Sustainable synthesis of structures containing quinoxaline-pseudopeptide-triazole pharmacophores *via* a one-pot six-component reaction

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Supporting Information

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Experimental section

General information

All commercially available chemicals and reagents were purchased from Merck Chemical Company and used without further purification. Melting points were measured with an Electrothermal 9200 apparatus. IR spectra were recorded on a Thermo Nicolet NEXUS 470 FT-IR spectrometer in cm^{-1}. ^{1}H NMR spectra were recorded on a BRUKER AVANCE DRX-300 spectrometer at 300 MHz. ^{13}C NMR spectra were recorded on a BRUKER AVANCE DRX-300 spectrometers at 75 MHz. NMR spectra were obtained in $CDCl_3$ and DMSO-d_6. Mass spectra of the products were obtained with an HP (Agilent technologies) 5973 Mass Selective Detector. Elemental analyses were performed on an elementar analysensysteme GmbH VarioEL CHNS mode.

General procedure for the synthesis of aromatic propargyloxy aldehydes 3a-c

To a solution of the corresponding salicylaldehyde (2.0 mmol) in DMF (10 mL) was added anhydrous K_2CO_3 (2.2 mmol) followed by propargyl bromide (2.2 mmol). The reaction mixture was stirred at ambient temperature until complete consumption of the salicylaldehyde (monitored by TLC). Then, ice water (200 mL) was added, and the product was quantitatively achieved by filtration.[1]

General procedure for the synthesis of alkyl azides 6a-b

A mixture of sodium azide (11 mmol) and alkyl bromide (10 mmol) in DMSO (22 mL) was stirred overnight. The reaction was quenched with H_2O (50 mL) and extracted with Et_2O (3 × 30 mL). The organic phase was washed with H_2O (2 × 30 mL) and brine (30 mL), and then was dried over anhydrous Na_2SO_4 and filtered. The solvent was removed by vacuum to give the pure product.[2]

Typical procedure for the synthesis of aryl azide 6c

A mixture of 2 mmol of 4-bromotoluene, 4 mmol of sodium azide, 0.2 mmol of copper iodide, 0.6 mmol of *L*-proline, and 0.6 mmol of NaOH in 4 mL EtOH/H_2O (7:3) in a sealed tube was heated to 95 ºC under argon. After the reaction was done (monitored by TLC), the cooled mixture was partitioned between ethyl acetate and water. The organic layer was separated, and the aqueous layer was extracted with ethyl acetate (2 × 20 mL). The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4, and concentrated in vacuo. Then, the crude residue was purified by column chromatography on silica gel to afford the pure product.[3]

General procedure for the synthesis of structures containing quinoxaline-pseudopeptide-triazole pharmacophores 7a-y

A mixture of 1,2-dicarbonyl compound (1 mmol) and 3,4-diaminobenzoic acid (1 mmol) in EtOH (8 mL) was stirred at room temperature for the appropriate time (30 min for benzil, 15 min for acenaphthoquinone, and 2 h for glyoxal 40 wt. % in H_2O). After completion of the reaction (monitored by TLC), an amine (1 mmol), a propargyloxy aldehyde (1 mmol), and an isocyanide (1 mmol) were added, and the mixture stirred at room temperature for 18 h. After completion of the reaction (monitored by TLC), an azide compound (1.2 mmol), $Cu(OAc)_2.H_2O$ (0.02 g, 10 mol %), and sodium ascorbate (0.04g, 20 mol %) were added. Then, the resulting mixture was stirred for 3 h at ambient temperature. After completion of the reaction (monitored by TLC), the reaction mixture was partitioned between ethyl acetate (30 mL), water (40 mL), and ammonia solution 25% (4 mL). The organic layer was separated, and the aqueous layer was extracted with ethyl acetate (2 × 30 mL). The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4, and concentrated in vacuo. The crude product was loaded on a silica gel column and eluted with *n*-hexane/EtOAc to afford the pure product.

X-ray crystallographic information of 7l

Summary of data: Cambridge Crystallographic Data Centre (CCDC) no.: 2181914; unit Cell Parameters: a 8.7966(18) b 14.281(3) c 15.932(3) P -1.

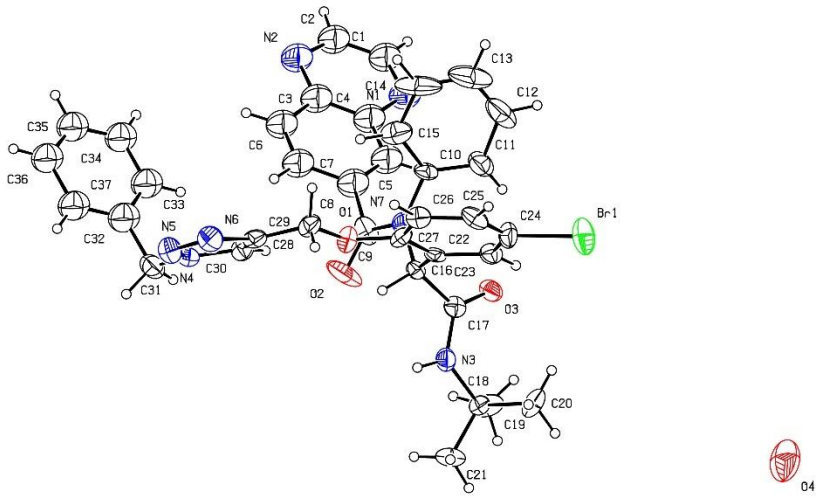

Figure 1. ORTEP diagram for **7l**

Characterization data of products 7a-y

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(3,4-dichlorophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7a**) Light yellow powders: 743 mg, 85% yield; mp 128-130 °C. IR (ATR) cm^{-1}: 3277, 2931, 2853, 1677, 1647, 1550, 1470. ^1H NMR (300 MHz, $CDCl_3$): δ 7.90-7.81 (m, 3H), 7.46-7.11 (m, 18H), 7.02 (d, J = 7.5 Hz, 1H), 6.87-6.70 (m, 5H), 6.44 (d, J = 7.9 Hz, 1H), 5.45 (s, 2H), 5.10 (AB_q, J = 12.1 Hz, 2H), 3.83-3.74 (m, 1H), 1.91-1.78 (m, 2H), 1.65-1.48 (m, 3H), 1.29-0.93 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.70, 168.65, 156.05, 154.28, 154.03, 144.18, 140.91, 140.13, 139.45, 138.57, 137.65, 134.60, 132.20, 131.46, 131.07, 130.53, 130.06, 129.75, 129.38, 129.02, 128.97, 128.80, 128.52, 128.20, 128.01, 122.89, 122.74, 121.23, 111.53, 62.73, 59.26, 54.17, 48.92, 32.76, 25.39, 24.92, 24.80. MS *m*/*z*: 599 (1.21), 590 (0.28), 562 (0.76), 547 (1.90), 469 (3.79), 437 (4.48), 407 (4.09), 326 (82.90), 309 (48.08), 281 (8.87), 264 (15.30), 223 (7.31), 178 (16.85), 144 (23.38), 91 (100), 67 (13.27). Anal. Calcd for $C_{51}H_{43}Cl_2N_7O_3$: C, 70.18; H, 4.97; N, 11.23; found C, 70.38; H, 4.99; N, 11.14.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7b**) Light yellow powders: 639 mg, 82% yield; mp 108-110 °C. IR (ATR) cm^{-1}: 3308, 2968, 2924, 1682, 1639, 1592, 1491. ^1H NMR (300 MHz, $CDCl_3$): δ 8.02 (d, J = 8.5 Hz, 2H), 7.83 (d, J = 8.6 Hz, 1H), 7.53-6.79 (m, 25H), 6.74 (s, 1H), 5.78 (s, 1H), 5.59 (s, 2H), 5.22 (AB_q, J = 12.0 Hz, 2H), 1.40 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.12, 168.81, 156.18, 154.10, 153.85, 140.84, 140.19, 139.97, 138.74, 138.21, 134.66, 131.18, 130.28, 130.20, 129.83, 129.79, 129.37, 129.08, 128.63, 128.47, 128.28, 128.24, 128.18, 127.24, 123.22, 121.05, 111.29, 62.97, 59.92, 54.35, 51.78, 28.75. MS *m*/*z*: 531 (3.40), 496 (0.25), 489 (4.96), 468 (2.03), 458 (2.92), 401 (9.15), 369 (28.74), 336 (9.78), 309 (100), 282 (12.13), 178 (11.61), 144 (7.72), 91 (38.93), 57 (12.97). Anal. Calcd for $C_{49}H_{43}N_7O_3$: C, 75.65; H, 5.57; N, 12.60; found C, 75.87; H, 5.69; N, 12.42.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*-(3,4-dichlorophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7c**) Light yellow powders: 745 mg, 88% yield; mp 127-129 °C. IR (ATR) cm^{-1}: 3323, 2970, 2870, 1677, 1627, 1548, 1493. ^1H NMR (300 MHz, $CDCl_3$): δ 8.03 (d, J = 1.8 Hz, 1H), 7.96-7.93 (m, 2H), 7.56-6.84 (m, 23H), 6.70 (s, 1H), 5.79 (s, 1H), 5.58 (s, 2H), 5.22 (AB_q, J = 12.1 Hz, 2H), 1.41 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.86, 168.63, 156.12, 154.38, 154.10, 144.24, 140.98, 140.15, 139.45, 138.57, 137.63, 134.52, 132.12, 131.69, 131.32, 131.01, 130.70, 130.05, 129.88, 129.85, 129.57, 129.10, 128.97, 128.69, 128.32, 128.29, 128.18, 122.78, 121.38, 111.60, 62.84, 59.67, 54.40, 51.94, 28.75. MS *m*/*z*: 574 (1.11), 536 (1.32), 469 (1.21), 437 (18.27), 336 (4.16), 309 (100), 282 (24.74), 254 (2.24), 203 (2.68), 178 (9.06), 144 (9.58), 91 (26.30), 57 (4.40). Anal. Calcd for $C_{49}H_{41}Cl_2N_7O_3$: C, 69.50; H, 4.88; N, 11.58; found C, 69.71; H, 4.97; N, 11.41.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7d**) Light yellow powders: 676 mg, 84% yield; mp 154-156 °C. IR (ATR) cm^{-1}: 3277, 2929, 2852, 1678, 1638, 1592, 1492. ^1H NMR (300 MHz, $CDCl_3$): δ 8.03 (s, 2H), 7.86 (dd, J = 8.7, 3.1 Hz, 1H), 7.56 (d, J = 9.0 Hz, 1H), 7.49-6.79 (m, 25H), 5.95 (d, J = 8.0 Hz, 1H), 5.54 (s, 2H), 5.20 (AB_q, J = 11.9 Hz, 2H), 3.98-3.87 (m, 1H), 2.05-1.91 (m, 2H), 1.75-1.58 (m, 3H), 1.45-1.03 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.19, 168.76, 156.31, 154.10, 153.86, 144.65, 140.87, 140.20, 140.02, 138.77, 138.27, 134.69, 131.43, 130.42, 130.30, 129.83, 129.79, 129.36, 129.04, 128.96, 128.58, 128.53, 128.28, 128.24, 128.16, 127.28, 123.20, 122.71, 121.09, 111.45, 63.07, 59.59, 54.30, 48.91, 32.93, 25.51, 24.93, 24.83. MS *m*/*z*: 577 (7.76), 551 (15.97), 523 (10.16), 495 (2.89), 458 (12.61), 401 (11.10), 368 (15.00), 336 (51.33), 309 (100), 282 (15.26), 260 (20.82), 236 (34.68), 204 (23.56), 178 (15.60), 91 (79.38), 57 (88.02). Anal. Calcd for $C_{51}H_{45}N_7O_3$: C, 76.19; H, 5.64; N, 12.20; found C, 76.37; H, 5.61; N, 12.28.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-phenylacenaphtho[1,2-*b*]quinoxaline-9-carboxamide** (**7e**) Light yellow powders: 683 mg, 88% yield; mp 236-237 °C. IR (ATR) cm^{-1}: 3261, 2931, 2855, 1682, 1620, 1536, 1491. ^1H NMR (300 MHz, $CDCl_3$): δ 8.13 (d, J = 7.0 Hz, 2H), 8.01-6.75 (m, 23H), 6.34 (d, J = 8.1 Hz, 1H), 5.48 (AB_q, J = 14.8 Hz, 2H), 5.10 (AB_q, J = 12.0 Hz, 2H), 3.97-3.90 (m, 1H), 2.05-1.93 (m, 2H), 1.73-1.56 (m, 3H), 1.39-1.05 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.34, 168.94, 156.22, 154.37, 154.17, 140.84, 140.20, 140.11, 137.36, 136.22, 134.68, 131.40, 131.11, 131.05, 130.53, 130.24, 129.65, 129.57, 129.47, 129.03, 128.81, 128.59, 128.51, 128.17, 127.28, 123.29, 121.96, 121.90, 121.07, 111.35, 62.98, 59.53, 54.24, 48.98, 32.96, 25.51, 24.98, 24.87. MS *m*/*z*: 588 (1.18), 503 (1.61), 494 (1.07), 461 (3.82), 369 (9.83), 336 (10.90), 298 (92.12), 281 (88.55), 253 (63.15), 226 (10.84), 196 (41.26), 167 (8.56), 144 (15.50), 91 (100), 77 (32.46). Anal. Calcd for $C_{49}H_{41}N_7O_3$: C, 75.85; H, 5.33; N, 12.64; found C, 75.98; H, 5.47; N, 12.52.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)naphthalen-1-yl)-2-(cyclohexylamino)-2-oxoethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7f**) Light yellow powders: 692 mg, 81% yield; mp 138-140 °C. IR (ATR) cm^{-1}: 3305, 2930, 2852, 1681, 1639, 1594, 1493. ^1H NMR (300 MHz, $CDCl_3$): δ 8.17 (bs, 1H), 8.05-7.26 (m, 26H), 7.18 (d, J = 9.1 Hz, 1H), 6.69 (t, J = 7.4 Hz, 1H), 6.51 (t, J = 7.6 Hz, 2H), 5.59 (s, 2H), 5.30-5.06 (m, 2H), 4.43 (bs, 1H), 3.80-3.70 (m, 1H), 1.99-1.93 (m, 1H), 1.64 (d, J = 13.4 Hz, 1H), 1.49-1.20 (m, 4H), 1.09-0.94 (m, 3H), 0.81-0.73 (m, 1H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.39, 168.90, 155.36, 154.02, 153.85, 144.50, 140.78, 140.11, 139.35, 138.76, 138.12, 134.95, 133.79, 132.29, 129.78, 129.44, 129.25, 129.14, 128.99, 128.91, 128.72, 128.50, 128.32, 128.24, 127.41, 124.41, 123.10, 122.71, 115.61, 113.48, 63.74, 56.12, 54.31, 48.61, 33.29, 33.03, 25.34, 24.90, 24.68. MS *m*/*z*: 581 (1.94), 544 (0.19), 536 (2.18), 482 (2.72), 437 (1.27), 401 (28.23), 355 (6.10),

326 (26.72), 309 (100), 281 (12.03), 178 (14.34), 151 (8.22), 91 (42.08), 56 (59.59). Anal. Calcd for $C_{55}H_{47}N_7O_3$: C, 77.35; H, 5.55; N, 11.48; found C, 77.51; H, 5.63; N, 11.35.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)naphthalen-1-yl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(3,4-dichlorophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7g**) Light yellow powders: 794 mg, 86% yield; mp 174-176 °C. IR (ATR) cm^{-1}: 3303, 2929, 2852, 1697, 1643, 1511, 1468. ^1H NMR (300 MHz, $CDCl_3$): δ 8.05-7.89 (m, 6H), 7.74-7.24 (m, 22H), 6.57 (d, J = 8.4 Hz, 1H), 5.60 (s, 2H), 5.27-5.11 (m, 2H), 4.71 (bs, 1H), 3.68 (bs, 1H), 1.99-1.94 (m, 1H), 1.64 (d, J = 13.2 Hz, 1H), 1.50-1.22 (m, 4H), 1.08-0.92 (m, 3H), 0.80-0.72 (m, 1H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.11, 168.63, 155.21, 154.40, 154.20, 144.02, 141.02, 140.14, 139.03, 138.66, 137.33, 134.88, 133.54, 132.70, 131.56, 129.82, 129.78, 129.28, 129.14, 129.07, 128.71, 128.33, 128.27, 124.61, 122.86, 122.32, 113.32, 63.77, 56.21, 54.35, 48.77, 33.33, 32.98, 25.28, 24.86, 24.67. MS *m*/*z*: 595 (0.76), 550 (1.97), 469 (11.29), 407 (6.67), 355 (4.48), 326 (41.31), 309 (100), 281 (11.28), 254 (3.64), 203 (4.42), 178 (15.02), 144 (12.83), 91 (55.86), 56 (9.44). Anal. Calcd for $C_{55}H_{45}Cl_2N_7O_3$: C, 71.58; H, 4.91; N, 10.62; found C, 71.74; H, 5.02; N, 10.49.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)naphthalen-1-yl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7h**) Light yellow powders: 721 mg, 87% yield; mp 186-188 °C. IR (ATR) cm^{-1}: 3304, 2972, 2869, 1688, 1640, 1594, 1493. ^1H NMR (300 MHz, $CDCl_3$): δ 8.16-7.85 (m, 6H), 7.72-7.30 (m, 22H), 6.68 (bs, 1H), 6.52 (bs, 2H), 5.56 (s, 2H), 5.22-5.11 (m, 2H), 4.44 (bs, 1H), 1.20 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.26, 168.75, 155.57, 153.99, 153.82, 144.33, 140.75, 140.10, 139.47, 138.76, 138.18, 134.82, 133.81, 132.21, 129.79, 129.50, 129.27, 129.11, 128.99, 128.91, 128.72, 128.44, 128.35, 128.26, 128.24, 127.37, 124.34, 123.59, 122.83, 115.94, 113.77, 63.86, 56.46, 54.28, 51.49, 29.06. MS *m*/*z*: 581 (0.93), 536 (1.08), 518 (0.41), 458 (1.17), 426 (0.34), 401 (22.86), 336 (4.83), 309 (100), 281 (10.55), 246 (12.33), 203 (5.04), 178 (12.80), 144 (9.19), 91 (43.49), 58 (8.64). Anal. Calcd for $C_{53}H_{45}N_7O_3$: C, 76.88; H, 5.48; N, 11.84; found C, 76.93; H, 5.37; N, 11.90.

***N*-(2-(*tert*-butylamino)-1-(2-((1-(4-nitrophenethyl)-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-oxoethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7i**) Light yellow powders: 670 mg, 80% yield; mp 124-126 °C. IR (ATR) cm^{-1}: 3276, 2969, 2870, 1679, 1625, 1517, 1492. ^1H NMR (300 MHz, $CDCl_3$): δ 8.10-7.98 (m, 4H), 7.83 (d, J = 8.7 Hz, 1H), 7.56 (d, J = 8.7 Hz, 1H) 7.45-6.80 (m, 22H), 5.87 (s, 1H), 5.22 (AB_q, J = 12.0 Hz, 2H), 4.70 (t, J = 7.4 Hz, 2H), 3.38 (t, J = 7.4 Hz, 2H), 1.43 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.10, 168.78, 156.13, 154.29, 154.01, 146.95, 144.52, 144.43, 140.89, 140.19, 139.82, 138.65, 138.58, 138.29, 131.15, 130.27, 129.85, 129.76, 129.60, 129.30, 129.09, 128.47, 128.28, 128.24, 127.39, 123.87, 123.52, 123.23, 122.78, 121.12, 111.17, 62.92, 59.79, 51.85, 50.75, 36.15, 28.77. MS *m*/*z*: 531 (12.87), 503 (10.48), 474 (5.86), 401 (25.29), 337 (2.19), 309 (100), 281 (11.44), 236 (2.97), 203 (3.83), 178 (10.28), 149 (14.31), 103 (9.13), 77 (15.62), 51 (3.54). Anal. Calcd for $C_{50}H_{44}N_8O_5$: C, 71.75; H, 5.30; N, 13.39; found C, 71.88; H, 5.39; N, 13.29.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)-5-bromophenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7j**) Light yellow powders: 751 mg, 85% yield; mp 210-212 °C. IR (ATR) cm^{-1}: 3278, 2930, 2852, 1679, 1636, 1594, 1490. ^1H NMR (300 MHz, $CDCl_3$): δ 8.06 (s, 1H), 7.93 (s, 1H), 7.86 (d, J = 8.5 Hz, 1H), 7.60-6.92 (m, 23H), 6.82 (d, J = 8.9 Hz, 1H), 6.76 (s, 1H), 6.20 (d, J = 8.1 Hz, 1H), 5.53 (s, 2H), 5.15 (AB_q, J = 12.1 Hz, 2H), 3.96-3.90 (m, 1H), 2.02-1.90 (m, 2H), 1.75-1.59 (m, 3H), 1.44-1.10 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.14, 168.19, 155.33, 154.22, 153.95, 144.06, 140.95, 140.19, 139.79, 138.71, 137.95, 134.60, 134.23, 132.82, 130.21, 129.83, 129.79, 129.29, 129.23, 129.07, 128.65, 128.60, 128.39, 128.29, 128.26, 128.11, 127.58, 125.49, 122.82, 113.34, 113.27, 63.22, 59.23, 54.29, 48.94, 32.84, 25.48, 24.91, 24.82.

MS *m*/*z*: 583 (7.01), 572 (0.31), 482 (7.07), 401 (21.44), 377 (5.25), 336 (5.55), 326 (78.45), 309 (96.11), 281 (14.43), 223 (7.59), 178 (22.65), 144 (21.56), 91 (100), 77 (32.74), 56 (17.33). Anal. Calcd for $C_{51}H_{44}BrN_7O_3$: C, 69.38; H, 5.02; N, 11.11; found C, 69.24; H, 5.11; N, 11.07.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)-5-bromophenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-phenylacenaphtho[1,2-*b*]quinoxaline-9-carboxamide** (**7k**) Light yellow powders: 744 mg, 87% yield; mp 188-190 °C. IR (ATR) cm^{-1}: 3293, 2924, 2850, 1674, 1617, 1592, 1489. ^1H NMR (300 MHz, $CDCl_3$): δ 8.33-6.91 (m, 22H), 6.81 (d, J = 8.8 Hz, 1H), 6.75 (s, 1H), 6.13 (d, J = 8.1 Hz, 1H), 5.58 (s, 2H), 5.16 (AB_q, J = 12.1 Hz, 2H), 4.00-3.88 (m, 1H), 2.14-1.92 (m, 2H), 1.77-1.59 (m, 3H), 1.46-1.10 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.33, 168.20, 155.33, 154.72, 154.46, 144.10, 141.12, 140.26, 139.94, 136.99, 136.53, 134.57, 134.28, 132.82, 131.38, 130.21, 129.90, 129.74, 129.63, 129.11, 128.93, 128.70, 128.58, 128.36, 128.18, 127.55, 125.50, 122.79, 122.07, 113.36, 113.25, 63.24, 59.25, 54.34, 48.93, 32.90, 25.49, 24.89, 24.80. MS *m*/*z*: 588 (1.38), 572 (0.47), 539 (15.45), 512 (5.89), 449 (8.19), 419 (3.33), 373 (14.53), 336 (15.60), 309 (14.79), 298 (32.10), 281 (98.83), 253 (58.03), 226 (11.49), 178 (9.68), 144 (21.58), 91 (100), 56 (40.14). Anal. Calcd for $C_{49}H_{40}BrN_7O_3$: C, 68.85; H, 4.72; N, 11.47; found C, 68.70; H, 4.77; N, 11.41.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)-5-bromophenyl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*-phenylquinoxaline-6-carboxamide** (**7l**) Light yellow powders: 529 mg, 75% yield; mp 115-117 °C. IR (ATR) cm^{-1}: 3302, 2920, 2850, 1679, 1628, 1548, 1488. ^1H NMR (300 MHz, $CDCl_3$): δ 8.76 (s, 2H), 7.94-6.66 (m, 17H), 6.60 (s, 1H), 5.94 (s, 1H), 5.58 (s, 2H), 5.12 (AB_q, J = 12.0 Hz, 2H), 1.39 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.65, 168.22, 155.22, 145.74, 145.52, 143.99, 142.71, 141.96, 139.71, 137.94, 134.54, 134.03, 132.75, 130.10, 129.72, 129.46, 129.13, 128.92, 128.75, 128.35, 128.15, 127.59, 125.52, 122.73, 113.32, 113.19, 63.04, 59.62, 54.34, 51.89, 28.73. MS *m*/*z*: 575 (0.71), 548 (2.44), 449 (38.55), 432 (9.04), 402 (1.85), 336 (2.75), 309 (1.88), 276 (6.25), 247 (13.83), 230 (18.19), 157 (100), 144 (27.14), 129 (22.37), 91 (56.84), 57 (7.04). Anal. Calcd for $C_{37}H_{34}BrN_7O_3$: C, 63.07; H, 4.86; N, 13.91; found C, 63.22; H, 4.96; N, 13.79.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-oxo-2-(phenylamino)ethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7m**) Light yellow powders: 575 mg, 72% yield; mp 127-129 °C. IR (ATR) cm^{-1}: 3557, 3263, 3197, 1691, 1626, 1552, 1493. ^1H NMR (300 MHz, $CDCl_3$): δ 8.62 (bs, 1H), 8.10 (s, 1H), 7.92-7.87 (m, 2H), 7.65-6.80 (m, 31H), 5.39 (s, 2H), 5.14 (AB_q, J = 12.1 Hz, 2H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.31, 168.36, 156.26, 154.19, 153.93, 144.59, 140.91, 140.19, 139.88, 138.74, 138.22, 138.09, 134.55, 131.58, 130.57, 129.81, 129.38, 129.22, 129.03, 128.93, 128.59, 128.30, 128.26, 128.19, 127.47, 124.16, 122.86, 122.60, 121.33, 120.00, 111.73, 63.12, 60.22, 54.23. MS *m*/*z*: 588 (0.74), 516 (0.31), 506 (5.31), 489 (0.92), 476 (1.84), 401 (23.69), 384 (7.99), 369 (18.88), 336 (6.10), 326 (8.42), 309 (100), 281 (11.92), 254 (3.59), 224 (13.69), 178 (14.94), 144 (14.37), 119 (38.88), 91 (73.54), 65 (10.36). Anal. Calcd for $C_{51}H_{39}N_7O_3$: C, 76.77; H, 4.93; N, 12.29; found C, 76.58; H, 5.00; N, 12.18.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*-(3,4-dichlorophenyl)quinoxaline-6-carboxamide** (**7n**) Light yellow powders: 528 mg, 76% yield; mp 124-126 °C. IR (ATR) cm^{-1}: 3289, 2971, 2928, 1683, 1642, 1553, 1471. ^1H NMR (300 MHz, $CDCl_3$): δ 8.78 (s, 2H), 7.94 (d, J = 1.9 Hz, 1H), 7.84-7.82 (m, 2H), 7.52 (dd, J = 8.7, 1.9 Hz, 1H), 7.32-7.21 (m, 7H), 7.13 (d, J = 7.6 Hz, 1H), 6.92-7.81 (m, 4H), 6.63 (s, 1H), 5.82 (s, 1H), 5.56 (s, 2H), 5.13 (AB_q, J = 12.0 Hz, 2H), 1.38 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.46, 168.62, 156.08, 145.87, 145.67, 144.13, 142.77, 142.03, 139.37, 137.66, 134.53, 132.08, 131.67, 131.32, 130.96, 130.67, 129.98, 129.52, 129.45, 129.34, 129.17, 129.10, 128.71, 128.15, 122.74, 122.59, 121.35, 111.56, 62.69, 59.75, 54.31, 51.90, 28.72. MS *m*/*z*: 593 (9.70), 565 (0.71), 536 (7.89), 437 (85.49), 403 (0.53), 377 (0.75),

336 (0.79), 300 (2.85), 266 (7.38), 157 (100), 144 (22.85), 129 (23.16), 91 (36.23), 57 (4.53). Anal. Calcd for $C_{37}H_{33}Cl_2N_7O_3$: C, 63.98; H, 4.79; N, 14.12; found C, 63.77; H, 4.85; N, 14.01.

***N*-(1-(5-bromo-2-((1-(4-nitrophenethyl)-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7o**) Light yellow powders: 751 mg, 82% yield; mp 88-90 °C. IR (ATR) cm^{-1}: 3273, 2970, 2869, 1681, 1640, 1515, 1488. ^1H NMR (300 MHz, $CDCl_3$): δ 8.06-7.91 (m, 5H), 7.80 (d, J = 8.7 Hz, 1H), 7.50 (dd, J = 8.7, 1.9 Hz, 1H), 7.40-6.90 (m, 18H), 6.74 (d, J = 8.8 Hz, 1H), 6.68 (s, 1H), 6.20 (s, 1H), 5.12 (AB_q, J = 12.0 Hz, 2H), 4.63 (t, J = 7.3 Hz, 2H), 3.31 (t, J = 7.3 Hz, 2H), 1.38 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.99, 168.26, 155.17, 154.33, 154.03, 146.89, 144.42, 143.79, 140.91, 140.12, 139.62, 138.59, 138.50, 137.96, 133.93, 132.65, 130.07, 129.85, 129.74, 129.58, 129.19, 129.09, 129.03, 128.50, 128.40, 128.25, 128.22, 127.62, 125.63, 123.83, 123.41, 122.95, 113.25, 112.97, 62.99, 59.47, 51.86, 50.73, 36.09, 28.70. MS *m*/*z*: 583 (12.84), 553 (2.63), 502 (3.14), 476 (3.12), 401 (10.69), 377 (8.69), 336 (4.45), 326 (8.02), 309 (100), 282 (26.20), 178 (16.28), 149 (14.57), 103 (12.38), 77 (30.11), 51 (6.74). Anal. Calcd for $C_{50}H_{43}BrN_8O_5$: C, 65.57; H, 4.73; N, 12.24; found C, 65.68; H, 4.81; N, 12.13.

***N*-(2-(cyclohexylamino)-1-(2-((1-(4-nitrophenethyl)-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-oxoethyl)-*N*-(3,4-dichlorophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7p**) Light yellow powders: 755 mg, 81% yield; mp 227-229 °C. IR (ATR) cm^{-1}: 3355, 2939, 2855, 1673, 1628, 1514, 1492. ^1H NMR (300 MHz, $CDCl_3$): δ 8.08-7.89 (m, 6H), 7.58 (dd, J = 8.7, 1.9 Hz, 1H), 7.47-6.83 (m, 19H), 5.94 (d, J = 8.2 Hz, 1H), 5.19 (AB_q, J = 11.9 Hz, 2H), 4.65 (t, J = 7.3 Hz, 2H), 3.96-3.82 (m, 1H), 3.32 (t, J = 7.3 Hz, 2H), 2.01-1.90 (m, 2H), 1.74-1.57 (m, 3H), 1.43-1.02 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.97, 168.47, 156.14, 154.57, 154.29, 146.94, 144.39, 144.02, 141.06, 140.19, 139.31, 138.56, 138.48, 137.56, 132.20, 131.76, 131.49, 131.19, 130.82, 130.07, 129.85, 129.81, 129.77, 129.58, 129.09, 128.91, 128.28, 123.88, 123.52, 122.80, 122.60, 121.43, 111.55, 62.82, 59.25, 50.73, 49.12, 36.10, 32.88, 25.43, 24.93, 24.84. MS *m*/*z*: 573 (0.62), 550 (1.33), 469 (12.53), 444 (1.13), 407 (4.10), 363 (12.48), 326 (25.18), 309 (100), 281 (10.17), 236 (4.53), 210 (5.60), 178 (12.44), 149 (21.51), 103 (14.73), 77 (18.73), 51 (5.09). Anal. Calcd for $C_{52}H_{44}Cl_2N_8O_5$: C, 67.02; H, 4.76; N, 12.02; found C, 67.16; H, 4.85; N, 11.90.

***N*-(2-(cyclohexylamino)-2-oxo-1-(2-((1-(*p*-tolyl)-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)ethyl)-*N*,2,3-triphenylquinoxaline-6-carboxamide** (**7q**) Light yellow powders: 700 mg, 87% yield; mp 160-162 °C. IR (ATR) cm^{-1}: 3329, 2928, 2853, 1680, 1629, 1592, 1492. ^1H NMR (300 MHz, $CDCl_3$): δ 8.56 (s, 1H), 8.06 (s, 1H), 7.91-6.80 (m, 26H), 6.11 (d, J = 8.1 Hz, 1H), 5.29 (AB_q, J = 12.0 Hz, 2H), 4.01-3.91 (m, 1H), 2.35 (s, 3H), 2.07-1.94 (m, 2H), 1.76-1.58 (m, 2H), 1.44-1.07 (m, 5H), 0.91-0.85 (m, 1H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.36, 168.78, 156.24, 154.09, 153.82, 144.98, 140.87, 140.20, 140.00, 138.75, 138.71, 138.64, 138.13, 134.65, 131.50, 130.37, 130.25, 129.83, 129.76, 129.36, 129.31, 128.98, 128.93, 128.52, 128.25, 128.21, 128.19, 127.33, 123.21, 121.12, 120.65, 120.05, 111.25, 63.07, 59.44, 48.99, 32.96, 25.52, 24.95, 24.86, 21.08. MS *m*/*z*: 545 (6.58), 523 (0.15), 503 (2.65), 494 (0.29), 481 (1.51), 401 (17.58), 369 (2.63), 340 (6.56), 326 (40.71), 309 (100), 281 (8.33), 248 (5.54), 223 (5.55), 196 (13.69), 178 (9.34), 91 (8.23), 56 (15.11). Anal. Calcd for $C_{51}H_{45}N_7O_3$: C, 76.19; H, 5.64; N, 12.20; found C, 76.03; H, 5.71; N, 12.10.

***N*-(2-(cyclohexylamino)-2-oxo-1-(2-((1-(*p*-tolyl)-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)ethyl)-*N*-(3,4-dichlorophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7r**) Light yellow powders: 734 mg, 84% yield; mp 132-134 °C. IR (ATR) cm^{-1}: 3294, 2929, 2853, 1679, 1640, 1518, 1469. ^1H NMR (300 MHz, $CDCl_3$): δ 8.48 (s, 1H), 8.04 (s, 1H), 7.91 (d, J = 8.6 Hz, 1H), 7.70 (d, J = 7.9 Hz, 2H), 7.59 (d, J = 8.8 Hz, 1H), 7.49-6.86 (m, 20H), 6.05 (d, J = 8.0 Hz, 1H), 5.29 (AB_q, J = 12.0 Hz, 2H), 3.99-3.89 (m, 1H), 2.36 (s, 3H), 2.06-1.94 (m, 2H), 1.75-1.59 (m, 3H), 1.44-1.07 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$):

δ 170.15, 168.54, 156.13, 154.41, 154.13, 144.65, 141.06, 140.23, 139.46, 138.75, 138.67, 138.63, 137.41, 134.58, 132.19, 131.82, 131.44, 131.29, 130.83, 130.27, 130.02, 129.84, 129.80, 129.60, 129.16, 129.07, 129.01, 128.27, 128.23, 122.72, 121.44, 120.57, 120.05, 111.52, 63.03, 59.20, 49.12, 32.93, 25.48, 24.93, 24.84, 21.09. MS *m*/*z*: 599 (2.47), 571 (1.59), 469 (10.20), 407 (6.32), 365 (5.06), 326 (47.48), 309 (100), 281 (8.76), 248 (5.60), 223 (3.26), 178 (7.16), 144 (44.56), 107 (8.91), 56 (7.00). Anal. Calcd for $C_{51}H_{43}Cl_2N_7O_3$: C, 70.18; H, 4.97; N, 11.23; found C, 70.01; H, 5.03; N, 11.09.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(4-methoxyphenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7s**) Light yellow powders: 726 mg, 87% yield; mp 146-148 °C. IR (ATR) cm^{-1}: 3276, 2934, 2852, 1674, 1635, 1507, 1453. ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.01 (d, *J* = 2.9 Hz, 2H), 7.86 (d, *J* = 8.6 Hz, 1H), 7.54 (dd, *J* = 8.5, 1.9 Hz, 1H), 7.48-6.78 (m, 22H), 6.35 (d, *J* = 8.4 Hz, 2H), 6.03 (d, *J* = 8.1 Hz, 1H), 5.50 (s, 2H), 5.19 (AB_q, *J* = 12.1 Hz, 2H), 3.96-3.84 (m, 1H), 3.52 (s, 3H), 2.02-1.89 (m, 2H), 1.73-1.55 (m, 3H), 1.39-1.02 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.44, 168.88, 158.21, 156.30, 154.01, 153.81, 144.67, 140.77, 140.23, 138.77, 138.57, 134.68, 132.54, 131.62, 131.45, 130.27, 129.83, 129.79, 129.30, 128.99, 128.75, 128.51, 128.27, 128.24, 128.14, 123.33, 122.72, 121.14, 113.20, 111.43, 63.08, 59.17, 55.07, 54.25, 48.88, 32.90, 25.49, 24.94, 24.83. MS *m*/*z*: 561 (27.22), 519 (34.90), 490 (4.64), 431 (51.87), 398 (6.08), 369 (1.23), 326 (15.43), 309 (100), 281 (9.51), 238 (4.73), 212 (1.75), 178 (6.02), 123 (10.45), 91 (23.18), 56 (22.86). Anal. Calcd for $C_{52}H_{47}N_7O_4$: C, 74.89; H, 5.68; N, 11.76; found C, 75.04; H, 5.58; N, 11.62.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*-(4-methoxyphenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7t**) Light yellow powders: 695 mg, 86% yield; mp 120-122 °C. IR (ATR) cm^{-1}: 3307, 2970, 2836, 1683, 1629, 1509, 1452. ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.02 (s, 2H), 7.85 (d, *J* = 8.8 Hz, 1H), 7.53-7.16 (m, 20H), 6.93 (d, *J* = 8.3 Hz, 1H), 6.84-6.76 (m, 2H), 6.36 (d, *J* = 8.5 Hz, 2H), 5.88 (s, 1H), 5.55 (s, 2H), 5.21 (AB_q, *J* = 12.1 Hz, 2H), 3.52 (s, 3H), 1.40 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.34, 168.96, 158.17, 156.23, 154.01, 153.79, 144.69, 140.77, 140.25, 138.78, 138.58, 134.68, 132.59, 131.50, 131.23, 130.17, 129.84, 129.80, 129.33, 129.03, 128.95, 128.83, 128.56, 128.45, 128.28, 128.24, 128.15, 123.42, 122.72, 121.11, 113.20, 111.32, 63.02, 59.54, 55.07, 54.30, 51.73, 28.77. MS *m*/*z*: 561 (43.15), 532 (13.30), 519 (16.30), 498 (0.18), 490 (4.58), 431 (39.22), 399 (2.69), 325 (4.64), 309 (100), 282 (13.34), 254 (2.65), 226 (9.46), 178 (5.34), 123 (4.87), 91 (17.87), 58 (27.04). Anal. Calcd for $C_{50}H_{45}N_7O_4$: C, 74.33; H, 5.61; N, 12.14; found C, 74.19; H, 5.70; N, 12.07.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)naphthalen-1-yl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(4-methoxyphenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7u**) Light yellow powders: 752 mg, 85% yield; mp 140-142 °C. IR (ATR) cm^{-1}: 3410, 2930, 2852, 1679, 1629, 1510, 1451. ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.15 (bs, 1H), 8.05 (d, *J* = 5.5 Hz, 2H), 7.92-7.25 (m, 24H), 7.18 (d, *J* = 9.1 Hz, 1H), 5.96 (d, *J* = 8.5 Hz, 2H), 5.58 (s, 2H), 5.33-5.07 (m, 2H), 4.49 (bs, 1H), 3.80-3.70 (m, 1H), 3.34 (s, 3H), 1.97-1.92 (m, 1H), 1.63 (d, *J* = 13.2 Hz, 1H), 1.47-1.21 (m, 4H), 1.06-0.94 (m, 3H), 0.81-0.69 (m, 1H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.67, 169.02, 158.25, 155.31, 153.95, 153.82, 144.52, 140.71, 140.16, 138.76, 138.41, 135.02, 133.76, 132.23, 131.94, 129.78, 129.37, 129.22, 129.14, 128.96, 128.90, 128.73, 128.47, 128.38, 128.24, 124.38, 123.15, 122.71, 115.61, 113.46, 112.60, 63.76, 56.06, 55.05, 54.31, 48.59, 33.27, 33.03, 25.33, 24.90, 24.69. MS *m*/*z*: 566 (5.75), 524 (0.97), 431 (50.44), 407 (0.94), 355 (4.28), 309 (100), 281 (9.03), 237 (3.10), 208 (2.24), 178 (5.62), 144 (3.21), 91 (14.62), 56 (13.00). Anal. Calcd for $C_{56}H_{49}N_7O_4$: C, 76.08; H, 5.59; N, 11.09; found C, 76.29; H, 5.65; N, 11.01.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)naphthalen-1-yl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*-(4-methoxyphenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7v**) Light yellow

powders: 747 mg, 87% yield; mp 148-150 °C. IR (ATR) cm^{-1}: 3413, 2970, 2930, 1688, 1627, 1509, 1450. ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.13 (bs, 1H), 8.01 (d, J = 9.3 Hz, 2H), 7.92-7.21 (m, 25H), 5.97 (d, J = 8.4 Hz, 2H), 5.55 (s, 2H), 5.21-5.13 (m, 2H), 4.48 (bs, 1H), 3.33 (s, 3H), 1.19 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 170.55, 168.89, 158.22, 155.52, 153.93, 153.80, 144.34, 140.68, 140.16, 138.78, 138.44, 134.88, 133.79, 132.14, 132.06, 129.78, 129.43, 129.25, 129.11, 128.96, 128.88, 128.72, 128.41, 128.25, 128.23, 124.30, 123.63, 122.84, 115.94, 113.73, 112.52, 63.88, 56.38, 55.05, 54.29, 51.48, 29.05. MS *m*/*z*: 566 (16.87), 521 (2.62), 431 (44.35), 435 (0.27), 382 (0.33), 355 (1.08), 326 (11.31), 309 (100), 281 (9.34), 237 (1.66), 212 (2.48), 178 (6.22), 144 (3.73), 91 (19.89), 64 (13.78). Anal. Calcd for $C_{54}H_{47}N_7O_4$: C, 75.59; H, 5.52; N, 11.43; found C, 75.50; H, 5.59; N, 11.36.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(3-nitrophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7w**) Light yellow powders: 705 mg, 83% yield; mp 127-129 °C. IR (ATR) cm^{-1}: 3063, 2929, 2852, 1660, 1528, 1450. ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.99 (s, 1H), 7.93-7.85 (m, 2H), 7.74 (d, J = 8.3 Hz, 1H), 7.57-7.02 (m, 21H), 6.95 (d, J = 8.3 Hz, 1H), 6.83-6.79 (m, 2H), 5.93 (d, J = 9.2 Hz, 1H), 5.56 (AB_q, J = 14.4 Hz, 2H), 5.19 (AB_q, J = 12.1 Hz, 2H), 3.96-3.86 (m, 1H), 2.05-1.88 (m, 2H), 1.75-1.59 (m, 3H), 1.40-1.02 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.92, 168.55, 156.15, 154.52, 154.22, 147.37, 144.02, 141.25, 141.00, 140.12, 138.52, 137.25, 134.55, 131.12, 130.93, 129.84, 129.10, 128.82, 128.68, 128.33, 128.18, 125.42, 122.82, 122.57, 122.13, 121.42, 111.81, 62.83, 59.52, 54.40, 49.06, 32.93, 25.46, 24.92, 24.80. MS *m*/*z*: 577 (8.11), 567 (0.83), 551 (23.91), 539 (1.54), 523 (20.50), 398 (28.31), 368 (33.18), 337 (26.44), 313 (36.50), 309 (7.15), 284 (20.09), 281 (7.06), 236 (44.51), 129 (38.73), 83 (69.34), 57 (100). Anal. Calcd for $C_{51}H_{44}N_8O_5$: C, 72.15; H, 5.22; N, 13.20; found C, 72.04; H, 5.28; N, 13.15.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(*tert*-butylamino)-2-oxoethyl)-*N*-(3-nitrophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7x**) Light yellow powders: 675 mg, 82% yield; mp 165-167 °C. IR (ATR) cm^{-1}: 3278, 2971, 1678, 1603, 1529, 1450. ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.00 (s, 1H), 7.92-7.89 (m, 2H), 7.72 (d, J = 8.2 Hz, 1H), 7.55-7.04 (m, 21H), 6.93 (d, J = 8.2 Hz, 1H), 6.81 (t, J = 7.6 Hz, 1H), 6.73 (s, 1H), 5.91 (s, 1H), 5.57 (AB_q, J = 14.6 Hz, 2H), 5.19 (AB_q, J = 12.0 Hz, 2H), 1.42 (s, 9H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.79, 168.67, 156.08, 154.48, 154.18, 147.34, 144.04, 141.27, 140.98, 140.15, 138.56, 138.54, 137.29, 136.94, 134.57, 130.86, 130.75, 129.85, 129.81, 129.15, 129.09, 128.79, 128.67, 128.31, 128.27, 128.14, 125.25, 122.80, 122.72, 122.03, 121.33, 111.66, 62.71, 59.89, 54.36, 51.98, 28.73. MS *m*/*z*: 549 (1.67), 513 (3.27), 446 (1.47), 414 (39.74), 309 (100), 282 (36.46), 254 (2.15), 203 (2.26), 178 (8.56), 144 (9.55), 91 (21.86), 57 (3.72). Anal. Calcd for $C_{49}H_{42}N_8O_5$: C, 71.52; H, 5.14; N, 13.62; found C, 71.45; H, 5.18; N, 13.55.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(isopropylamino)-2-oxoethyl)-*N*-(3-nitrophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**7y**) Light yellow powders: 640 mg, 79% yield; mp 134-136 °C. IR (ATR) cm^{-1}: 3300, 2970, 1677, 1642, 1528, 1451. ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.01 (s, 1H), 7.95-7.92 (m, 2H), 7.75 (d, J = 8.1 Hz, 1H), 7.59-7.03 (m, 21H), 6.96 (d, J = 8.2 Hz, 1H), 6.85-6.81 (m, 2H), 5.85 (d, J = 7.7 Hz, 1H), 5.59 (AB_q, J = 14.5 Hz, 2H), 5.21 (AB_q, J = 12.0 Hz, 2H), 4.27-4.18 (m, 1H), 1.23 (d, J = 6.4 Hz, 3H), 1.12 (d, J = 6.4 Hz, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.87, 168.56, 156.13, 154.51, 154.21, 147.37, 144.02, 141.24, 140.99, 140.12, 138.52, 137.23, 137.04, 134.56, 131.11, 130.89, 129.82, 129.07, 128.79, 128.66, 128.29, 128.16, 125.41, 122.77, 122.56, 122.11, 121.41, 111.82, 62.79, 59.50, 54.36, 42.12, 22.64, 22.53. MS *m*/*z*: 576 (6.92), 548 (7.84), 500 (0.34), 446 (11.32), 396 (6.91), 367 (5.32), 326 (100), 309 (81.61), 281 (12.52), 241 (10.96), 206 (7.80), 178 (20.48), 144 (26.07), 91 (91.51), 65 (9.44). Anal. Calcd for $C_{48}H_{40}N_8O_5$: C, 71.27; H, 4.98; N, 13.85; found C, 71.36; H, 4.93; N, 13.78.

Characterization data of intermediates A1 and B1

2,3-Diphenylquinoxaline-6-carboxylic acid (**A1**) White powders: mp 288-290 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ 13.59 (bs, 1H), 8.59 (s, 1H), 8.25 (d, J = 8.7 Hz, 1H), 8.14 (d, J = 8.7 Hz, 1H), 7.47-7.44 (m, 4H), 7.39-7.30 (m, 6H). ^{13}C NMR (75 MHz, DMSO-d_6): δ 167.03, 155.09, 154.46, 142.72, 140.09, 138.80, 132.48, 131.16, 130.20, 130.16, 129.92, 129.64, 129.57, 129.46, 128.52. Data matched with literature reference[4].

***N*-(2-(cyclohexylamino)-2-oxo-1-(2-(prop-2-yn-1-yloxy)phenyl)ethyl)-*N*-(3,4-dichlorophenyl)-2,3-diphenylquinoxaline-6-carboxamide** (**B1**) White powders: mp 147-149 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.20 (s, 1H), 7.97 (d, J = 8.6 Hz, 1H), 7.70 (d, J = 8.6 Hz, 1H), 7.50-6.84 (m, 17H), 6.61 (s, 1H), 5.72 (d, J = 8.0 Hz, 1H), 4.82-4.68 (m, 2H), 3.98-3.87 (m, 1H), 2.60 (t, J = 2.5 Hz, 1H), 2.06-1.94 (m, 2H) 1.75-1.58 (m, 3H), 1.46-1.02 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 169.90, 168.57, 155.27, 154.35, 154.12, 141.08, 140.32, 139.66, 138.71, 137.67, 132.24, 131.73, 131.35, 131.17, 130.46, 130.16, 129.84, 129.60, 129.11, 128.99, 128.27, 122.60, 121.49, 111.65, 77.97, 76.45, 60.00, 55.80, 49.04, 32.88, 25.49, 24.89, 24.80.

General procedure for the synthesis of *N*-substituted isatins 2d-e

N-substituted isatins were synthesized from the reaction of isatin with MeI or BnBr in the presence of K_2CO_3 in DMF at room temperature. MeI or BnBr (6 mmol) was added to a stirred solution of isatin (2 mmol) and K_2CO_3 (5 mmol) in DMF and stirred for 12 h at room temperature. The reaction mixture was quenched with water and extracted with dichloromethane (3 × 20 mL). The combined organic phases were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated in vacuum. Then, the crude residue was purified by column chromatography on silica gel to afford the pure product.[5]

General procedure for the synthesis of indolo[2,3-*b*]quinoxalines 8a-b/8a′-b′

A solution of 3,4-diaminobenzoic acid (1 mmol) and a *N*-substituted isatin (1 mmol) in 3 mL of glacial acetic acid was stirred at 90 °C for 2 h. After cooling to room temperature, the mixture was diluted with EtOH (2 mL). Then, the precipitated was filtered off to afford a pure inseparable mixture of regioisomers of indolo[2,3-*b*]quinoxalines **8**/**8′**.

Characterization data of indolo[2,3-*b*]quinoxalines 8a-b/8a′-b′

6-Methyl-6*H*-indolo[2,3-*b*]quinoxaline-2-carboxylic acid (**8a**) and **6-methyl-6*H*-indolo[2,3-*b*]quinoxaline-3-carboxylic acid** (**8a′**) Inseparable mixture of regioisomers, yellow powders: 250 mg, 90% yield. ^{1}H NMR (300 MHz, DMSO-d_6): (mixture of regioisomers) δ 13.14 (bs, 1H), 8.50 (s, 0.34H), 8.33 (s, 0.66H), 8.11 (d, J = 7.7 Hz, 1H), 8.05-7.22 (m, 5H), 3.67 (s, 3H). ^{13}C NMR (75 MHz, DMSO-d_6): (mixture of regioisomers) δ 167.39, 145.72, 145.42, 145.33, 145.01, 142.39, 140.92, 140.62, 140.55, 139.09, 137.51, 132.12, 131.86, 131.42, 130.57, 129.66, 129.38, 128.28, 127.87, 127.72, 125.29, 122.62, 122.48, 121.49, 121.30, 118.42, 118.31, 110.39, 27.68, 27.63.

6-Benzyl-6*H*-indolo[2,3-*b*]quinoxaline-2-carboxylic acid (**8b**) and **6-benzyl-6*H*-indolo[2,3-*b*]quinoxaline-3-carboxylic acid** (**8b′**) Inseparable mixture of regioisomers, yellow powders: 293 mg, 83% yield. ^{1}H NMR (300 MHz, DMSO-d_6): (mixture of regioisomers) δ 13.23 (bs, 1H), 8.74 (s, 0.34H), 8.58 (s, 0.66H), 8.32 (d, J = 7.8 Hz, 1H), 8.27-7.19 (m, 10H), 5.67 (s, 2H). ^{13}C NMR (75 MHz, DMSO-d_6): (mixture of regioisomers) δ 167.44, 146.13, 145.83, 144.87, 144.55, 142.72, 141.38, 141.15, 139.46, 138.17, 137.12, 137.02, 132.52, 131.62, 131.02, 129.95, 129.74, 129.14, 128.42, 127.99, 127.76, 127.64, 125.84, 123.09, 122.95, 121.89, 118.86, 111.27, 44.65.

General procedure for the synthesis of structures containing indolo[2,3-*b*]quinoxaline-pseudopeptide-triazole pharmacophores 9a-c/9a′-c′

A mixture of indolo[2,3-*b*]quinoxalines **8**/**8′** (1 mmol), an amine (1 mmol), a propargyloxy aldehyde (1 mmol), and an isocyanide (1 mmol) in EtOH (8 mL) was stirred at room temperature for 18 h. After completion of the reaction (monitored by TLC), an azide compound (1.2 mmol), $Cu(OAc)_2.H_2O$ (0.02 g, 10 mol %), and sodium ascorbate (0.04g, 20 mol %) were added. Then, the resulting mixture was stirred for 3 h at ambient temperature. After completion of the reaction (monitored by TLC), the reaction mixture was partitioned between ethyl acetate (30 mL), water (40 mL), and ammonia solution 25% (4 mL). The organic layer was separated, and the aqueous layer was extracted with ethyl acetate (2 × 30 mL). The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4, and concentrated in vacuo. The crude product was loaded on a silica gel column and eluted with *n*-hexane/EtOAc to afford a pure inseparable mixture of regioisomers **9**/**9′**.

Characterization data of products 9a-c/9a′-c′

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)naphthalen-1-yl)-2-(cyclohexylamino)-2-oxoethyl)-6-methyl-*N*-phenyl-6*H*-indolo[2,3-*b*]quinoxaline-2-carboxamide** (**9a**) and ***N*-(1-(2-((1-**

benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)naphthalen-1-yl)-2-(cyclohexylamino)-2-oxoethyl)-6-methyl-*N*-phenyl-6*H*-indolo[2,3-*b*]quinoxaline-3-carboxamide (**9a′**), Inseparable mixture of regioisomers, yellow powders: 628 mg, 78% yield. IR (ATR) cm^{-1}: 3249, 2928, 2852, 1681, 1618, 1586, 1403. ^{1}H NMR (300 MHz, $CDCl_3$): (mixture of regioisomers) δ 8.30 (d, J = 7.8 Hz, 1H), 8.16-7.07 (m, 21H), 6.63 (t, J = 7.5 Hz, 1H), 6.47 (t, J = 7.7 Hz, 2H), 5.56-5.51 (m, 3H), 5.05 (d, J = 12.1 Hz, 1H), 4.38 (bs, 1H), 4.34 (bs), 3.80-3.73 (m, 4H), 2.04-1.96 (m, 1H), 1.64 (d, J = 13.9 Hz, 1H), 1.48-1.26 (m, 4H), 1.11-0.88 (m, 3H), 0.79-0.72 (m, 1H). ^{13}C NMR (75 MHz, $CDCl_3$): (mixture of regioisomers) δ 170.93, 169.04, 155.30, 145.79, 144.90, 144.52, 140.46, 139.63, 139.40, 138.74, 136.72, 134.95, 133.75, 132.06, 131.24, 129.10, 128.78, 128.68, 128.44, 128.30, 127.74, 127.21, 125.44, 124.24, 123.13, 122.70, 122.57, 121.01, 118.97, 115.80, 113.43, 109.08, 63.69, 56.08, 54.27, 48.67, 33.30, 33.10, 27.41, 25.35, 24.94, 24.71. MS *m*/*z*: 545 (0.19), 532 (1.50), 487 (2.65), 434 (6.07), 403 (0.90), 352 (52.19), 336 (30.68), 308 (4.93), 283 (2.68), 276 (9.22), 260 (100), 232 (9.27), 205 (16.68), 184 (12.66), 156 (4.23), 128 (3.86), 91 (43.07), 56 (23.40). Anal. Calcd for $C_{50}H_{44}N_8O_3$: C, 74.61; H, 5.51; N, 13.92; found C, 74.70; H, 5.57; N, 13.82.

***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(4-methoxyphenyl)-6-methyl-6*H*-indolo[2,3-*b*]quinoxaline-2-carboxamide** (**9b**) and ***N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(4-methoxyphenyl)-6-methyl-6*H*-indolo[2,3-*b*]quinoxaline-3-carboxamide** (**9b′**), Inseparable mixture of regioisomers, yellow powders: 691 mg, 88% yield. IR (ATR) cm^{-1}: 3270, 2934, 2855, 1669, 1631, 1584, 1402. ^{1}H NMR (300 MHz, $CDCl_3$): (mixture of regioisomers) δ 8.25-7.96 (m, 3H), 7.86-7.82 (m, 0.66H), 7.75-7.70 (m, 0.34H), 7.54-6.74 (m, 16H), 6.38-6.30 (m, 3H), 5.51-5.37 (m, 2H), 5.21-4.94 (m, 2H), 3.97-3.90 (m, 1H), 3.73 (s), 3.72 (s, 3H), 3.43 (s), 3.42 (s, 3H), 2.01-1.88 (m, 2H), 1.71-1.53 (m, 3H), 1.40-1.01 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): (mixture of regioisomers) δ 170.95, 170.88, 169.10, 158.06, 156.22, 145.80, 145.71, 144.80, 144.69, 140.36, 139.49, 138.69, 137.94, 137.13, 134.71, 134.27, 133.14, 132.92, 131.63, 131.41, 131.17, 130.11, 129.44, 128.95, 128.47, 128.28, 128.11, 127.59, 126.80, 125.26, 123.61, 123.53, 122.66, 122.53, 121.06, 120.95, 118.92, 118.81, 113.02, 111.32, 109.02, 63.02, 59.15, 54.97, 54.16, 48.89, 32.92, 27.34, 25.49, 24.96, 24.85. MS *m*/*z*: 545 (0.23), 525 (0.28), 512 (9.07), 470 (16.28), 441 (3.88), 400 (1.60), 382 (28.92), 349 (3.04), 305 (3.81), 277 (10.85), 260 (100), 232 (9.16), 205 (13.38), 173 (2.13), 123 (14.30), 91 (27.65), 56 (32.66). Anal. Calcd for $C_{47}H_{44}N_8O_4$: C, 71.92; H, 5.65; N, 14.28; found C, 71.81; H, 5.72; N, 14.13.

6-Benzyl-*N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(4-methoxyphenyl)-6*H*-indolo[2,3-*b*]quinoxaline-2-carboxamide (**9c**) and **6-benzyl-*N*-(1-(2-((1-benzyl-1*H*-1,2,3-triazol-4-yl)methoxy)phenyl)-2-(cyclohexylamino)-2-oxoethyl)-*N*-(4-methoxyphenyl)-6*H*-indolo[2,3-*b*]quinoxaline-3-carboxamide** (**9c′**), Inseparable mixture of regioisomers, yellow powders: 715 mg, 83% yield. IR (ATR) cm^{-1}: 3273, 2928, 2852, 1674, 1611, 1581, 1491. ^{1}H NMR (300 MHz, $CDCl_3$): (mixture of regioisomers) δ 8.42-8.02 (m, 3H), 7.95 (d, J = 8.7 Hz, 0.7H), 7.81 (d, J = 8.7 Hz, 0.3H), 7.58-6.77 (m, 21H), 6.35 (d, J = 8.5 Hz, 2H), 6.09 (d, J = 8.1 Hz, 0.3H), 6.04 (d, J = 8.1 Hz, 0.7H), 5.63 (s), 5.62 (s, 2H), 5.53-5.49 (m, 2H), 5.29-5.07 (m, 2H), 3.98-3.88 (m, 1H), 3.50 (s), 3.49 (s, 3H), 2.04-1.91 (m, 2H), 1.73-1.57 (m, 3H), 1.44-1.04 (m, 5H). ^{13}C NMR (75 MHz, $CDCl_3$): (mixture of regioisomers) δ 170.88, 169.03, 158.14, 158.06, 156.30, 145.99, 145.86, 144.79, 144.32, 144.20, 140.55, 140.48, 139.67, 139.17, 138.39, 137.12, 136.36, 136.29, 134.68, 134.46, 132.88, 131.57, 131.49, 131.30, 130.18, 129.00, 128.80, 128.54, 128.43, 128.17, 127.99, 127.74, 127.31, 127.18, 126.91, 125.54, 123.56, 123.44, 122.81, 122.75, 122.68, 121.27, 121.11, 119.48, 119.39, 113.10, 111.40, 110.10, 63.13, 59.25, 55.03, 54.26, 48.89, 45.02, 32.95, 25.51, 24.95, 24.84. MS *m*/*z*: 588 (0.15), 470 (0.22), 443 (1.58), 407 (0.17), 382 (0.35), 353 (79.31), 334 (5.49), 336

(2.06), 308 (5.65), 276 (7.85), 260 (4.62), 249 (0.85), 227 (4.73), 203 (6.36), 158 (3.96), 91 (90.03), 64 (100). Anal. Calcd for $C_{53}H_{48}N_8O_4$: C, 73.93; H, 5.62; N, 13.01; found C, 73.85; H, 5.68; N, 12.91.

IR, ^{1}H NMR, ^{13}C NMR, and Mass spectra

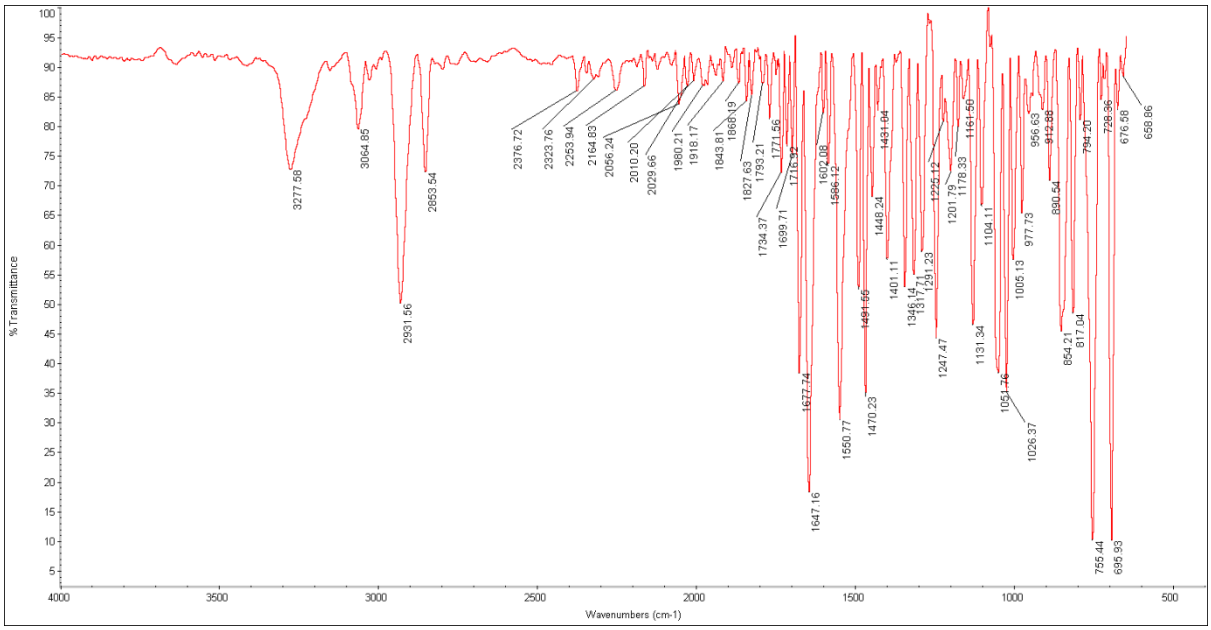

Figure 2. IR spectrum of compound **7a**

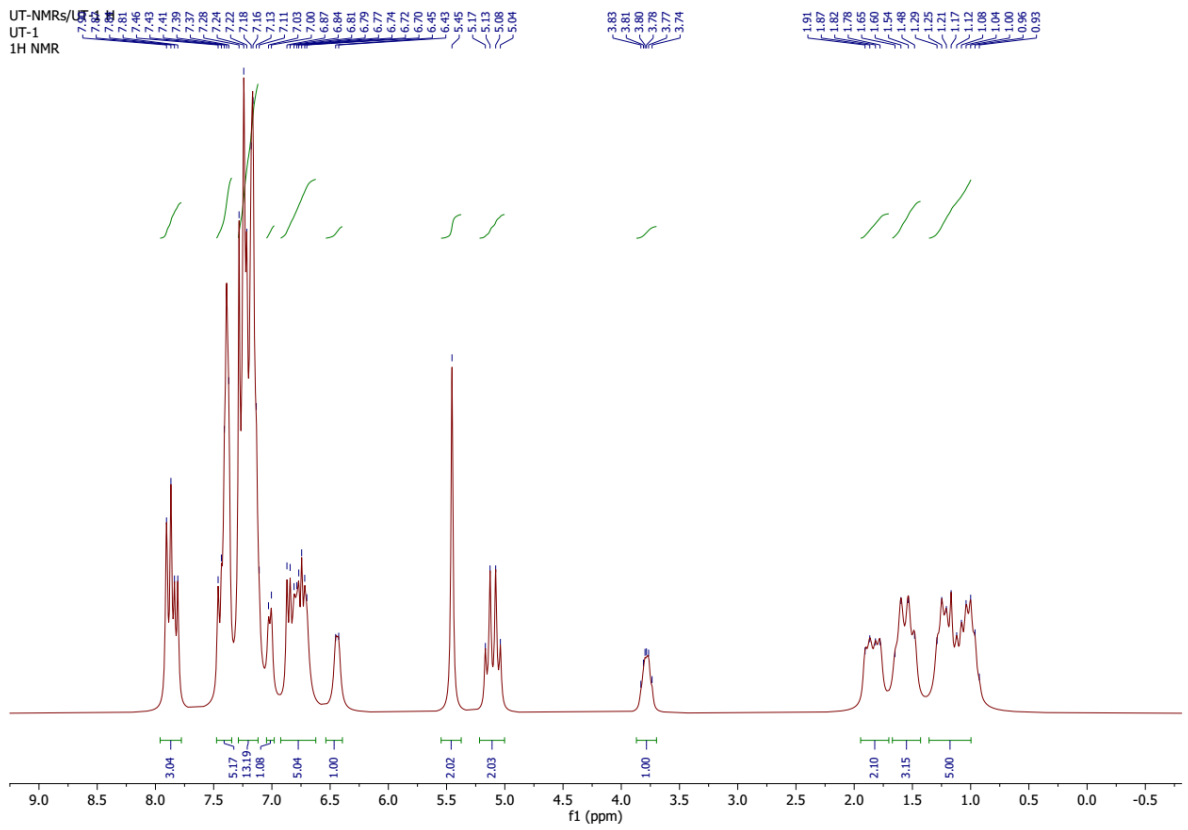

Figure 3. ^{1}H NMR spectrum of compound **7a**

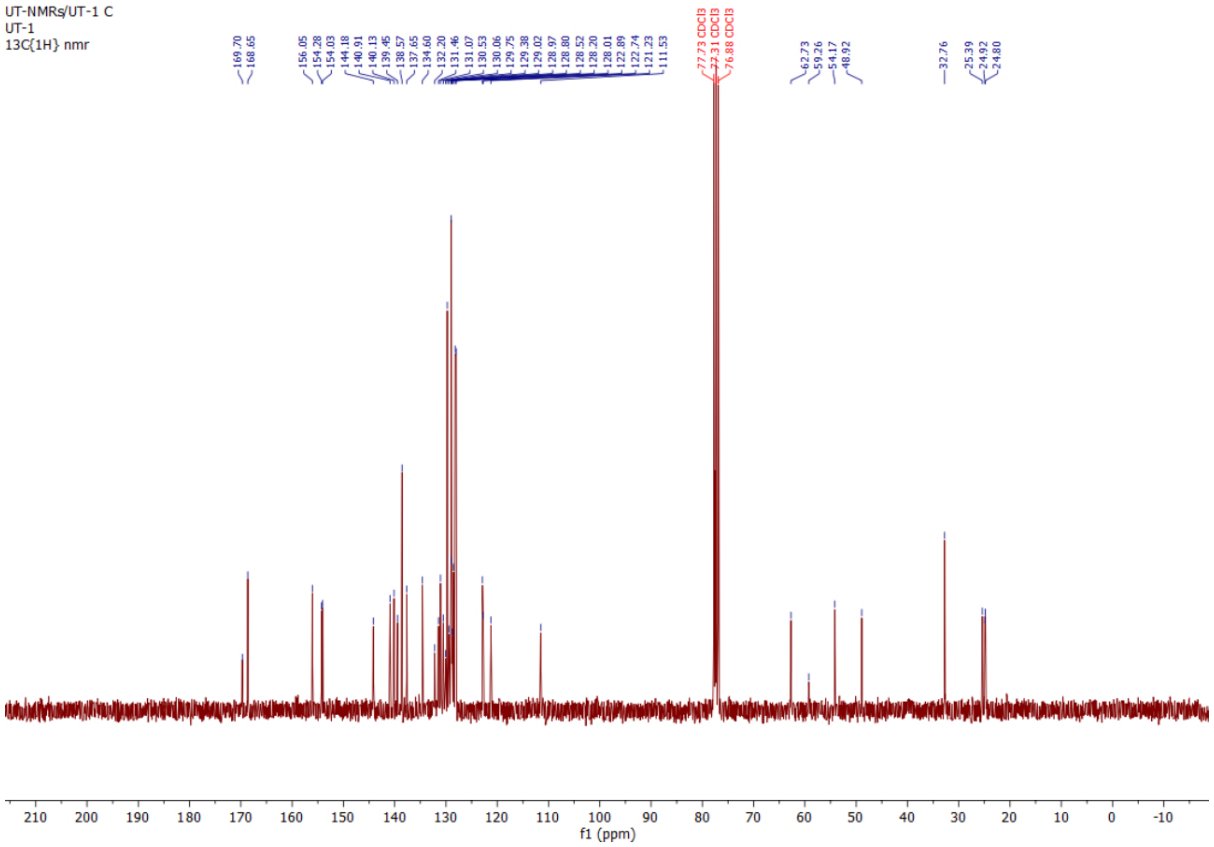

Figure 4. ^{13}C NMR spectrum of compound **7a**

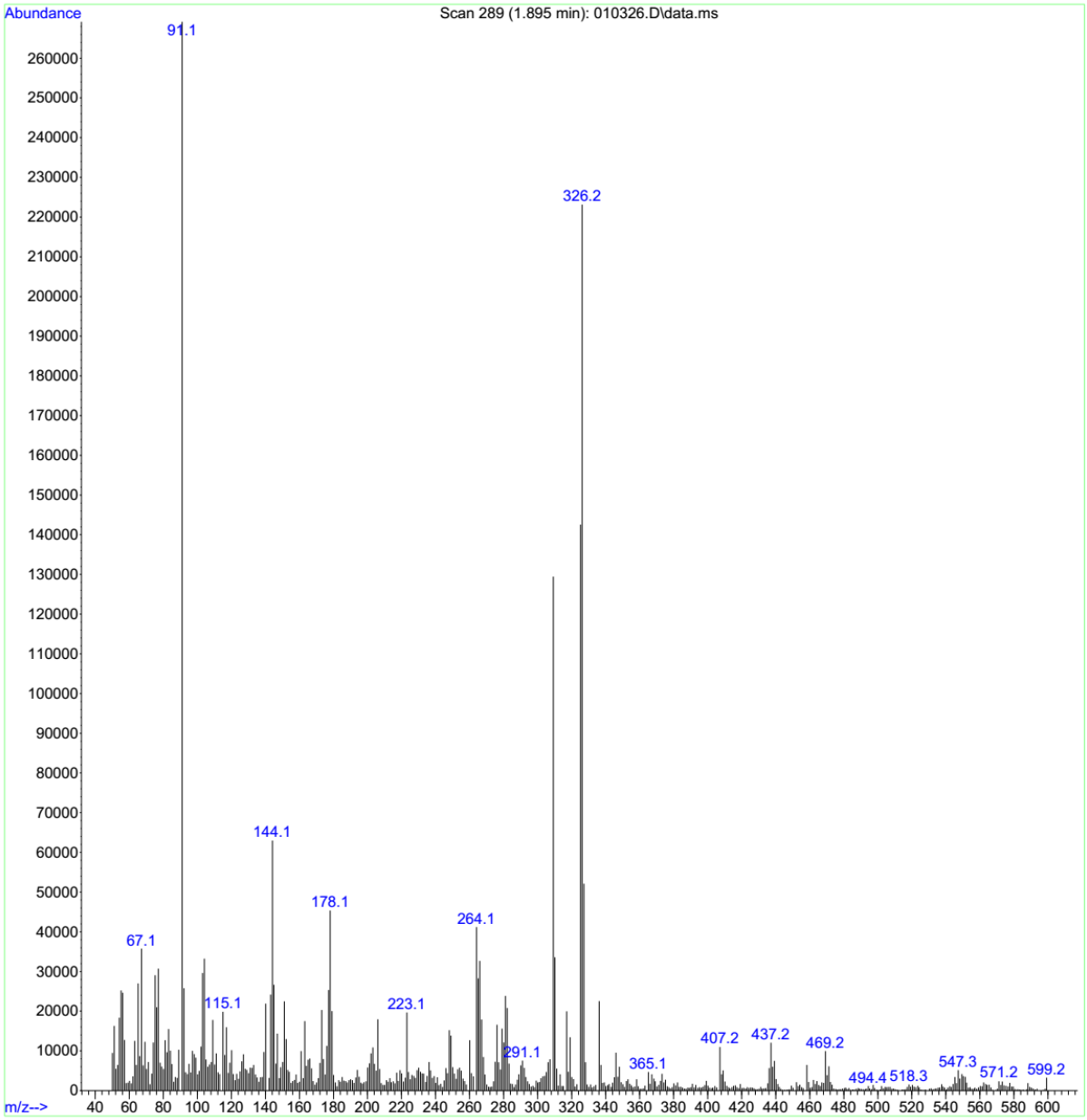

Figure 5. Mass spectrum of compound **7a**

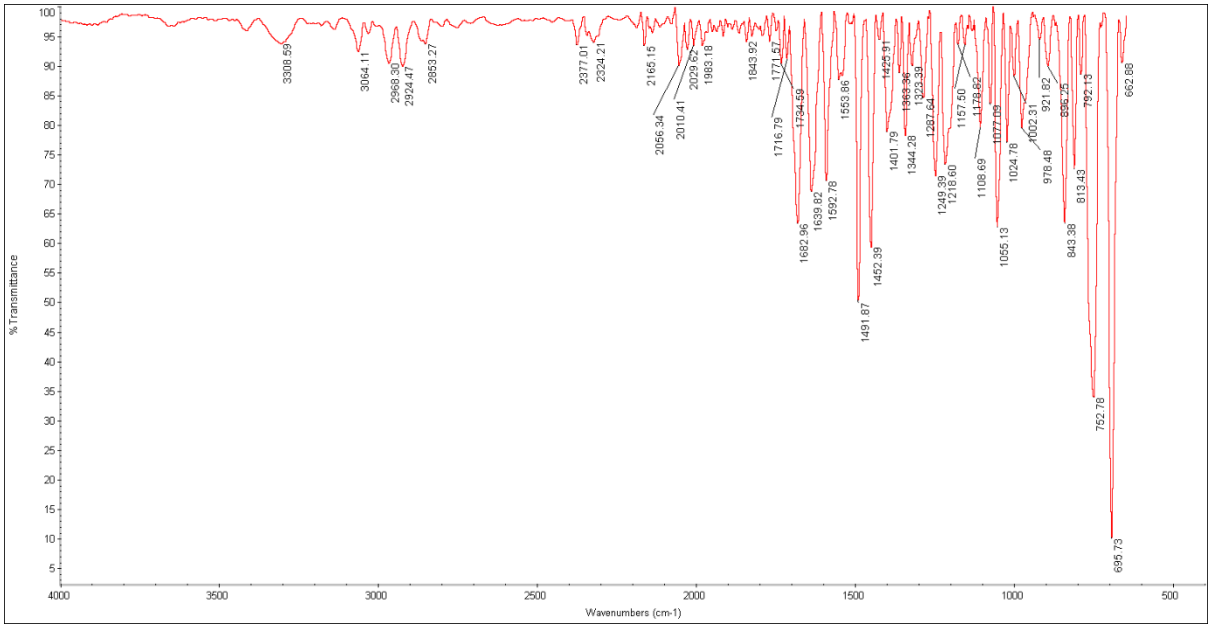

Figure 6. IR spectrum of compound **7b**

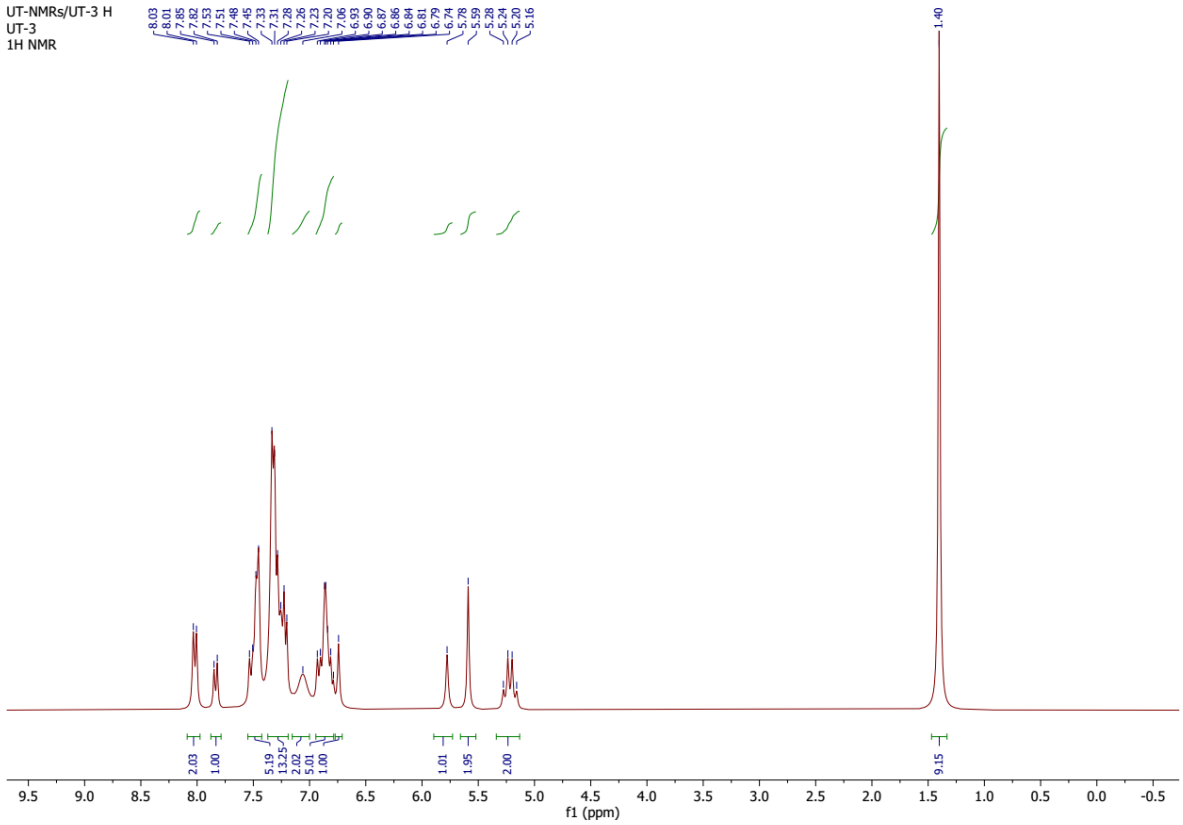

Figure 7. ^{1}H NMR spectrum of compound **7b**

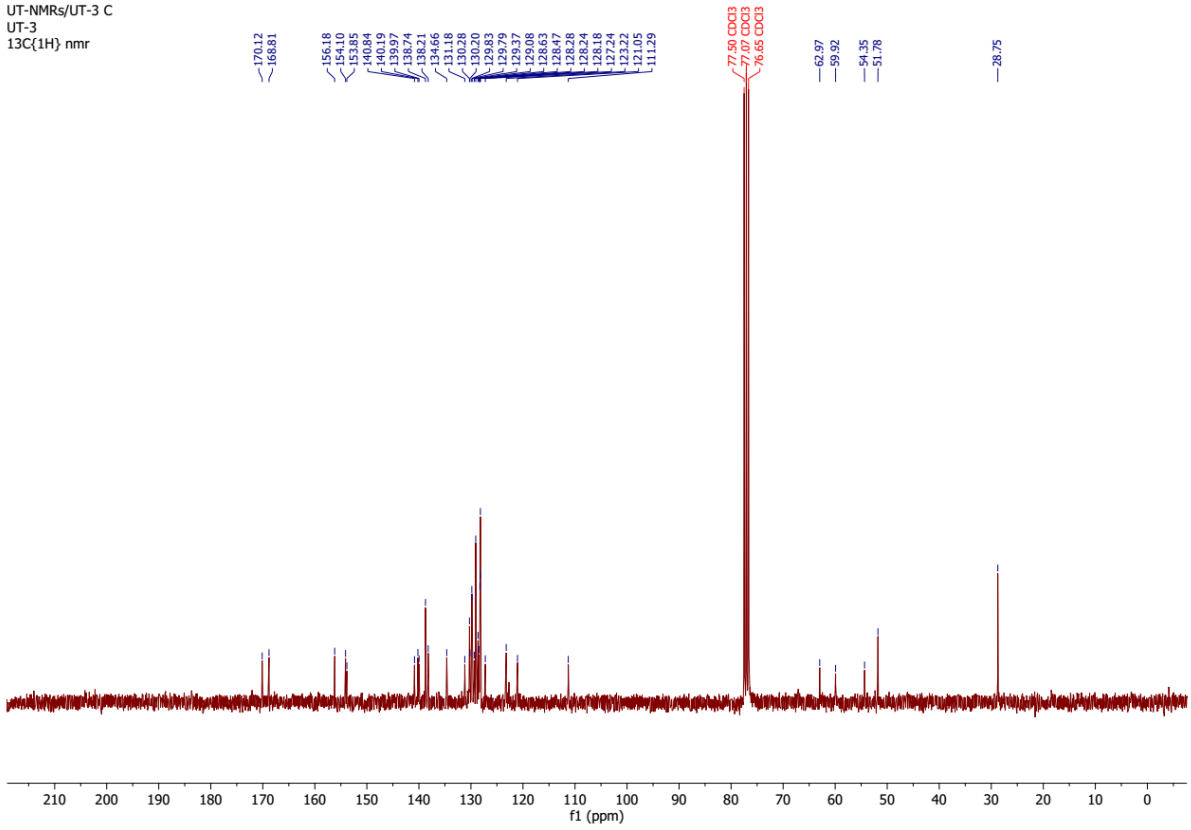

Figure 8. ^{13}C NMR spectrum of compound **7b**

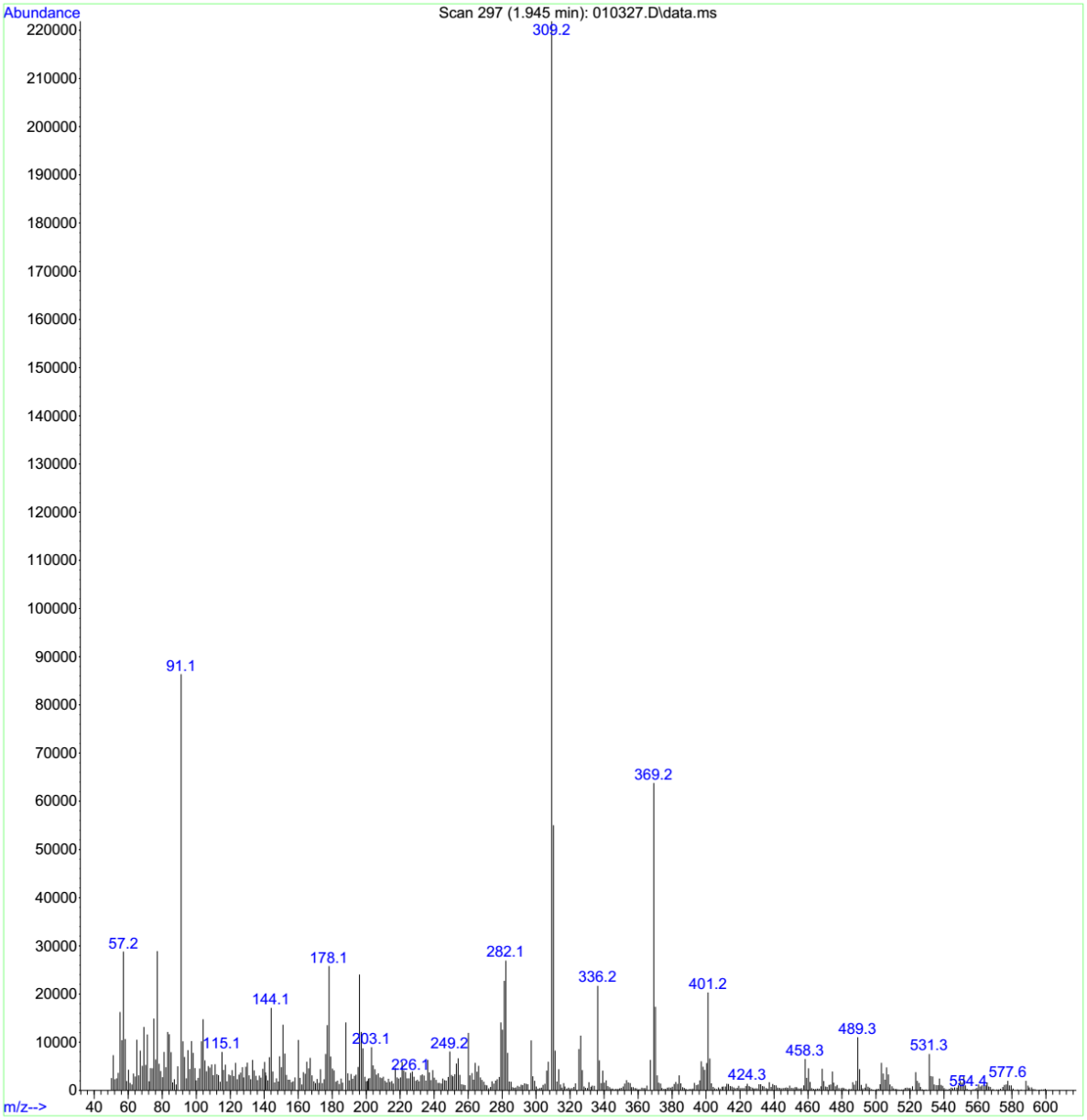

Figure 9. Mass spectrum of compound **7b**

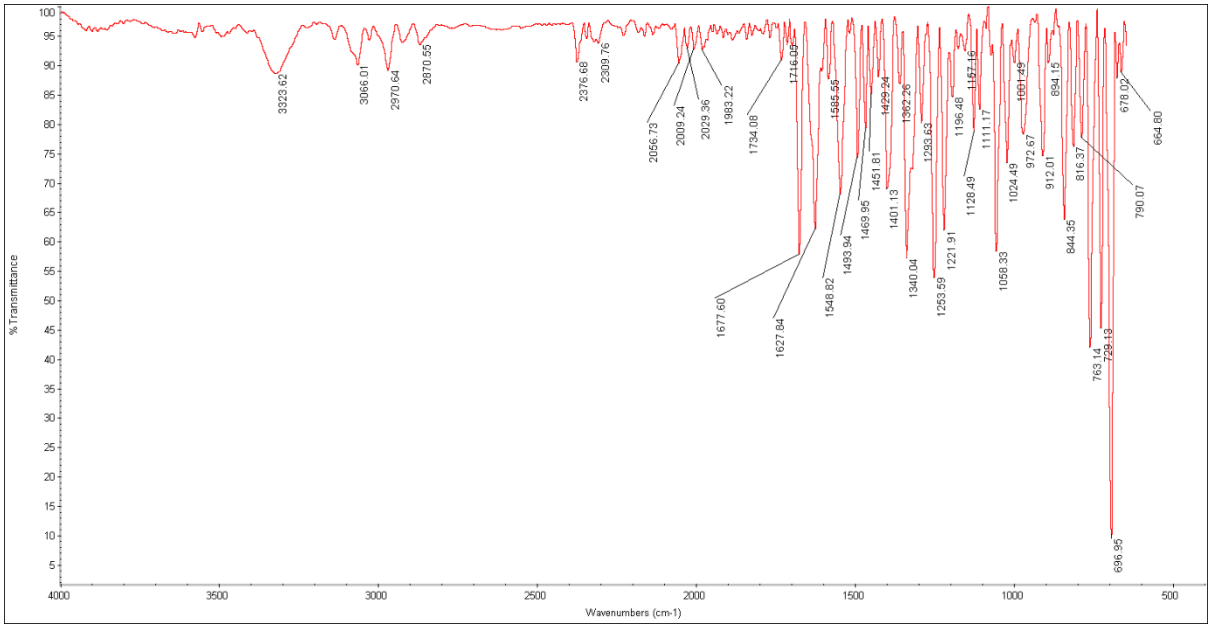

Figure 10. IR spectrum of compound **7c**

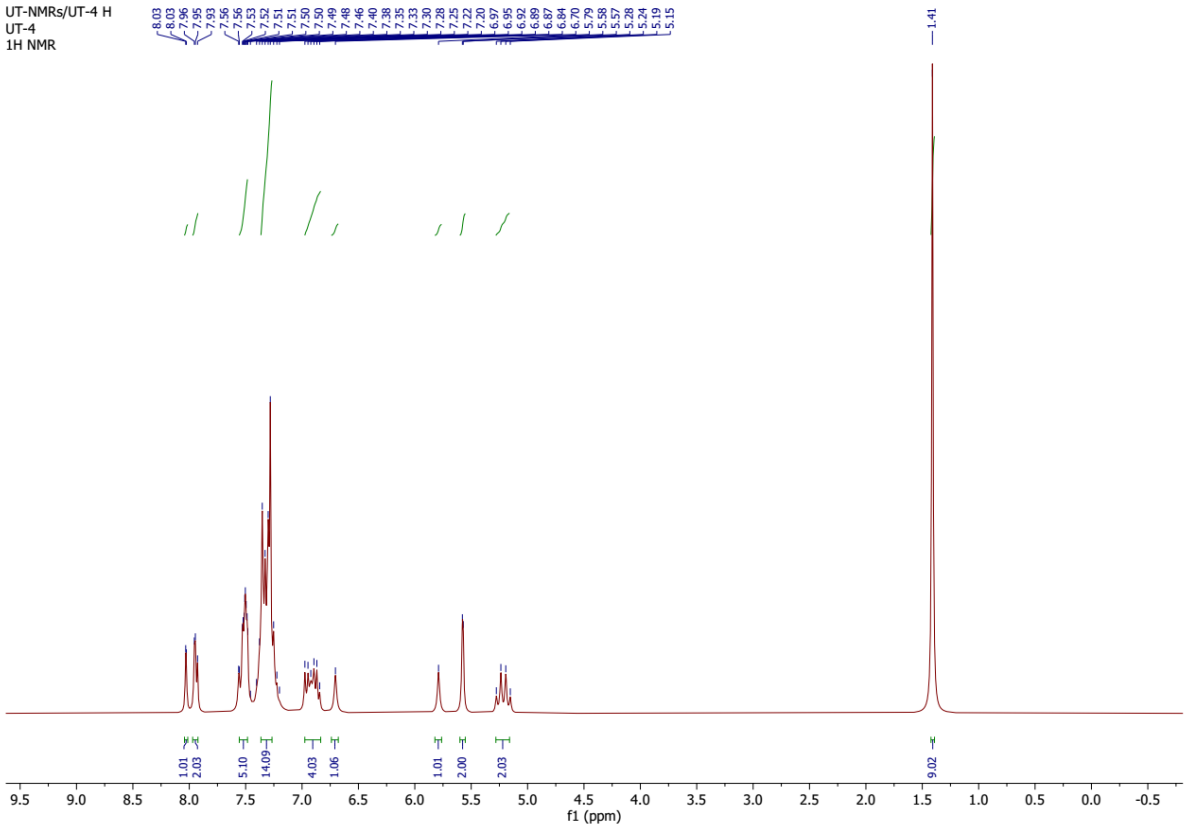

Figure 11. ^{1}H NMR spectrum of compound **7c**

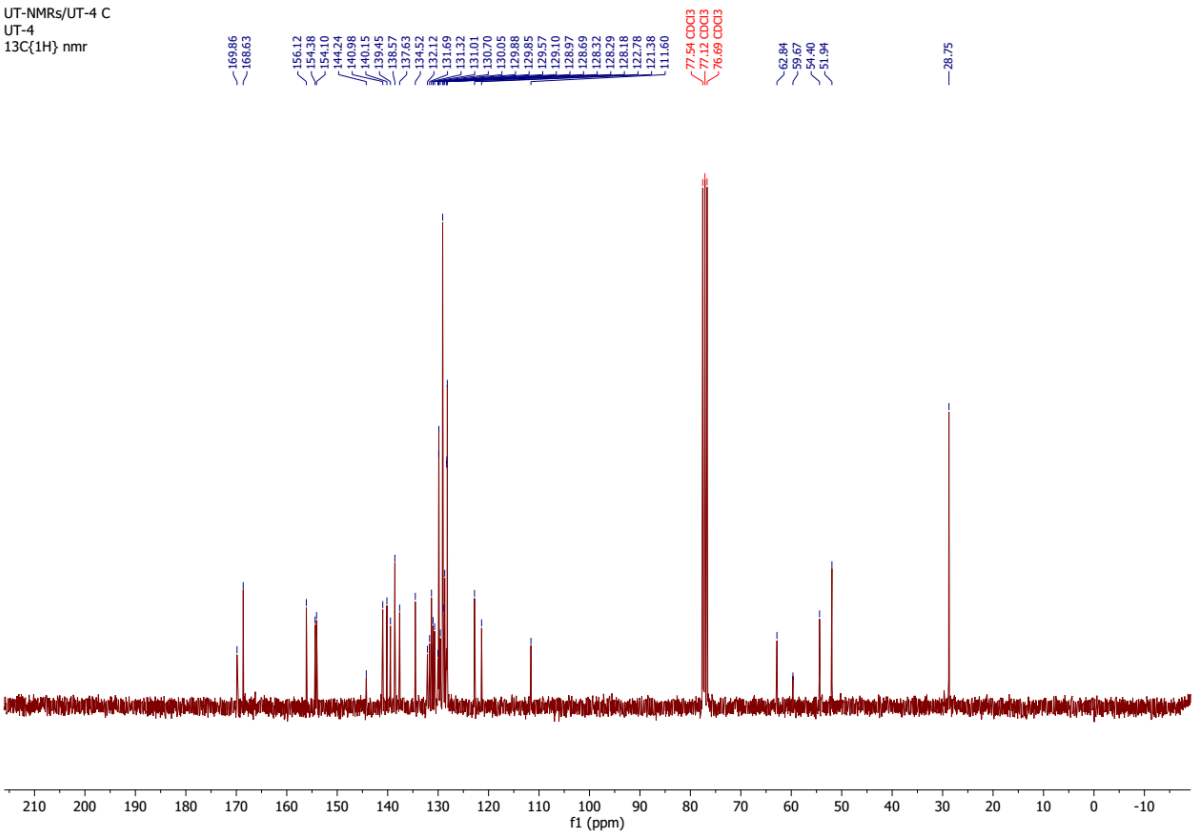

Figure 12. ^{13}C NMR spectrum of compound **7c**

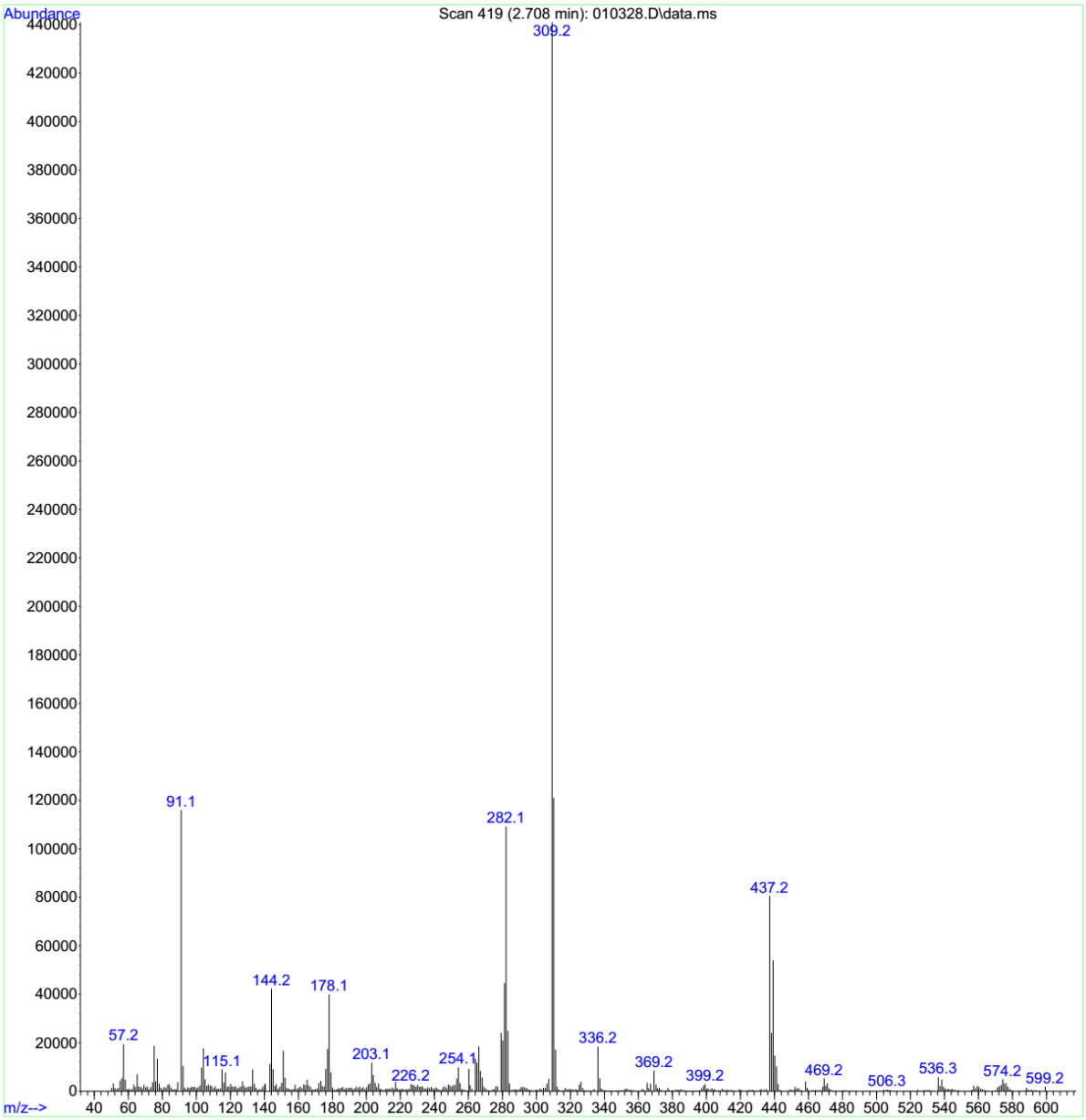

Figure 13. Mass spectrum of compound **7c**

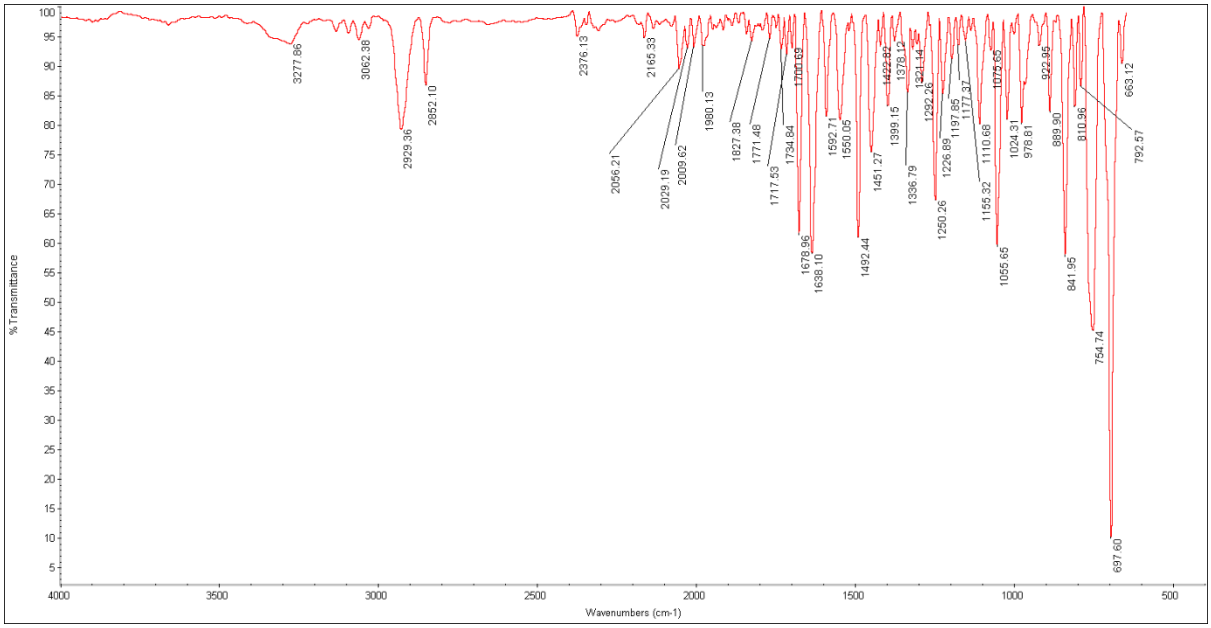

Figure 14. IR spectrum of compound **7d**

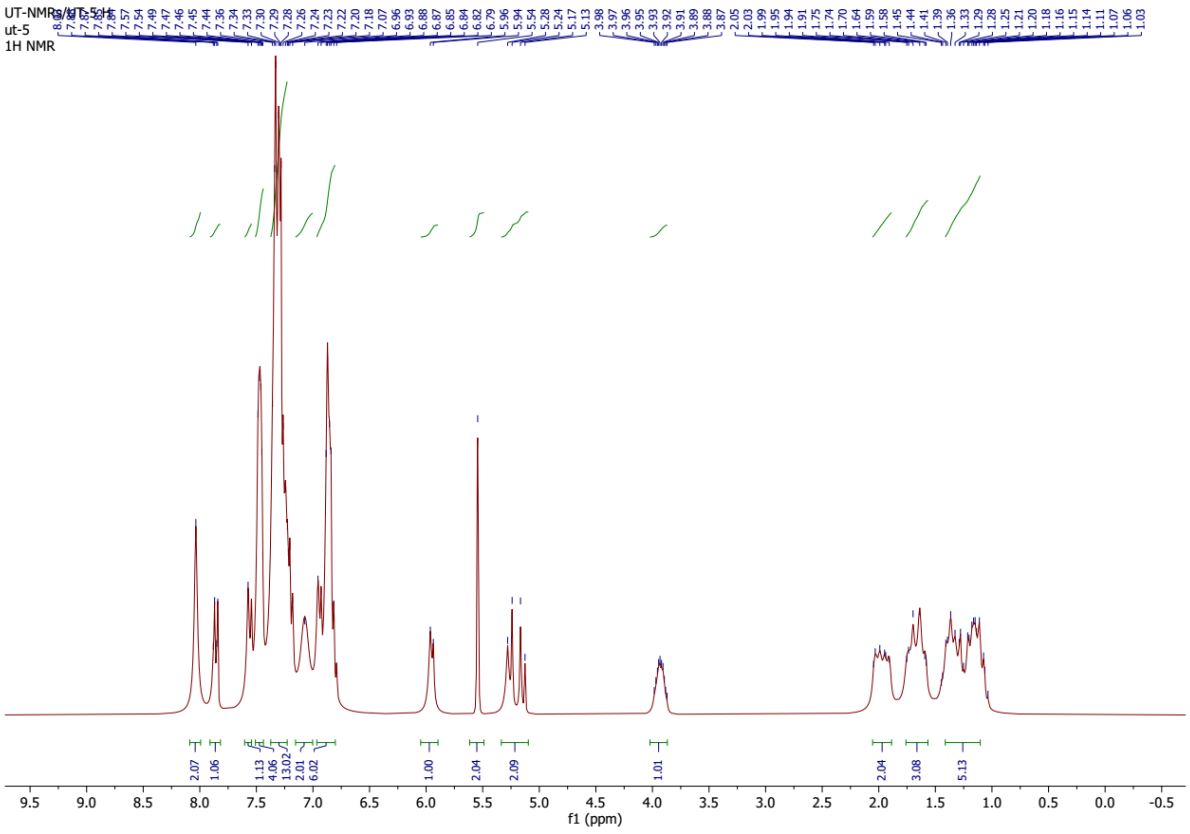

Figure 15. ^{1}H NMR spectrum of compound **7d**

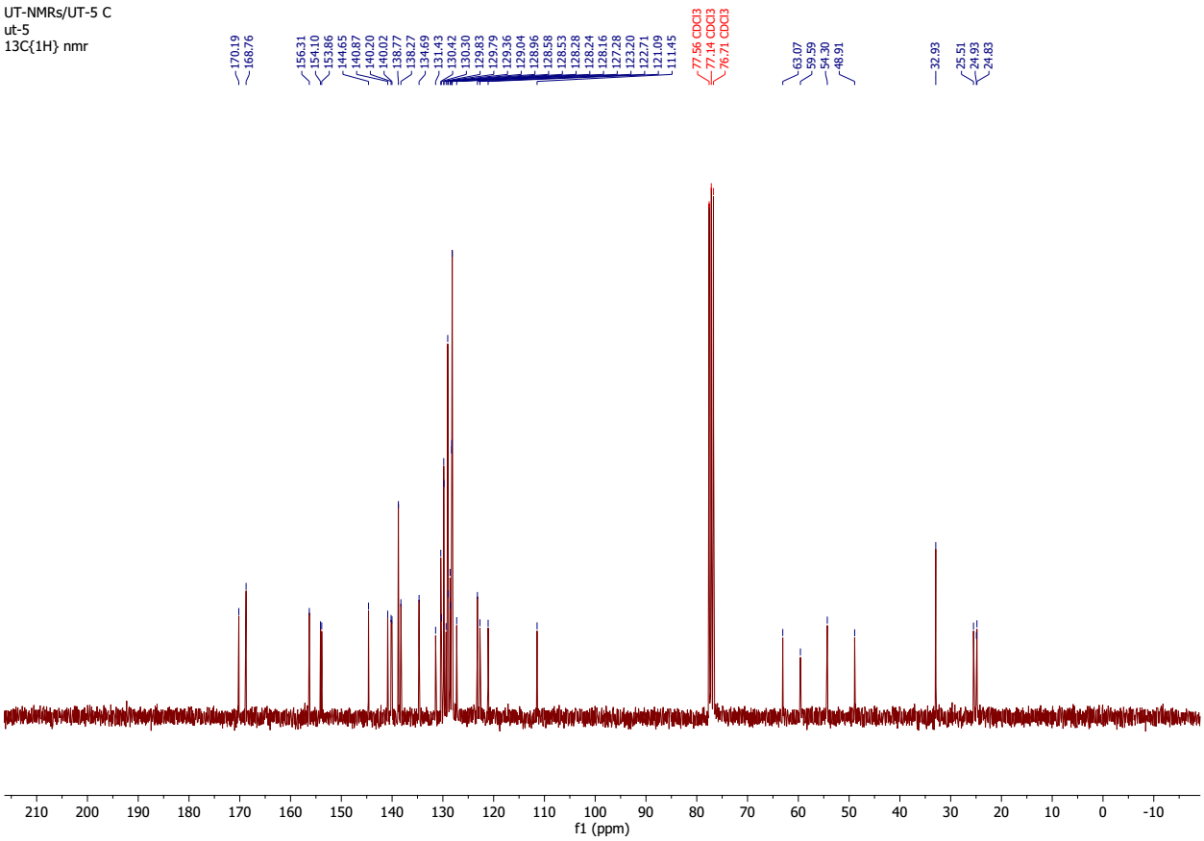

Figure 16. ^{13}C NMR spectrum of compound **7d**

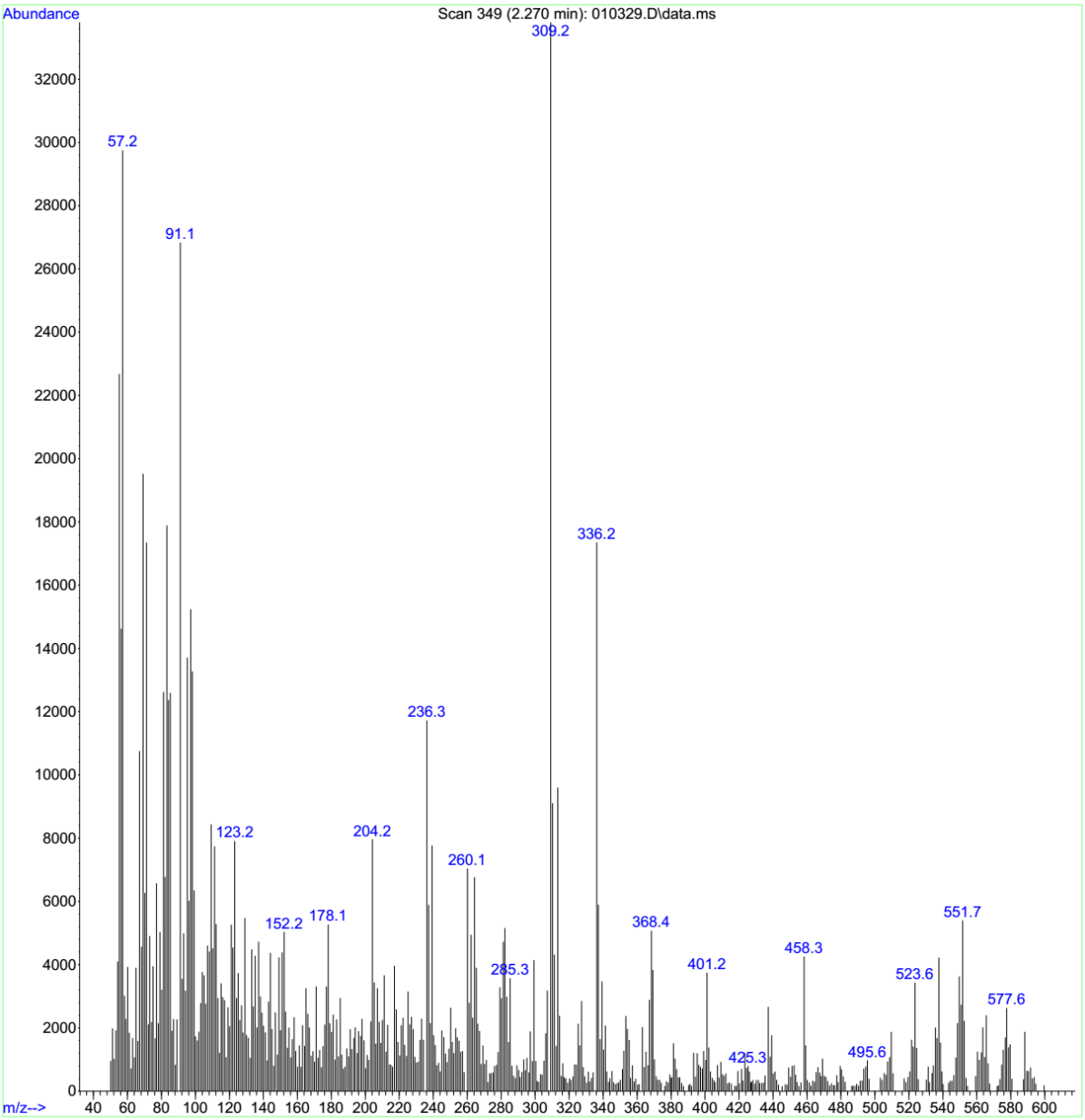

Figure 17. Mass spectrum of compound **7d**

Figure 18. IR spectrum of compound **7e**

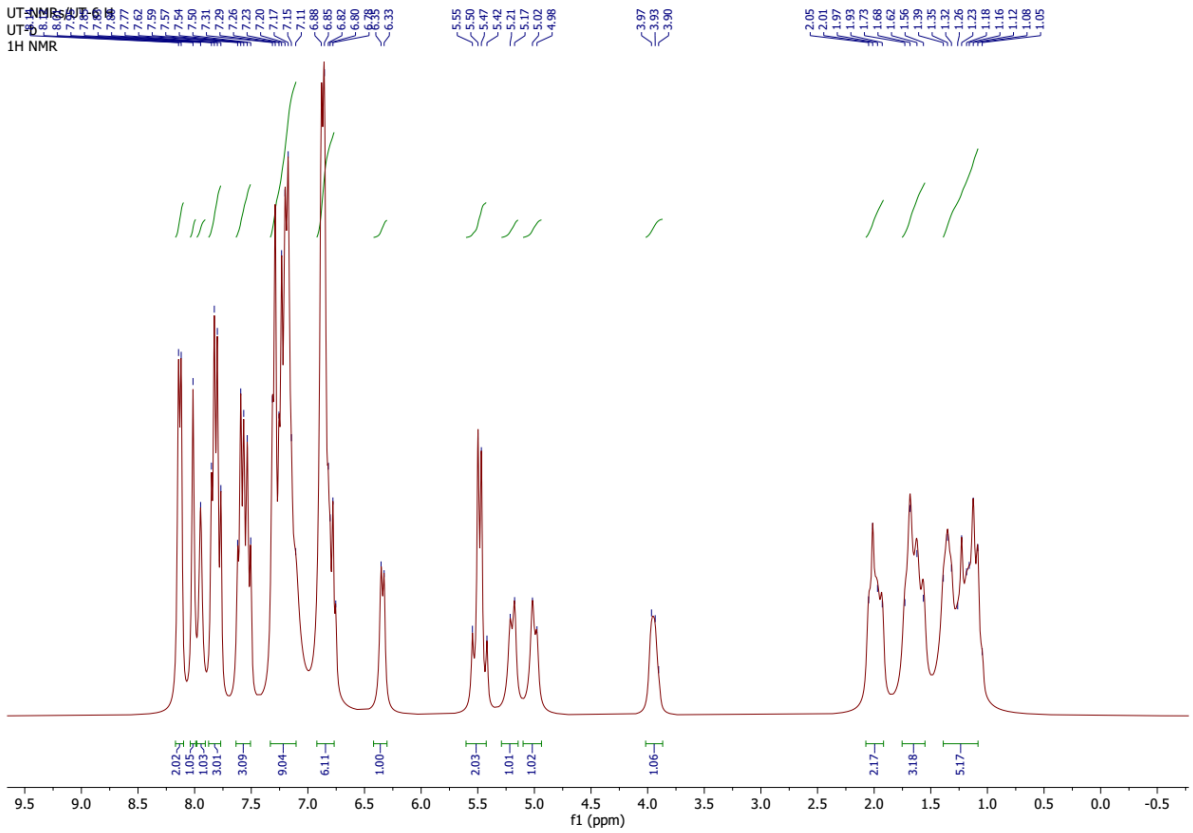

Figure 19. ^{1}H NMR spectrum of compound **7e**

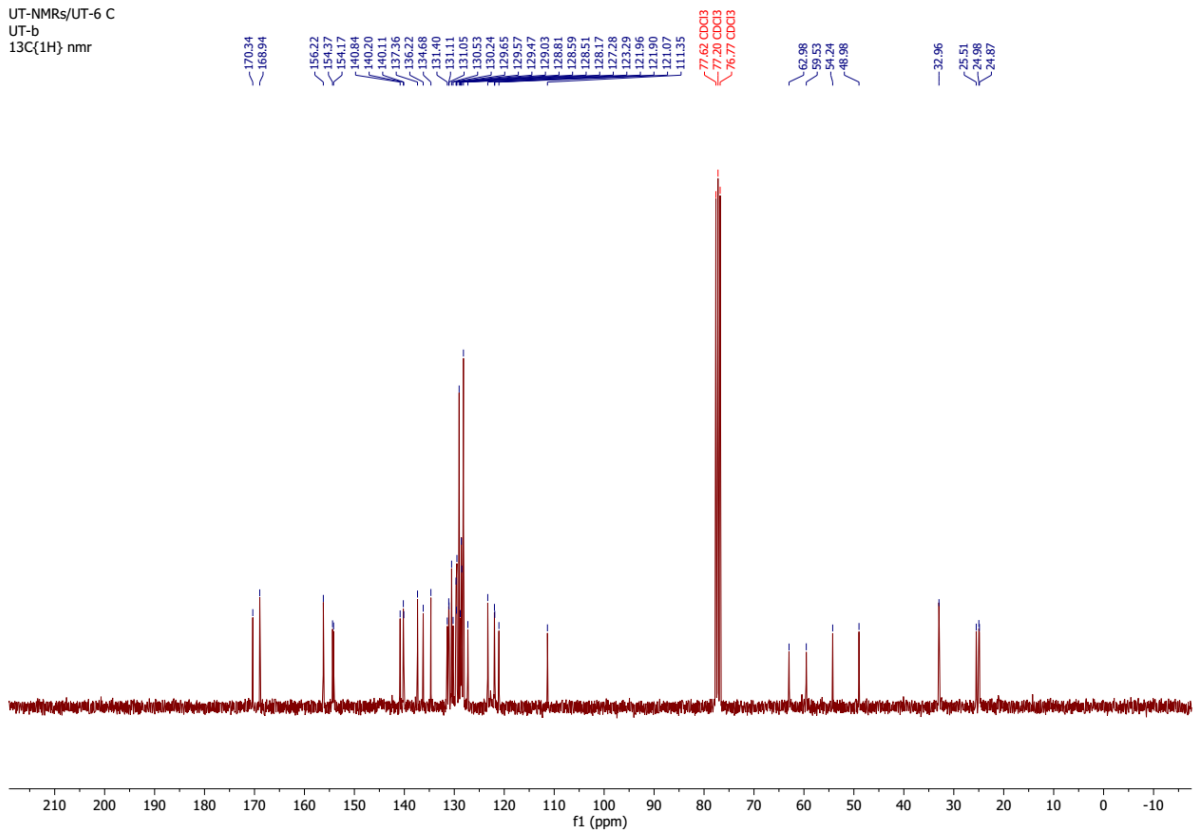

Figure 20. ^{13}C NMR spectrum of compound **7e**

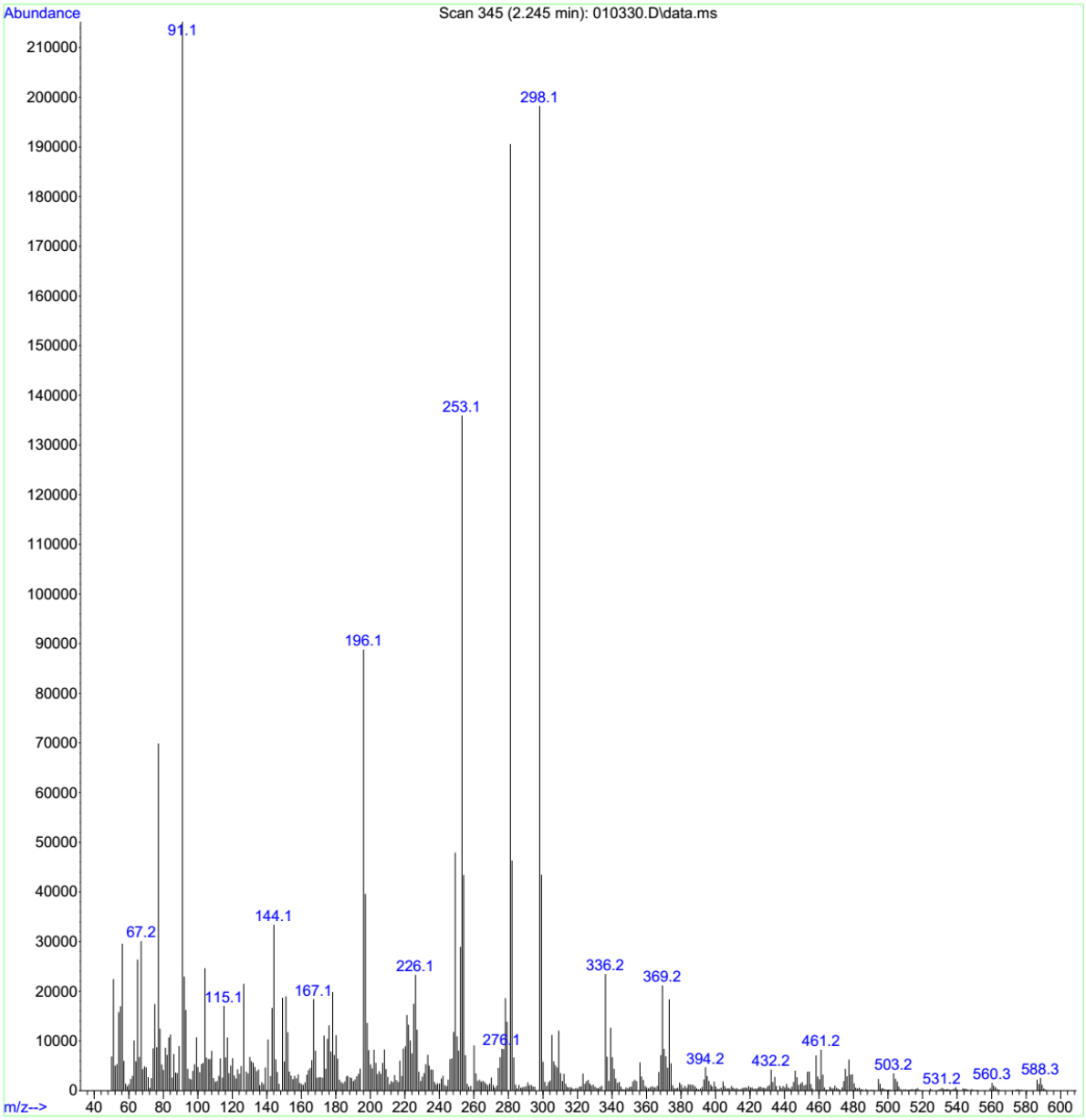

Figure 21. Mass spectrum of compound **7e**

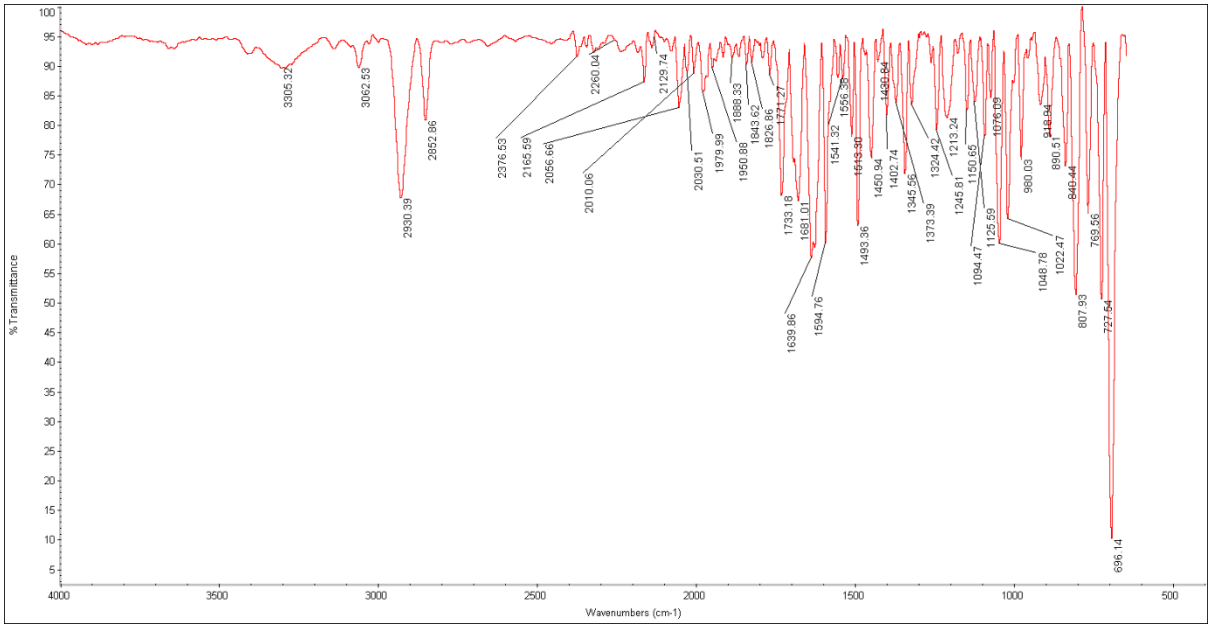

Figure 22. IR spectrum of compound **7f**

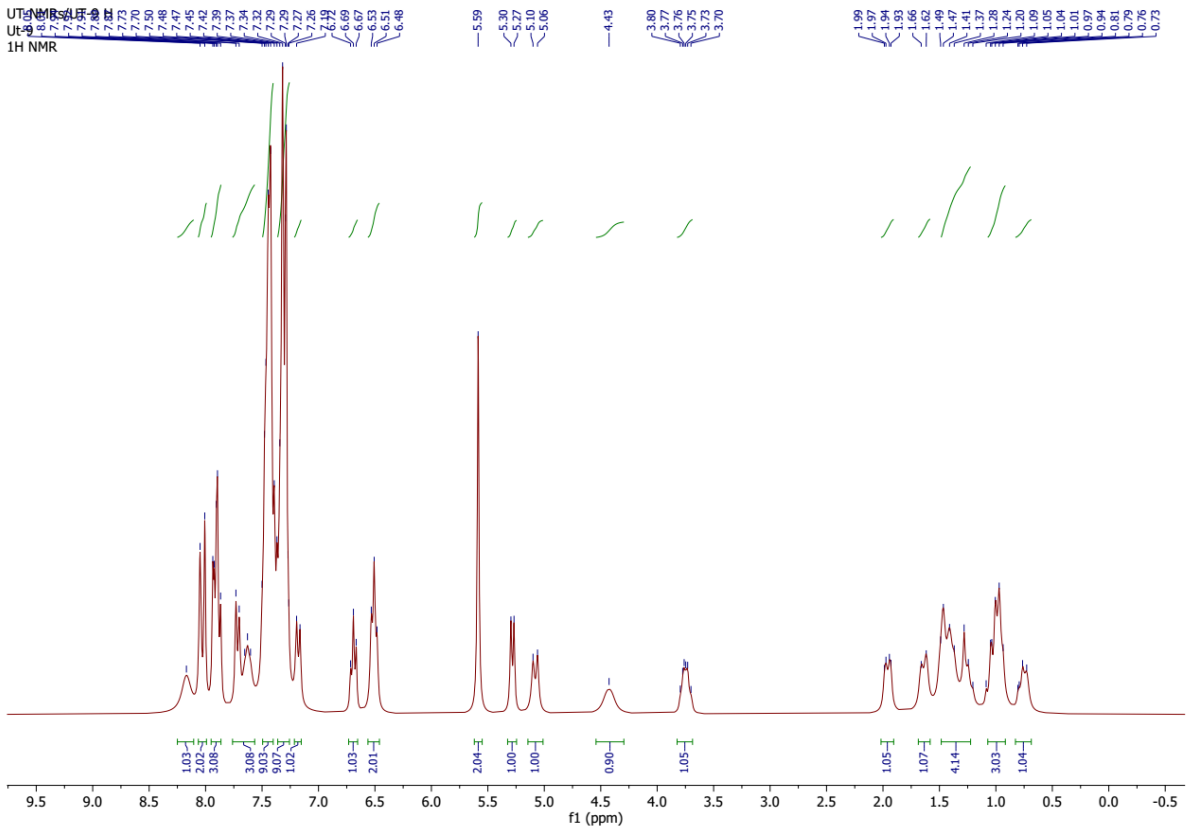

Figure 23. ^{1}H NMR spectrum of compound **7f**

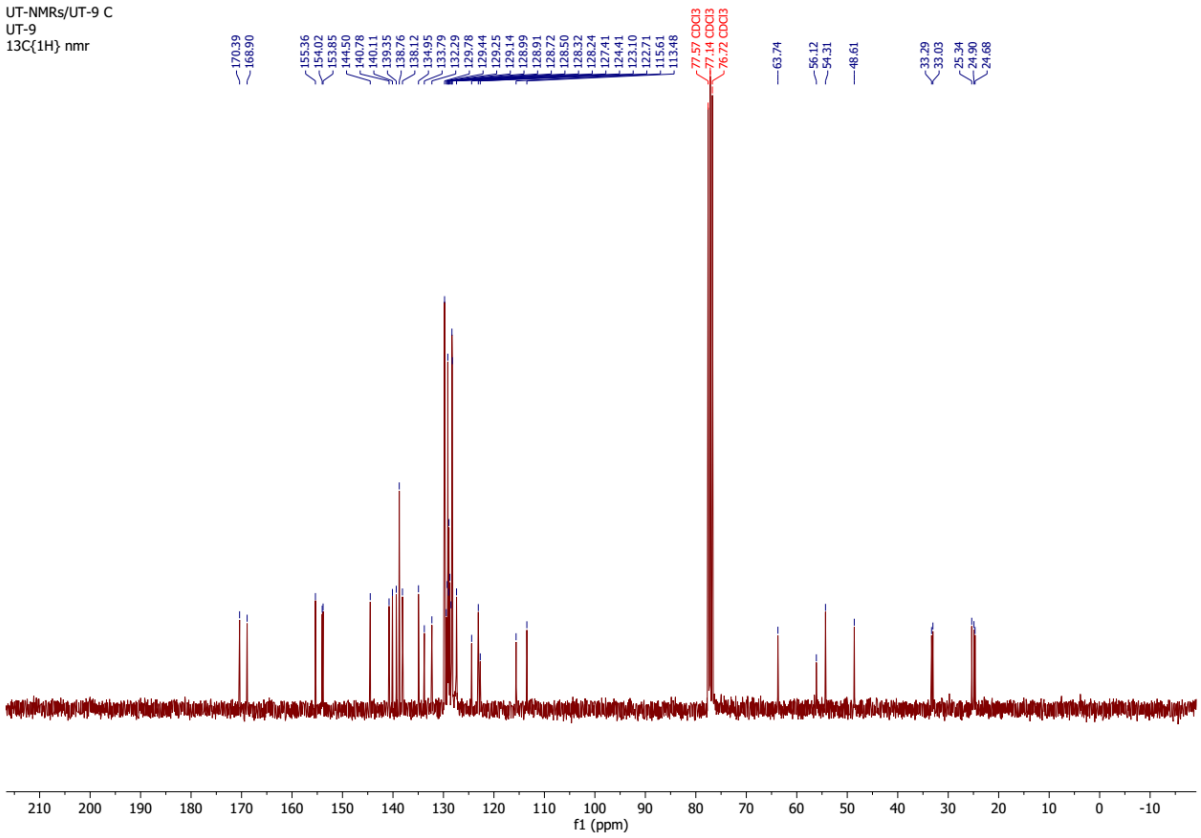

Figure 24. ^{13}C NMR spectrum of compound **7f**

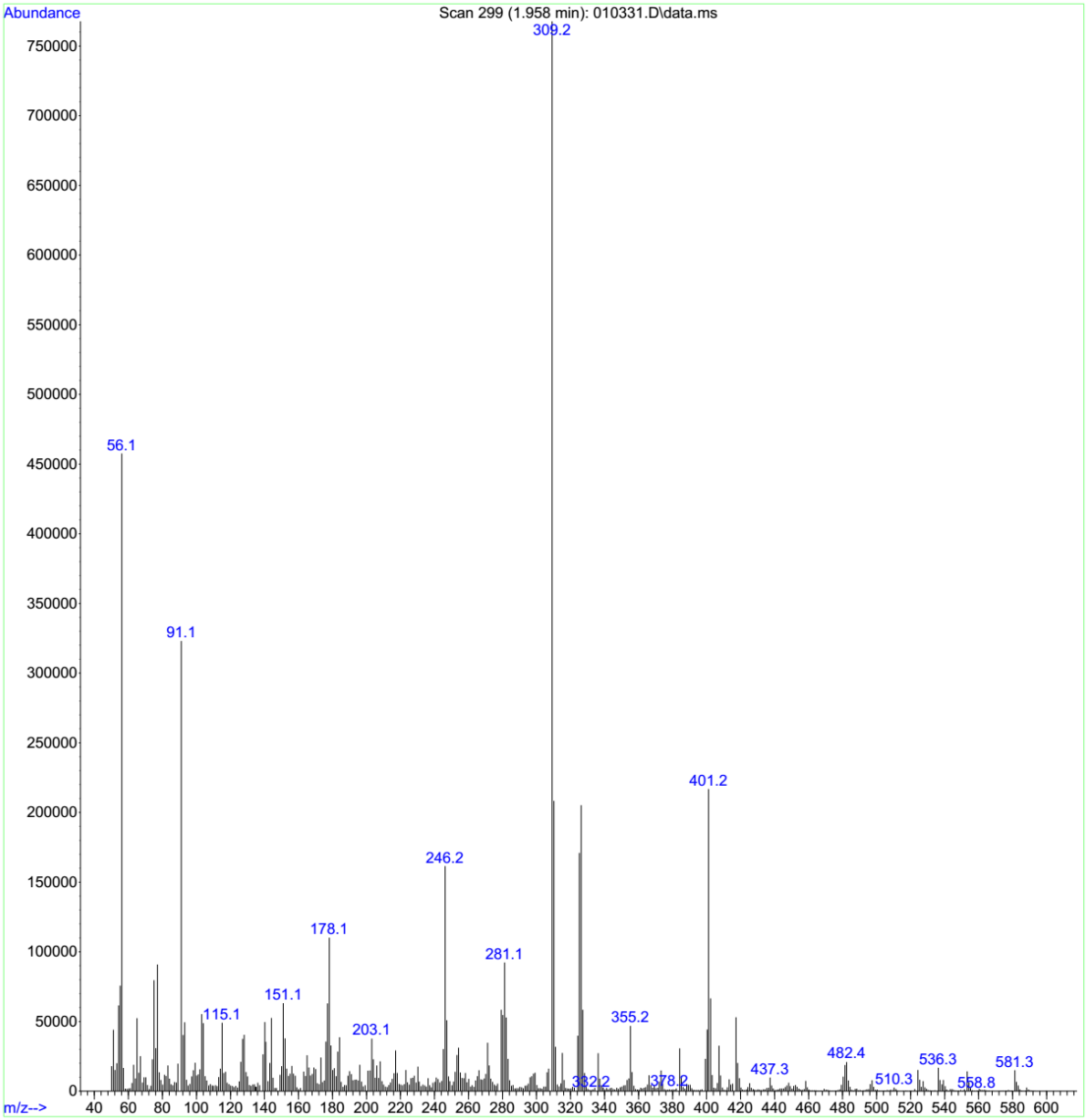

Figure 25. Mass spectrum of compound **7f**

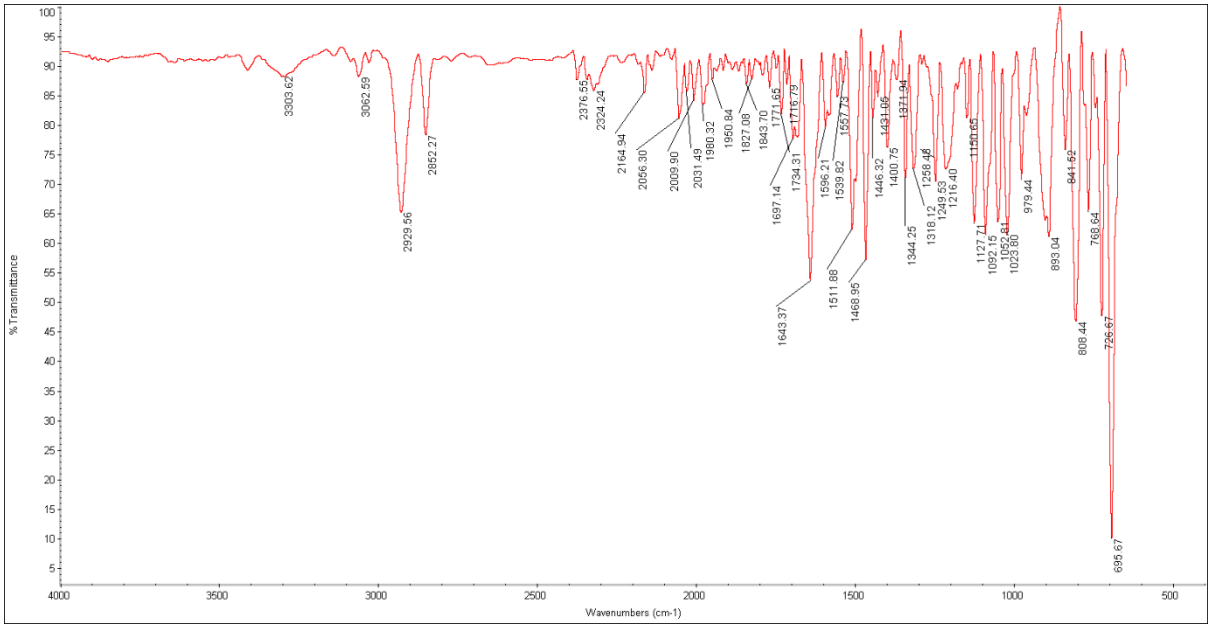

Figure 26. IR spectrum of compound **7g**

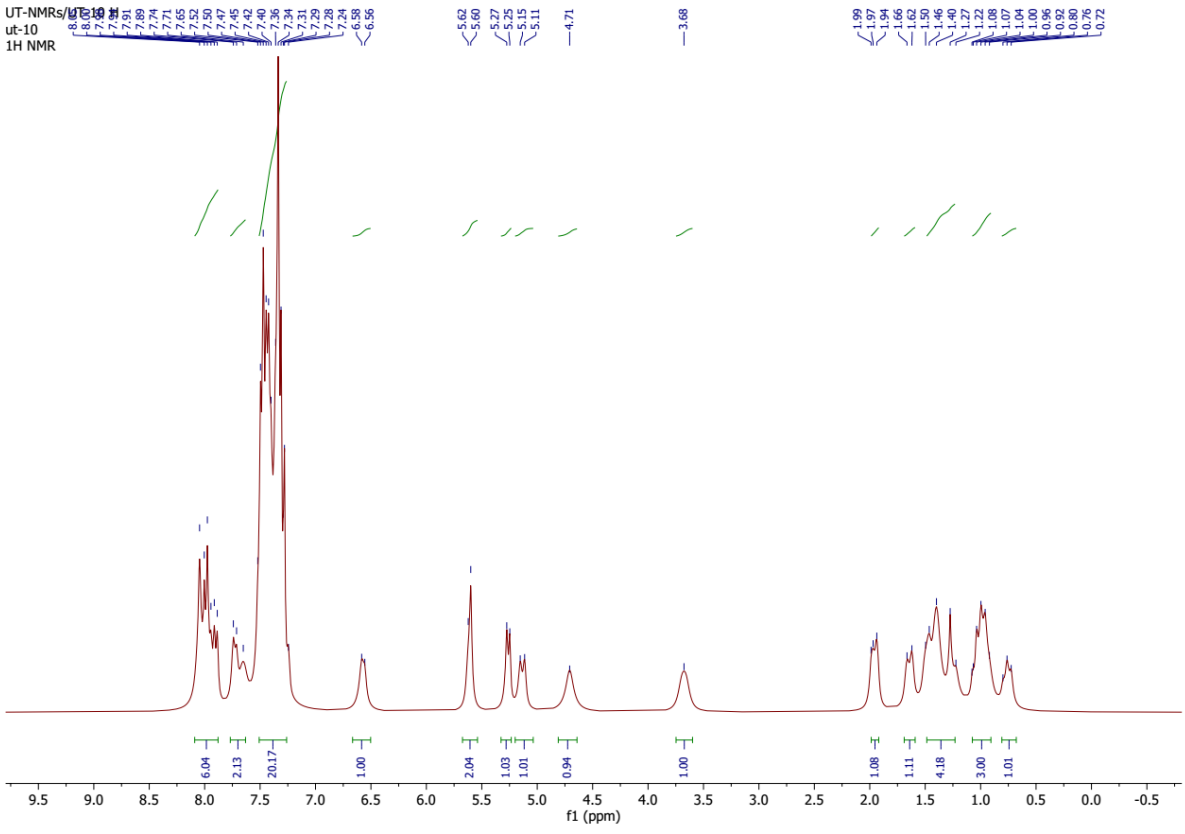

Figure 27. ^{1}H NMR spectrum of compound **7g**

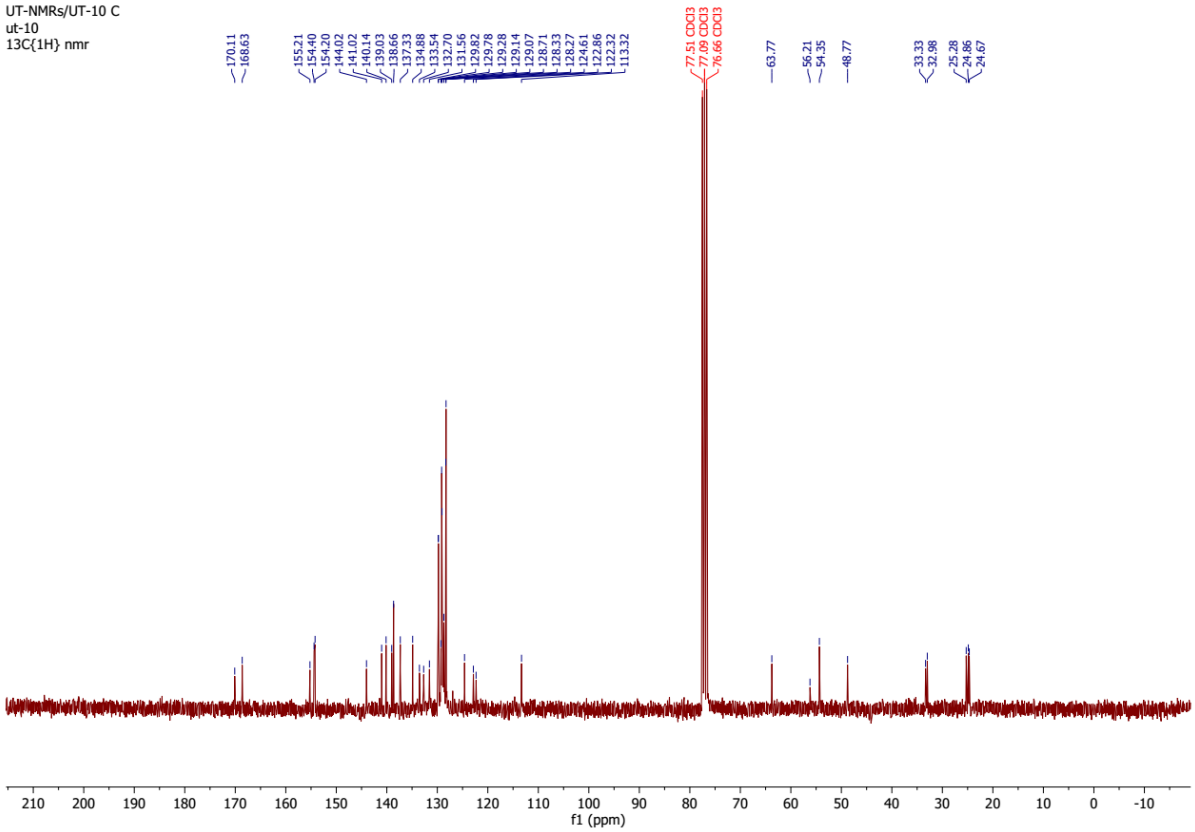

Figure 28. ^{13}C NMR spectrum of compound **7g**

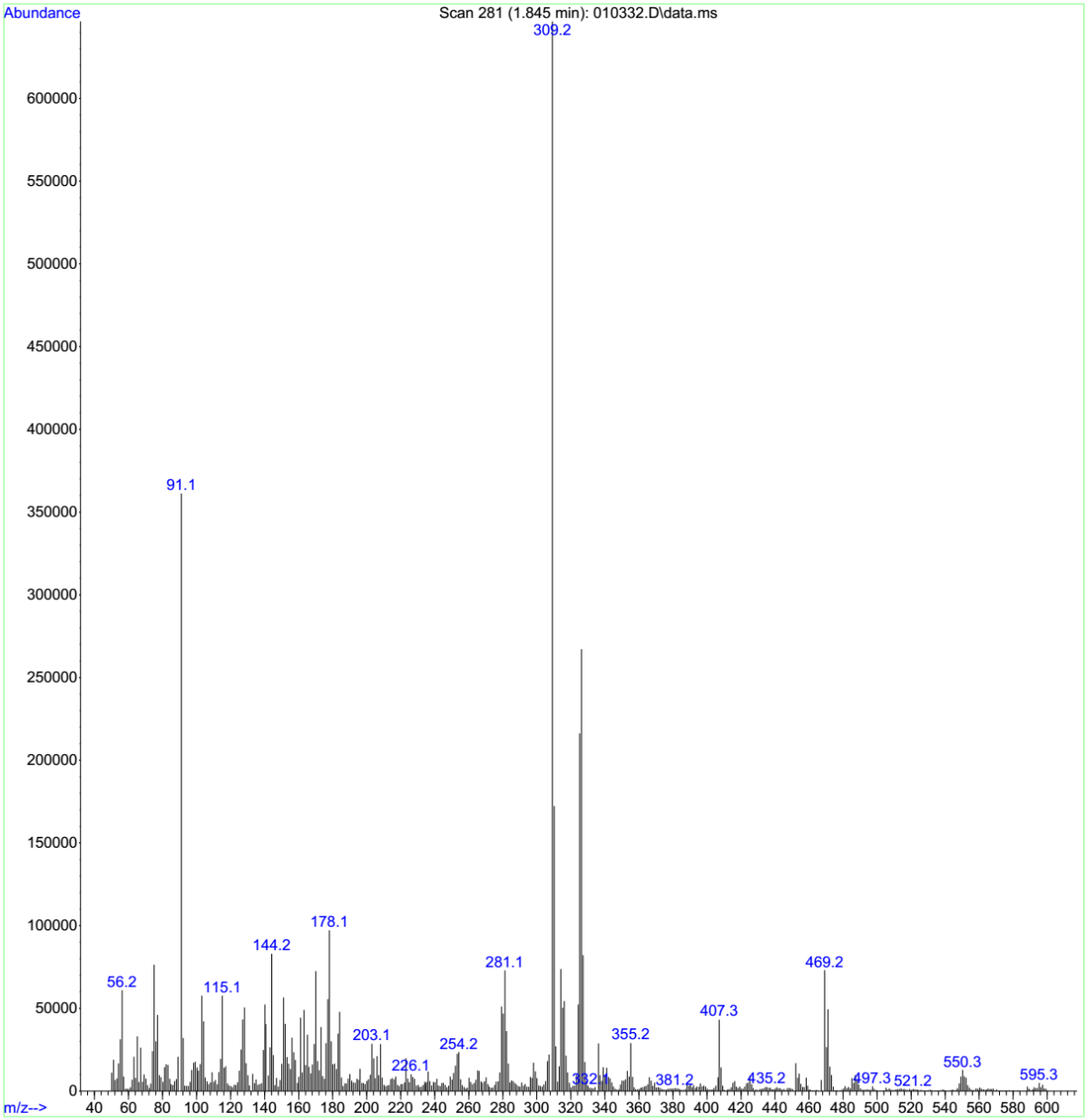

Figure 29. Mass spectrum of compound **7g**

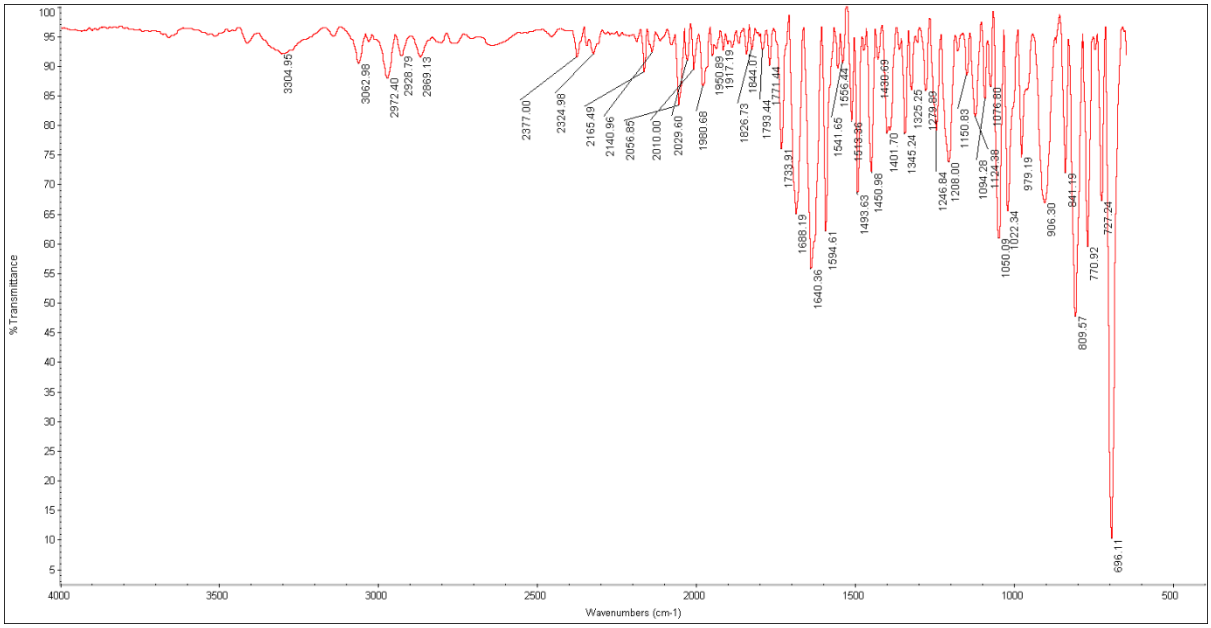

Figure 30. IR spectrum of compound **7h**

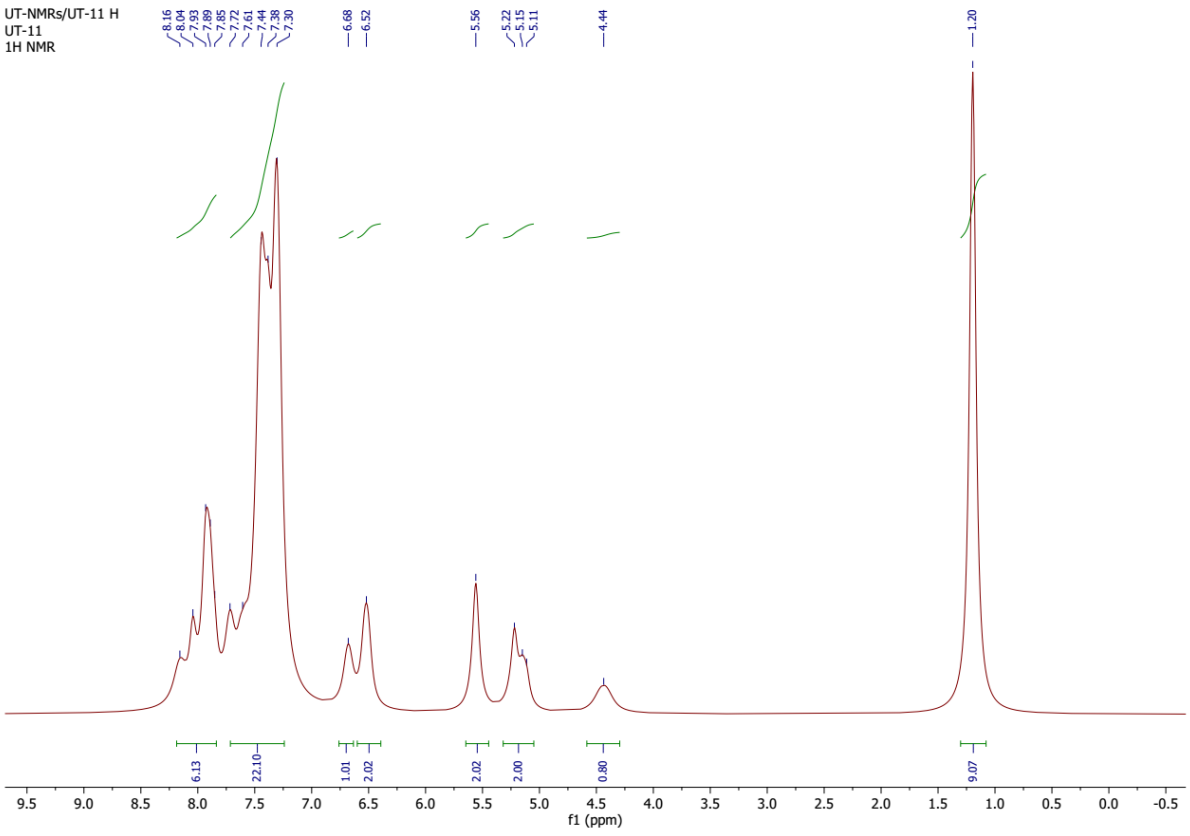

Figure 31. ^{1}H NMR spectrum of compound **7h**

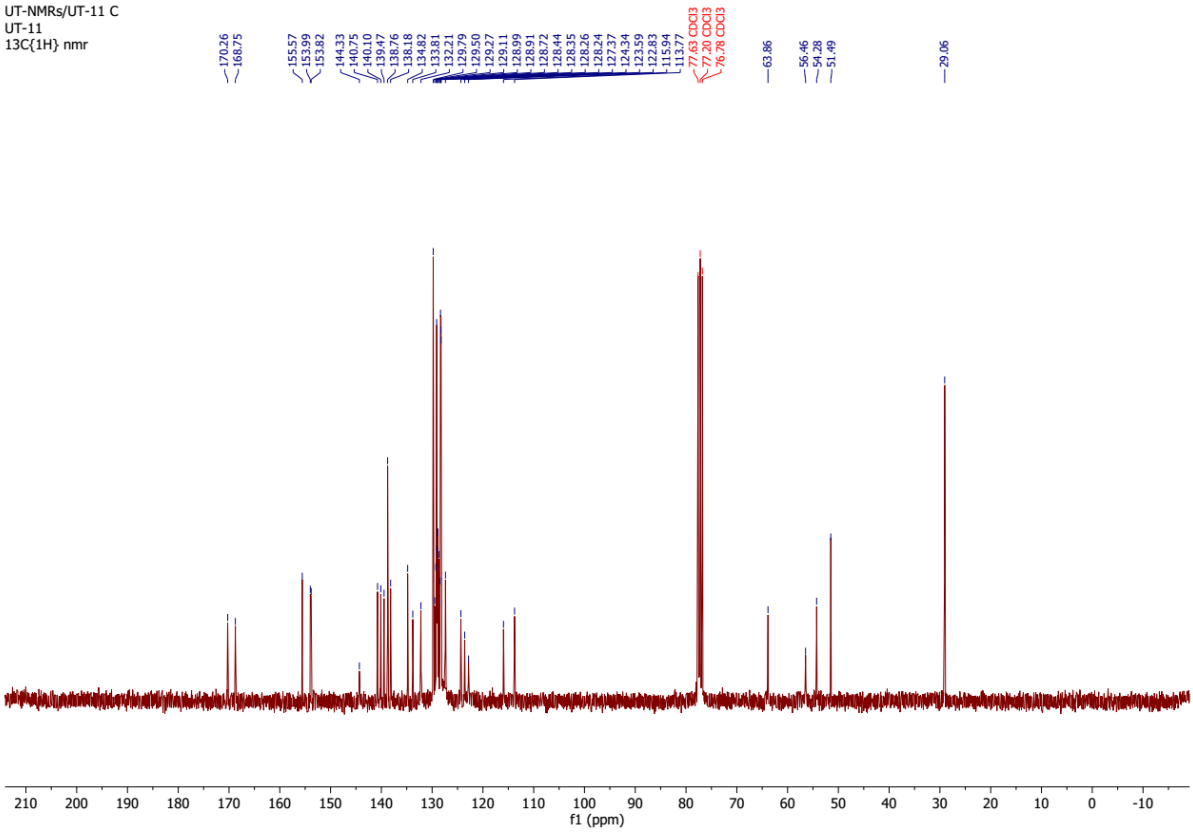

Figure 32. ^{13}C NMR spectrum of compound **7h**

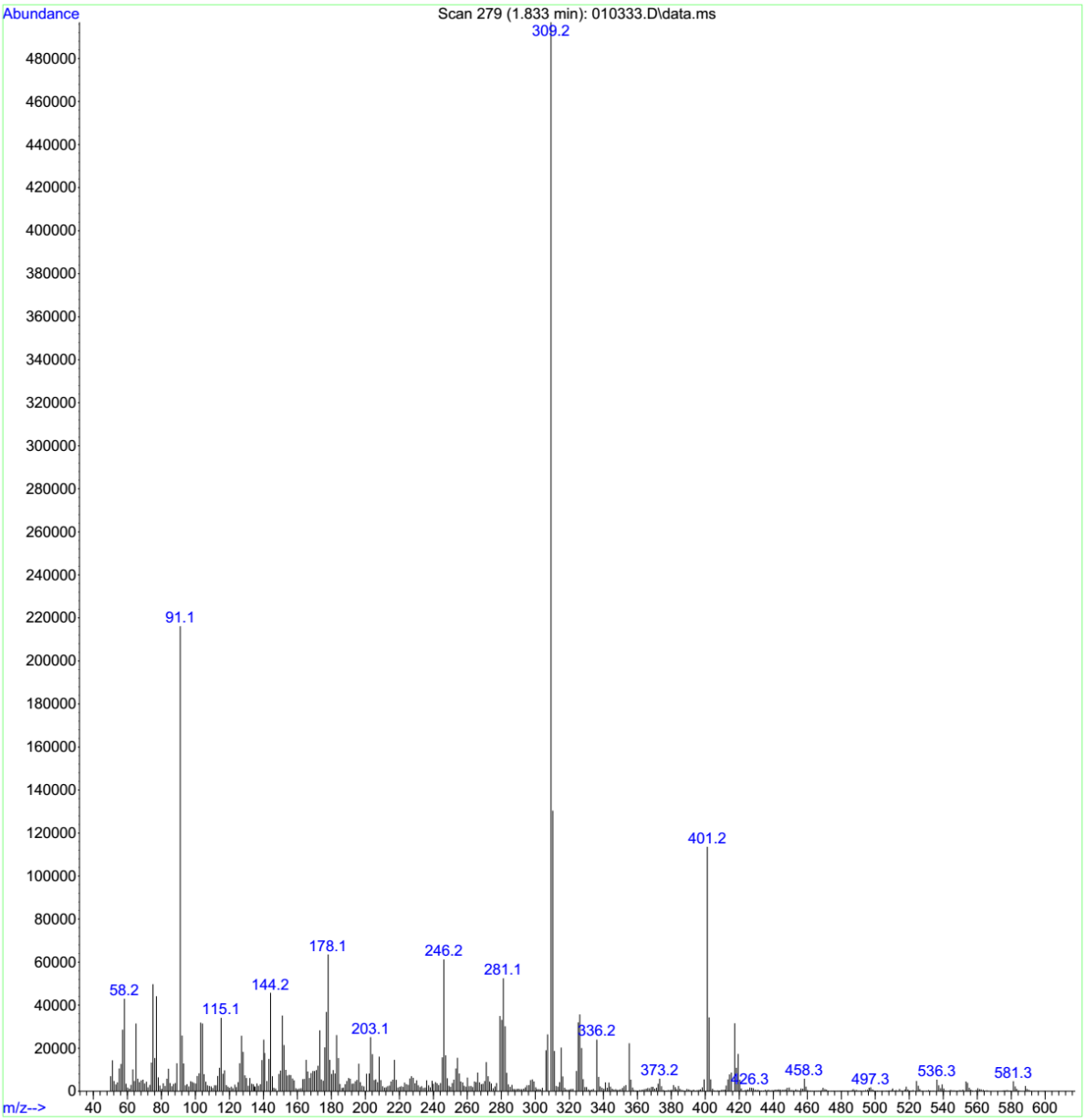

Figure 33. Mass spectrum of compound **7h**

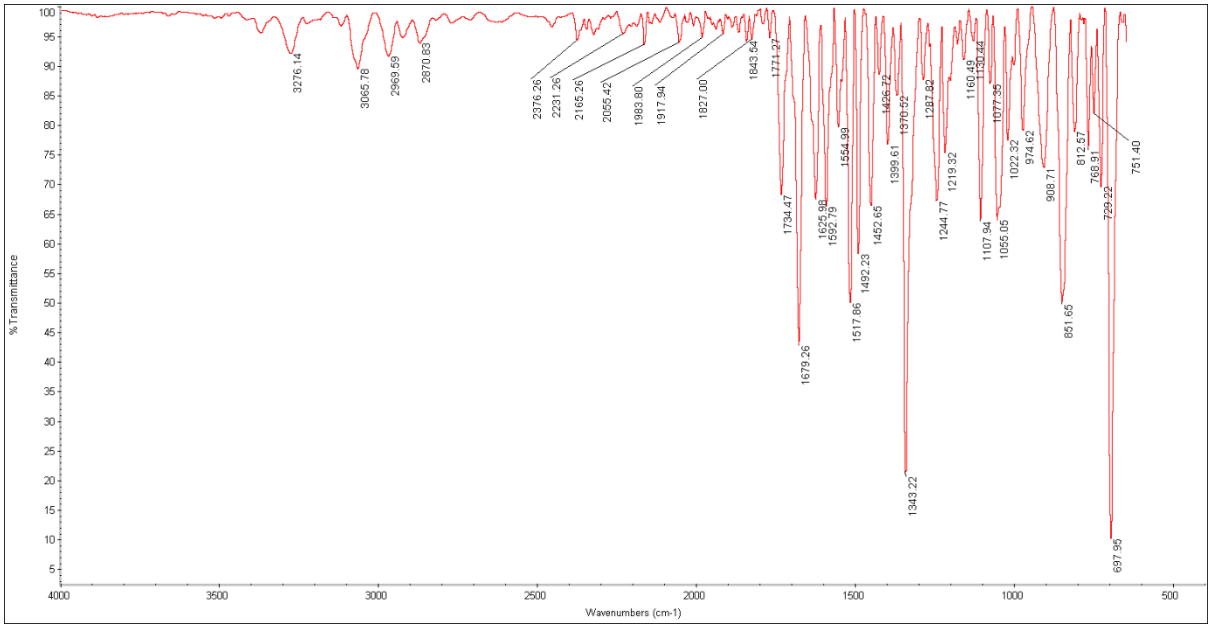

Figure 34. IR spectrum of compound **7i**

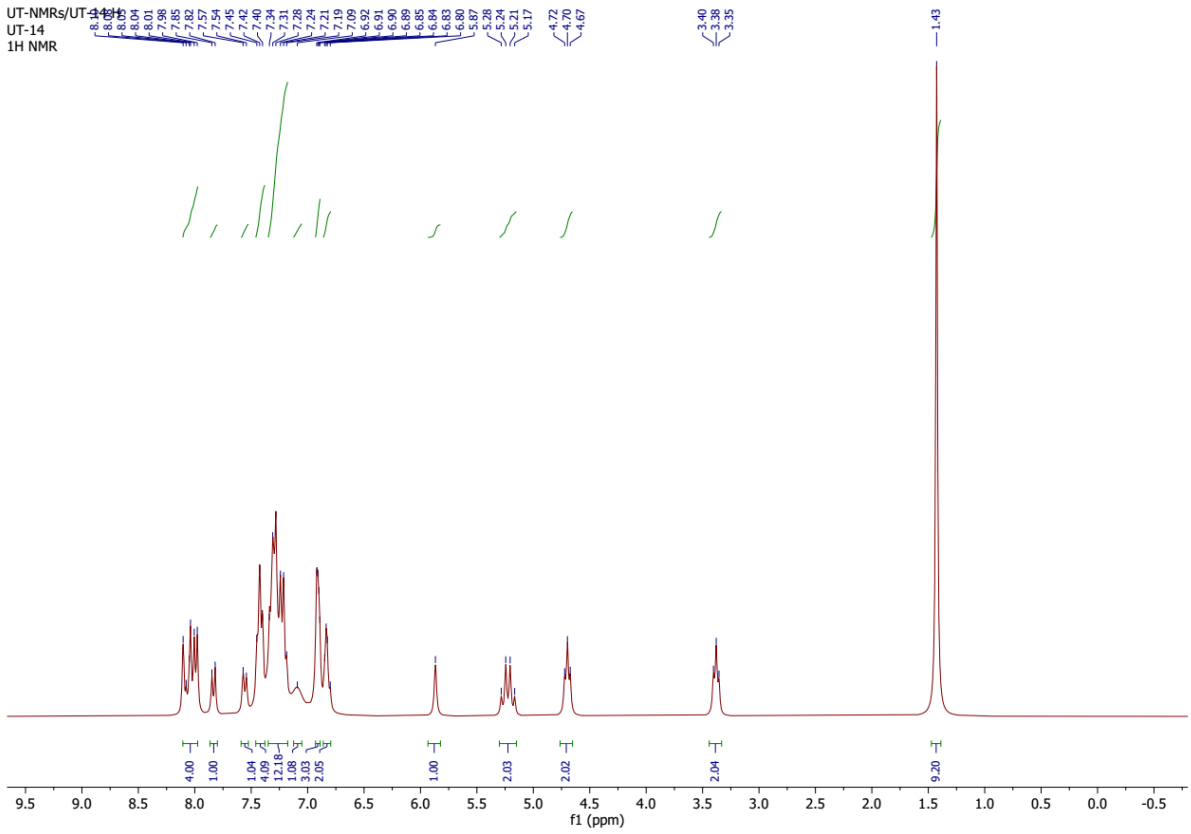

Figure 35. ^{1}H NMR spectrum of compound **7i**

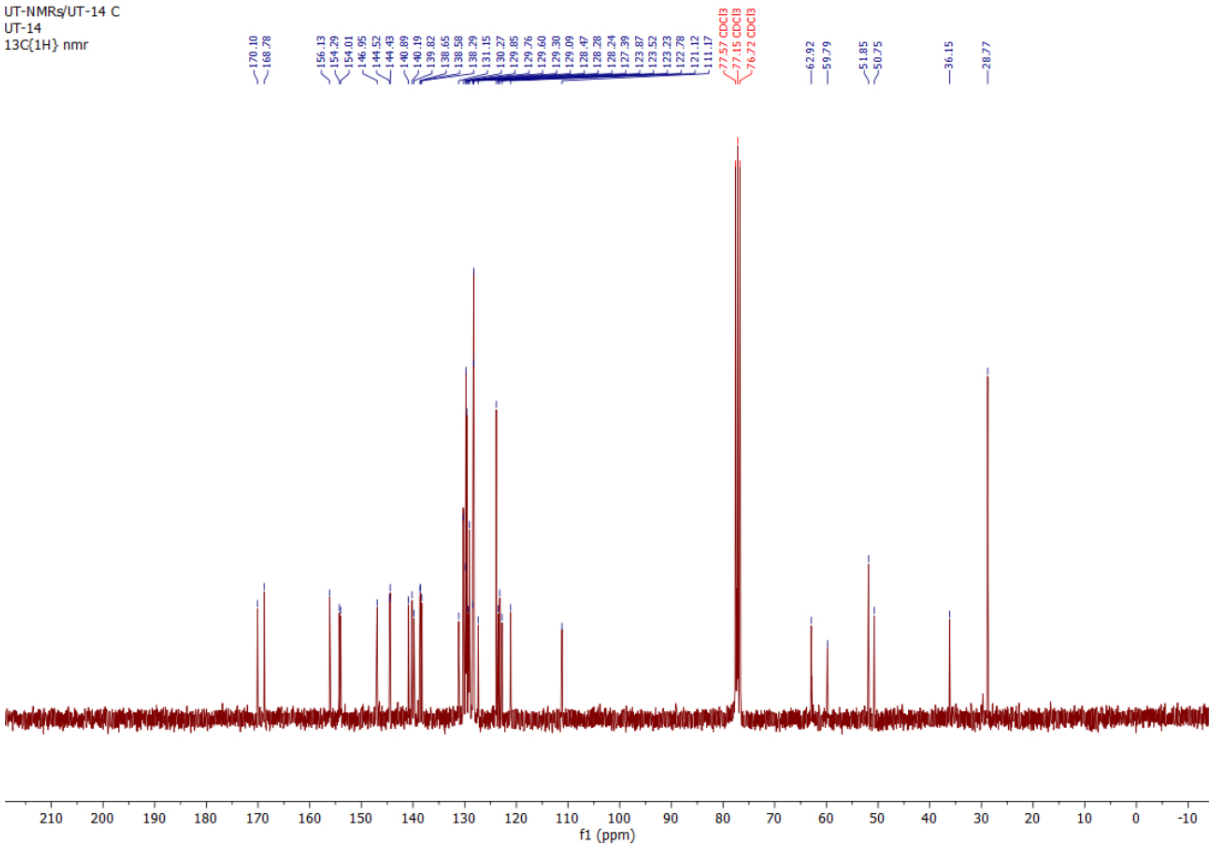

Figure 36. ^{13}C NMR spectrum of compound **7i**

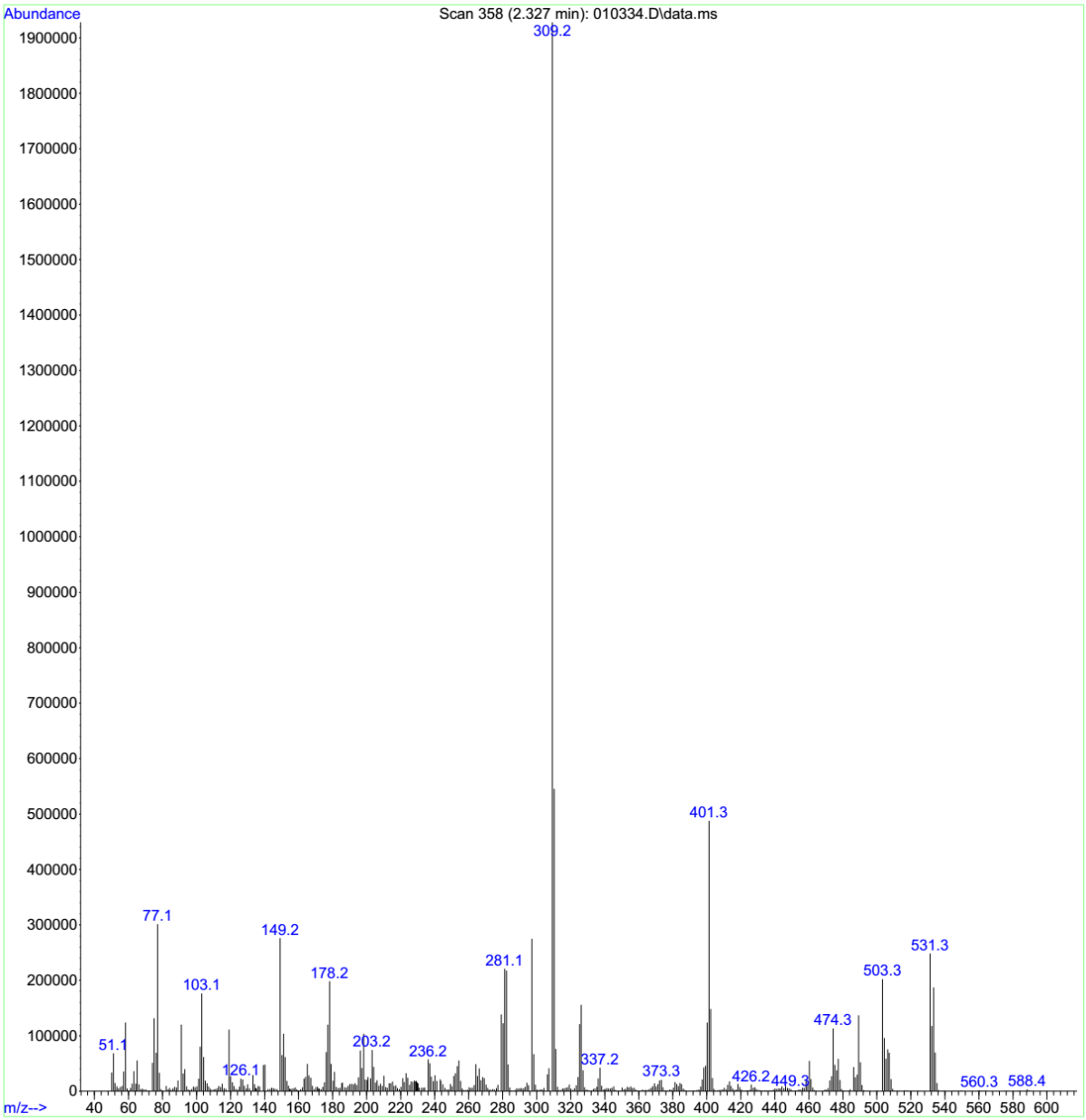

Figure 37. Mass spectrum of compound **7i**

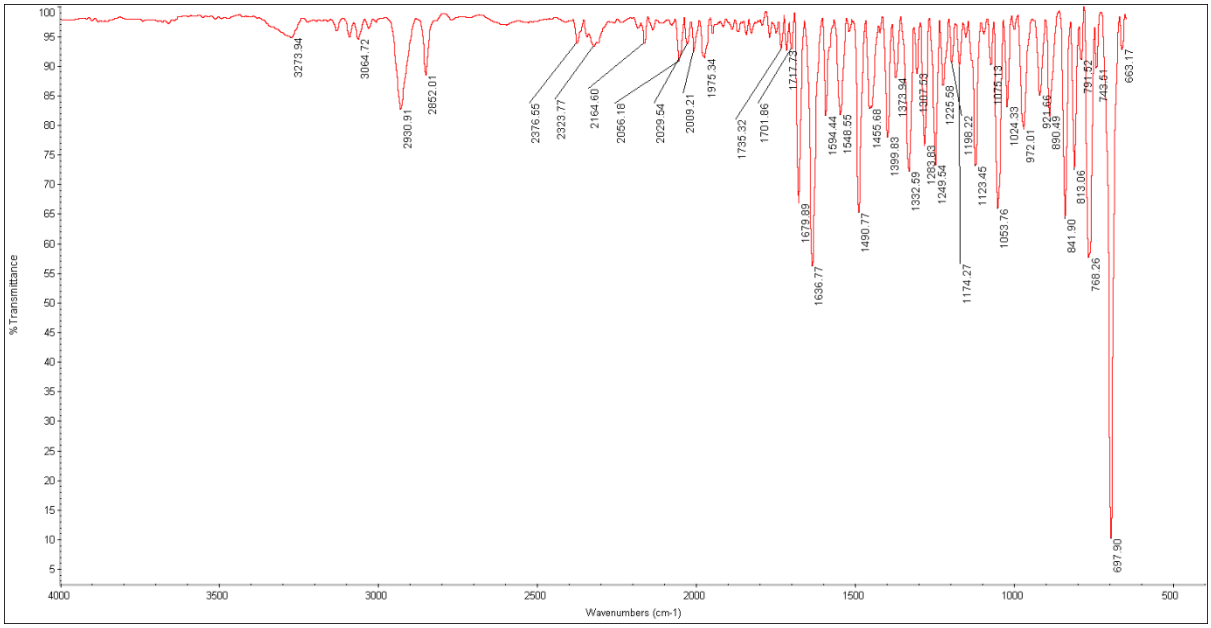

Figure 38. IR spectrum of compound **7j**

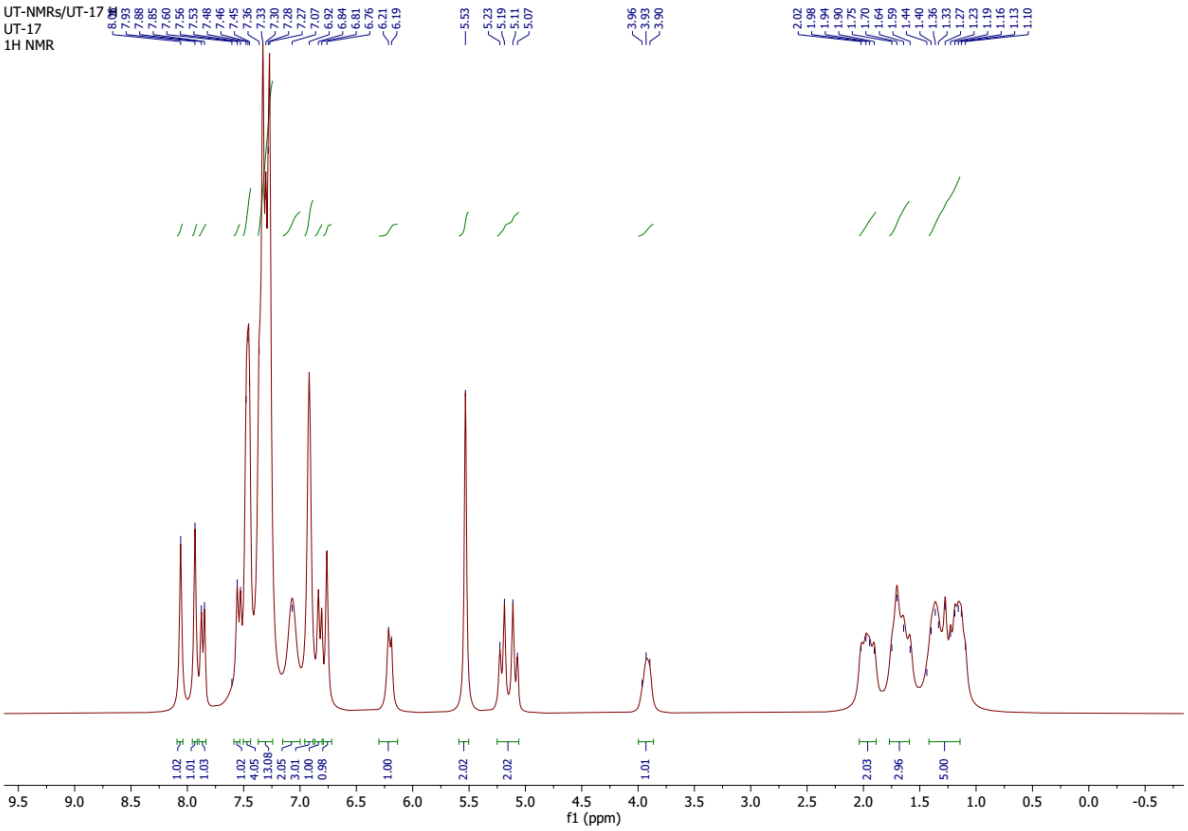

Figure 39. ^{1}H NMR spectrum of compound **7j**

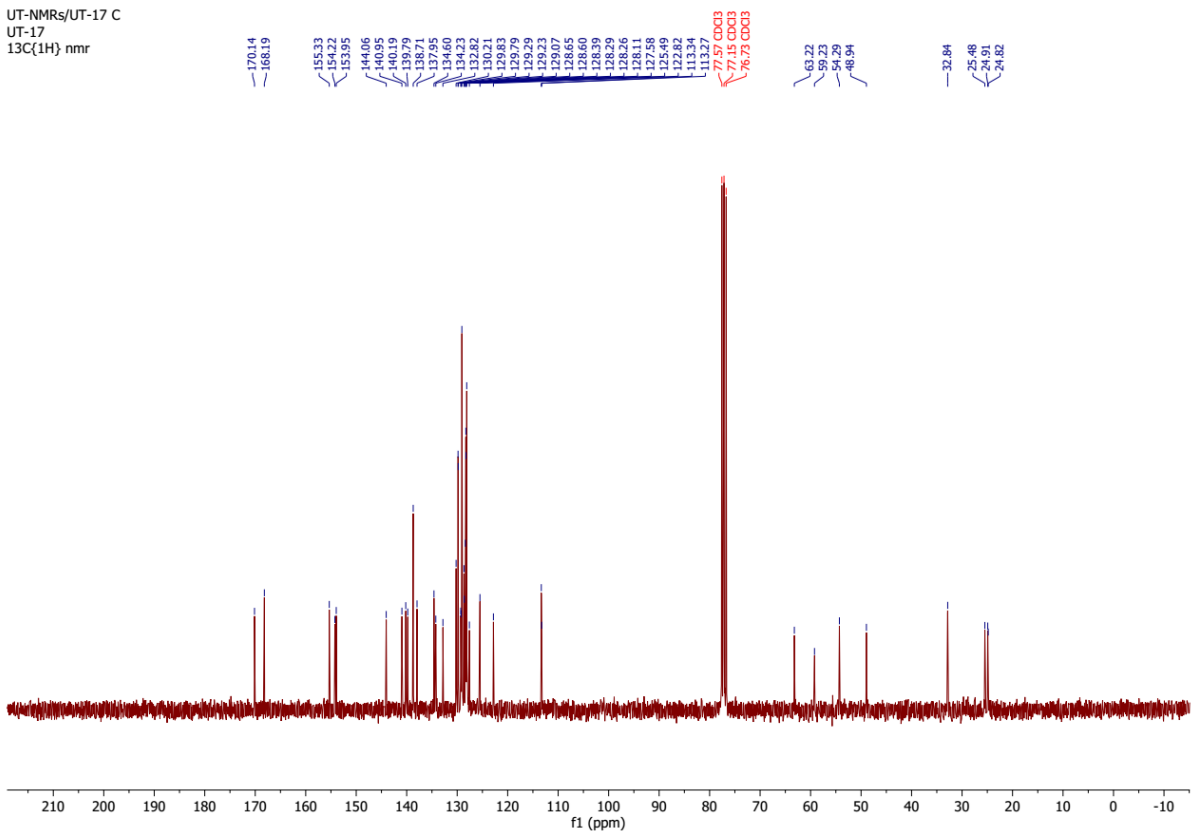

Figure 40. ^{13}C NMR spectrum of compound **7j**

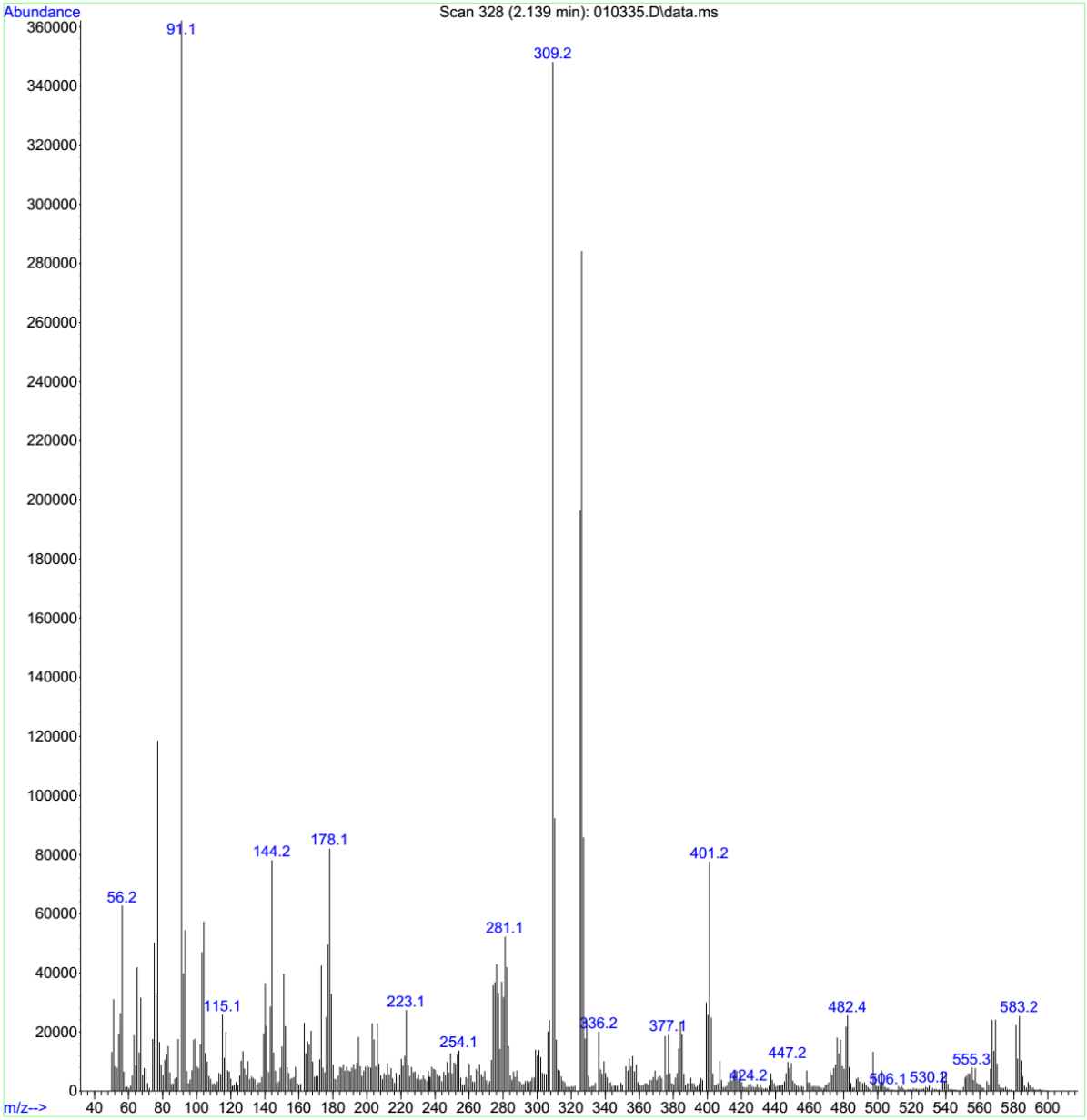

Figure 41. Mass spectrum of compound **7j**

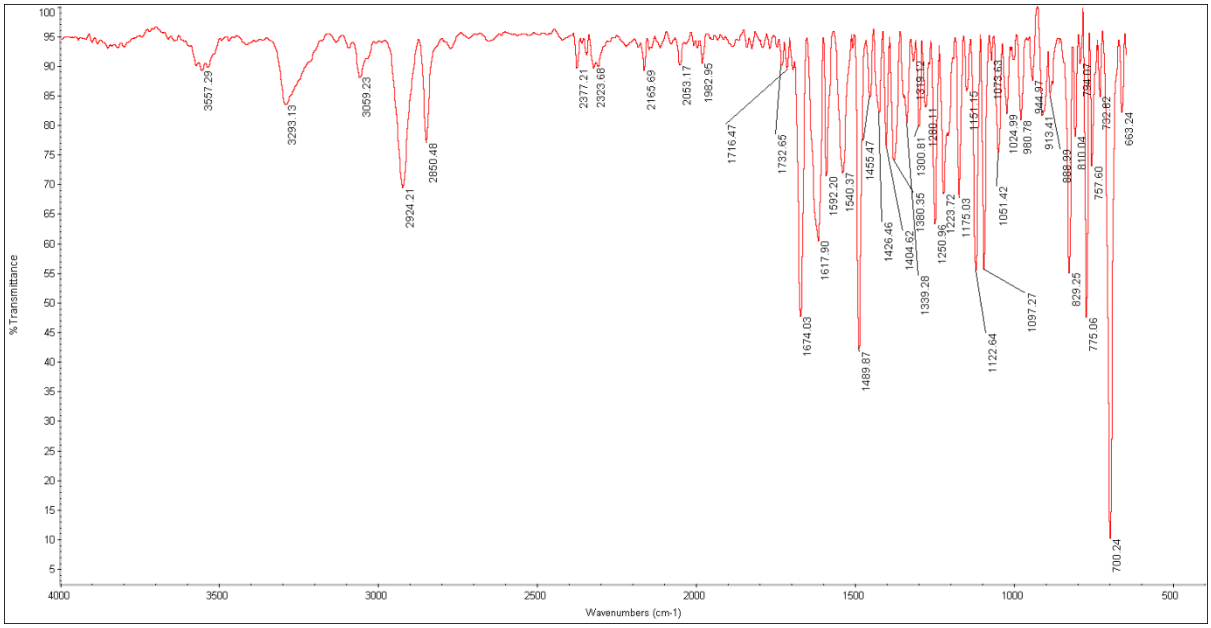

Figure 42. IR spectrum of compound **7k**

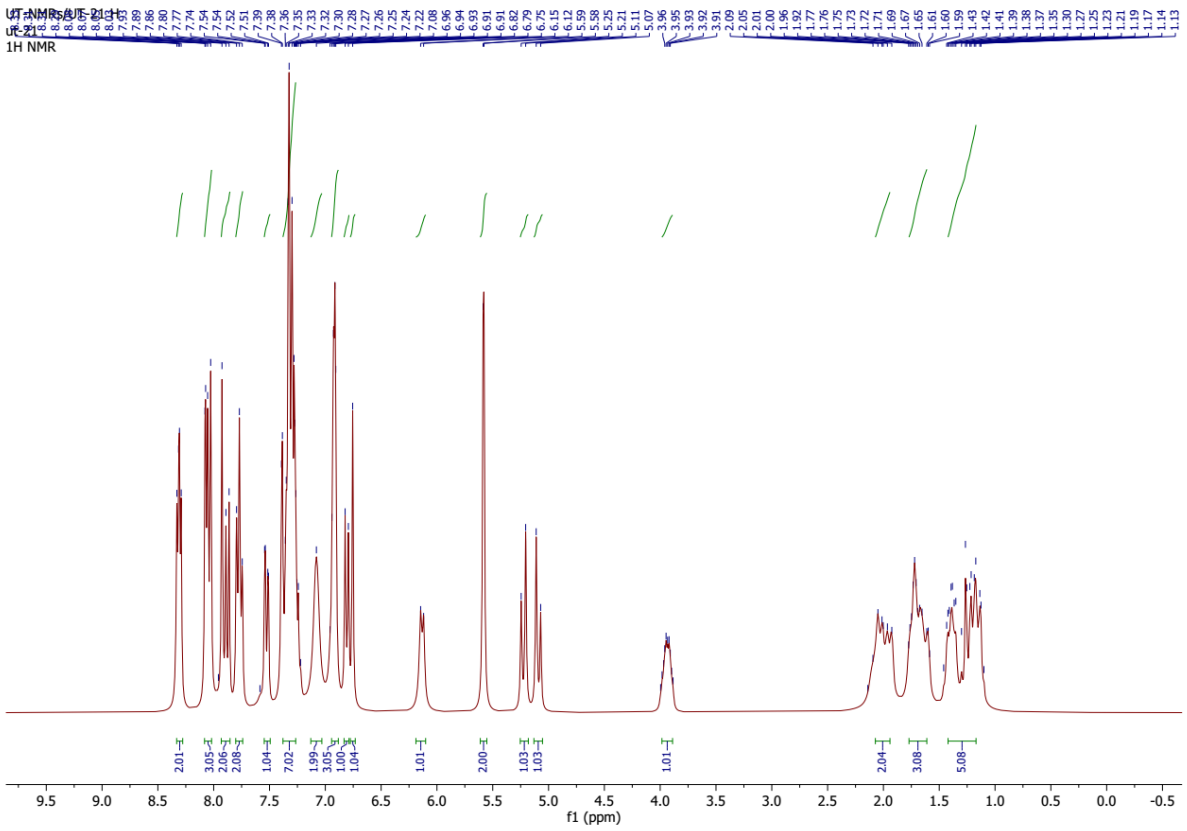

Figure 43. ^{1}H NMR spectrum of compound **7k**

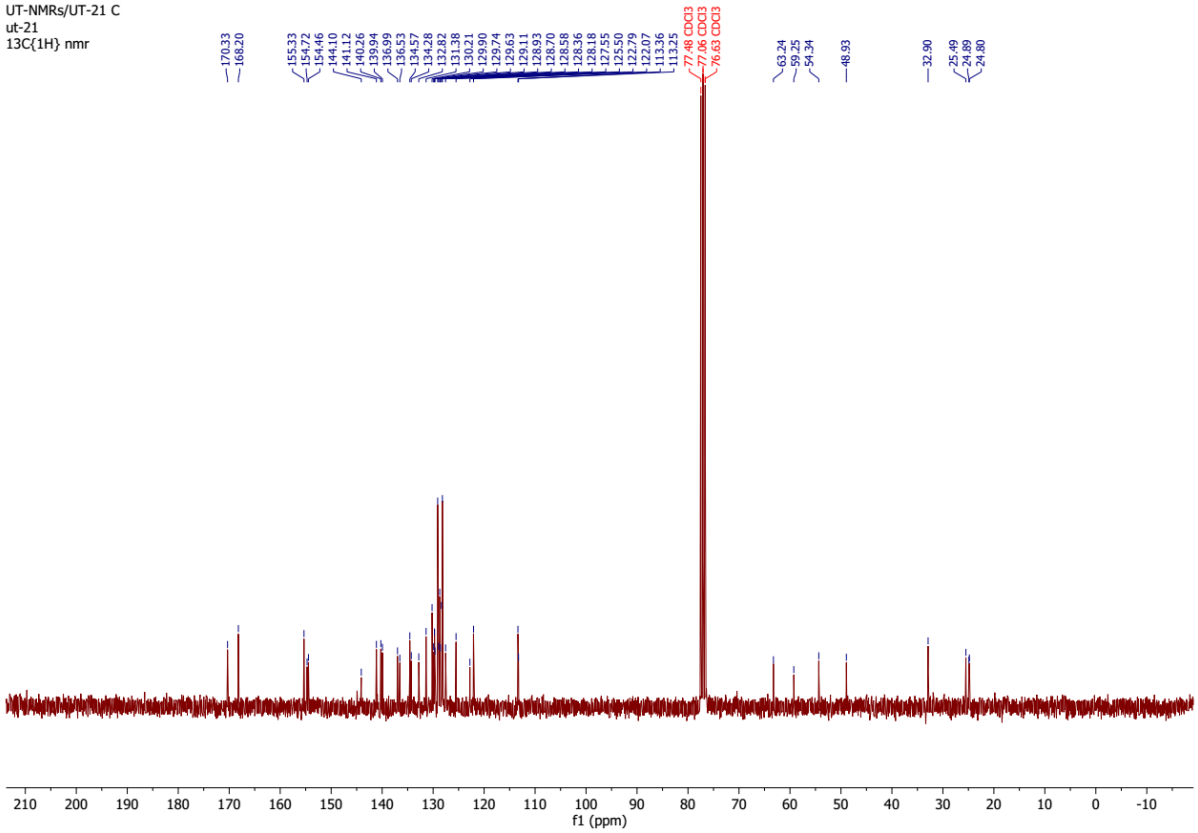

Figure 44. ^{13}C NMR spectrum of compound **7k**

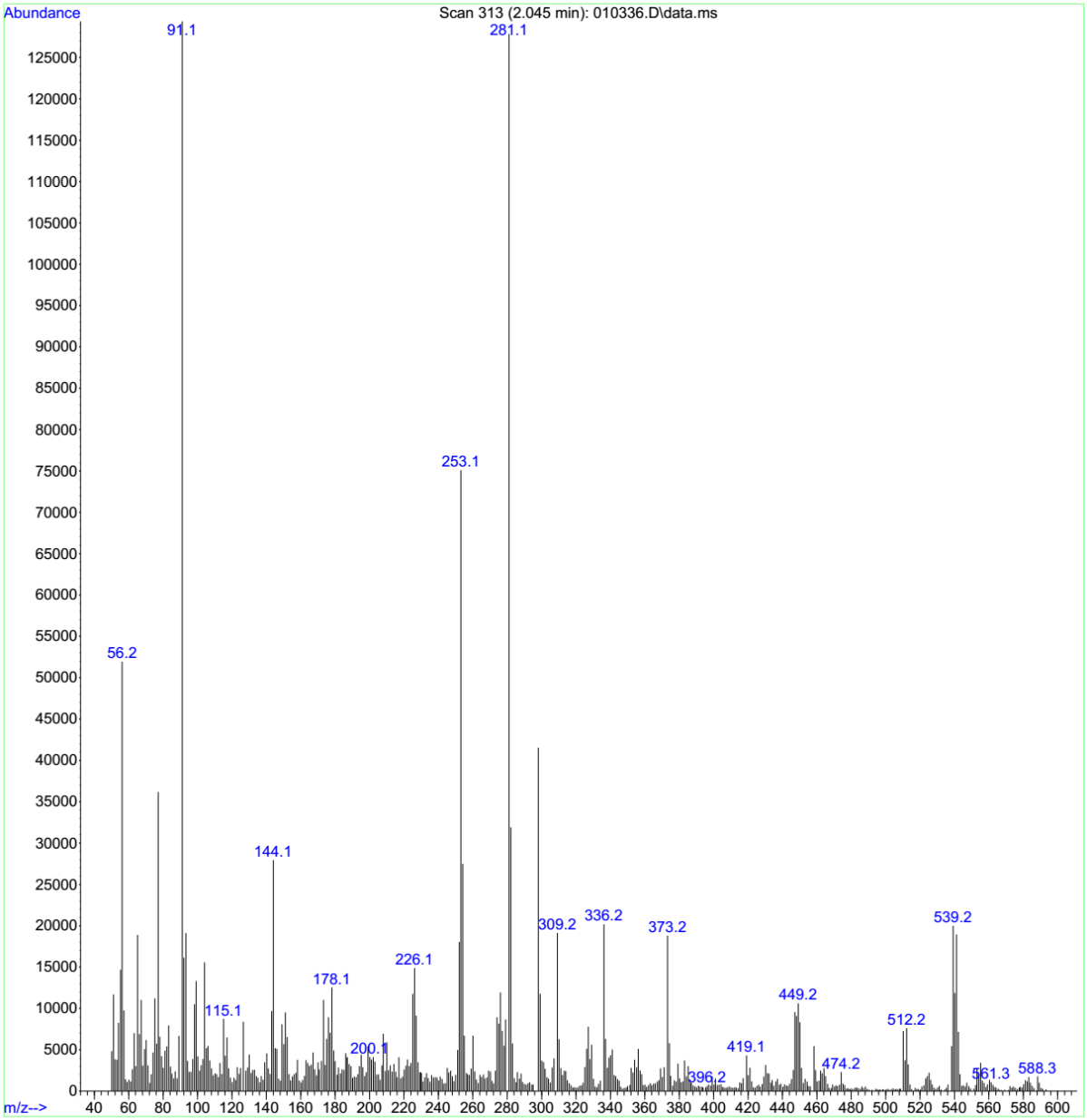

Figure 45. Mass spectrum of compound **7k**

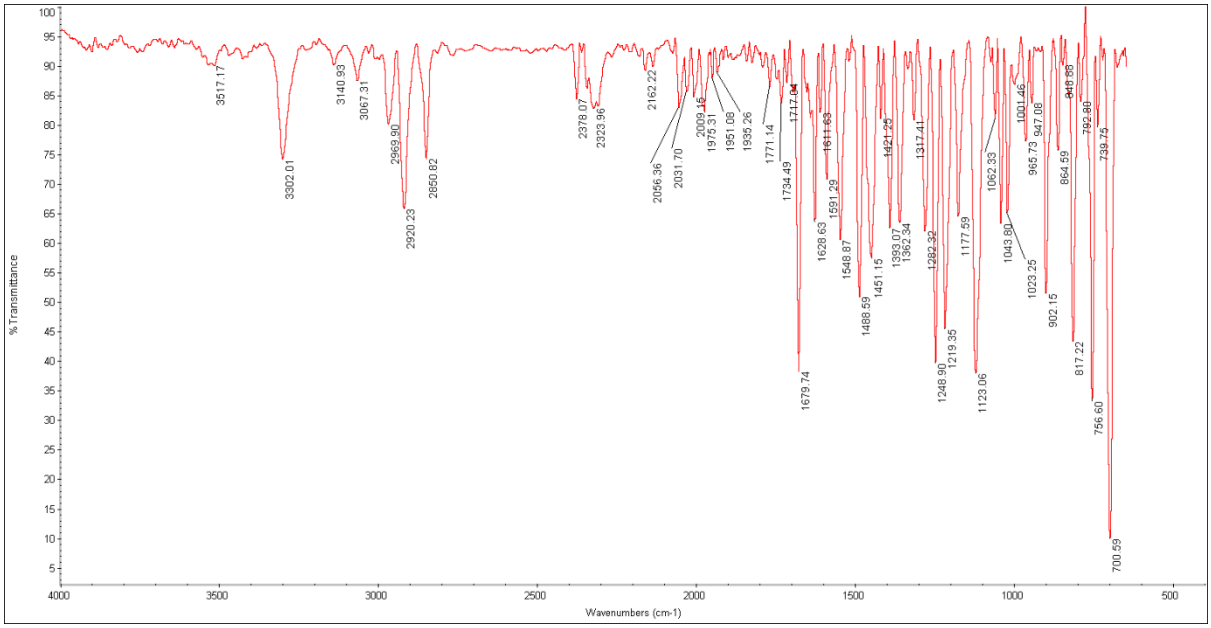

Figure 46. IR spectrum of compound **7l**

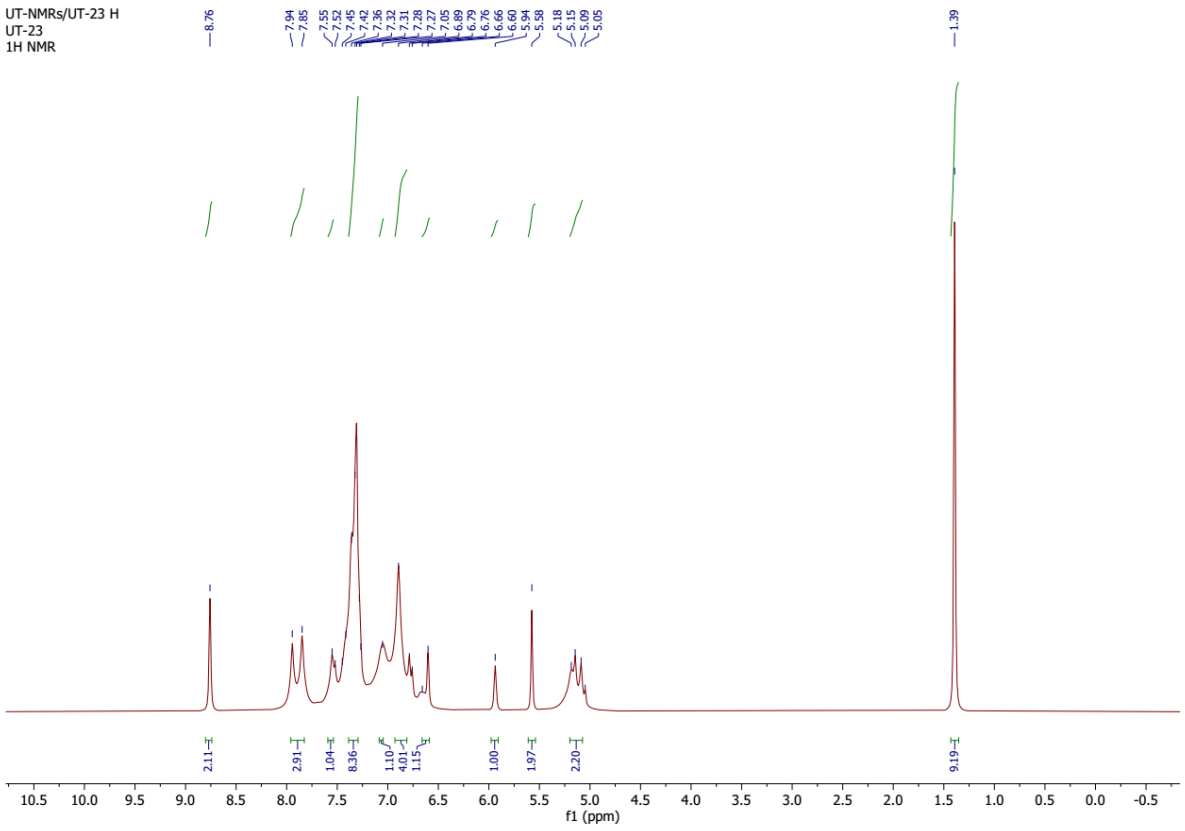

Figure 47. ^{1}H NMR spectrum of compound **7l**

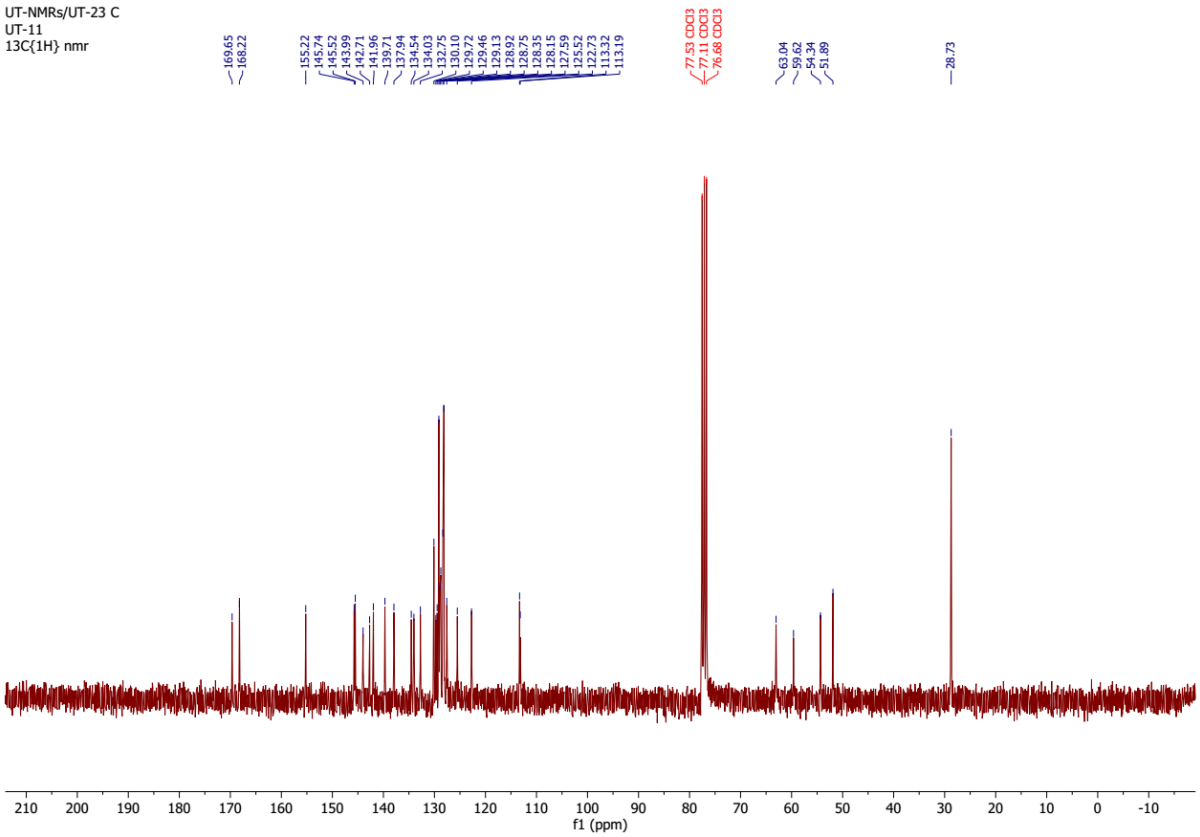

Figure 48. ^{13}C NMR spectrum of compound **7l**

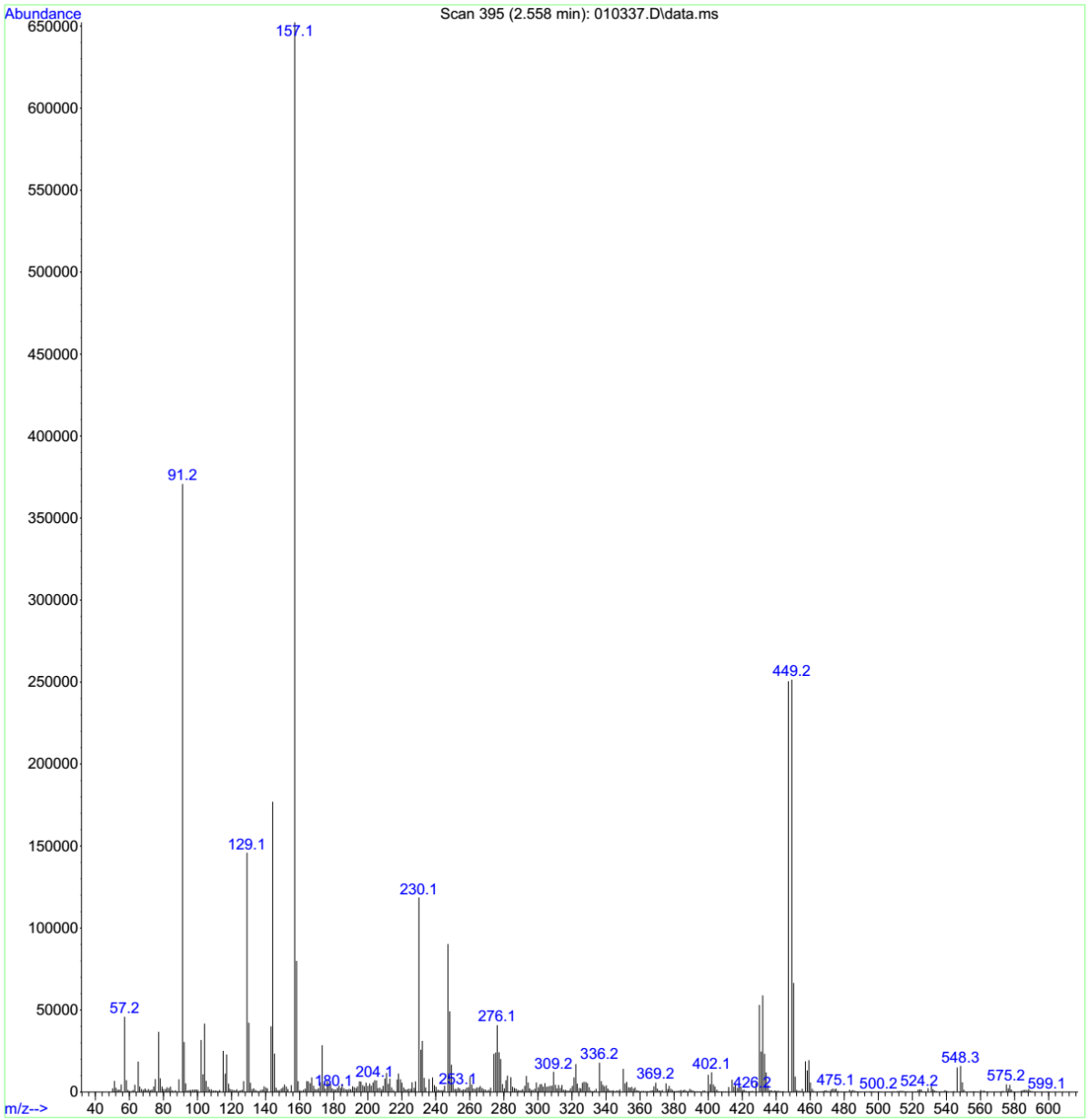

Figure 49. Mass spectrum of compound **7l**

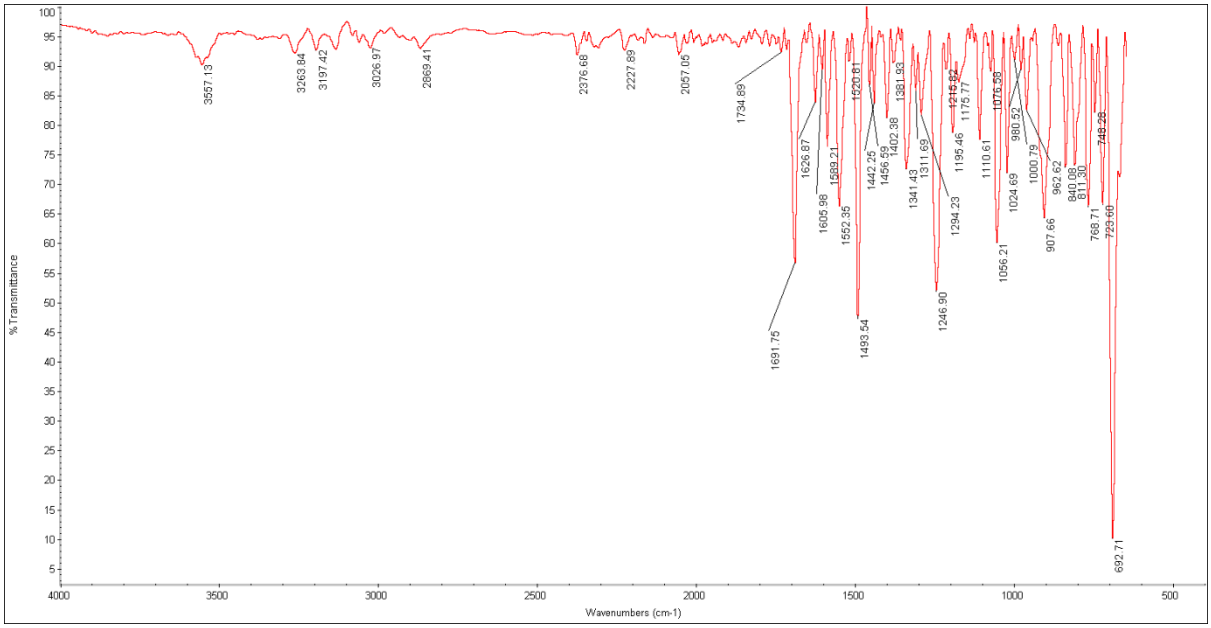

Figure 50. IR spectrum of compound **7m**

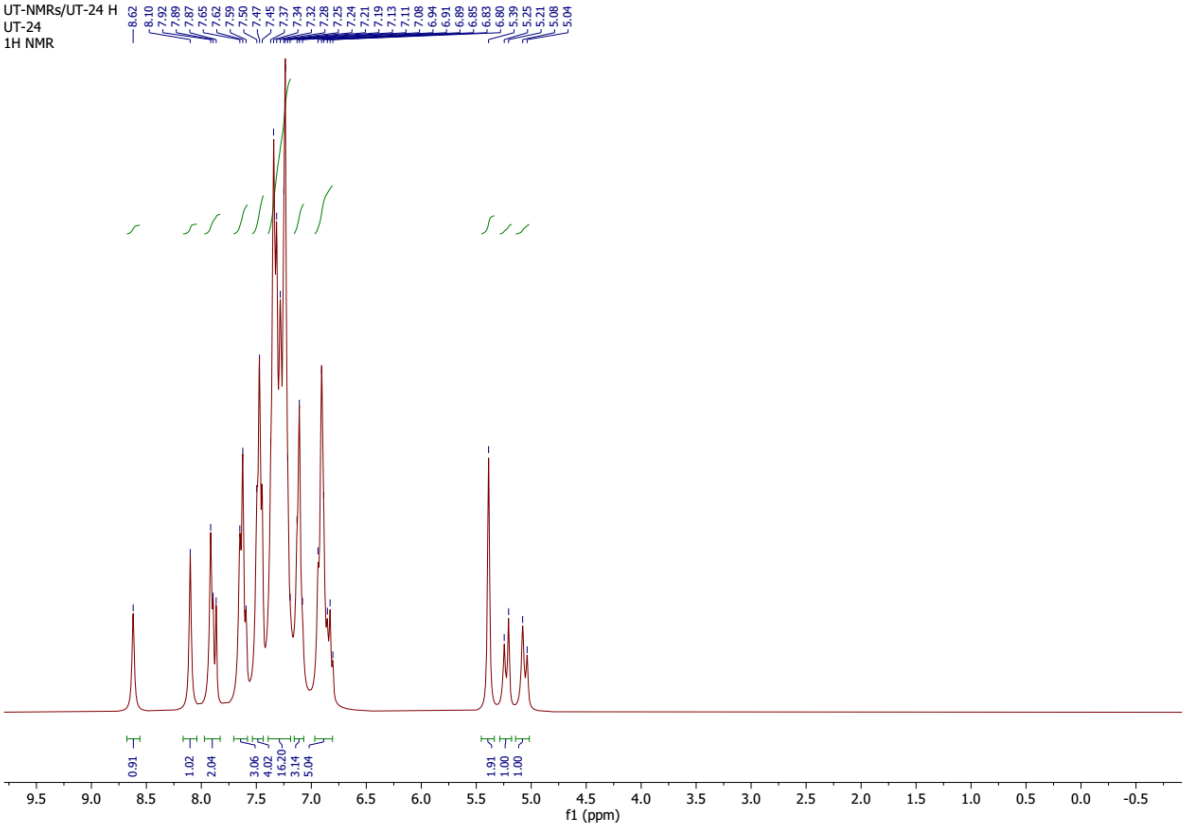

Figure 51. ^{1}H NMR spectrum of compound **7m**

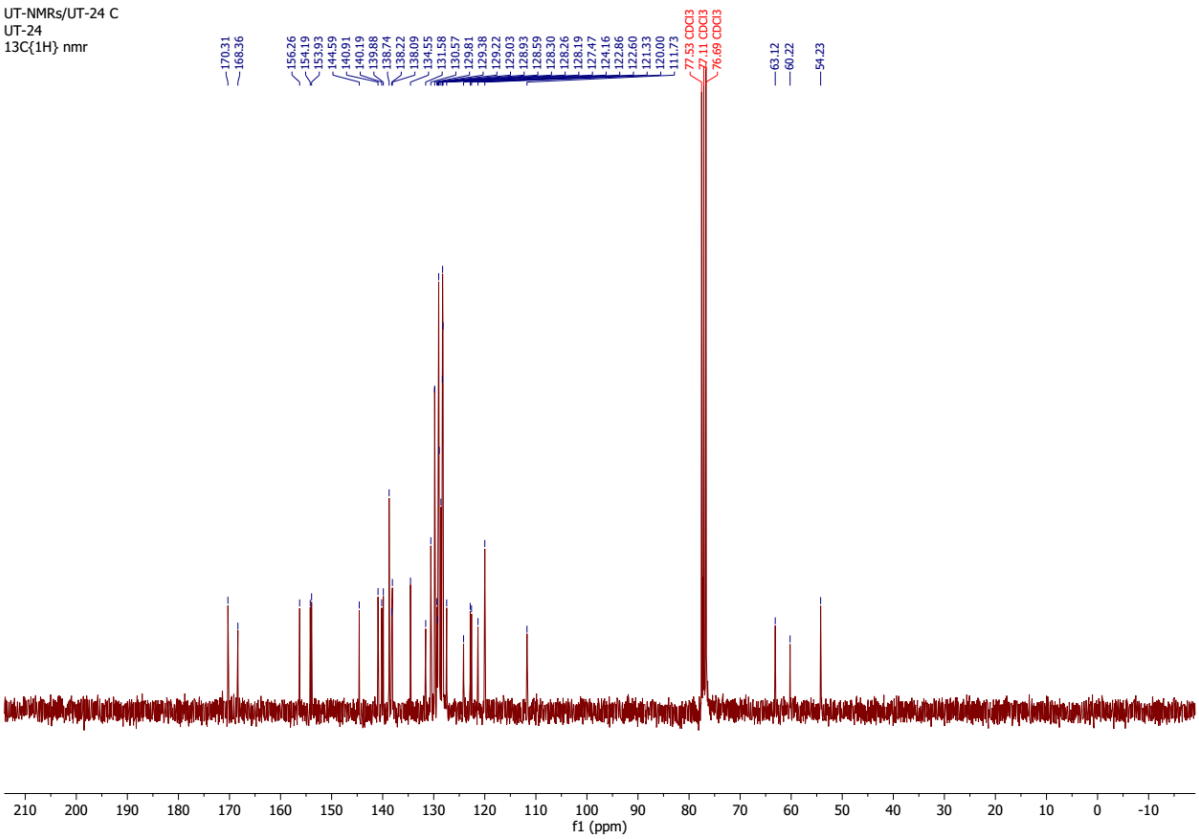

Figure 52. ^{13}C NMR spectrum of compound **7m**

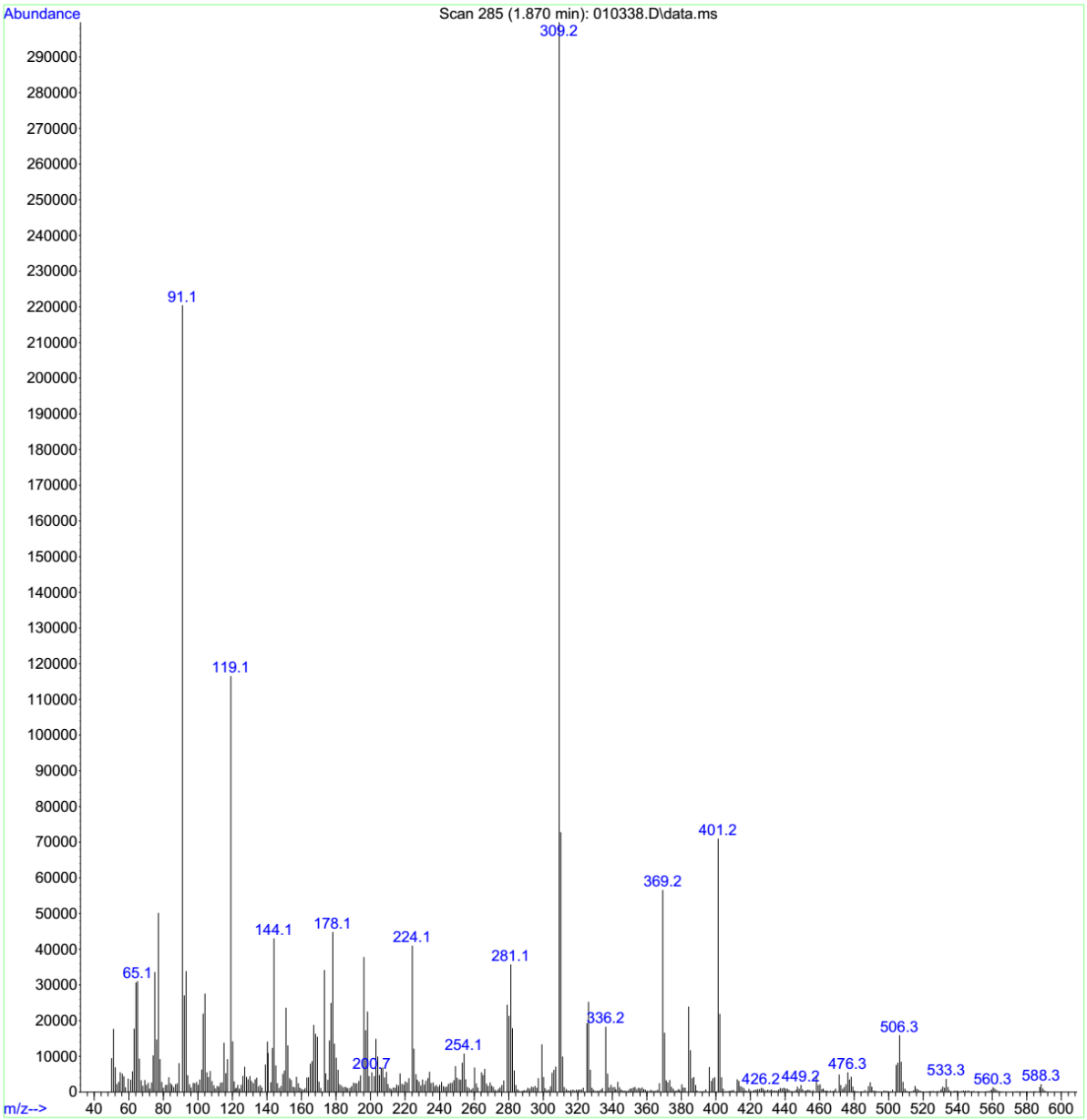

Figure 53. Mass spectrum of compound **7m**

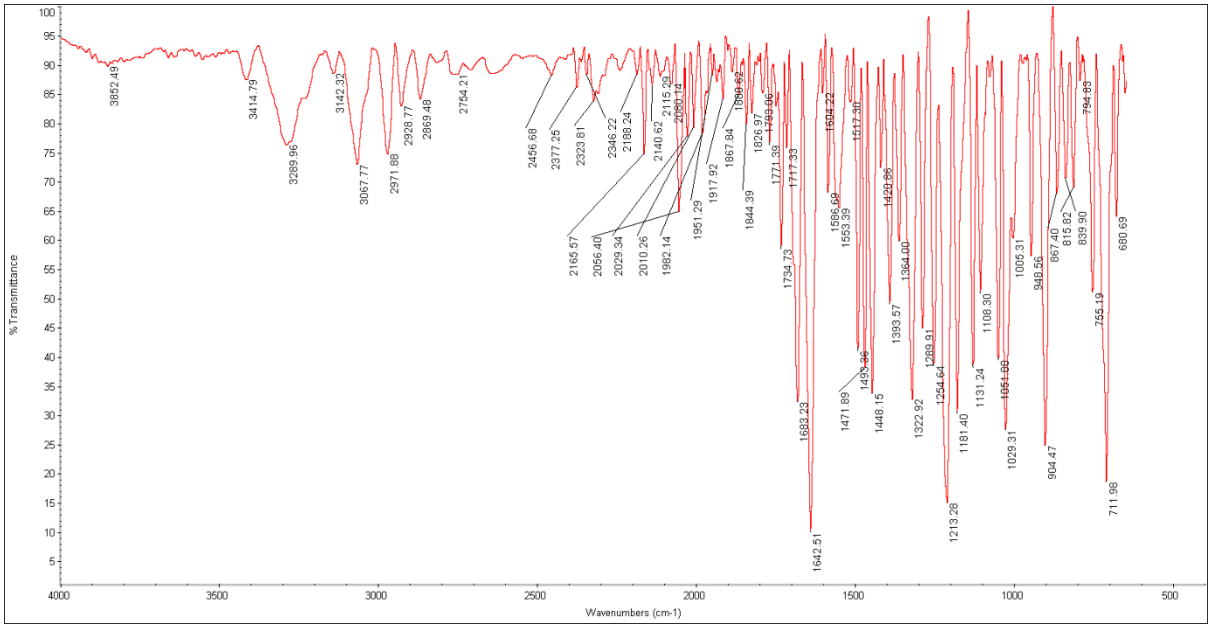

Figure 54. IR spectrum of compound **7n**

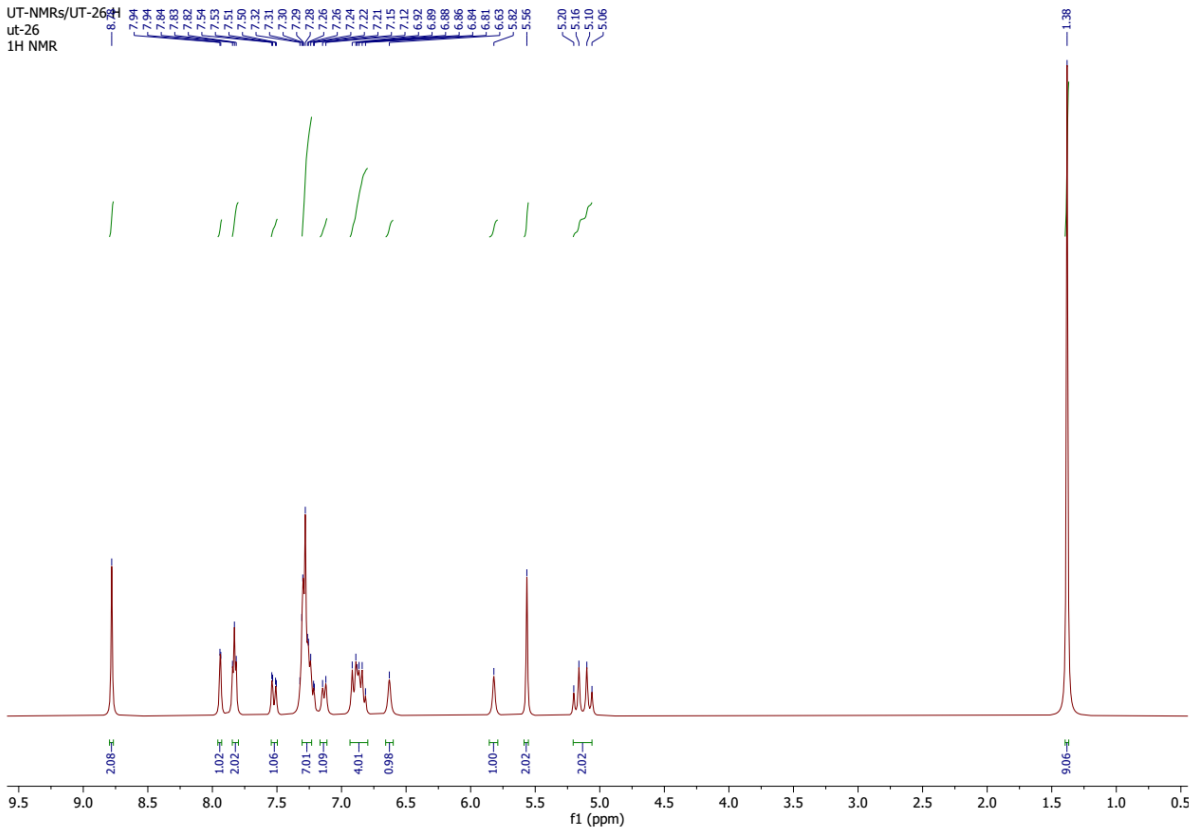

Figure 55. ^{1}H NMR spectrum of compound **7n**

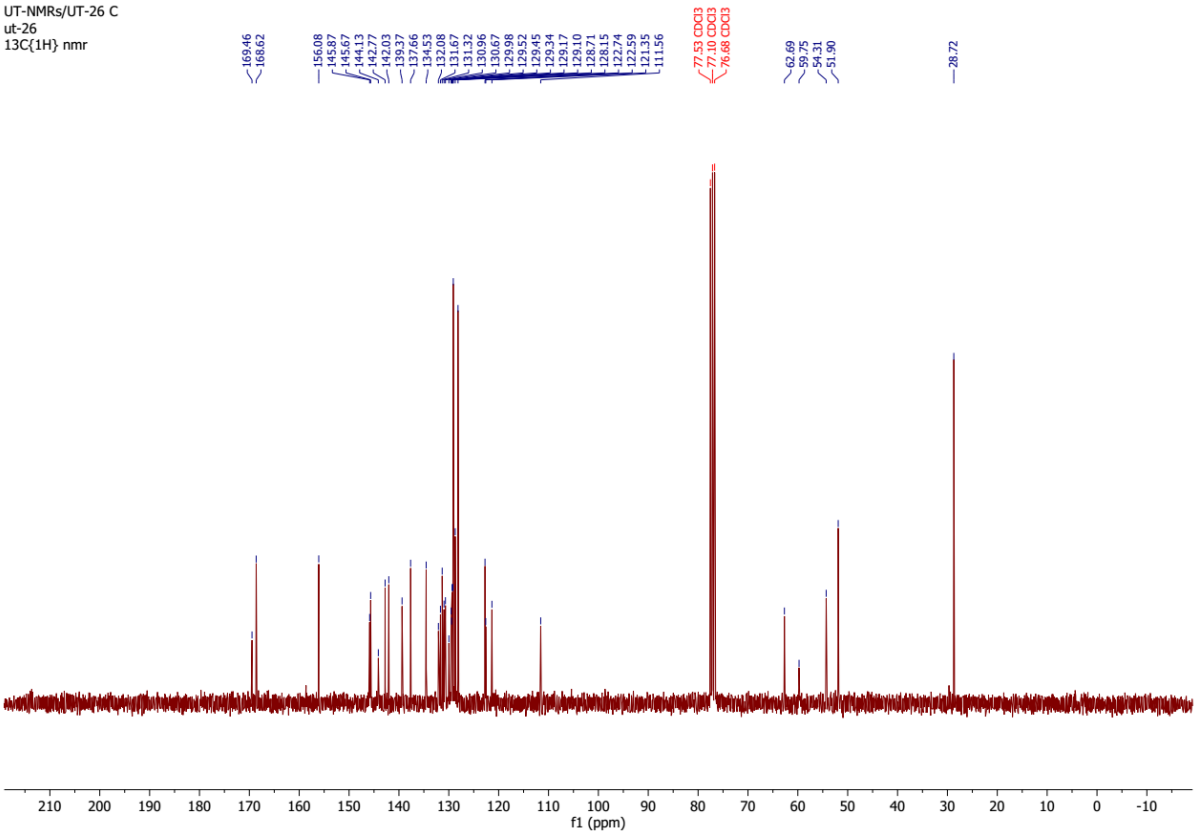

Figure 56. ^{13}C NMR spectrum of compound **7n**

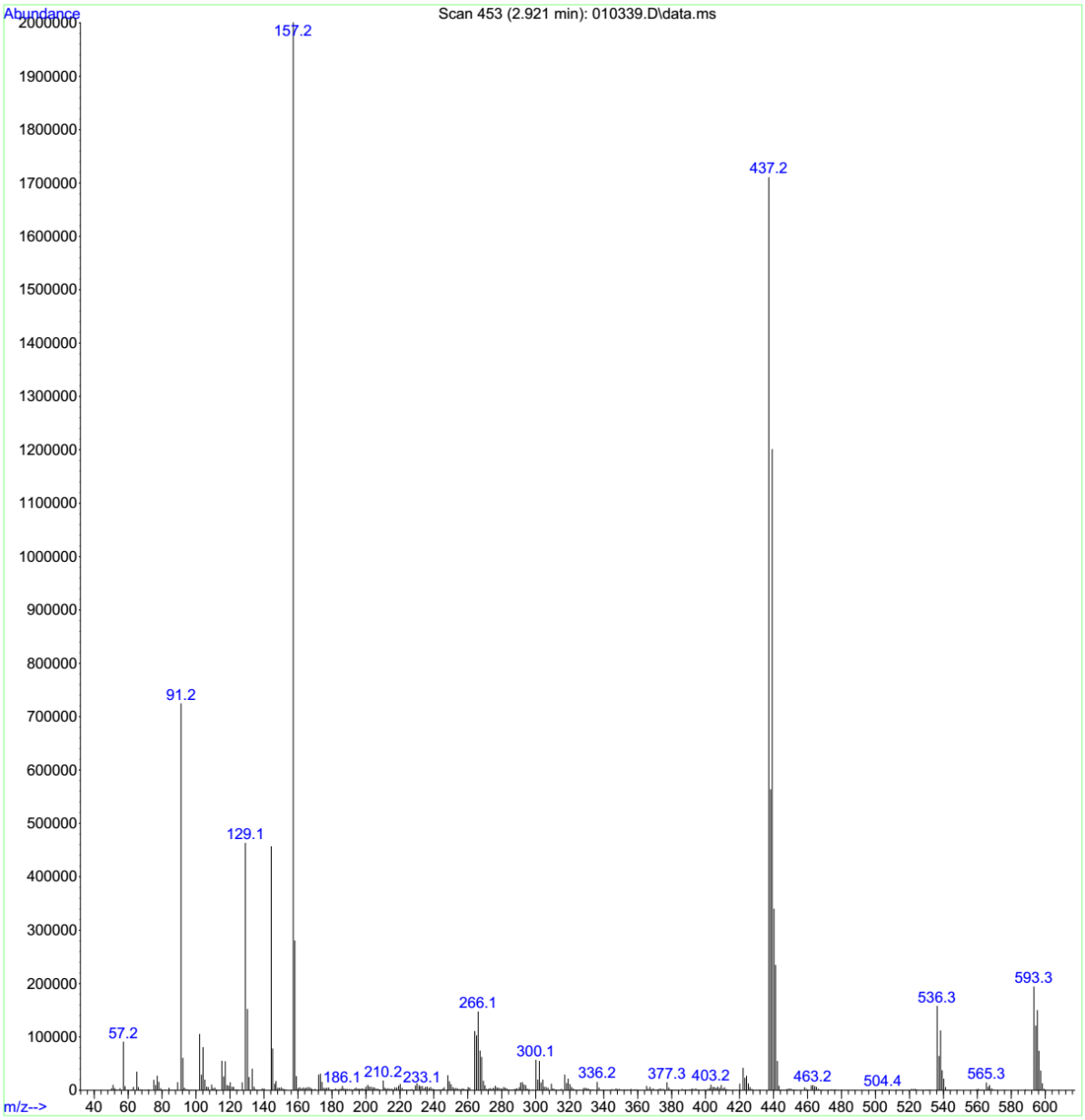

Figure 57. Mass spectrum of compound **7n**

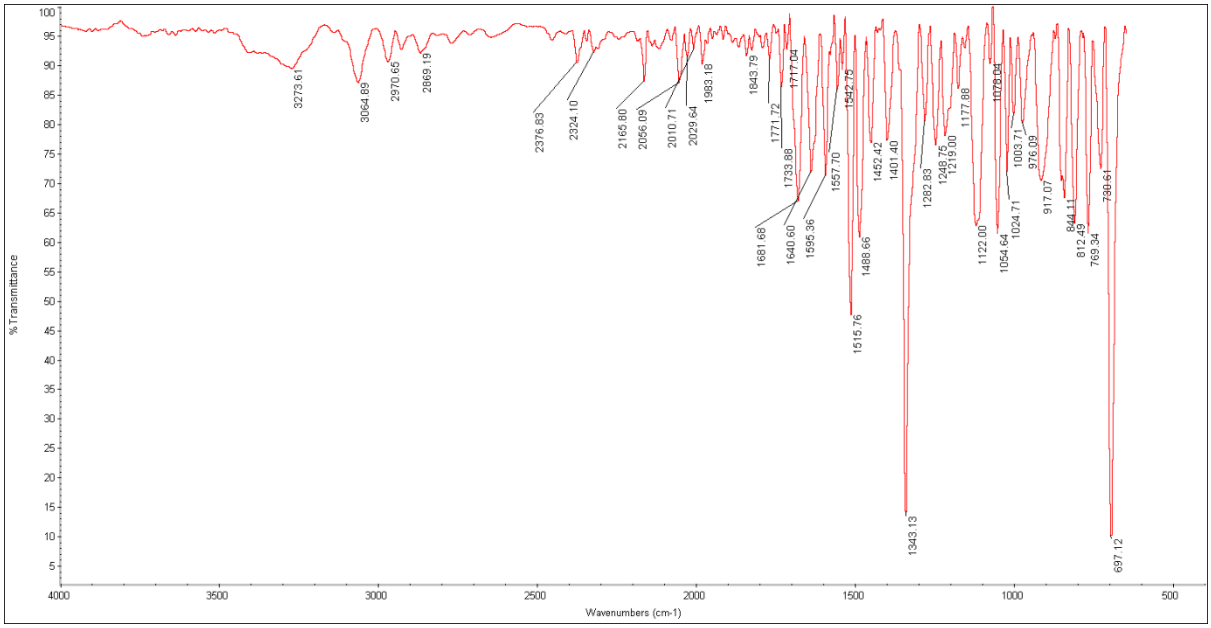

Figure 58. IR spectrum of compound **7o**

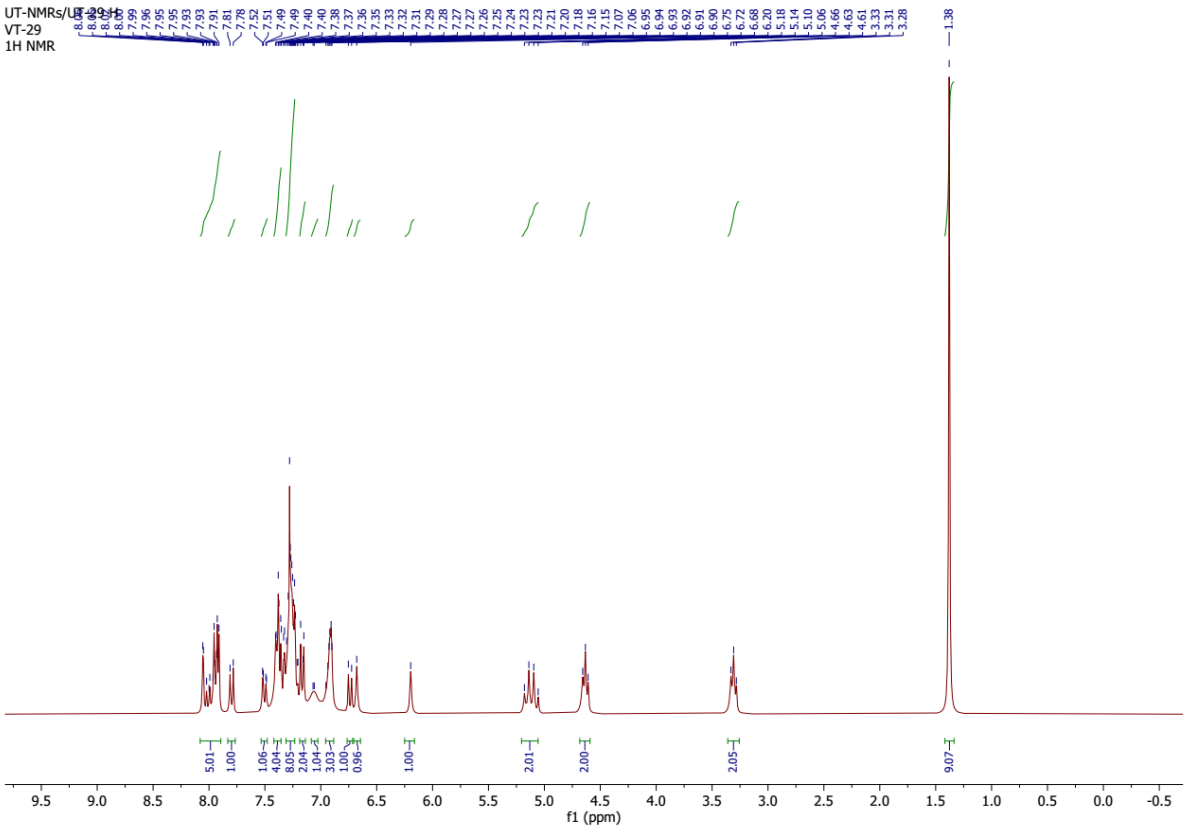

Figure 59. ^{1}H NMR spectrum of compound **7o**

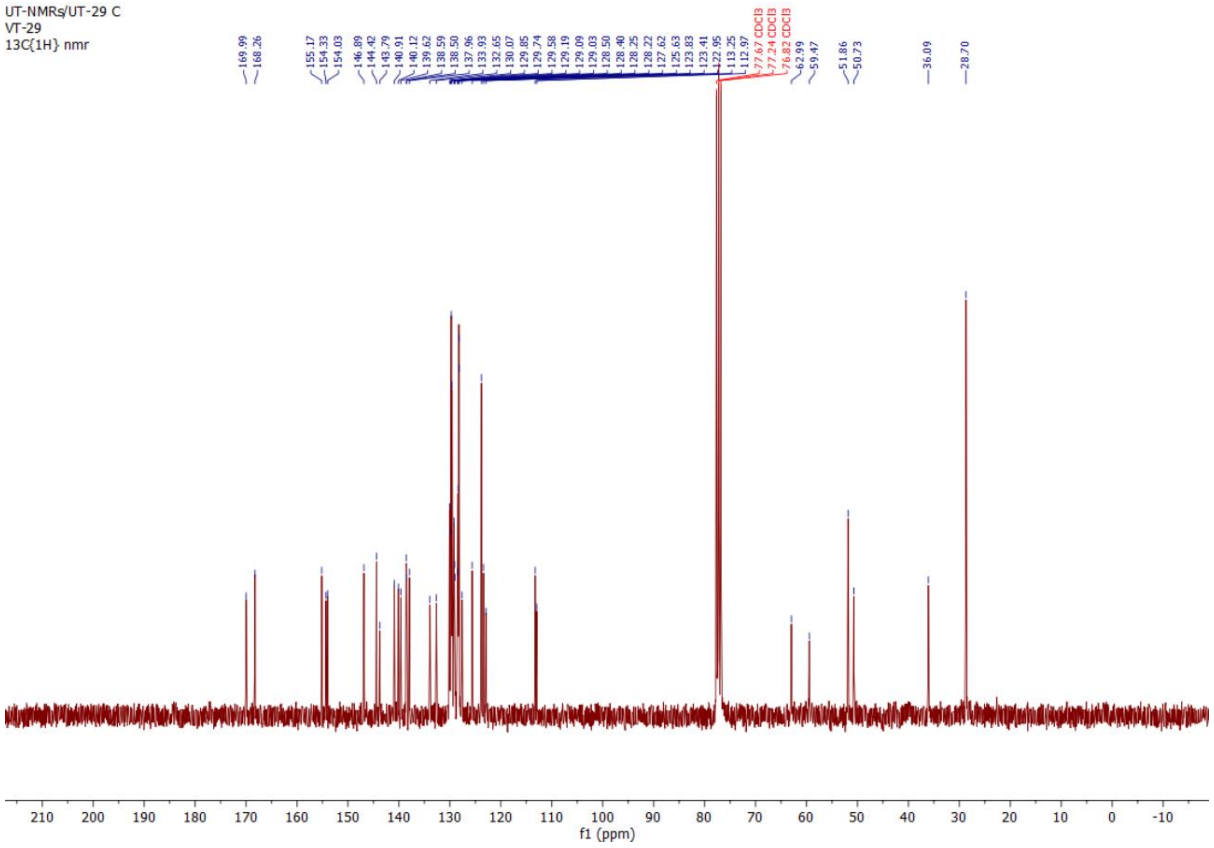

Figure 60. ^{13}C NMR spectrum of compound **7o**

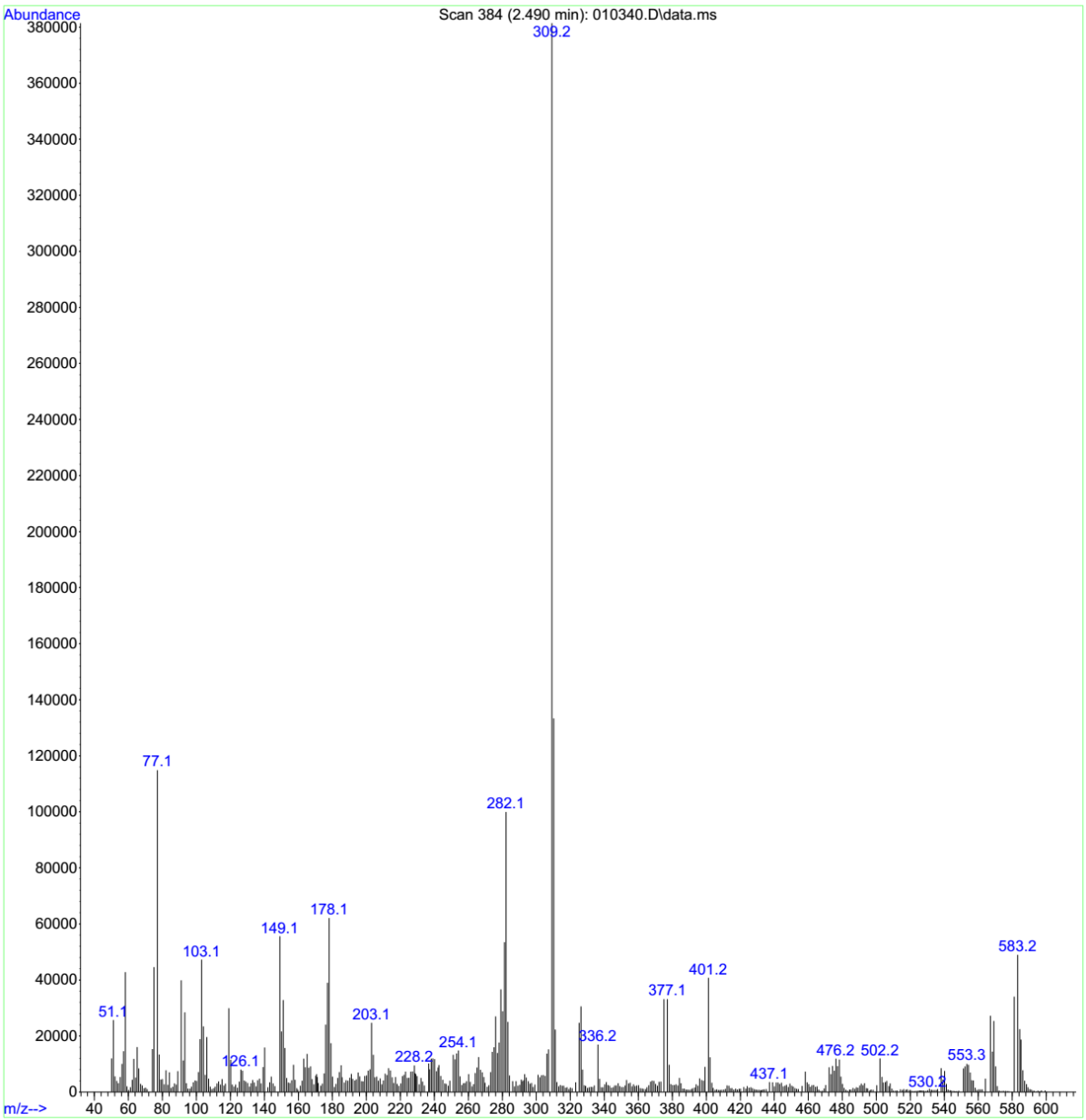

Figure 61. Mass spectrum of compound **7o**

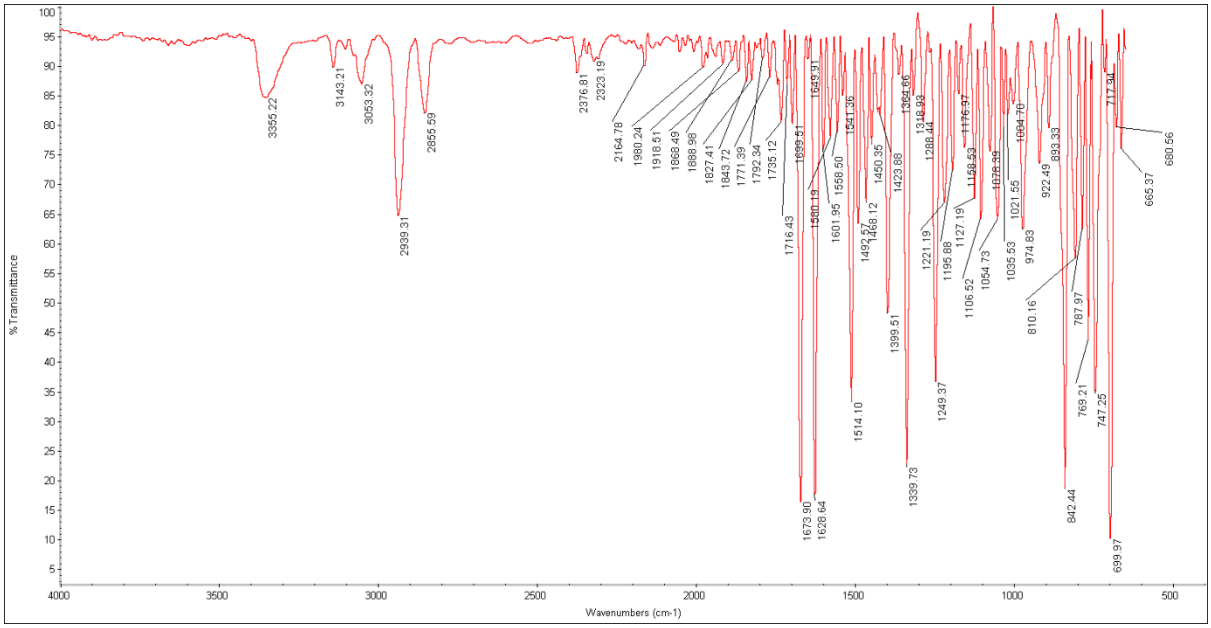

Figure 62. IR spectrum of compound **7p**

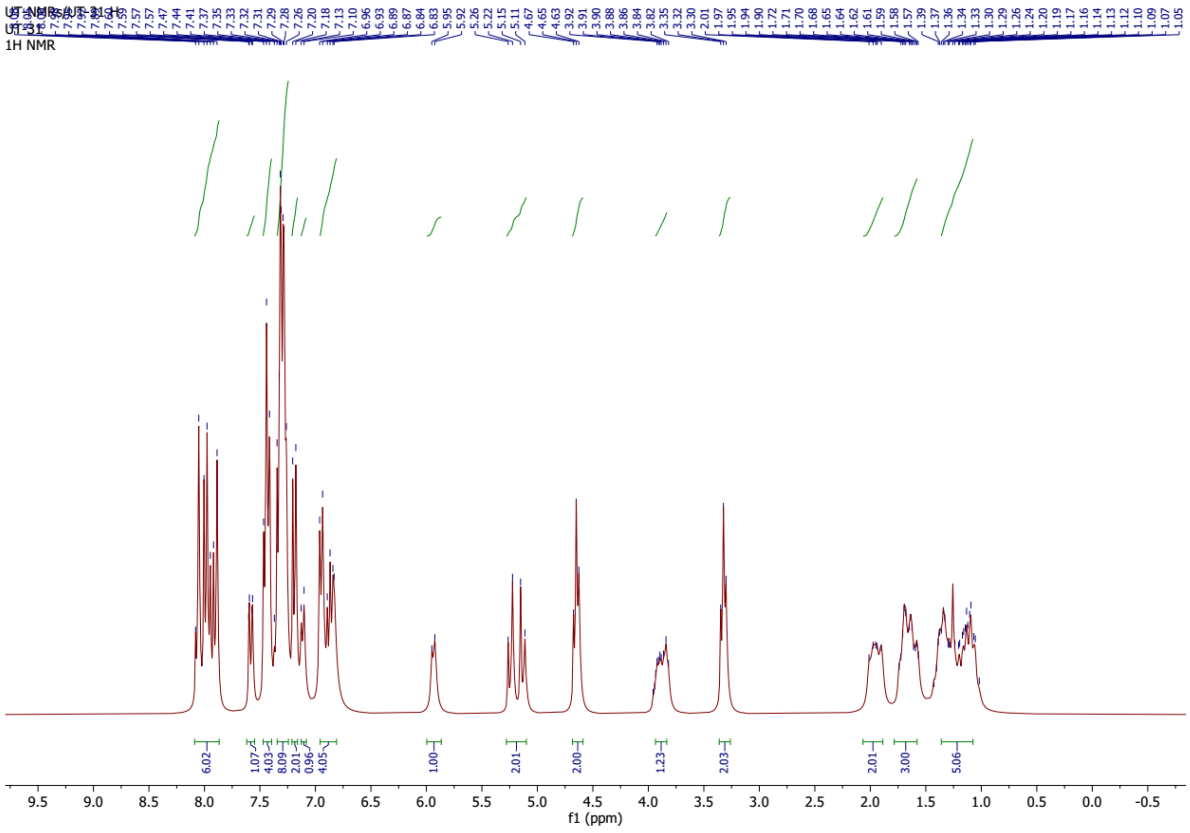

Figure 63. ^{1}H NMR spectrum of compound **7p**

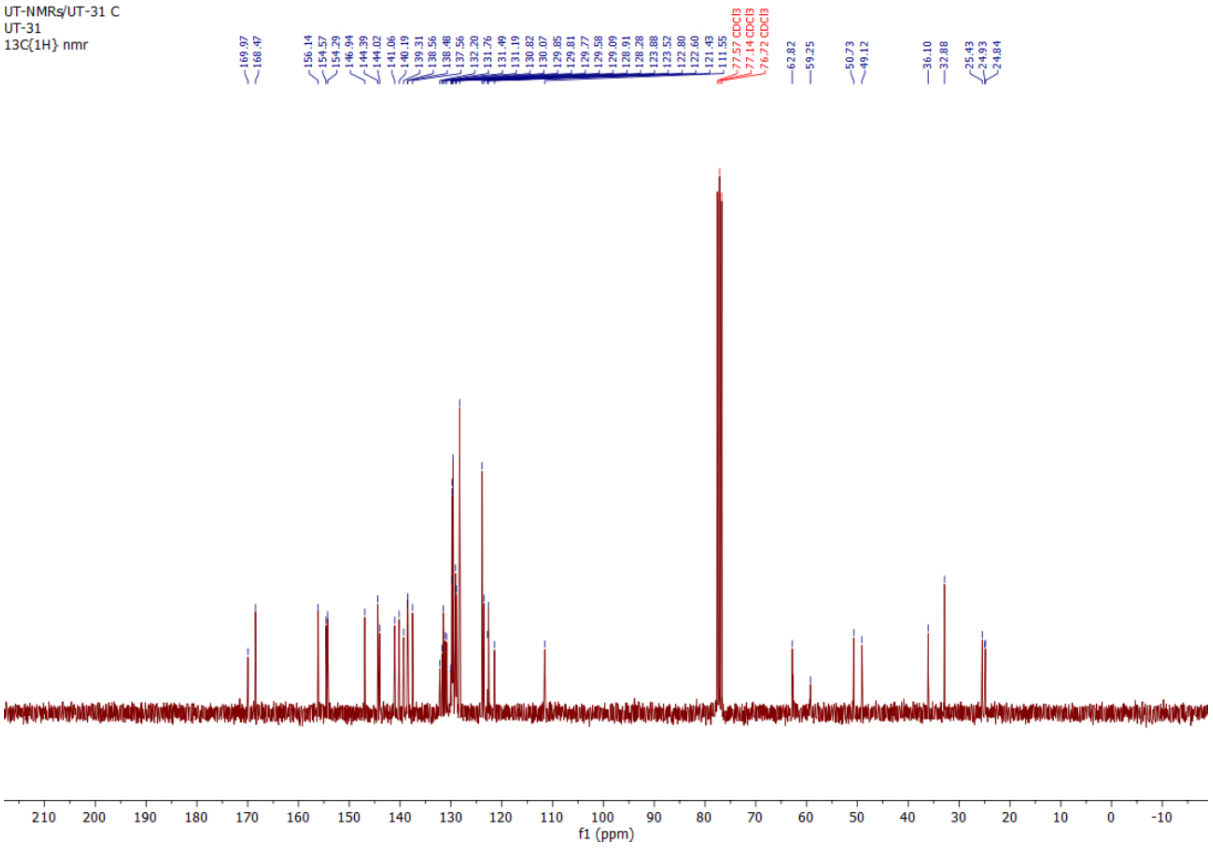

Figure 64. ^{13}C NMR spectrum of compound **7p**

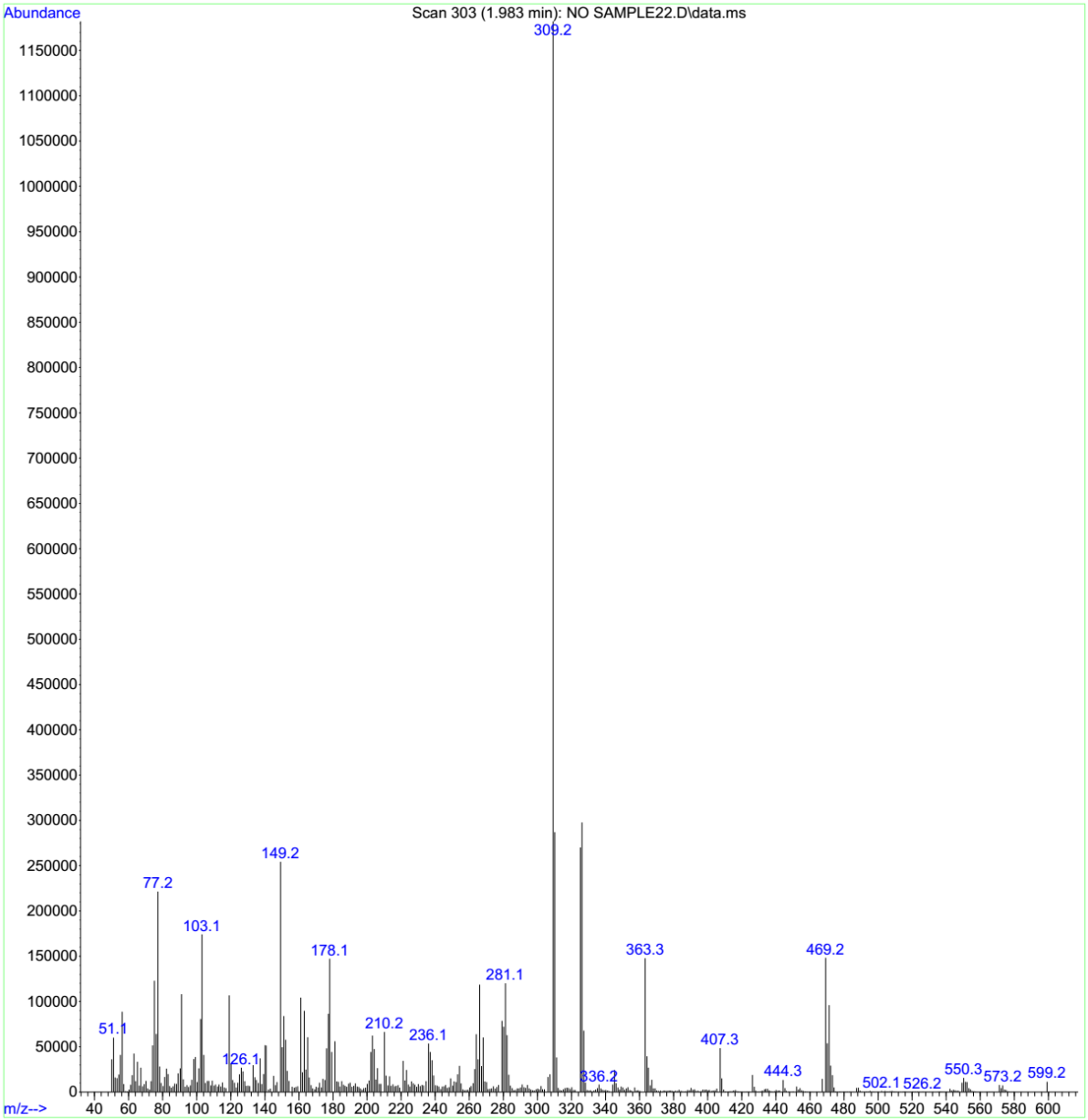

Figure 65. Mass spectrum of compound **7p**

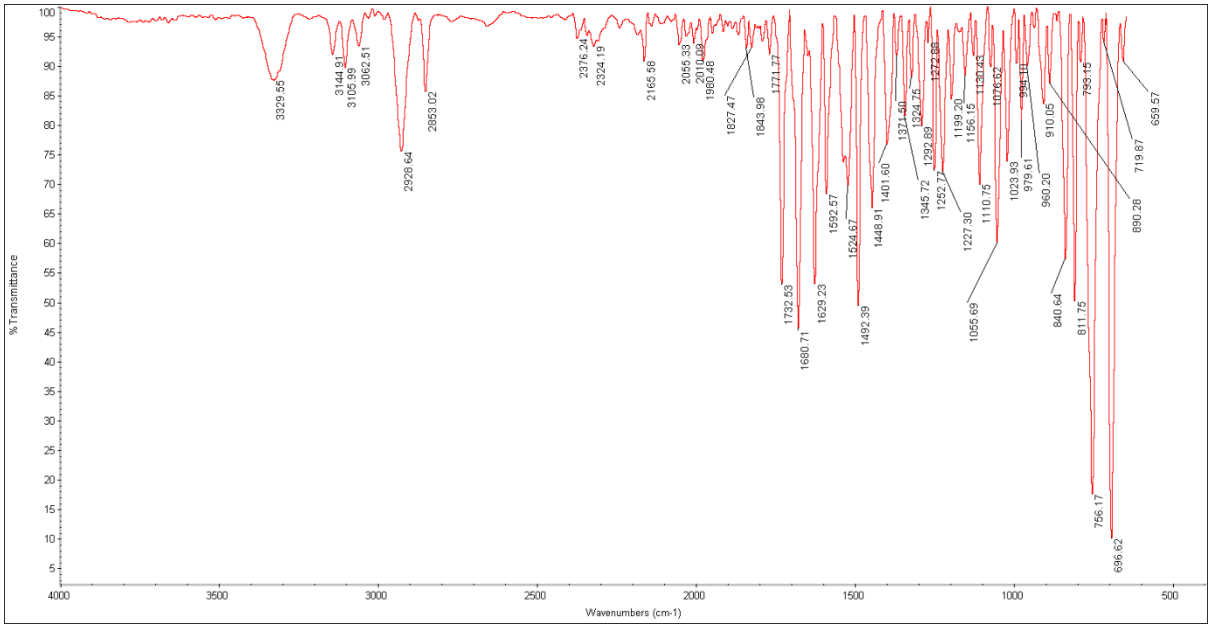

Figure 66. IR spectrum of compound **7q**

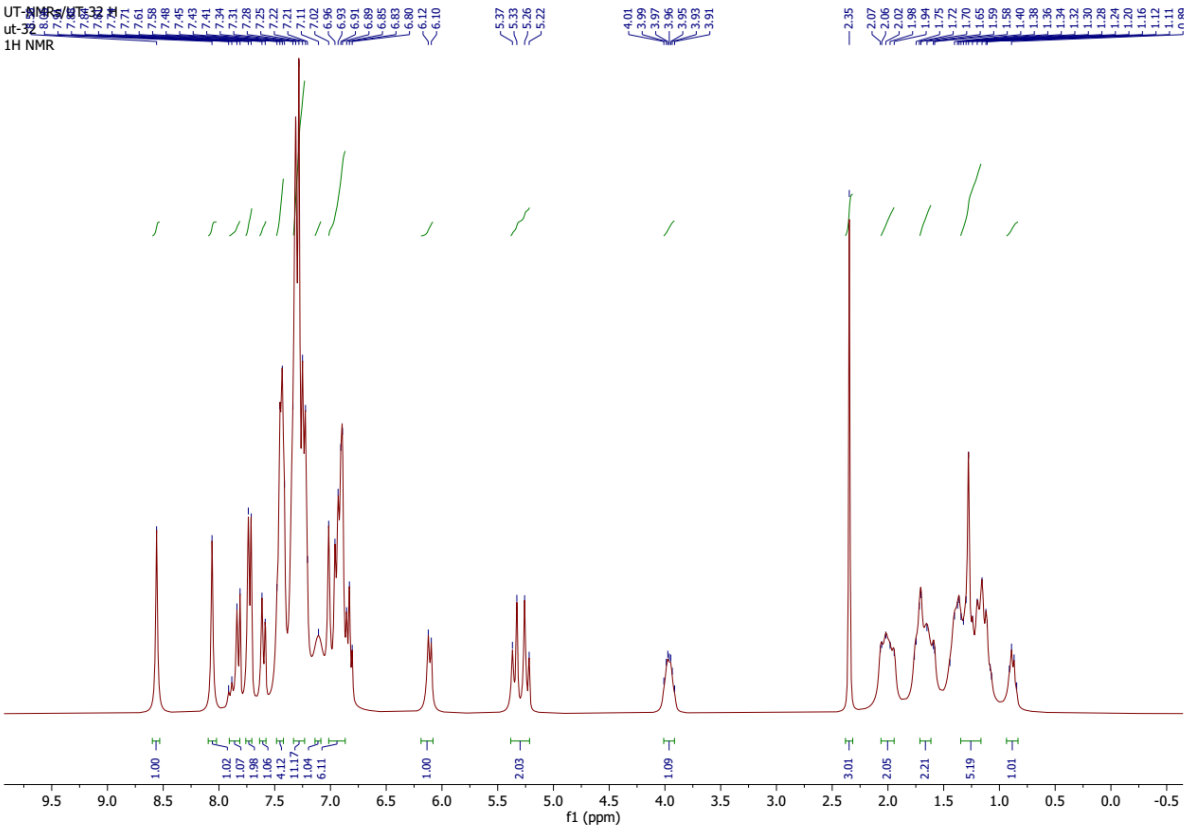

Figure 67. ^{1}H NMR spectrum of compound **7q**

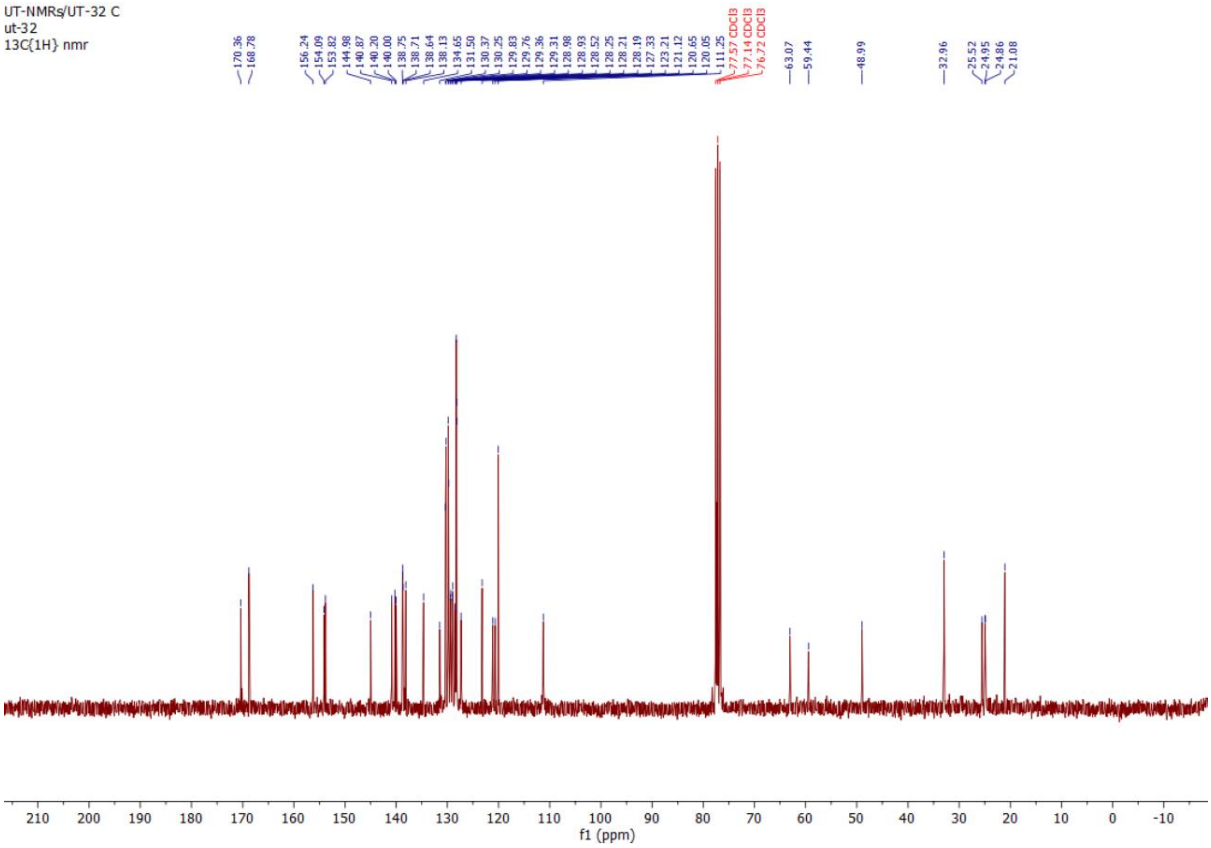

Figure 68. ^{13}C NMR spectrum of compound **7q**

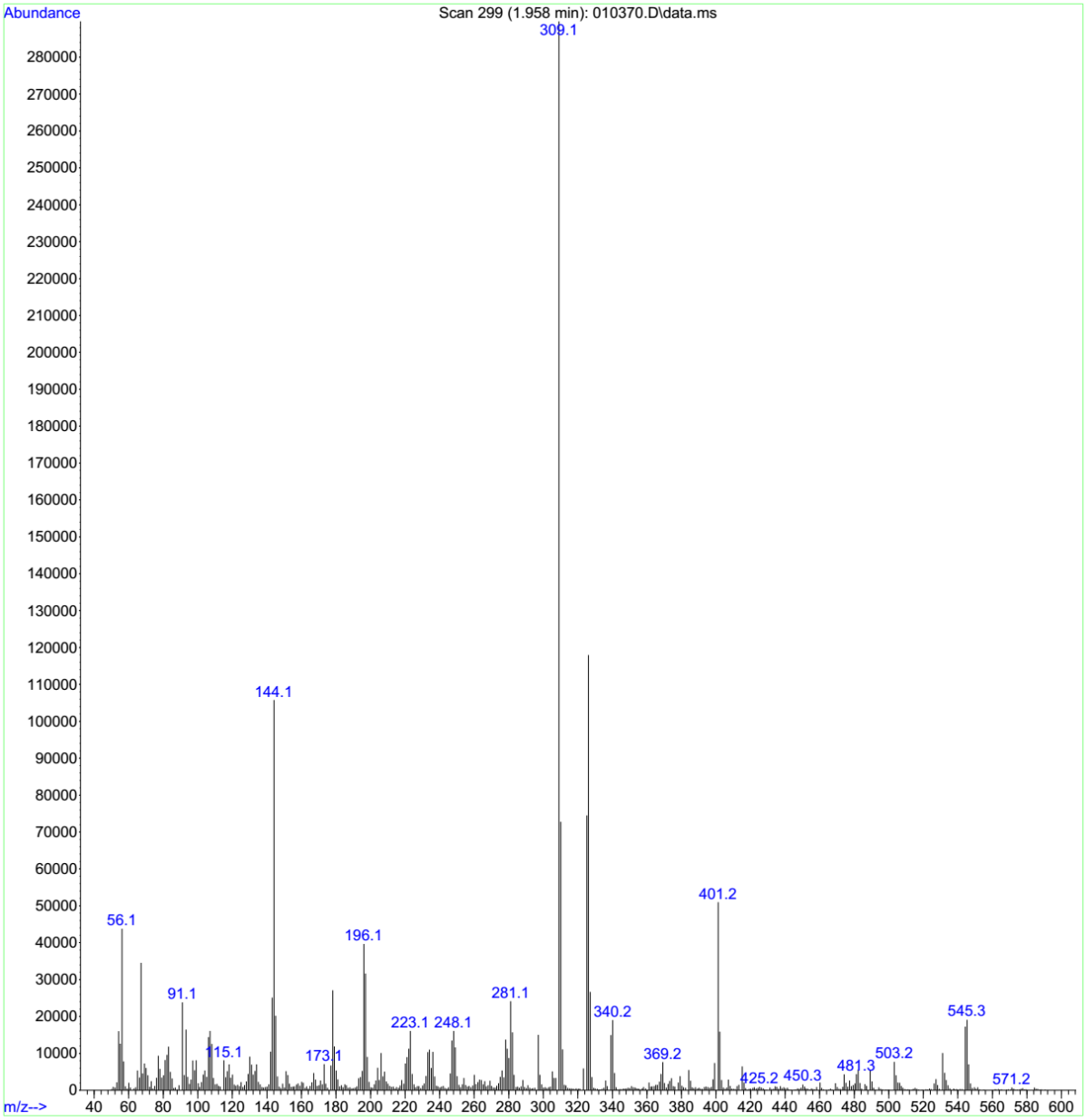

Figure 69. Mass spectrum of compound **7q**

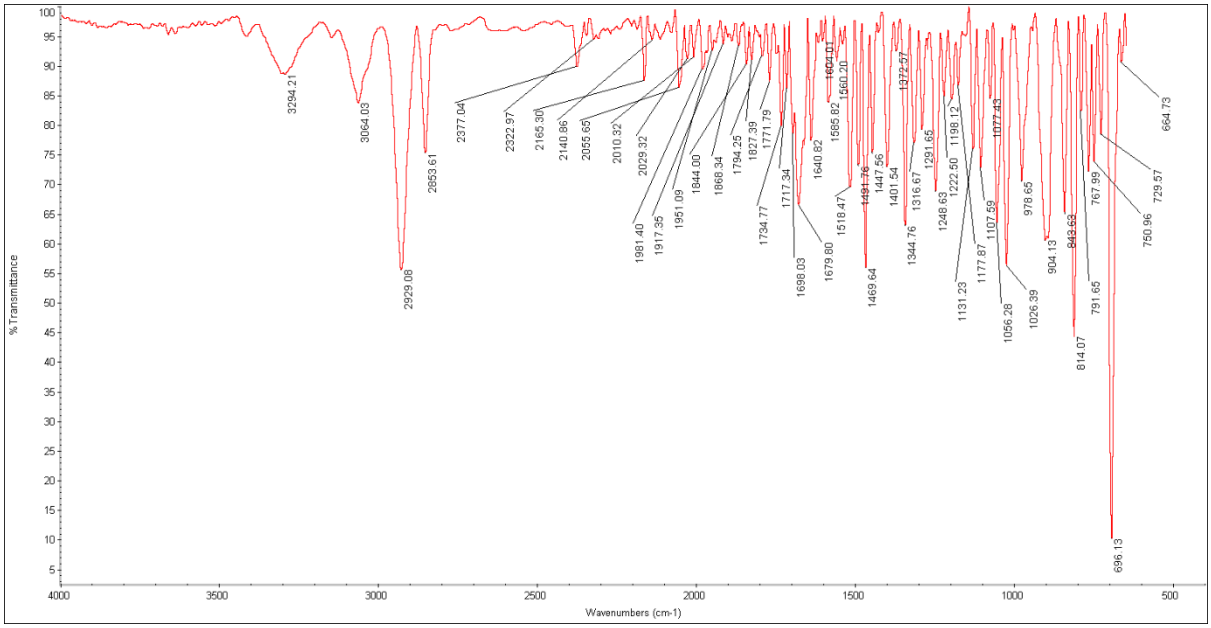

Figure 70. IR spectrum of compound **7r**

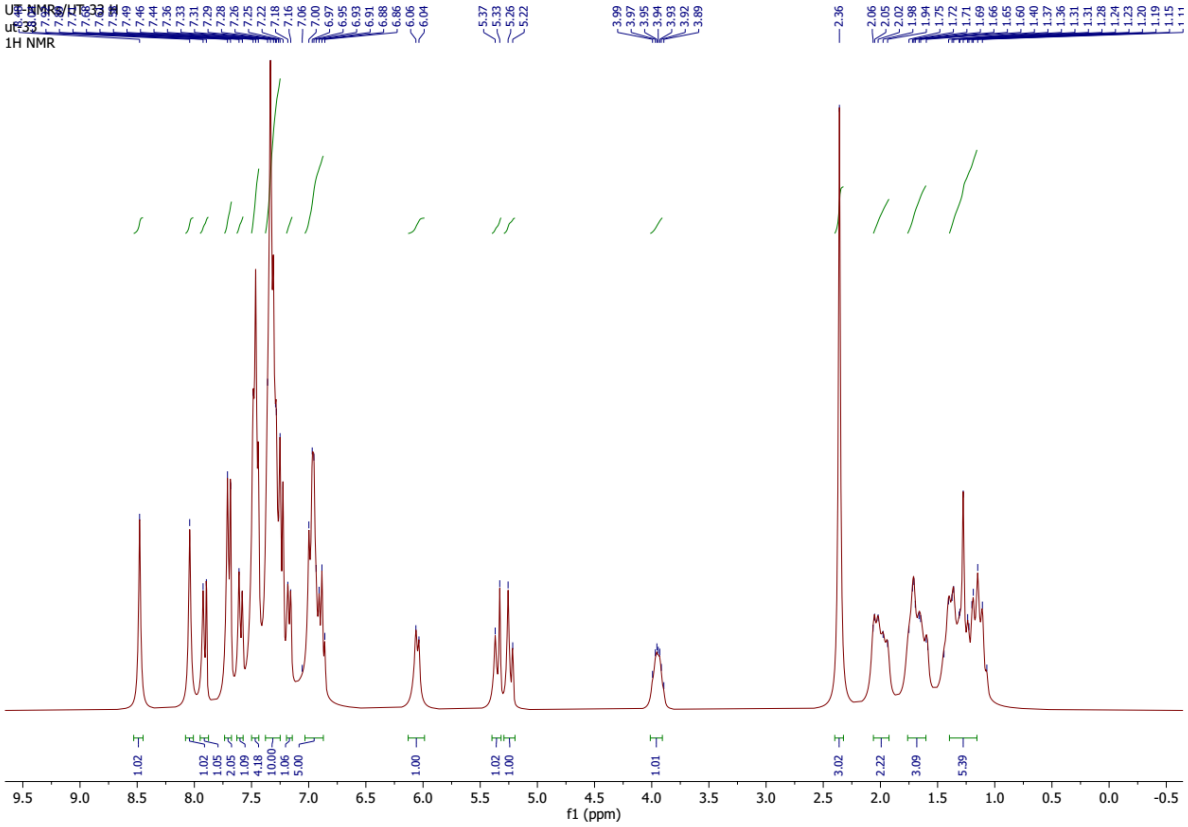

Figure 71. ^{1}H NMR spectrum of compound **7r**

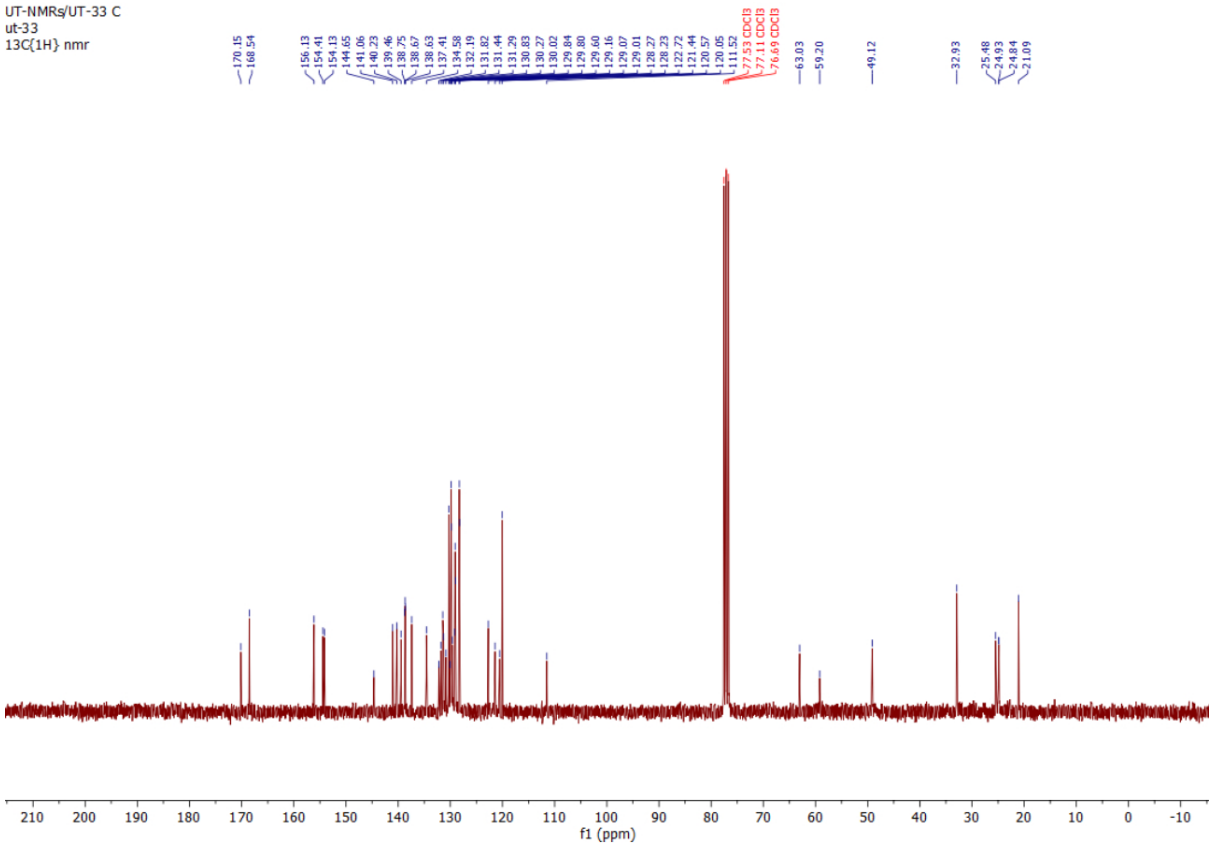

Figure 72. ^{13}C NMR spectrum of compound **7r**

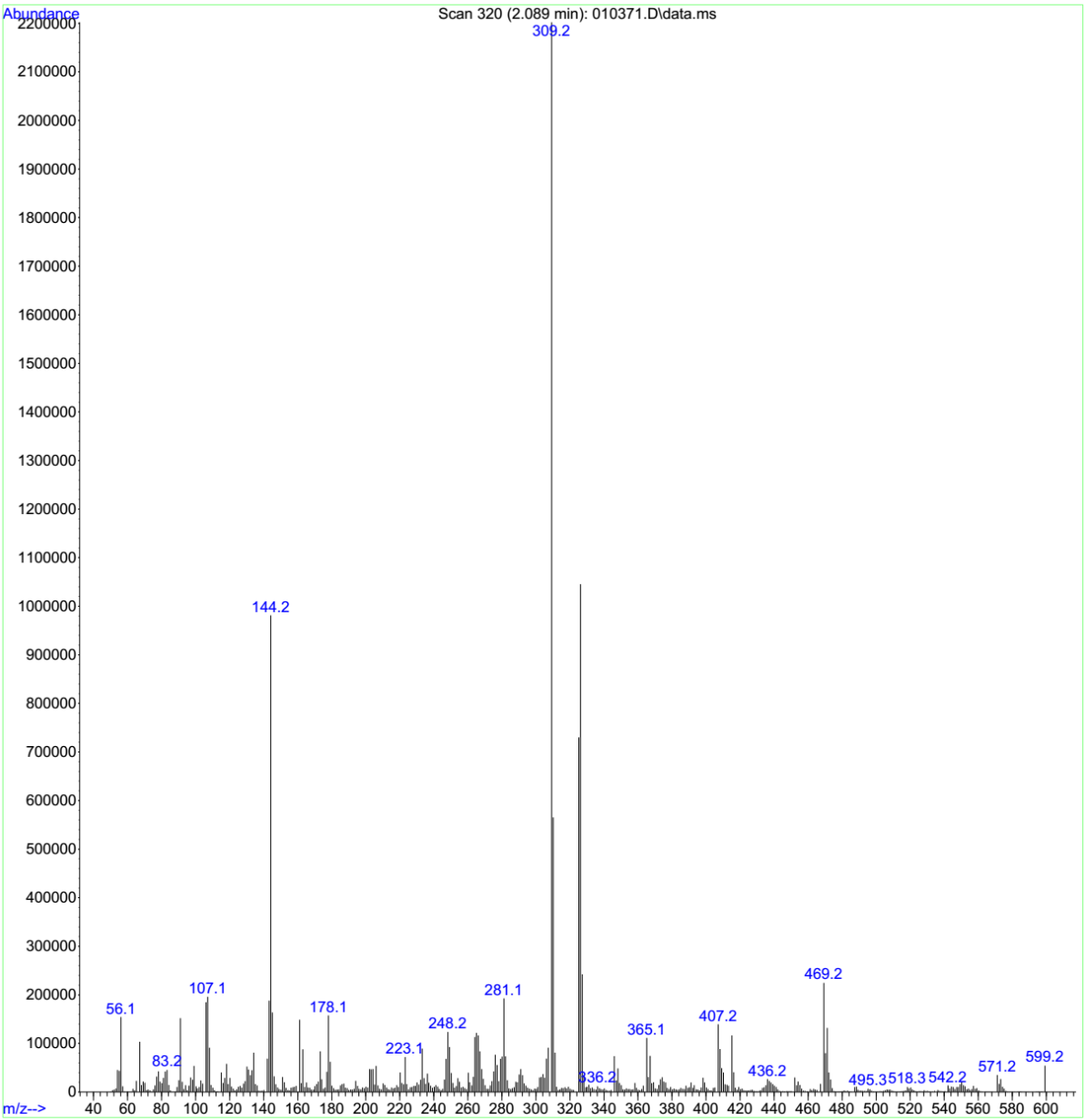

Figure 73. Mass spectrum of compound **7r**

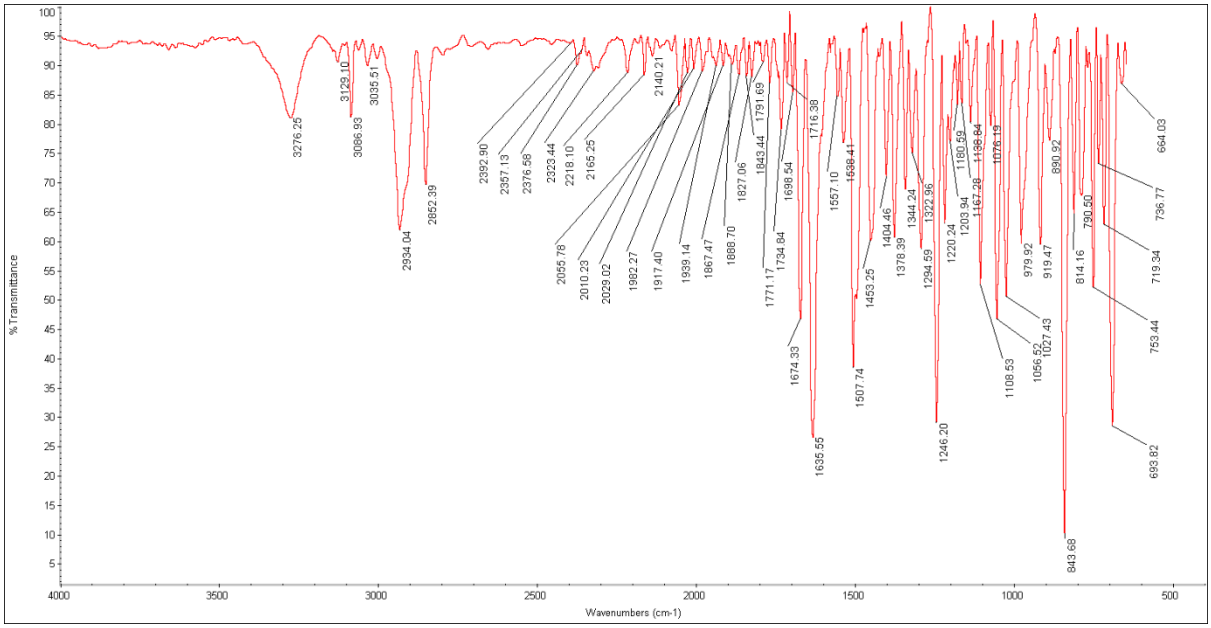

Figure 74. IR spectrum of compound **7s**

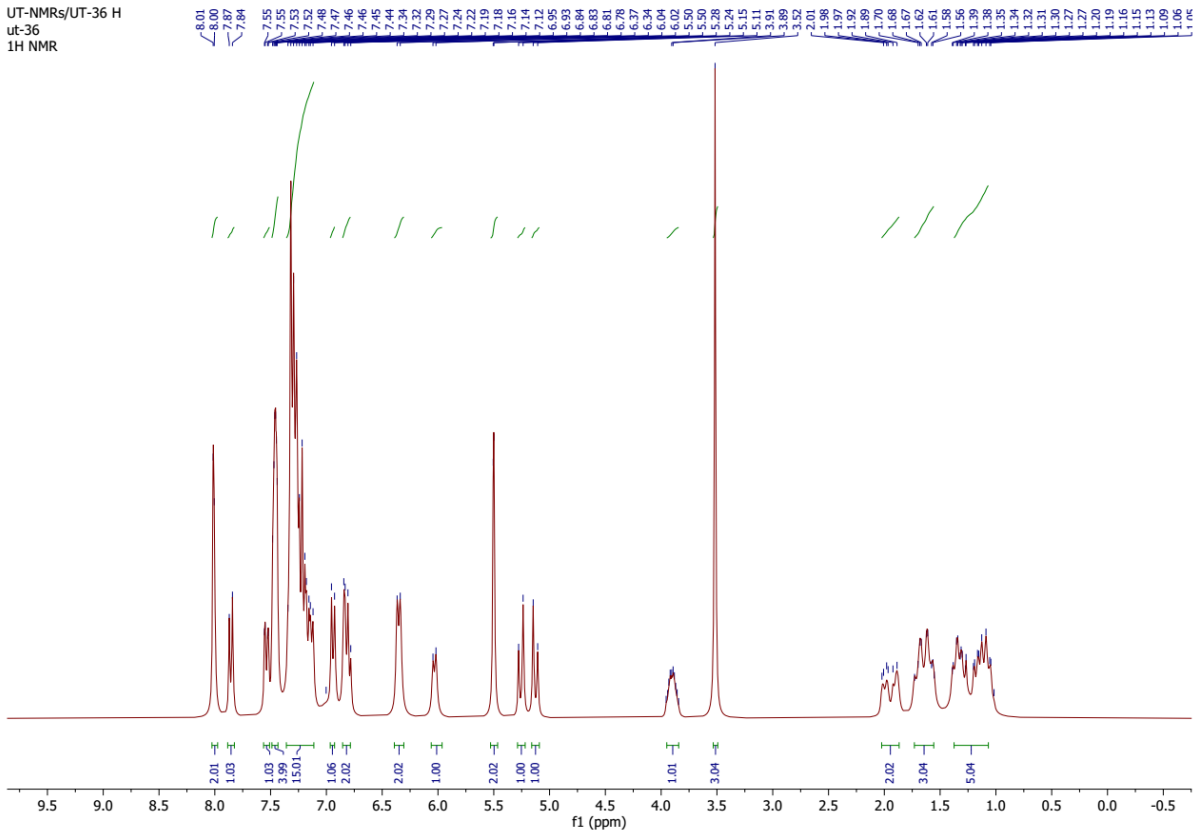

Figure 75. ^{1}H NMR spectrum of compound **7s**

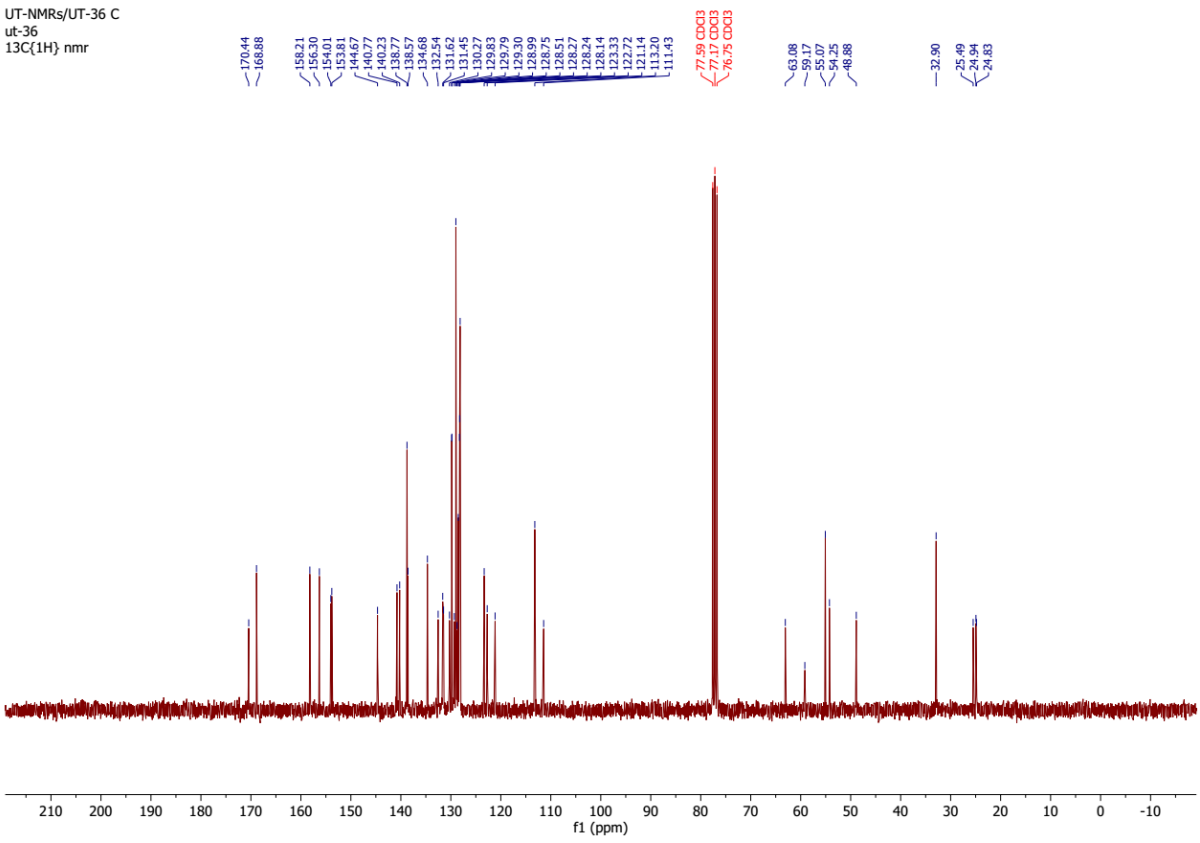

Figure 76. ^{13}C NMR spectrum of compound **7s**

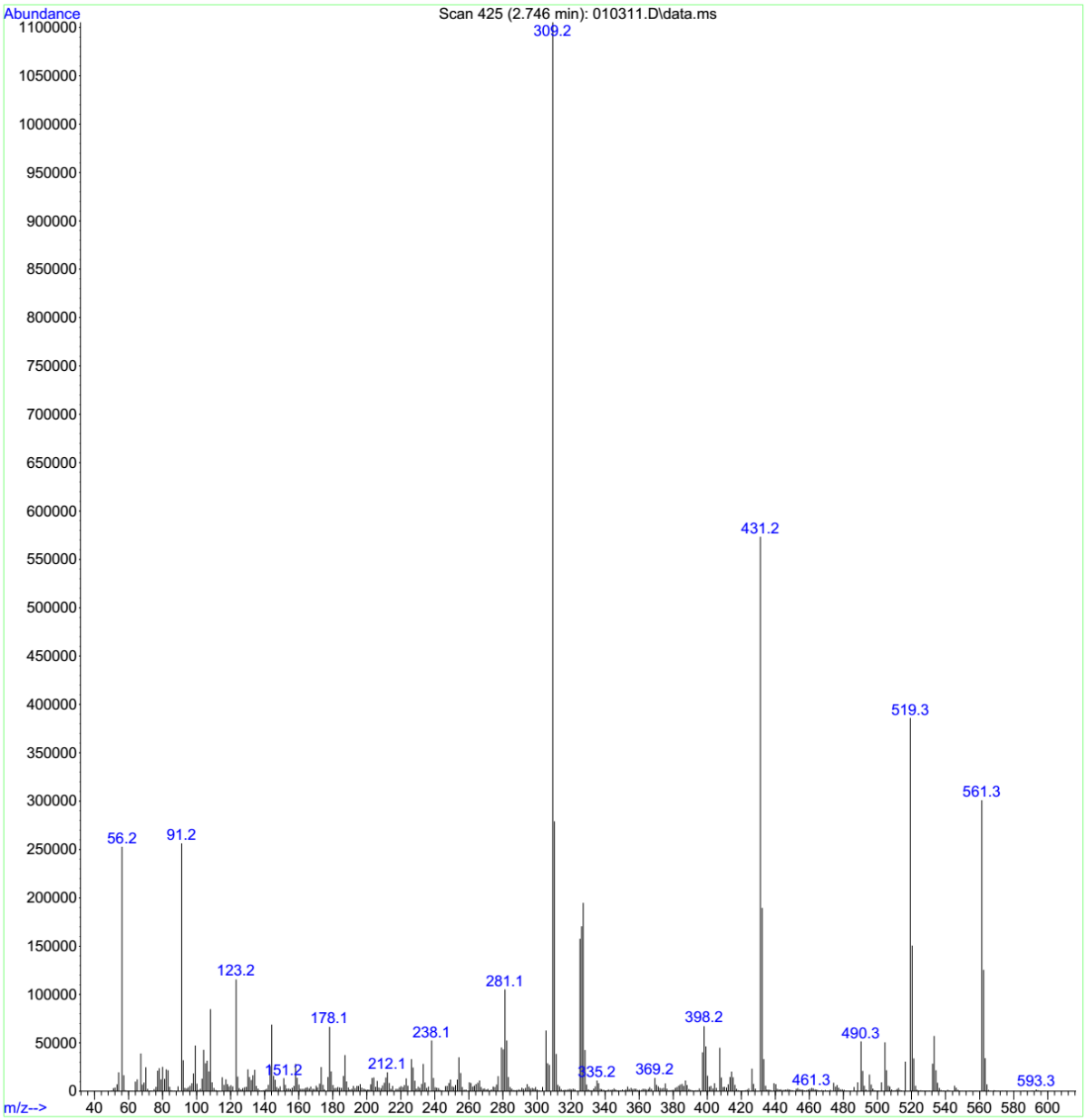

Figure 77. Mass spectrum of compound **7s**

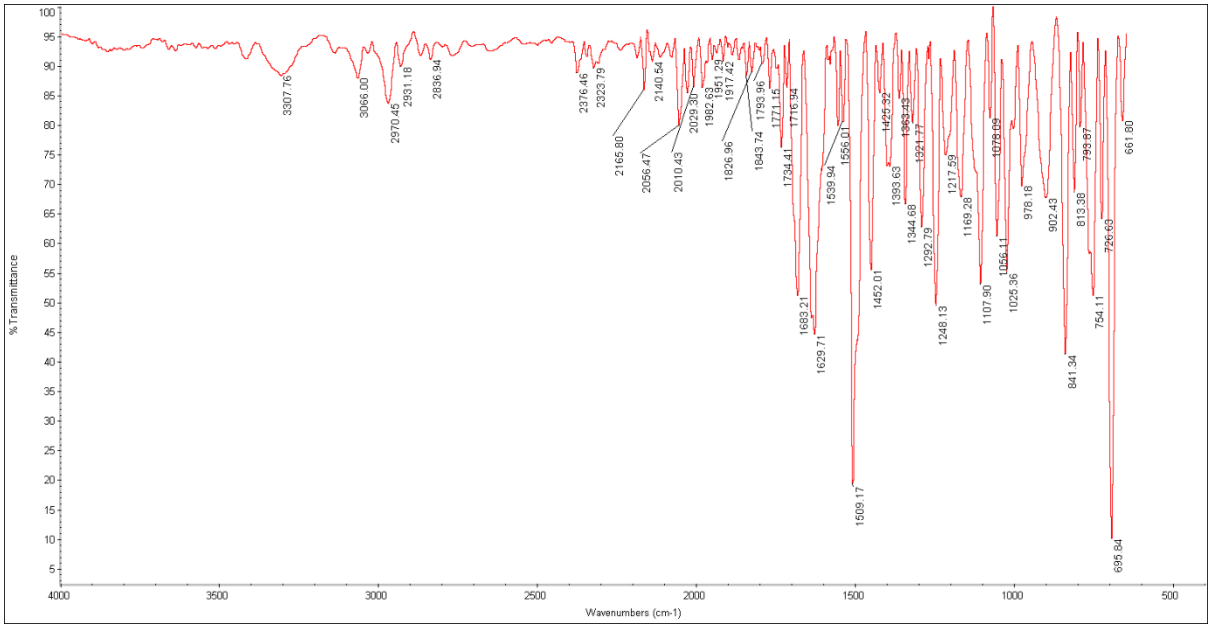

Figure 78. IR spectrum of compound **7t**

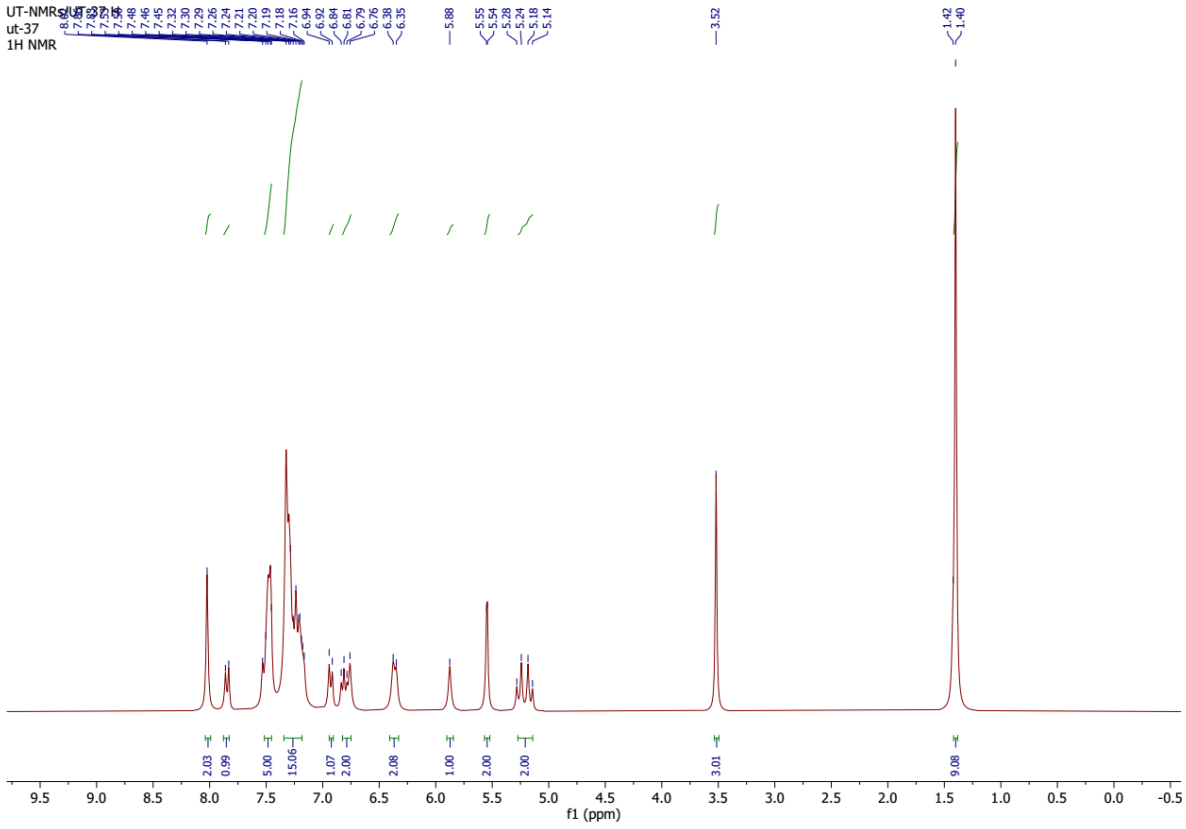

Figure 79. ^{1}H NMR spectrum of compound **7t**

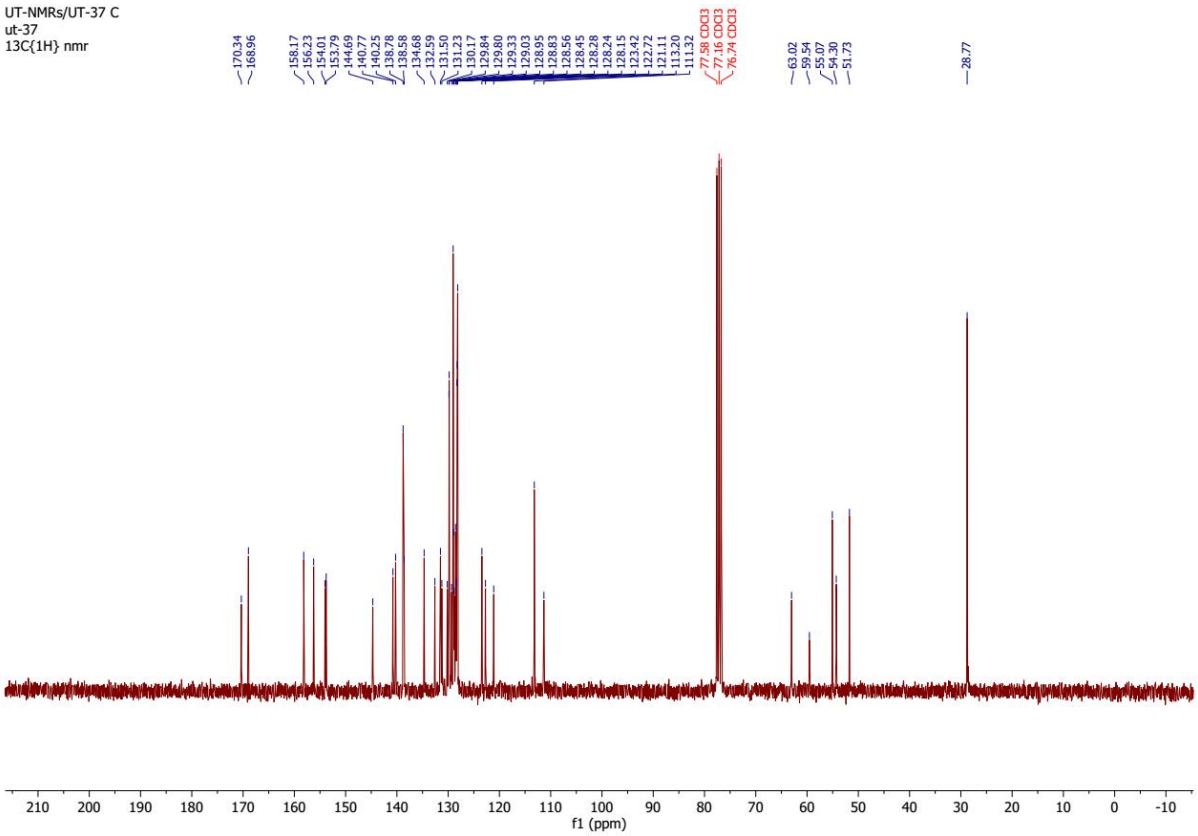

Figure 80. ^{13}C NMR spectrum of compound **7t**

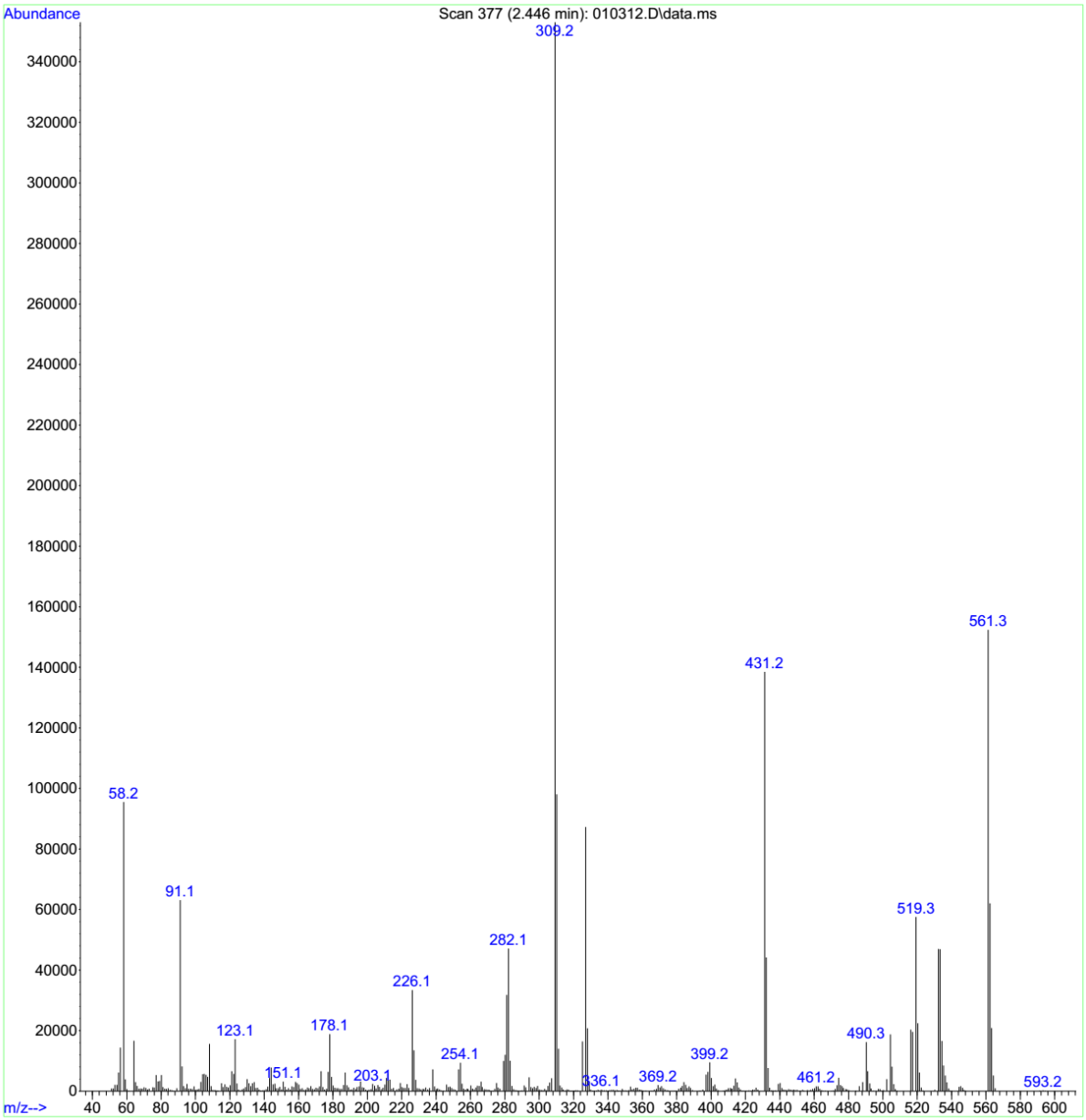

Figure 81. Mass spectrum of compound **7t**

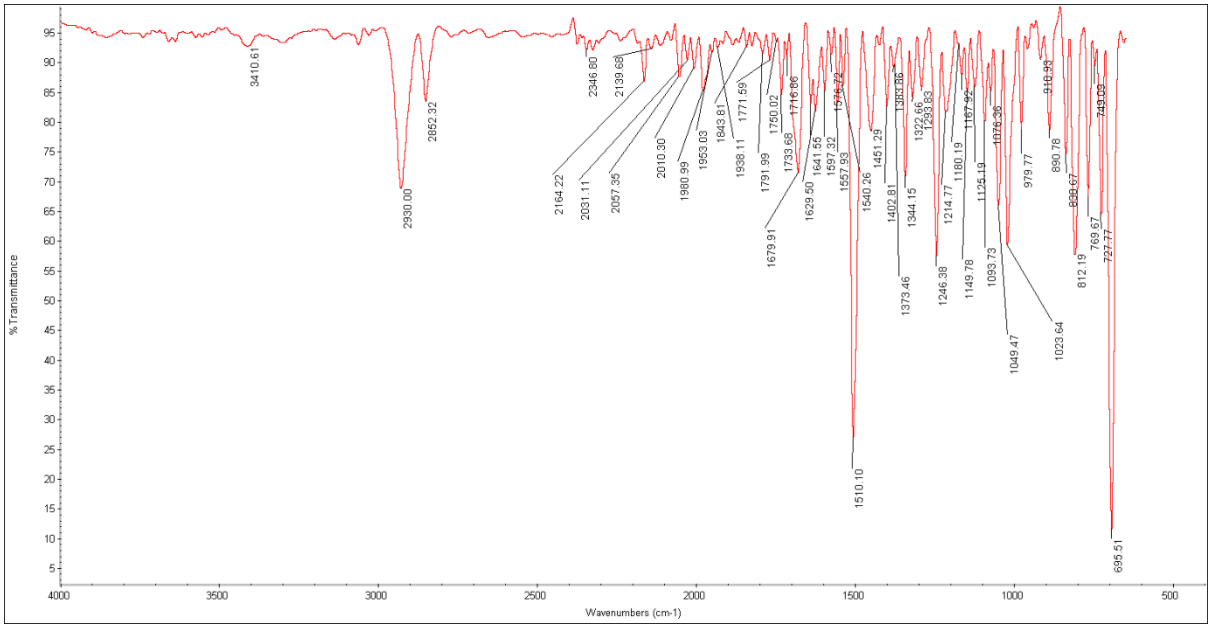

Figure 82. IR spectrum of compound **7u**

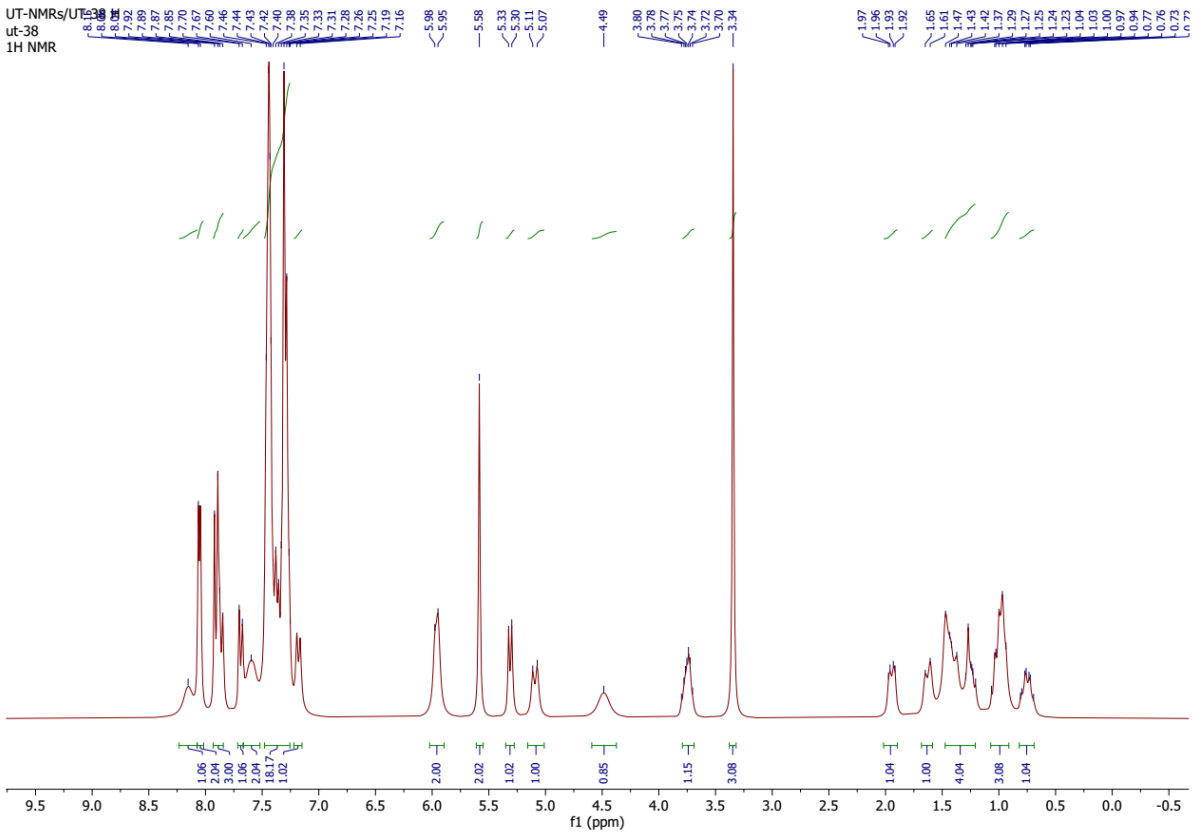

Figure 83. ^{1}H NMR spectrum of compound **7u**

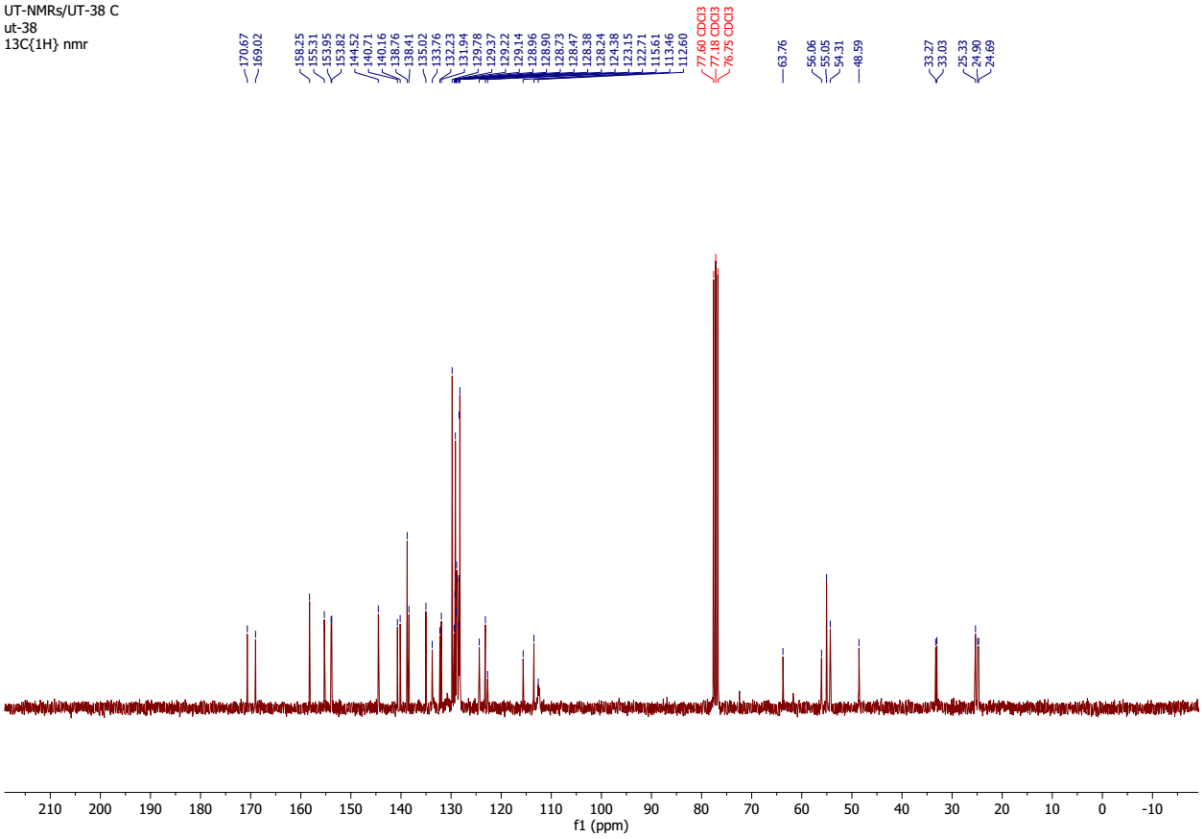

Figure 84. ^{13}C NMR spectrum of compound **7u**

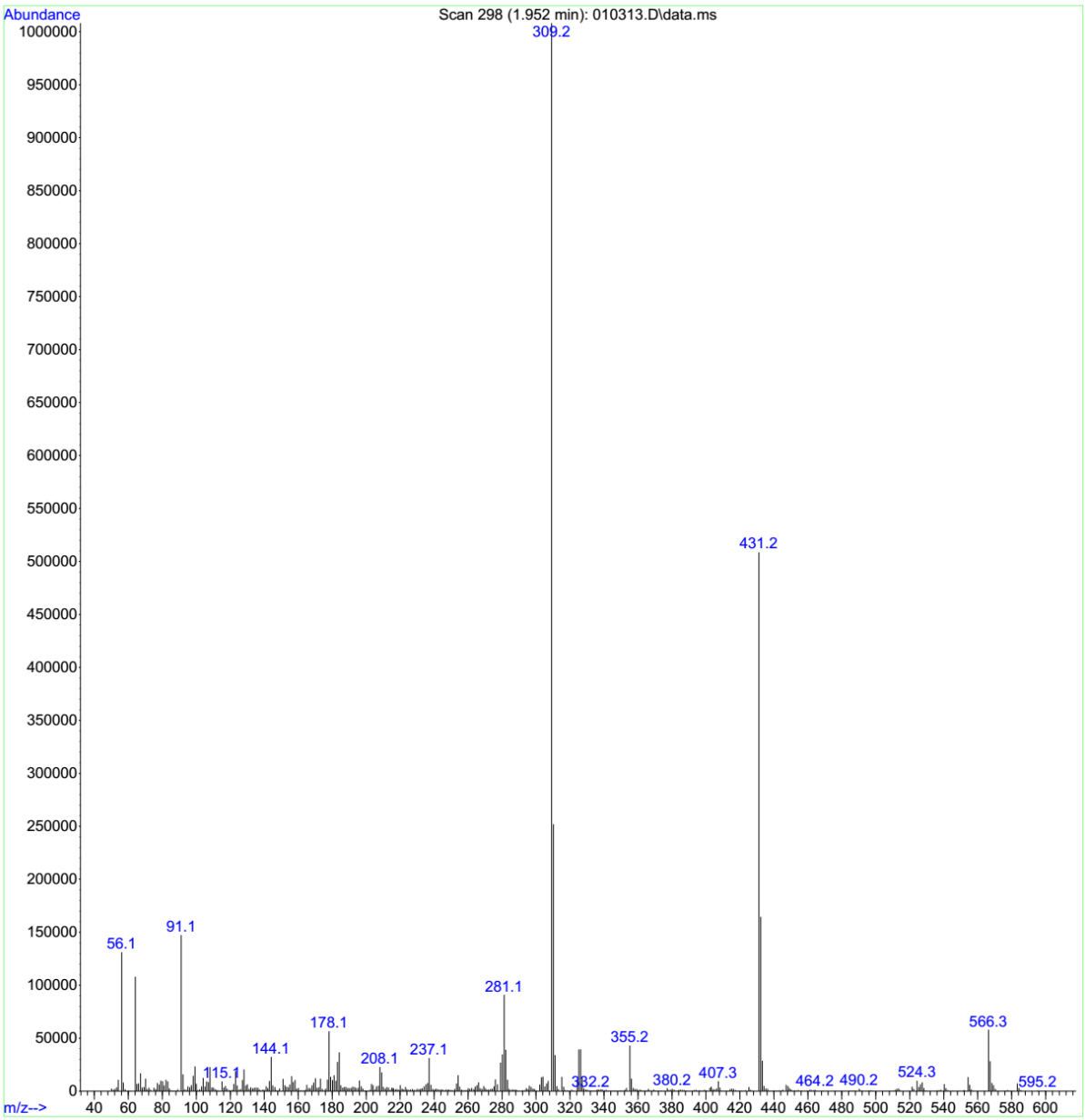

Figure 85. Mass spectrum of compound **7u**

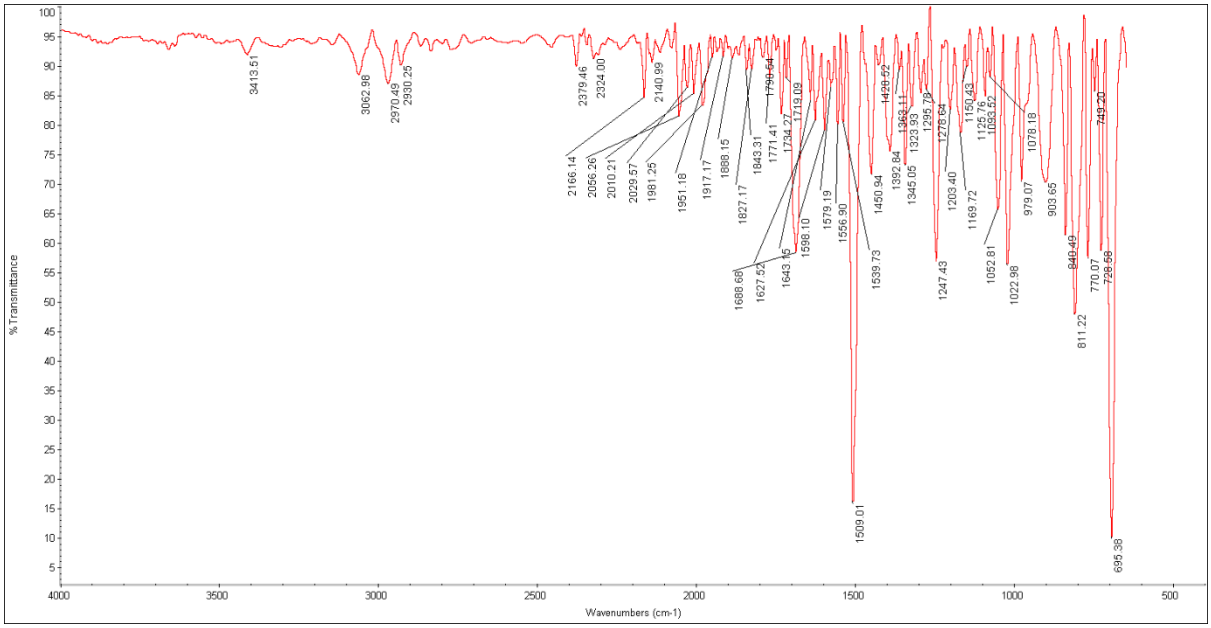

Figure 86. IR spectrum of compound **7v**

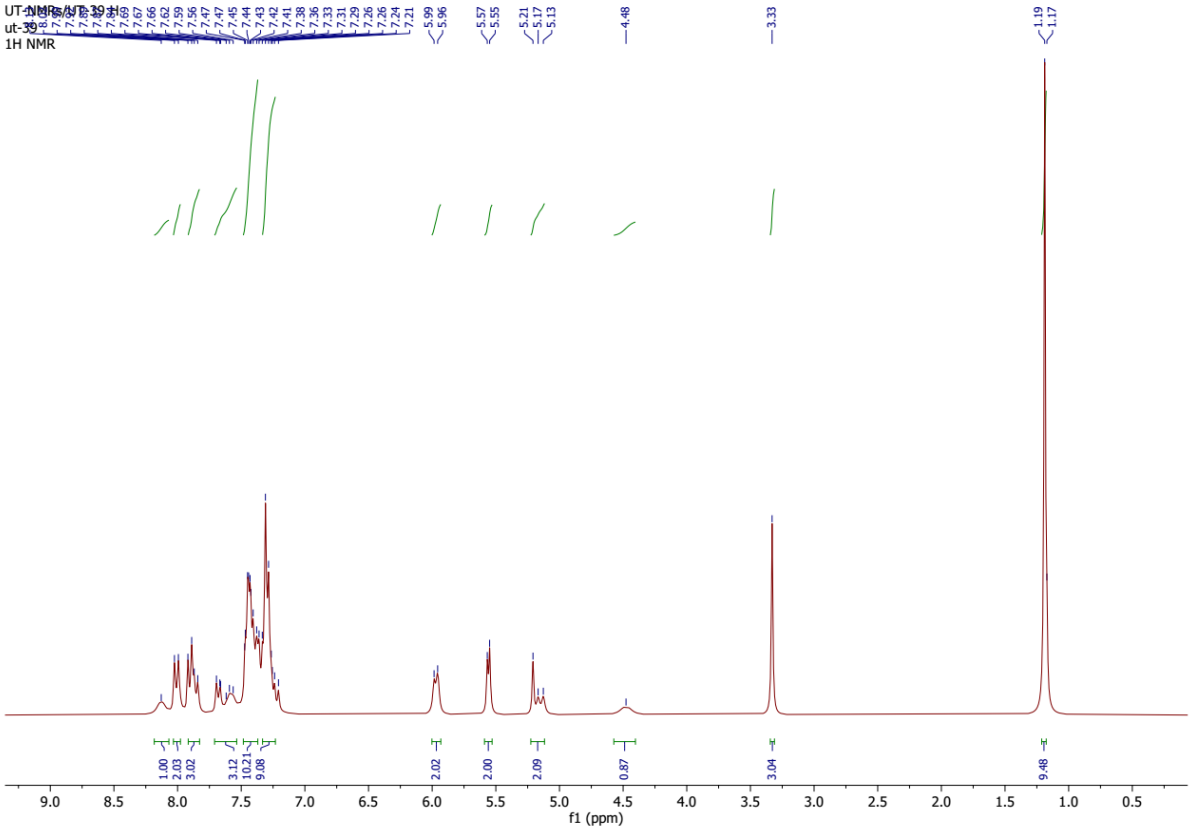

Figure 87. ^{1}H NMR spectrum of compound **7v**

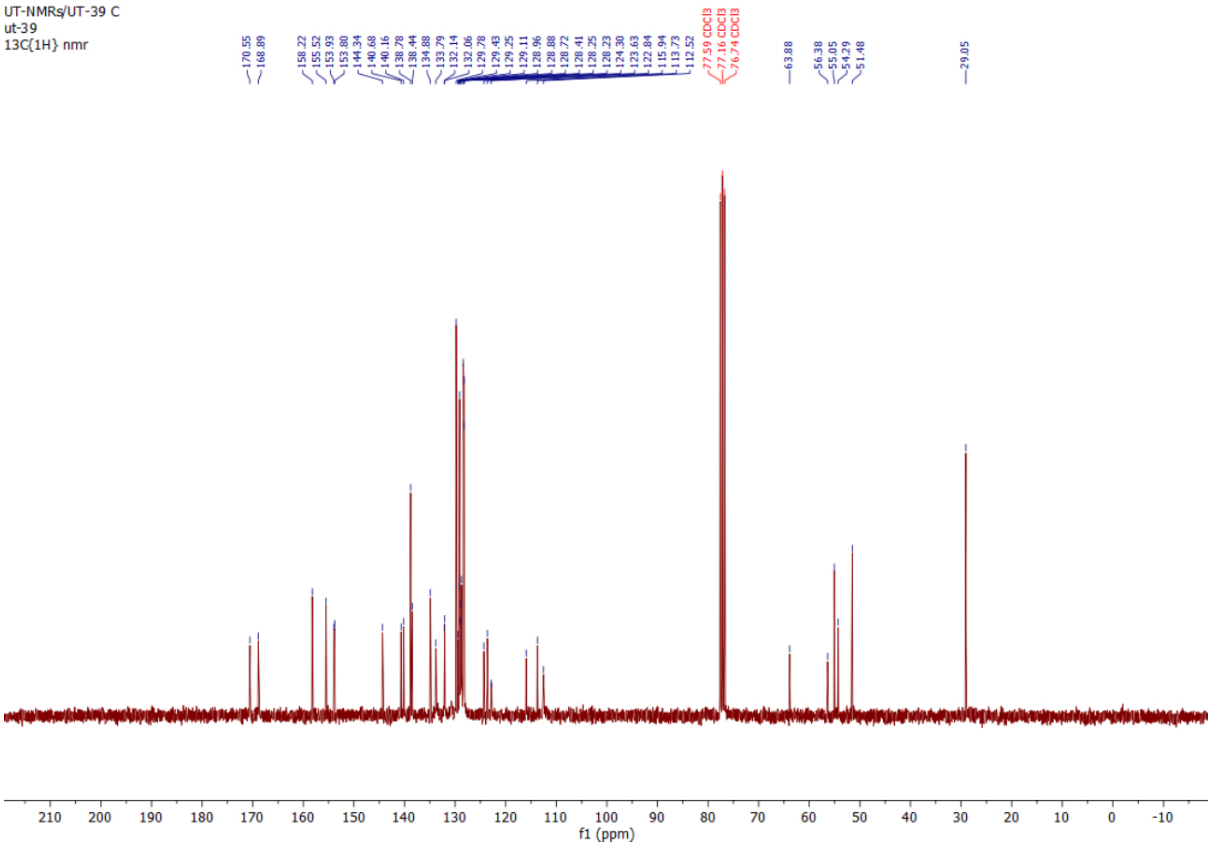

Figure 88. ^{13}C NMR spectrum of compound **7v**

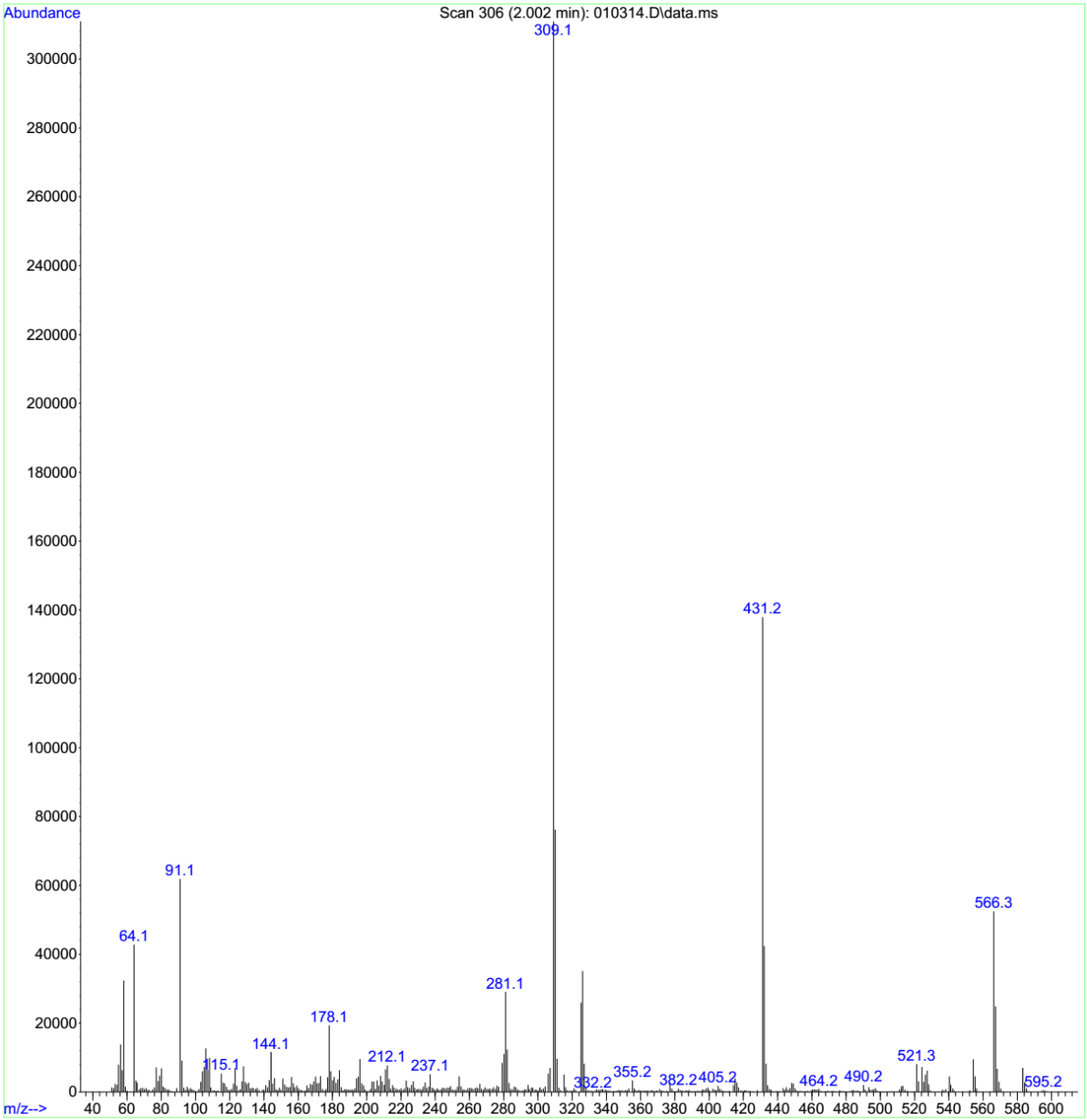

Figure 89. Mass spectrum of compound **7v**

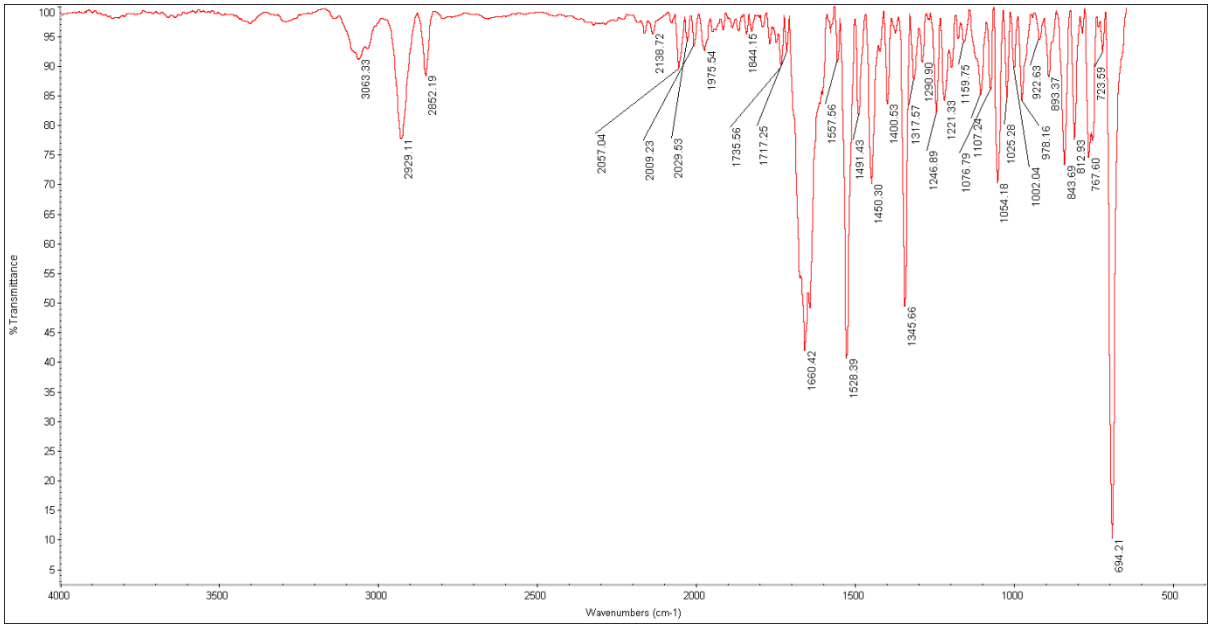

Figure 90. IR spectrum of compound **7w**

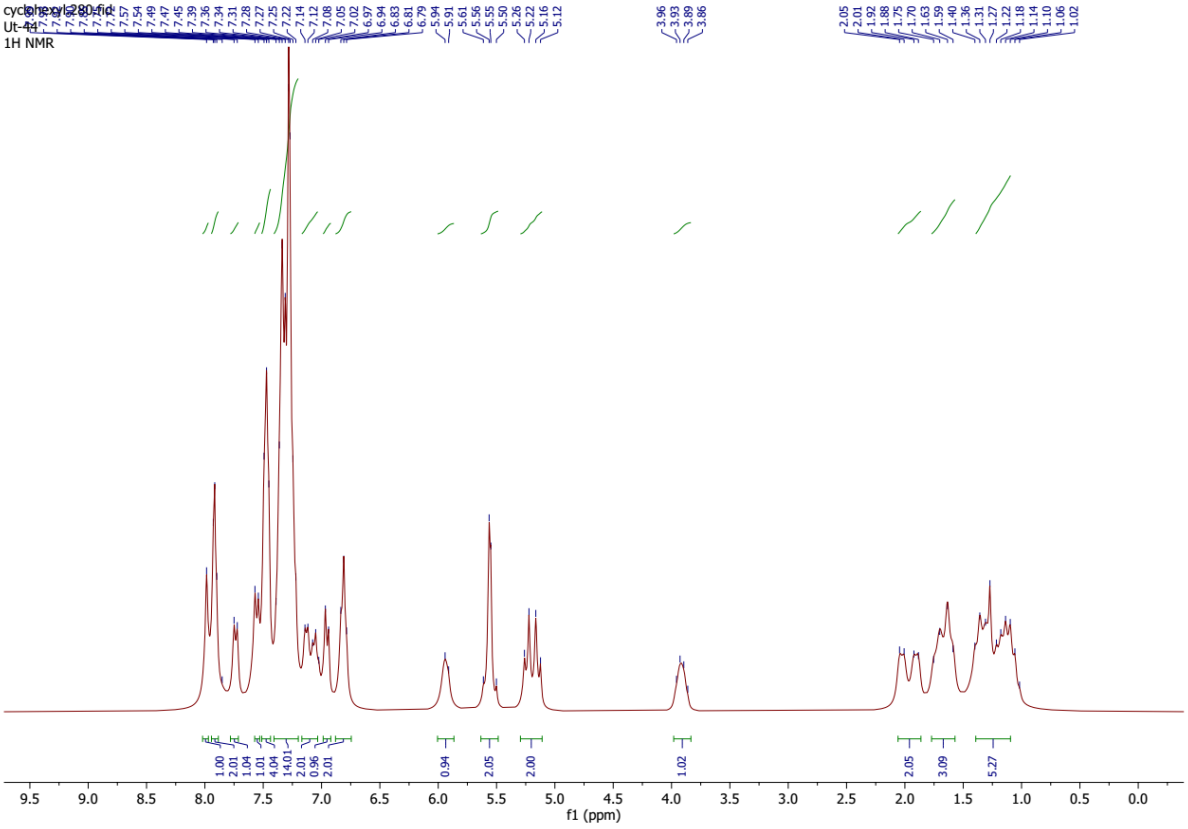

Figure 91. ^{1}H NMR spectrum of compound **7w**

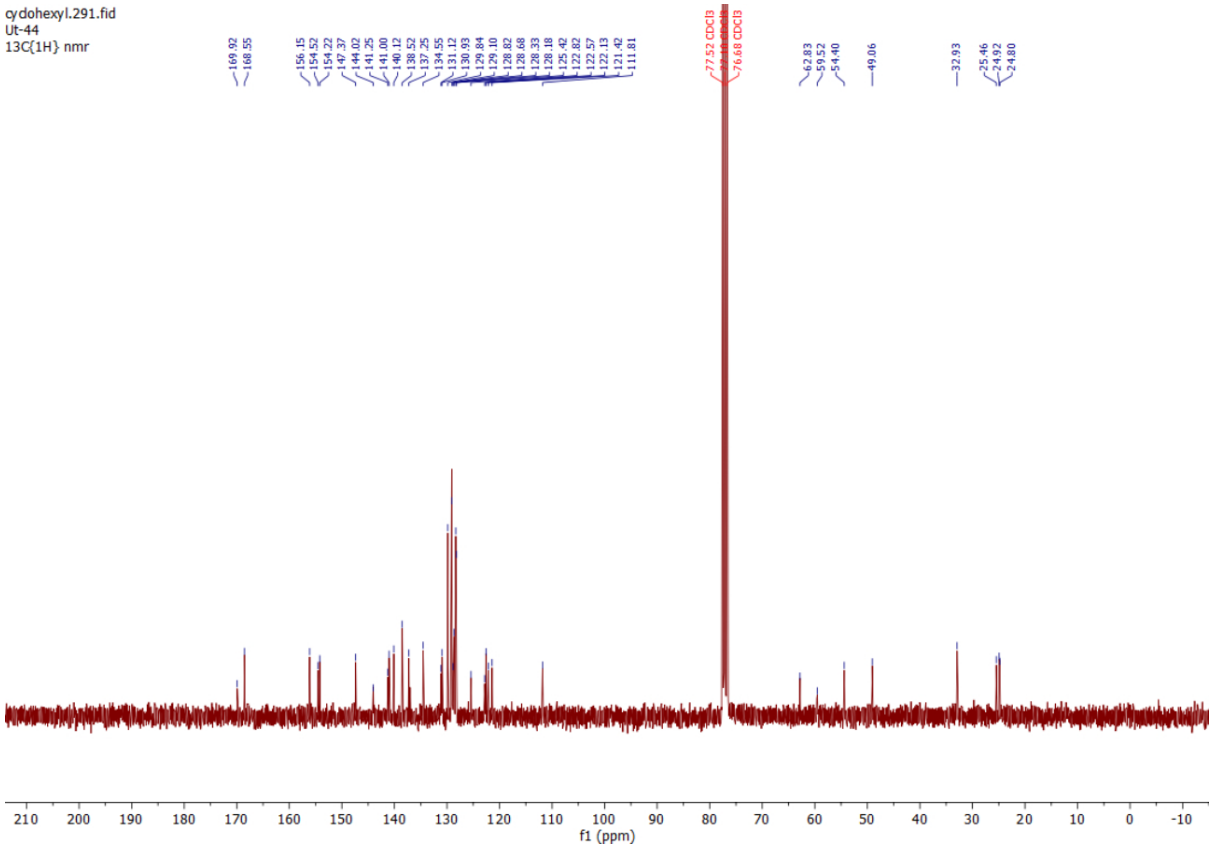

Figure 92. ^{13}C NMR spectrum of compound **7w**

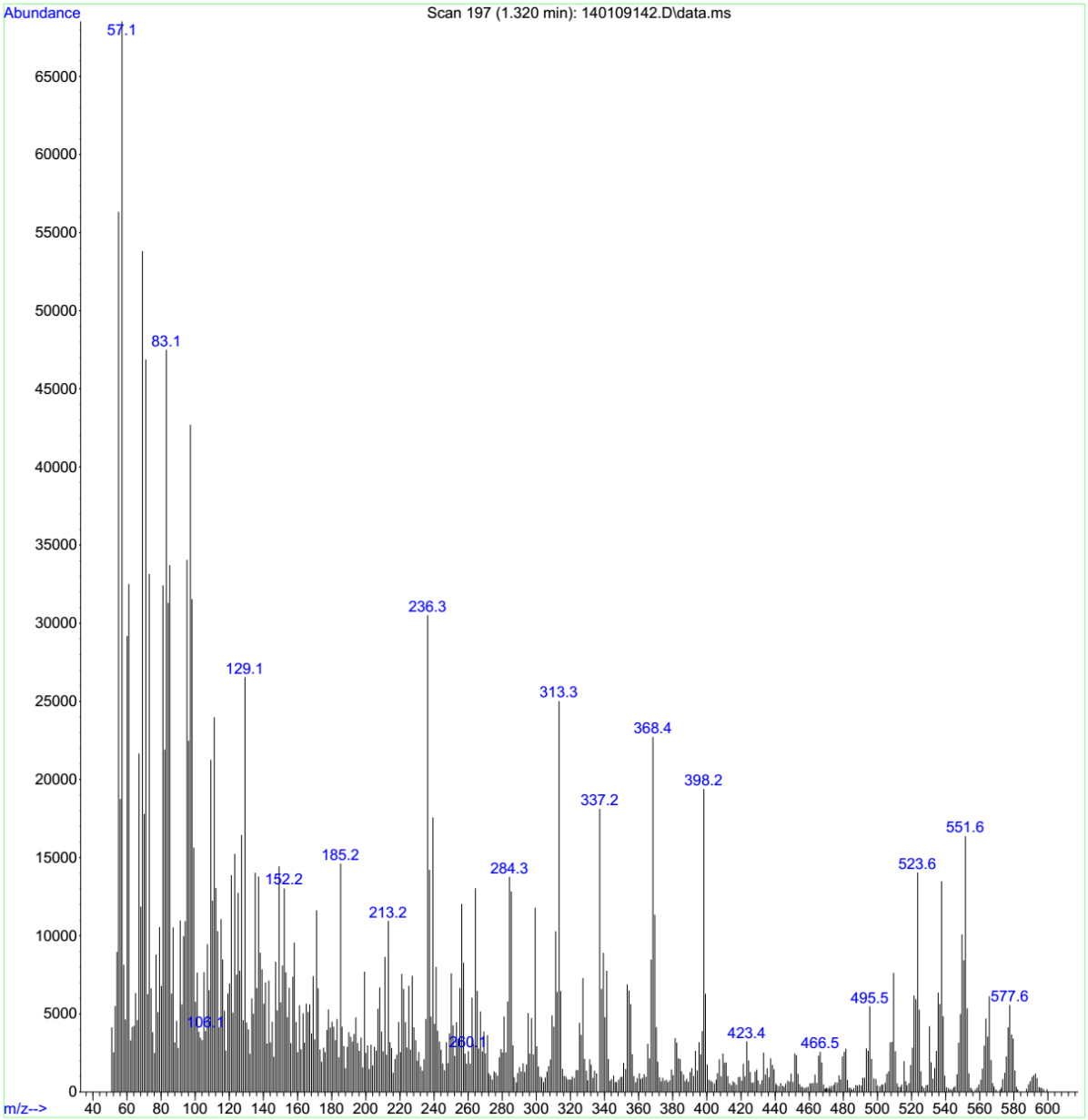

Figure 93. Mass spectrum of compound **7w**

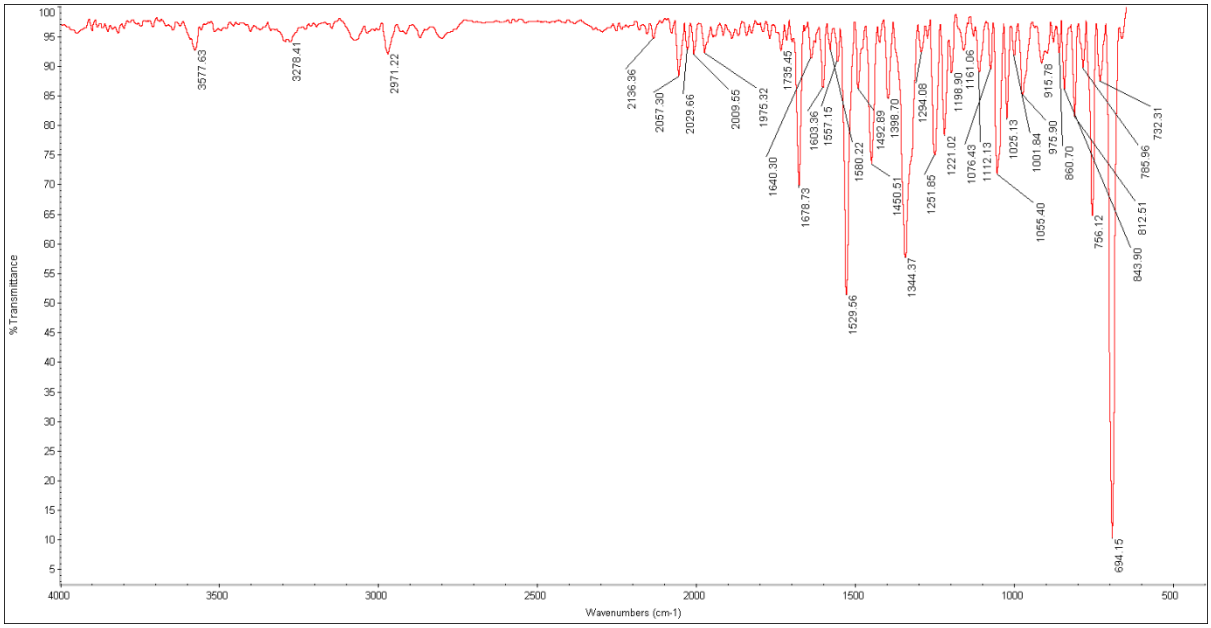

Figure 94. IR spectrum of compound **7x**

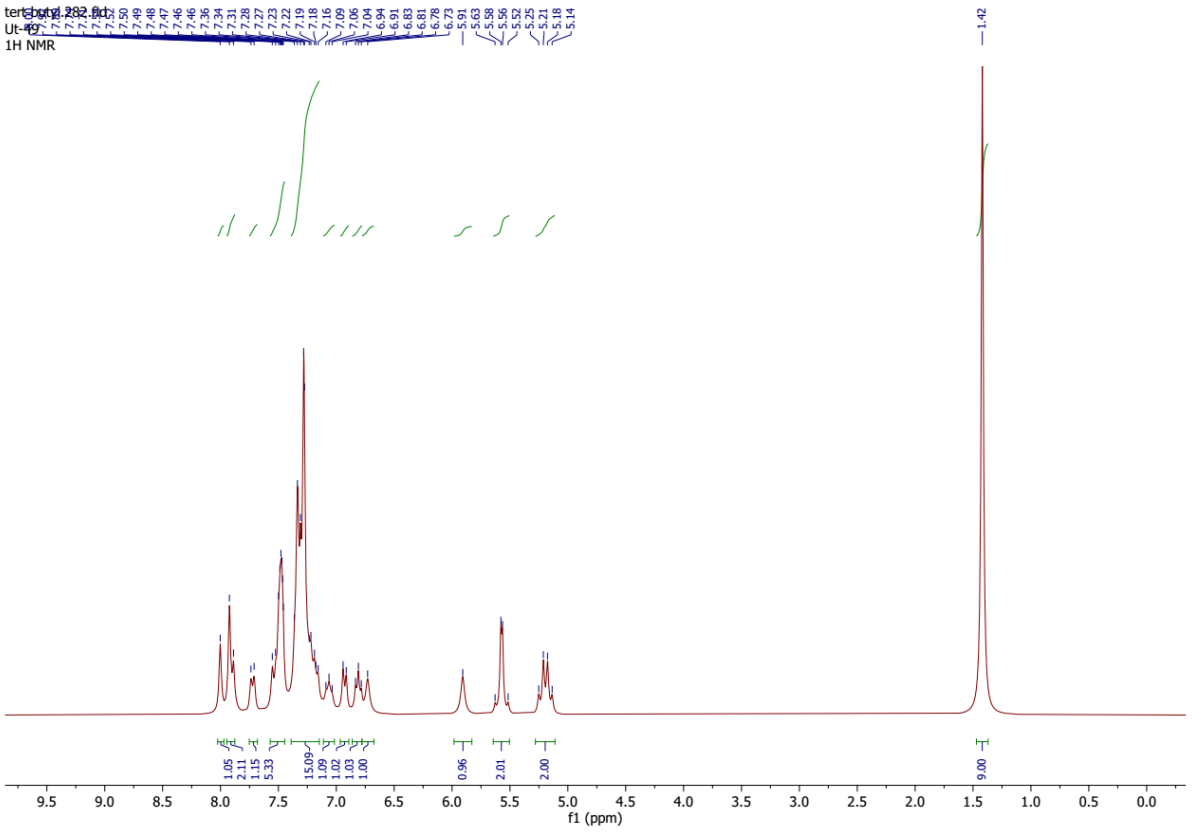

Figure 95. ^{1}H NMR spectrum of compound **7x**

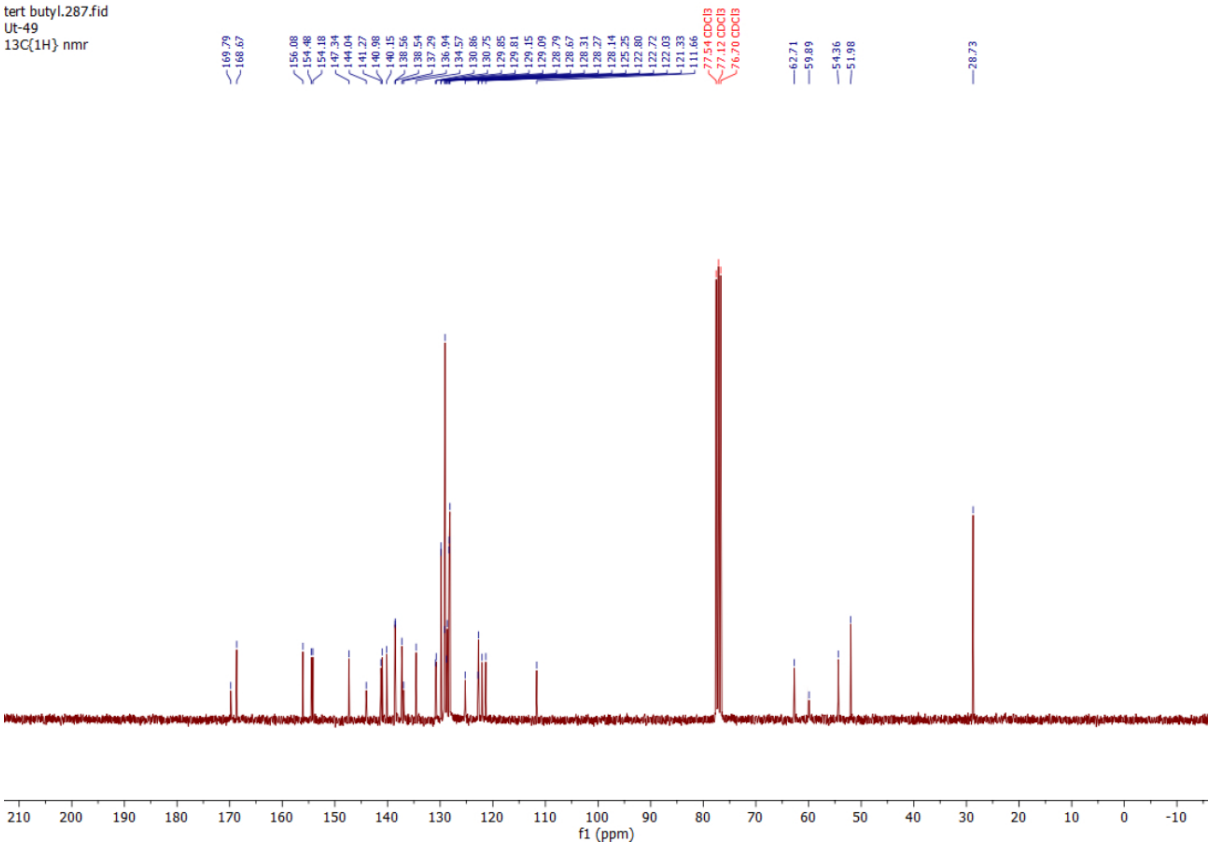

Figure 96. ^{13}C NMR spectrum of compound **7x**

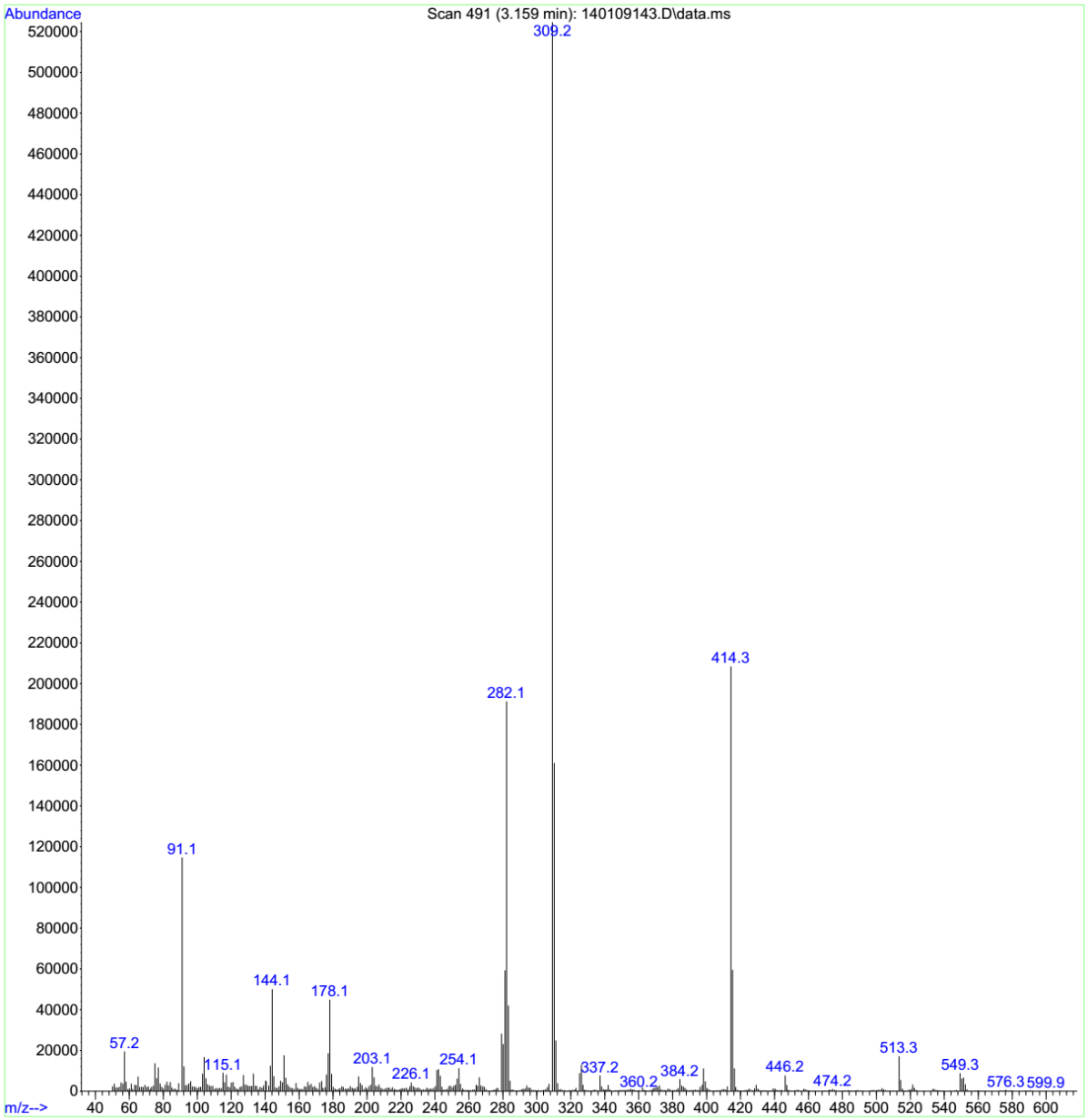

Figure 97. Mass spectrum of compound **7x**

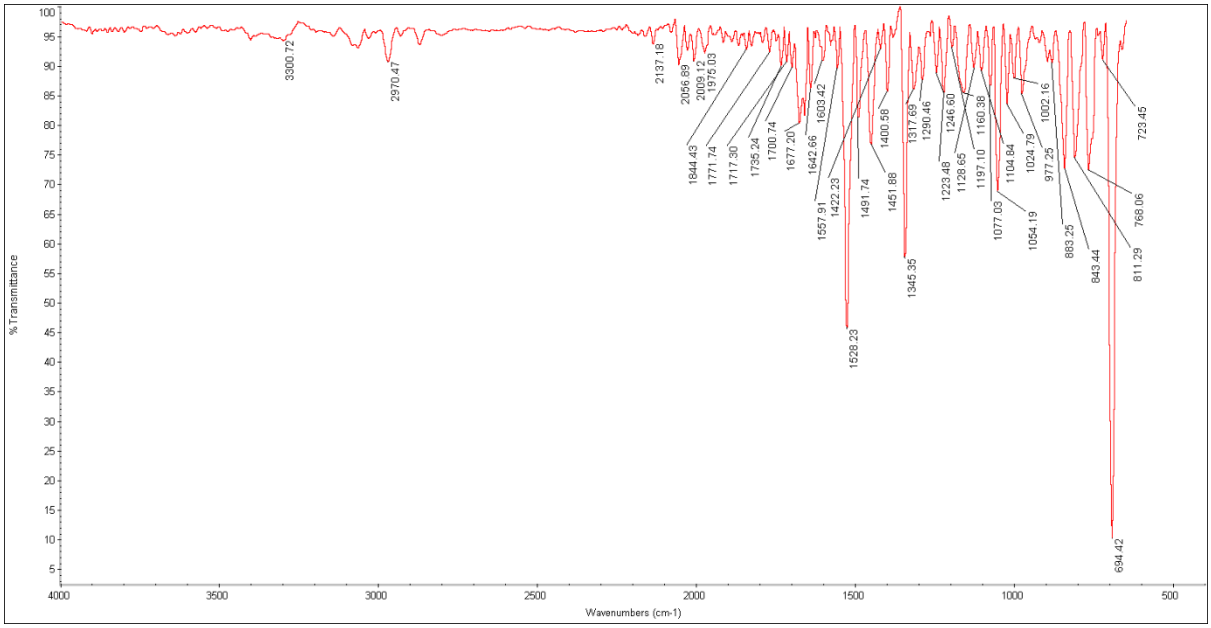

Figure 98. IR spectrum of compound **7y**

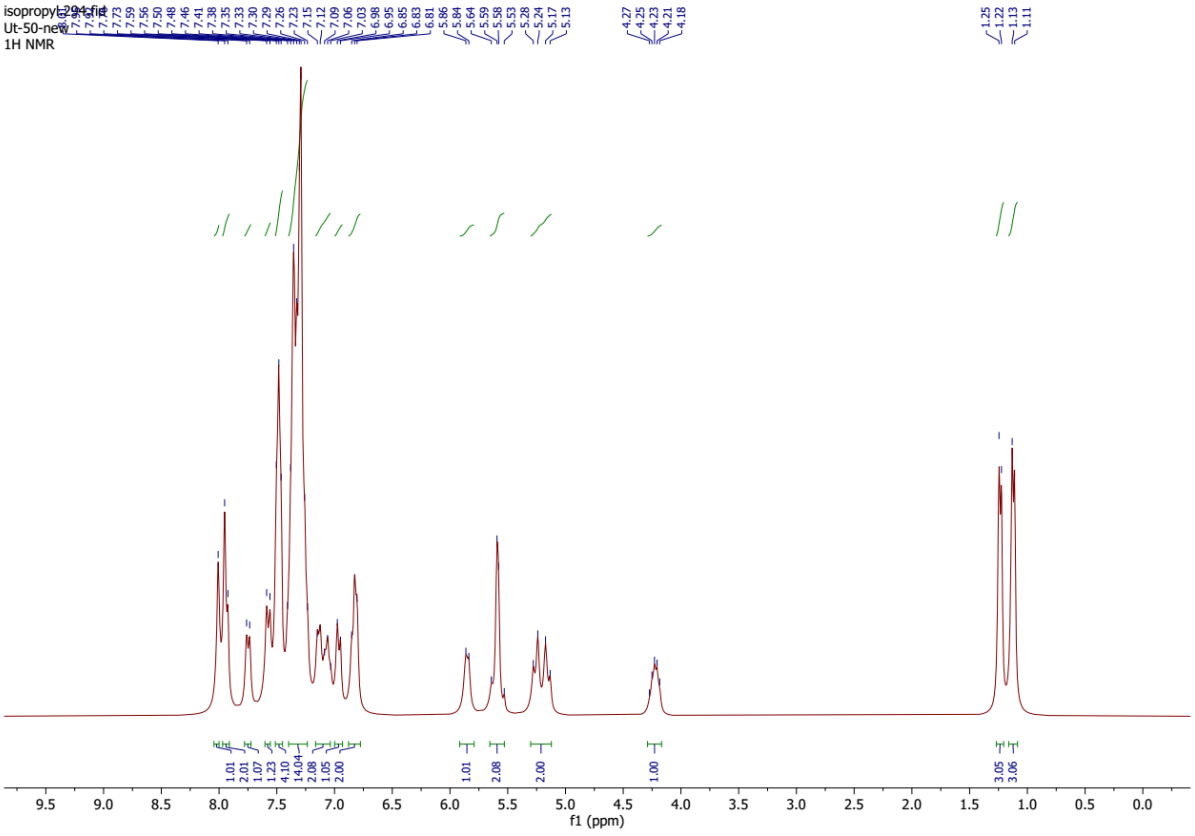

Figure 99. ^{1}H NMR spectrum of compound **7y**

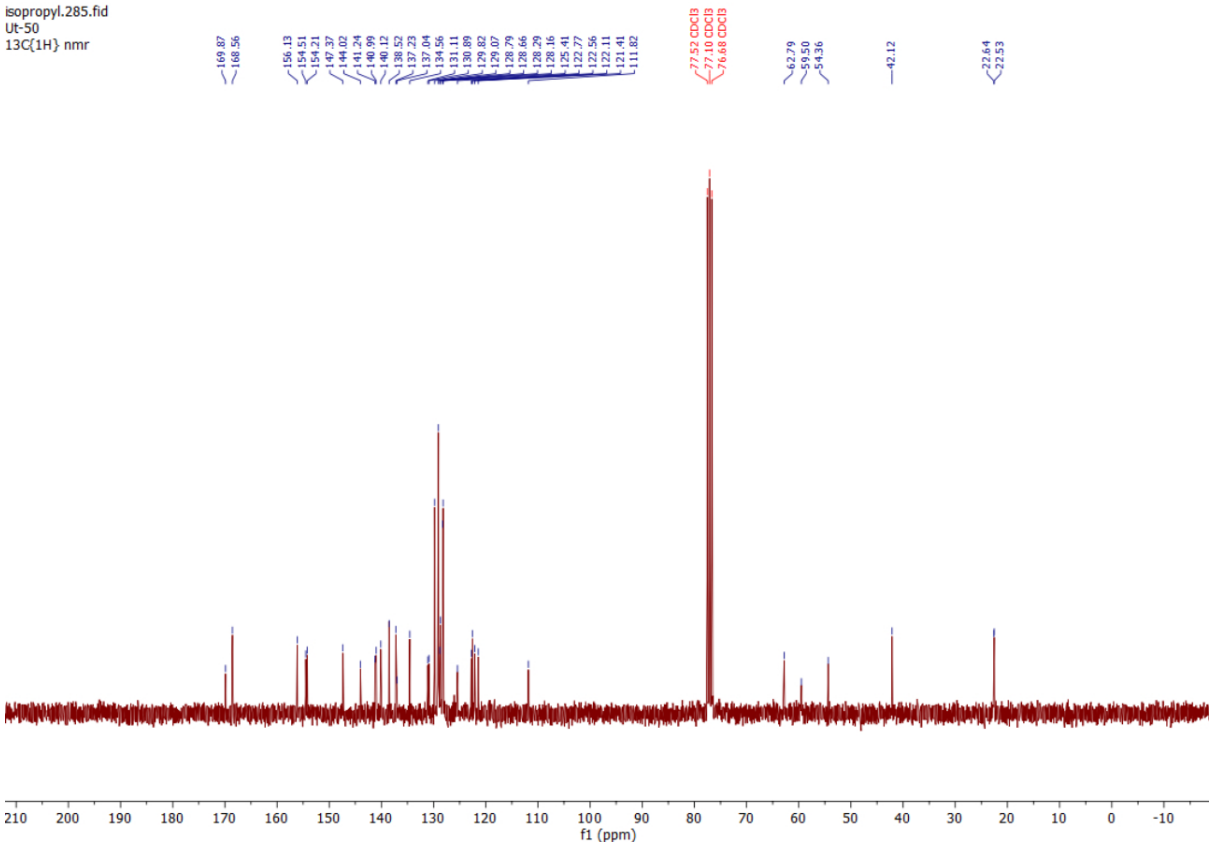

Figure 100. ^{13}C NMR spectrum of compound **7y**

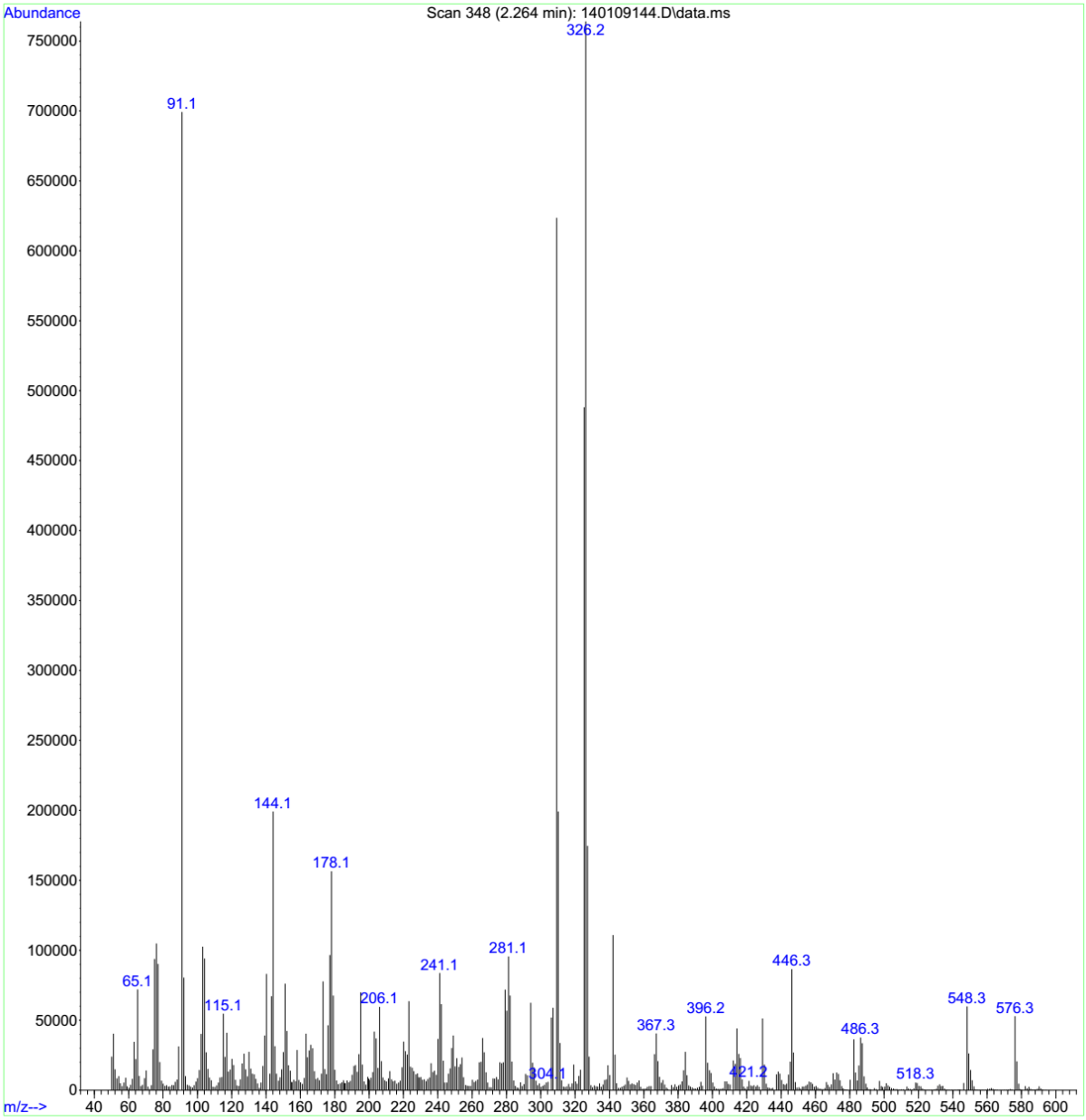

Figure 101. Mass spectrum of compound **7y**

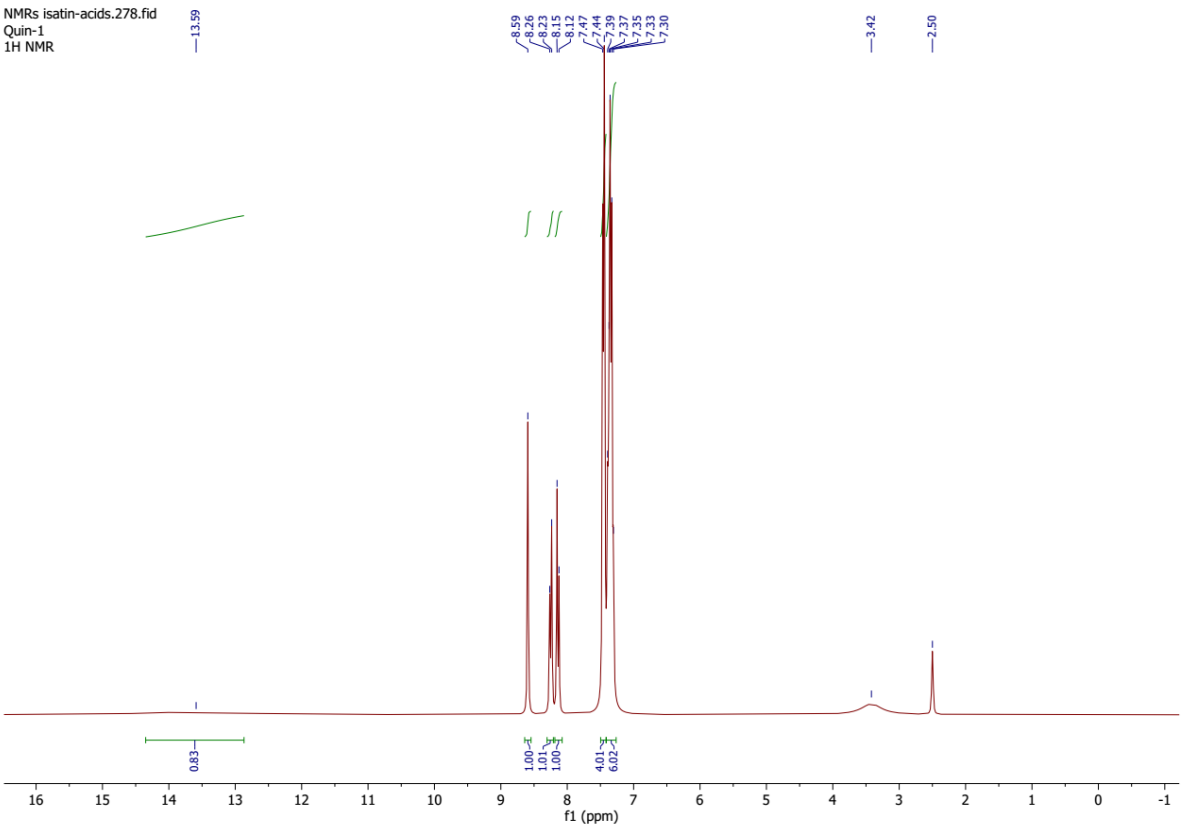

Figure 102. ^{1}H NMR spectrum of intermediate **A1**

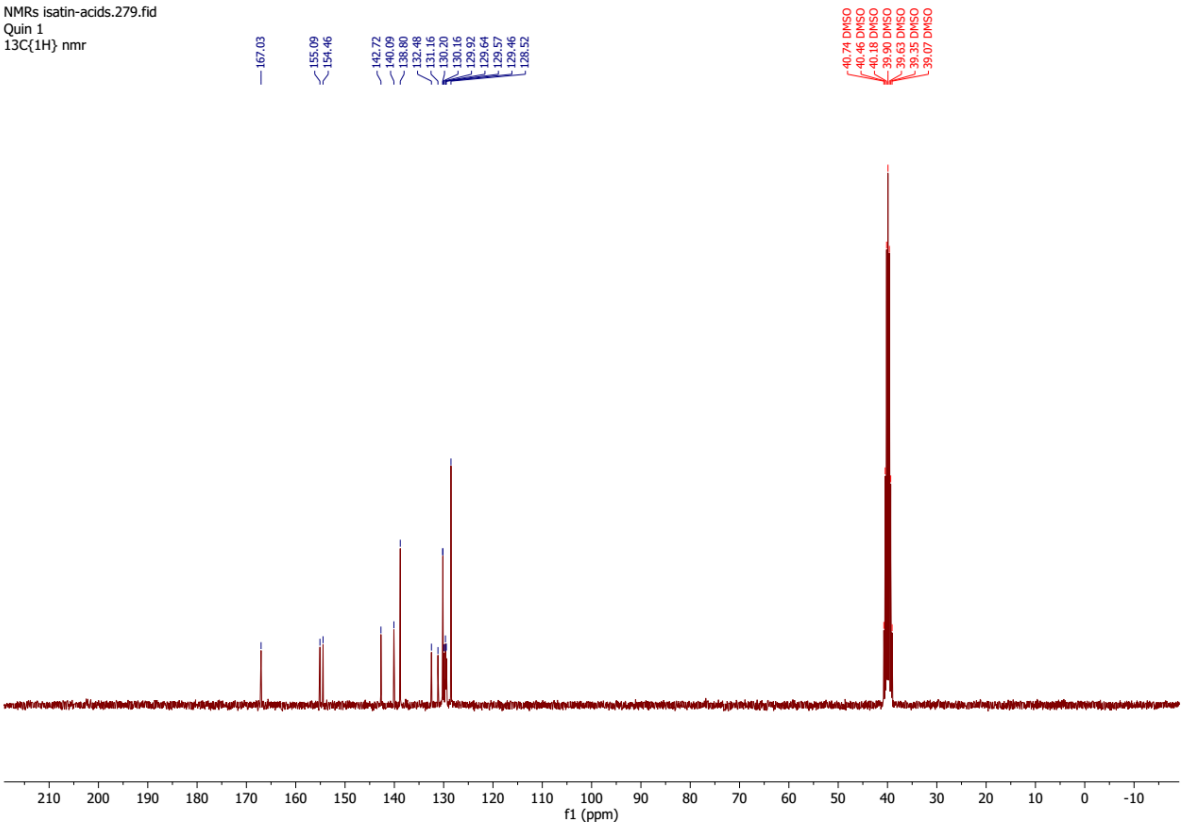

Figure 103. ^{13}C NMR spectrum of intermediate **A1**

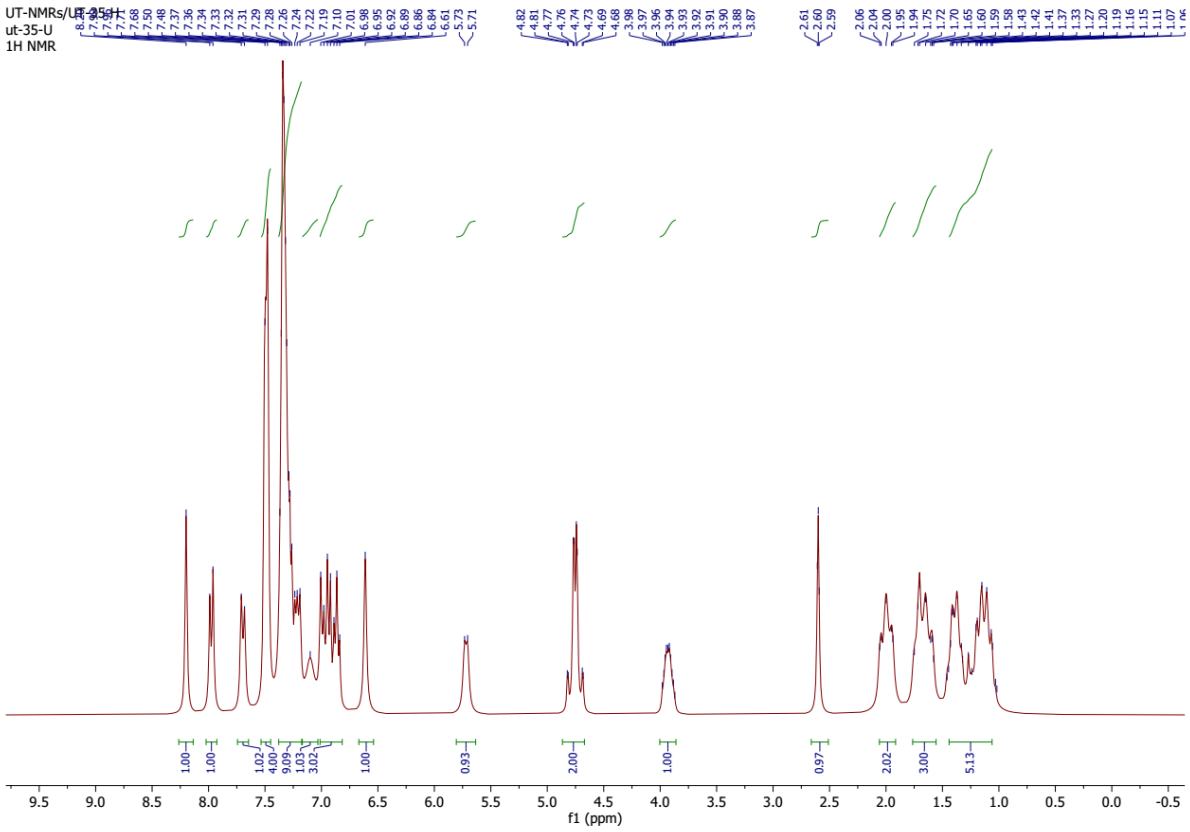

Figure 104. ^{1}H NMR spectrum of intermediate **B1**

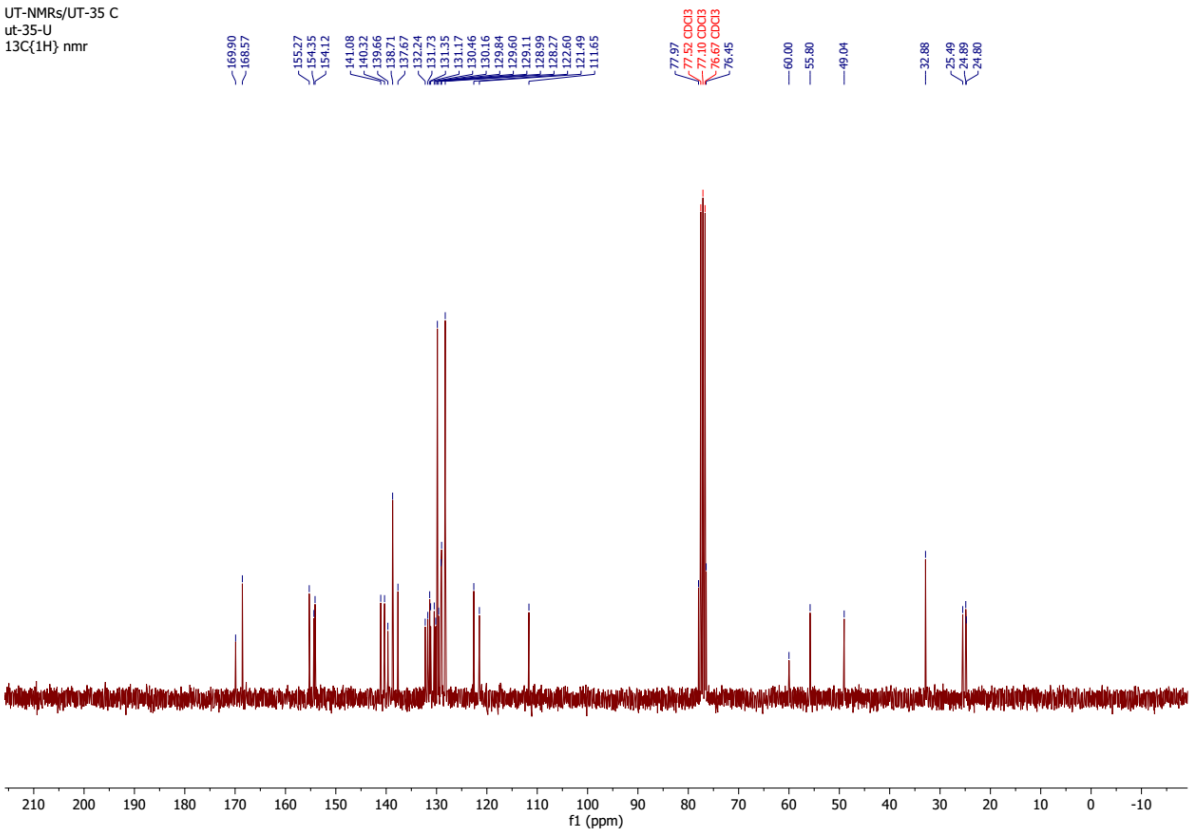

Figure 105. ^{13}C NMR spectrum of intermediate **B1**

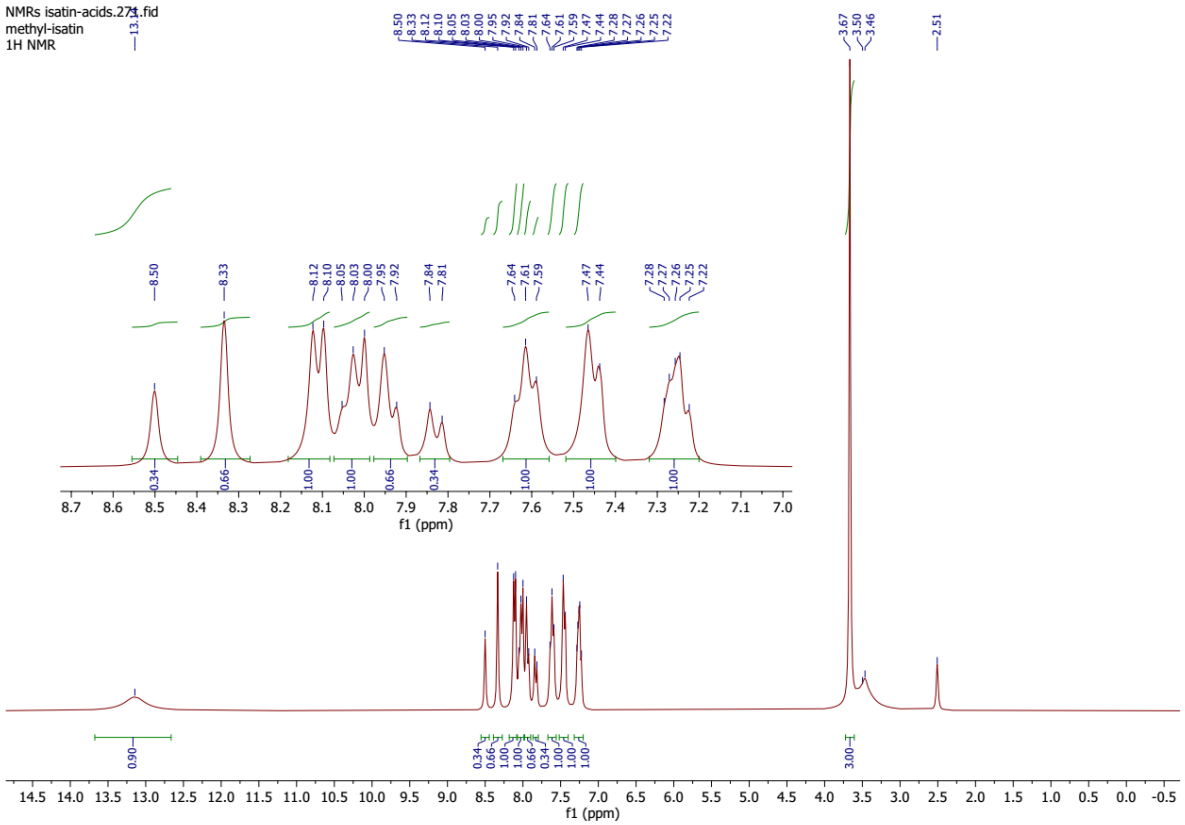

Figure 106. ^{1}H NMR spectrum of compounds **8a**/**8a′**

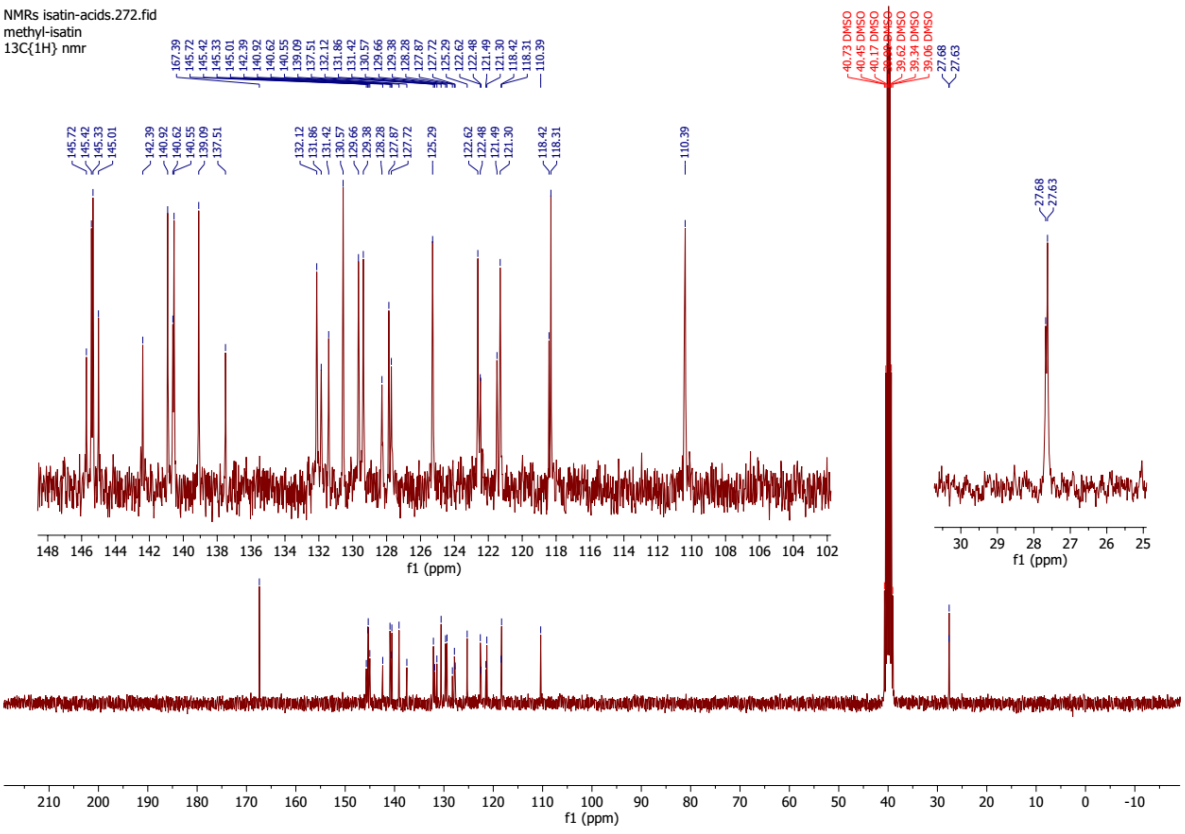

Figure 107. ^{13}C NMR spectrum of compounds **8a**/**8a′**

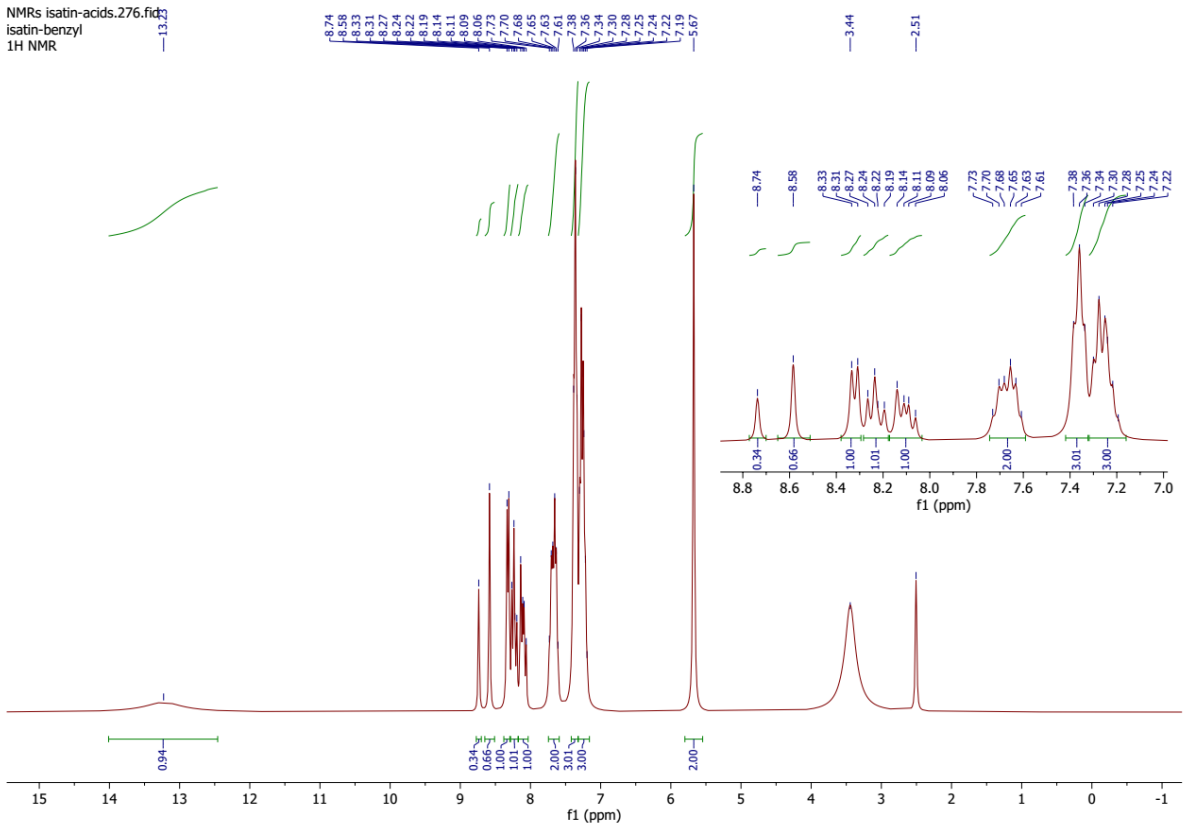

Figure 108. ^{1}H NMR spectrum of compounds **8b**/**8b′**

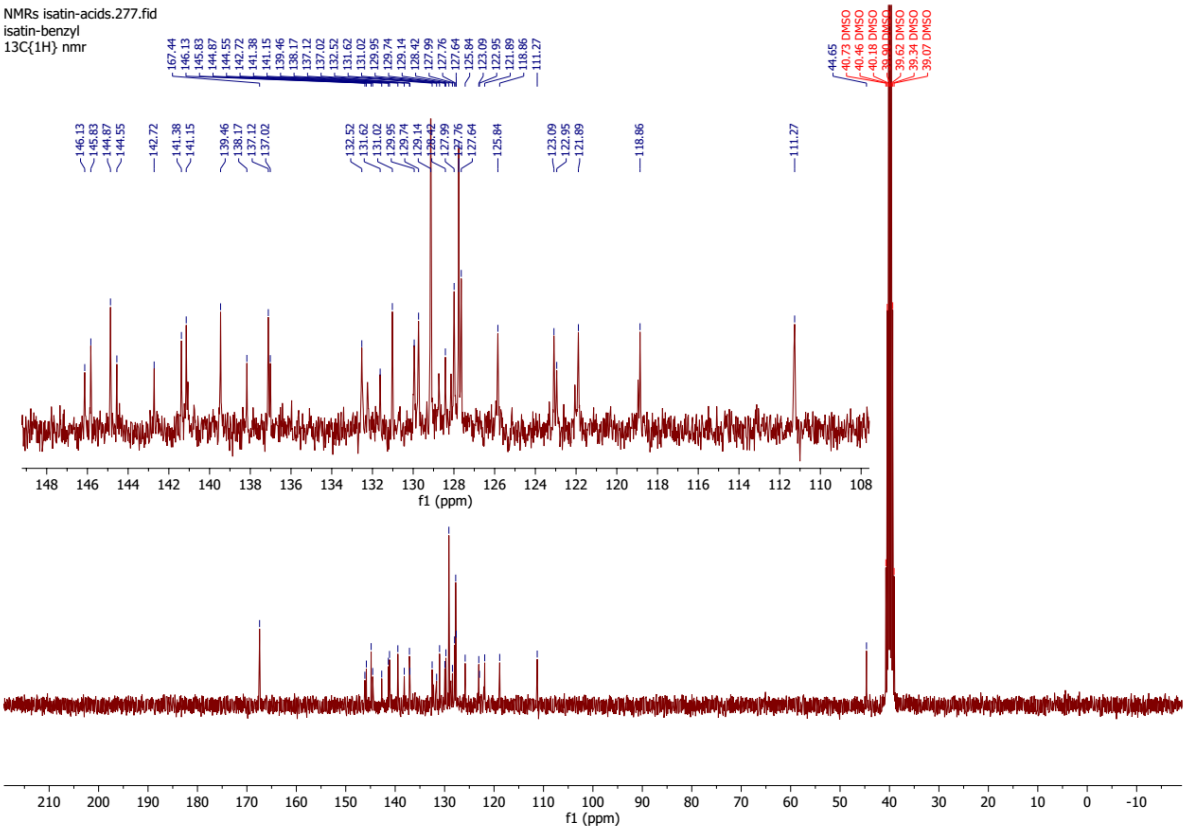

Figure 109. ^{13}C NMR spectrum of compounds **8b**/**8b′**

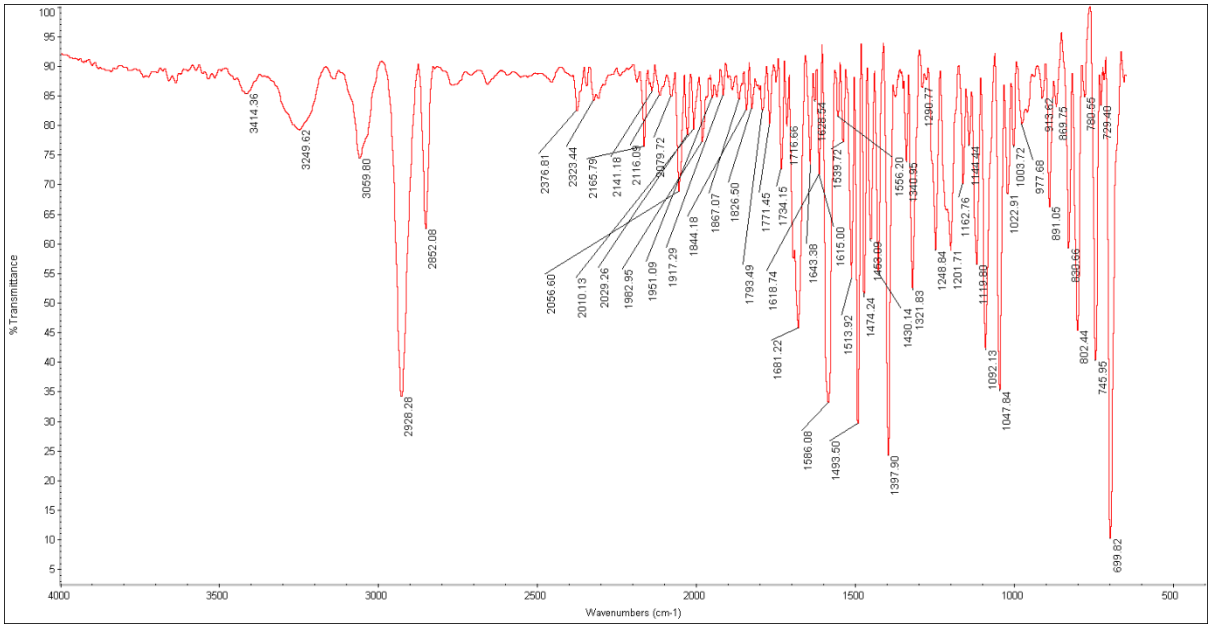

Figure 110. IR spectrum of compounds **9a**/**9a′**

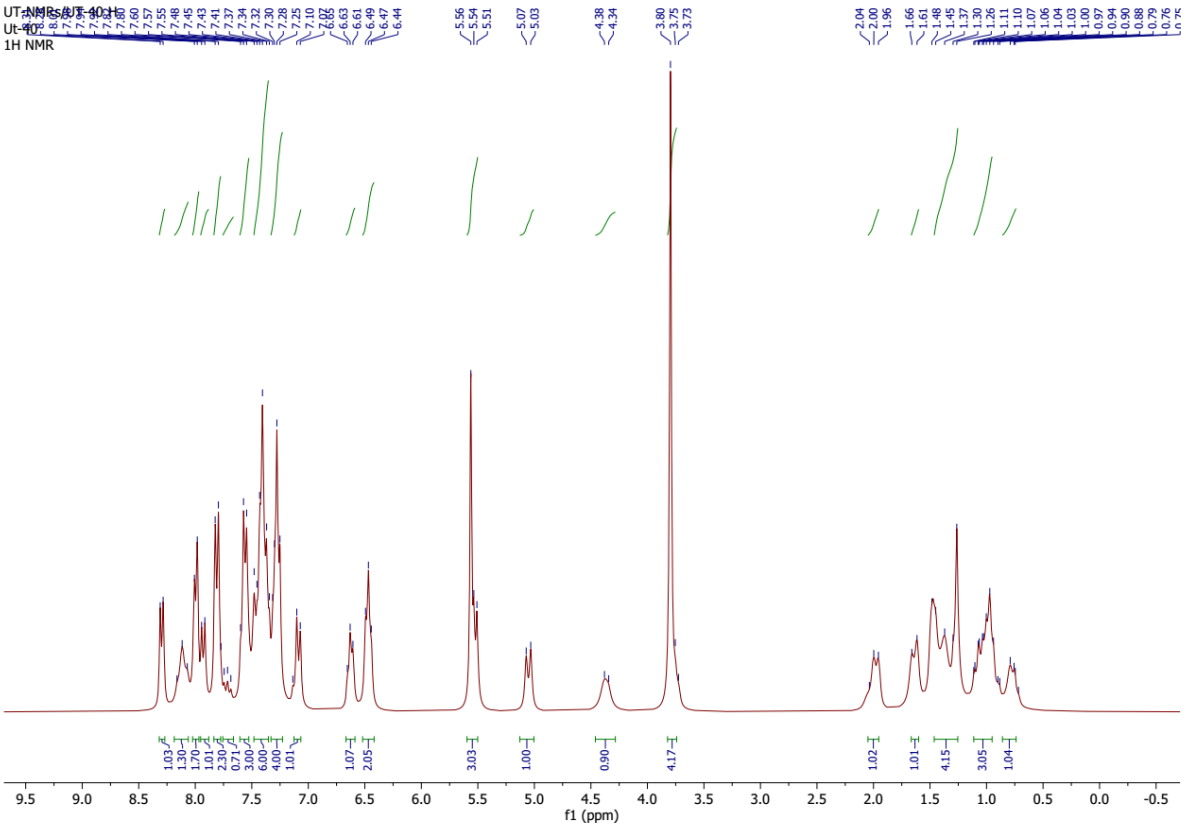

Figure 111. ^{1}H NMR spectrum of compounds **9a**/**9a′**

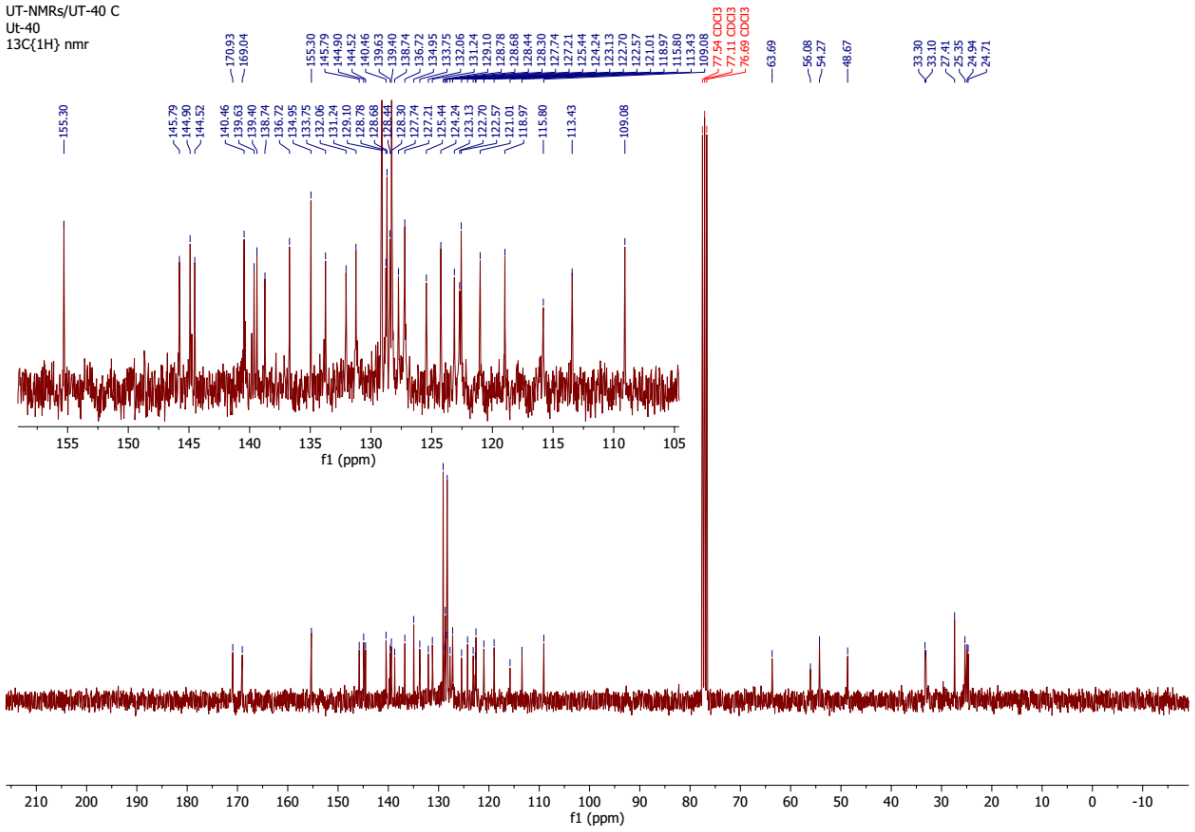

Figure 112. ^{13}C NMR spectrum of compounds **9a**/**9a′**

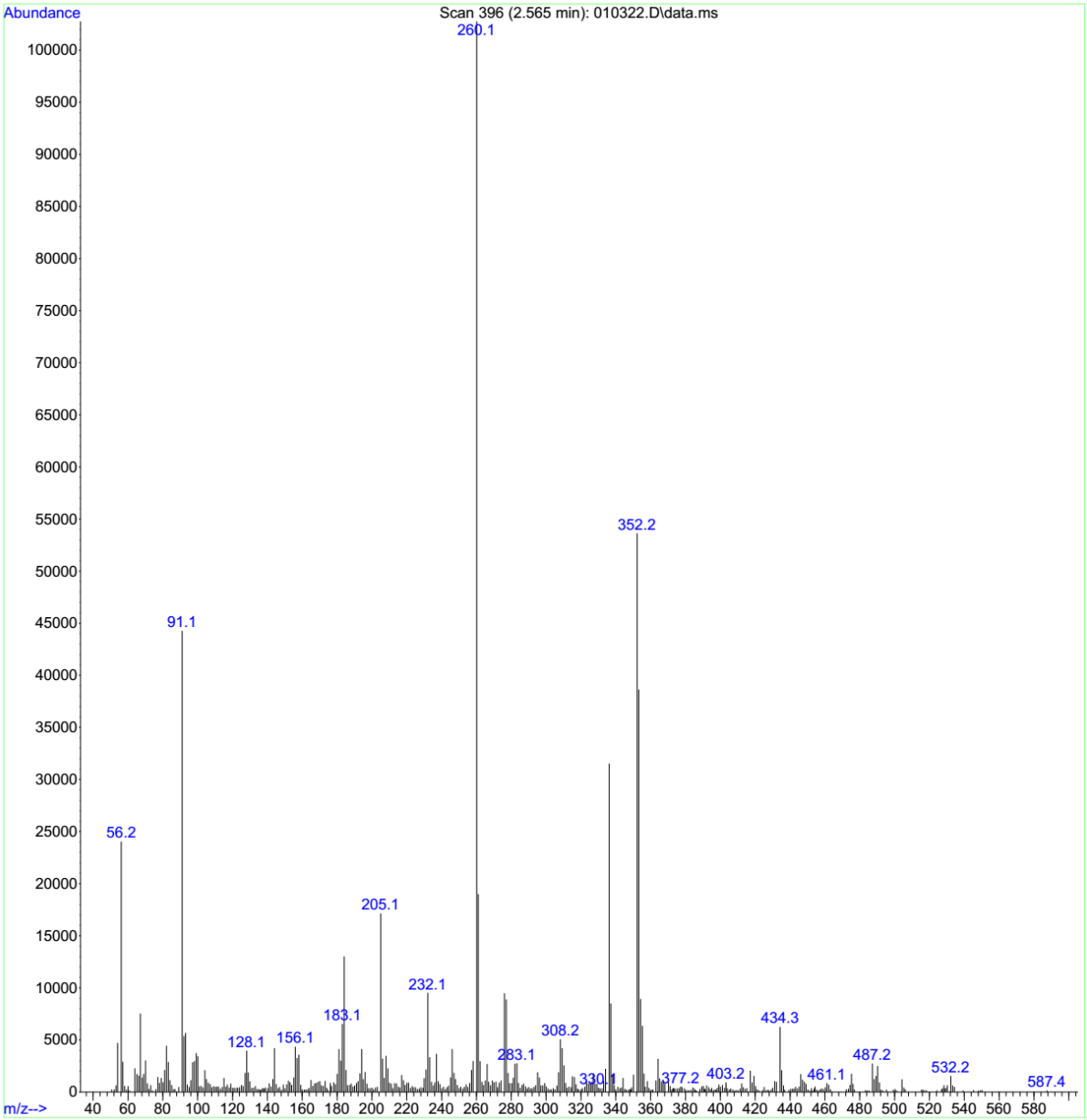

Figure 113. Mass spectrum of compounds **9a**/**9a′**

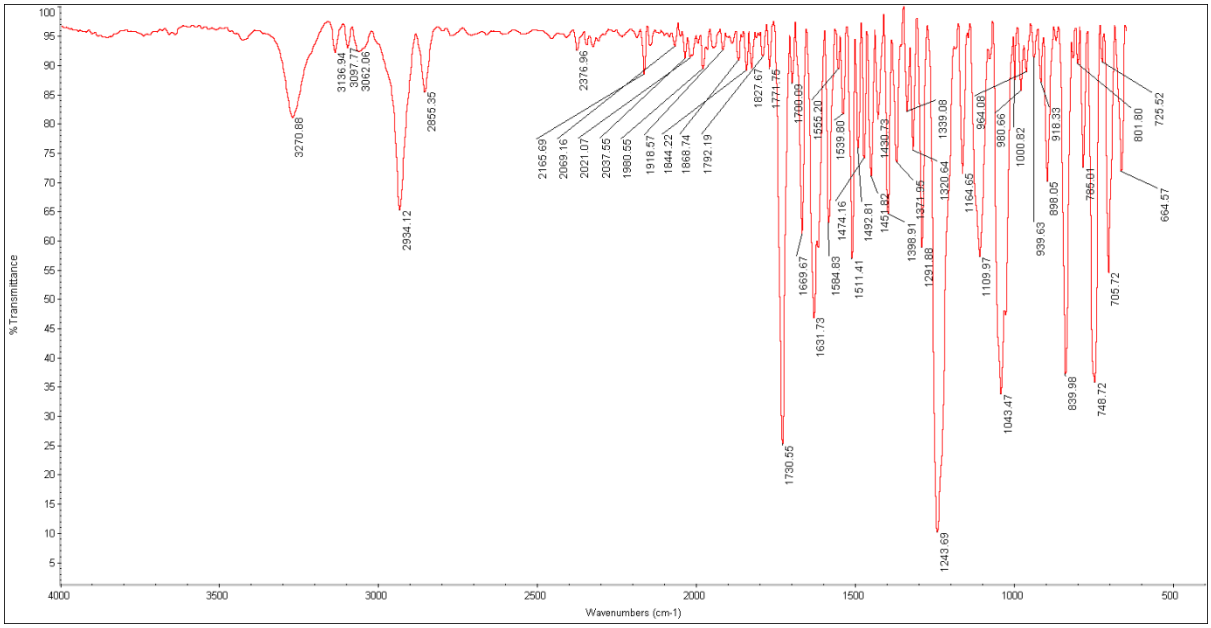

Figure 114. IR spectrum of compounds **9b**/**9b′**

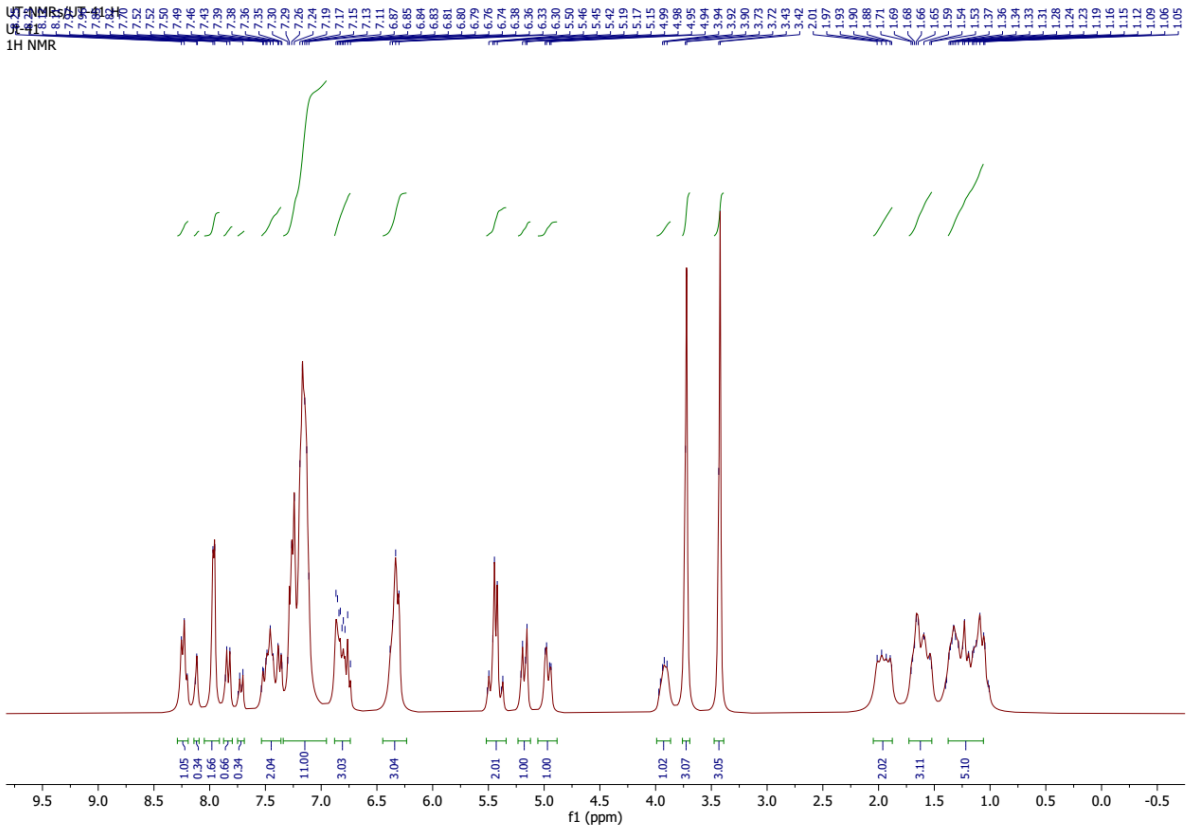

Figure 115. ^{1}H NMR spectrum of compounds **9b**/**9b′**

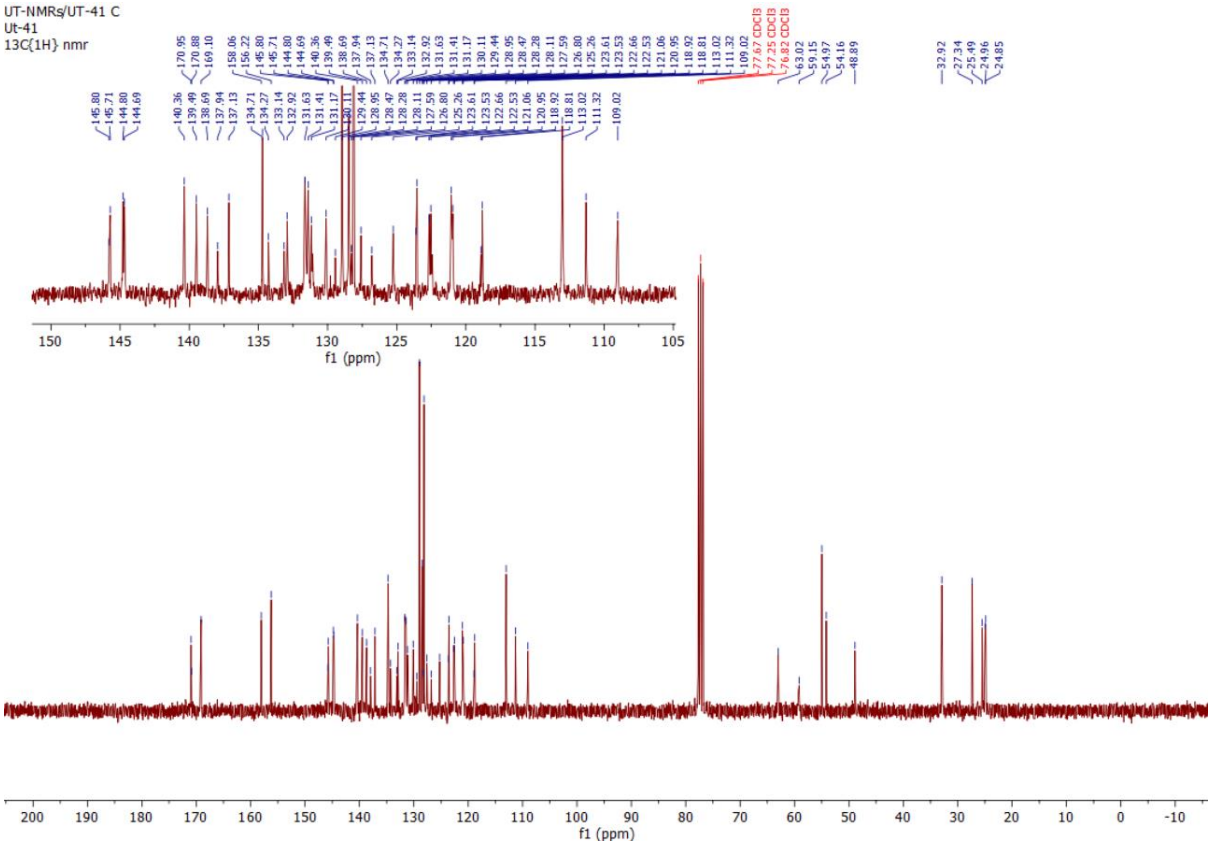

Figure 116. ^{13}C NMR spectrum of compounds **9b**/**9b′**

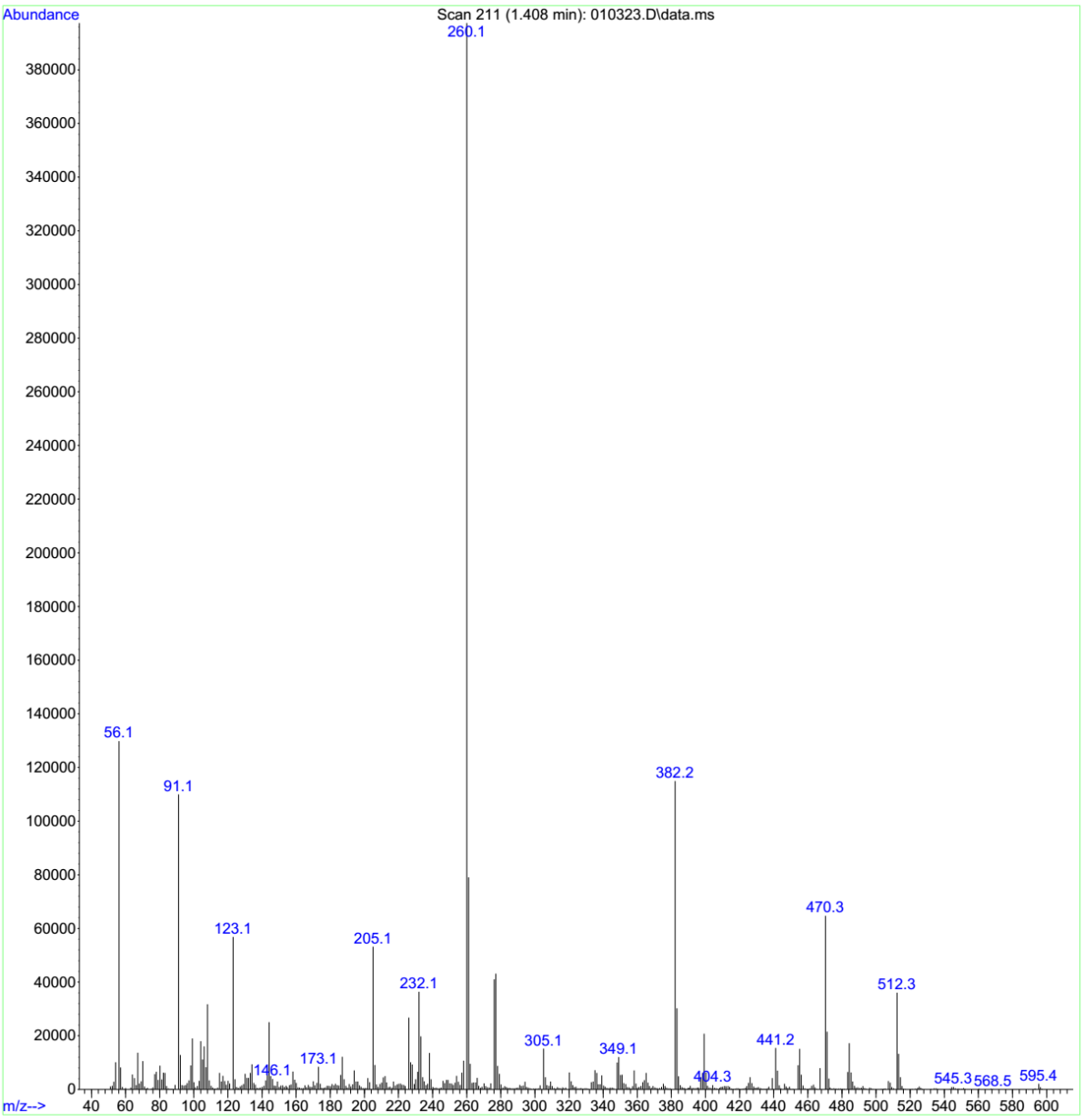

Figure 117. Mass spectrum of compounds **9b**/**9b′**

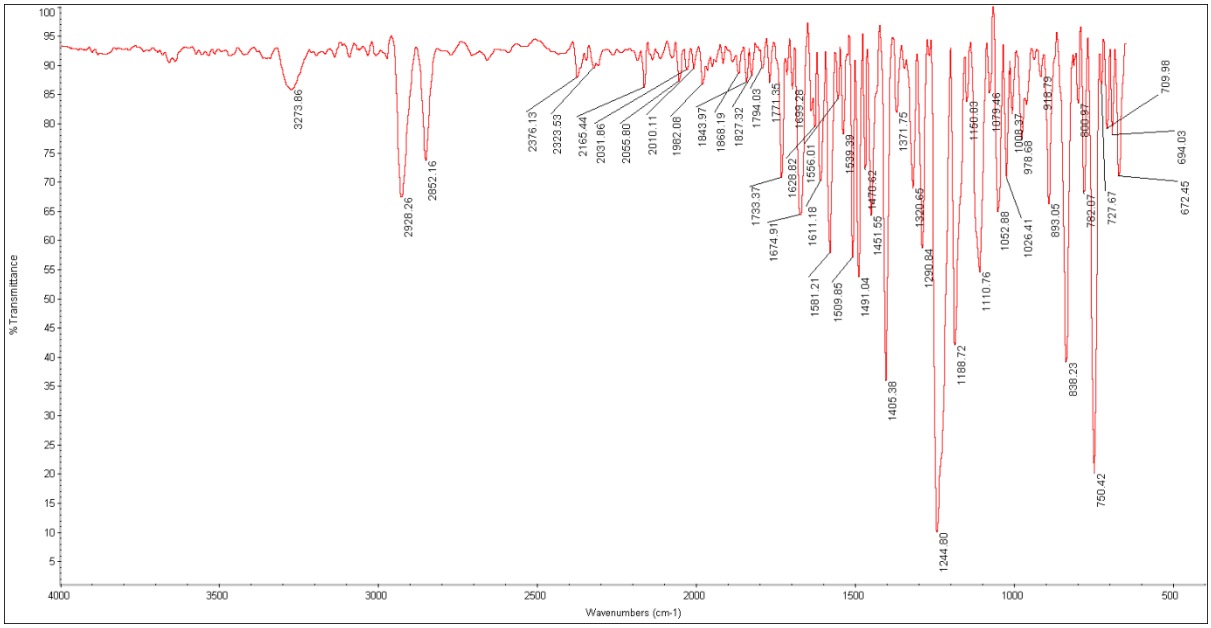

Figure 118. IR spectrum of compounds **9c**/**9c′**

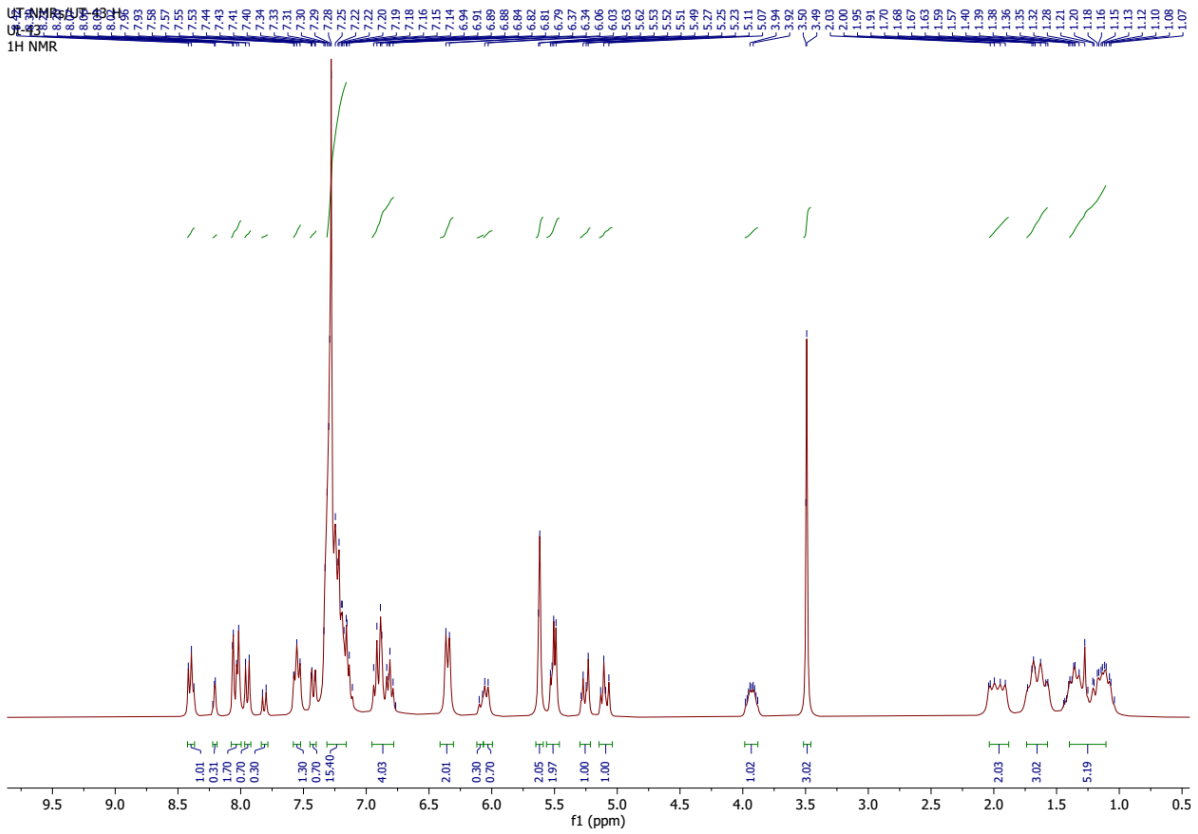

Figure 119. ^{1}H NMR spectrum of compounds **9c**/**9c′**

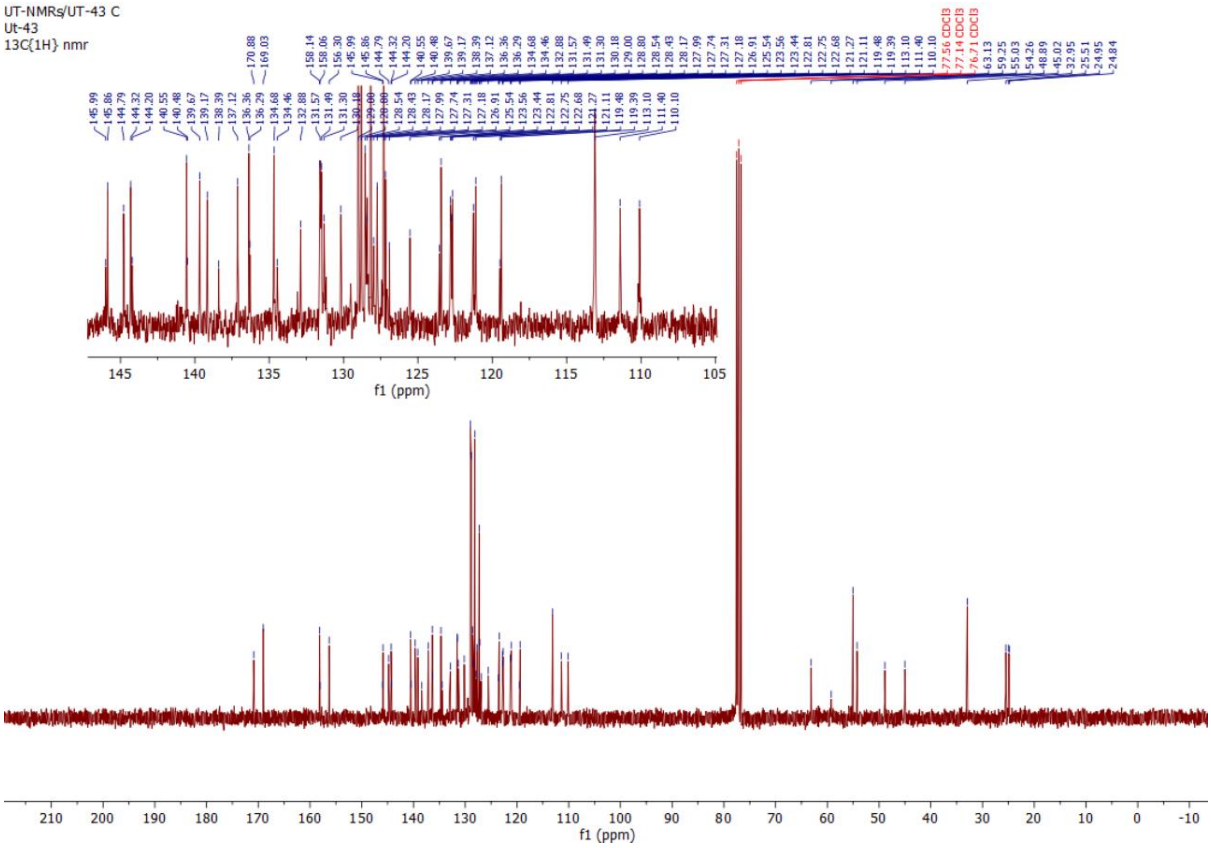

Figure 120. ^{13}C NMR spectrum of compounds **9c**/**9c′**

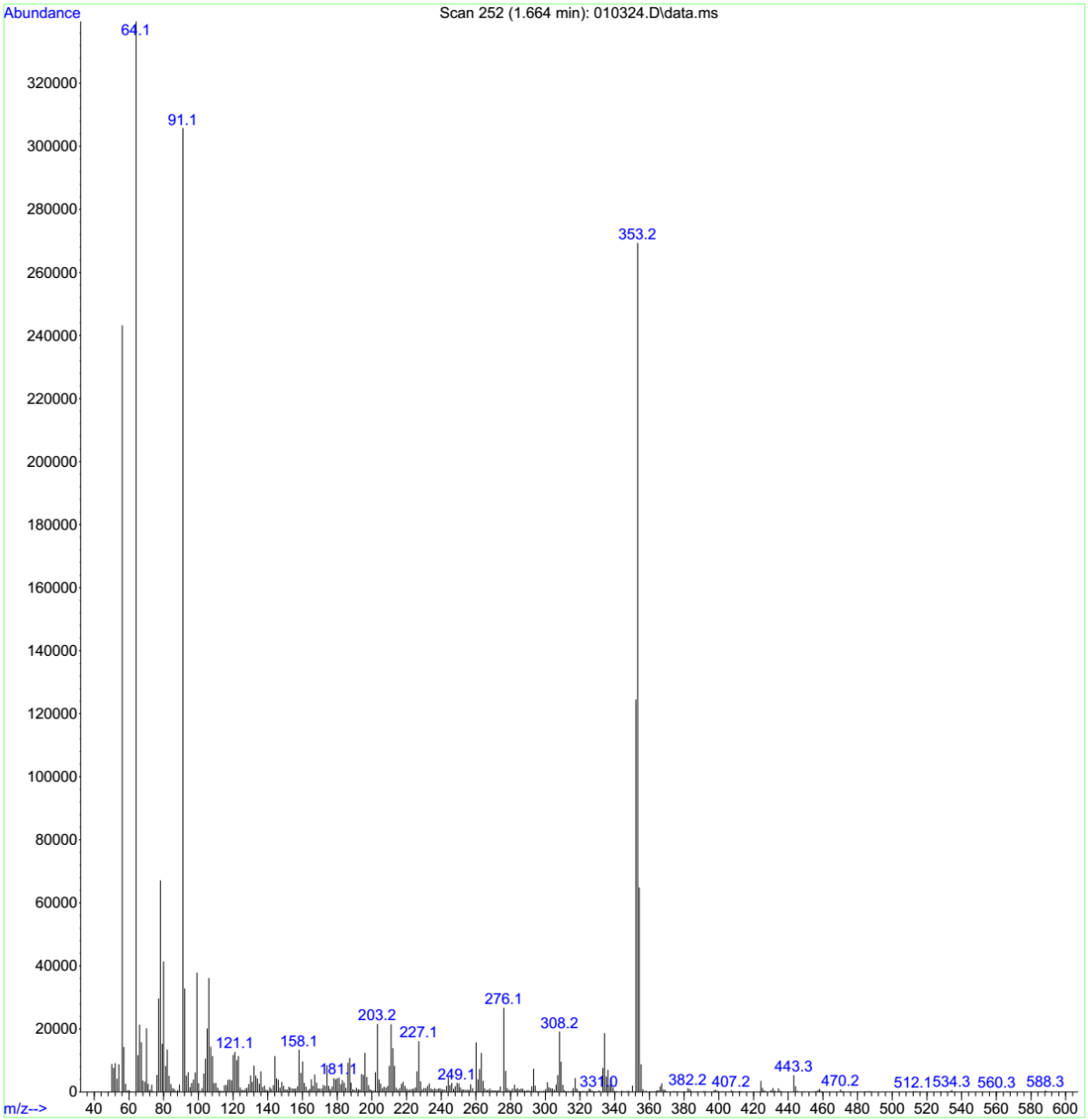

Figure 121. Mass spectrum of compounds **9c**/**9c′**

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