Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

Pd-catalyzed desulfitative arylation of olefins by *N*-methoxysulfonamide

Subhadra Ojha[a] and Niranjan Panda[a*]

[a] Department of Chemistry, National Institute of Technology Rourkela, Odisha, India-769008
Email: npanda@nitrkl.ac.in; niranjanpanda@gmail.com
ORCID: Niranjan Panda (0000-0002-7431-8826)

Table of contents

General procedure for the desulfitative Heck reaction of *N*-methoxy arylsulfonamides with alkenes (procedure A):
An oven-dried Schlenk tube equipped with a stir bar was charged with *N*-methoxy sulfonamide (**1**, 0.5 mmol), $Pd(OAc)_2$ (5.6 mg, 5 mol %), $CuCl_2$ (1 mmol), NaOAc (1 mmol), alkene (**2**, 0.75 mmol) and 3 ml. of anhydrous ethyl acetate. The resulting reaction mixture was stirred at 130 °C (oil bath temperature) for 12 h until complete consumption of starting material as monitored by TLC. After cooling to room temperature, the reaction mixture was triturated with water (10 mL) and extracted with ethyl acetate (3 × 10 mL). The combined organic layer was dried over anhydrous sodium sulfate and concentrated under reduced pressure. The crude reaction mixture was purified by column chromatography over silica gel to afford the desired product (**3**).

General procedure for the homocoupling of *N*-methoxy arylsulfonamides (procedure B):
To a Schlenk tube were added N-methoxy sulfonamide (**1**, 0.5 mmol), $CuCl_2$ (1.25 mmol), NaOAc (1 mmol) and anhydrous ethyl acetate (3 ml). Then the tube was stirred at 160 °C (oil bath temperature) for 12 h until complete consumption of starting material as monitored by TLC. After cooling to room temperature, the reaction mixture was triturated with water (10 mL) and extracted with ethyl acetate (3 × 10 mL). The combined organic layer was dried over anhydrous sodium sulfate and concentrated under reduced pressure. The crude reaction mixture was purified by column chromatography over silica gel to afford the desired product (**4**).

***3-p-Tolyl-acrlic acid methyl ester*[1] (3aa)** . Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and methyl acrylate **(2a)** as a white solid in 73% yield (64 mg). M.P. 58 °C; IR 1708, 1630, 1315, 1158, 983, 809, 503 cm^{-1}; ^1H NMR (400 $MH_{Z,}$ $CDCl_3$): δ 7.69 (d, 1H, *J* = 16.0 Hz), 7.44 (d, 2H, *J* = 8.0 Hz), 7.21 (d, 2H, *J* = 8.0 Hz), 6.42 (d, 1H, *J* = 16.0 Hz), 3.82 (s, 3H), 2.39 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.6, 144.9, 140.7, 131.6, 129.6, 128.0, 116.7, 51.6, 21.4.

***3-phenyl-acrylic acid methyl ester*[1] (3ba).** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-benzenesulfonamide **(1b)** and methyl acrylate **(2a)** as a white solid in 68% yield (55 mg). M.P. 35 °C; IR 1717, 1630, 1446, 1307, 1272, 1167, 983, 765, 687 cm^{-1}; ^1H NMR (400 $MH_{Z,}$ $CDCl_3$): δ 7.72 (d, 1H, *J* = 16.0 Hz), 7.58-7.51 (m, 2H), 7.43-7.38 (m, 3H), 6.47 (d, 1H, *J* = 16.0 Hz), 3.83 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.4, 144.8, 134.4, 130.3, 128.9, 128.0, 117.8, 51.7.

***3-(4-Chloro-phenyl)-acrylic acid methyl ester*[1] (3ca).** Following the general procedure A, the desired compound was obtained from the reaction of 4-chloro-*N*-methoxy-benzenesulfonamide **(1c)** and methyl acrylate **(2a)** as a white solid in 65 % yield (64 mg). M.P. 73 °C; IR 1700, 1630, 1489, 1315, 1167, 1001, 817, 495 cm^{-1}; ^1H NMR (400 $MH_{Z,}$ $CDCl_3$): δ 7.66 (d, 1H, *J* = 16.0 Hz), 7.47 (d, 2H, *J* = 8.4 Hz), 7.38 (d, 2H, *J* = 8.4 Hz), 6.43 (d, 1H, *J* = 16.0 Hz), 3.83 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.1, 143.5, 133.3, 132.1, 124.5, 118.5, 51.8.

***3-(4-Bromo-phenyl)-acrylic acid methyl ester*[2] (3da) .** Following the general procedure A, the desired compound was obtained from the reaction of 4-bromo-*N*-methoxy-benzenesulfonamide **(1d)** and methyl acrylate **(2a)** as a white solid in 62 % yield (74 mg). M.P. 90 °C; IR 1694, 1630, 1489, 1429, 1307, 1167, 1071, 1001, 813, 495 cm^{-1}; ^1H NMR (400 $MH_{Z,}$ $CDCl_3$): δ 7.64 (d, 1H, *J* = 16.0 Hz), 7.53 (d, 2H, *J* = 8.4 Hz), 7.40 (d, 2H, *J* = 8.4 Hz), 6.44 (d, 1H, *J* = 16.0 Hz), 3.82 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.1, 143.4, 133.3, 132.1, 129.4, 124.5, 118.5, 51.7.

***3-(4-Nitro-phenyl)-acrylic acid methyl ester*[2] (3ea)**. Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-nitro-benzenesulfonamide **(1e)** and methyl acrylate **(2a)** as a white solid in 48 % yield (50 mg). M.P. 123 °C; IR 1798, 1532, 1432, 1331, 1158, 1052, 994, 837, 768 cm^{-1}; ^1H NMR (400 $MH_{Z,}$ $CDCl_3$): δ 8.31-8.23 (m, 2H), 7.78-7.66 (m, 3H), 6.58 (d, 1H, *J* = 16.0 Hz), 3.86 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 166.4, 148.5, 141.9, 140.4, 128.6, 124.1, 122.1, 52.0.

***3-(2-Methoxycarbonyl-vinyl)-benzoic acid methyl ester*[3] (3fa).** Following the general procedure A, the desired compound was obtained from the reaction of 3-methoxysulfamoyl-benzoic acid methyl ester **(1f)** and methyl acrylate **(2a)** as a white solid in 53 % yield (58 mg). M.P. 89 °C; IR 1717, 1437, 1307, 1224, 1080, 983, 739, 695 cm^{-1}; ^1H NMR (400 $MH_{Z,}$ $CDCl_3$): δ 8.22 (s, 1H), 8.06 (d, 1H, *J* = 7.6 Hz), 7.77-7.68 (m, 2H), 7.49 (t, 1H, *J* = 8.0 Hz), 6.53 (d, 1H, 16.0 Hz), 3.96 (s, 3H), 3.83 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.1, 166.4, 143.6, 134.7, 132.2, 131.0, 130.9, 129.0, 129.0, 119.1, 52.3, 51.8.

***3-(3,4-Dichloro-phenyl)-acrylic acid methyl ester*[4]** (**3ga**). Following the general procedure A, the desired compound was obtained from the reaction of 3,4-dichloro-*N*-methoxy-benzenesulfonamide **(1g)** and methyl acrylate **(2a)** as a white solid in 58 % yield (67 mg). M.P. 92 °C; IR 1717, 1638, 1429, 1315, 992, 861, 809, 747, 530 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.62 (s, 1H), 7.60 (d, 1H, *J* = 15.6 Hz), 7.48 (d, 1H, *J* = 8.4 Hz), 7.36 (dd, 1H, *J* = 6.8 Hz), 6.44 (d, 1H, *J* = 16.0 Hz), 3.83 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 166.7, 142.0, 134.4, 134.2, 133.2, 130.9, 129.6, 126.9, 119.7, 51.8.

***3-(4-Ethyl-phenyl)-acrylic acid methyl ester*[5] (3ha).** Following the general procedure A, the desired compound was obtained from the reaction of 4-ethyl-*N*-methoxy-benzenesulfonamide **(1h)** and methyl acrylate **(2a)** as an oily liquid in 75% yield (71 mg). IR 1717, 1630, 1446, 1307, 1272, 1167, 983, 765, 687 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.70 (d, 1H, *J* = 16.0 Hz), 7.46 (d, 2H, *J* = 8.4 Hz), 7.23 (d, 2H, *J* = 8.0 Hz), 6.42 (d, 1H, *J* = 16.0 Hz), 3.82 (s, 3H), 2.67 (q, 2H, *J* = 7.6 Hz), 1.26 (t, 3H, *J* = 7.6 Hz); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.6, 147.0, 144.8, 131.9, 128.4, 128.1, 116.7, 51.5, 28.8, 15.3.

***3-Biphenyl-4-yl-acrylic acid methyl ester*[1]** (**3ja**). Following the general procedure A, the desired compound was obtained from the reaction of biphenyl-4-sulfonic acid methoxy-amide **(1j)** and methyl acrylate **(2a)** as a white solid in 66 % yield (63 mg). M.P. 147 °C; IR 1717, 1638, 1559, 1489, 1437, 1307, 1158, 983, 835, 765 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.73 (d, 1H, *J* = 16.0 Hz), 7.65-7.56 (m, 6H), 7.45 (t, 2H, *J* = 7.6 Hz), 7.38 (d, 1H, *J* = 7.2 Hz), 6.48 (d, 1H, *J* = 16.0 Hz), 3.82 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.4, 144.3, 143.1, 140.1, 133.4, 128.8, 128.5, 127.8, 127.5, 127.0, 117.7, 51.6.

***3-Naphthalen-2-yl-acrylic acid methyl ester*[3]** (**3ka**). Following the general procedure A, the desired compound was obtained from the reaction of naphthalene-2-sulfonic acid methoxy-amide **(1k)** and methyl acrylate **(2a)** as an oily liquid in 61 % yield (64 mg). IR 1708, 1638, 1437, 1307, 1158, 974, 774 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 8.53 (d, 1H, *J* = 15.6 Hz), 8.18 (d, 1H, *J* = 8.4 Hz), 7.87 (t, 2H, *J* = 8.0 Hz), 7.74 (d, 1H, *J* = 7.2 Hz), 7.60-7.43 (m, 3H), 6.52 (d, 1H, *J* = 15.6 Hz), 3.85 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.2, 141.9, 133.7, 131.8, 131.4, 130.5, 128.7, 126.8, 126.2, 125.4, 125.0, 123.3, 120.5, 51.7.

***3-(4-Methoxy-phenyl)-acrylic acid methyl ester*[2]** (**3la**). Following the general procedure A, the desired compound was obtained from the reaction of 4,*N*-dimethoxy-benzenesulfonamide **(1l)** and methyl acrylate **(2a)** as a white solid in 66 % yield (63 mg). M.P. 86 °C; IR 1717, 1638, 1603, 1559, 1507, 1437, 1289, 1167, 983, 817 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.67 (d, 1H, *J* = 16.0 Hz), 7.49 (d, 2H, *J* = 8.8 Hz), 6.92 (d, 2H, *J* = 8.4 Hz), 6.33 (d, 1H, *J* = 16.0 Hz), 3.86 (s, 3H), 3.81 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.7, 161.4, 144.5, 129.7, 127.1, 115.2, 114.3, 55.3, 51.9.

***3-(3,4-Dimethyl-phenyl)-acrylic acid methyl ester*[6]** (**3ma**). Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-3,4-dimethyl-benzenesulfonamide **(1m)** and methyl acrylate **(2a)** as a white solid in 75 % yield (71 mg). M.P. 74 °C; IR 1700, 1442, 1272, 1175, 992, 826, 556 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.67 (d, 1H, *J* = 16.0 Hz), 7.33-7.26 (m, 2H), 7.16 (d, 1H, *J* = 7.6 Hz), 6.41 (d, 1H, *J* = 16.0 Hz), 3.82 (s, 3H), 2.30 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.6, 145.0, 139.4, 137.1, 132.0, 130.1, 129.3, 125.7, 116.5, 51.5, 19.7, 19.7.

***3-(3,4-Dimethoxy-phenyl)-acrylic acid methyl ester*[7]** (**3na**). Following the general procedure A, the desired compound was obtained from the reaction of 3,4,*N*-Trimethoxy-benzenesulfonamide **(1n)** and methyl acrylate **(2a)** as a white solid in 61 % yield (68 mg). M.P. 141 °C; IR 1690, 1507, 1437, 1228, 1140, 1009, 983, 804 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.65 (d, 1H, *J* = 15.6 Hz), 7.12 (dd, 1H, *J* = 8.0 Hz), 7.06 (s, 1H), 6.88 (d, 1H, *J* = 8.0 Hz), 6.33 (d, 1H, *J* = 16.0 Hz), 3.93 (s, 6H), 3.81 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.6, 151.1, 149.2, 144.7, 127.4, 122.5, 115.5, 111.1, 109.7, 55.9, 55.9, 51.5.

***3-(5-Bromo-2-methoxy-phenyl)-acrylic acid methyl ester*[8] (3oa).** Following the general procedure A, the desired compound was obtained from the reaction of 5-bromo-2,*N*-dimethoxy-benzenesulfonamide **(1o)** and methyl acrylate **(2a)** as a white solid in 61 % yield (82 mg); IR 1717, 1636, 1481, 1315, 1175, 983, 861, 809, 625, 455 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.89 (d, 1H, *J* = 16.0 Hz), 7.60 (s, 1H), 7.42 (dd, 1H, J_1 = 8.8 Hz, J_2 = 2.4 Hz), 6.79 (d, 1H, *J* = 8.8 Hz), 6.49 (d, 1H, J = 16.4 Hz), 3.86 (s, 3H), 3.80 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.4, 157.2, 138.6, 133.7, 131.1, 125.3, 119.5, 112.9, 112.9, 55.7, 51.6.

3-(5-Acetyl-2-methoxy-phenyl)-acrylic acid methyl ester **(3pa).** Following the general procedure A, the desired compound was obtained from the reaction of 5-acetyl-2,*N*-dimethoxy-benzenesulfonamide **(1p)** and methyl acrylate **(2a)** as a white solid in 58 % yield (68 mg). IR 1700, 1673, 1437, 1241, 1123, 983, 826, 565 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 8.14 (d, 1H, *J* = 2.0 Hz), 8.03-7.95 (m, 2H), 6.98 (d, 1H, *J* = 8.8 Hz), 6.62 (d, 1H, *J* = 16.4 Hz), 3.98 (s, 3H), 3.83 (s, 3H), 2.60 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 196.3, 167.5, 161.7, 139.2, 131.9, 130.2, 129.4, 123.4, 119.7, 110.7, 55.8, 51.7, 26.2. HRMS (ESI) calcd for $C_{13}H_{15}O_4^+$ $[M + H]^+$ 235.065; found 235.078.

3-(2,5-Dichloro-phenyl)-acrylic acid methyl ester[9] **(3qa).** Following the general procedure A, the desired compound was obtained from the reaction of 2,5-dichloro-*N*-methoxy-benzenesulfonamide **(1q)** and methyl acrylate **(2a)** as a white solid in 57 % yield (65 mg). M.P. 95 °C; IR 1708, 1454, 1394, 1272, 1175, 1036, 983, 800, 573, 486 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 8.01 (d, 1H, *J* = 16.0 Hz), 7.60 (s, 1H), 7.37 (d, 1H, *J* = 8.4 Hz), 7.33-7.27 (m, 1H), 6.44 (d, 1H, J = 16.0 Hz), 3.84 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 166.5, 139.3, 134.1, 133.1, 133.0, 131.2, 130.8, 127.4, 121.7, 51.9.

3-(2,4-Dimethyl-phenyl)-acrylic acid methyl ester[10] (**3ra**). Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-2,4-dimethyl-benzenesulfonamide **(1r)** and methyl acrylate **(2a)** as a colourless oil in 70 % yield (66 mg). IR 1717, 1612, 1437, 1315, 1280, 1158, 983, 817, 713, 547 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.98 (d, 1H, *J* = 16.0 Hz), 7.47 (d, 1H, *J* = 8.4 Hz), 7.04 (s, 2H), 6.35 (s, 1H, *J* = 16.0 Hz), 3.82 (s, 3H), 2.42 (s, 3H), 2.34 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.6, 142.4, 140.3, 137.6, 131.5, 130.5, 127.1, 126.3, 117.6, 51.5, 21.2, 19.6.

3-Thiophen-2-yl-acrylic acid methyl ester[9] **(3sa).** Following the general procedure A, the desired compound was obtained from the reaction of thiophene-2-sulfonic acid methoxy-amide **(1s)** and methyl acrylate **(2a)** as a white solid in 52 % yield (44 mg). M.P. 55 °C; IR 1700, 1638, 1419, 1307, 1210, 1158, 974, 844, 722, 590 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.80 (d, 1H, *J* = 15.6 Hz), 7.39 (d, 1H, *J* = 5.2 Hz), 7.27 (d, 1H, *J* = 6.4 Hz), 7.07 (dd, 1H, J_1 = 5.2 Hz, J_2 = 3.6 Hz), 6.26 (d, 1H, *J* = 16.0 Hz), 3.80 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.3, 139.5, 137.3, 130.9, 128.4, 128.0, 116.5, 51.7.

3-p-Tolyl-acrylic acid butyl ester[11] (**3ab**)**.** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and acrylic acid butyl ester **(2b)** as a yellow oil in 76 % yield (83 mg). IR 1708, 1638, 1516, 1315, 1167, 974, 809, 503 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.68 (d, 1H, *J* = 16.0 Hz), 7.44 (d, 2H, *J* = 8.4 Hz), 7.21 (d, 2H, *J* = 8.0 Hz), 6.41 (d, 1H, *J* = 16.0 Hz), 4.22 (t, 2H, *J* = 6.8 Hz), 2.39 (s, 3H), 1.75-1.65 (m, 2H), 1.53-1.39 (m, 2H), 0.99 (t, 3H, *J* = 7.2 Hz); ^{13}C NMR (100 MHz, $CDCl_3$): δ 162.4, 139.7, 135.8, 127.0, 124.8, 123.2, 112.5, 59.5, 26.0, 16.6, 14.4, 8.9.

3-p-Tolyl-acrylic acid tert-butyl ester[11] (**3ac**)**.** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and acrylic acid tert-butyl ester **(2c)** as a yellow oil in 77 % yield (84 mg). IR 1708, 1630, 1507, 1367, 1324, 1150, 974, 870, 809 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.58 (d, 1H, *J* = 16.0 Hz), 7.42 (d, 2H, *J* = 8.4 Hz), 7.19 (d, 2H, *J* = 7.6 Hz), 6.36 (d, 1H, *J* = 16.0 Hz), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 166.5, 143.5, 140.2, 131.9, 129.5, 127.9, 119.1, 80.3, 28.2, 21.3.

3-ρ-Tolyl-acrylic aci[12] **(3ad).** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and acrylic acid **(2d)** as a white solid in 60 % yield (49 mg). M.P. 180°C; IR 1682, 1655, 1559, 1419, 1315, 983, 931, 809, 687, 495 cm^{-1}; ^1H NMR (400 MH_Z, DMSO-d_6): δ 7.59-7.51 (m, 3H), 7.22 (d, 2H, *J* = 7.2 Hz), 6.45 (d, 1H, *J* = 16.0 Hz), 2.31 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6): δ 168.1, 144.4, 140.6, 131.9, 129.9, 128.6, 118.5, 21.4.

N,N-Dimethyl-3-p-tolyl-acrylamide[13] **(3ae) .** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and *N,N*-dimethyl-acrylamide **(2e)** as a white solid in 76 % yield (71 mg). M.P. 99 °C; IR 2215, 1603, 1507, 1272, 1175, 974, 792, 538 cm^{-1}; ^1H NMR (400 MH_Z, DMSO-d_6): δ 7.57 (d, 2H, *J* = 7.2 Hz), 7.45 (d, 1H, *J* = 15.2 Hz), 7.20 (d, 2H, *J* = 7.6 Hz), 7.12 (d, 1H, J = 15.6 Hz), 3.13 (s, 3H), 2.92 (s,3H), 2.30 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6): δ 170.9, 146.1, 144.4, 137.6, 134.5, 133.1, 122.5, 42.0, 40.5, 26.1.

3-ρ-Tolyl-acrylonitrile[14] **(3af).** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and acrylonitrile **(2f)** as a yellow oil in 78 % yield (56

mg). IR 2215, 1603, 1507, 1272, 1185, 974, 800, 459 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.43-7.35 (m, 3H), 7.23 (s, 2H), 5.85 (d, 2H, J = 16.4 Hz), 2.41 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 150.5, 141.8, 130.9, 129.8, 127.3, 118.4, 95.0, 21.5.

***1-Methyl-4-styryl-benzene*[1] (3ag).** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and vinyl-benzene **(2g)** as a white solid in 46 % yield (45 mg). M.P. 73°C; IR 1655, 1507, 1446, 974, 809, 747, 687, 530 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.53 (d, 2H, *J* = 7.2 Hz), 7.44 (d, 2H, *J* = 8.0 Hz), 7.37 (t, 2H, *J* = 8.0 Hz), 7.27 (d, 1H, *J* = 7.2 Hz), 7.19 (d, 2H, *J* = 7.6 Hz), 7.10 (d, 2H, *J* = 2.4 Hz), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): 137.5, 137.5, 134.6, 129.3, 128.6, 128.6, 127.7, 127.3, 126.4, 126.4, 21.2.

***1-Methyl-4-(2-phenyl-ethenesulfonyl)-benzene* [15] (3ag').** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and vinyl-benzene **(2g)** as a white solid in 32 % yield (41 mg). M.P. 126°C; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.85 (d, 2H, *J* = 8.0 Hz), 7.68 (d, 1H, *J* = 15.6 Hz), 7.52-7.46 (m, 2H), 7.47-7.38 (m, 3H), 7.36 (d, 2H, *J* = 8.0 Hz), 7.86 (d, 1H, *J* = 15.2 Hz), 2.45 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): 144.4, 141.9, 137.7, 132.4, 131.1, 129.9, 129.0, 128.5, 127.7, 127.6, 21.6.

***1-Methyl-4-(3-phenoxy-propenyl)-benzene*[16]** (**3ah**). Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and allyloxy-benzene **(2h)** as a white solid in 75 % yield (84 mg). M.P. 58 °C; IR 1655, 1586, 1489, 1454, 1385, 1228, 1175, 1009, 966, 747, 695, 512 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.36-7.28 (d, 4H), 7.16 (d, 2H, *J* = 8.0 Hz), 6.98 (t, 3H, *J* = 6.8 Hz), 6.73 (d, 1H, *J* = 16.0 Hz), 6.45-6.34 (m, 1H), 4.71 (d, 2H, *J* = 6.0 Hz) , 2.36 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 158.6, 137.8, 133.6, 133.0, 129.4, 129.3, 126.5, 123.4, 120.8, 114.8, 68.7, 21.2.

***Carbonic acid methyl ester 3-p-tolyl-allyl-ester*[17] (3ai).** Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and Carbonic acid allyl ester methyl ester **(2i)** as a white solid in 74 % yield (76 mg). M.P. 56 °C; IR 1655, 1595, 1507, 1446, 974, 800, 747, 687, 530 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.31 (d, 2H, *J* = 8.0 Hz), 7.15 (d, 2H, *J* = 7.6 Hz), 6.68 (d, 1H, *J* = 16.0 Hz), 6.32-6.21 (m, 1H), 4.80 (d, 2H, J = 6.4 Hz), 3.82 (s, 3H), 2.36 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 155.7, 138.1, 134.9, 133.2, 129.3, 126.6, 121.3, 68.6, 54.8, 21.2.

***1,1'-(1E)-1-Propene-1,3-diylbis[4-methylbenzene]*[18]** (**3aj**). Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and 3-Bromo-propene **(2j)** as a white solid in 58 % yield (39 mg). ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.27 (d, 2H, *J* = 6.8 Hz), 7.17-6.99 (m, 6H), 6.44 (d, 1H, *J* = 15.6 Hz), 6.37-6.25 (m, 1H), 3.52 (d, 2H, *J* = 6.8 Hz), 2.35 (s, 3H), 2.34 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 137.2, 136.7, 135.6, 134.7, 130.6, 129.1, 129.1, 128.5, 128.4, 126.0, 38.9, 21.1, 21.0.

***3-p-Tolyl-chromen-2-one*[19]** (**3ak**). Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and Chromen-2-one **(2k)** as a white solid in 72 % yield (85 mg). M.P. 158 °C; IR 1655, 1586, 1489, 1454, 1385, 1228, 1175, 1009, 966, 747, 695, 512 cm^{-1}; ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.81 (s, 1H), 7.63 (d, 2H, *J* = 8.0 Hz), 7.59-7.50 (m, 2H), 7.39 (d, 1H, *J* = 8.0 Hz), 7.35-7.26 (m, 3H), 2.42 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 160.7, 153.4, 139.2, 138.9, 131.8, 131.2, 129.2, 128.4, 128.3, 127.8, 124.4, 119.8, 116.4, 21.3.

***3-p-Tolyl-but-2-enoic acid methyl ester* [20]** (**3al**). Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and But-2-enoic acid methyl ester **(2l)** as a yellow oil in 68 % yield (64 mg). ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.39 (d, 2H, *J* = 8.0 Hz), 7.1 (d, 2H, *J* = 8.0 Hz), 6.15 (s, 1H), 3.77 (s, 3H), 2.59 (s, 3H), 2.39 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 167.3, 155.7, 139.1, 139.1, 129.1, 126.1, 115.7, 51.0, 21.1, 17.8. HRMS (ESI) calcd for $C_{12}H_{15}O_2^+$ $[M + H]^+$ 191.1072; found 191.1081.

***2-p-Tolyl-but-2-enedioic acid dimethyl ester* [21]** (**3am**). Following the general procedure A, the desired compound was obtained from the reaction of *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** and But-2-enedioic acid dimethyl ester **(2m)** as a colourless oil in 71 % yield (E:Z::8:2) (81 mg). ^1H NMR (400 MH_Z, $CDCl_3$): δ 7.39 (d, 2H, *J* = 8.0 Hz), 7.22 (d, 2H, *J* = 8.0 Hz), 6.31 (s, 1H), 3.96 (s, 3H), 3.80 (s, 3H), 2.39 (s, 3H)); ^{13}C NMR (100 MHz, $CDCl_3$): δ 169.3, 168.5, 165.5, 149.0, 141.2, 138.9, 135.8, 130.3, 129.7, 129.3, 126.7, 125.9, 115.8, 53.7, 52.6, 52.1, 51.9, 46.1, 21.3, 21.0. HRMS (ESI) calcd for $C_{13}H_{14}NaO_4^+$ $[M + Na]^+$ 257.0790; found 257.0786.

2-Methyl-3-p-tolyl-acrylic acid methyl ester [22] (**3an**). Following the general procedure A, when *N*-methoxy-4-methyl-benzenesulfonamide **(1a)** reacted with 2-Methyl-acrylic acid methyl ester **(2n)**, we got an inseparable mixture of 2-methyl-3-p-tolyl-acrylic acid methyl ester and 2-(4-methyl-benzyl)-acrylic acid methyl ester (**3an´**)[23] in 1:1 ratio as a yellow oil in 64 % yield (61 mg). ^{1}H NMR (400 MH_Z, $CDCl_3$): δ 7.69 (s, 1H), 7.33 (d, 2H, *J* = 8.0 Hz), 7.22 (d, 2H, *J* = 8.0 Hz), 7.16-7.07 (m, 4H), 6.23 (s, 1H), 5.48 (s, 1H), 3.83 (s, 3H), 3.75 (s, 3H), 3.61 (s, 2H), 2.39 (s, 3H), 2.34 (s, 3H), 2.15 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 169.2, 167.4, 140.3, 138.9, 138.4, 135.8, 135.5, 133.0, 129.7, 129.1, 128.9, 127.3, 126.0, 52.0, 51.8, 37.6, 21.3, 21.0, 14.0.

4,4´-Dimethyl-biphenyl[24] **(4a).** Following the general procedure B, when *N*-Methoxy-4-methyl-benzenesulfonamide **(1a)** was stirred at 160 °C the desired compound (**4a)** was obtained as a white crystalline solid in 74% yield (33 mg). M.P. 127 °C; IR 2922, 2852, 1655, 1454, 1001, 800, 547, 503 cm^{-1}; ^{1}H NMR (400 MH_Z, $CDCl_3$): δ 7.50 (d, 4H, *J* = 8.4 Hz), 7.26 (d, 4H, *J* = 8.0 Hz), 2.41 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 138.0, 136.6, 129.4, 126.8, 21.0.

Biphenyl[24] **(4b).** Following the general procedure B, when *N*-Methoxy-benzenesulfonamide **(1b)** was stirred at 160 °C the desired compound (**4b)** was obtained as a white crystalline solid in 70% yield (27 mg). M.P. 72 °C; IR 1481, 1429, 1167, 1001, 904, 730, 687, 608 cm^{-1}; ^{1}H NMR (400 MH_Z, $CDCl_3$): δ 7.68-7.62 (m, 4H), 7.53-7.45 (m, 4H), 7.44-7.35 (m,2H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 141.2, 128.7, 127.2, 127.2.

4,4´-Dichloro-biphenyl[24] **(4c)**. Following the general procedure B, when 3,4-Dichloro-*N*-methoxy-benzenesulfonamide **(1c)** was stirred at 160 °C the desired compound (**4c)** was obtained as a white crystalline solid in 64% yield (36 mg). M.P. 151 °C; IR 1655, 1559, 1472, 1385, 1088, 1001, 809, 704, 547, 503 cm^{-1}; ^{1}H NMR (400 MH_Z, $CDCl_3$): δ 7.50 (d, 4H, *J* = 8.8 Hz), 7.43 (d, 4H, *J* = 8.8 Hz) ; ^{13}C NMR (100 MHz, $CDCl_3$): δ 138.4, 133.7, 129.0, 128.2.

4,4´-Dibromo-biphenyl[24] **(4d)**. Following the general procedure B, when 4-Bromo-*N*-methoxy-benzenesulfonamide **(1d)** was stirred at 160 °C the desired compound (**4d)** was obtained as a white crystalline solid in 62% yield (47 mg). M.P. 166 °C; IR 1582, 1472, 1385, 1071, 1001, 804, 722, 669, 538, 502 cm^{-1}; ^{1}H NMR (400 MH_Z, $CDCl_3$) δ 7.58 (d, 2H, *J* = 8.4 Hz), 7.43 (d, 2H, *J* = 8.4 Hz); ^{13}C NMR (100 MHz, $CDCl_3$): δ 138.9, 132.0, 128.5, 121.9.

4,4´-Dinitro-biphenyl[24] **(4e)**. Following the general procedure B, when *N*-Methoxy-4-nitro-benzenesulfonamide **(1e)** was stirred at 160 °C the desired compound (**4e)** was obtained as a white crystalline solid in 45% yield (28 mg). M.P. 226 °C; IR 1577, 1507, 1472, 1341, 1088, 1009, 844, 739, 530 cm^{-1}; ^{1}H NMR (400 MH_Z, $CDCl_3$): δ 8.20 (d, 4H, *J* = 8.8 Hz), 7.54 (d, 4H, *J* = 8.4 Hz); ^{13}C NMR (100 MHz, $CDCl_3$): δ 146.5, 141.3, 129.5, 124.9.

Biphenyl-3,3´-dicarboxylic acid dimehyl ester[24] **(4f).** Following the general procedure B, when biphenyl-4-sulfonic acid methoxy-amide **(1f)** was stirred at 160 °C the desired compound (**4f)** was obtained as a white crystalline solid in 53% yield (35 mg). M.P. 103 °C; IR 1708, 1446, 1376, 1175, 1036, 835, 687, 590, 495 cm^{-1}; ^{1}H NMR (400 MH_Z, $CDCl_3$): δ 8.32 (s, 2H), 8.07 (d,2H, *J* = 7.6 Hz), 7.84 (d, 2H, *J* = 8.0 Hz), 7.56 (t, 2H, *J* = 8.0 Hz), 3.98 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 166.9, 140.3, 131.5, 130.8, 129.0, 128.8, 128.2, 52.2.

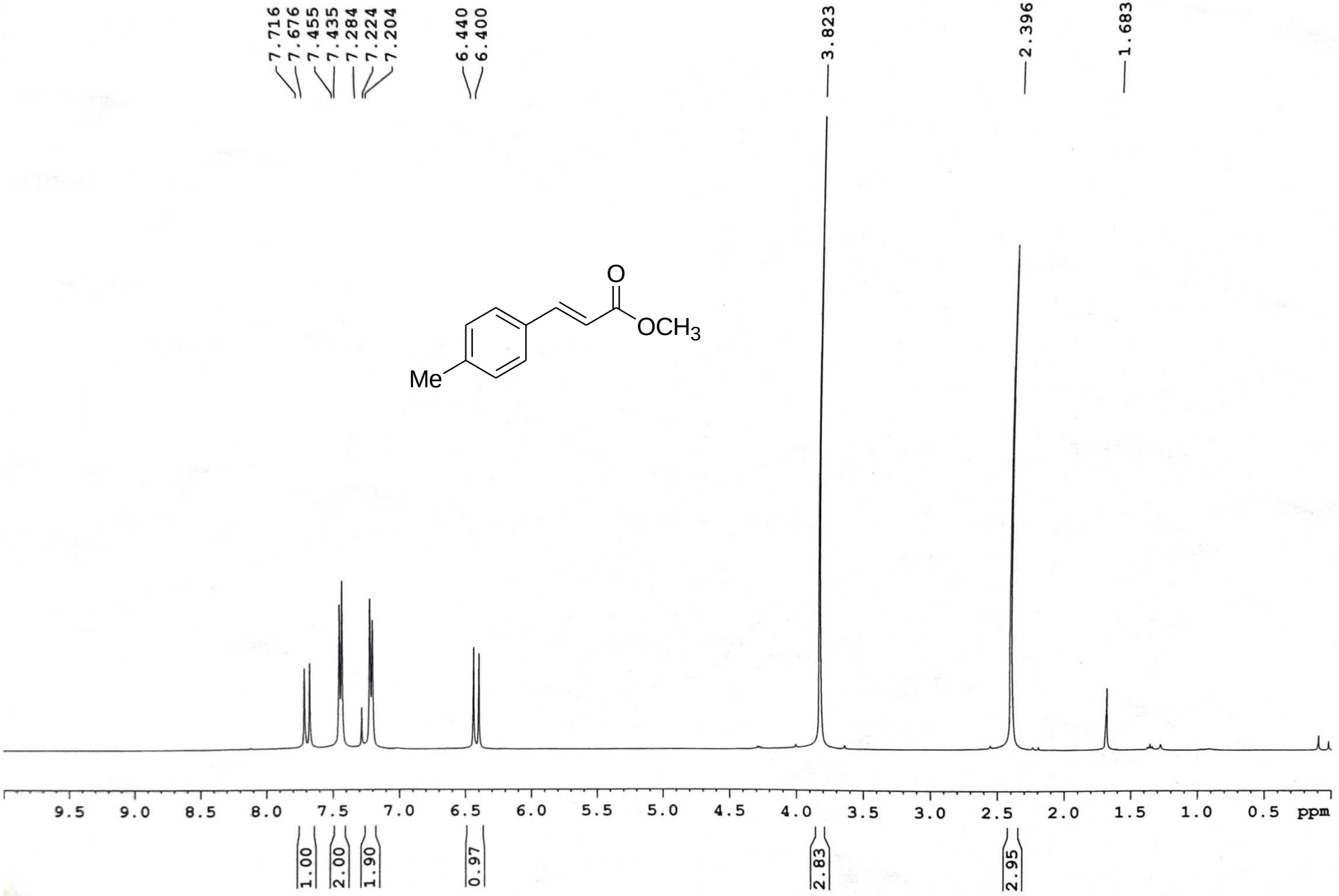
3,4,3´,4´-Tetrachloro-biphenyl[24] **(4g)**. Following the general procedure B, when 3,4-Dichloro-*N*-methoxy-benzenesulfonamide **(1g)** was stirred at 160 °C the desired compound (**4g)** was obtained as a white crystalline solid in 57% yield (41 mg). M.P. 173 °C; IR 1655, 1542, 1454, 1359, 1132, 817, 747, 669, 441 cm^{-1}; ^{1}H NMR (400 MH_Z, $CDCl_3$): δ 7.65 (d, 2H, *J* = 2.0 Hz), 7.54 (d, 2H, *J* = 8.0 Hz), 7.38 (dd, 2H, J_1= 8.0 Hz, J_2 = 2.0 Hz); ^{13}C NMR (100 MHz, $CDCl_3$): δ 138.7, 133.2, 132.4, 130.9, 128.8, 126.1.

References

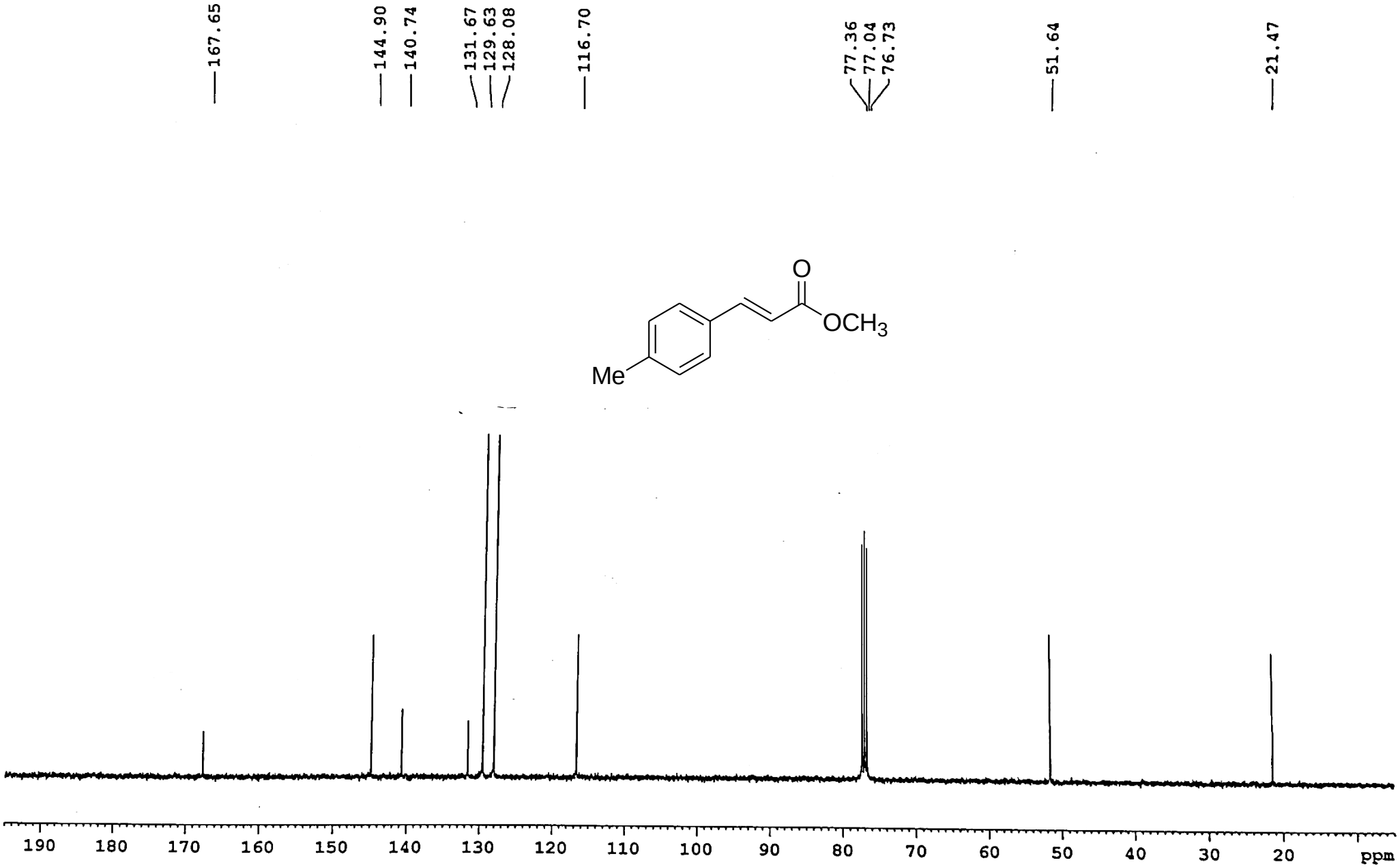
1. M. L. Wang, H. Xu, H. Y. Li, B. Ma, Z. Y. Wang, X. Wang and H. X. Dai, Mizoroci-Heck Reaction of Unstrained Aryl Ketones Via Ligand-Promoted C-C-Bond Olefination, *Org. Lett.*, 2021, **23**, 2147.
2. F. H. Roa, S. C. Mendoza, D. G. Rosas, R. A. Toscano, M. C. Ortega-Alfaro and J. G. Lopez-Cortes, Synthesis and Catalytic Applications of [*N*, *N*]-pyrrole Ligands for the Regioselective of Styrene Derivatives, *Adv. Synth. Catal*., 2019, **361**, 4055.

3. T. Werner, M. Hoffmann and S. Deshmukh, First Microwave-Assisted Catalytic Wittig Reaction, *Eur. J. Org. Chem.*, 2014, 6873.
4. C. –A. Wang, Y. –W. Li, X. -M. Hou, Y. F. Han, K. Nie and J. P. Zhang, N-Heerocyclic Carbene-based Microporous Organic Polymer Supported Palladium Catalyst for Carbon-Carbon Coupling Reaction, *Chemistry Select.*, 2016, **1**, 1371.
5. B. Karimi, M. R. Marefat, M. Hasannia, P. F. Akhavan, F. Mansouri, Z. Artelli, F. Mohammadi, and H. Vali, Imidazolyl-Functionalized Ordered Mesoporous Polymer from Nanocasting as an Effective Support for Highly Dispersed Palladium Nanoparticles in the Heck Reaction, *ChemCatChem*, 2016, 8, 2508.
6. P. Wang, P. Verma and G. Xia, Ligand-accelerated non-directed C–H functionalization of arenes, *Nature*, 2017, **551**, 489.
7. J. Dambacher, W. Zhao, A. El-Batta, R. Anness, C. Jiang and M. Bergdahl, Water is an efficient medium for witing reactions employing stabilized ylides and aldehydes, *Terahedron Lett.*, 2005, **46**, 4473.
8. J. F. Teichert and B. L. Feringa, Caalytic asymmetric conjugate addition of Grignard reagents to coumarins-synthesis of versatile chiral building blocks, *Chem. Commun*., 2011, **47**, 2679.
9. T. Asukata and T. Matsuura, Efficient Synthesis of Acrylates Bearing a Heteroaryle Moiety: One Pot Method from Aromatics and Heteroaromatics Using Formylation and the Horner-Wadsworth-Emmons Reacion, *Heterocycles*, 2021, **102**, 527.
10. A. Bhunia and A. Studer, Synthesis of Highly Substituted Arenes via Cyclohexadiene-Alkene C-H Cross Coupling and Aromatization, *ACS Catal.*, 2018, **8**, 1213.
11. M. K. Zhu, J. F. Zhao and T. P. Loh, Palladim Catalyzed C-C Bond Formation of Arylhydrazines with Olefins via Carbon-Nitrogen Bond Cleavage, *Org. Lett.*, 2011, **13**, 6308.
12. H. Yu, S. Ru, Y. Zhai, G. Dai, S. Han and Y. Wei, An Efficient Aerobic Oxidation Protocol of Aldehydes to Carboxylic Acid in water Catalyzed by an Inorganic-Ligand-Supported Copper Catalyst, *ChemCatChem*, 2018, **10**, 1253.
13. X. H. Yang, W. T. Wei, H. B. Li, R. J. Song and J. H. Li, Oxidative coupling of alkenes with amides using peroxides: selective amide C(sp3)-H *versus* C(sp2)-H functionalization, *Chem. Commun.*, 2014, **50**, 12867.
14. B. V. Rokade, S. K. Malekar and K. R. Prabhu, A novel oxidative transformation of alcohols to nitriles: an efficient utility of azides as a nitrogen source, *Chem. Commun.*, 2012, **48**, 5506.
15. A. Hossain, S. Engl, E. Lutsker and O. Reiser, Visible-Light-Mediated Regioselective Chlorosulfonylation of Alkenes and Alkynes: Introducing the Cu(II) Complex [Cu(dap)Cl_2] to Photochemical ATRA Reactions, *ACS Catal.*, 2019, **9**, 1103.
16. W. Wang, R. Zhou, Z. J. Jiang, K. Wang, H. Y. Fu, X. L. Zheng, H. Chen and R. X. Li, An Efficient Palladium Catalyzed Synthesis of Cinnamyl Ethers from Aromatic Halides, Phenols, and Allylic Chloride, *Adv. Synth. Catal.*, 2014, **356**, 616.
17. R. L. Grange, E. A. Clizbe, E. J. Counsell and P. A. Evans, Enantioselecive Construction of C-chiral allylic sulfilines *via* the iridium-catalyzed allylic amination with s,s-diphenyl sulfimine: asymmetric synthesis of primary allylic amines, *Chem. Sci*., 2015, **6**, 777.
18. Q. Yuan, K. Yao, D. Liu and W. Zhang, Iridium-catalyzed allyl–allyl cross-coupling of allylic carbonates with (E)-1,3-diarylpropenes, *Chem. Commun*., 2015, 51, 11834.
19. J. H. Yoo and S. W. Youn, Zn(II)-Catalyzed One-Pot Synthesis of Coumarins from Ynamides and Salicylaldehydes, *Org. Lett.*, 2019, **21**, 3422.
20. Y. –M. Wei, X. –D. Ma, L. Wang and X. –F. Duan, Iron-Catalyzed Stereospecific Arylation of Enol Tosylates with Grignard reagents , *Chem. Commun.*, 2020, **56** , 1101.
21. M. Bernasconi, M. –A. Mller, and A. Pfaltz, Asymmetric Hydrogenation of Maleic Acid Diesters and Anhydrides, *Angew. Chem. Int. Ed*., 2014, **53**, 5385.
22. P.B. Rathod, K.S.A. Kumar, M. Kumar, A.K. Debnath, A.K. Pandey and A.A. Athawale, Palladium acetate and Pd nanoparticles loaded hexamethylenetetramine anchored magnetically retrievable assemblies for catalyzing Mizoroki-Heck type mono and gem-dicoupling reactions, *ChemistrySelect*, 2020, **5**, 1961.
23. R. M. Appa, J. Lakshmidevi, B. R. Naidu and K. Venkateswarlu, Iodine Promoted Metal-Free Aromatization: Synthesis of Biaryls, oligo p-phynylenes and A-Ring Modified Steroids, *Mol. Catal.*, 2021, **501**, 111366.
24. M. L. N. Rao and S. Giri, Pd-Catalyzed Threefold Arylation of Baylis–Hillman Bromides and Acetates with Triarylbismuth Reagents, *Eur. J. Org. Chem*., 2012, 4580.

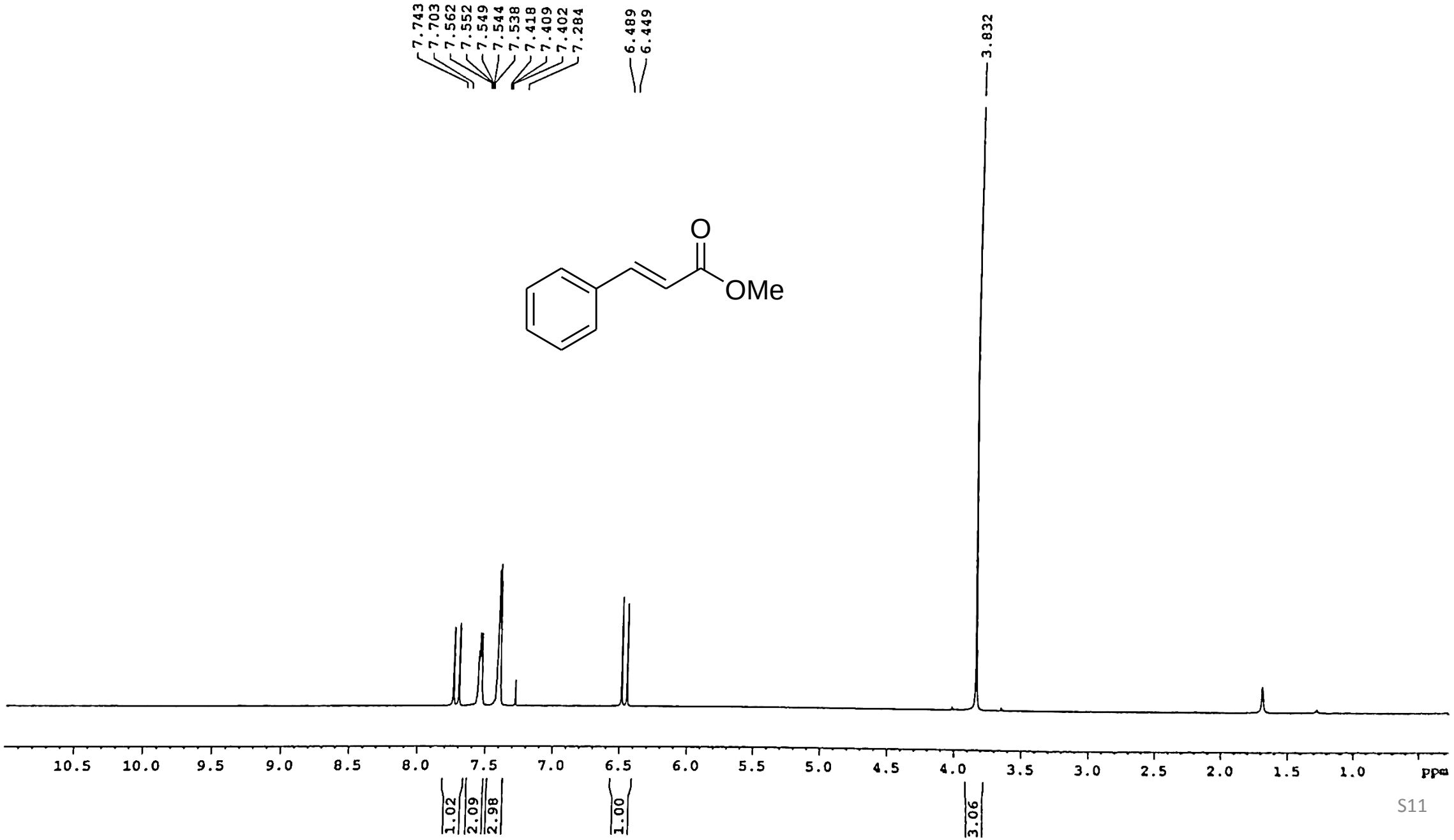
^{1}H NMR OF 3-p-Tolyl-acrlic acid methyl ester (3aa)



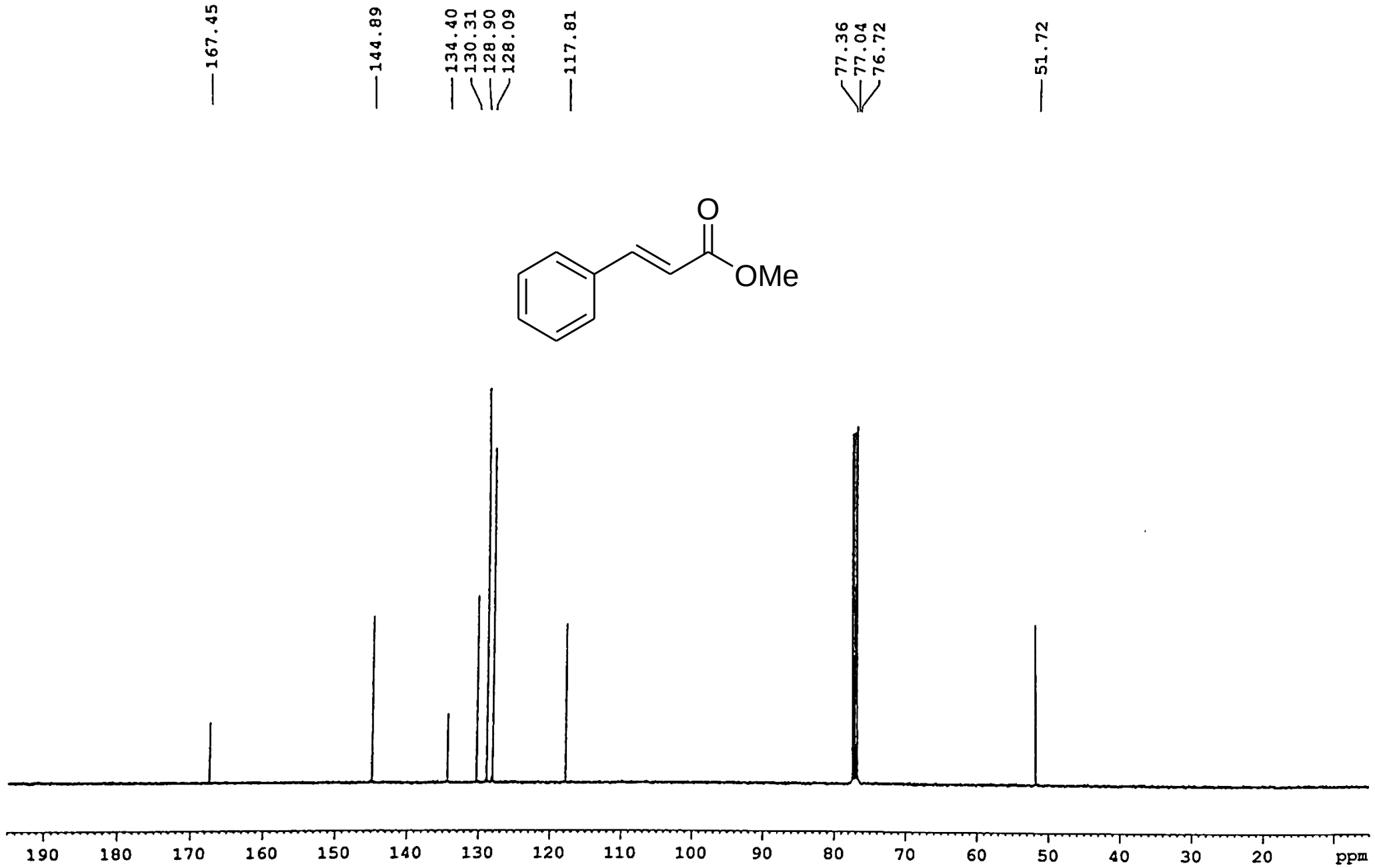
^{13}C NMR OF 3-p-Tolyl-acrlic acid methyl ester (3aa)



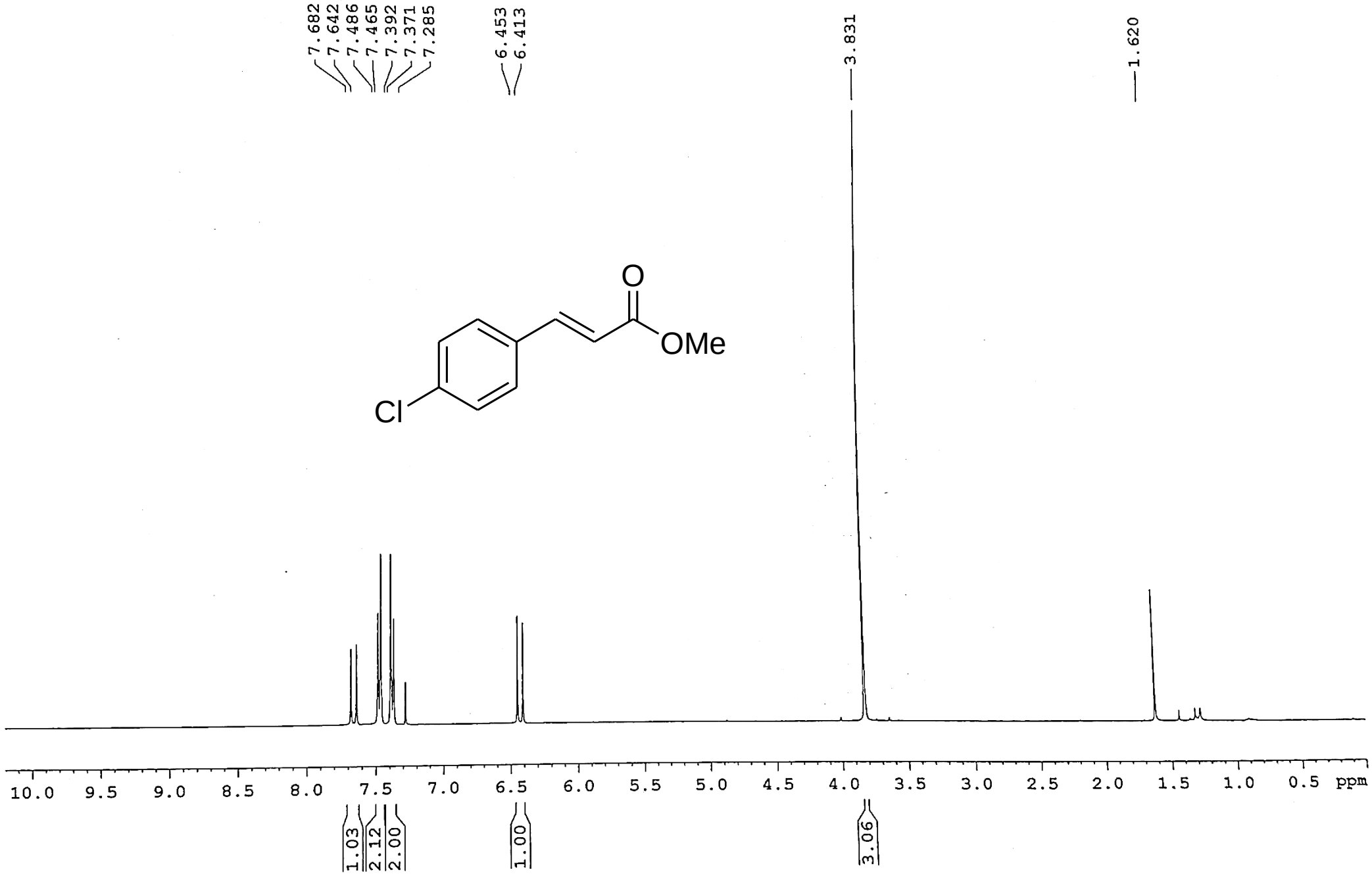
^{1}H NMR OF 3-phenyl-acrylic acid methyl ester (3ba)



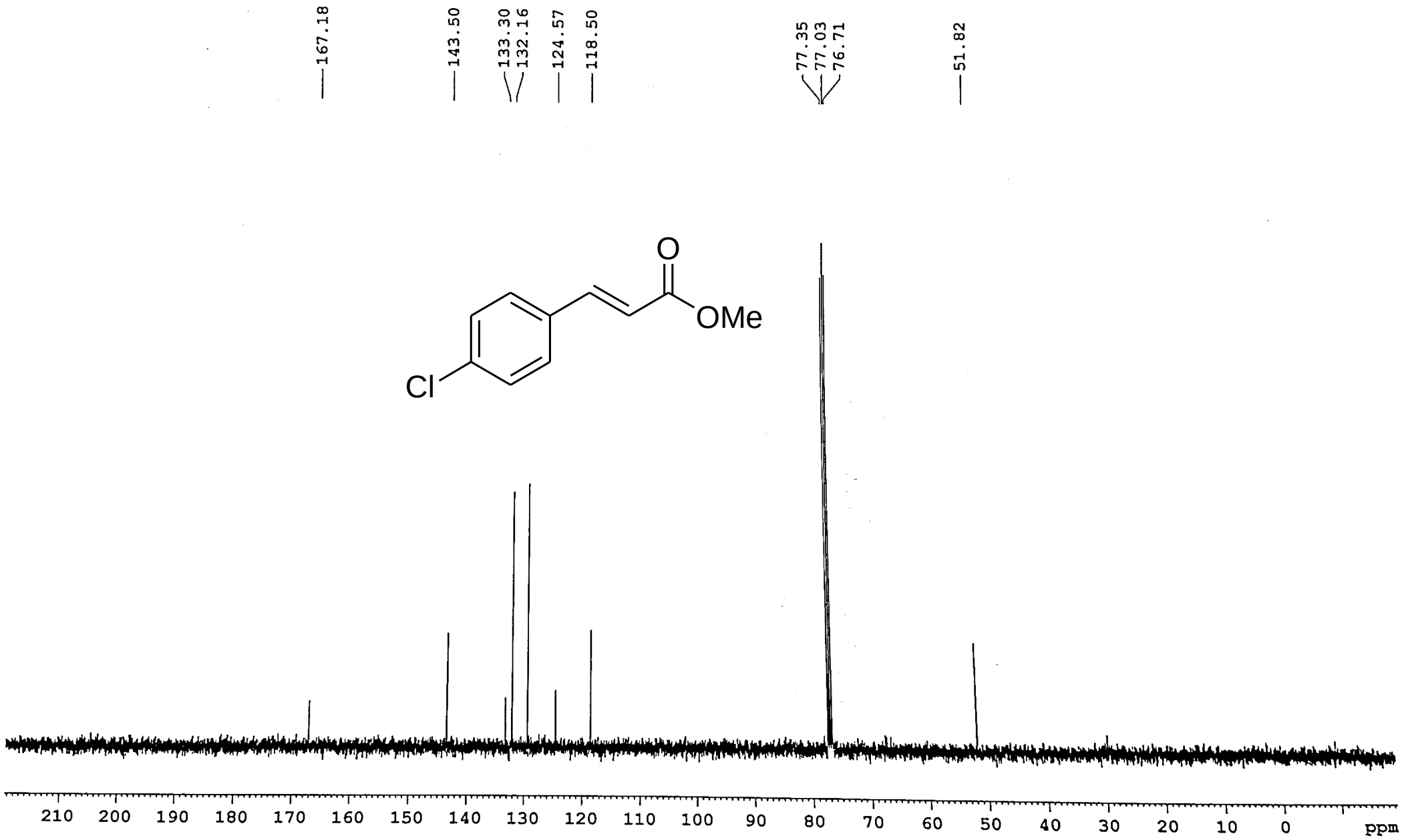
^{13}C NMR OF 3-phenyl-acrylic acid methyl ester (3ba)



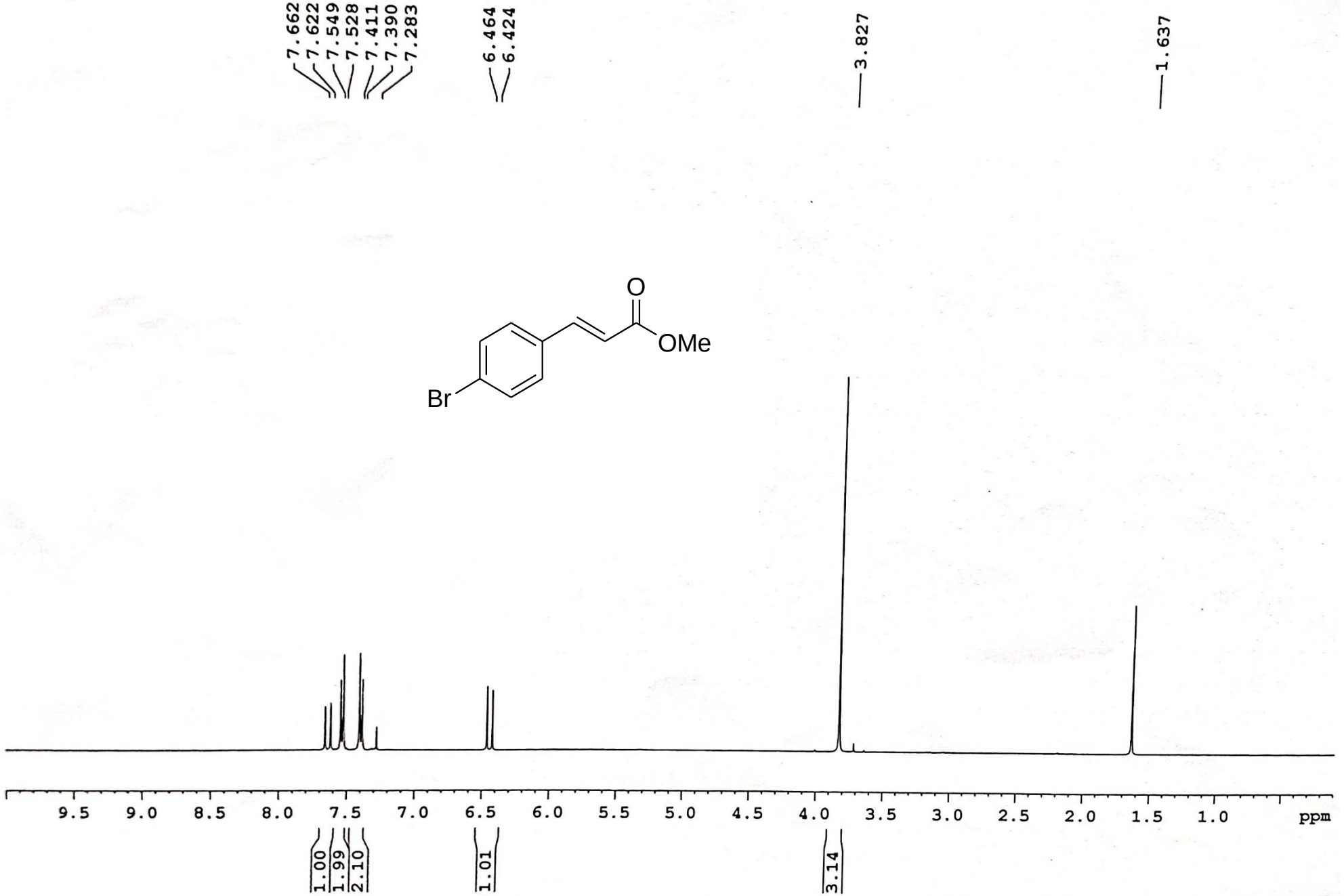
^{1}H NMR OF 3-(4-Chloro-phenyl)-acrylic acid methyl ester (3ca)



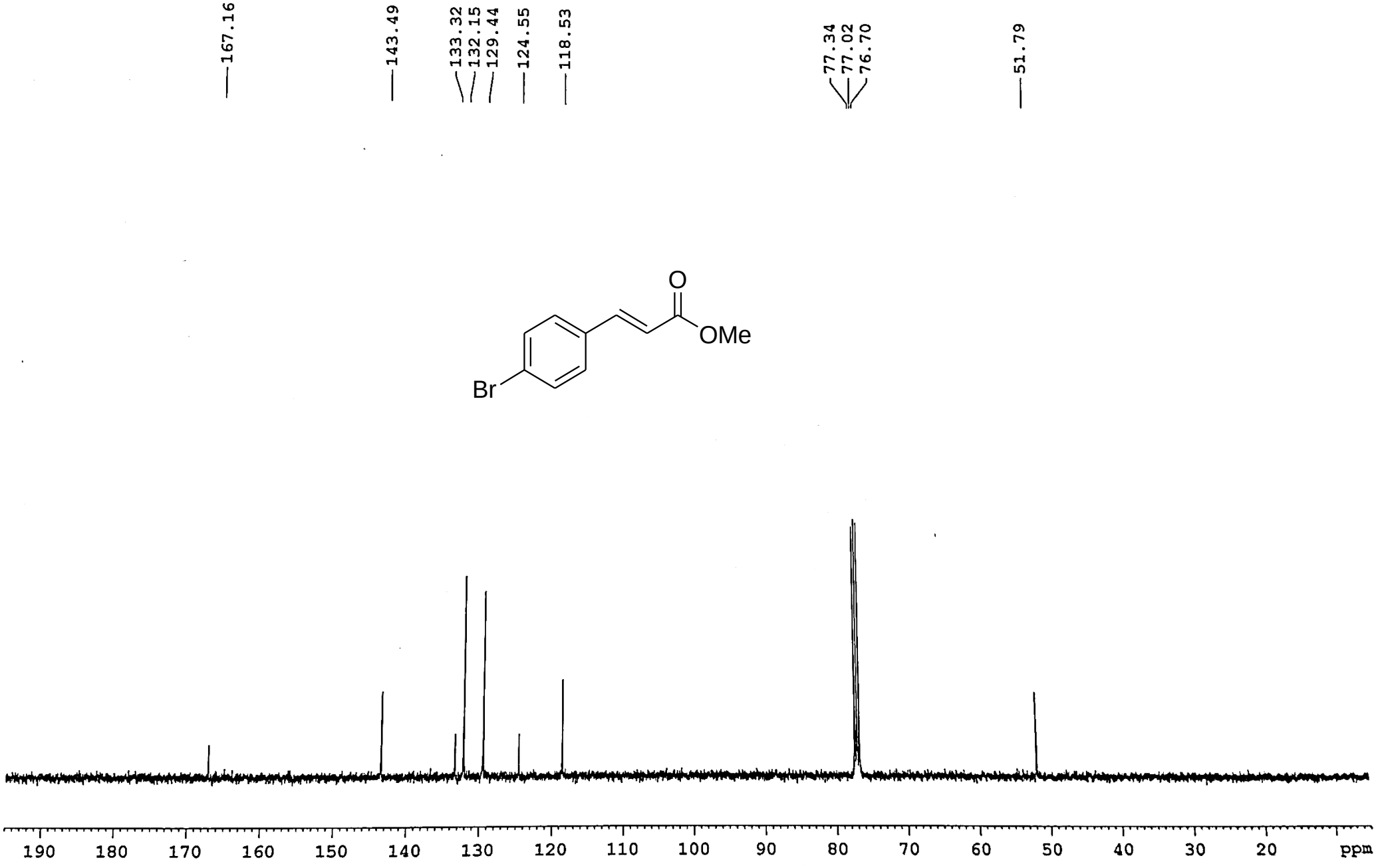
^{13}C NMR OF 3-(4-Chloro-phenyl)-acrylic acid methyl ester (3ca)



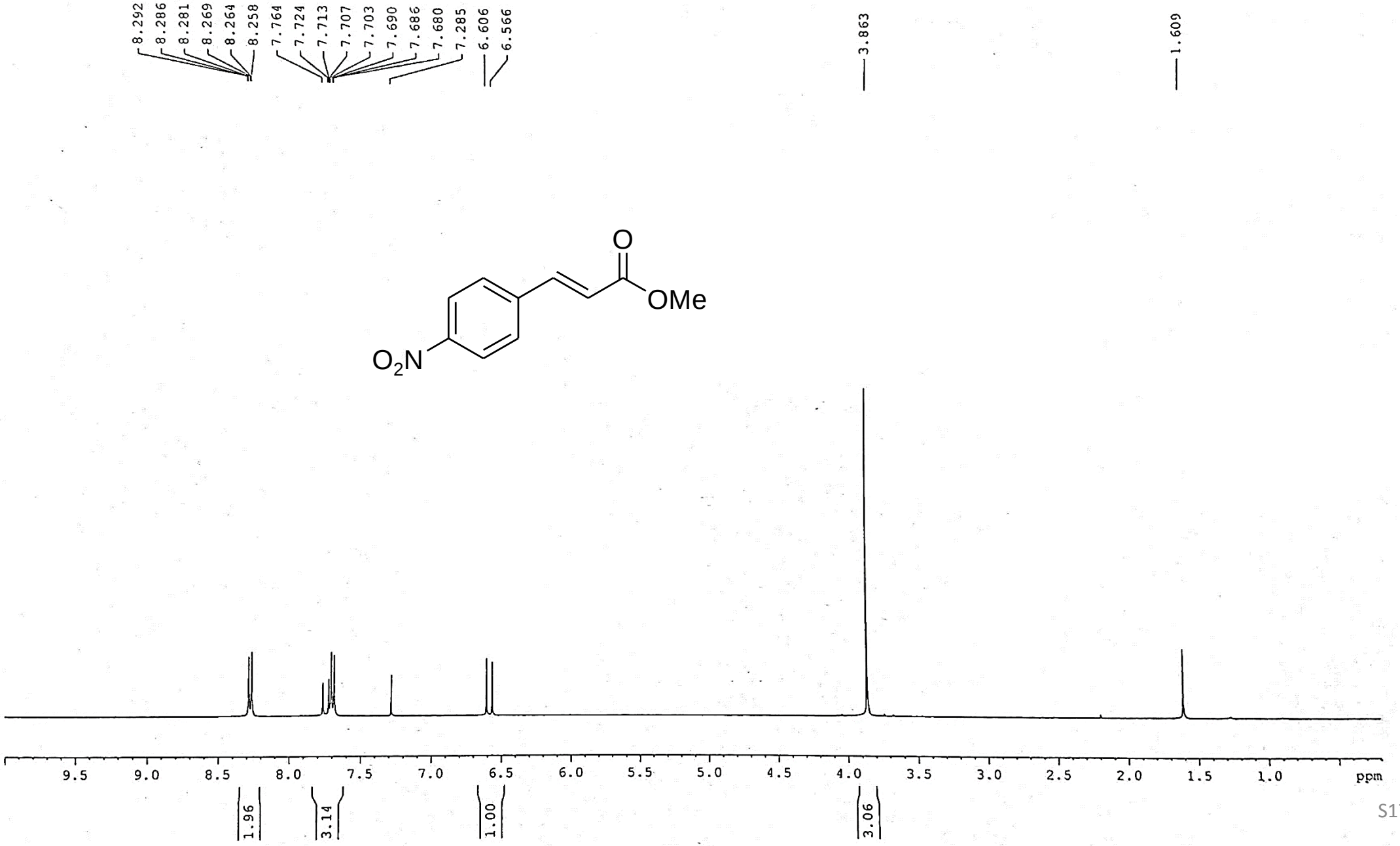
^{1}H NMR OF 3-(4-Bromo-phenyl)-acrylic acid methyl ester (3da)



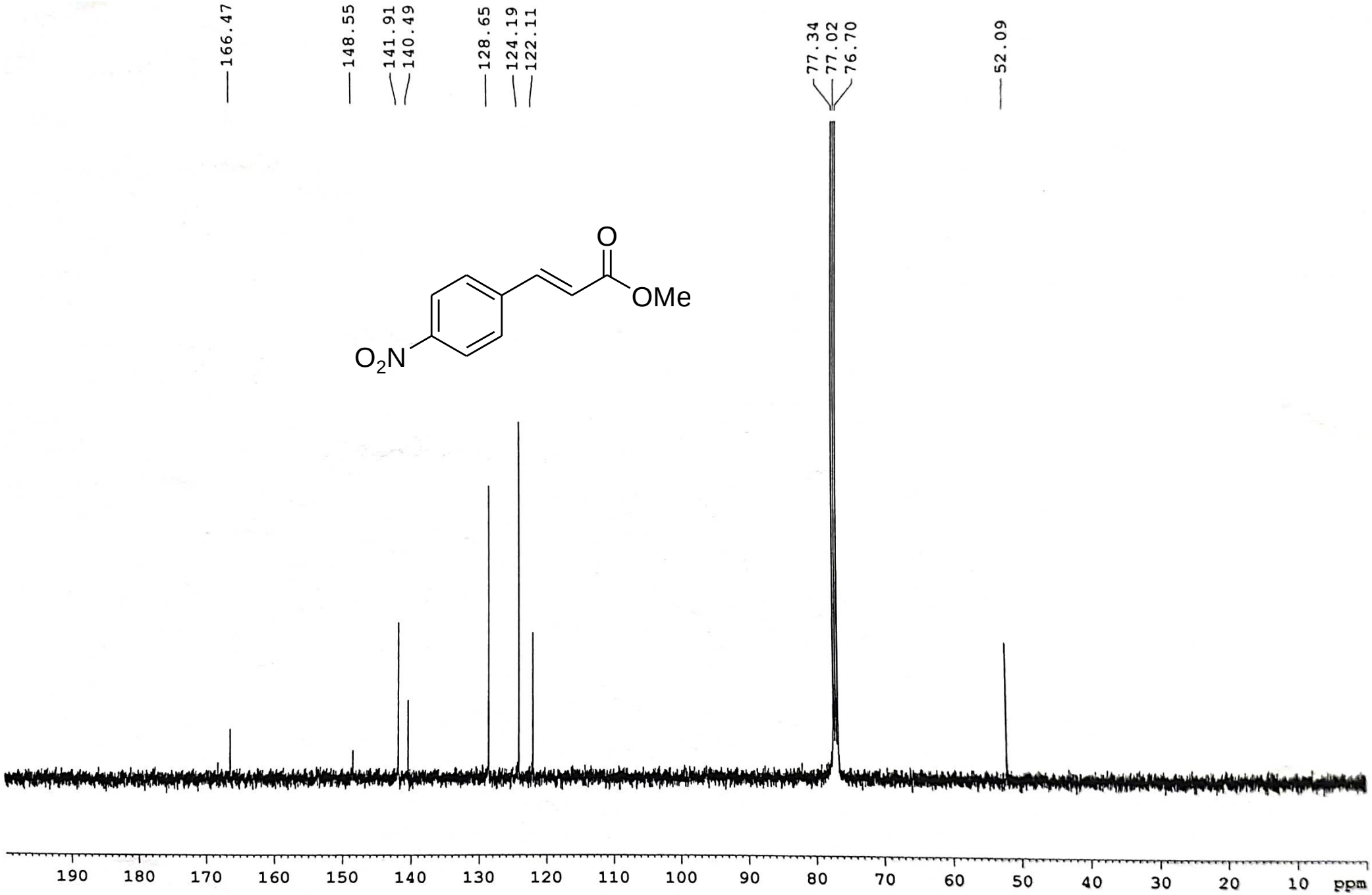
^{13}C NMR OF 3-(4-Bromo-phenyl)-acrylic acid methyl ester (3da)



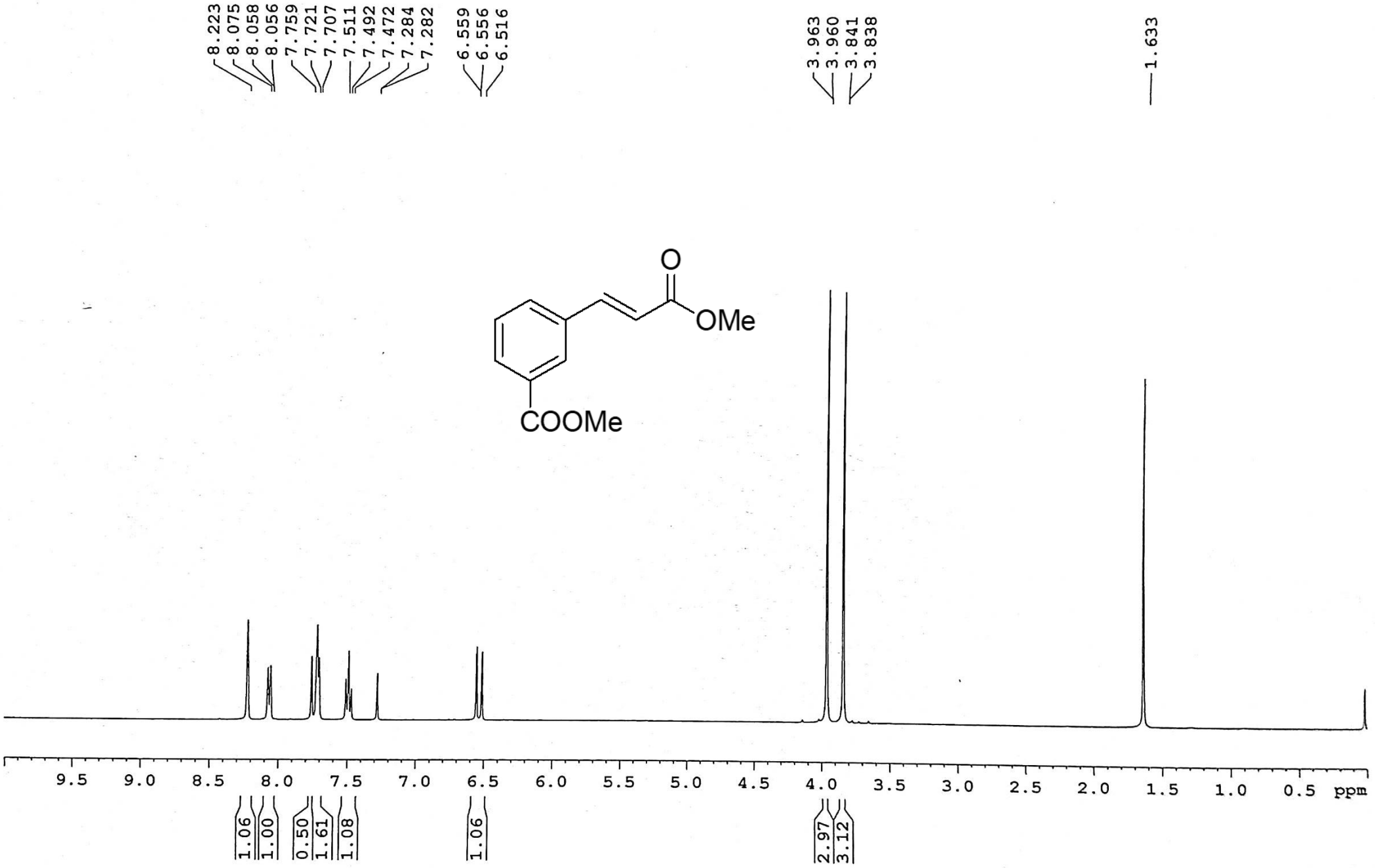
^{1}H NMR OF 3-(4-Nitro-phenyl)-acrylic acid methyl ester (3ea)



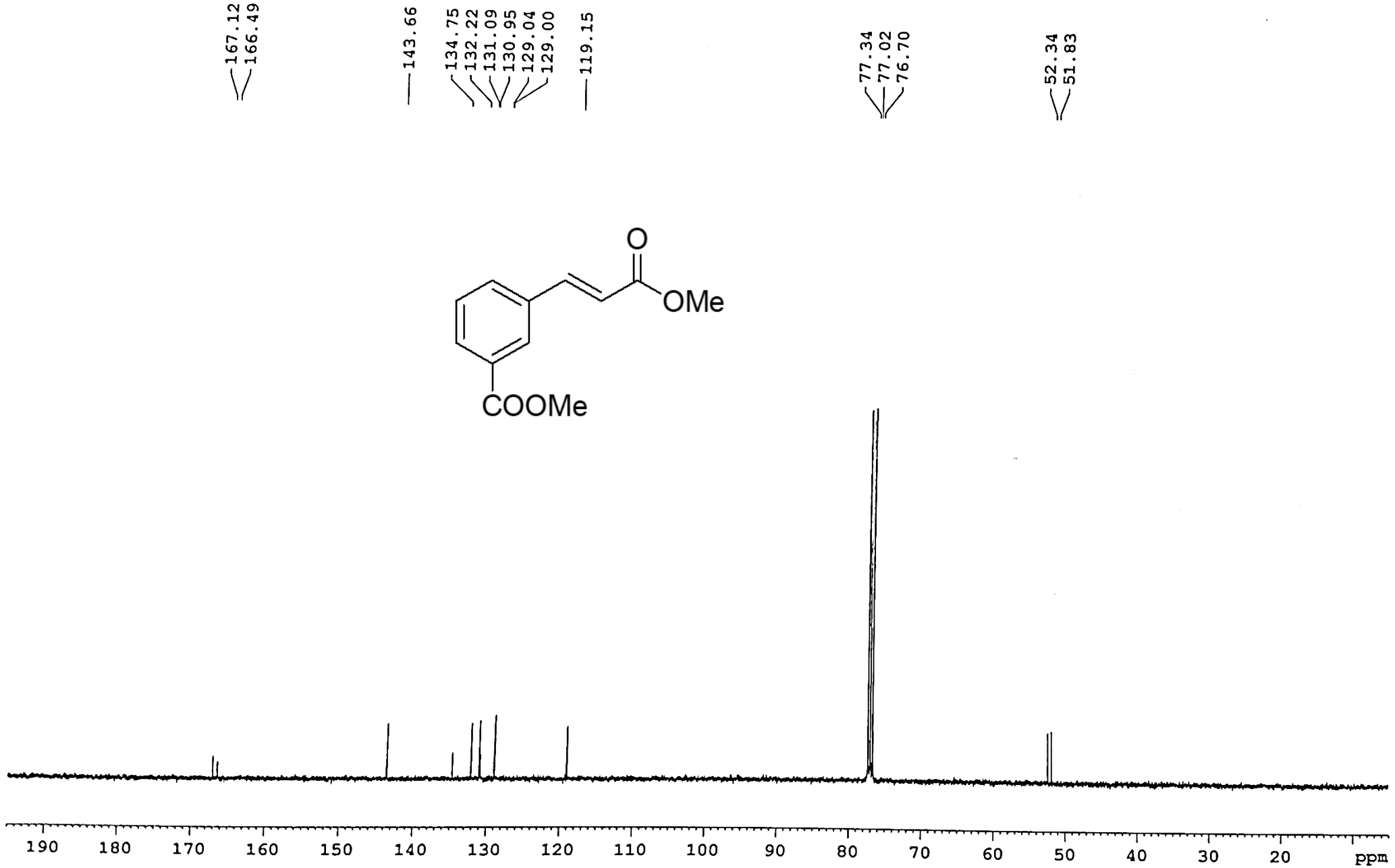
^{13}C NMR OF 3-(4-Nitro-phenyl)-acrylic acid methyl ester (3ea)



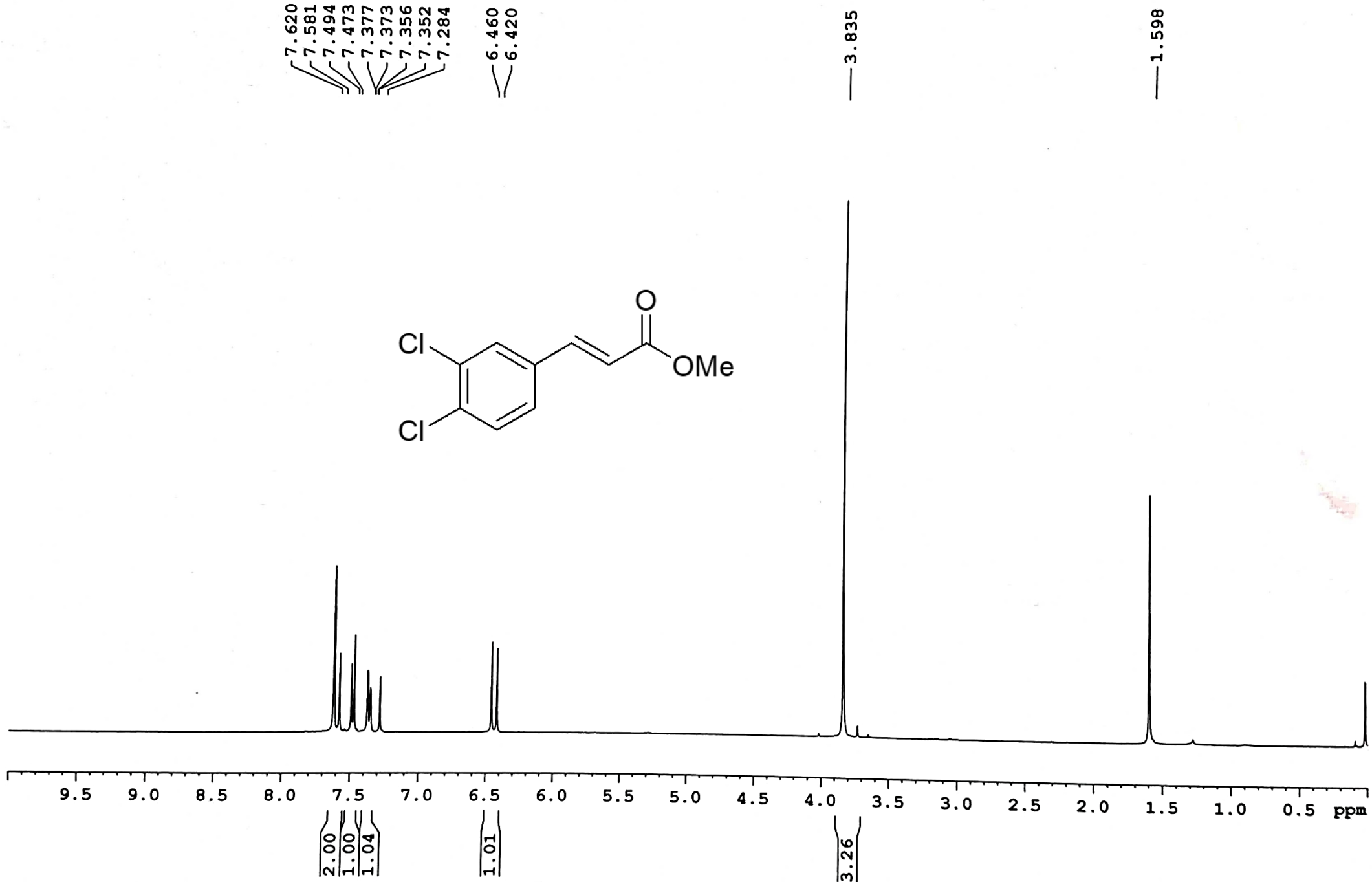
^{1}H NMR OF 3-(2-Methoxycarbonyl-vinyl)-benzoic acid methyl ester (3fa)



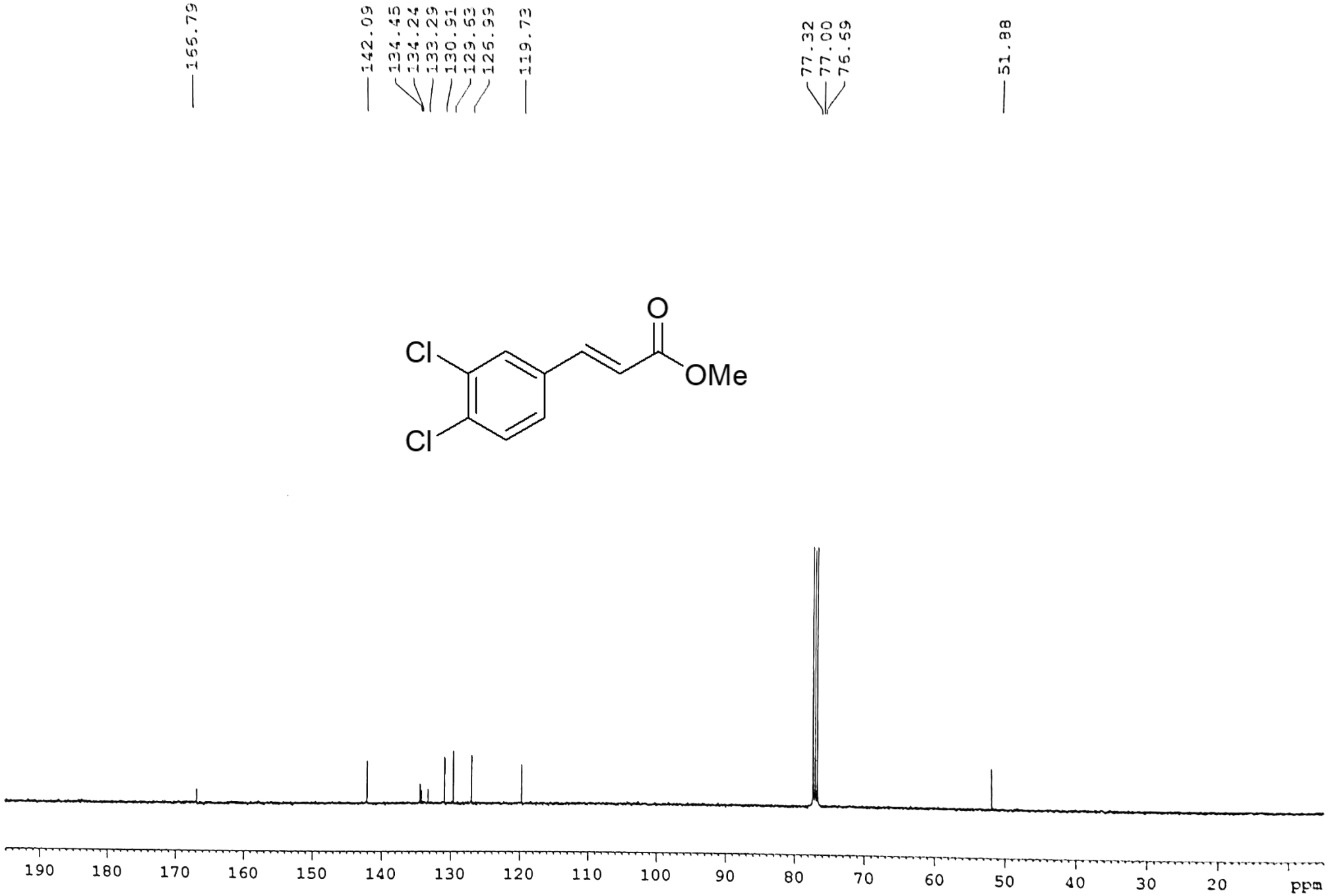
^{13}C NMR OF 3-(2-Methoxycarbonyl-vinyl)-benzoic acid methyl ester (3fa)



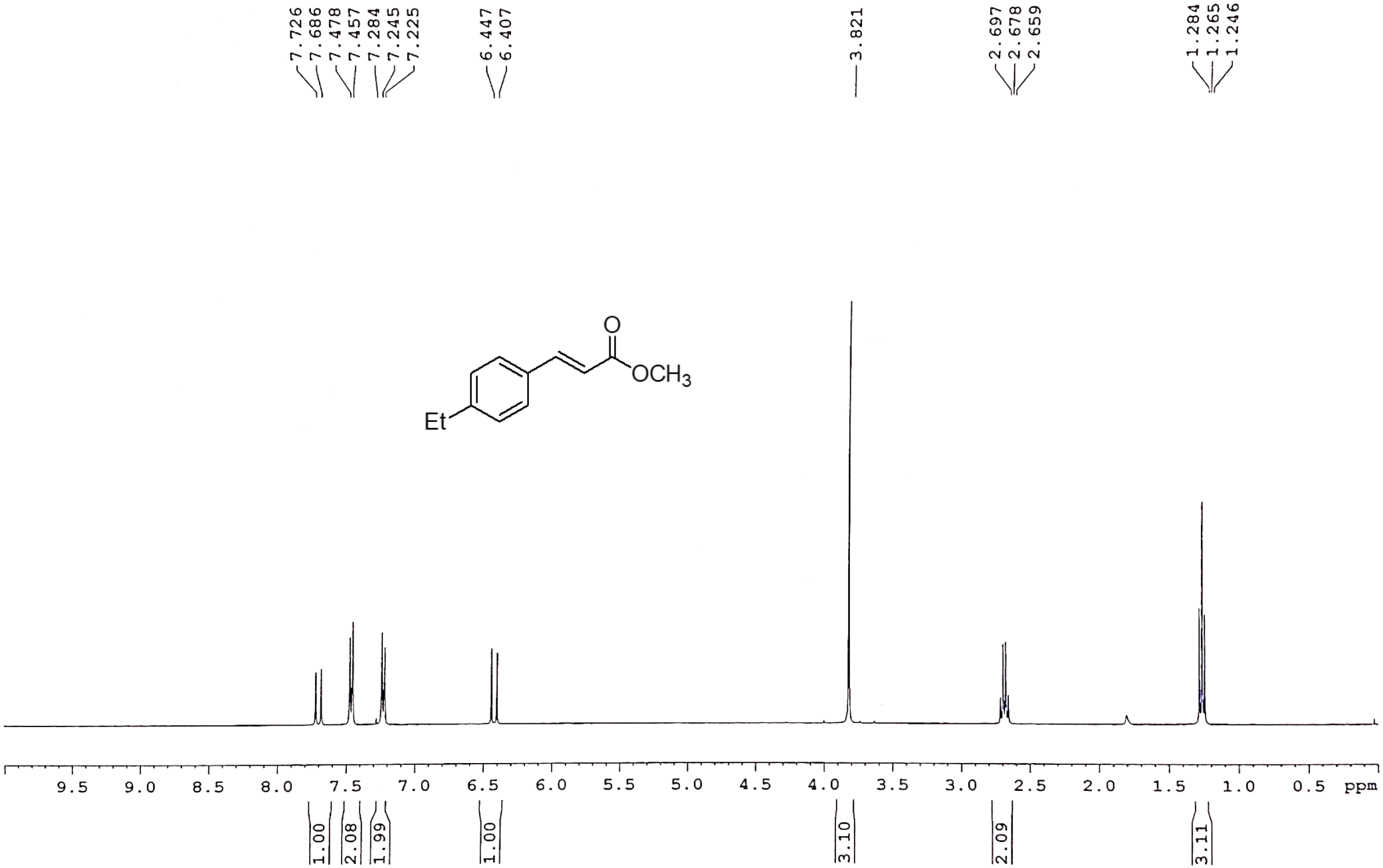
^{1}H NMR OF 3-(3,4-Dichloro-phenyl)-acrylic acid methyl ester (3ga)



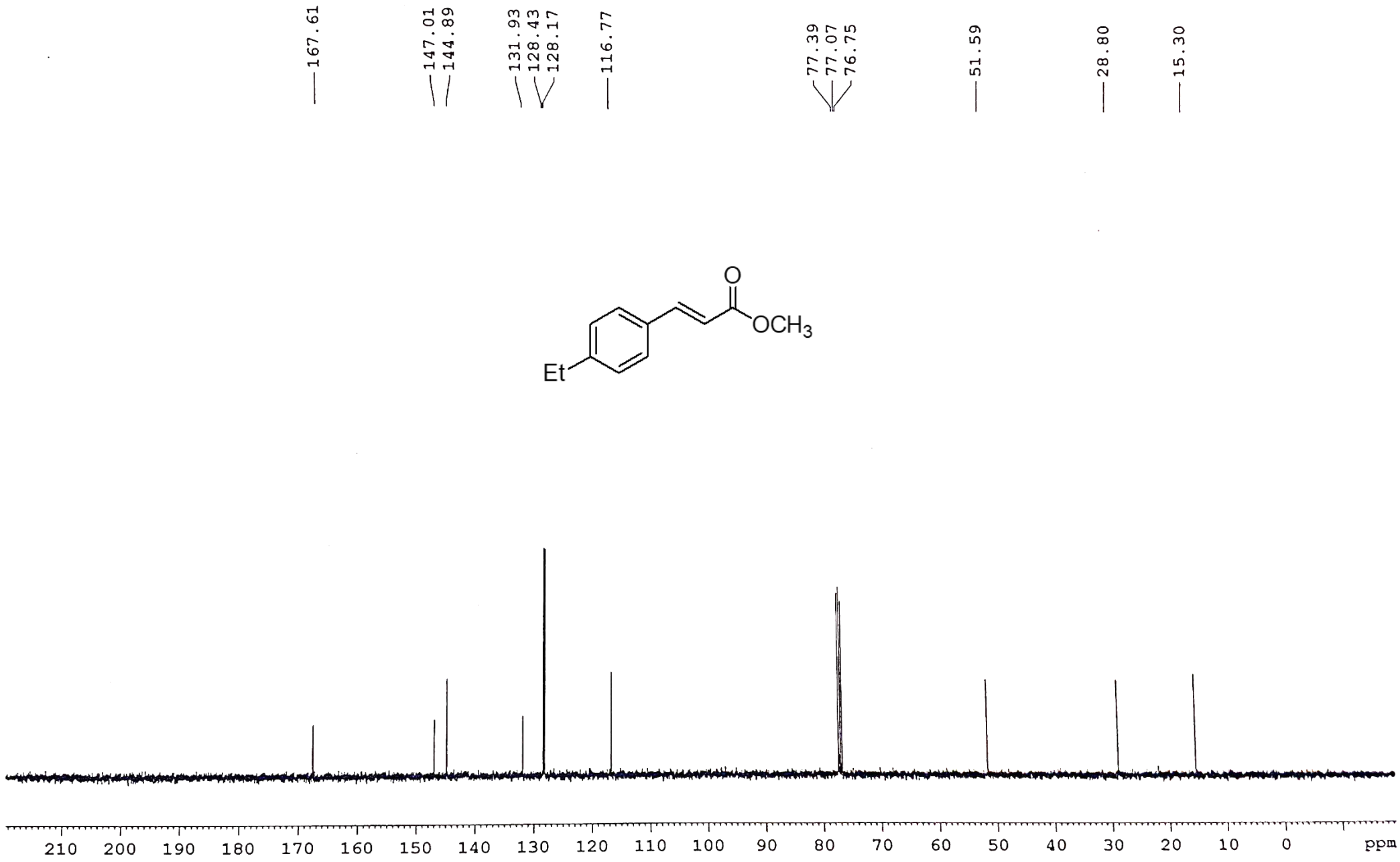
^{13}C NMR OF 3-(3,4-Dichloro-phenyl)-acrylic acid methyl ester (3ga)



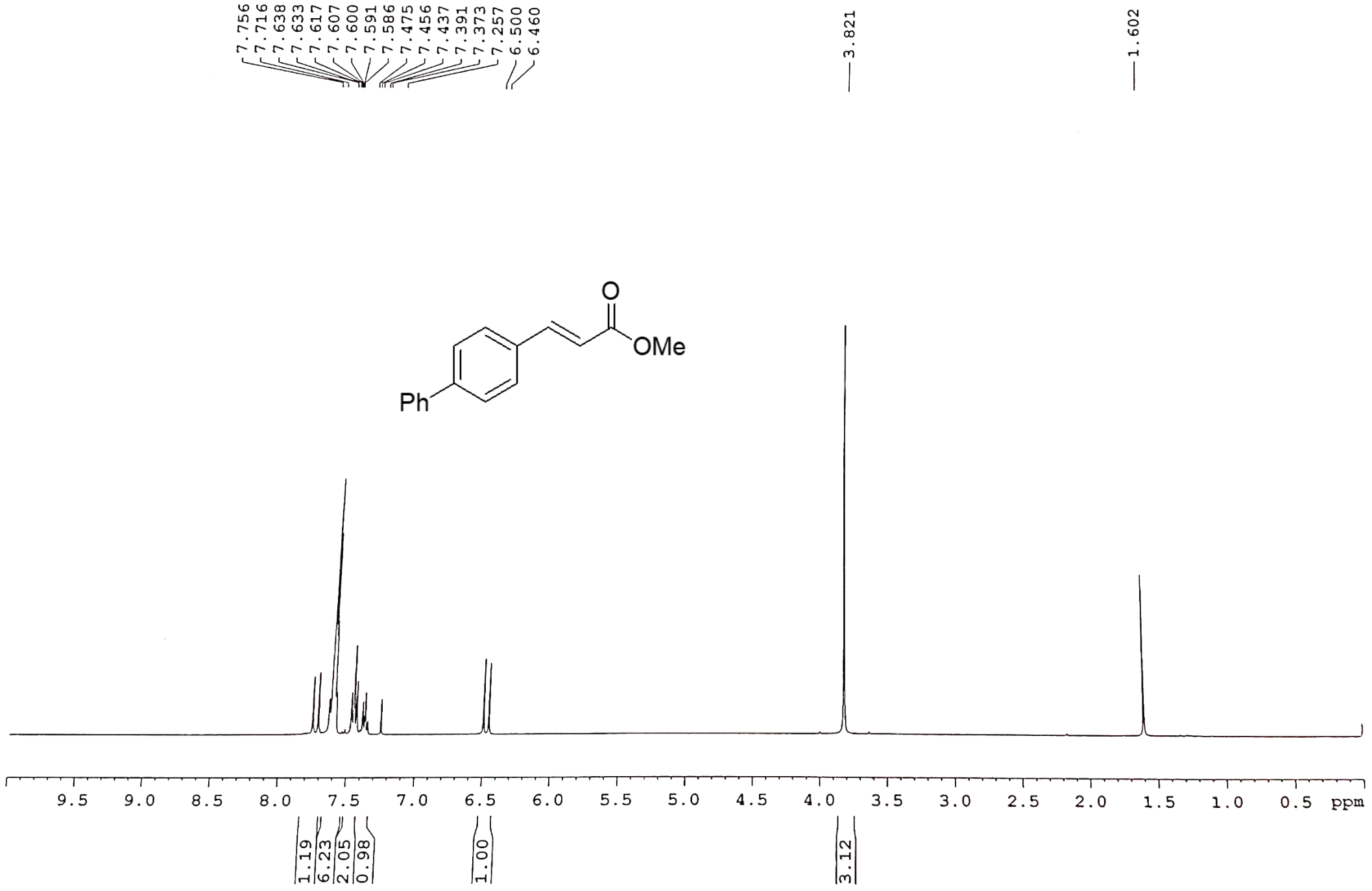
^{1}H NMR OF 3-(4-Ethyl-phenyl)-acrylic acid methyl ester (3ha)



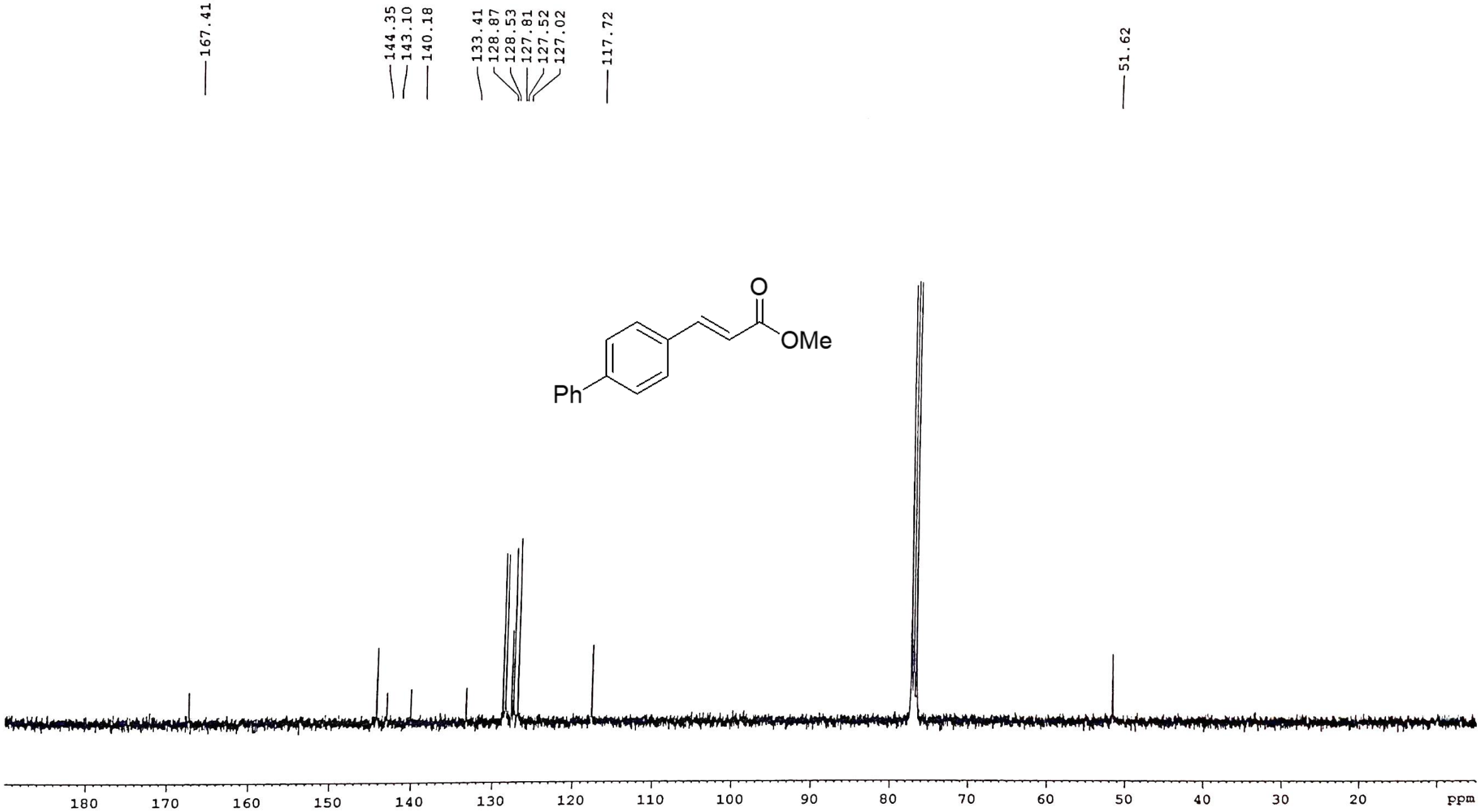
^{13}C NMR OF 3-(4-Ethyl-phenyl)-acrylic acid methyl ester (3ha)



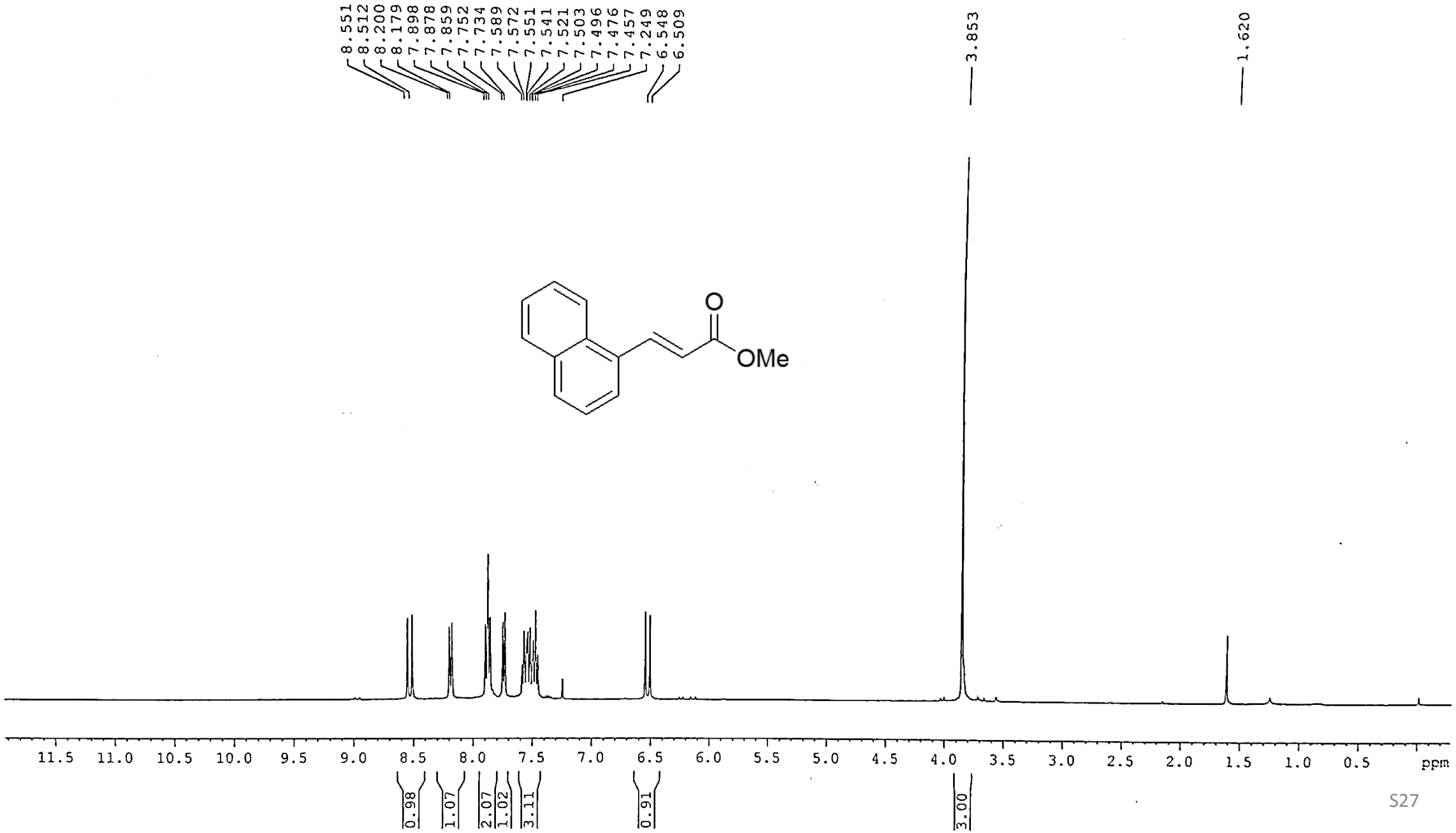
^{1}H NMR OF 3-Biphenyl-4-yl-acrylic acid methyl ester (3ja)



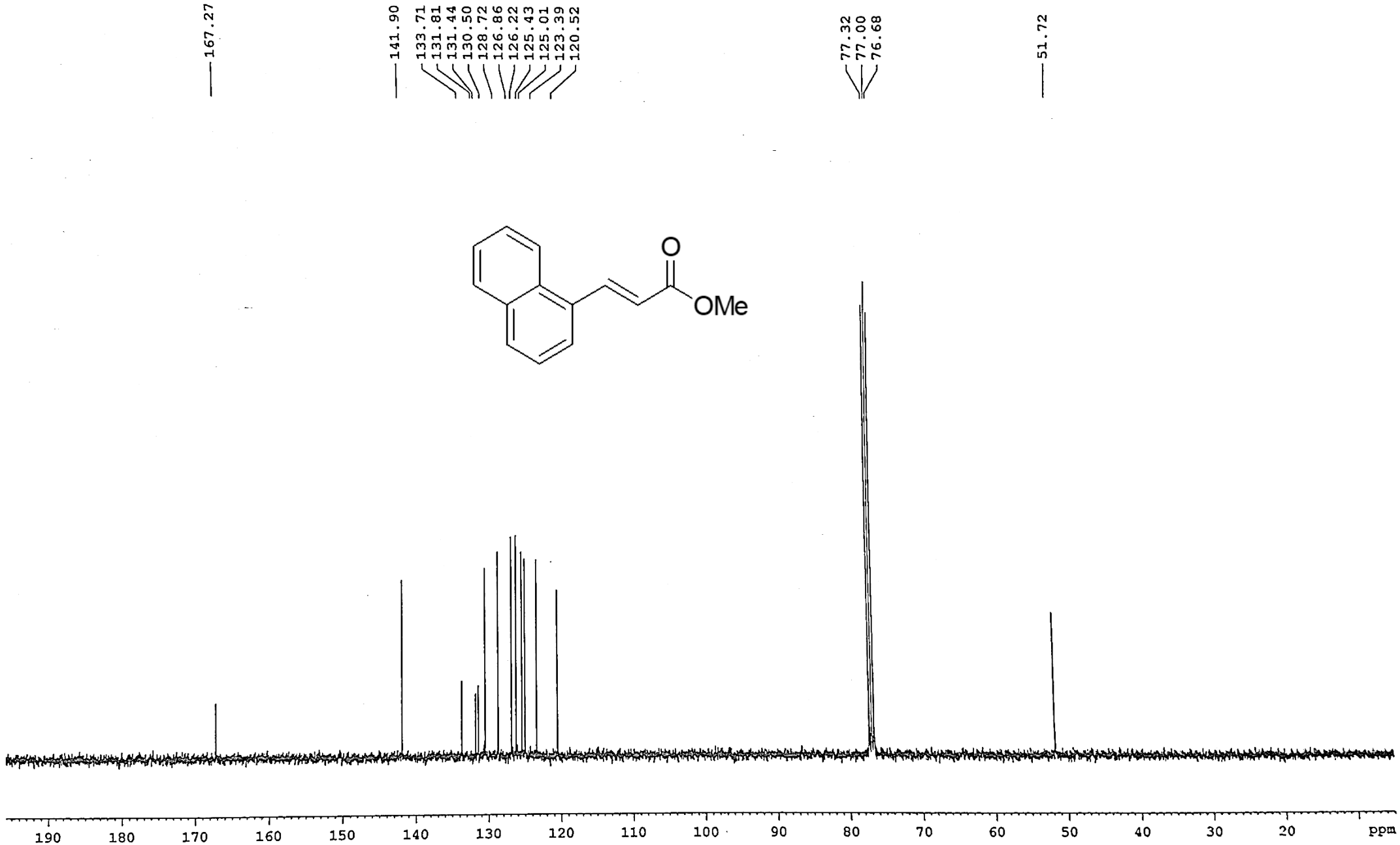
^{13}C NMR OF 3-Biphenyl-4-yl-acrylic acid methyl ester (3ja)



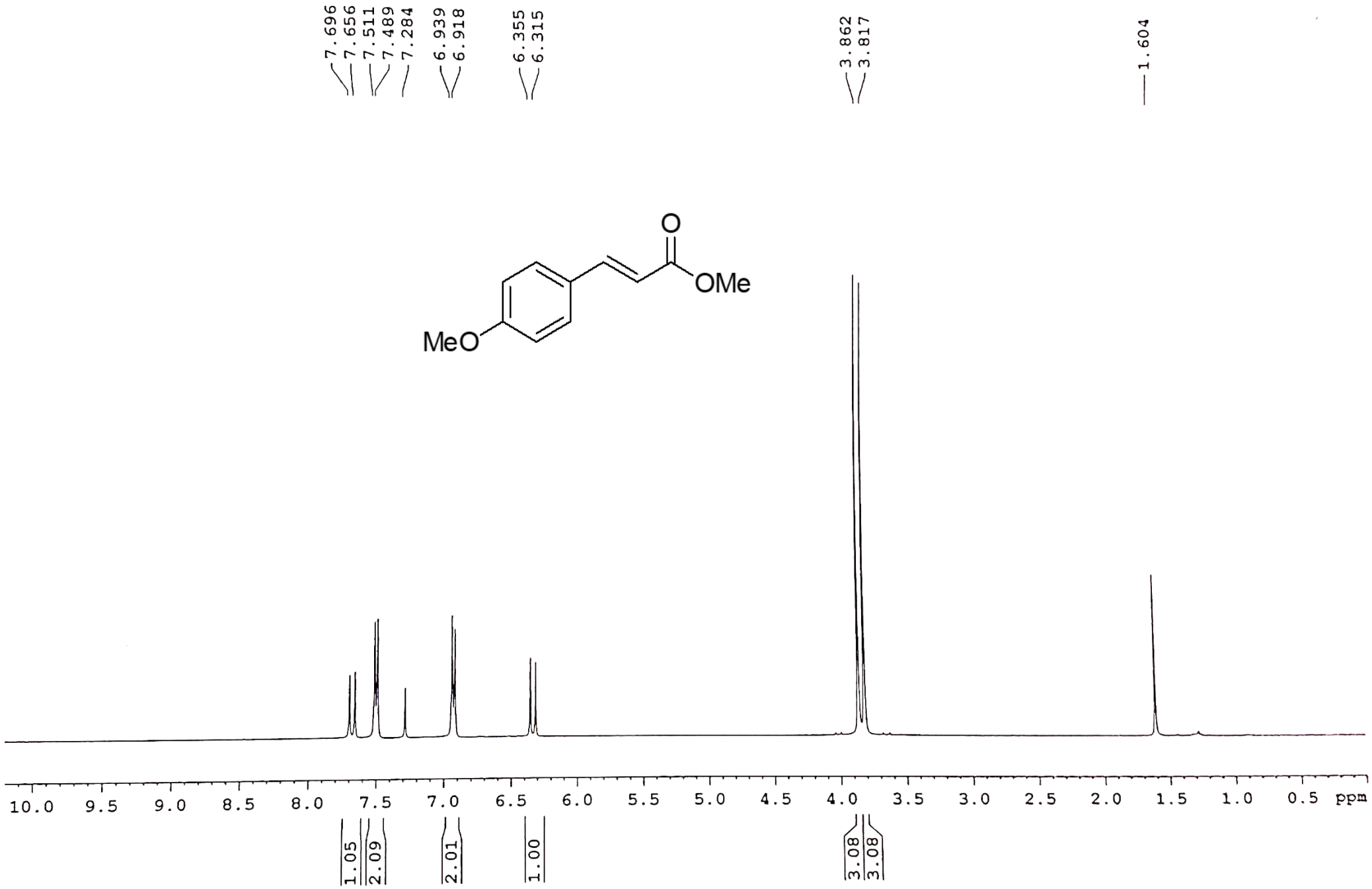
1H NMR OF 3-Naphthalen-2-yl-acrylic acid methyl ester (3ka)



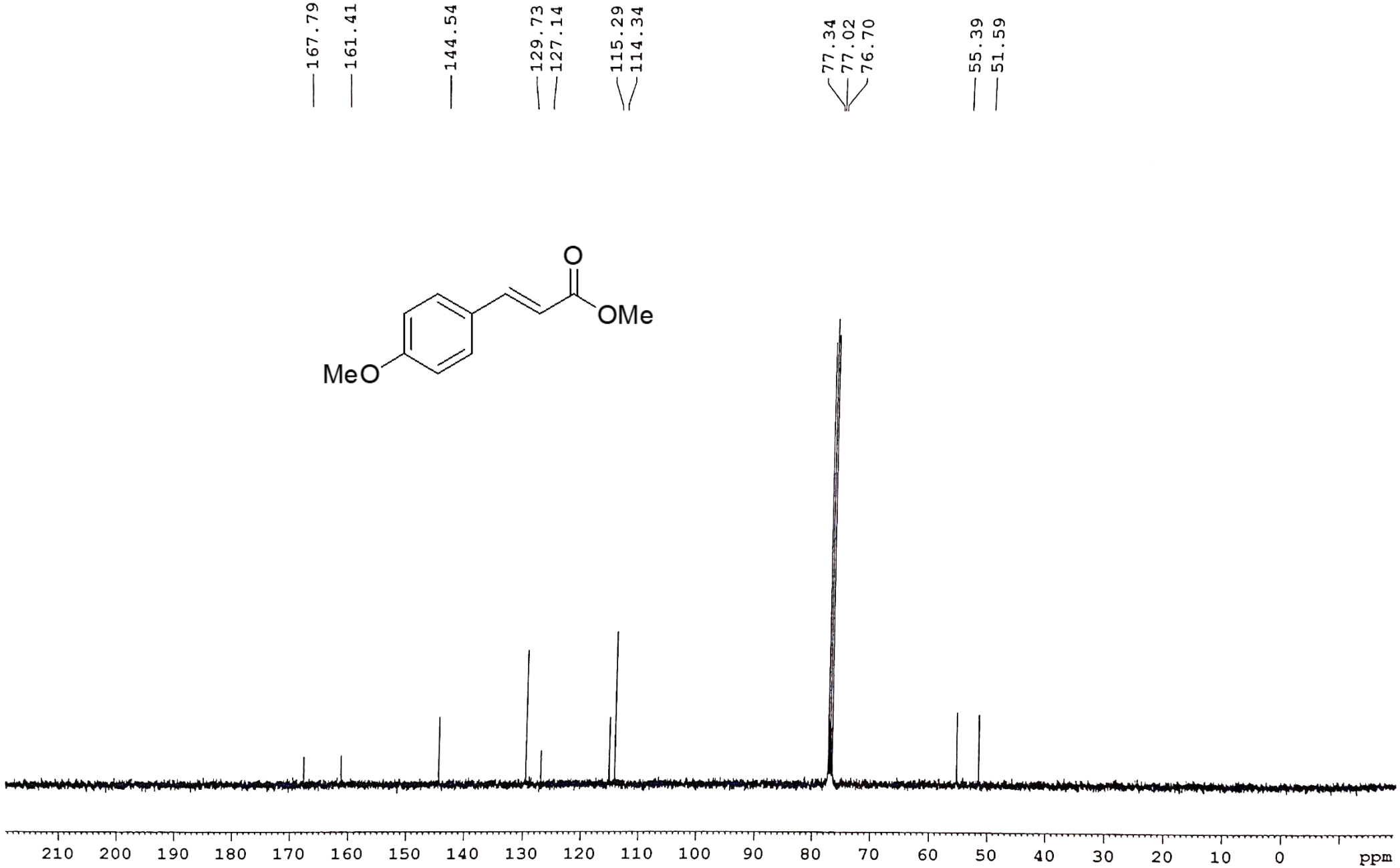
^{13}C NMR OF 3-Naphthalen-2-yl-acrylic acid methyl ester (3ka)



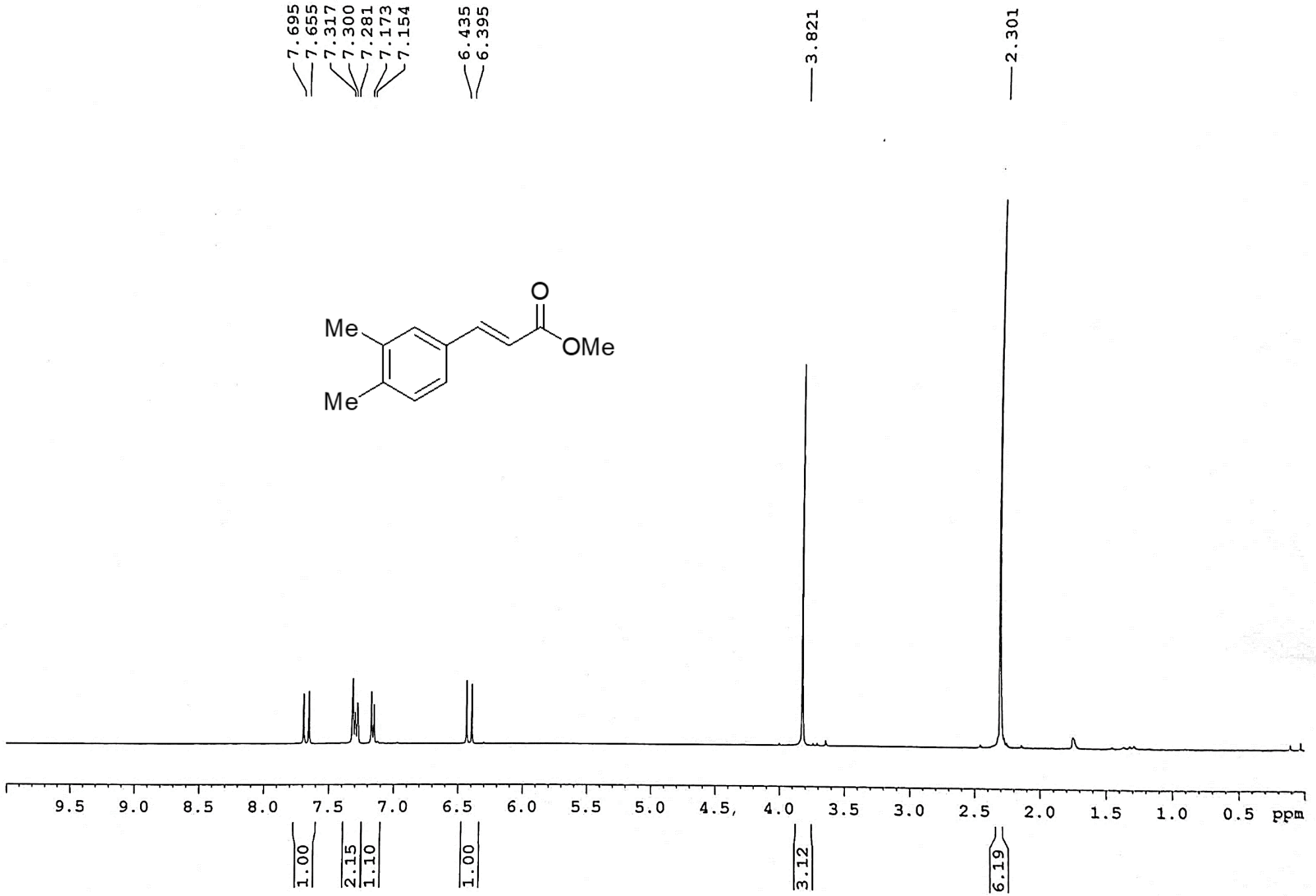
^{1}H NMR OF 3-(4-Methoxy-phenyl)-acrylic acid methyl ester (3la)



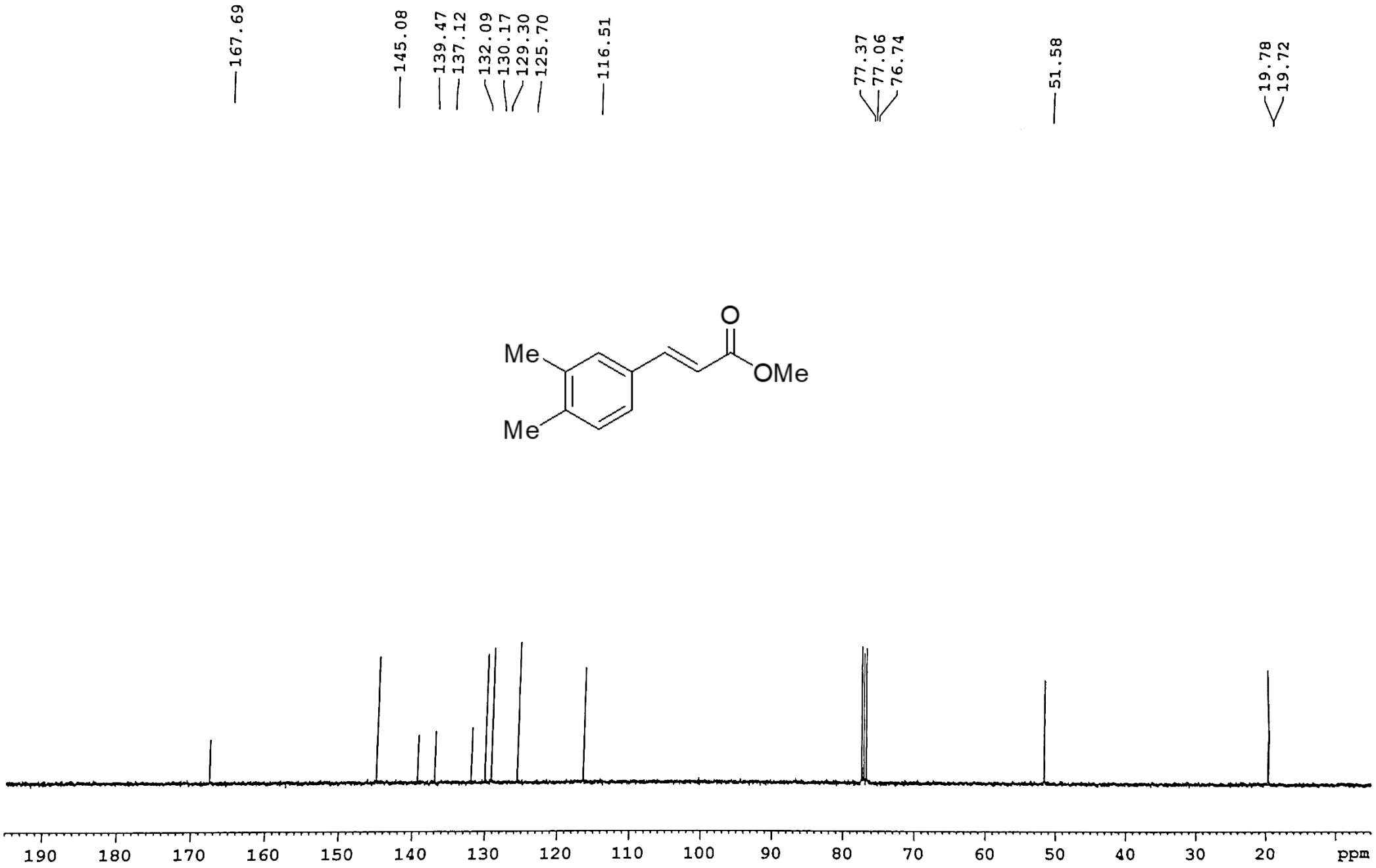
^{13}C NMR OF 3-(4-Methoxy-phenyl)-acrylic acid methyl ester (3la)



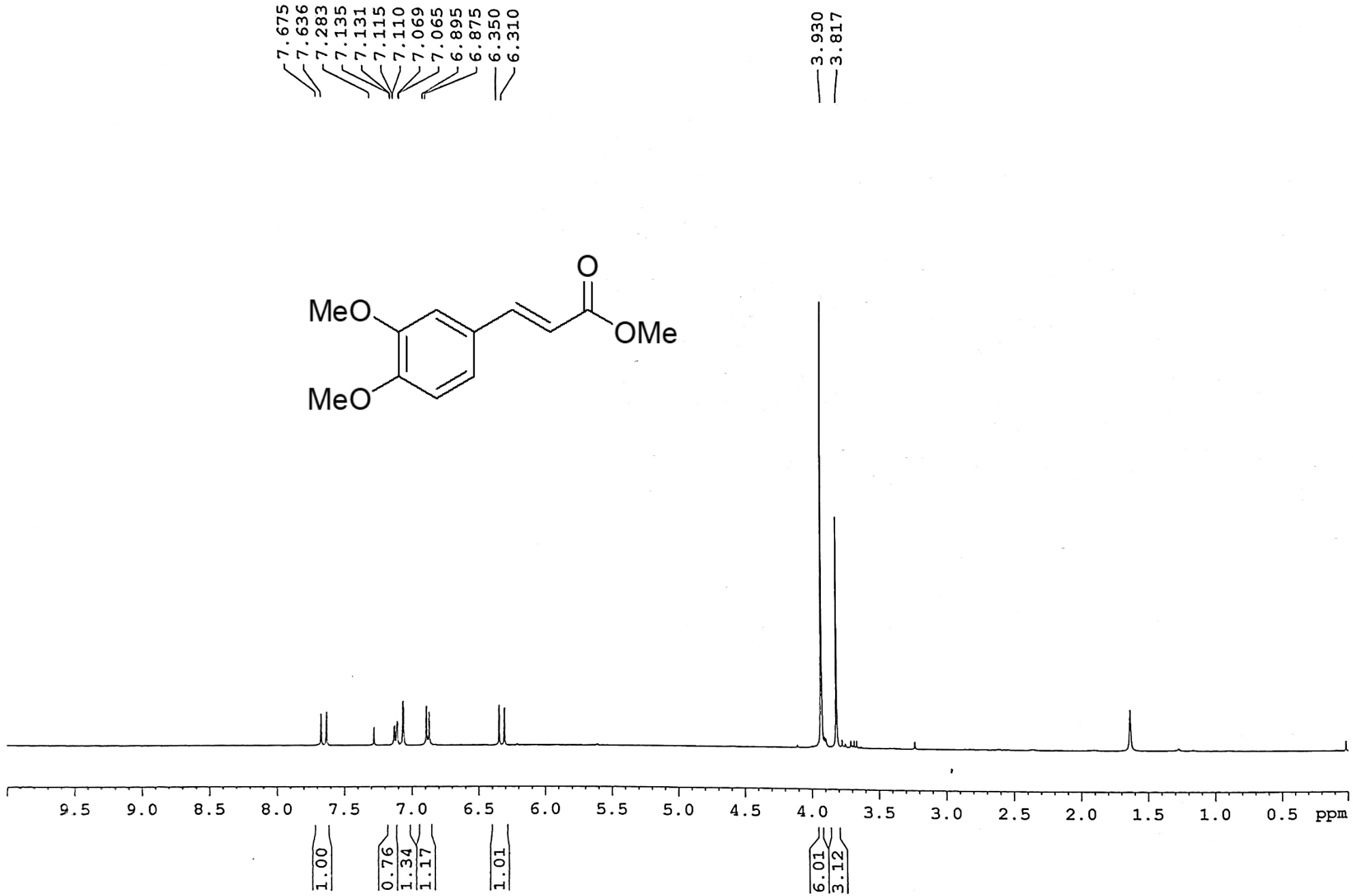
^{1}H NMR OF 3-(3,4-Dimethyl-phenyl)-acrylic acid methyl ester (3ma)



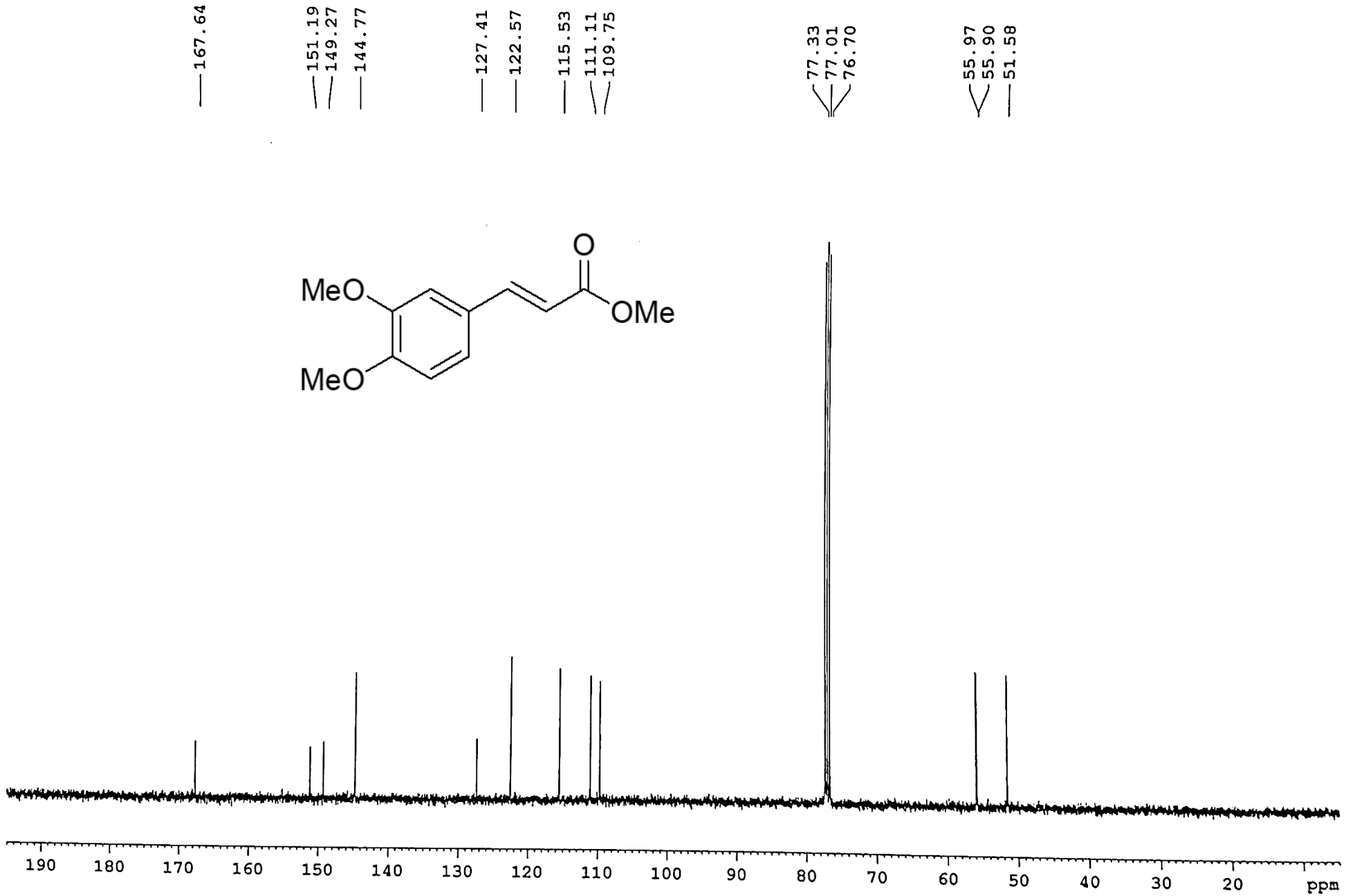
^{13}C NMR OF 3-(3,4-Dimethyl-phenyl)-acrylic acid methyl ester (3ma)



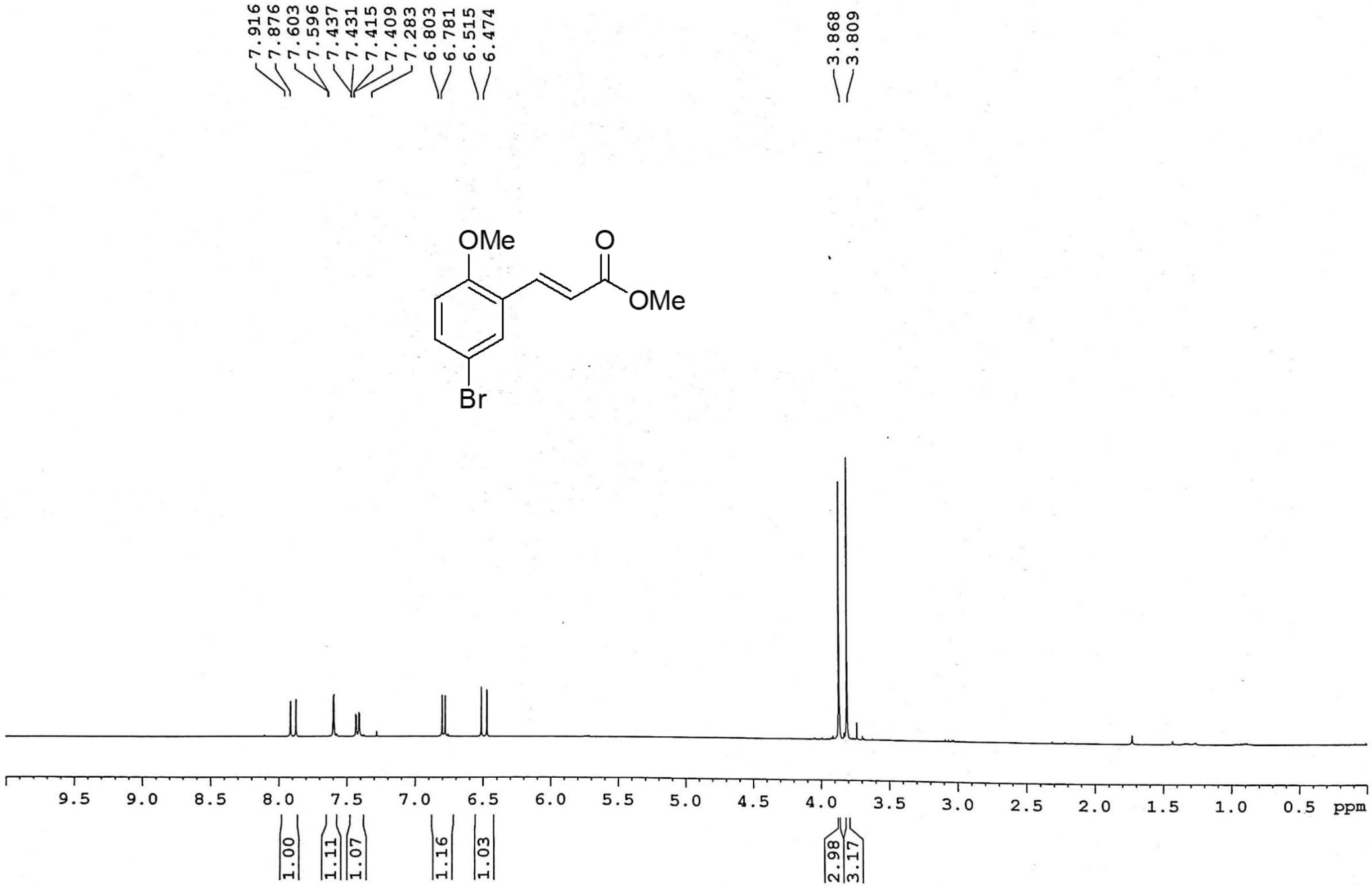
^{1}H NMR OF 3-(3,4-Dimethoxy-phenyl)-acrylic acid methyl ester (3na)



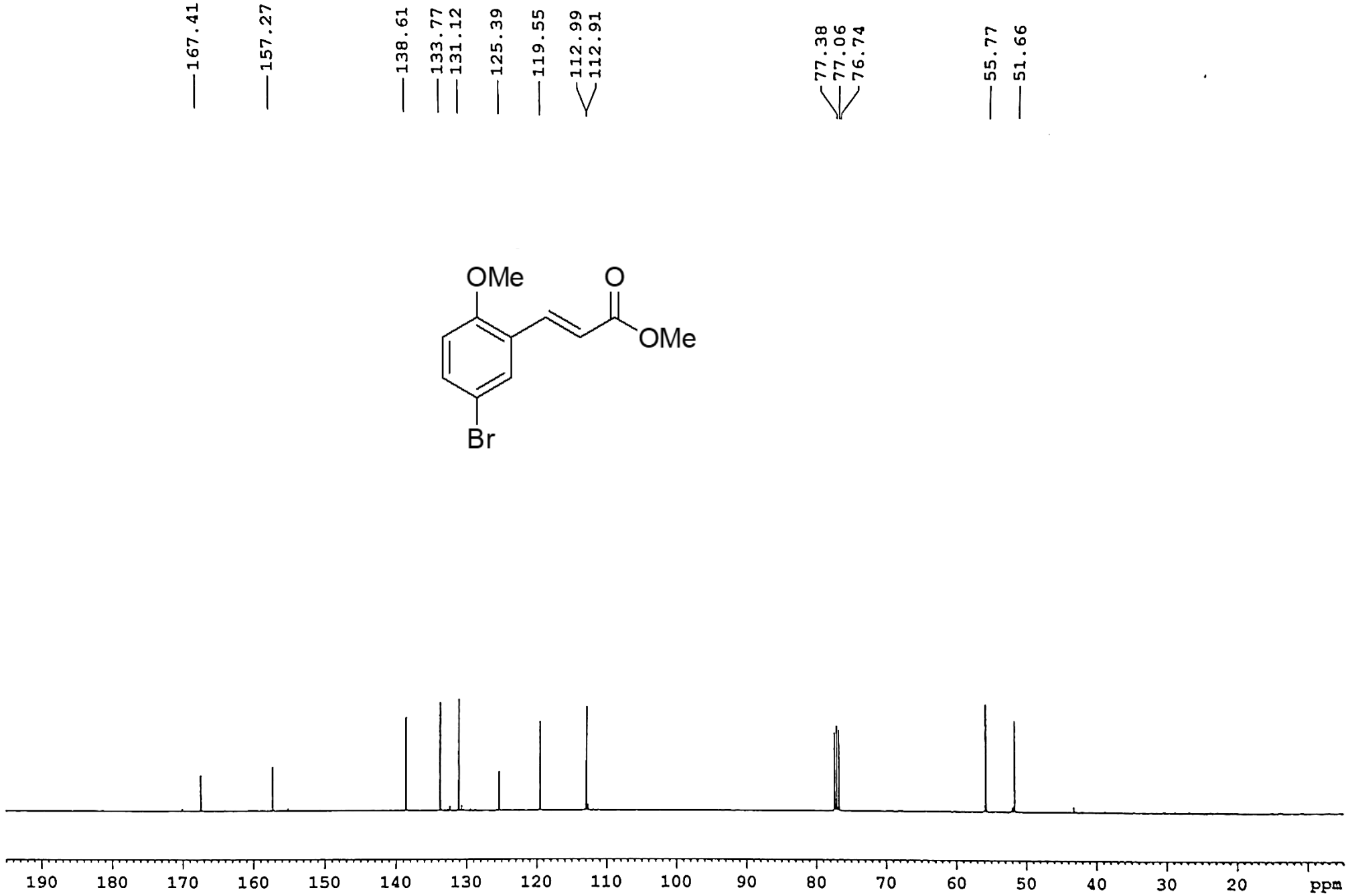
^{13}C NMR OF 3-(3,4-Dimethoxy-phenyl)-acrylic acid methyl ester (3na)



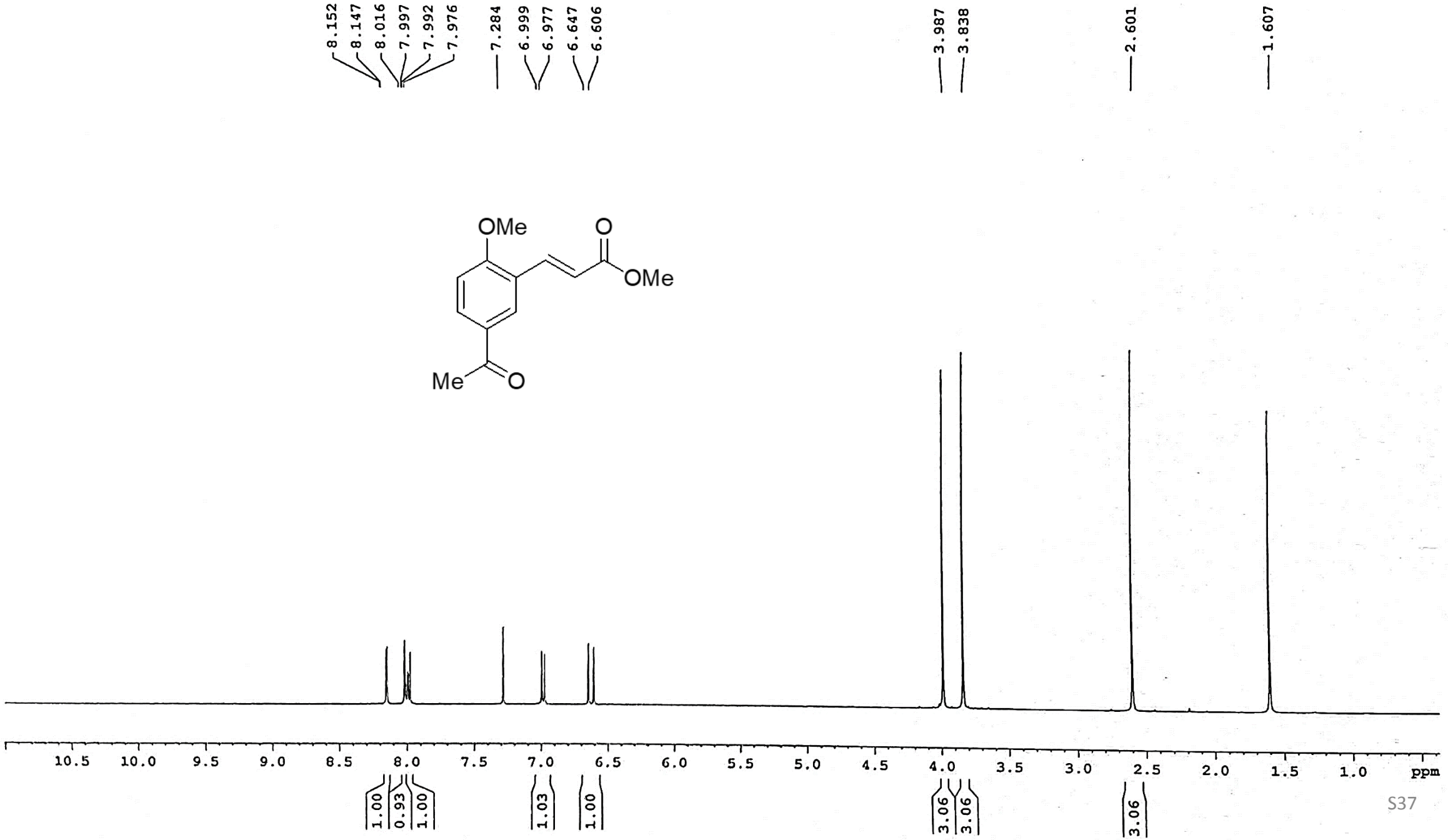
^{1}H NMR OF 3-(5-Bromo-2-methoxy-phenyl)-acrylic acid methyl ester (3oa)



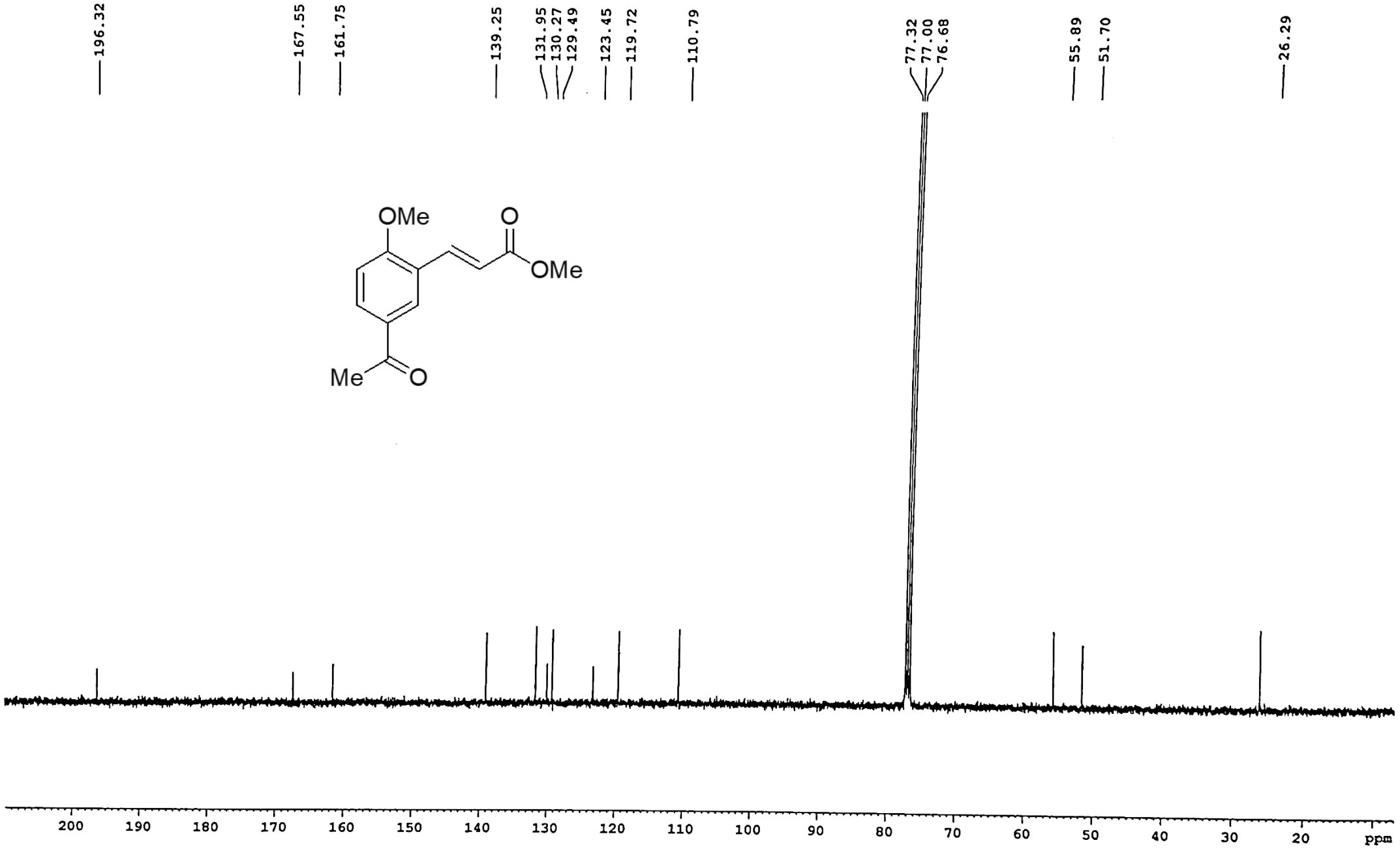
^{13}C NMR OF 3-(5-Bromo-2-methoxy-phenyl)-acrylic acid methyl ester (3oa)



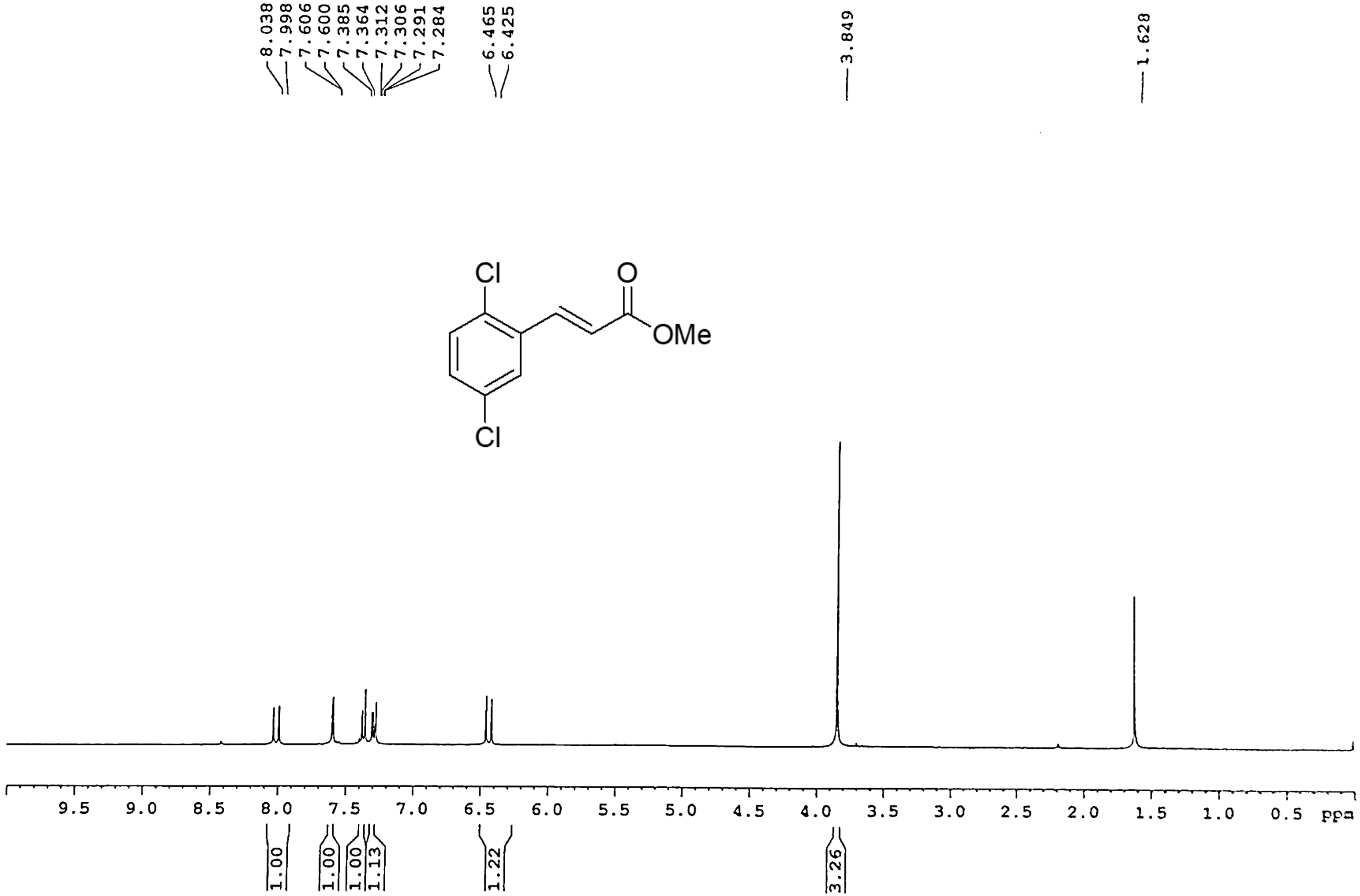
^{1}H NMR OF 3-(5-Acetyl-2-methoxy-phenyl)-acrylic acid methyl ester (3pa)



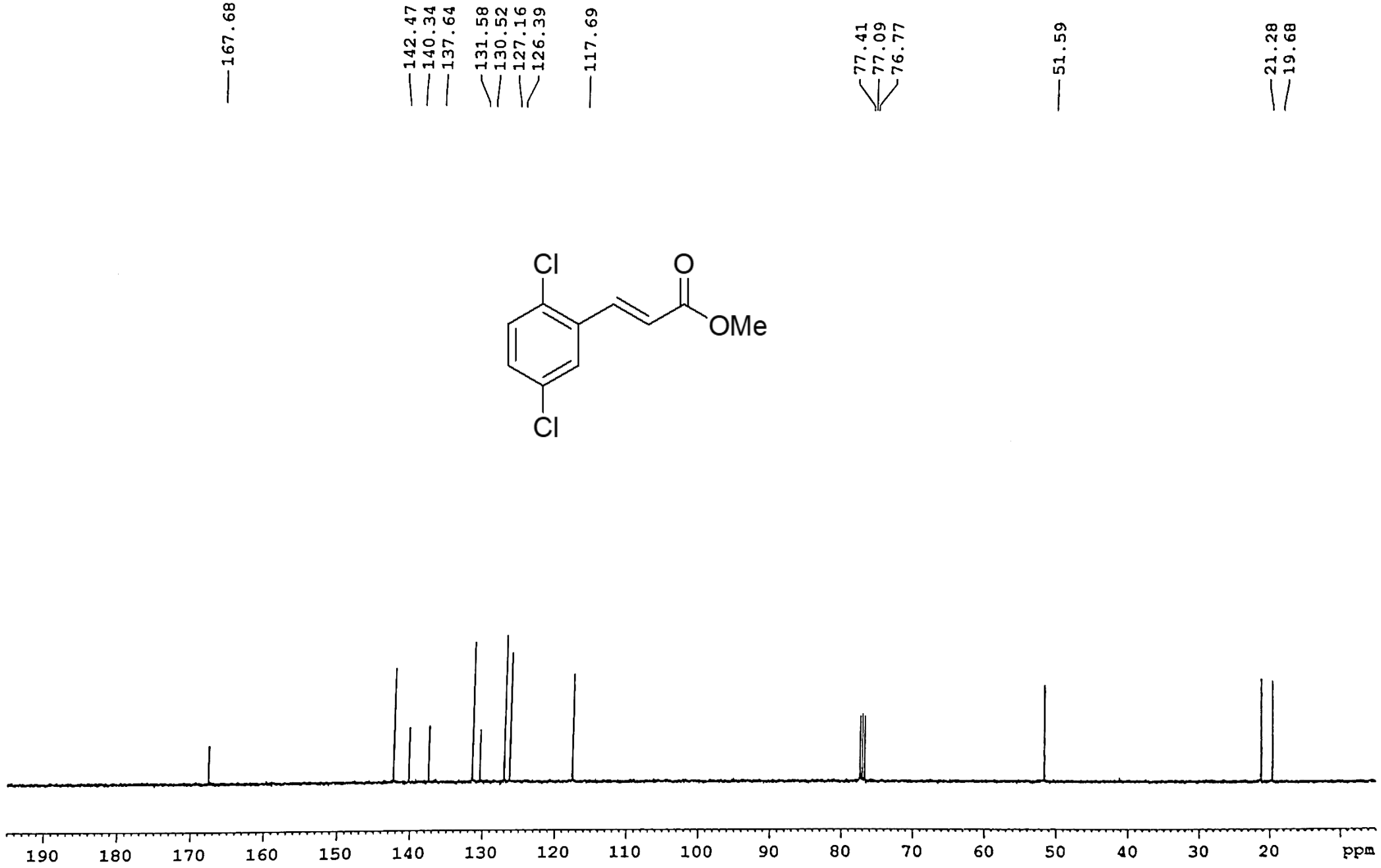
^{13}C NMR OF 3-(5-Acetyl-2-methoxy-phenyl)-acrylic acid methyl ester (3pa)



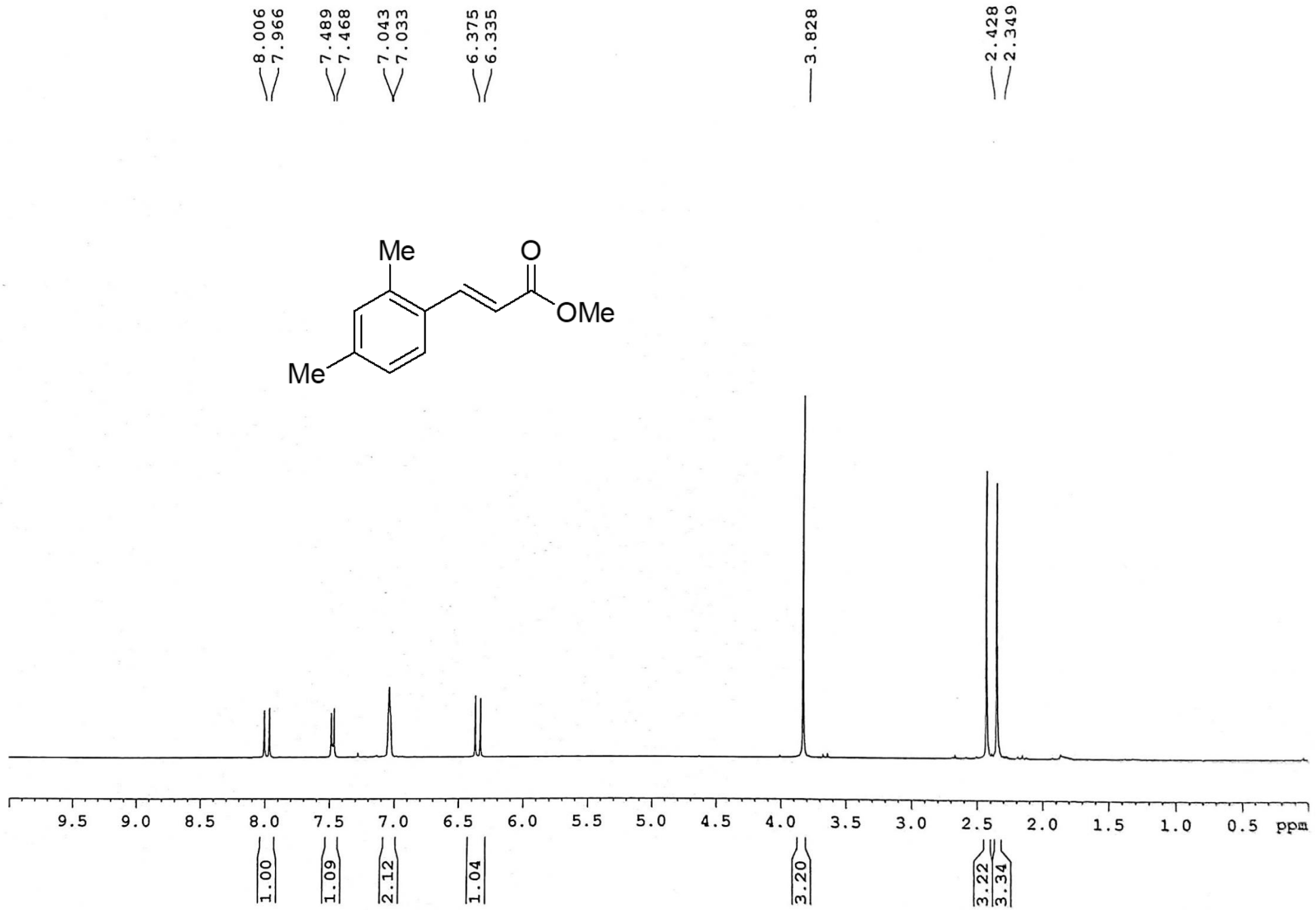
^{1}H NMR OF 3-(2,5-Dichloro-phenyl)-acrylic acid methyl ester (3qa)



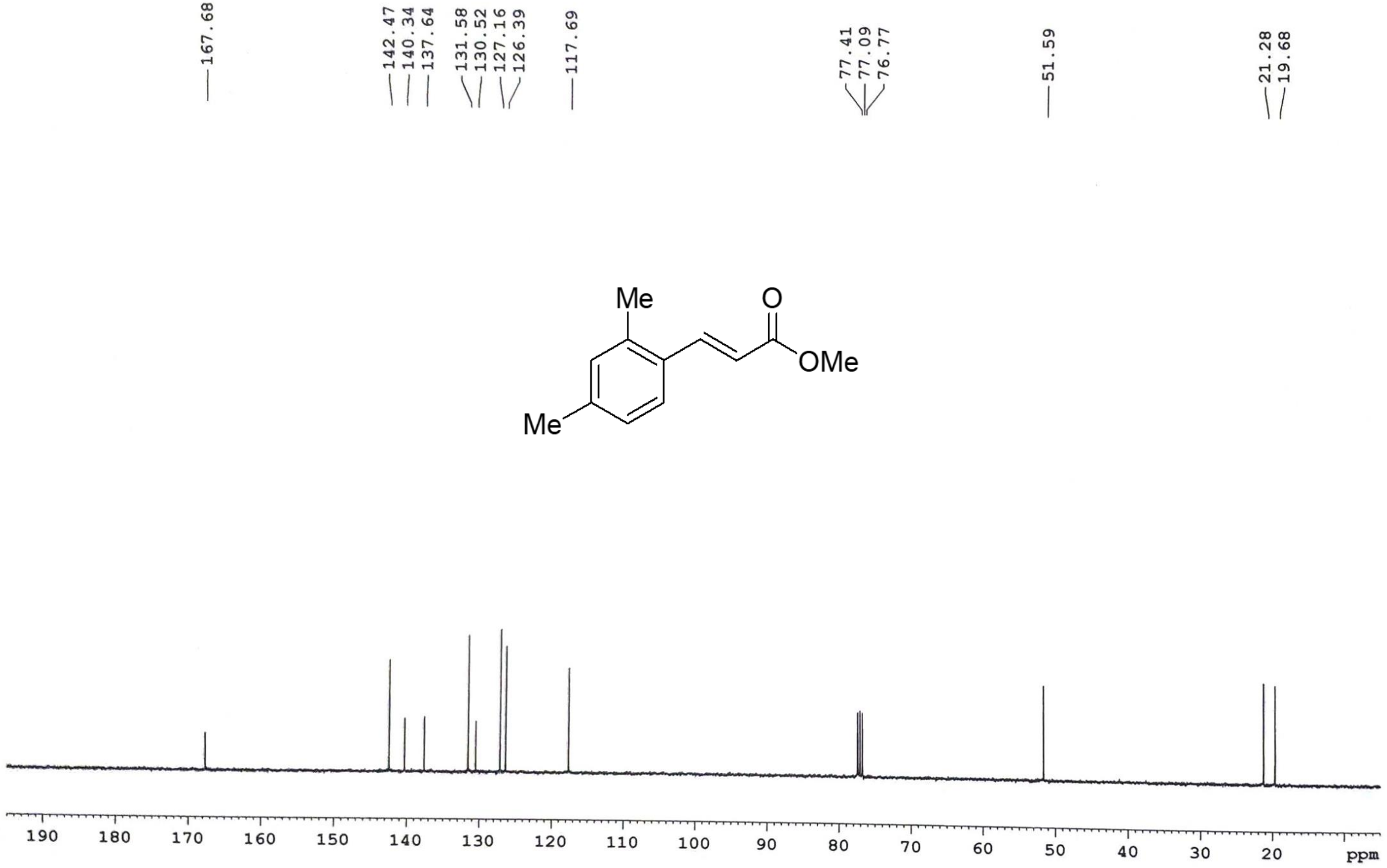
^{13}C NMR OF 3-(2,5-Dichloro-phenyl)-acrylic acid methyl ester (3qa)



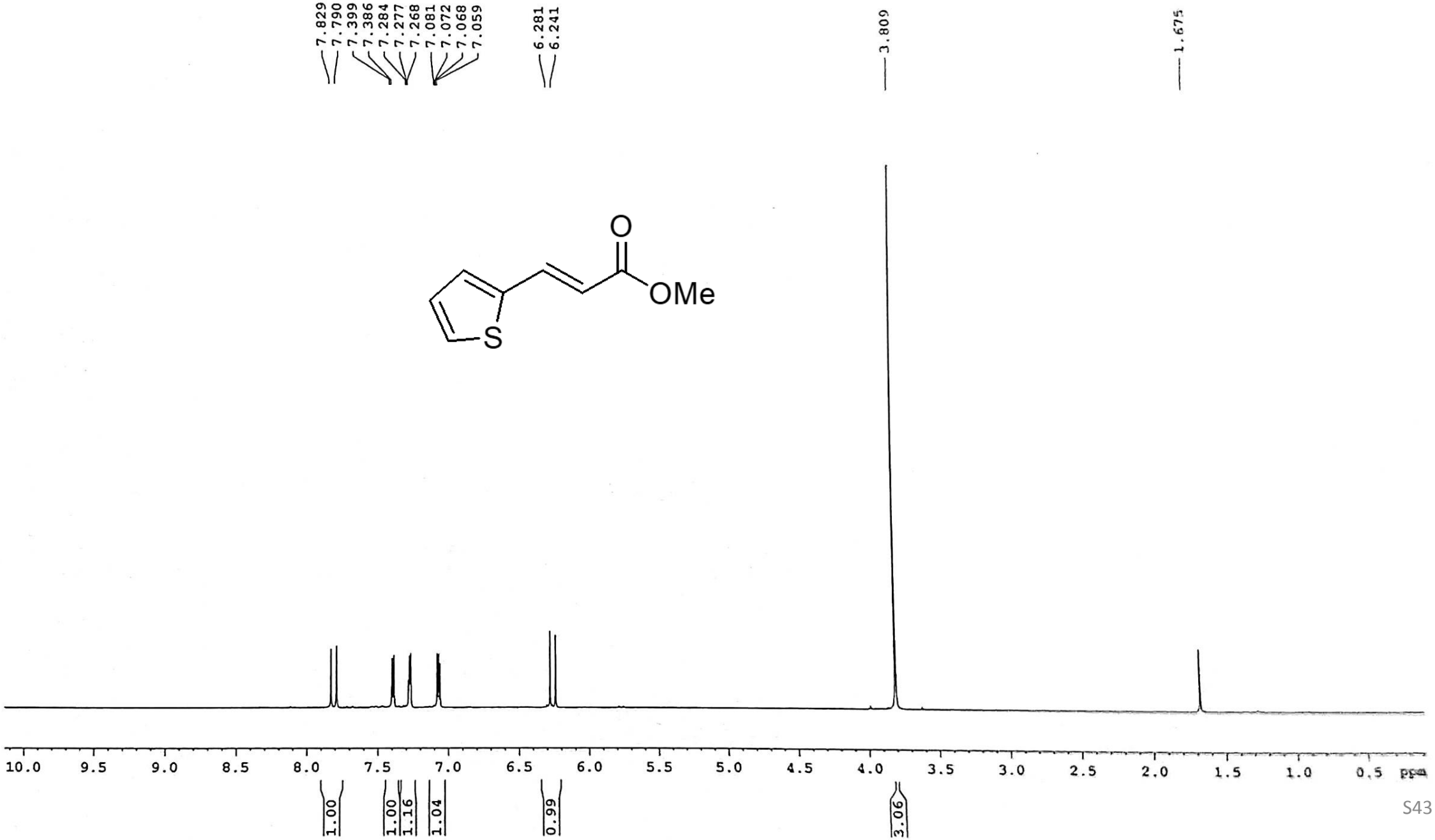
^{1}H NMR OF 3-(2,4-Dimethyl-phenyl)-acrylic acid methyl ester (3ra)



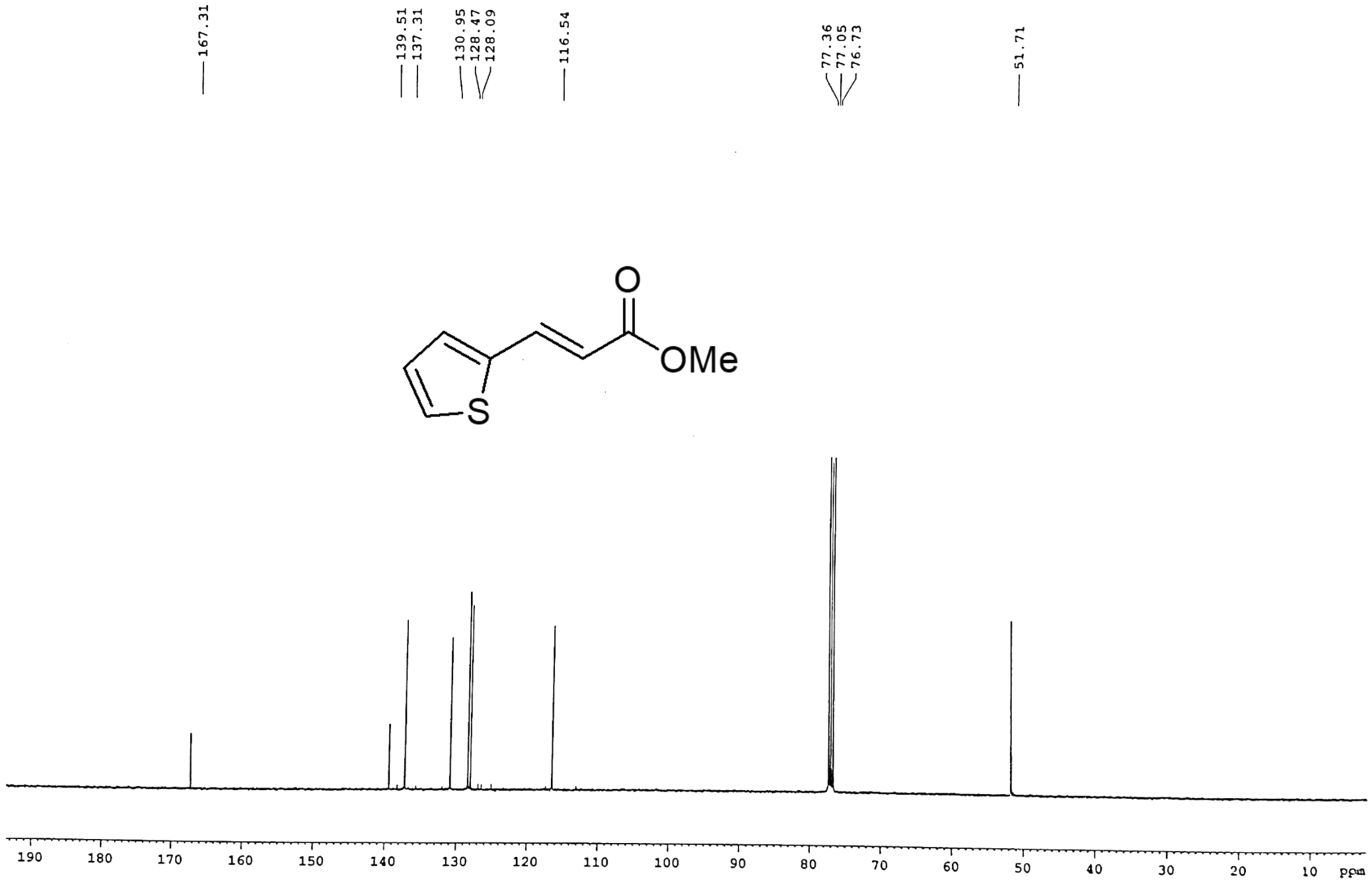
^{13}C NMR OF 3-(2,4-Dimethyl-phenyl)-acrylic acid methyl ester (3ra)



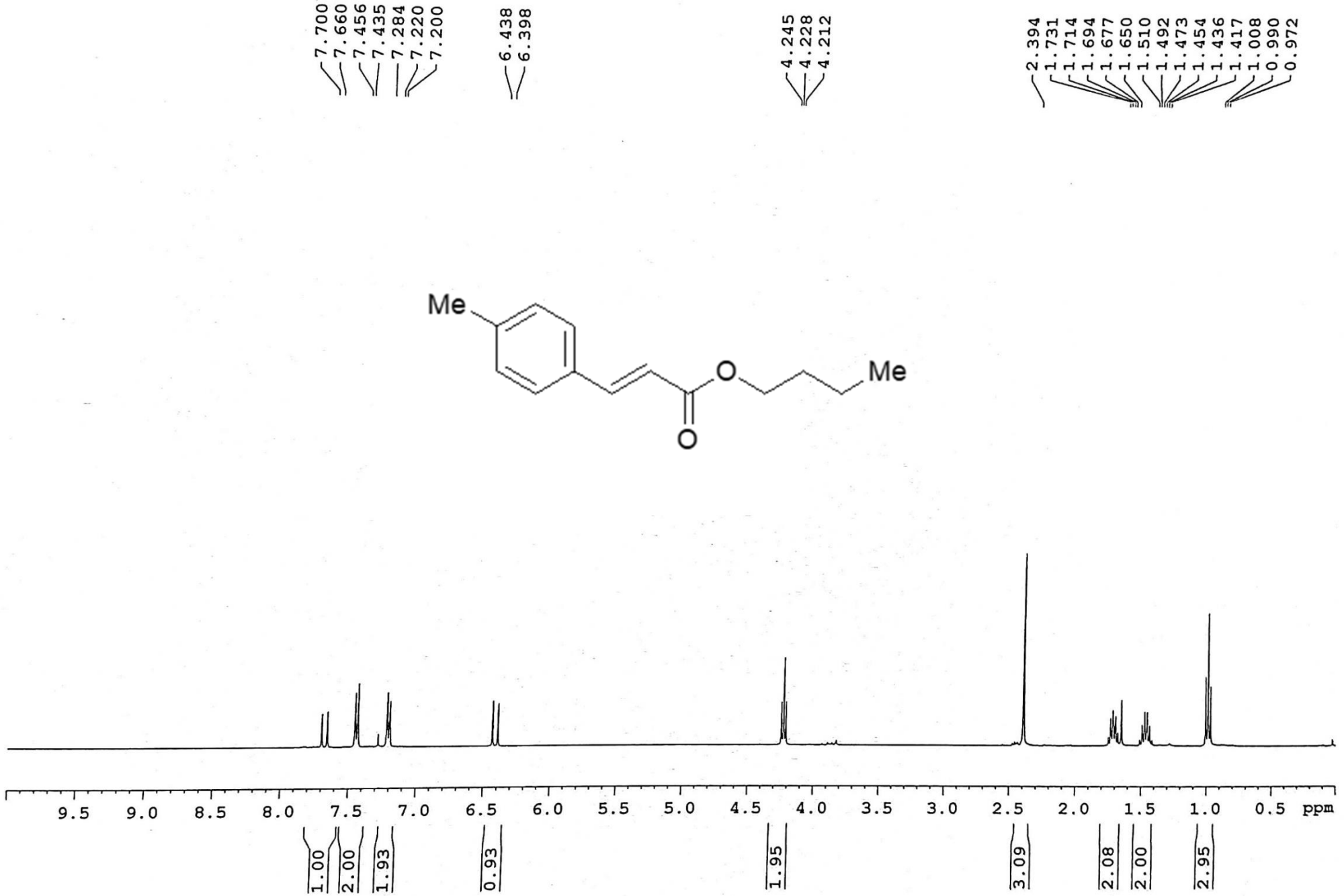
^{1}H NMR OF 3-Thiophen-2-yl-acrylic acid methyl ester (3sa)



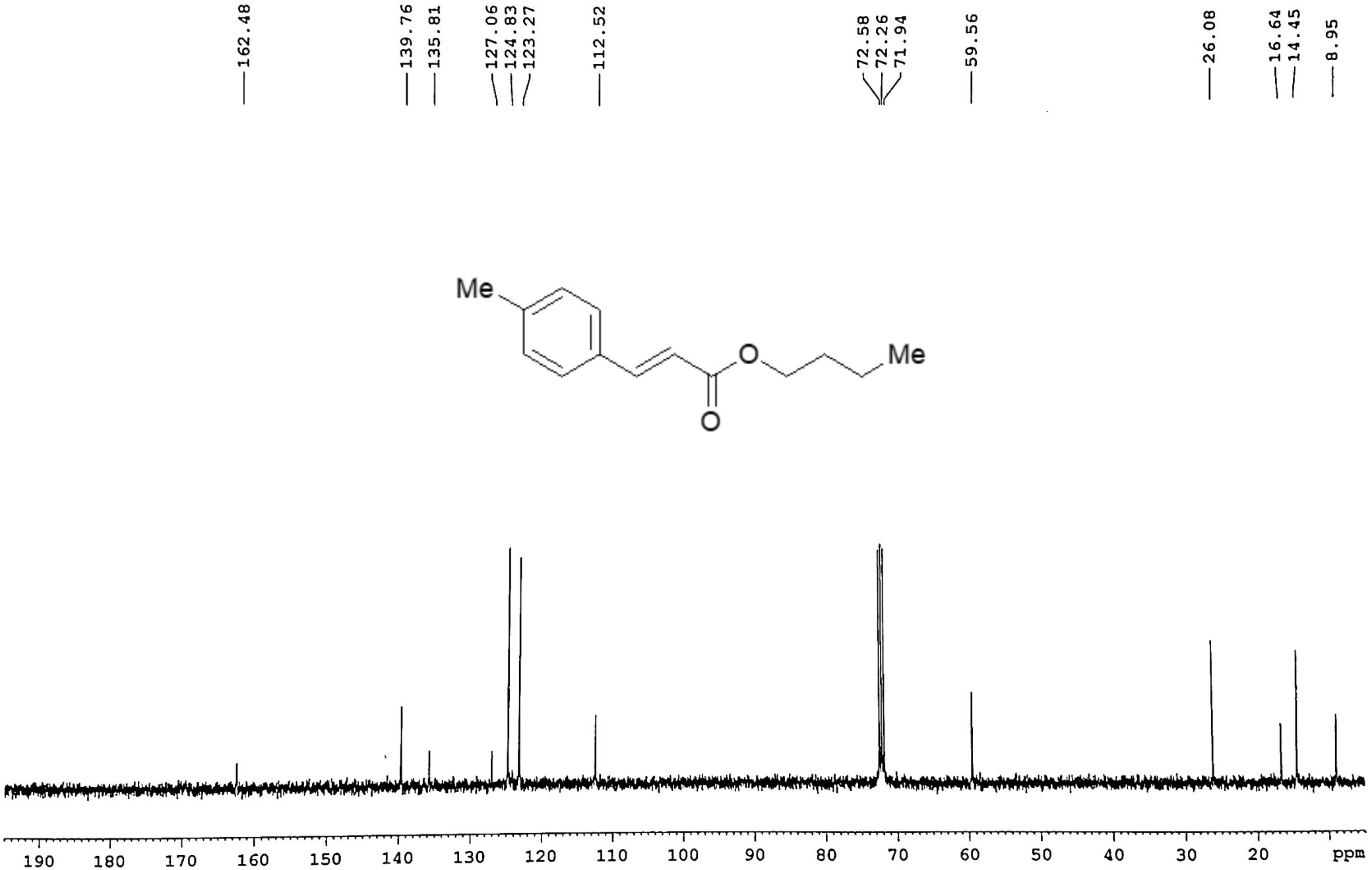
^{13}C NMR OF 3-Thiophen-2-yl-acrylic acid methyl ester (3sa)



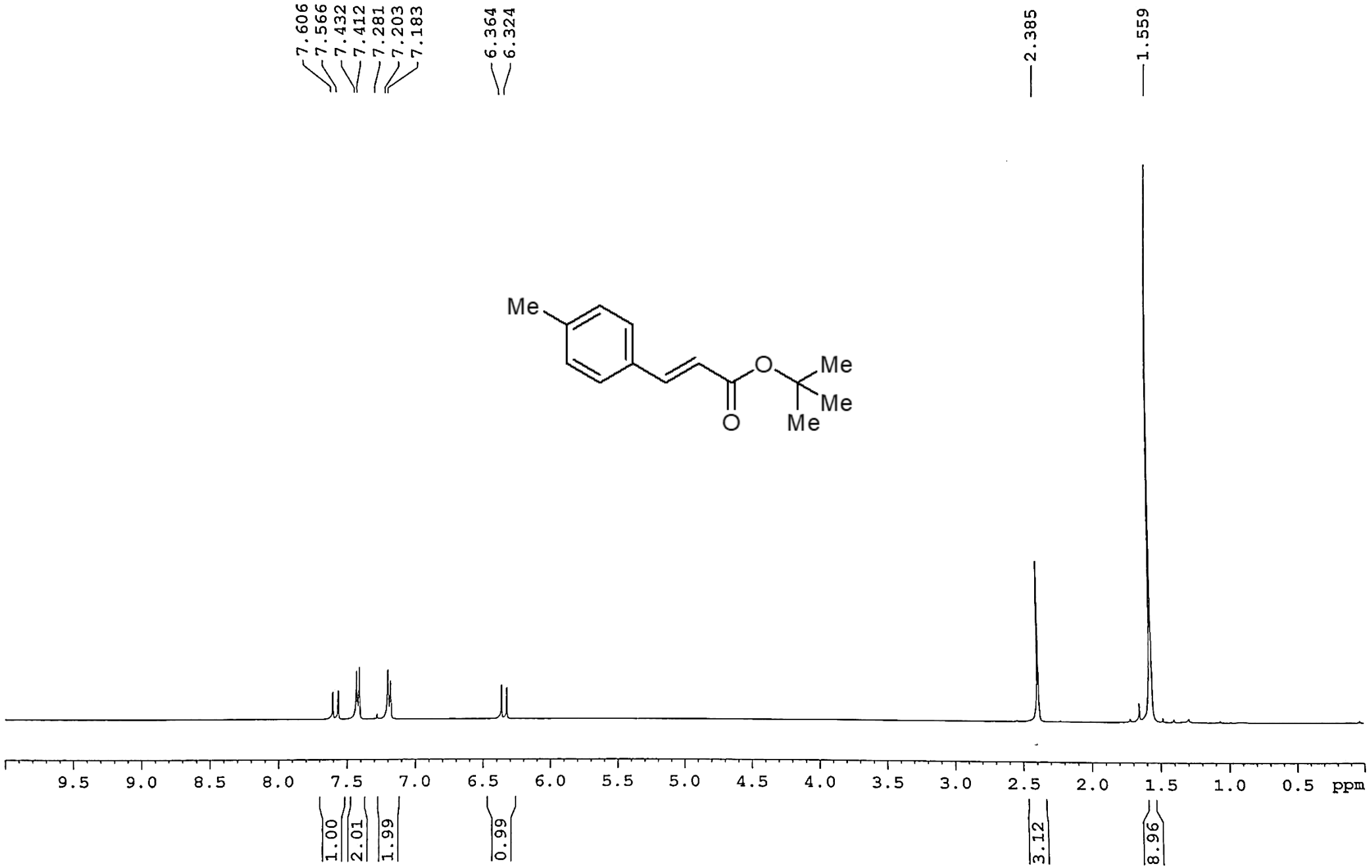
^{1}H NMR OF 3-p-Tolyl-acrylic acid butyl ester (3ab)



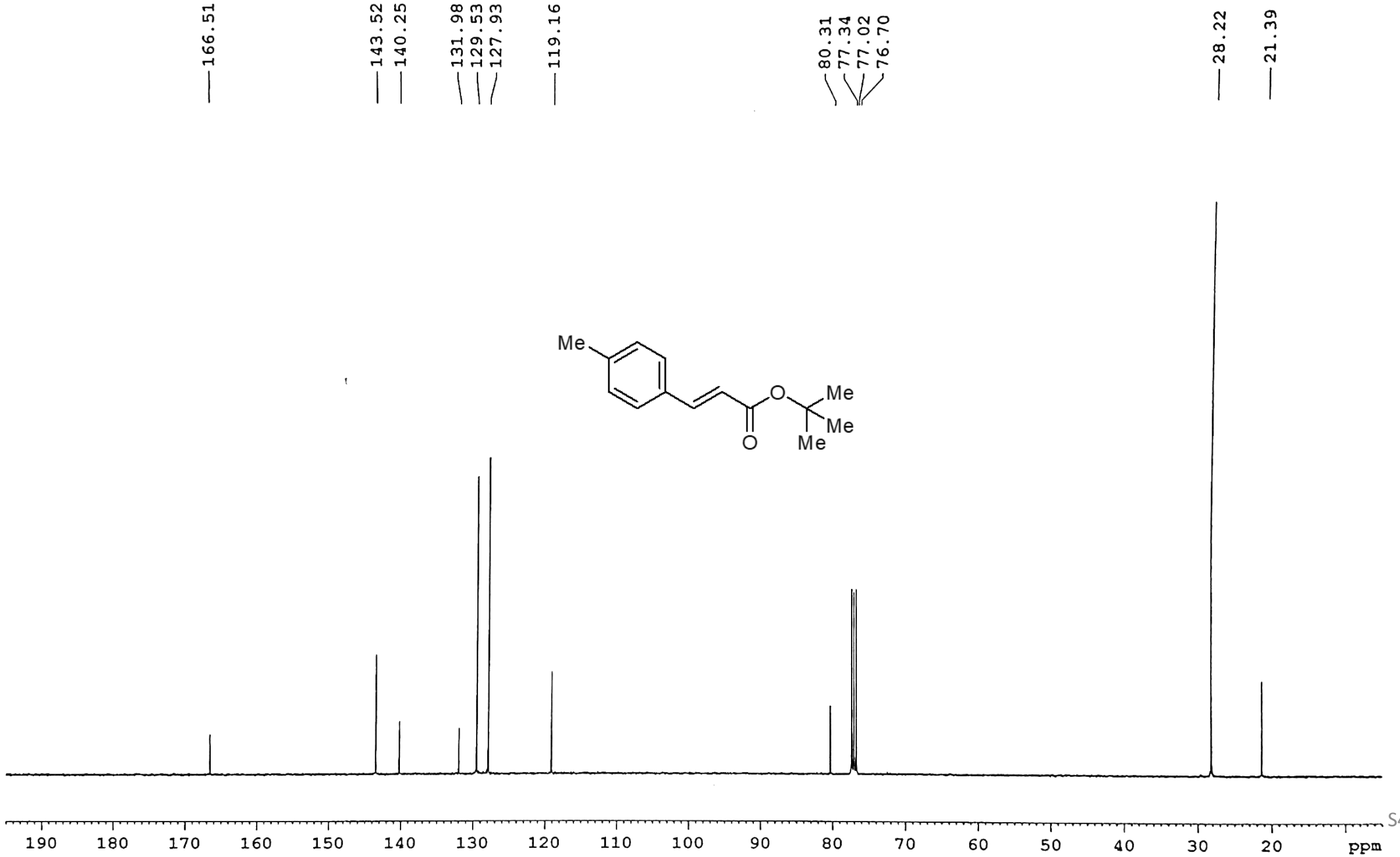
^{13}C NMR OF 3-p-Tolyl-acrylic acid butyl ester (3ab)



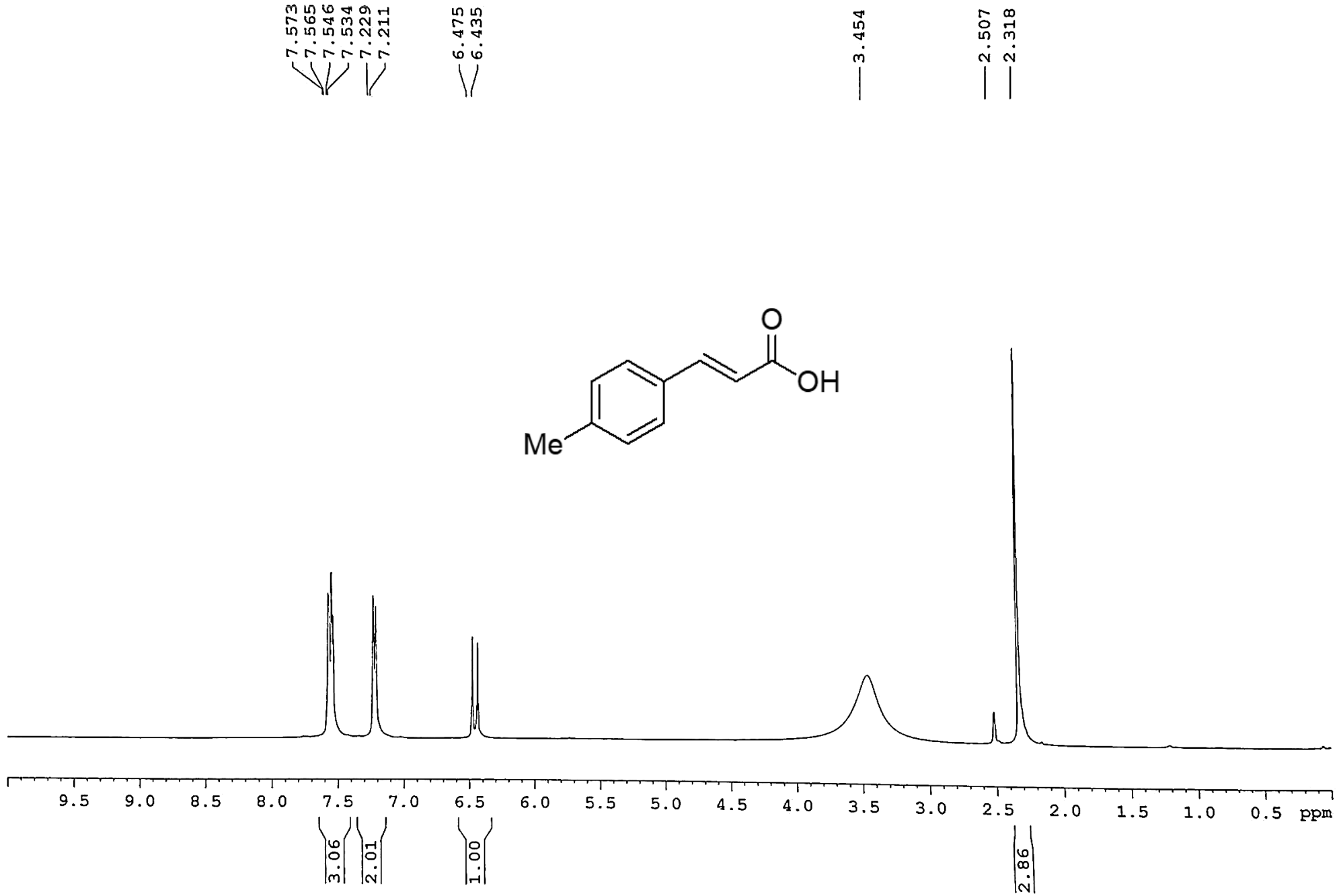
^{1}H NMR OF 3-*p*-Tolyl-acrylic acid tert-butyl ester (3ac)



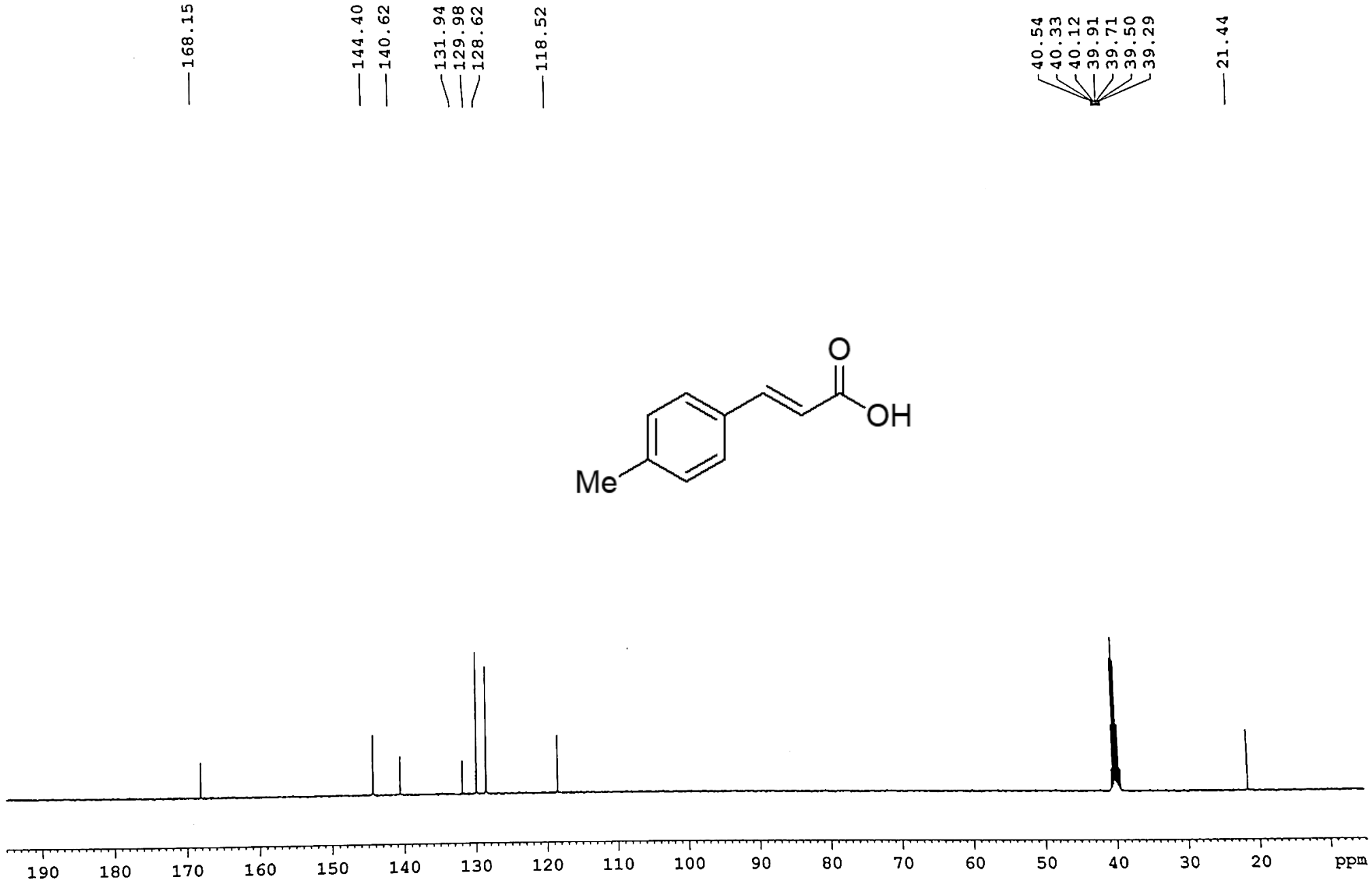
^{13}C NMR OF 3-*p*-Tolyl-acrylic acid tert-butyl ester (3ac)



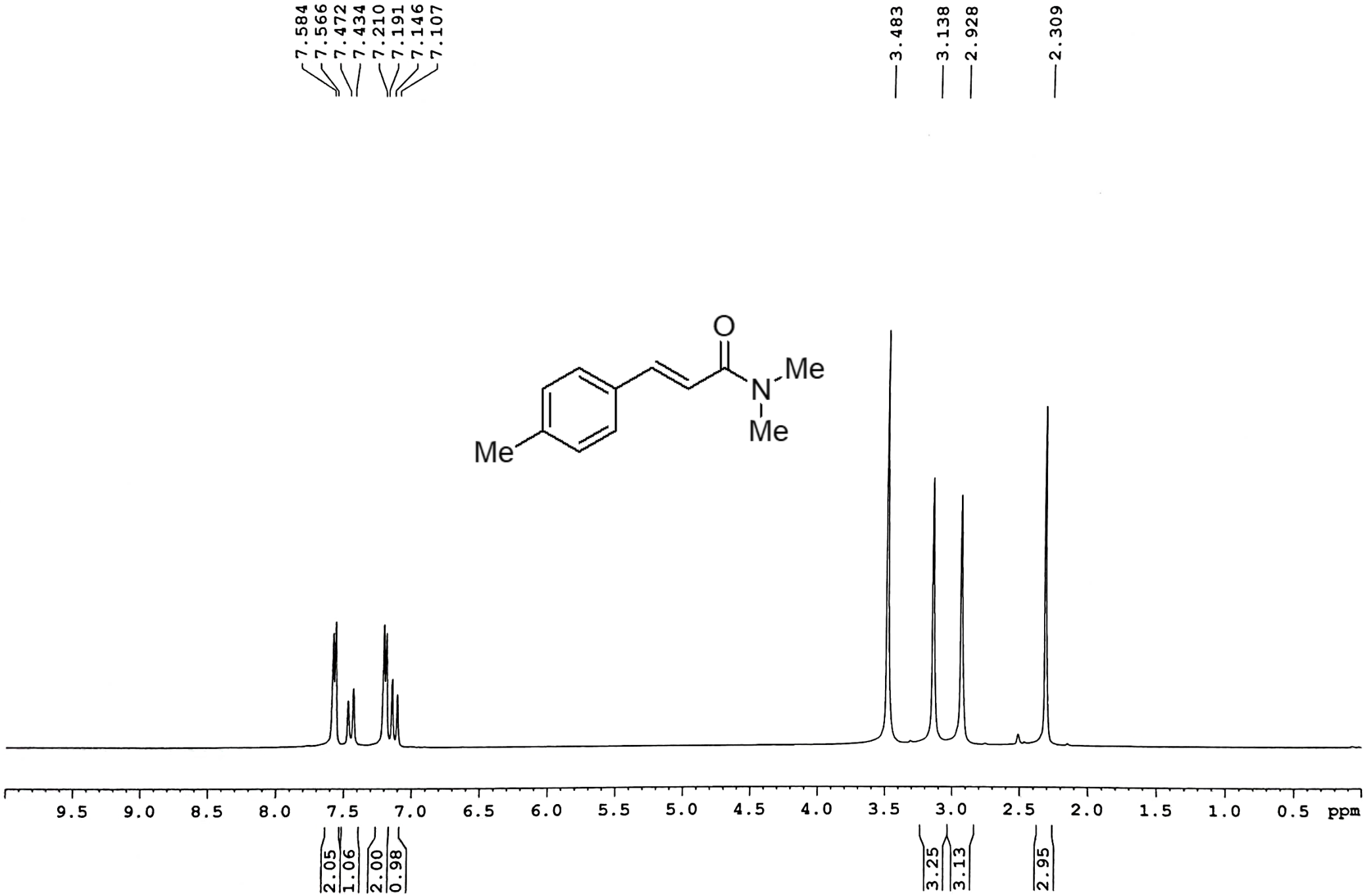
^{1}H NMR OF 3-p-Tolyl-acrylic acid (3ad)



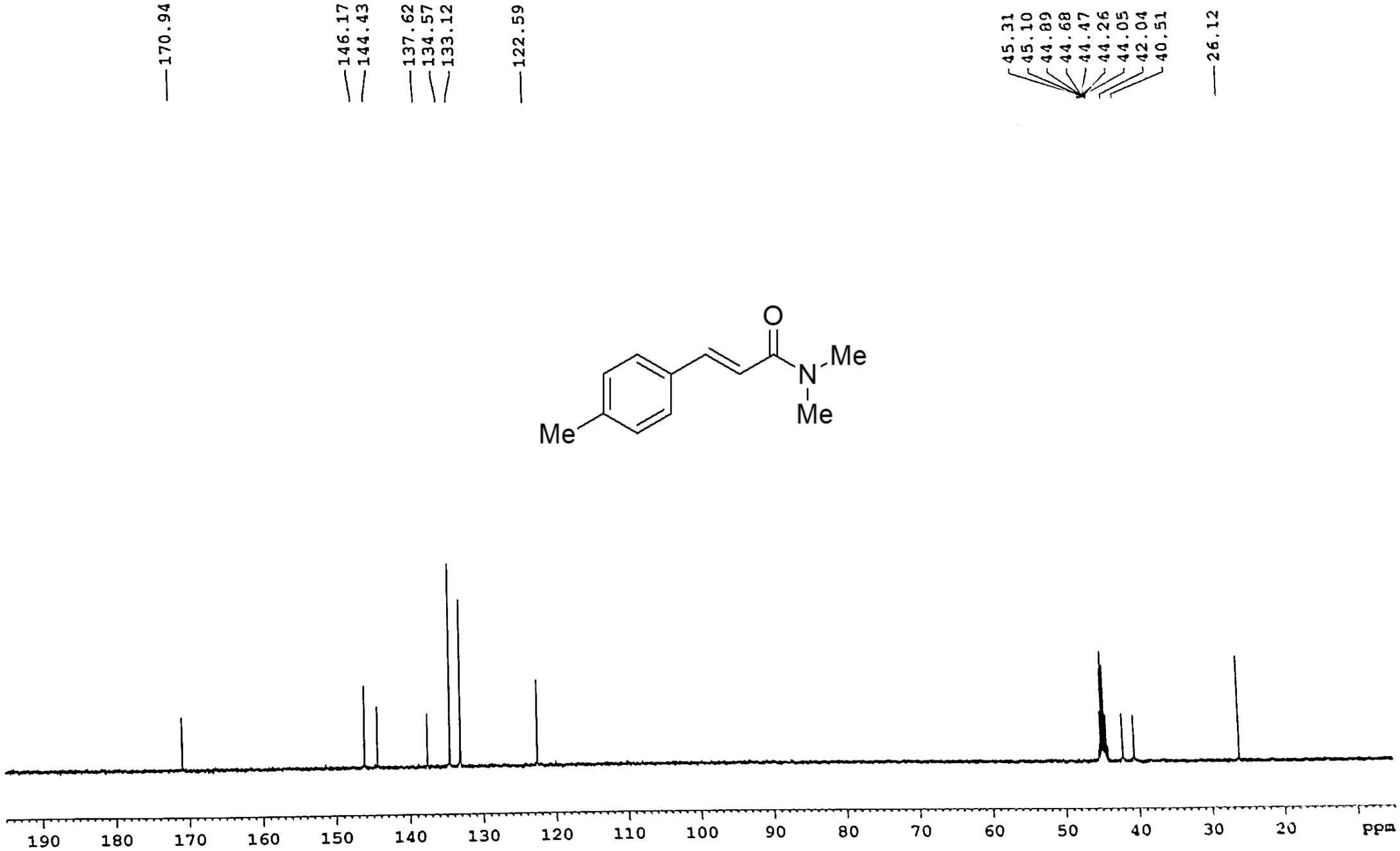
^{13}C NMR OF 3-p-Tolyl-acrylic acid (3ad)



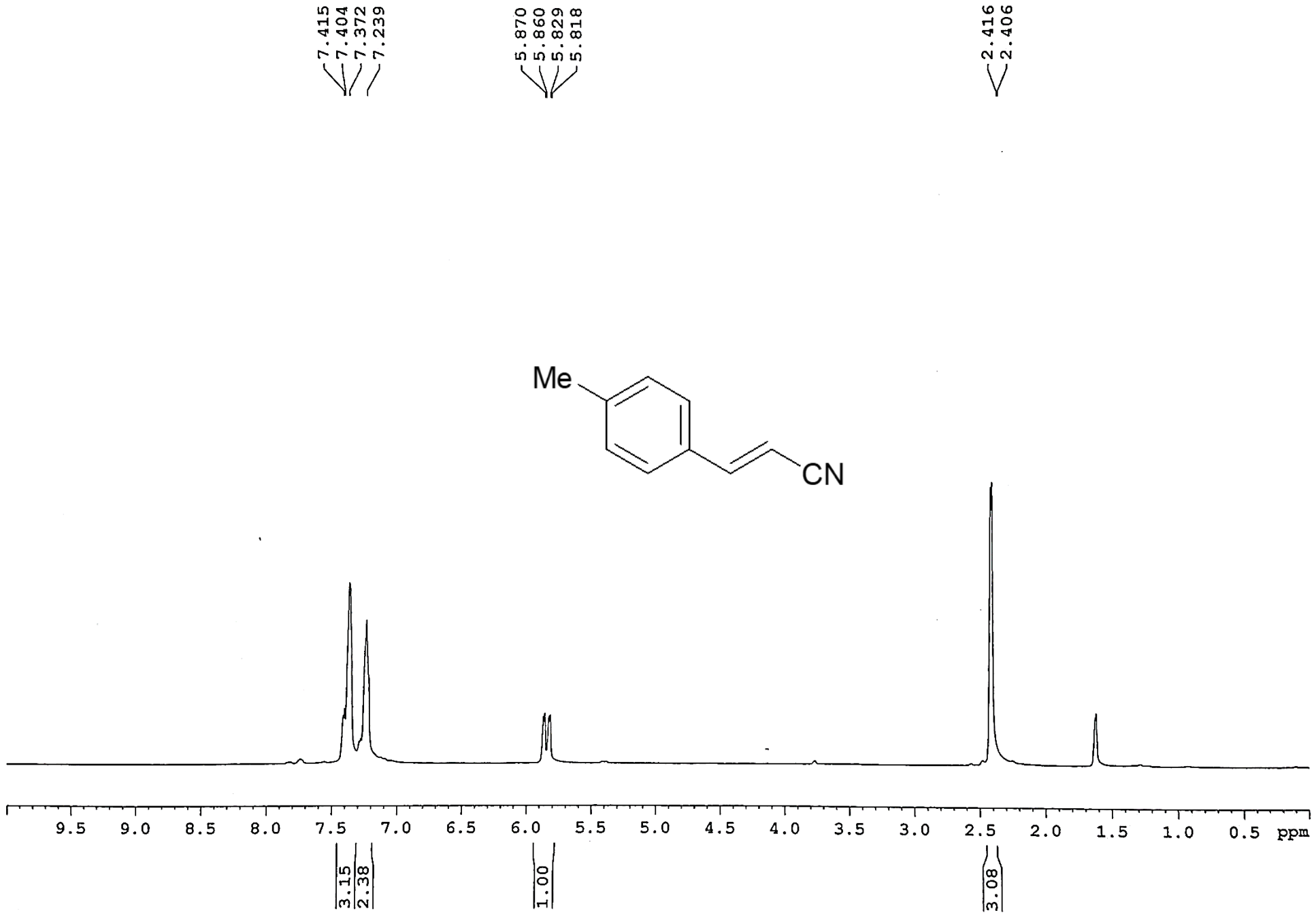
^{1}H OF NMR *N*,*N*-Dimethyl-3-p-tolyl-acrylamide (3ae)



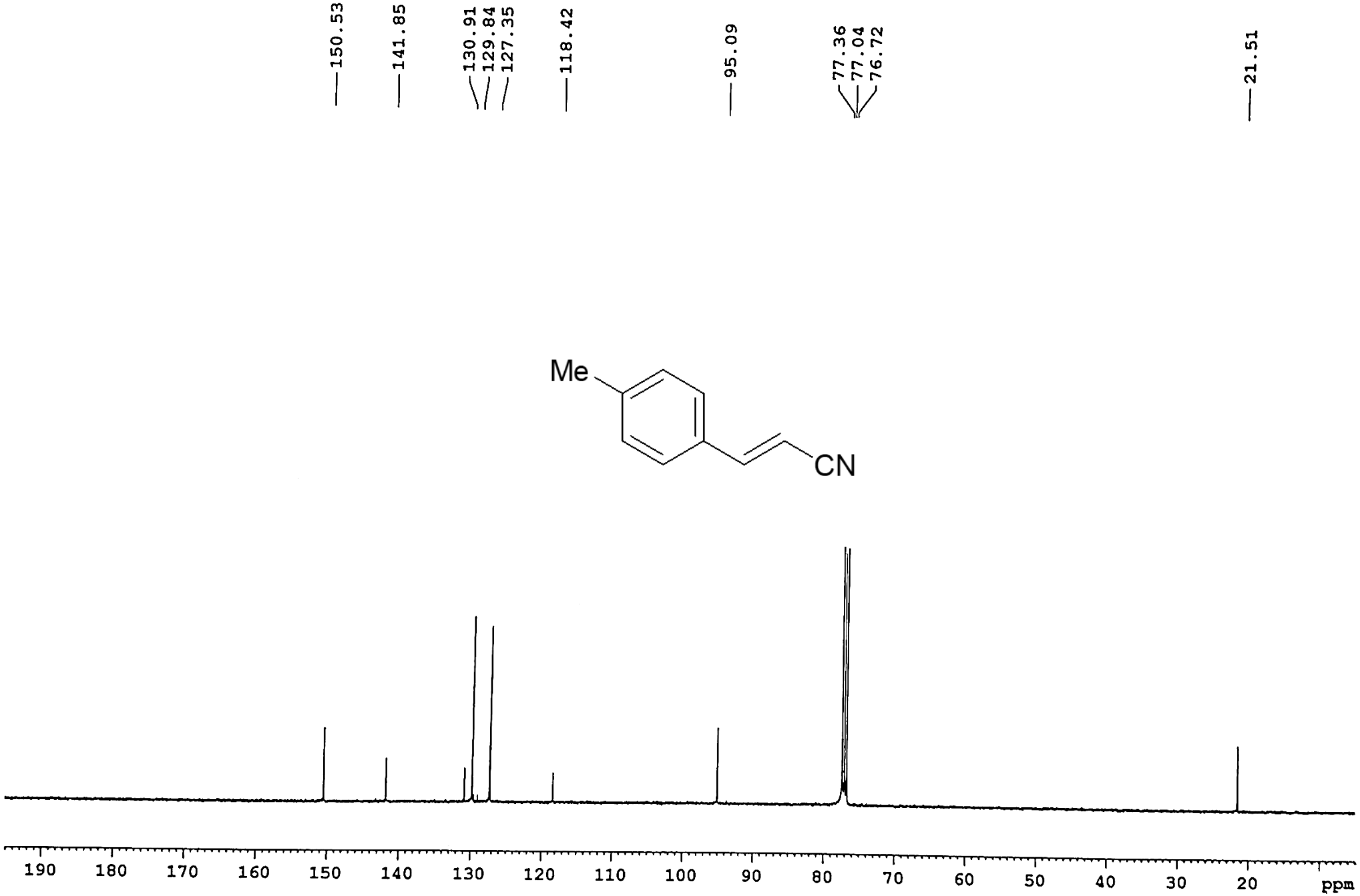
^{13}C OF NMR N,N-Dimethyl-3-p-tolyl-acrylamide (3ae)



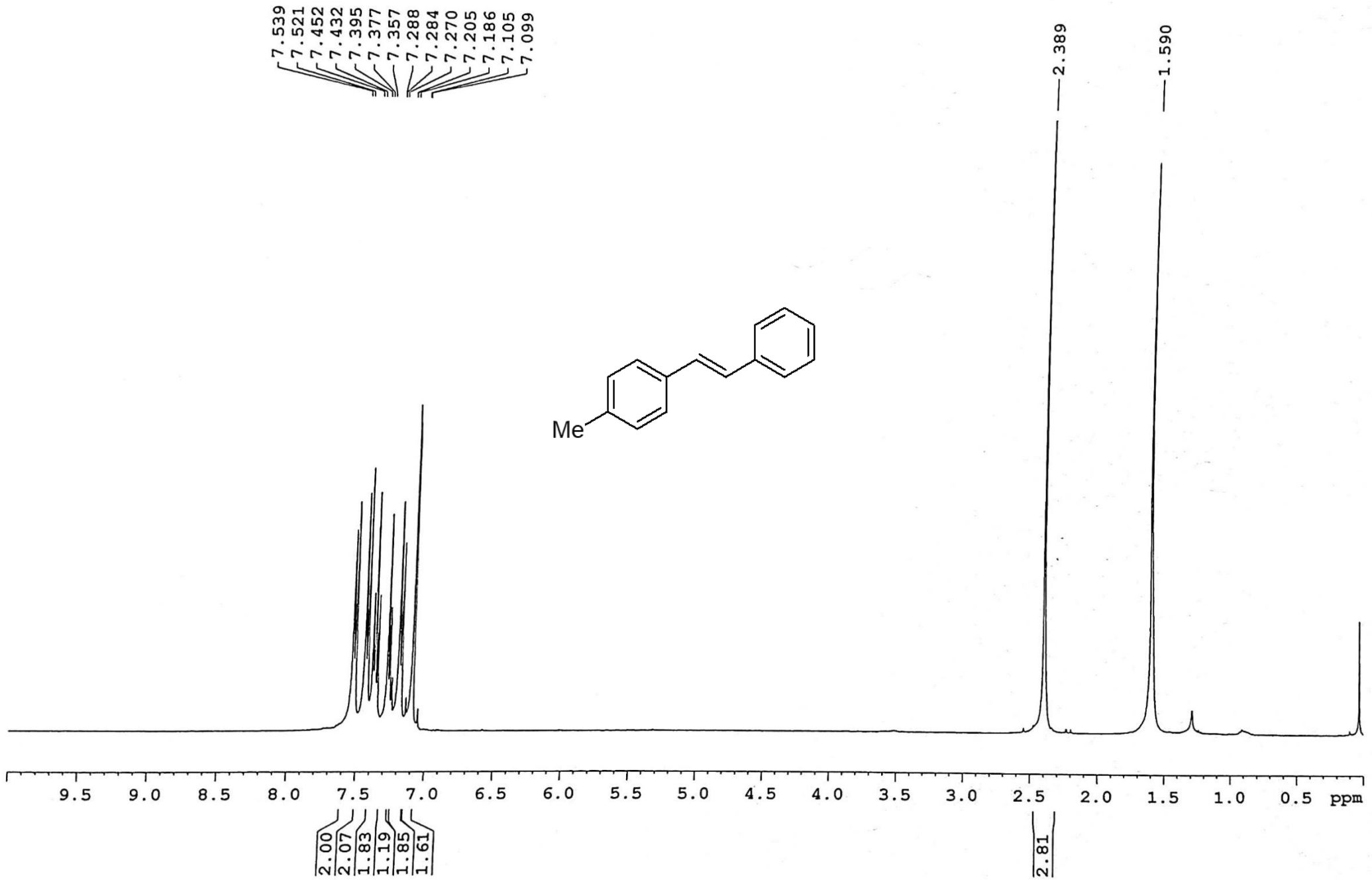
^{1}H NMR OF 3-*ρ*-Tolyl-acrylonitrile (3af)



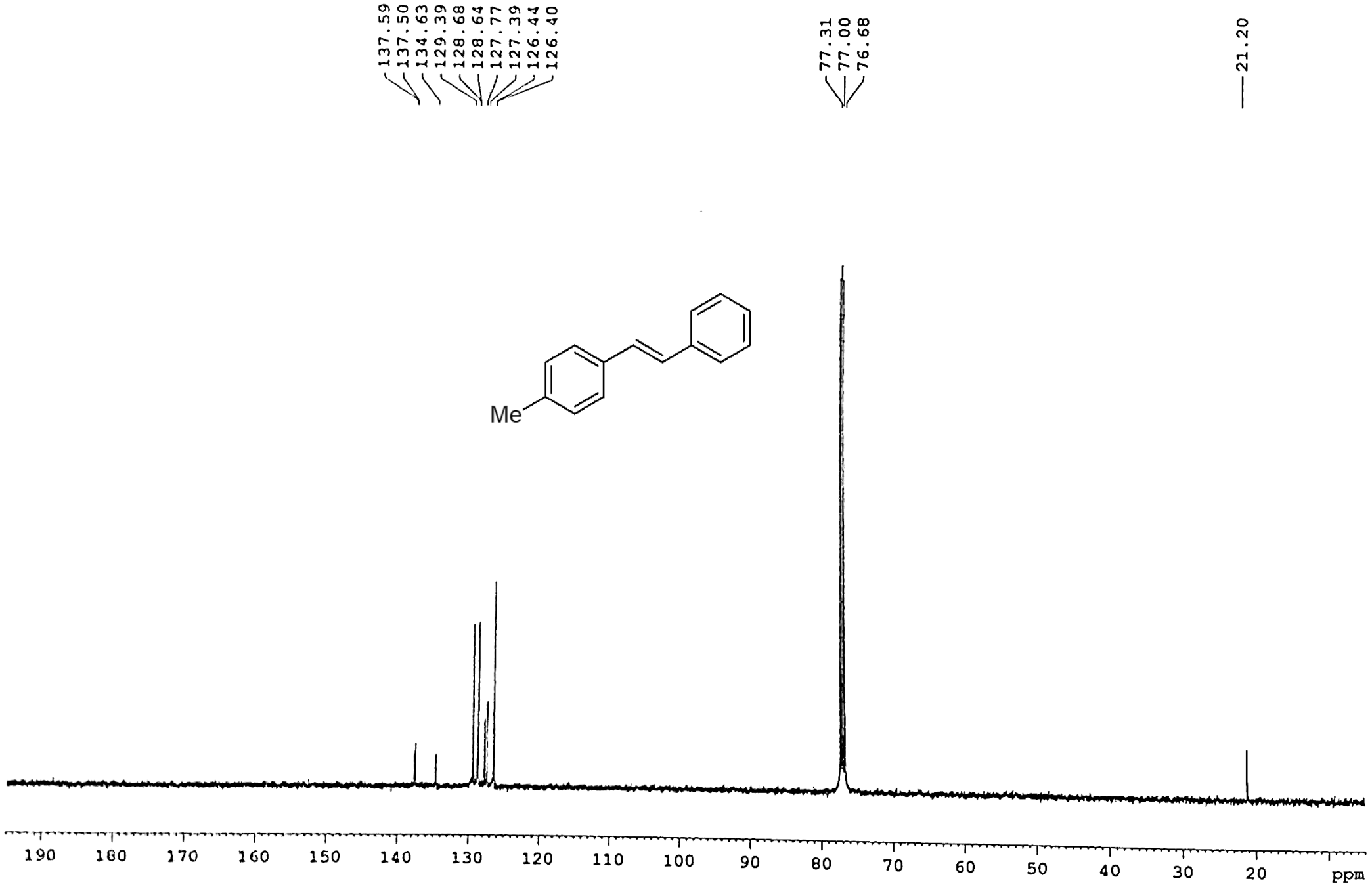
^{13}C NMR OF 3-*ρ*-Tolyl-acrylonitrile (3af)



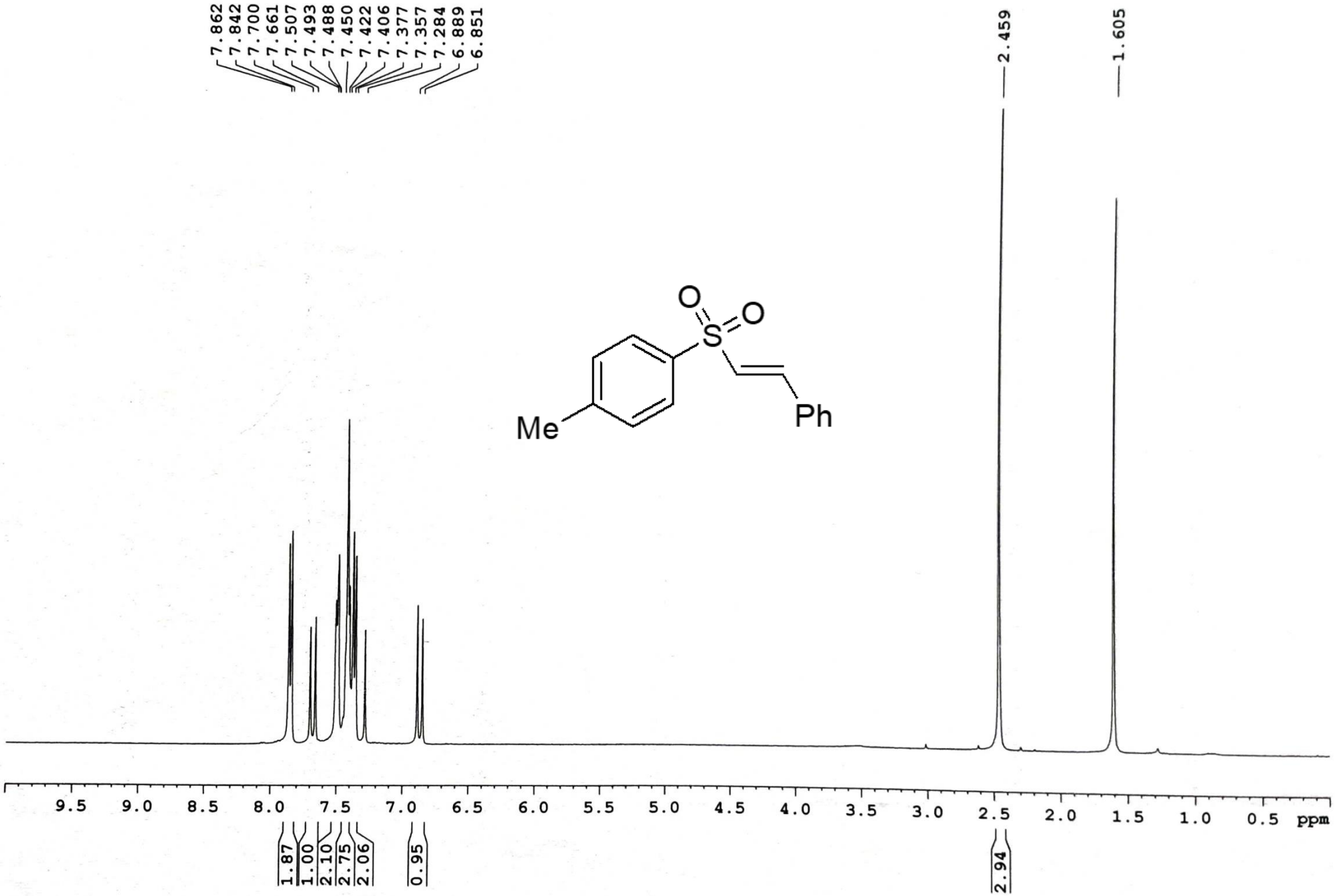
^{1}H NMR OF 1-Methyl-4-styryl-benzene (3ag)



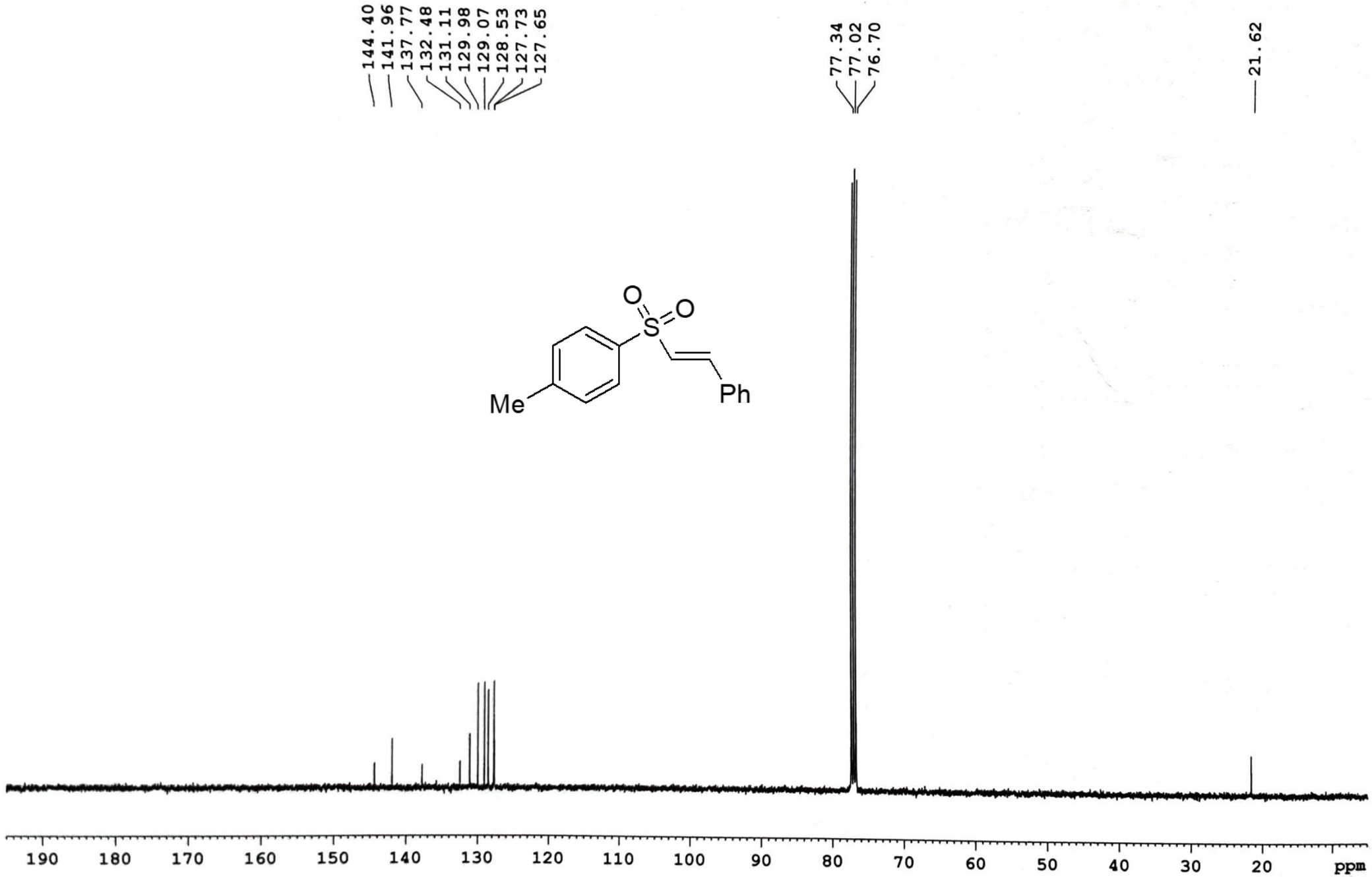
^{13}C NMR OF 1-Methyl-4-styryl-benzene (3ag)



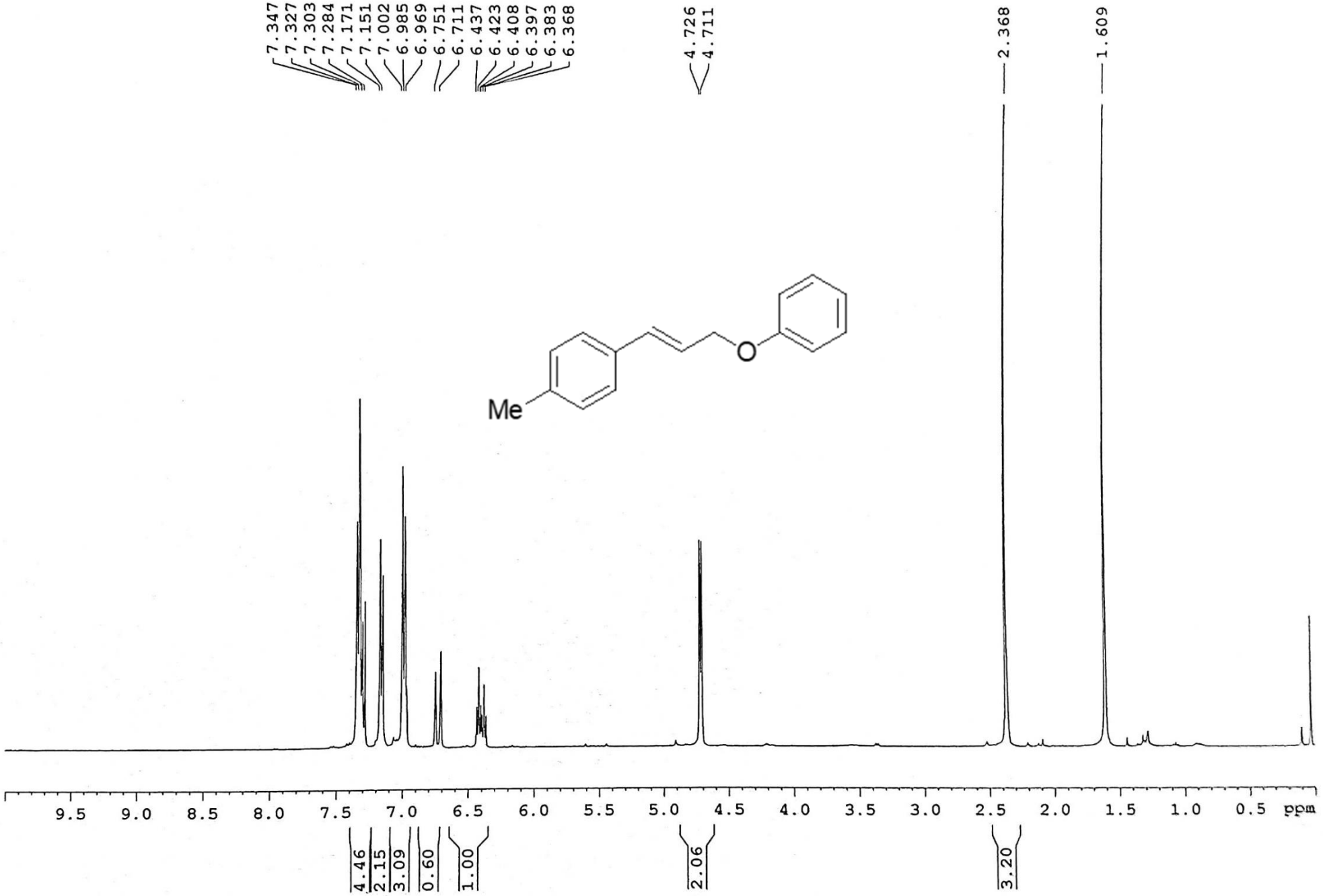
^{1}H NMR OF 1-Methyl-4-(2-phenyl-ethenesulfonyl)-benzene (3ag')



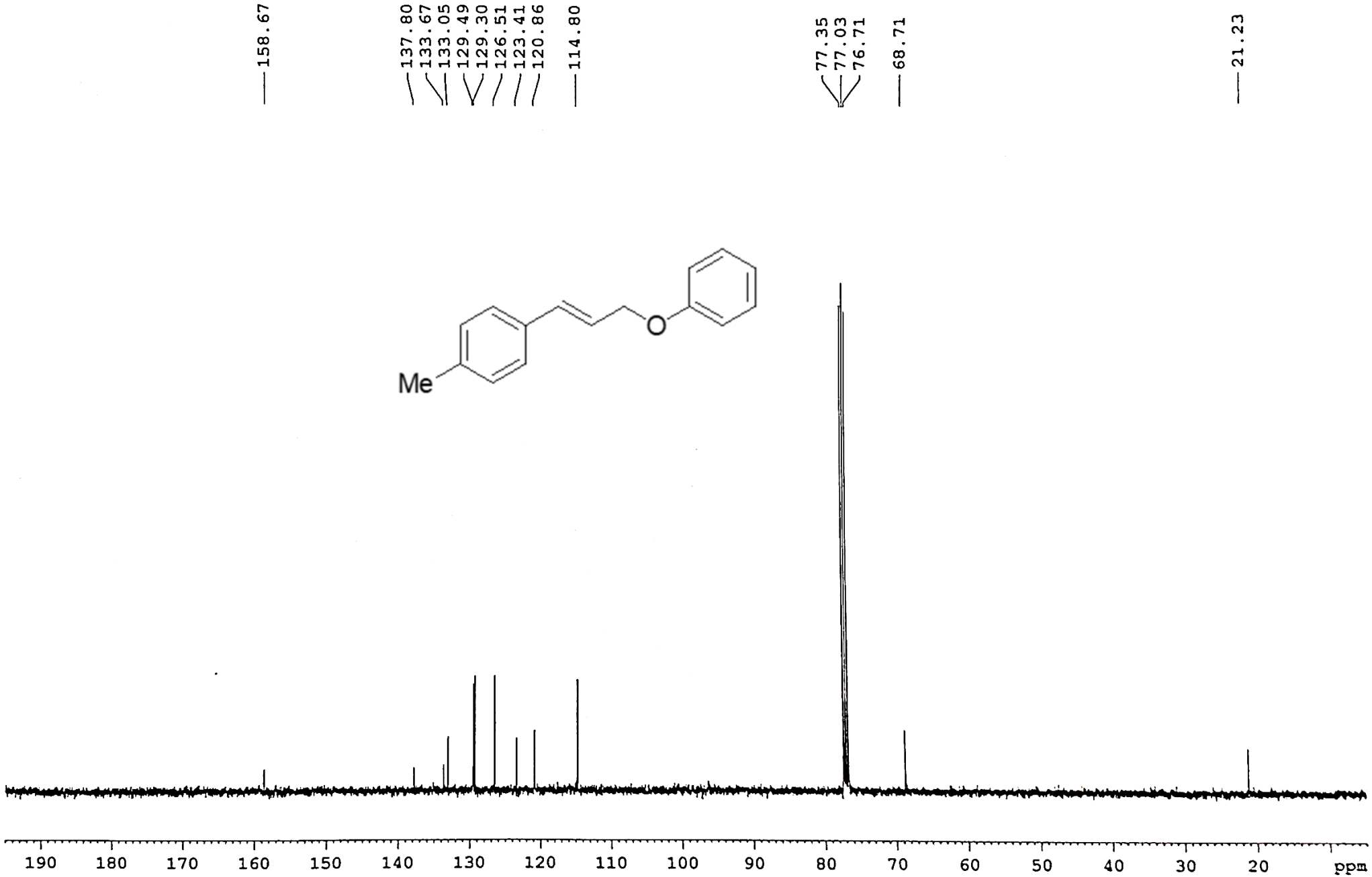
^{13}C NMR OF 1-Methyl-4-(2-phenyl-ethenesulfonyl)-benzene (3ag')



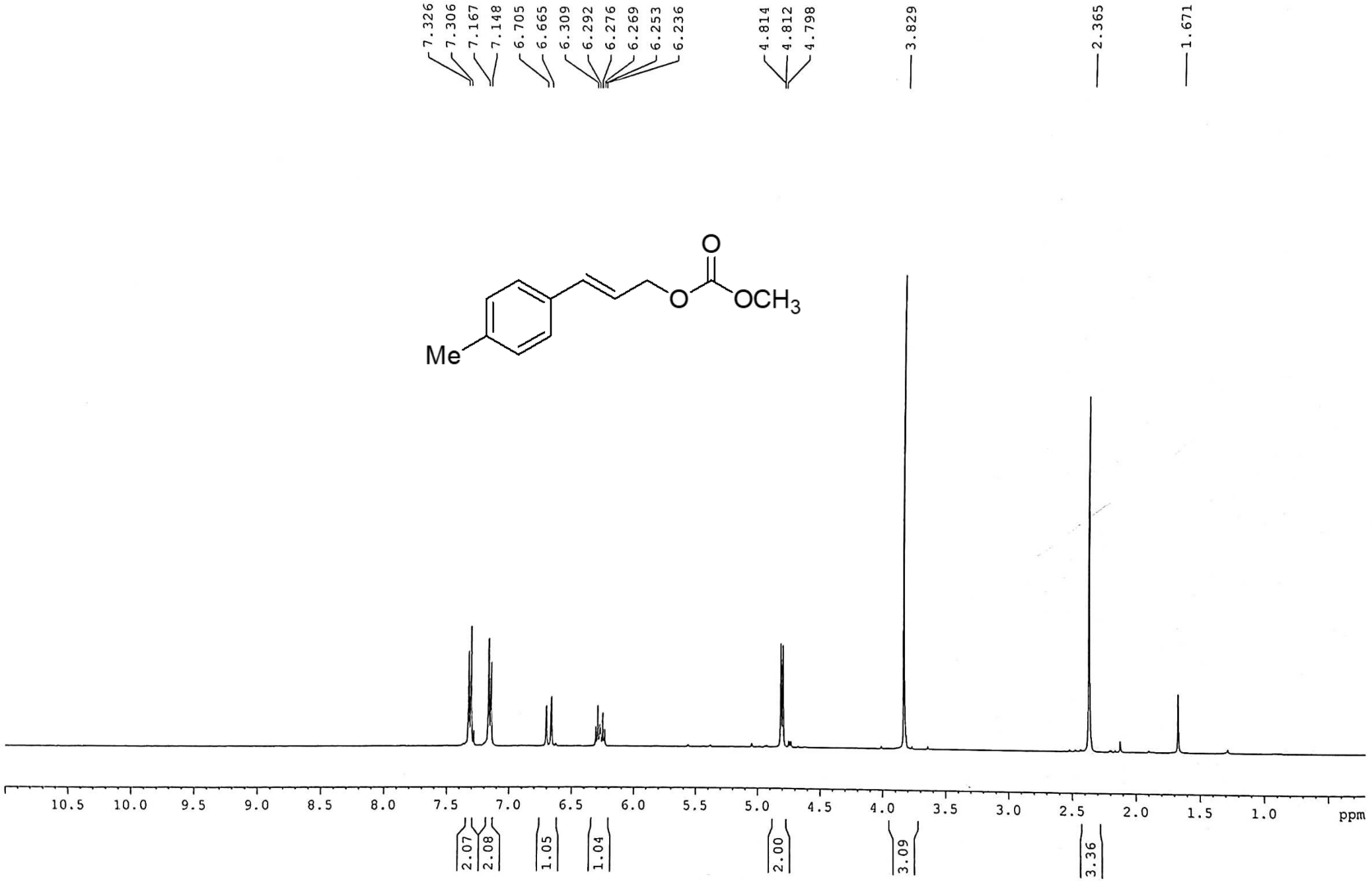
^{1}H NMR OF 1-Methyl-4-(3-phenoxy-propenyl)-benzene (3ah)



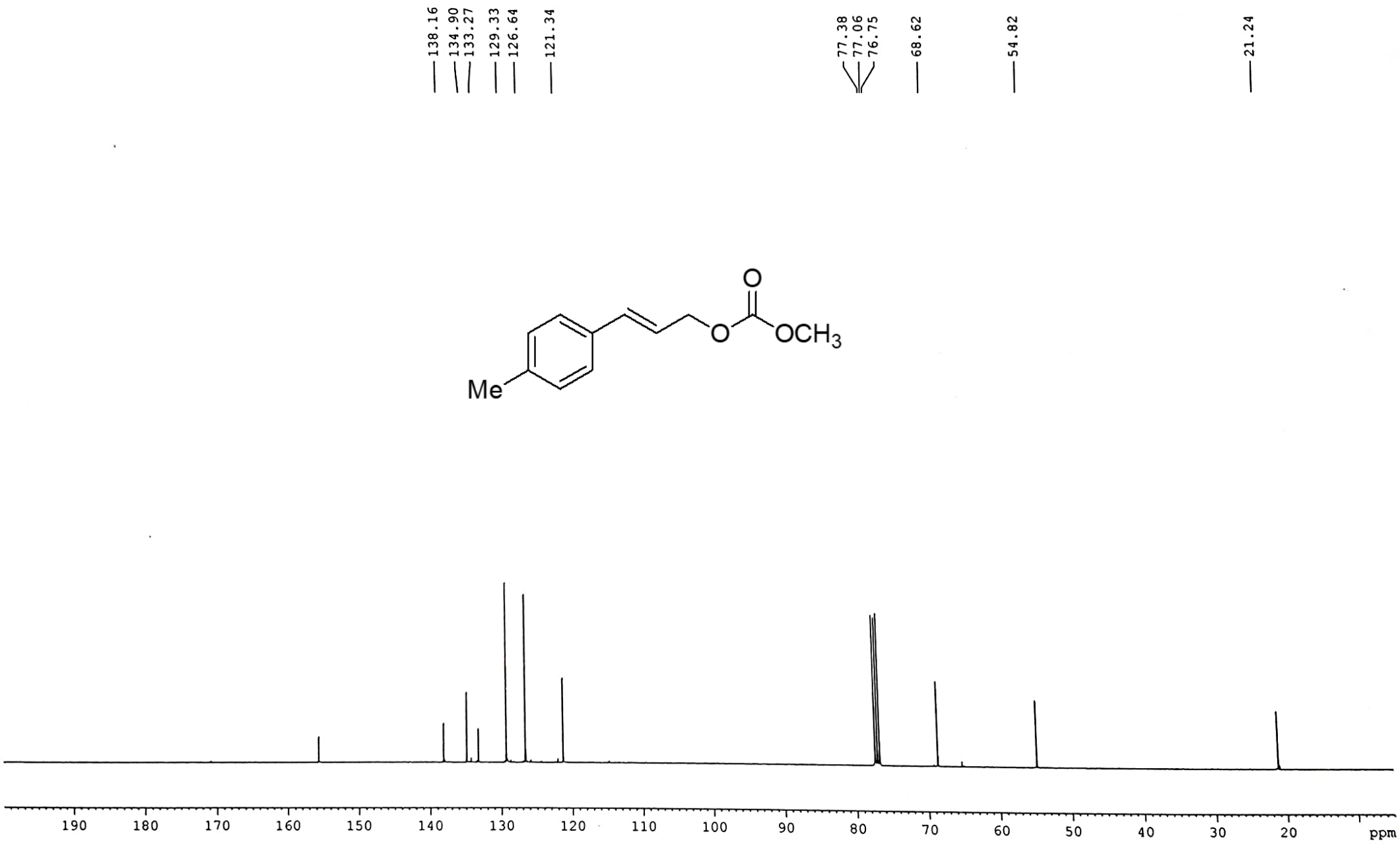
^{13}C NMR OF 1-Methyl-4-(3-phenoxy-propenyl)-benzene (3ah)



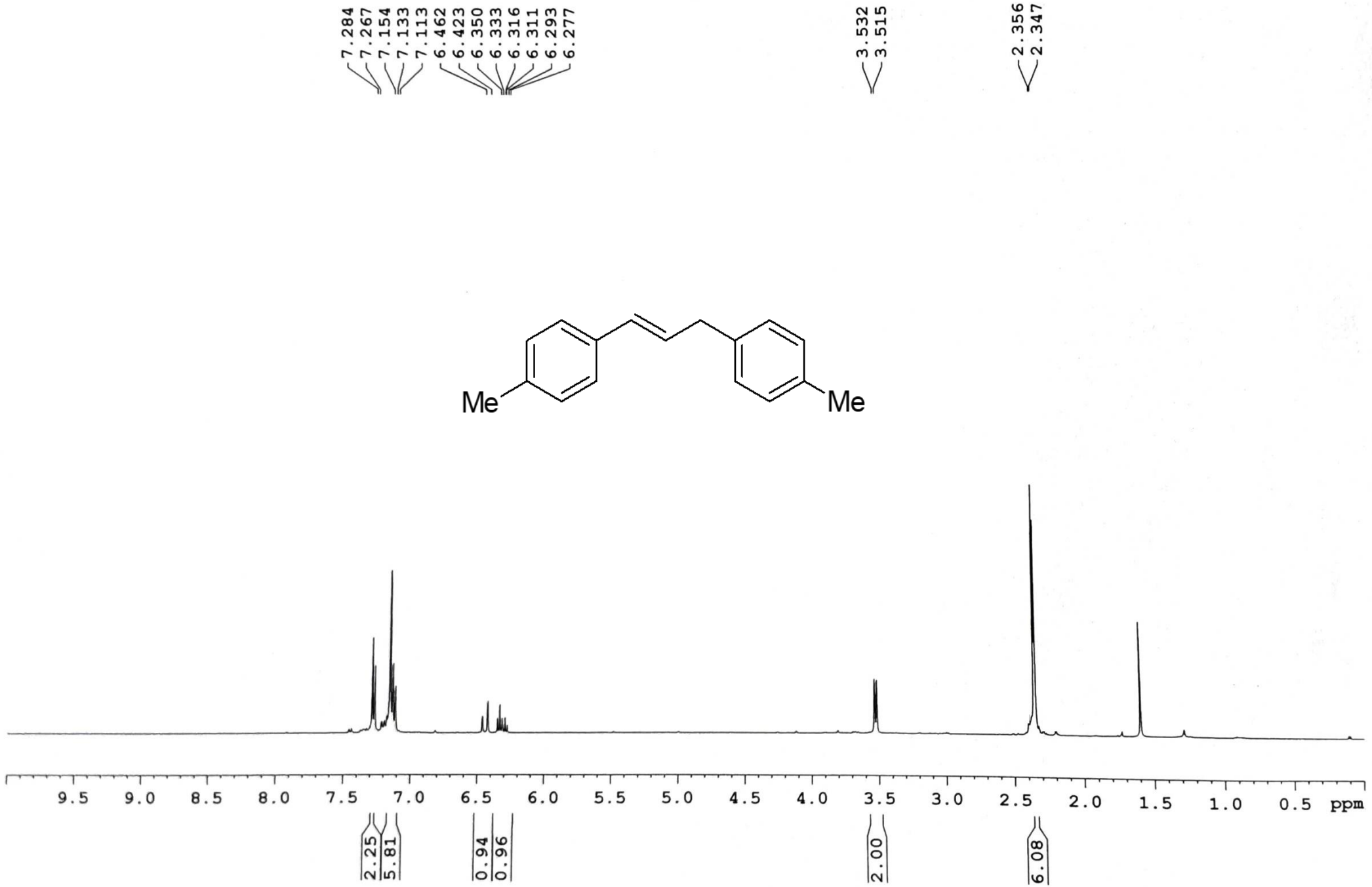
^{1}H NMR OF Carbonic acid methyl ester 3-p-tolyl-allyl-ester (3ai)



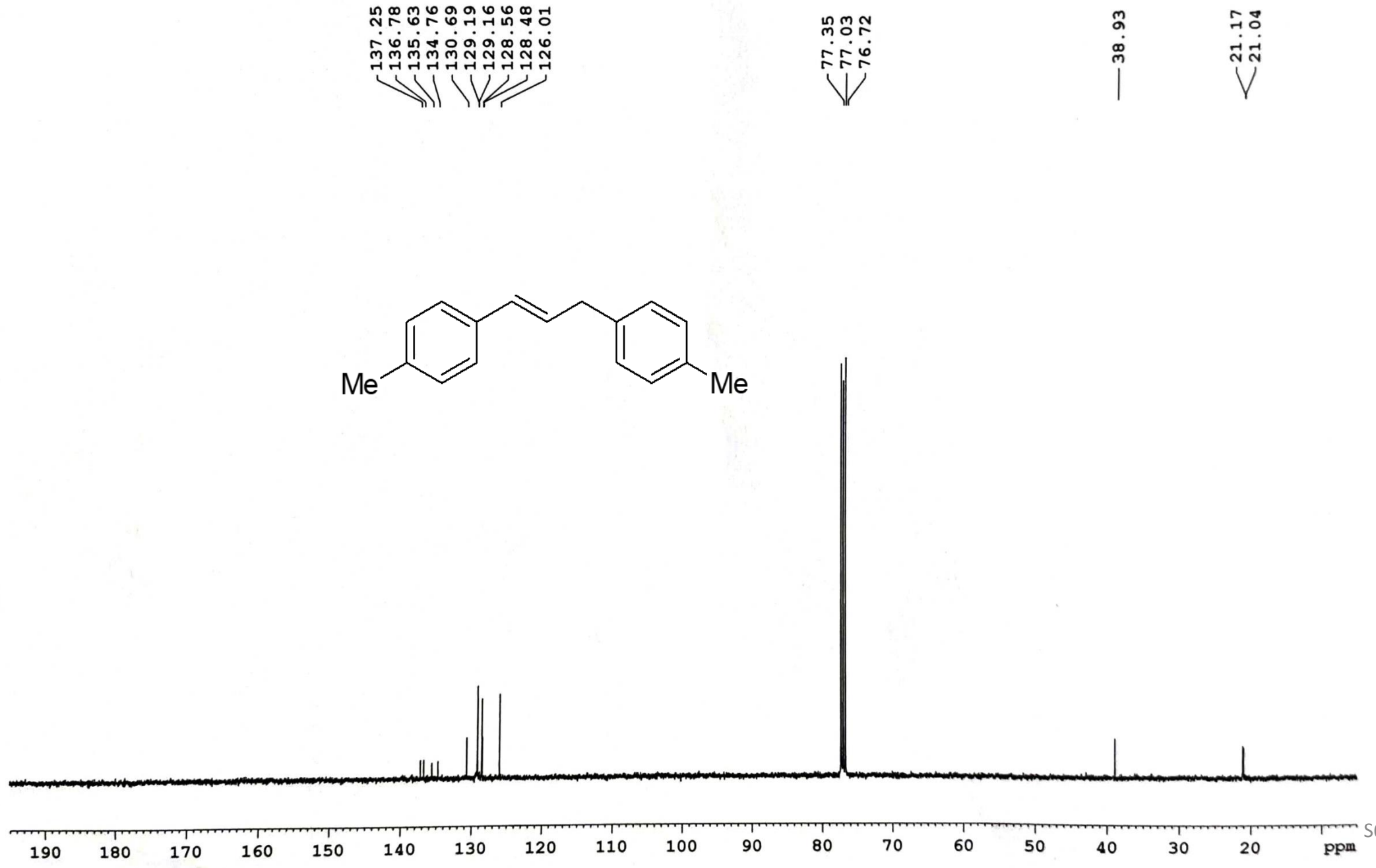
^{13}C NMR OF Carbonic acid methyl ester 3-p-tolyl-allyl-ester (3ai)



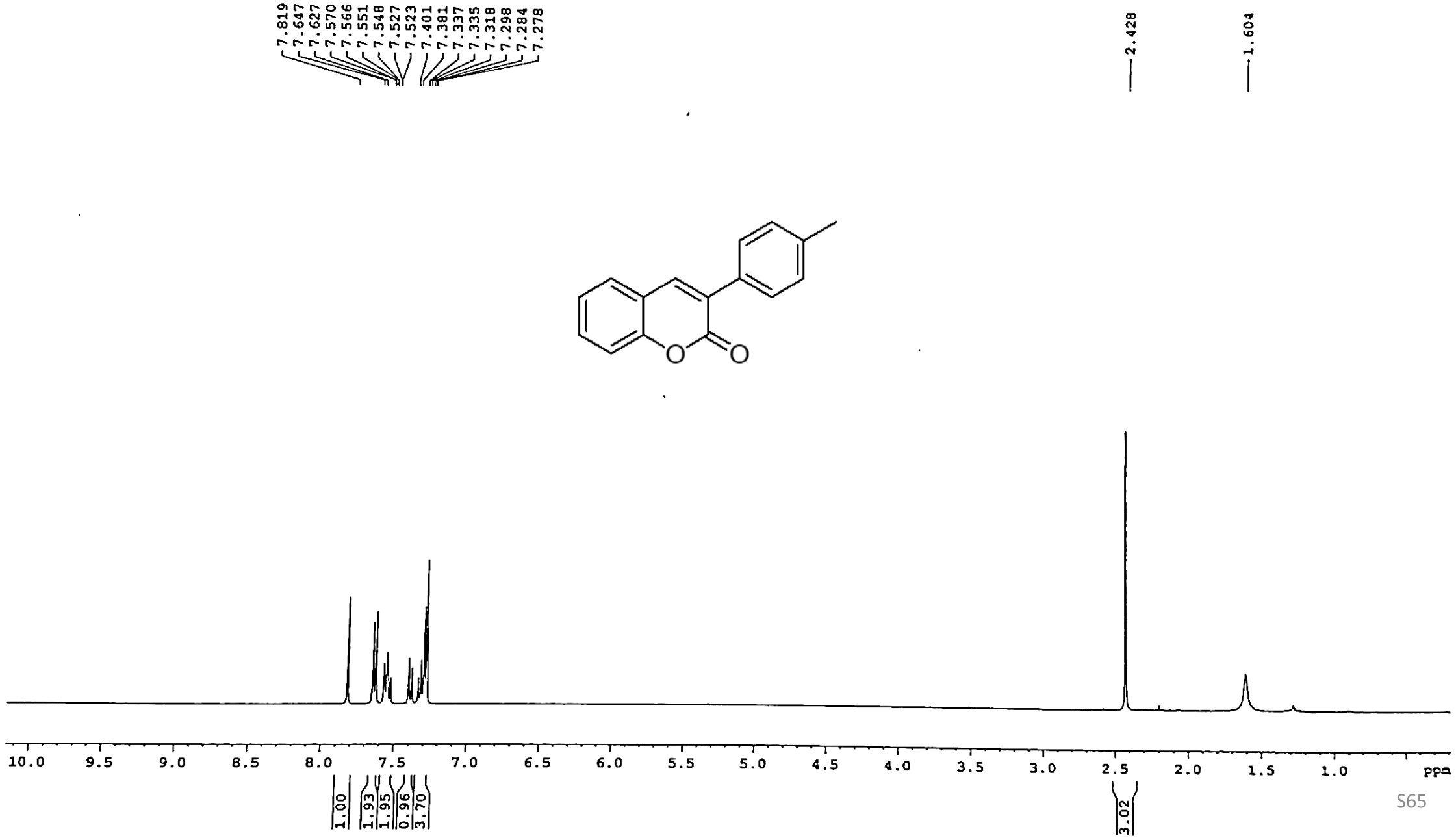
^{1}H NMR OF 1,1’-(1*E*)-1-Propene-1,3-diylbis[4-methylbenzene] (3aj)



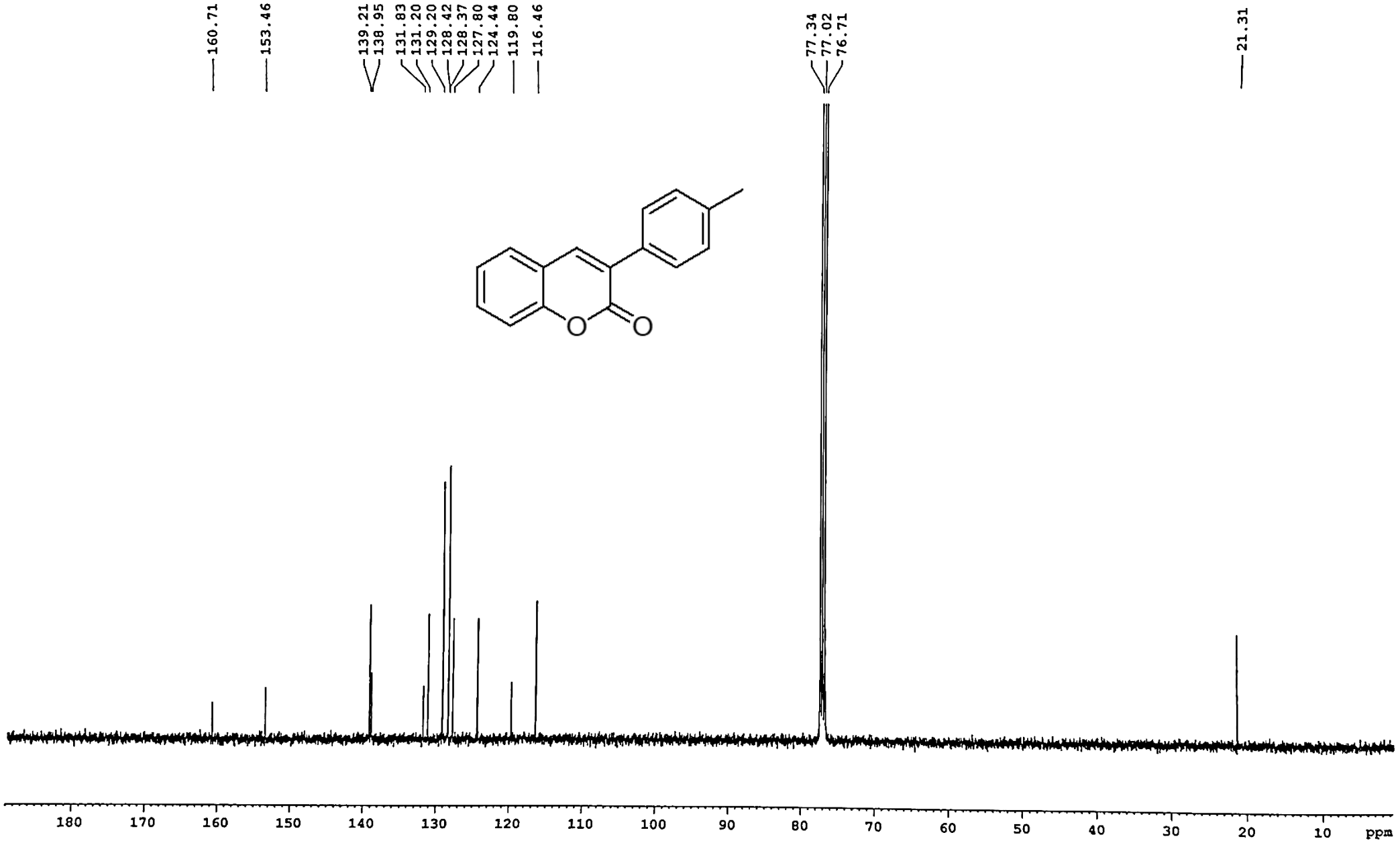
^{13}C NMR OF 1,1’-(1*E*)-1-Propene-1,3-diylbis[4-methylbenzene] (3aj)



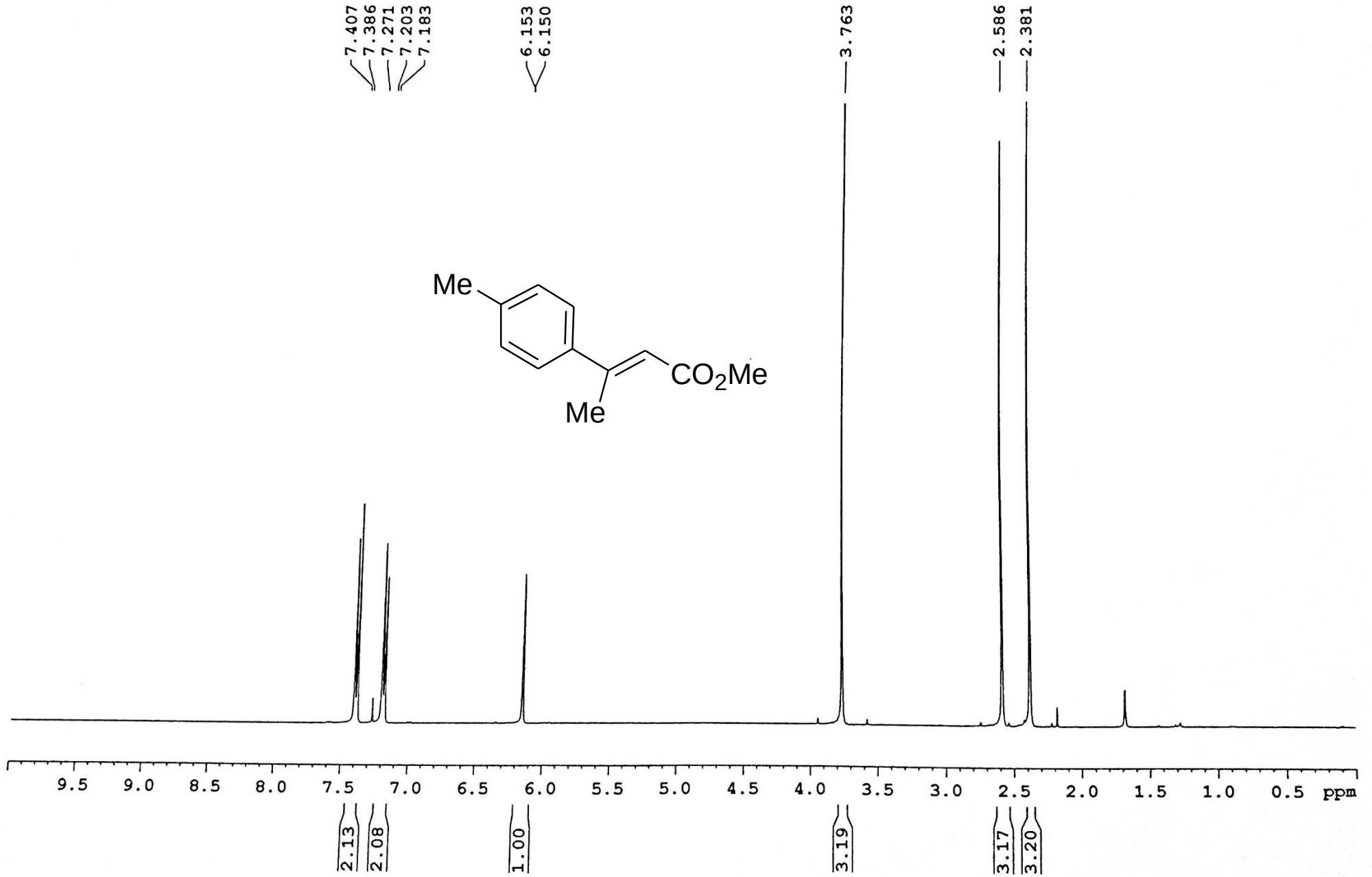
^{1}H NMR OF 3-*p*-Tolyl-chromen-2-one (3ak)



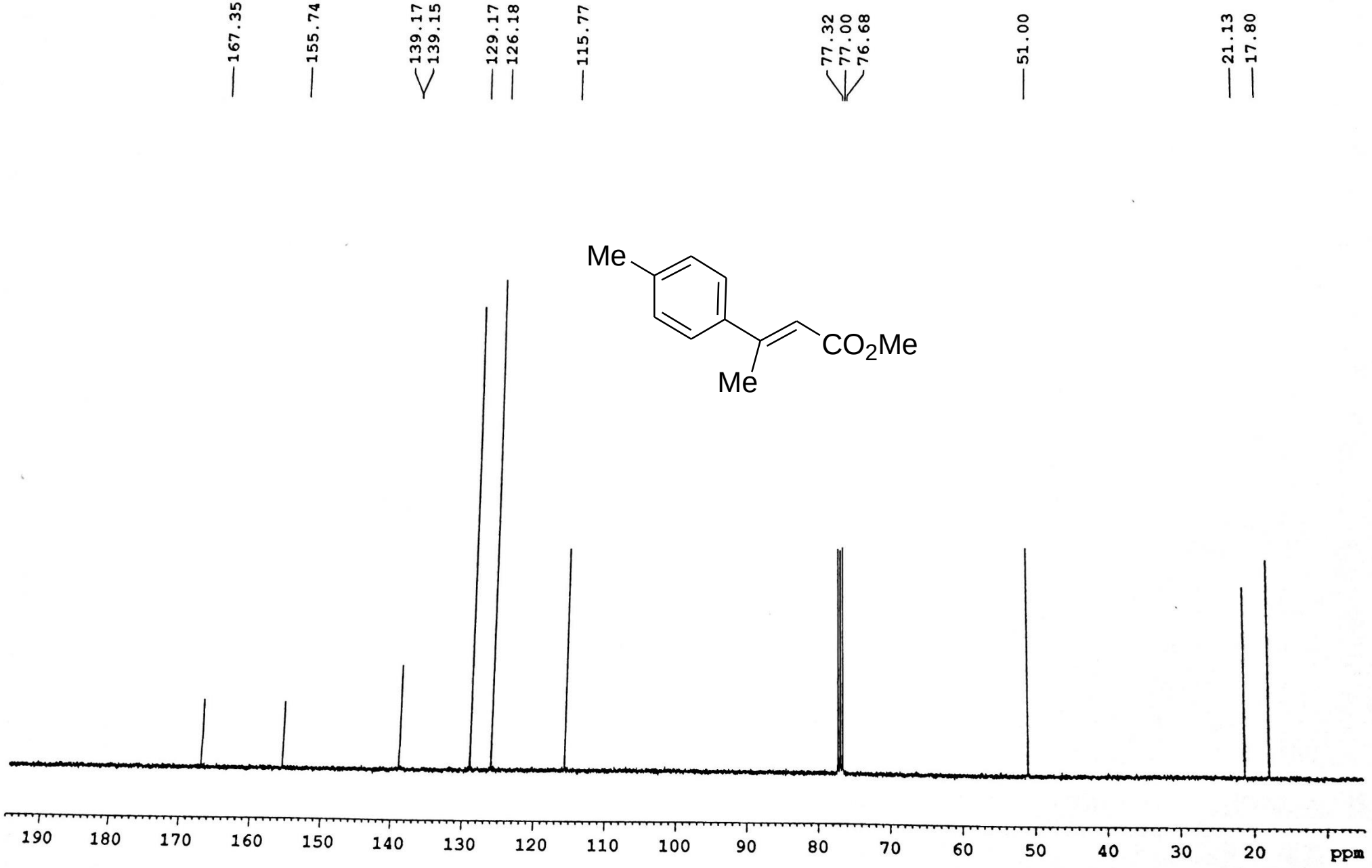
^{13}C NMR OF 3-*p*-Tolyl-chromen-2-one (3ak)



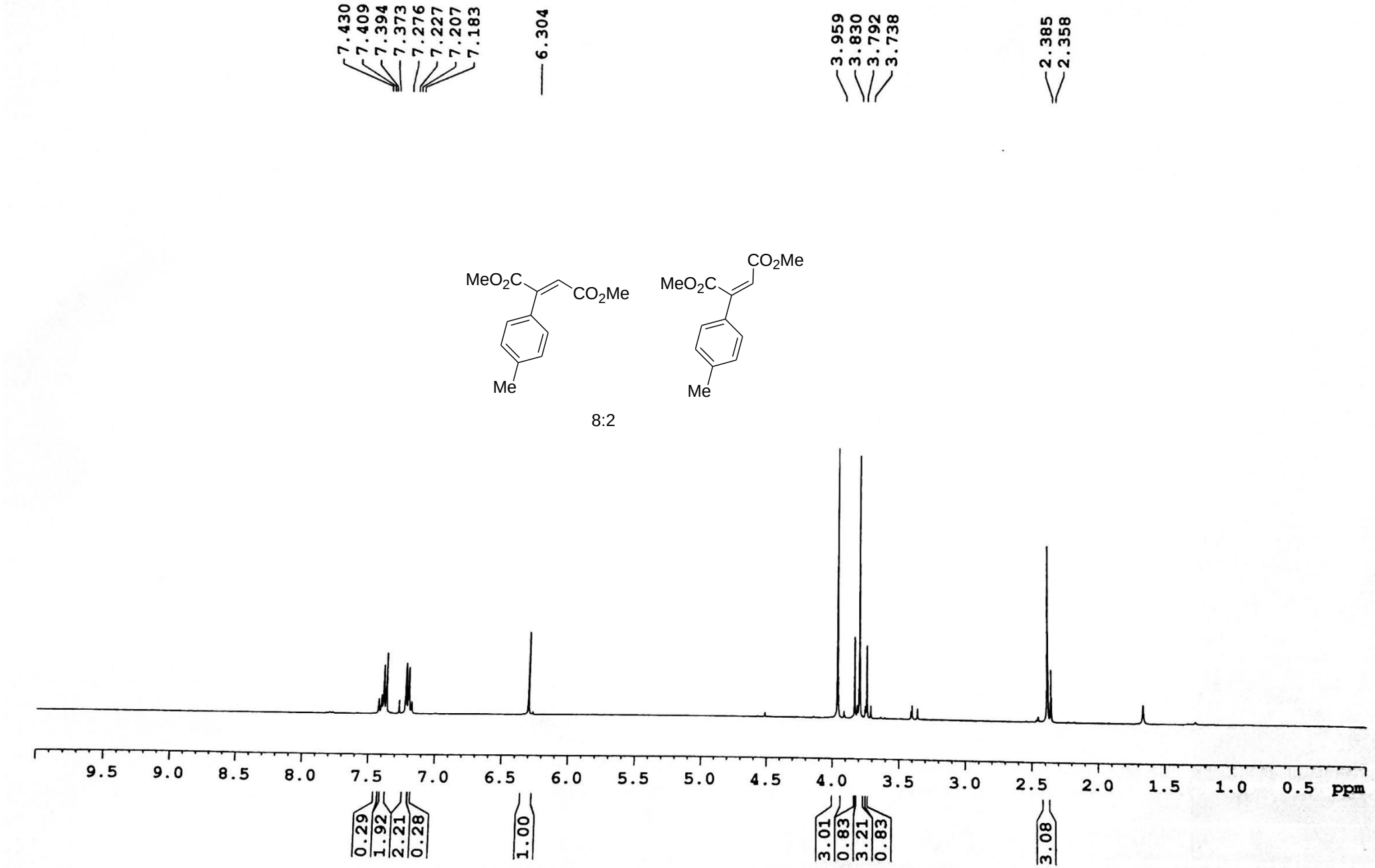
^{1}H NMR OF 3-p-Tolyl-but-2-enoic acid methyl ester (3al)



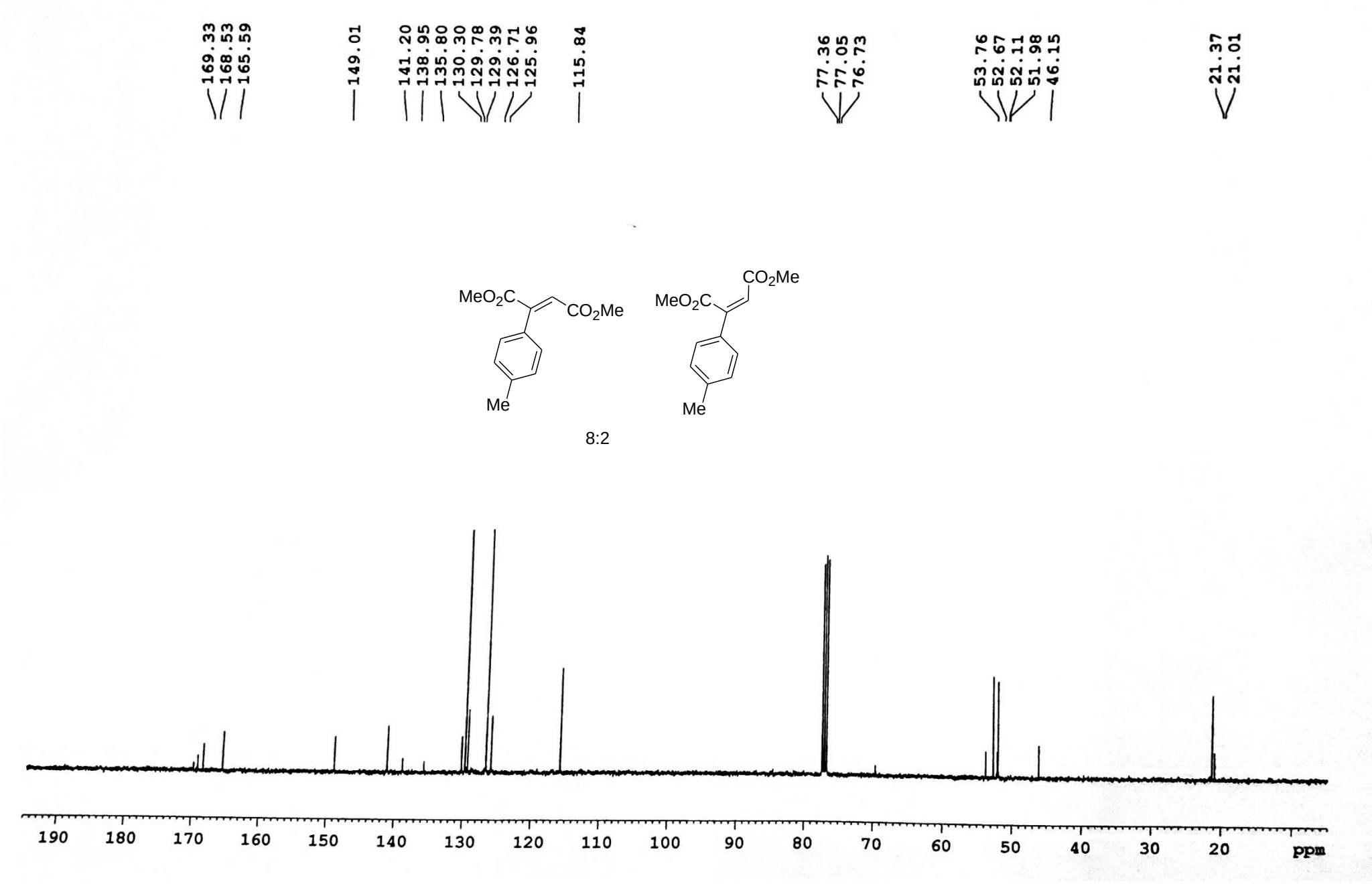
^{13}C NMR OF 3-p-Tolyl-but-2-enoic acid methyl ester (3al)



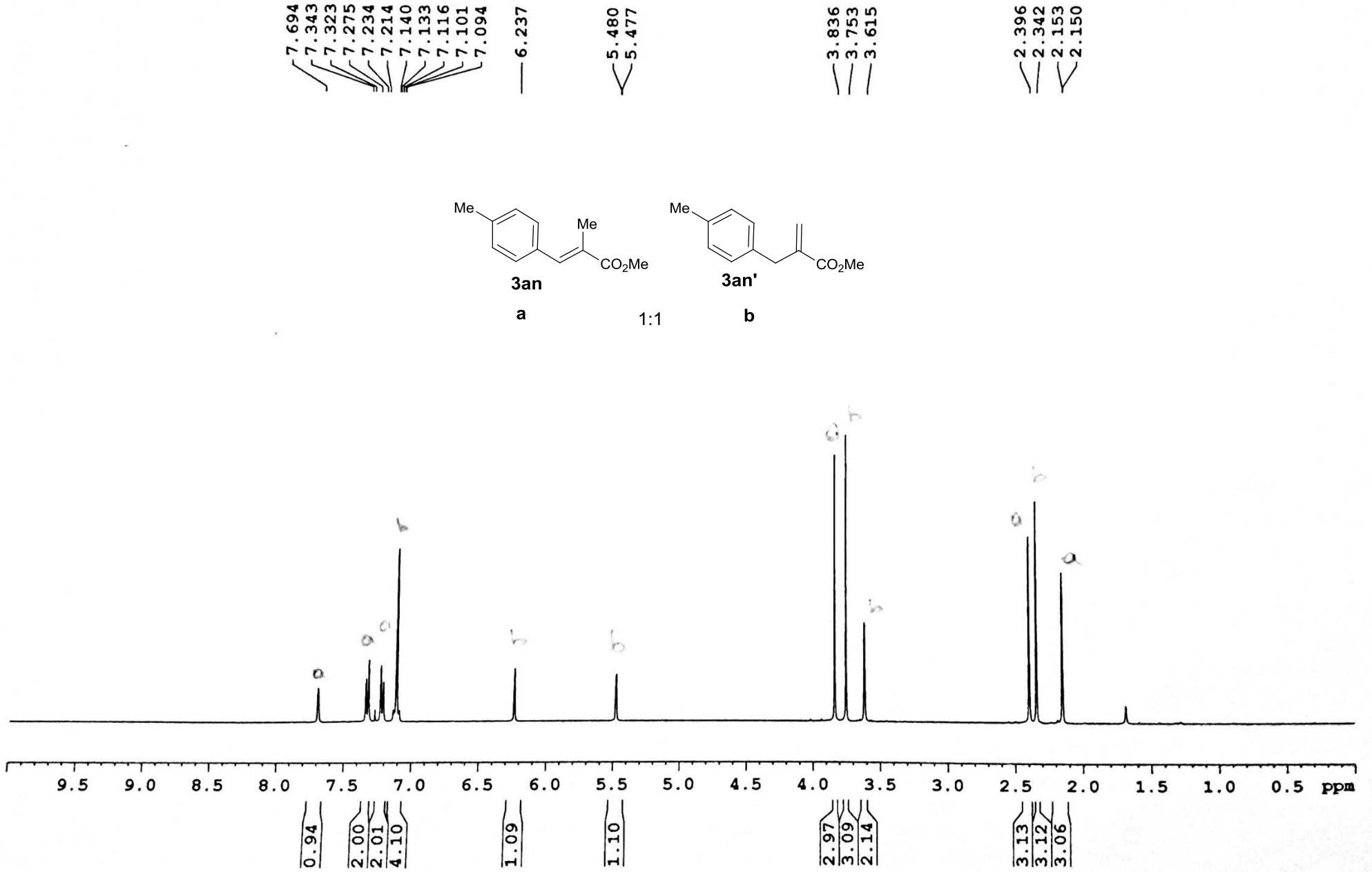
^{1}H NMR OF 2-p-Tolyl-but-2-enedioic acid dimethyl ester (3am)



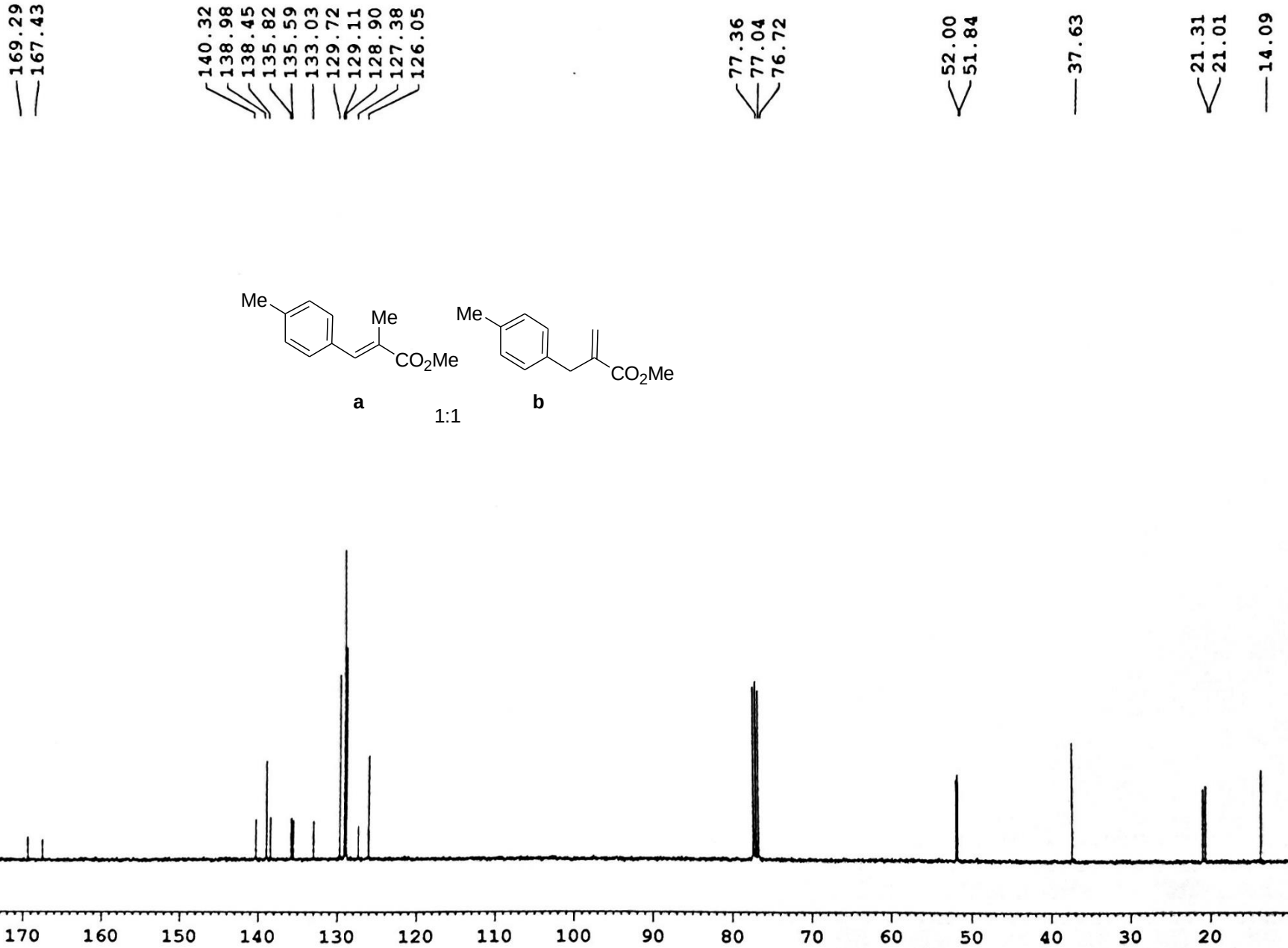
^{13}C NMR OF 2-p-Tolyl-but-2-enedioic acid dimethyl ester (3am)



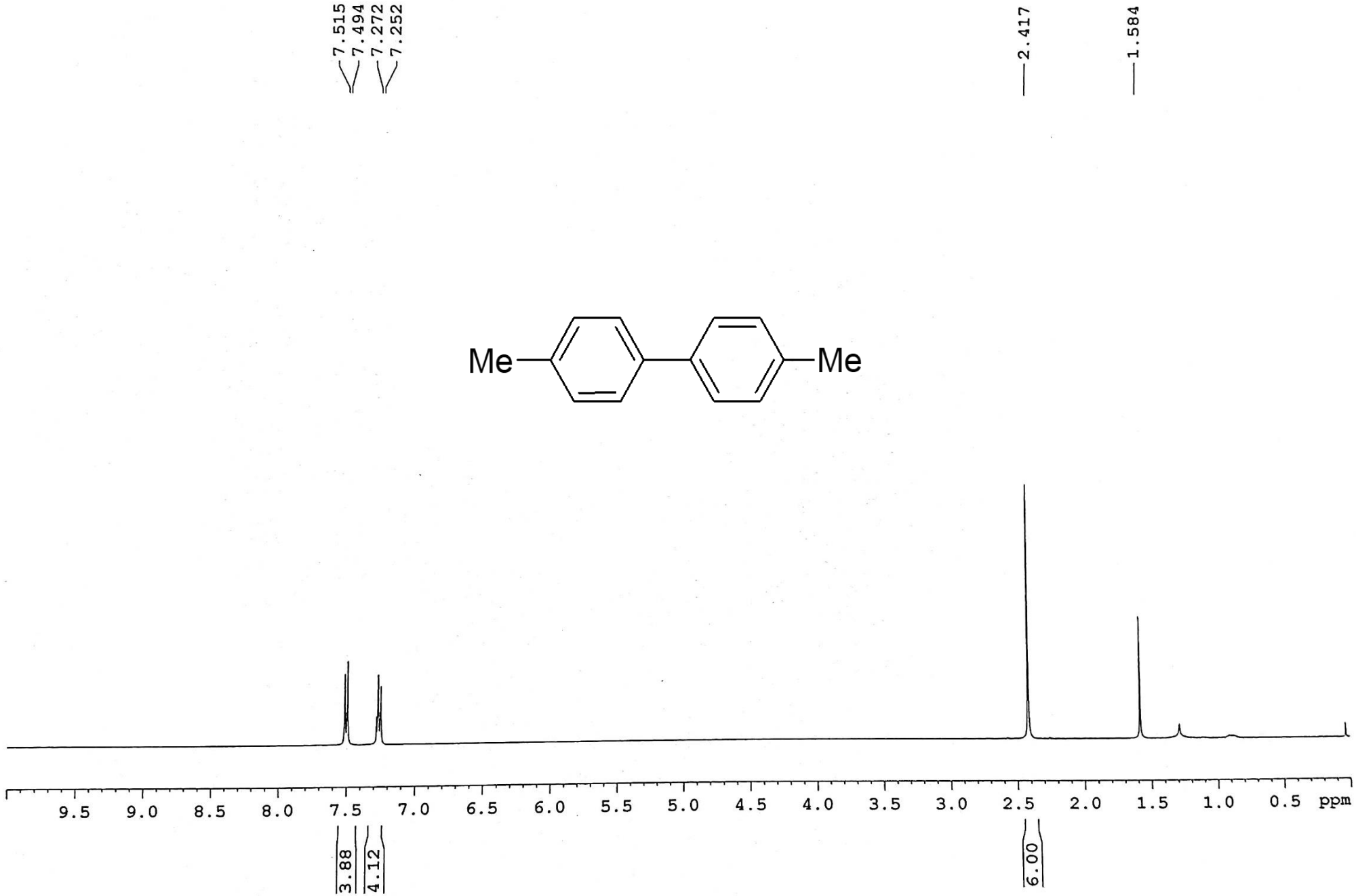
^{1}H NMR Of 2-Methyl-3-p-tolyl-acrylic acid methyl ester (3an)



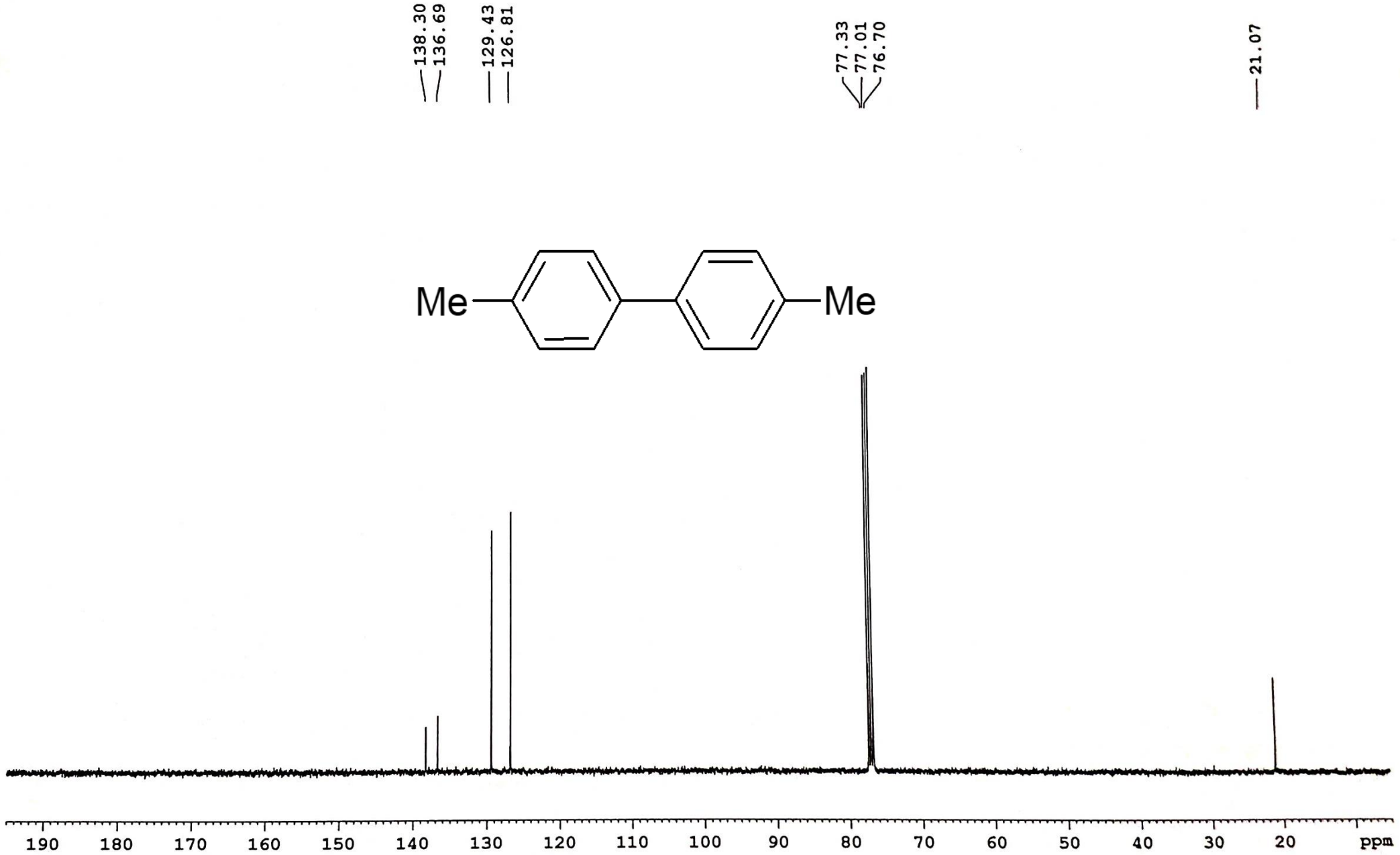
^{13}H NMR OF 2-Methyl-3-p-tolyl-acrylic acid methyl ester (3an)



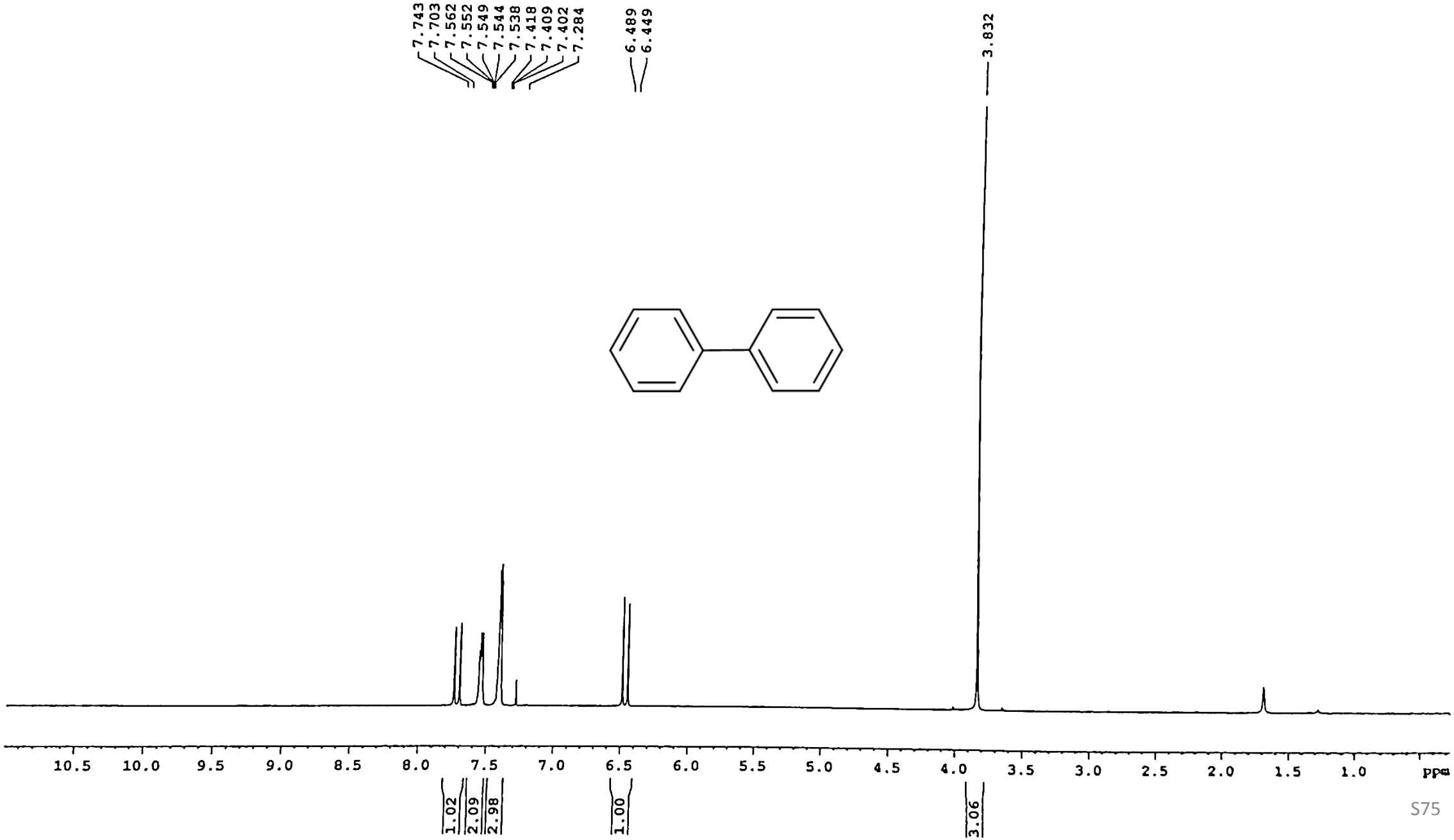
^{1}H NMR OF 4,4'-Dimethyl-biphenyl (4a)



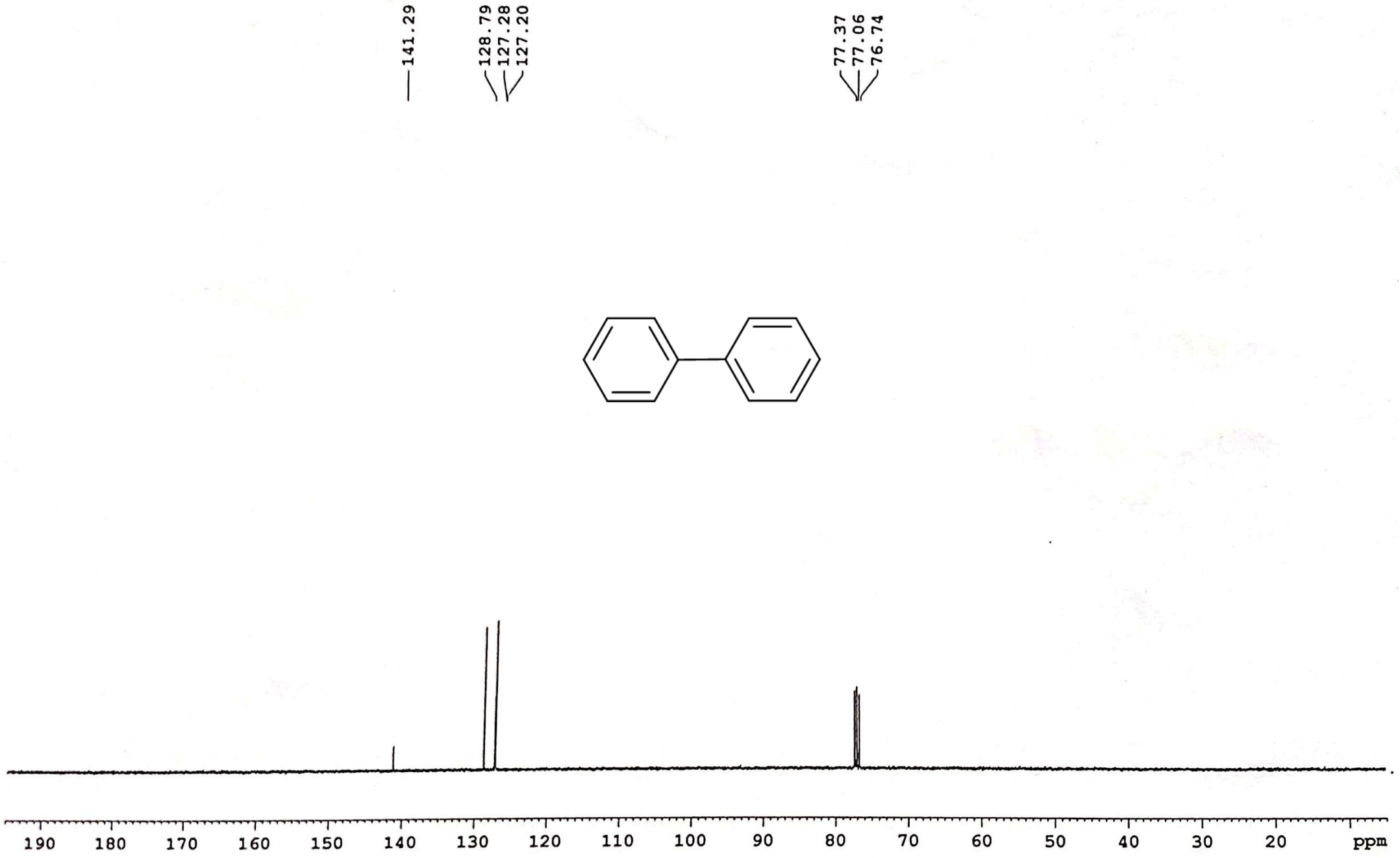
^{13}C NMR OF 4,4'-Dimethyl-biphenyl (4a)



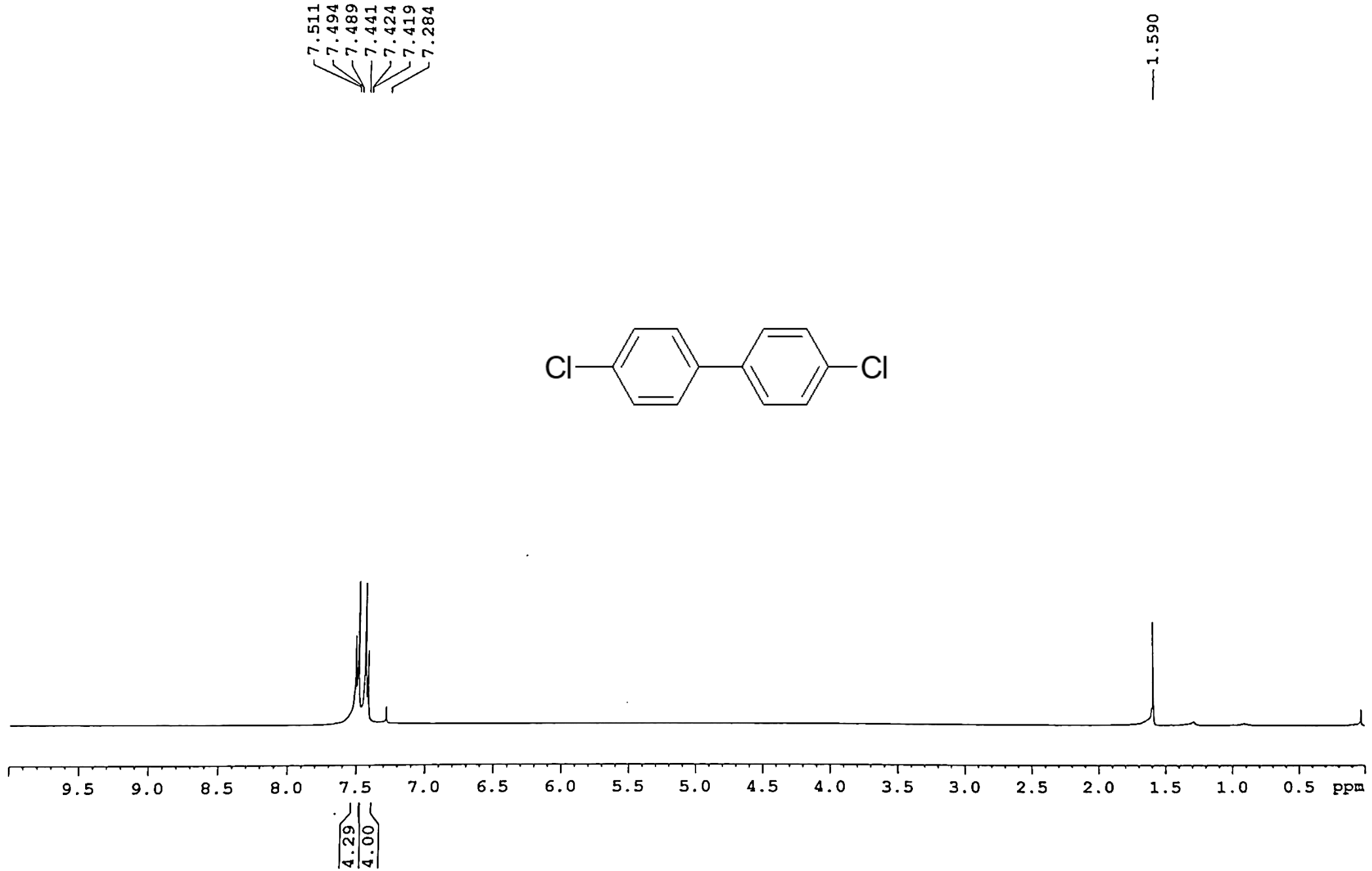
^{1}H NMR OF Biphenyl (4b)



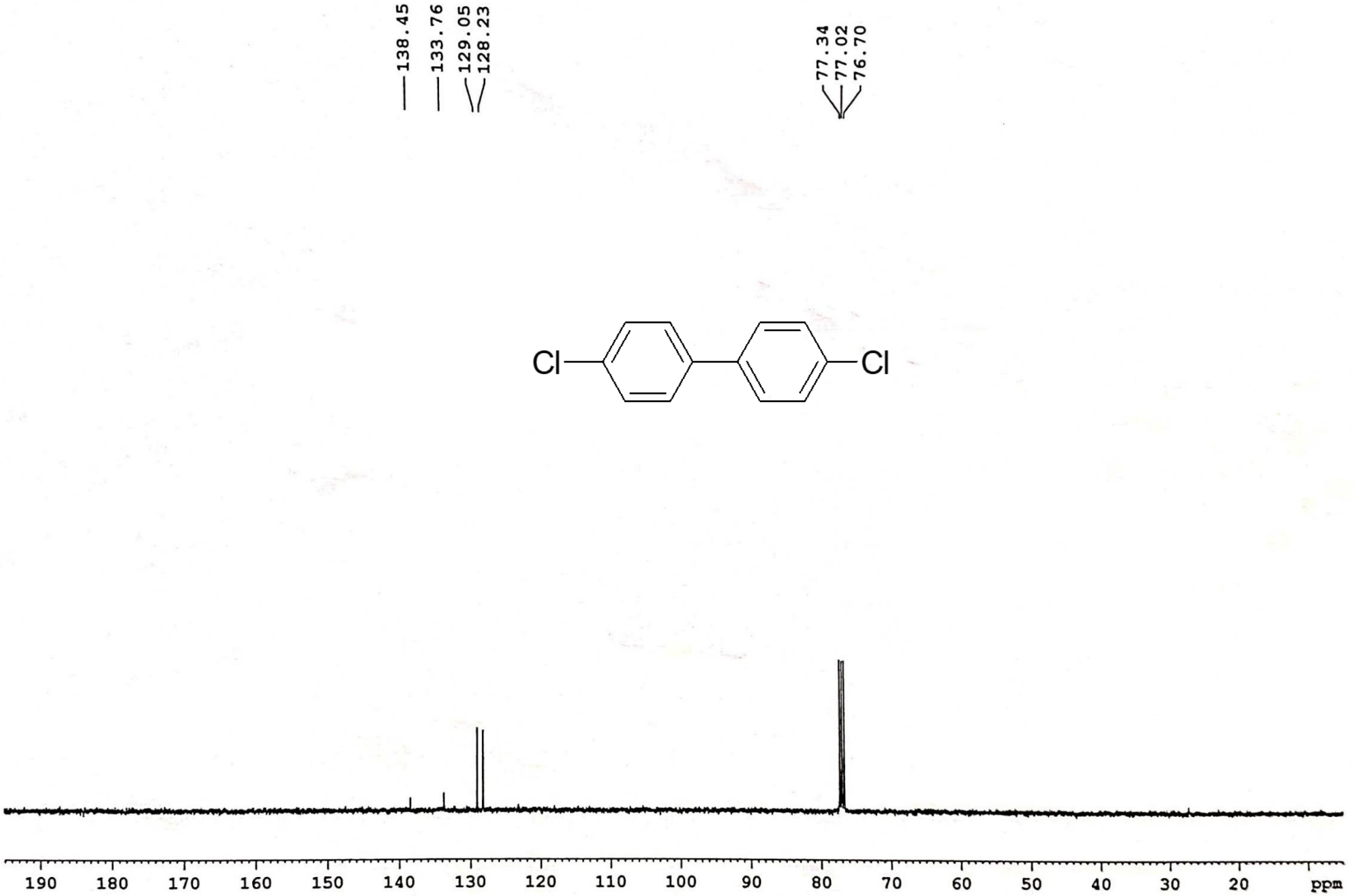
^{13}C NMR OF Biphenyl (4b)



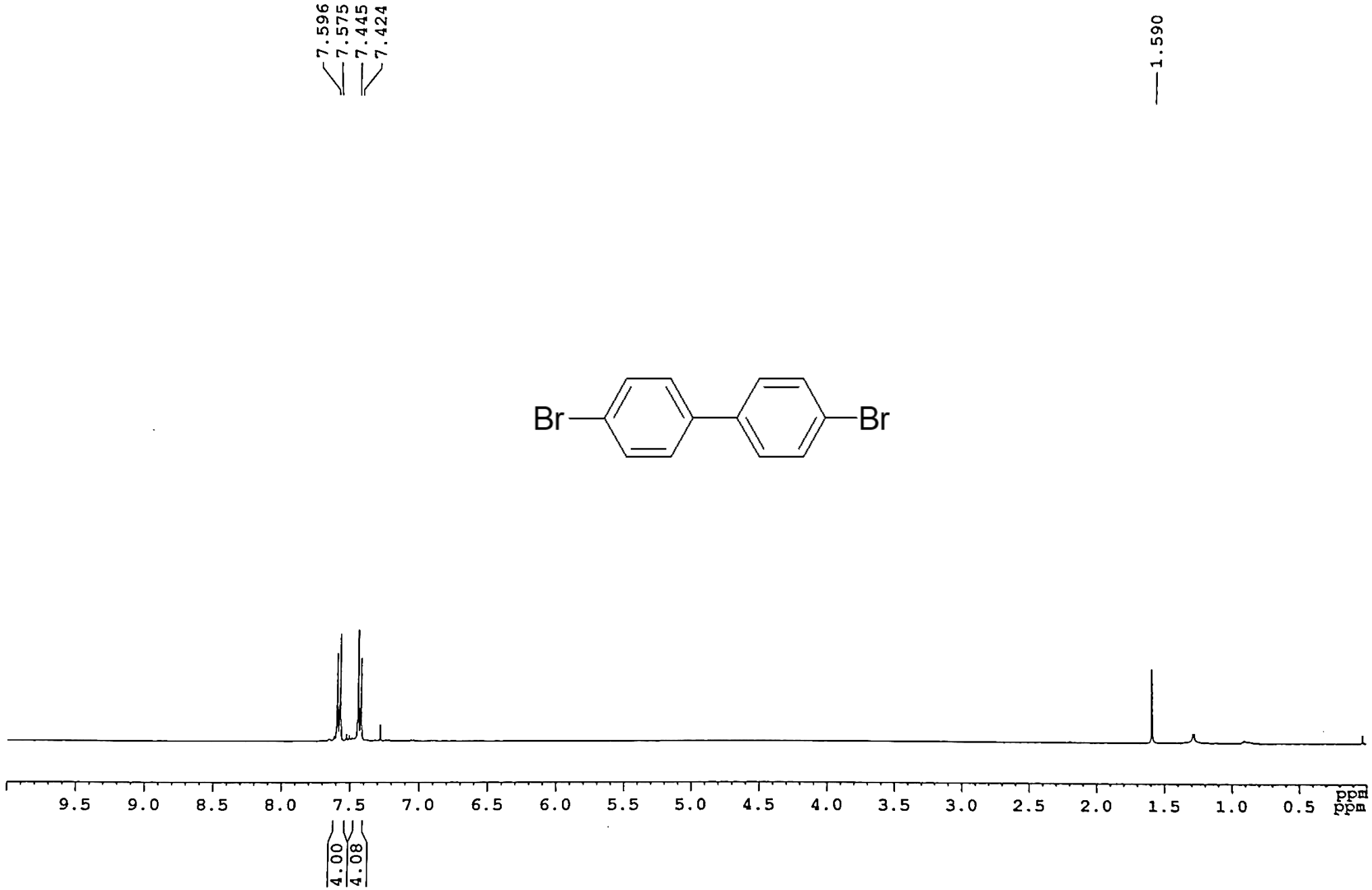
^{1}H NMR OF 4,4'-Dichloro-biphenyl (4c)



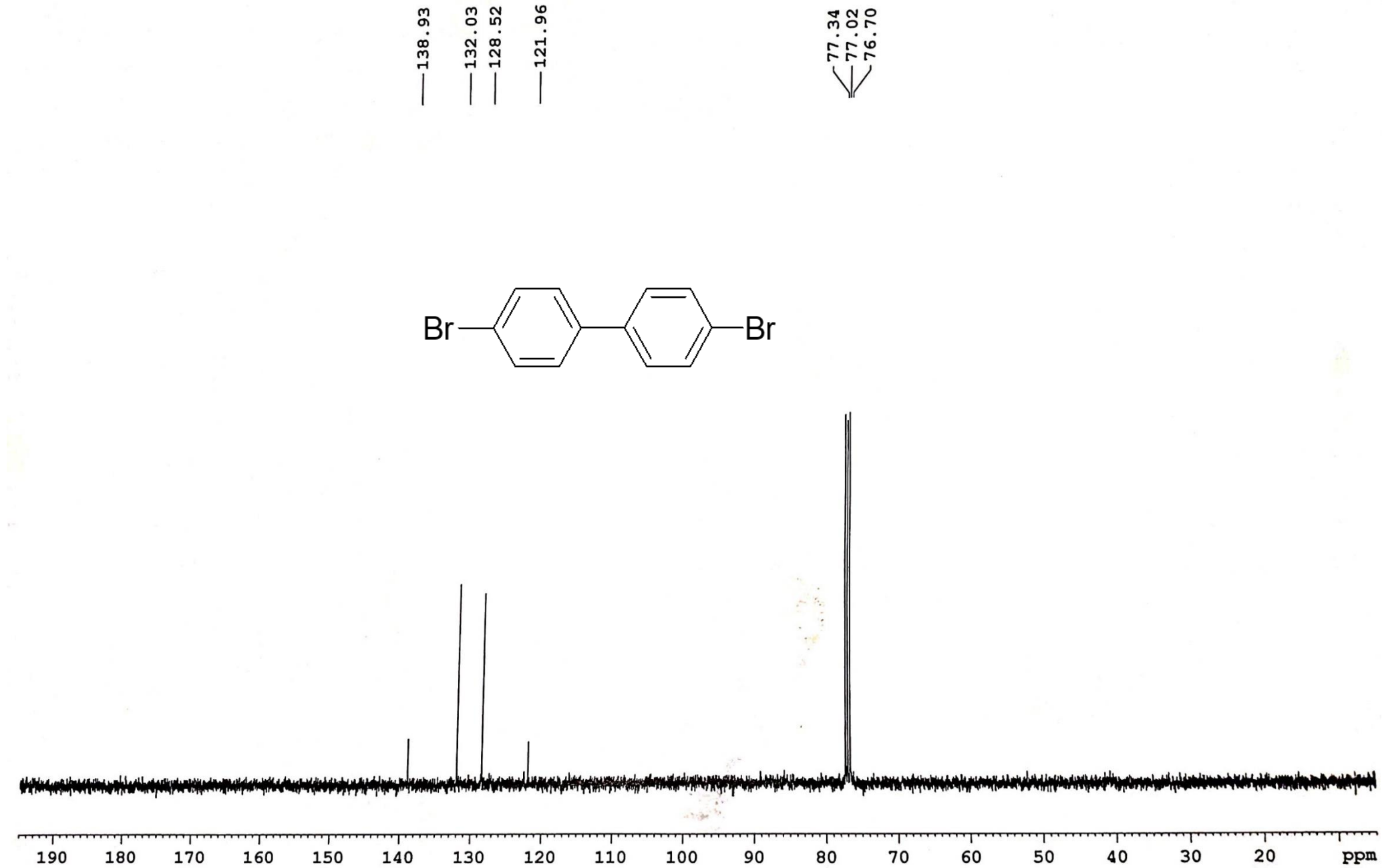
^{13}C NMR OF 4,4'-Dichloro-biphenyl (4c)



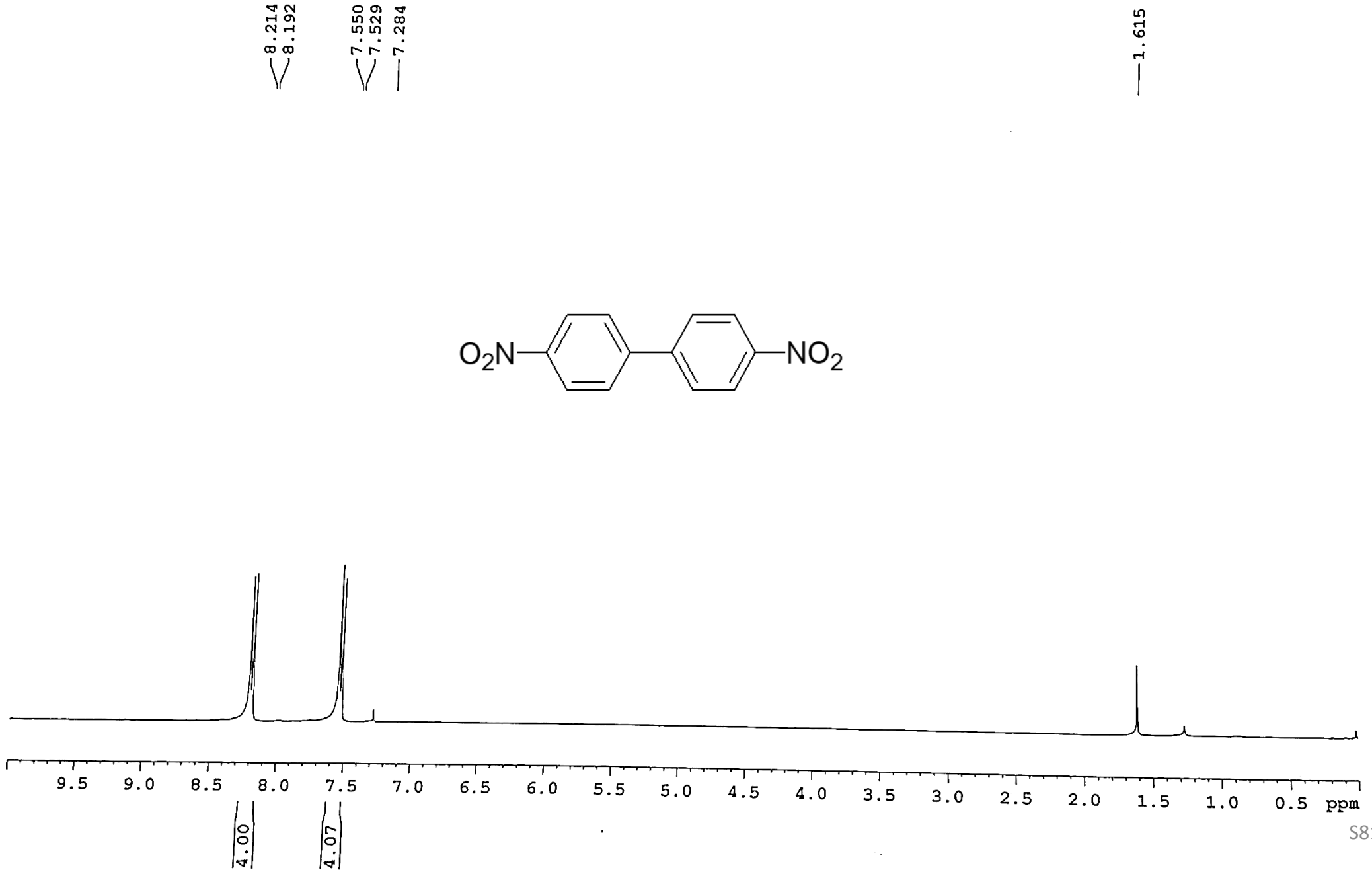
^{1}H NMR OF 4,4'-Dibromo-biphenyl (4d)



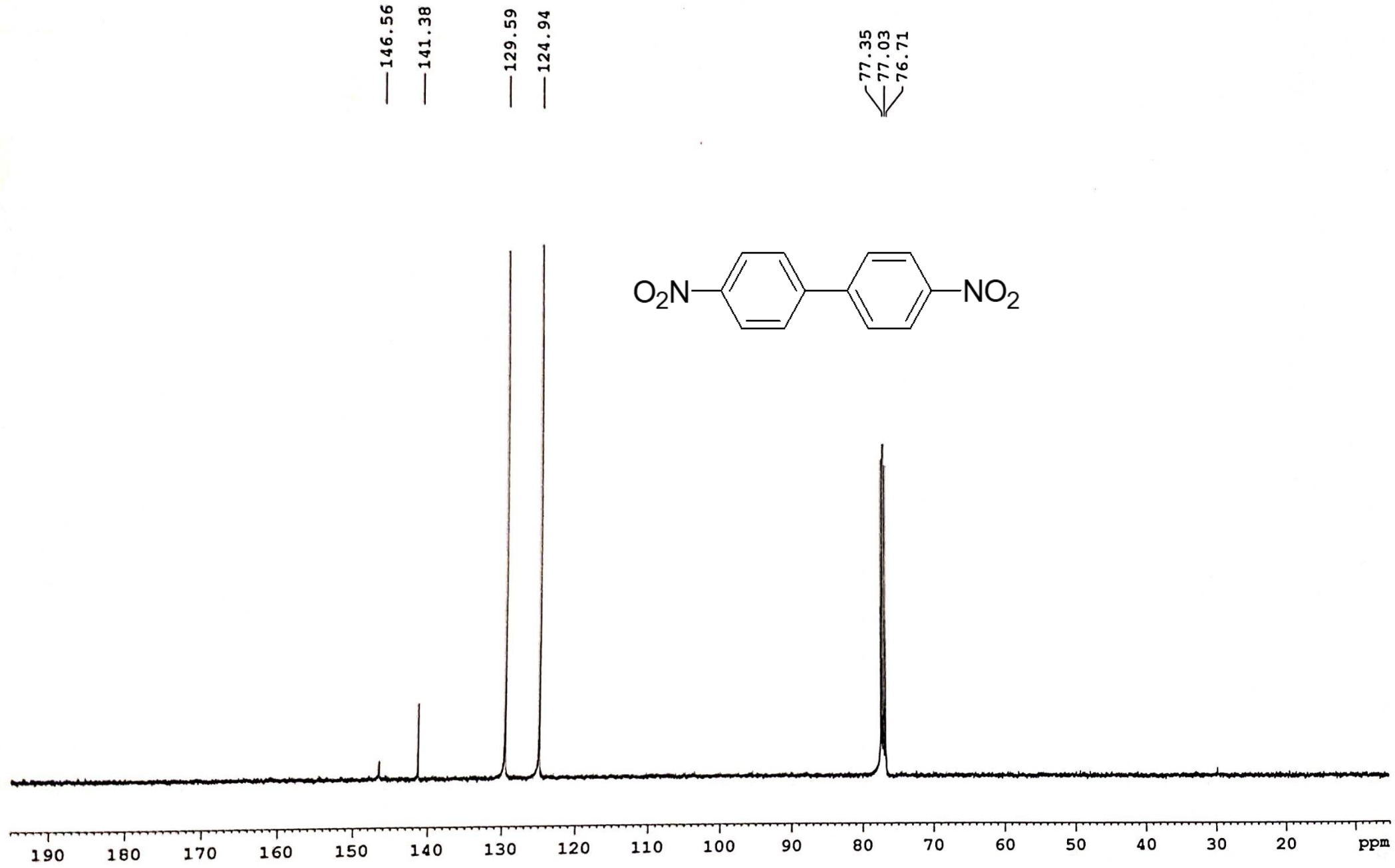
^{13}C NMR OF 4,4'-Dibromo-biphenyl (4d)



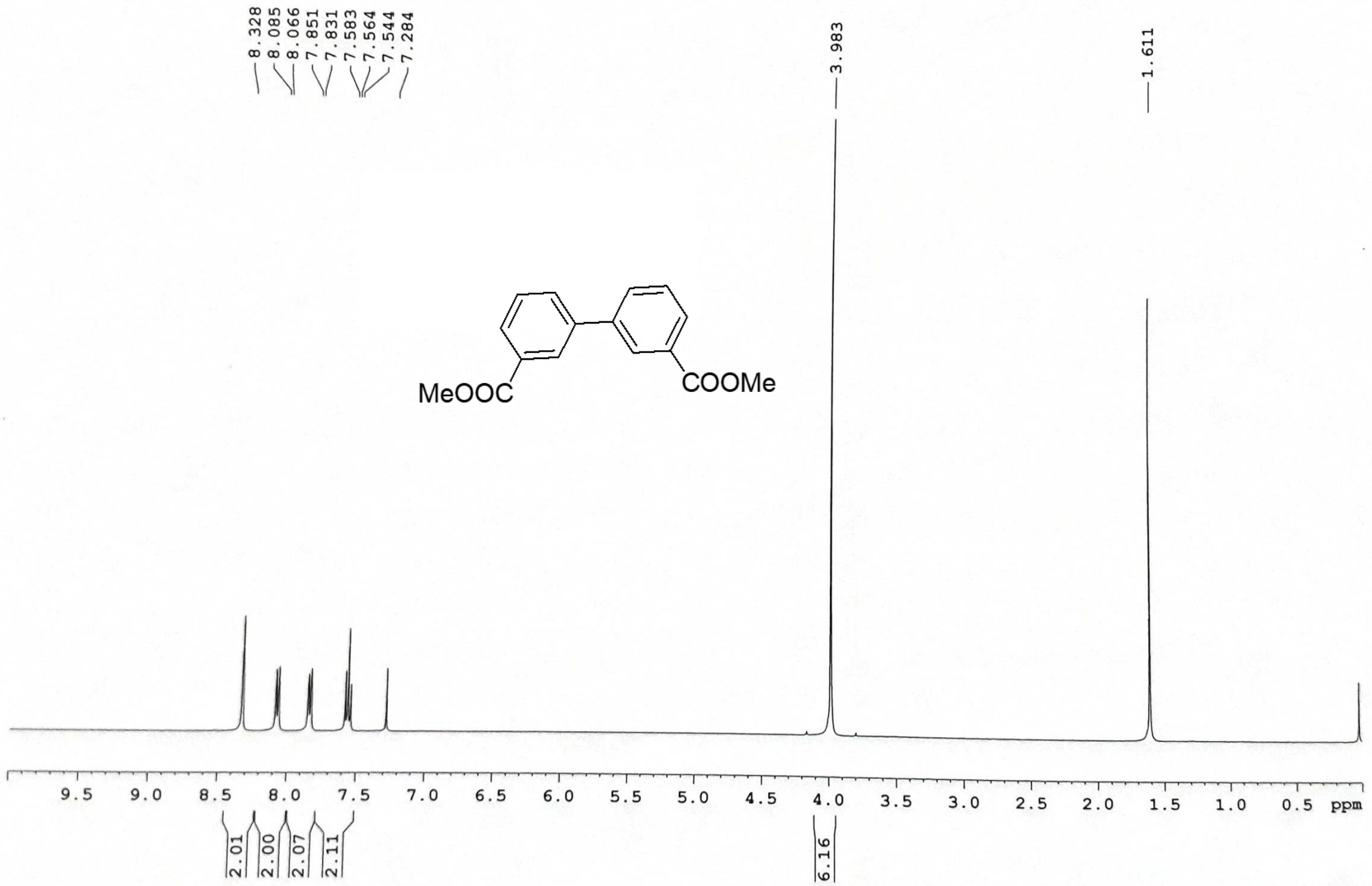
^{1}H NMR OF 4,4'-Dinitro-biphenyl (4e)



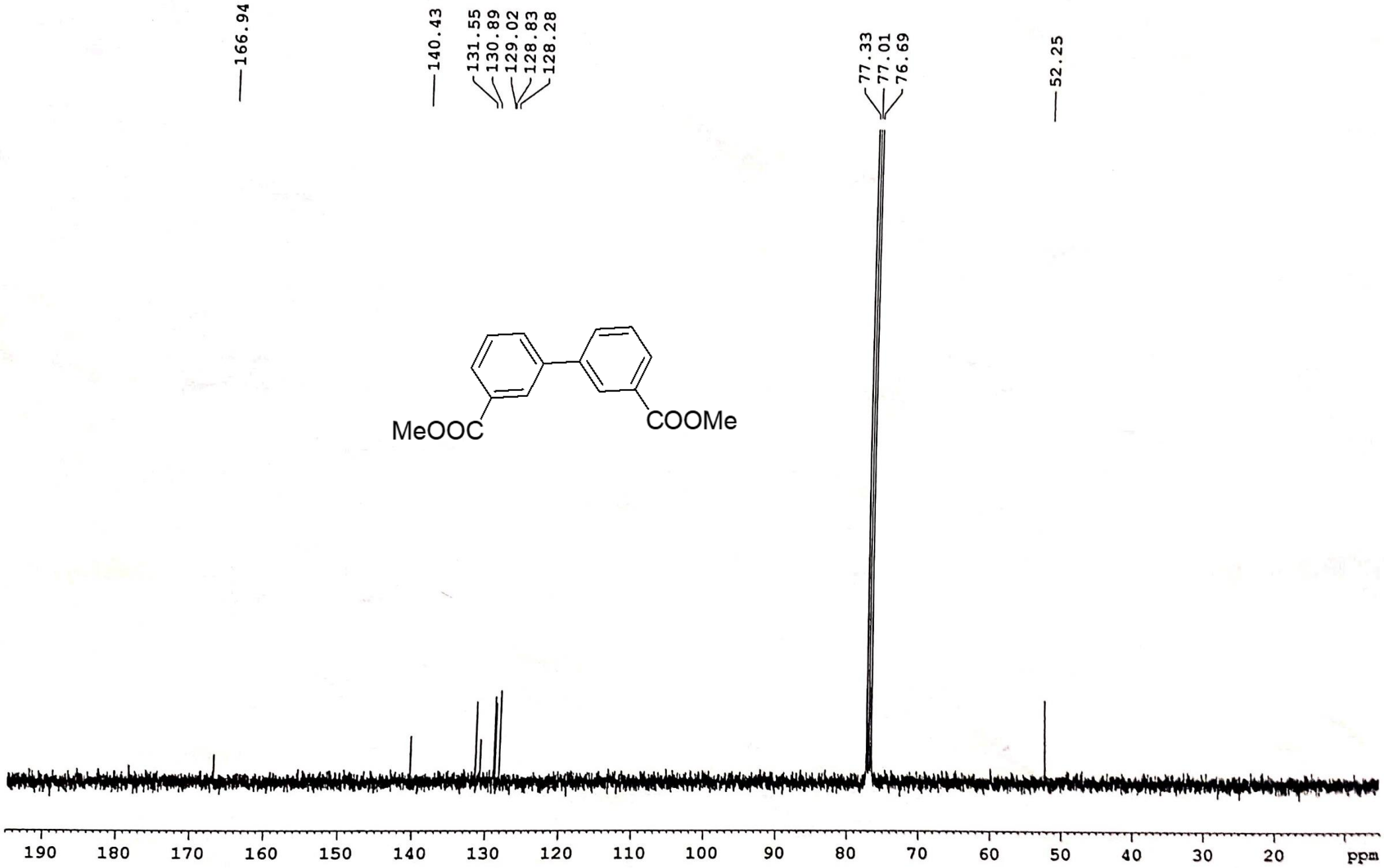
^{13}C NMR OF 4,4'-Dinitro-biphenyl (4e)



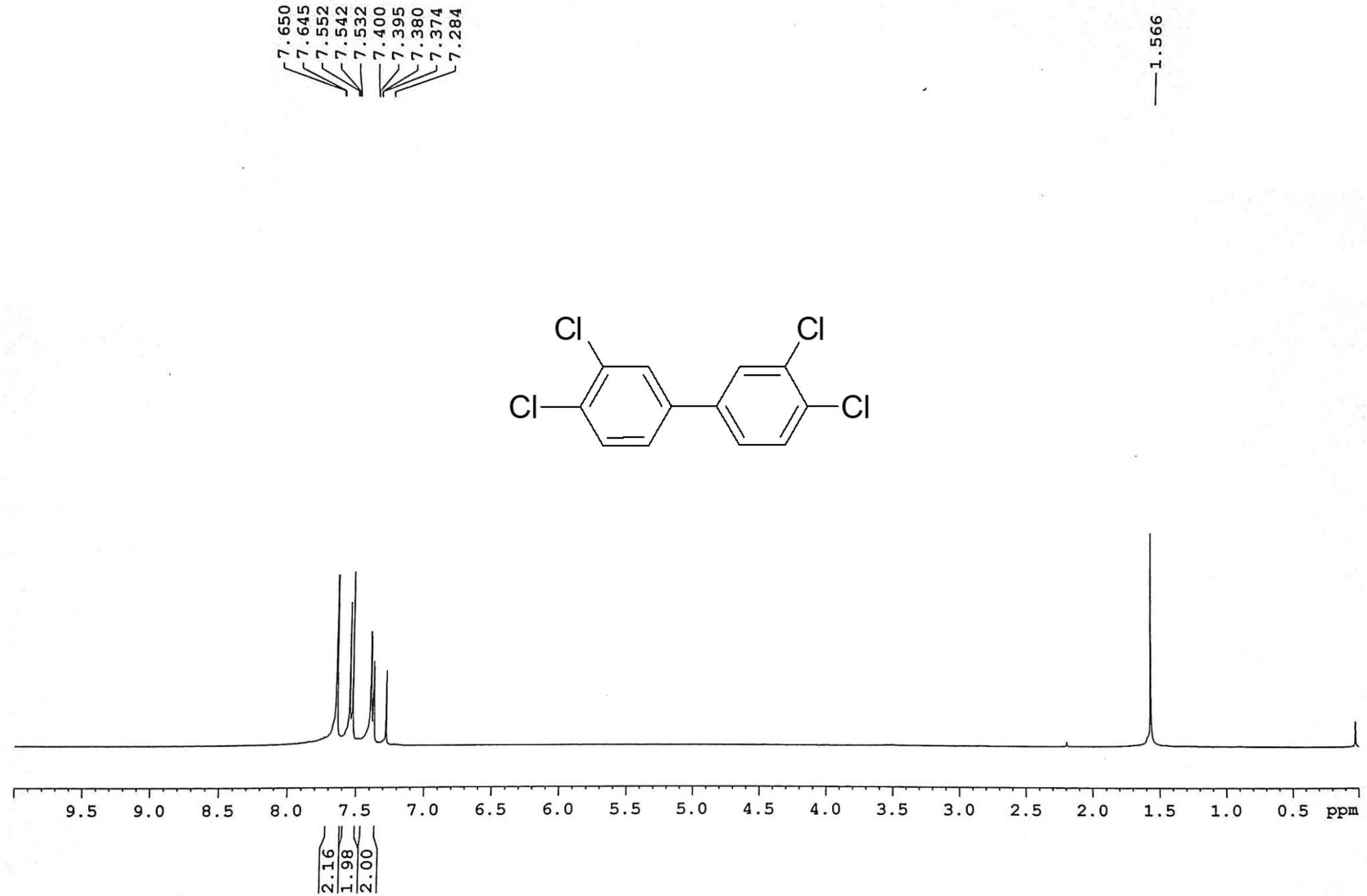
^{1}H NMR OF Biphenyl-3,3'-dicarboxylic acid dimehyl ester (4f)



^{13}C NMR OF Biphenyl-3,3'-dicarboxylic acid dimehyl ester (4f)



^{1}H NMR OF 3,4,3',4'-Tetrachloro-biphenyl (4g)



^{13}C NMR OF 3,4,3',4'-Tetrachloro-biphenyl (4g)