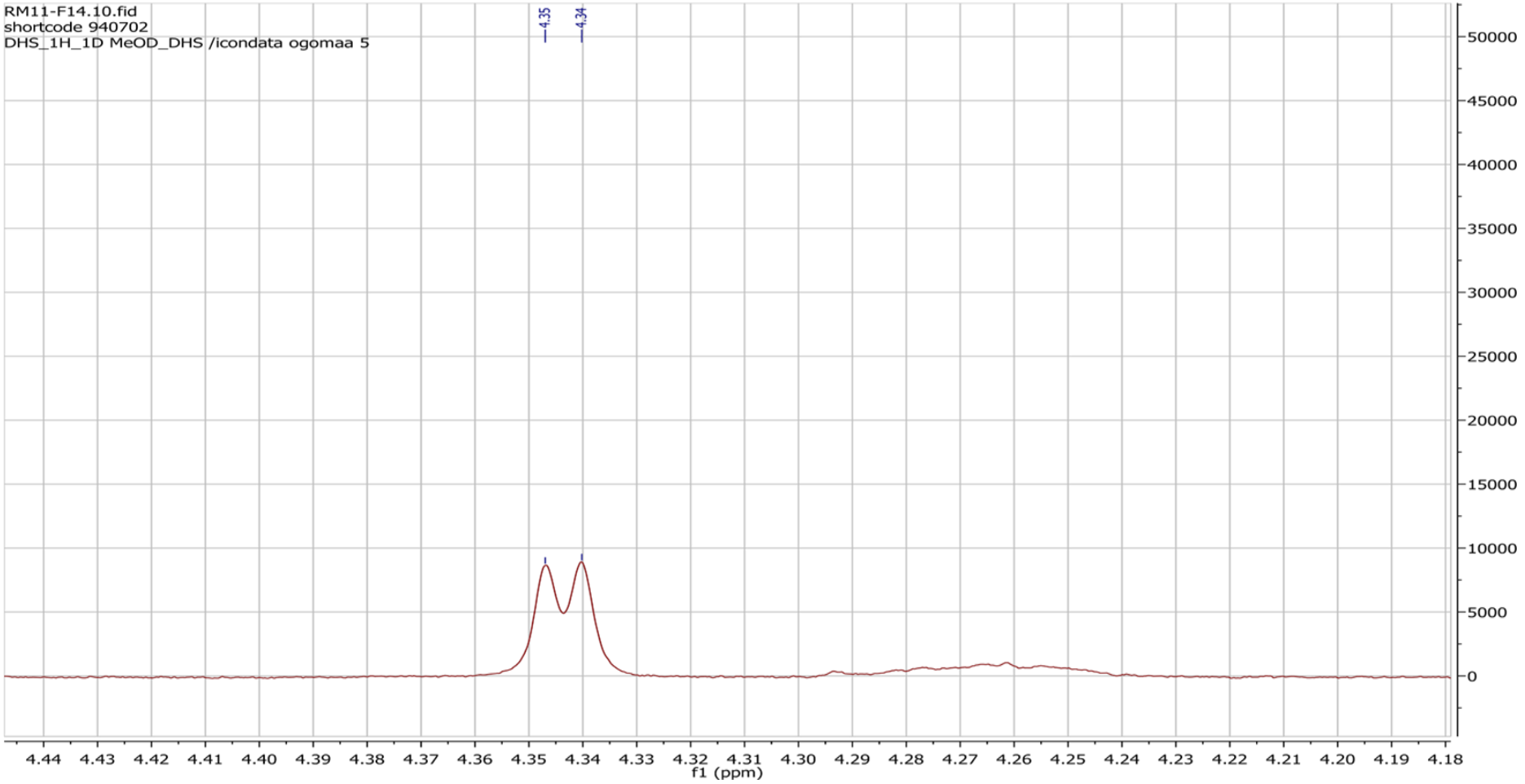

Figure. S 50 Partial expansion of ^{1} H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

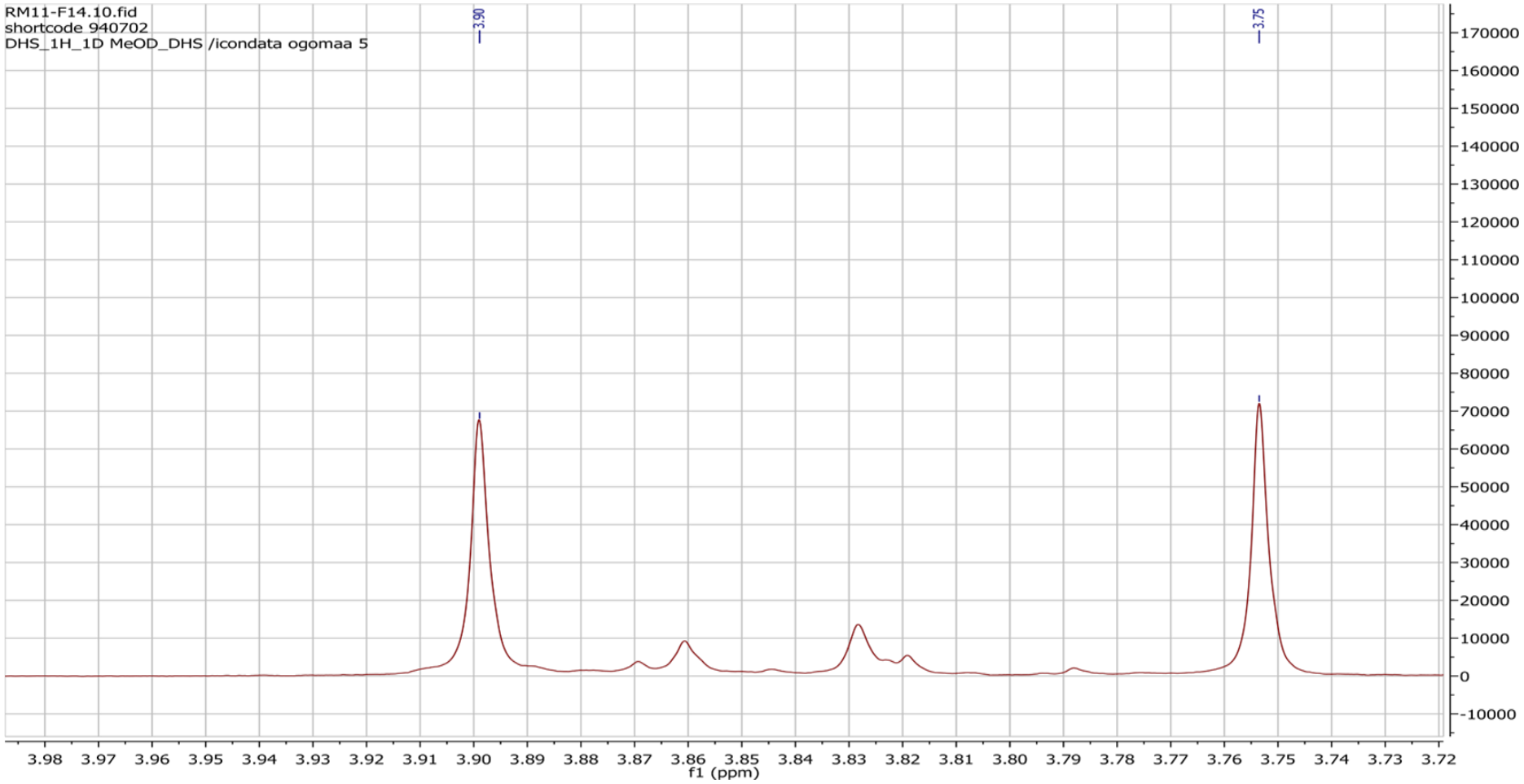

Figure. S 51 Partial expansion of ^{1} H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

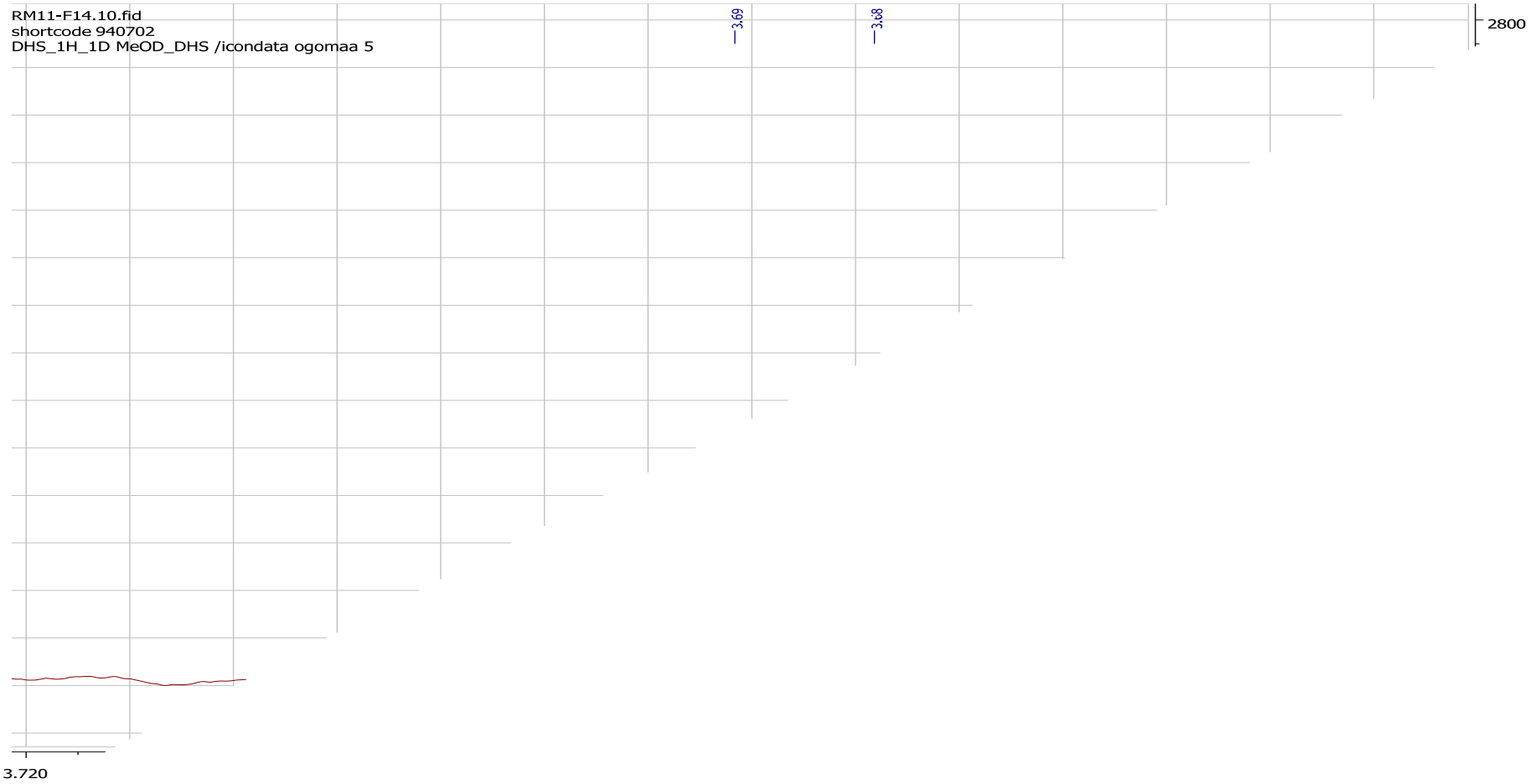

Figure. S 52 Partial expansion of ^{1} H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

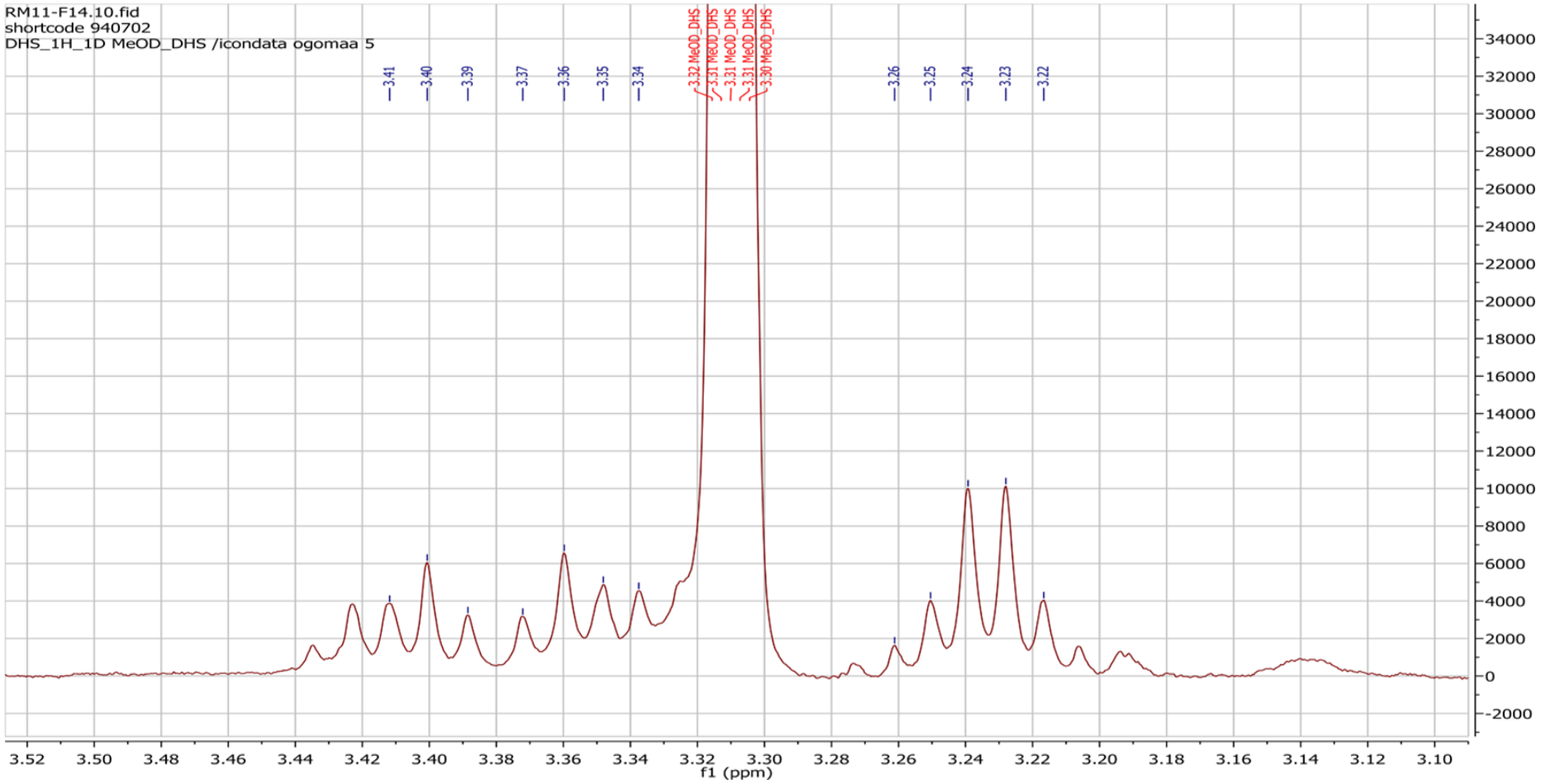

Figure. S 53 Partial expansion of ^{1} H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

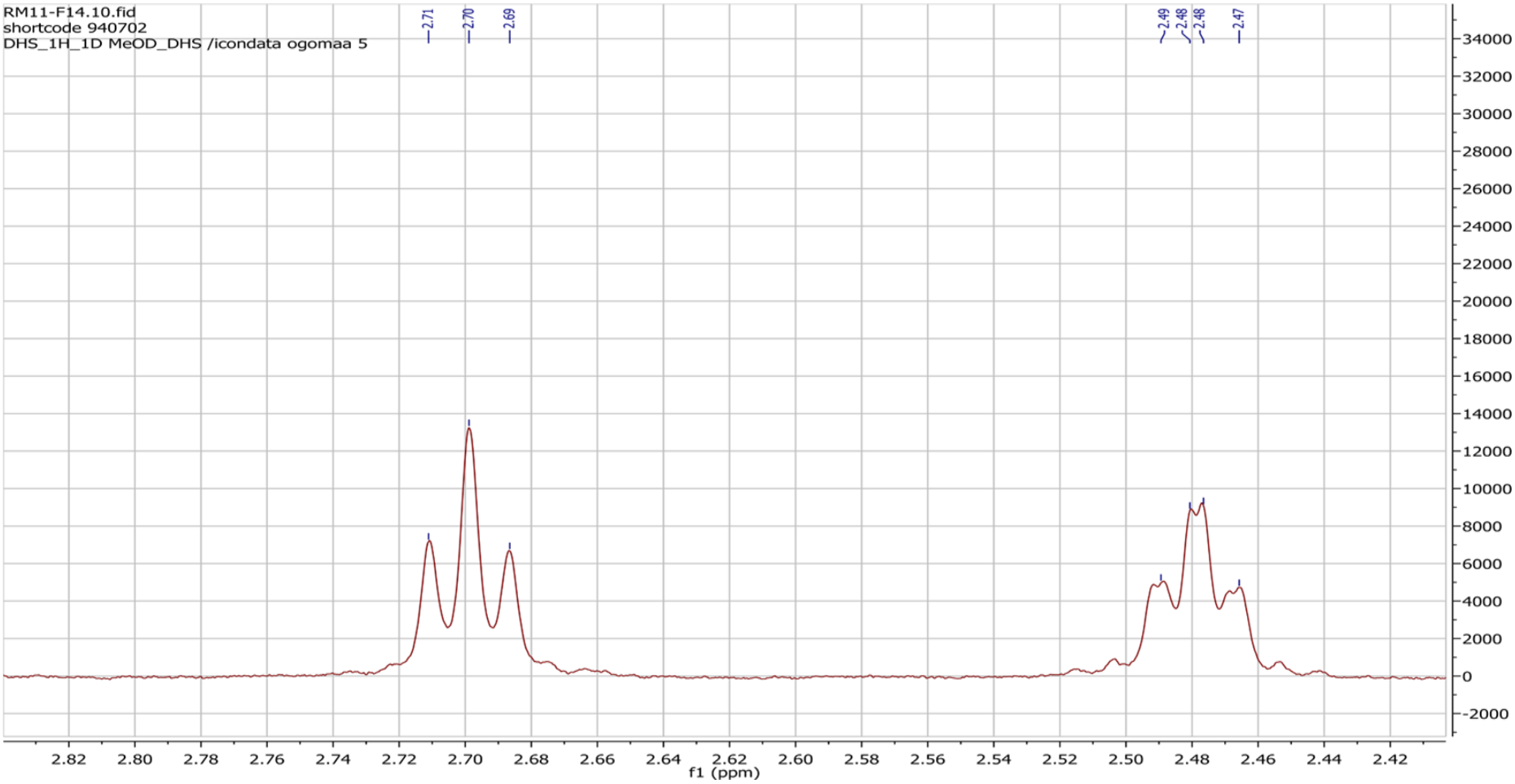

Figure. S 54 Partial expansion of ^{1} H-NMR spectrum of compound 6 (600 MHz, CD_3OD)

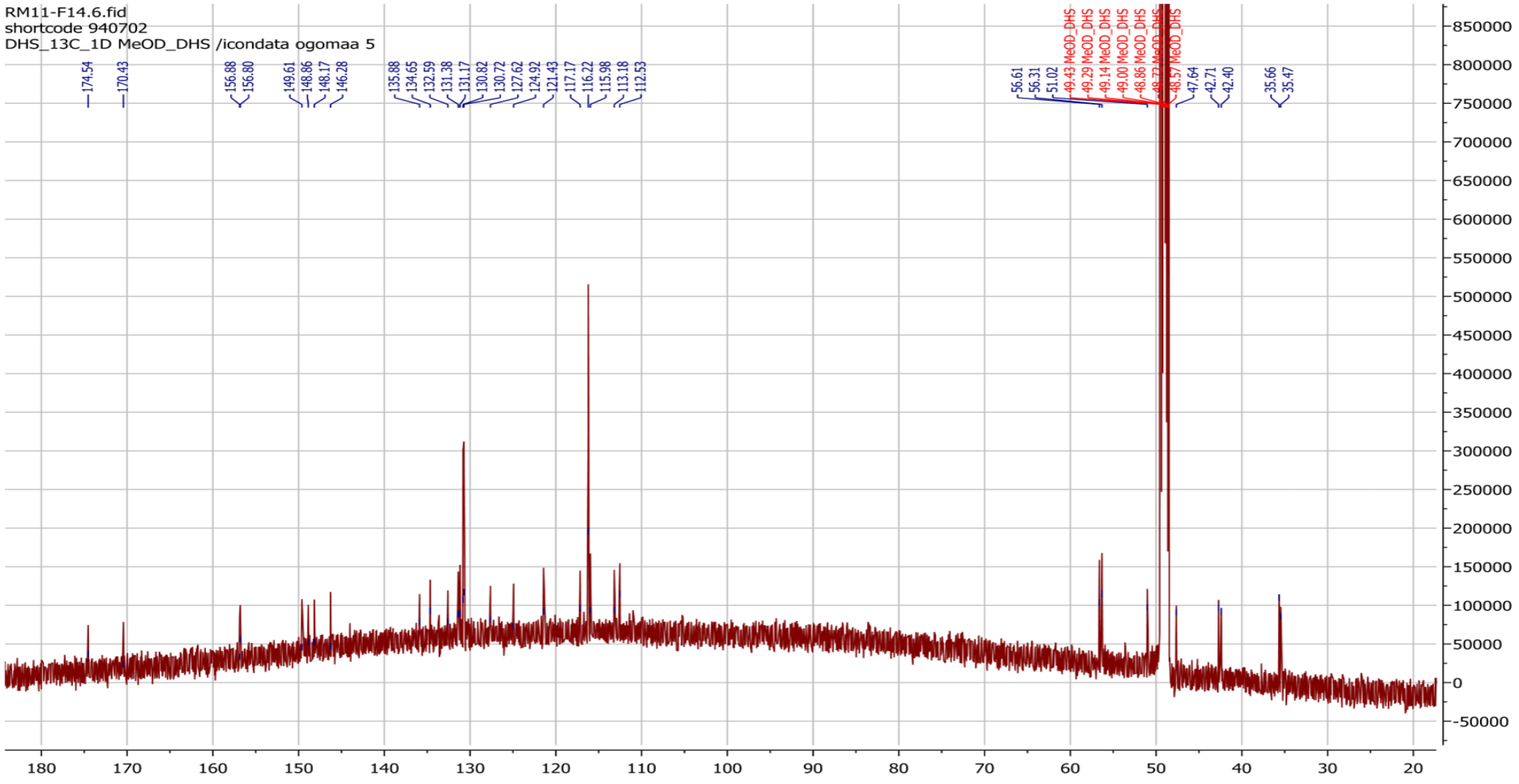

Figure. S 55 ^{13}C-NMR spectrum of compound 6 (150 MHz, CD_3OD)

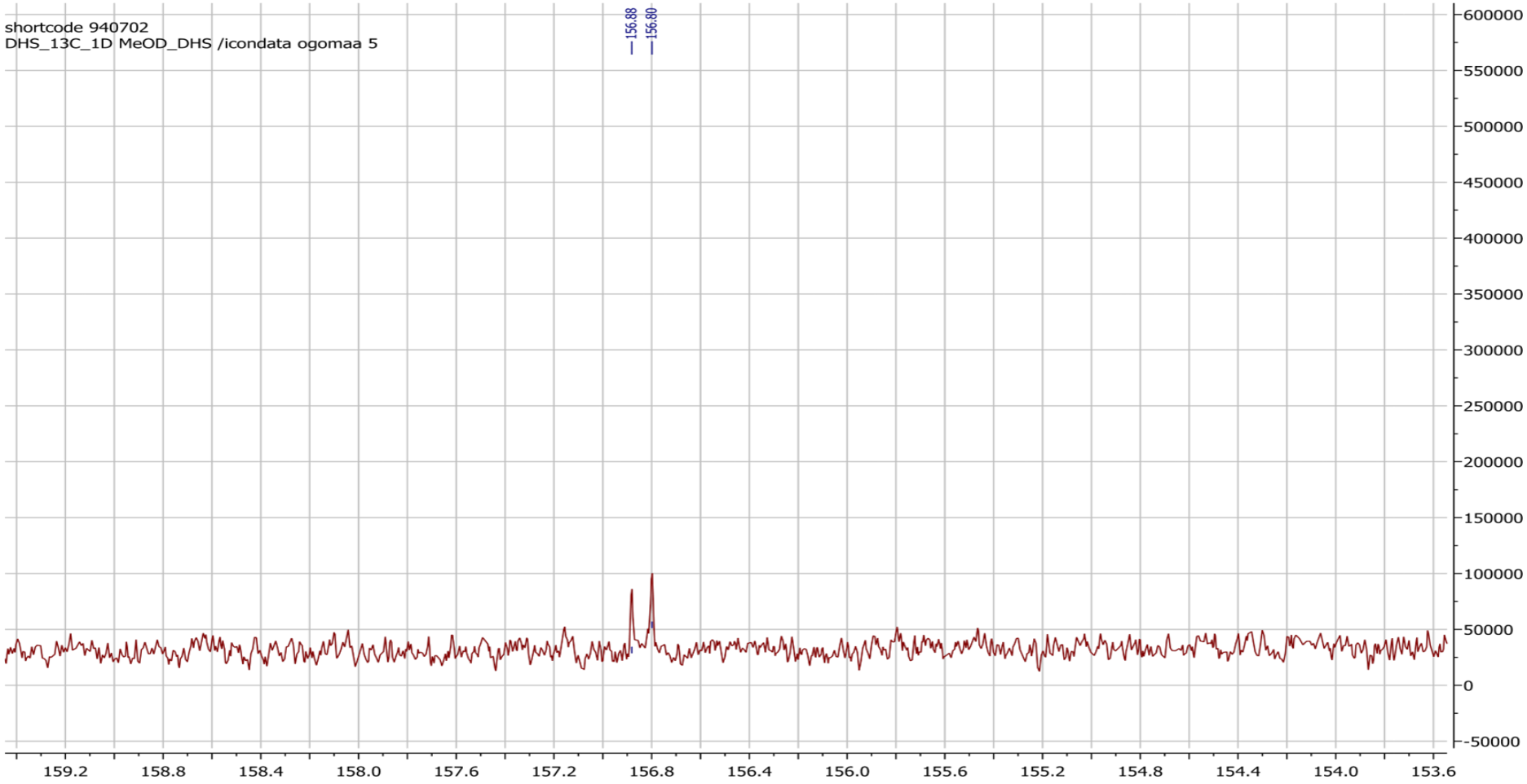

Figure. S 56 Partial expansion of ^{13}C-NMR spectrum of compound 6 (150 MHz, CD_3OD)

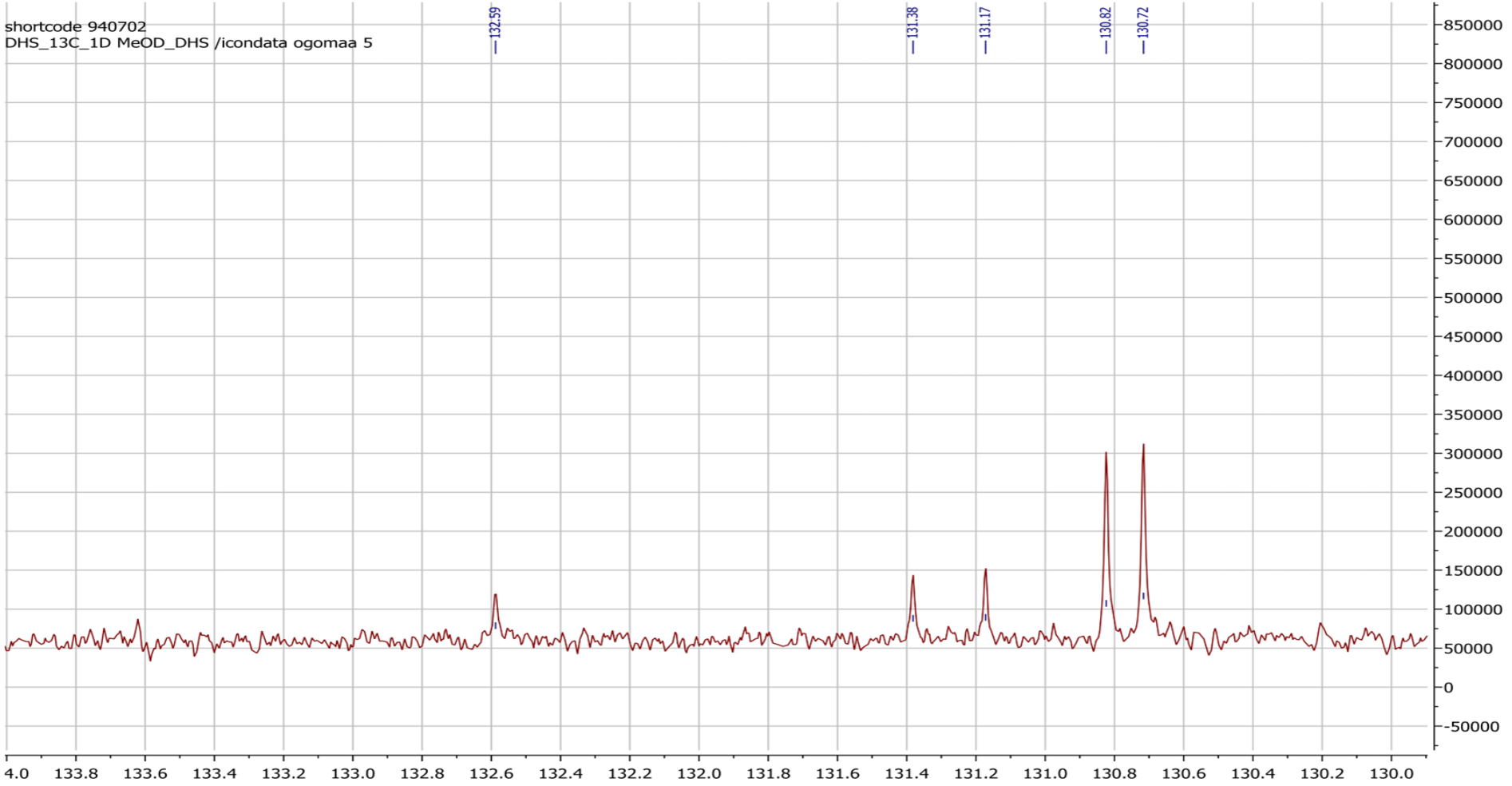

Figure. S 57 Partial expansion of ^{13}C-NMR spectrum of compound 6 (150 MHz, CD_3OD)

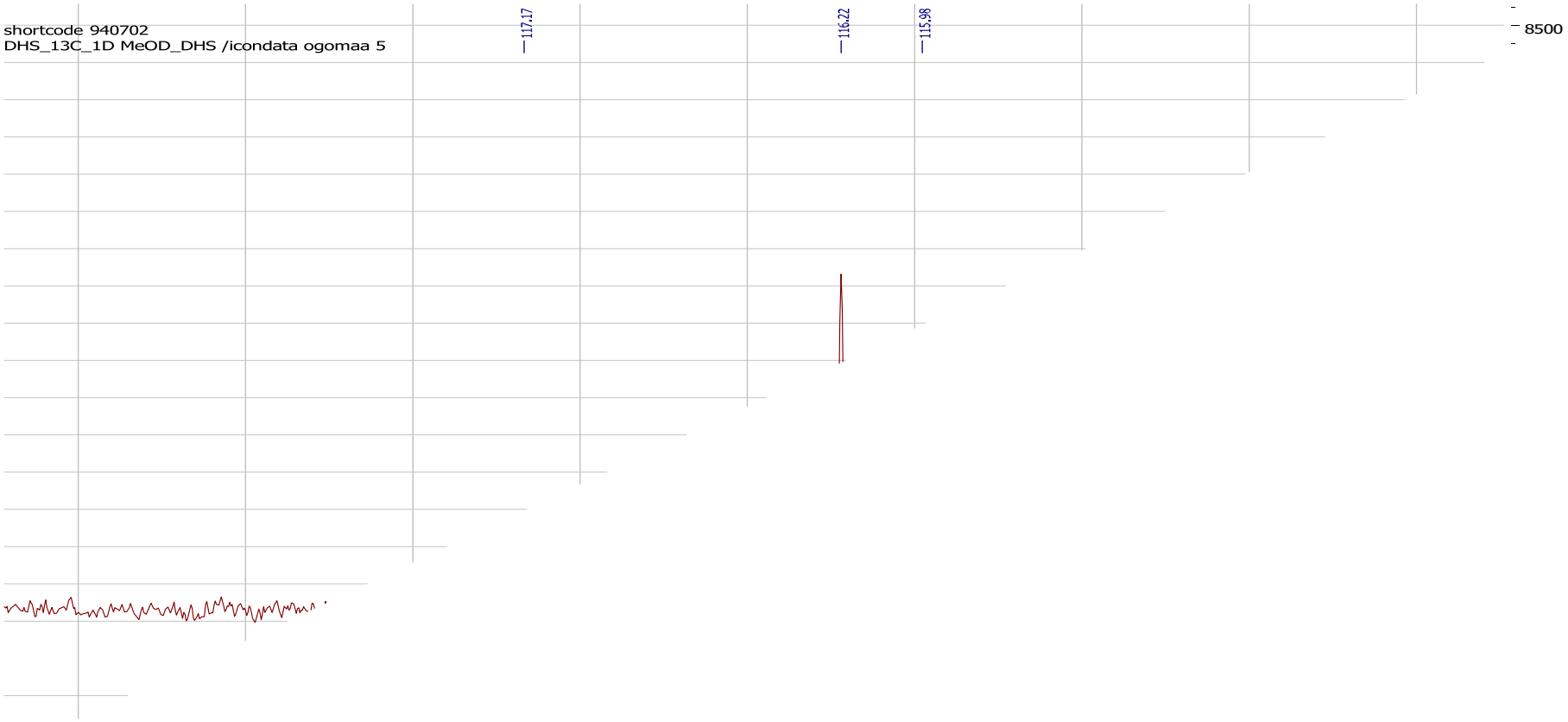

Figure. S 58 Partial expansion of ^{13}C-NMR spectrum of compound 6 (150 MHz, CD_3OD)

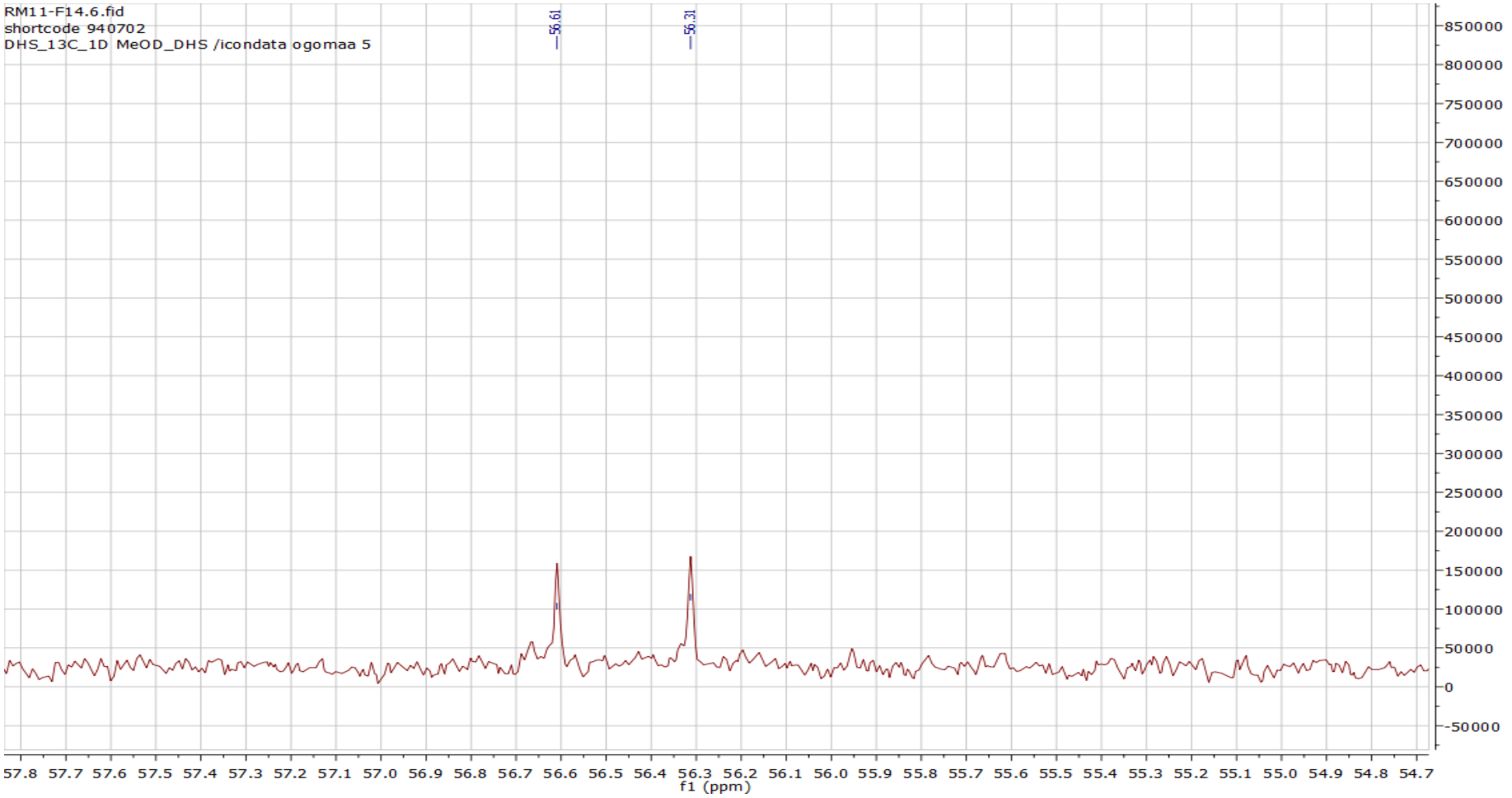

Figure. S 59 Partial expansion of ^{13}C-NMR spectrum of compound 6 (150 MHz, CD_3OD)

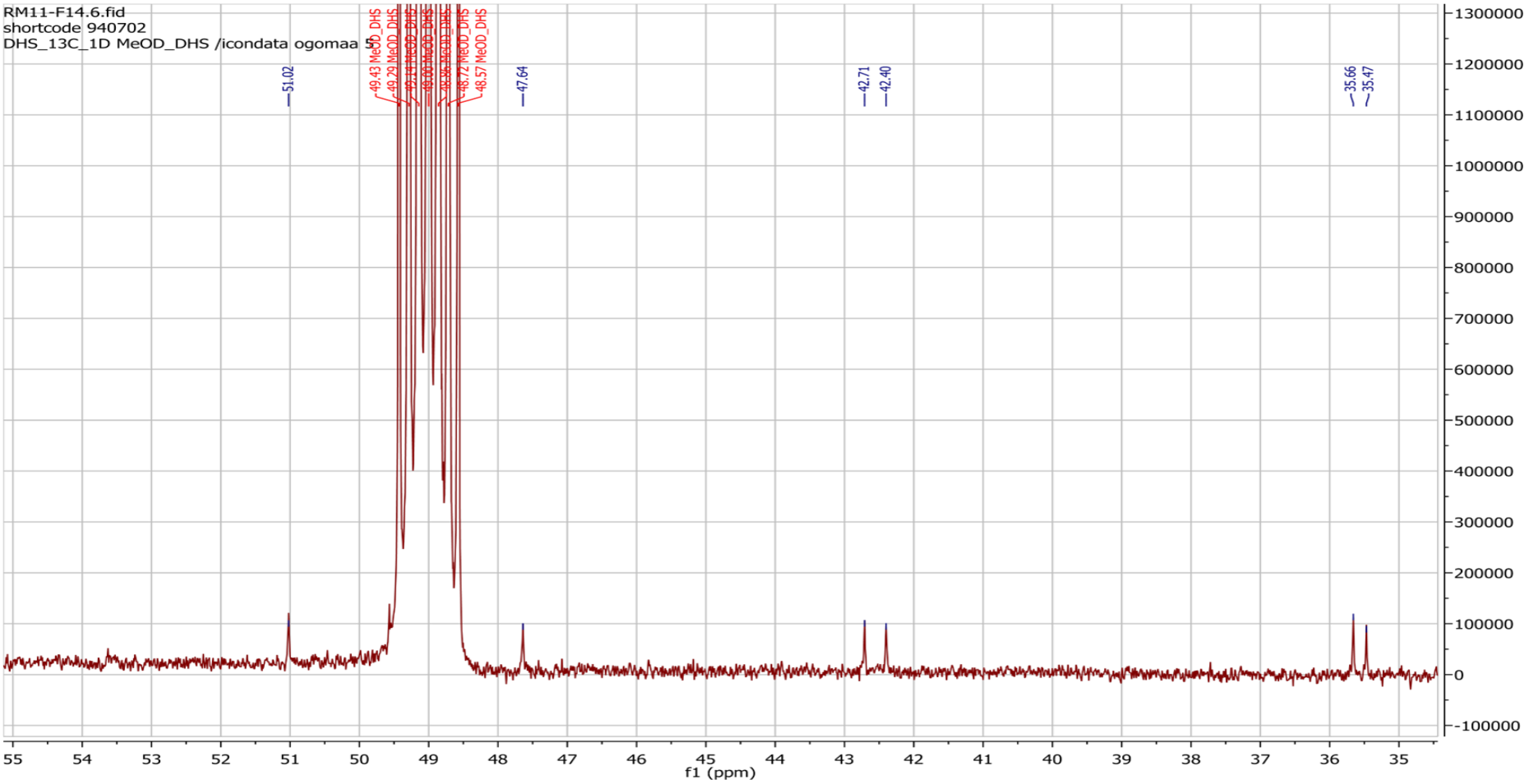

Figure. S 60 Partial expansion of ^{13}C-NMR spectrum of compound 6 (150 MHz, CD_3OD)

Table. S 1 ^{1}H (600 MHz) and ^{13}C (150 MHz) NMR spectroscopic data of compound 2 (CD_3OD δ in ppm, J in Hz)

Position	δ_H (ppm, *m*, *J* Hz)	δ_C (ppm)
1	--	128.3
2	7.11 (*d*, *J* = 2 Hz)	111.5
3	--	149.3
4	--	149.8
5	6.80 (*d*, *J* = 8.4 Hz)	116.4
6	7.00 (*dd*, *J* = 8.4 Hz, 2.0 Hz)	123.2
7	7.45 (*d*, *J* = 15.6 Hz)	142.0
8	6.44 (*d*, *J* = 15.6 Hz)	118.7
9	--	169.2
1'	--	131.3
2'-6'	7.05 (*d*, *J* = 8.6 Hz)	130.7
3'-5'	6.73 (*d*, *J* = 8.6 Hz)	116.2
4'	--	156.9
7'	2.75 (*t*, *J* = 7.6 Hz)	35.8
8'	3.46 (*t*, *J* = 7.6 Hz)	42.5
3-OCH3	3.87 (*S*)	56.4

Table. S 2 ^{1}H (600 MHz) and ^{13}C (150 MHz) NMR spectroscopic data of compound 3 (CD_3OD, δ in ppm, J in Hz)

Position	δ_H (ppm, *m*, *J* Hz)	δ_C (ppm)
1	--	128.3
2	7.11 (*d*, *J* = 1.9 Hz)	113.4
3	3.88 (*s*)	149.3
4	--	149.8
5	6.80 (*d*, *J* = 8.2 Hz)	116.5
6	7.02 (*dd*, *J* = 8.2, 1.9 Hz)	123.2

7	7.45 (*d*, *J* = 15.7 Hz)	142.0
8	6.42 (*d*, *J* = 15.7 Hz)	118.7
9	--	169.2
1'	--	132.0
2'	6.82 (*d*, *J* = 1.9 Hz)	111.5
3'	3.83 (*s*)	148.9
4'	--	146.0
5'	6.72 (*d*, *J* = 8.0 Hz)	116.2
6'	6.67 (*dd*, *J* = 8.0, 1.9 Hz)	122.2
7'	2.77 (*t*, *J* = 7.3 Hz)	36.2
8'	3.49 (*t*, *J* = 7.3 Hz)	42.5
3-OCH_3	3.88 (*s*)	56.4
3'-OCH_3	3.83 (*s*)	56.3

Table. S 3 ^{1}H (300 MHz) NMR spectroscopic data of compound 4 (CD_3OD, δ in ppm, *J* in Hz)

Position	δ_H (ppm, *m*, *J* Hz)
2	7.13 (*d*, *J* = 1.4 Hz)
5	6.80 (*d*, *J* = 8.4 Hz)
6	7.01 (*dd*, *J* = 8.4, 2.1 Hz)
7	7.42 (*d*, *J* = 15.4 Hz)
8	6.44 (*d*, *J* = 15.4 Hz)
2'-6'	7 .21 (*d*, *J* = 8.4 Hz)
3'-5'	6.77 (*d*, *J* = 8.4 Hz)
7'	3.47 (*t*, *J* = 7.0 Hz)
8'	2.76 (*t*, *J* = 7.0 Hz)

Table. S 4 ^{1}H (600 MHz) and ^{13}C (150 MHz) NMR spectroscopic data of compound 5 (CD_3OD, δ in ppm, J in Hz)

Position	δ_H (ppm, *m*, *J* Hz)	δ_C (ppm)
1	--	126.2
2	7.24 (*d*, *J* = 2.0 Hz)	112.5
3	--	148.9
4	--	147.5
5	6.71 (*d*, *J* = 8.2 Hz)	115.2
6	7.01 (*dd*, *J* = 8.2, 2.0 Hz)	121.0
7	7.24 (*s*)	125.3
8	--	141.6
9	--	168.8
1'	--	130.8
2-6'	6.85 (*d*, *J* = 8.5 Hz)	130.7
3' and 5'	6.58 (*d*, *J* = 8.5 Hz)	116.3
4'	--	156.9
7'	2.65 (*t*, *J* = 6.9 Hz)	35.6
8'	3.46 (*dd*, *J* = 13.0, 2.0 Hz)	42.1
1''	--	131.9
2''	7.29 (*d*, *J* = 2.0 Hz)	113.7
3''	--	150.5
4''	--	149.5
5''	6.73 (*d*, *J* = 8.2 Hz)	116.2
6''	7.03 (*dd*, *J* = 8.2, 2.0 Hz)	125.5
7''	7.45 (*d*, *J* = 15.7 Hz)	141.1
8''	6.48 (*d*, *J* = 15.7 Hz)	122.2
9''	--	165.5
1'''	--	131.3
2''' and 6'''	7.05 (*d*, *J* = 8.5 Hz)	130.7
3''' and 5'''	6.72 (*d*, *J* = 8.5 Hz)	116.3
4'''	--	156.9
7'''	2.75 (*t*, *J* = 7.4 Hz)	35.8
8'''	3.47 (*dd*, *J* = 13.0, 6.0 Hz)	42.6
3-OCH_3	3.93 (*s*)	56.0
3''-OCH_3	3.67 (*s*)	56.4

Table. S 5 ^{1}H (600 MHz) and ^{13}C (150 MHz) NMR spectroscopic data of compound 6 (CD_3OD, δ in ppm, J in Hz)

Position	δ_H (ppm, *m*, *J* Hz)	δ_C (ppm)
1	--	174.5
2	3.68 (d, J = 4.0 Hz)	51.0
3	4.34 (d, J = 4.0 Hz)	47.6
4	--	135.9
5	6.70 (d, J = 2.0 Hz)	112.5
6	--	148.9
7	--	146.3
8	6.65 (d, J = 8.4 Hz)	115.9
9	6.41 (dd, J = 8.2, 2.0 Hz)	121.4
1'	3.24 (m)	42.4
2'	2.48 (m)	35.5
3'	--	131.2
4' and 8'	6.83 (d, J = 8.4 Hz)	130.7
5'and	6.68 (d, J = 8.4 Hz)	116.2
6'	--	156.8
6-OCH3	3.75 (s)	56.3
1''	--	170.4
2''	7.20 (s)	134.7
3''	--	132.6
4''	--	127.6
5''	6.88 (s)	113.2
6''	--	148.2
7''	--	149.6
8''	6.52 (s)	117.2
9''	--	124.9
1'''	3.37 (m)	42.7
2'''	2.70 (t, J = 7.4 Hz)	35.7
3'''	--	131.4
4''' and 8'''	6.98 (d, J = 8.4 Hz)	130.8
5''' and 7'''	6.64 (d, J = 8.4 Hz)	116.2
6'''	--	156.9
6''-OCH3	3.90 (s)	56.6