Electronic Supporting Information

Nimesulide based novel glycolamide ester: Their design, synthesis and pharmacological evaluation

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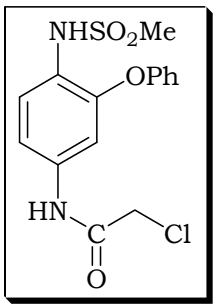
General Methods

Melting points were determined by open glass capillary method on a Cintex melting point apparatus and are uncorrected. IR spectra were recorded on a Perkin-Elmer spectrometer using KBr pellets. ^{1}HNMR spectra were recorded on a Bruker ACF-300 machine and a Varian 300 and 400 MHz spectrometer using $CDCl_3$ or DMSO-d_6, with reference to tetramethylsilane as an internal reference. ^{13}CNMR spectra were recorded on a 75 MHz spectrometer. Elemental analyses were performed by Varian 3LV analyzer series CHN analyzer. Mass spectra were recorded on a Jeol JMC D-300 instrument by using Electron ionization at 70 ev. The ALOGPS 2.1 program (http://www.vcclab.org/lab/alogps/start.html) was used to calculate the average logP and average logs values. All reactions were monitored by TLC on pre-coated silica gel plates. Column chromatography was performed on 100-200 mesh silica gel (SRL, India) using 10-20 times (by weight) of the crude product. All the carboxylic acids used are commercially available.

Synthesis of 2-chloro-*N*–(4-methanesulfonylamino-3-phenoxy-phenyl)-acetamide (2)



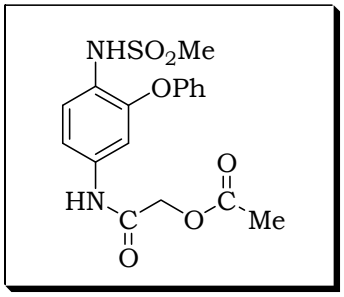
3.6 mmol (1gm) of compound (**1**) was taken into a round bottomed flask. To this 20 mL of $CHCl_3$ and 0.6 mL of TEA were added. This mixture was stirred and then cooled to 0 ºC using ice. To this mixture 3.6 mmol (0.5 mL) of α-chloro acetyl chloride was added drop wise. The mixture was then allowed to come to room temperature and stirring was continued for an additional 30 minutes. After completion of the reaction as monitored by TLC, the reaction was quenched with 10-15 mL of cold water, which was then extracted with $CHCl_3$. The organic layers were collected, combined, washed with water, dried over anhydrous Na_2SO_4 and concentrated under reduced pressure. The crude was recrystallised with aqueous EtOH. Off White; M.P: 135-136 ºC; R_f: 0.45 ($CHCl_3$: Ethyl acetate = 9:1); IR (KBr) ν_{max}/cm^{-1}: 3325, 3265, 1665, 1611, 1589; ^{1}H NMR (400 MHz, DMSO-d_6): δ 10.30 (s, 1H, NHCO, D_2O exchangeable), 9.25 (s, 1H, NH, D_2O exchangeable), 7.50-7.40 (m, 2H), 7.38-7.26 (m, 2H), 7.21-7.14 (m, 2H),7.10 (d, *J* 8.8 Hz, 2H), 4.20 (s, 2H), 3.00 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 164.7, 155.4, 148.2, 134.8, 130.2, 124.7, 124.4, 123.1, 118.8, 115.6, 110.1, 52.7, 39.4; MS (*m*/*z*): 355 (M^+, 100%), 357.2 (M^++2, 33%); Elemental analysis: found: C, 50.84; H, 4.02; N, 7.73; $C_{15}H_{15}ClN_2O_4S$ requires C, 50.78; H, 4.26; N, 7.90.

General procedure for the synthesis of glycolamide esters (4a-l)

A mixture of *N*-chloroacetamide (0.01 mol), appropriate acid (0.01mol), potassium iodide (0.001mol), triethyl amine (0.011mol) and dimethyl formamide (10 mL) was stirred for 15-45 min (depending on the acid derivative) at 90^{o}C. The reaction mixture was poured into water (50 mL) and extracted with ethyl acetate (3× 50 mL). The combined organic extracts were washed with 2% aqueous sodium bicarbonate (50 mL) and water (3×50 mL). The organic layer was dried over anhydrous sodium sulphate and evaporated under

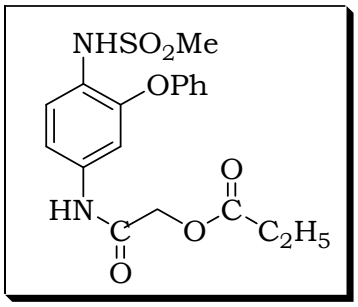
reduced pressure to get solid residue which was purified by column chromatography to get the corresponding glycolamide esters (**4a-l**).

Acetic acid (4-methanesulfonylamino-3-phenoxy-phenyl carbamoyl)-methyl ester (4a)



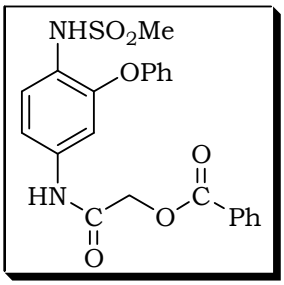
Colour: Light orange.**M.P:** 116-120 ºC.**R_f:** 0.38 ($CHCl_3$: Ethyl acetate = 9:1).**IR (KBr) ν_{max}/cm^{-1}:** 3277, 1742, 1677, 1616, 1591.**^{1}H NMR (400 MHz, $CDCl_3$):** δ 7.78 (bs, 1H, NH, D_2O exchangeable), 7.58 (d, 1H, *J* 8.8Hz), 7.41-7.37 (m, 2H), 7.32 (d, 1H, *J* 2.1Hz), 7.21-7.13 (m, 2H), 7.01 (d, 2H, *J* 7.9Hz), 6.76 (s, 1H), 4.62 (s, 2H), 2.98 (s, 3H), 2.20 (s, 3H).**^{13}C NMR (100 MHz, DMSO-d_6):** δ 169.9, 165.5, 155.8, 151.1, 137.8, 130.0, 127.8, 123.9, 122.9, 119.3, 114.0, 108.8, 62.4, 40.3, 20.4.**MASS (*m*/*z*):** 379.2 (M^+, 100%).**ELEMENTAL ANALYSIS** found: C, 53.84; H, 4.82; N, 7.33; $C_{17}H_{18}N_2O_6S$ requires C, 53.96; H, 4.79; N, 7.40.

Propionic acid (4-methanesulfonylamino-3-phenoxy-phenyl carbamoyl)-methyl ester (4 b)



Colour: Light orange.**M.P:** 102-104 ºC.**R_f:** 0.52 ($CHCl_3$: Ethyl acetate =9:1).**IR (KBr) ν_{max}/cm^{-1}:** 3278, 2928, 1747, 1674, 1612.**^{1}H NMR (400 MHz, $CDCl_3$):** δ 7.72 (bs, 1H, D_2O exchangeable, NH), 7.59 (d, 1H, *J* 8.5Hz), 7.41-7.37 (m, 2H), 7.34 (s, 1H), 7.19-7.17 (m, 1H), 7.13 (dd, 1H, *J* 8.5, 1.8 Hz), 7.01 (d, 2H, *J* 8.3 Hz), 6.78 (bs, 1H, D_2O exchangeable, NH), 4.63 (s, 2H), 2.98 (s, 3H), 2.48 (q, 2H, *J* 7.6 Hz), 1.20 (t, 3H, *J* 7.6 Hz).**^{13}C NMR (100 MHz, DMSO-d_6):** δ 173.2, 165.5, 155.9, 151.0, 137.4, 130.0, 127.8, 123.9, 122.9, 119.2, 114.0, 108.8, 62.3, 40.3, 26.4, 8.8.**MASS (*m*/*z*):** 393.20 (M^+, 100%).**ELEMENTAL ANALYSIS:** found: C, 55.39; H, 5.02; N, 7.01. $C_{18}H_{20}N_2O_6S$ requires C, 55.09; H, 5.14; N, 7.14.

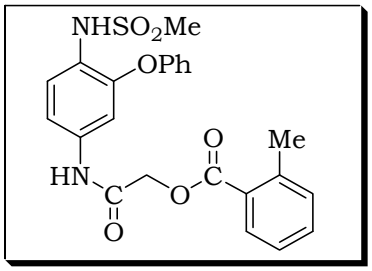
Benzoic acid (4-methanesulfonylamino-3-phenoxy-phenyl carbamoyl)-methyl ester (4c)



Colour: white.**M.P:** 127-128 ºC.**R_f:** 0.72 ($CHCl_3$: Ethyl acetate =9:1).**IR (KBr) ν_{max}/cm^{-1}:** 3266, 2933, 1736, 1672, 1611, 1548.**^{1}H NMR (400 MHz, $CDCl_3$):** δ 8.07 (d,

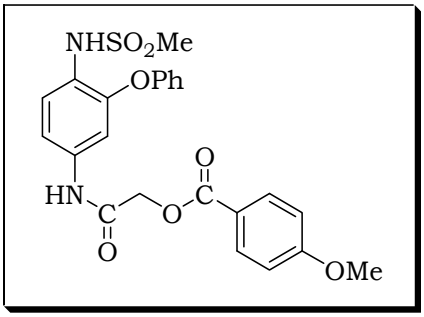
2H, *J* 7.4Hz), 7.77 (s, 1H), 7.65-7.61 (m, 2H), 7.59-7.50 (m, 2H), 7.48-7.36 (m, 3H), 7.20-7.16 (m, 1H), 7.10 (dd,1H, *J* 8.7, 2.2 Hz), 7.01 (d, 2H, *J* 8.0 Hz), 6.73 (s, 1H), 4.88(s, 2H), 2.97(s, 3H).**^{13}C NMR (100 MHz, DMSO):** δ 165.4, 155.8, 151.1, 137.4, 133.6, 130.0, 129.3, 129.1, 128.8, 127.9, 123.9, 122.9, 119.3, 114.0, 108.7, 63.0, 40.3.**MASS (*m*/*z*):** 441.20 (M^+, 100%).**ELEMENTAL ANALYSIS:** found: C, 60.09; H, 4.34; N, 6.17. $C_{22}H_{20}N_2O_6S$ requires C, 59.99; H, 4.58; N, 6.36.

2-Methyl-benzoic acid-(4-methanesulfonylamino-3-phenoxy phenylcarbamoyl)-methyl ester (4d)



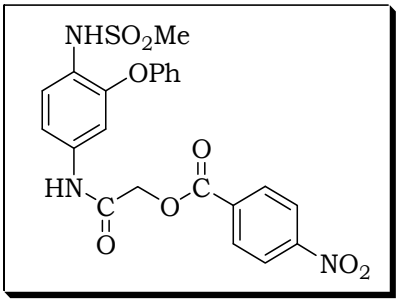
Colour: White.**M.P:** 139-140 ºC.**R_f:** 0.51 ($CHCl_3$: Ethyl acetate =9:1).**IR (KBr) ν_{max}/cm^{-1}: ^{1}H NMR (400 MHz, $CDCl_3$):** δ 7.95 (dd, 1H, *J* 8.7, 1.5 Hz), 7.78 (s, 1H), 7.60 (d, 1H, *J* 8.2 Hz), 7.48 (dd, 1H, *J* 7.6, 1.5 Hz), 7.41 -7.37 (m, 3H), 7.35-7.29 (m, 2H), 7.17 (t, 1H, 8.1 Hz), 7.10 (dd, 1H, *J* 8.7, 2.0 Hz), 7.02 (d, 2H, *J* 7.7 Hz), 6.72 (s, 1H), 4.86 (s, 2H), 2.97 (s, 3H), 2.68 (s, 3H). **^{13}C NMR (100 MHz, $CDCl_3$):** δ 180.0, 165.7, 165.3, 155.5, 148.1, 140.9, 134.7, 133.0, 132.1, 131.5, 130.2, 127.9, 126.0, 124.6, 123.0, 118.6, 115.8, 110.6, 63.3, 39.4, 21.8.**MASS (*m*/*z*):** 455 (M^+, 100%).**ELEMENTAL ANALYSIS:** found: C, 60.56; H, 4.69; N, 6.27. $C_{23}H_{22}N_2O_6S$ requires C, 60.78; H, 4.88; N, 6.16.

4-Methoxy-benzoic acid (4-methanesulfonylamino-3-phenoxy phenylcarbamoyl)-methyl ester (4e)



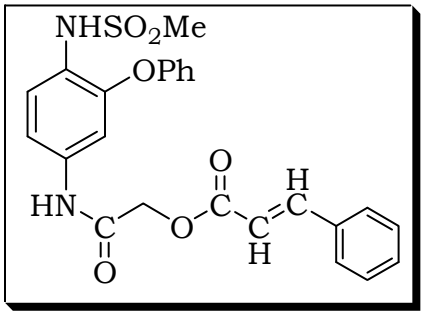
Colour: White.**M.P**: 198-200 ºC.**R_f:** 0.64 ($CHCl_3$: Ethyl acetate = 9:1).**IR (KBr) ν_{max}/cm^{-1}:** 3340, 3307, 2843, 1710, 1604.**^{1}H NMR (400 MHz, $CDCl_3$):** δ 8.03 (d, 2H, *J* 8.8 Hz), 7.76 (bs, 1H, D_2O exchangeable, NH), 7.60 (d, 1H, *J* 8.4Hz), 7.39 (t, 3H, *J* 8.5 Hz), 7.20-7.17 (m, 1H) 7.09 (dd, 1H, *J* 8.8, 2.2 Hz), 7.01 (d, 2H, *J* 8.6 Hz), 6.97 (d, 2H, *J* 8.8 Hz), 6.71 (bs, 1H, D_2O exchangeable, NH), 4.86 (s, 2H), 3.89 (s, 3H), 2.97 (s, 3H).**^{13}C NMR (100 MHz, DMSO-d_6):** δ 165.6, 165.0, 163.3, 155.8, 151.1, 137.4, 131.54, 130.0, 127.9, 123.9, 122.9, 121.3, 119.3, 114.0, 108.8, 62.7, 55.5, 40.3.**MASS (*m*/*z*):** 471.20 (M^+, 100%).**ELEMENTAL ANALYSIS:** found C, 58.58; H, 4.60; N, 6.12, $C_{23}H_{22}N_2O_7S$ requires C, 58.71; H, 4.71; N, 5.95.

4-Nitro-benzoic acid (4-methanesulfonylamino-3-phenoxy-phenylcarbamoyl)-methyl ester (4f)



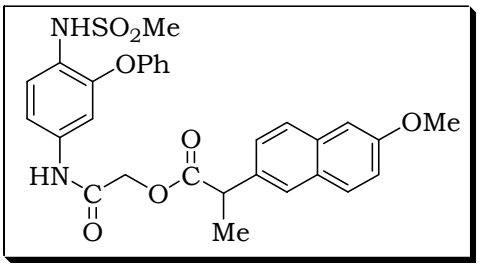
Colour: White.**M.P:** 206-208ºC.**R_f:** 0.49 ($CHCl_3$: Ethyl acetate = 7:3).**IR (KBr) ν_{max}/cm^{-1}:** 3273, 3096, 2949, 1728, 1682, 1663.**^{1}H NMR (400 MHz, DMSO-*d*$_6$):** δ 10.33 (1H, NH, D_2O exchangeable), 9.26 (s, 1H, NH, D_2O exchangeable), 8.37 (d, 2H, *J* 8.8 Hz), 8.22 (d, 2H, *J* 8.7 Hz), 7.43 (t, 2H, *J* 7.8 Hz), 7.36-7.27 (m, 2H), 7.22 (d, 1H, 3.0 Hz), 7.18 (t, 1H, *J* 7.3 Hz), 7.07 (d, 2H, *J* 7.3 Hz), 4.92 (s, 2H), 3.32 (s, 3H).**^{13}C NMR (100 MHz, $CDCl_3$ + DMSO-*d*$_6$):** δ 163.9, 163.0, 155.3, 149.5, 148.9, 136.0, 133.8, 130.0, 128.9, 125.3, 122.8, 122.7, 122.5, 117.8, 114.0, 109.1, 62.6, 39.1.**MASS (*m*/*z*):** 485.09 (M^+, 100%). **ELEMENTAL ANALYSIS:** found: C, 54.54; H, 4.23; N, 8.78; $C_{22}H_{19}N_3O_8S$ requires C, 54.43; H, 3.94; N, 8.66.

3-Phenyl-acrylic acid (4-methanesulfonylamino-3-phenoxy-phenylcarbamoyl)-methyl ester (4g)



Colour: Buff **R_f:** 0.62 ($CHCl_3$: Ethyl acetate = 8:2). **IR (KBr) ν_{max}/cm^{-1}:** 3251, 3092, 1719, 1682, 1509. **^{1}H NMR (400 MHz, DMSO-*d*$_6$):** δ 10.22 (1H, NH, D_2O exchangeable), 9.25 (1H, NH, D_2O exchangeable), 7.75-7.68 (m, 3H), 7.45-7.40 (m, 4H), 7.35-7.28 (m, 3H), 7.23 (d, 1H, *J* 2.4 Hz), 7.18 (t, 1H, *J* 7.3Hz), 7.07 (d, 2H, *J* 7.4 Hz), 6.72 (d, 1H, *J* 16.1 Hz), 4.72 (s, 2H), 2.96 (s, 3H). **^{13}C NMR (100 MHz, DMSO-*d*$_6$ + $CDCl_3$):** δ 174.31, 165.00, 164.73, 155.34, 148.8, 144.80, 136.14, 133.07, 129.64, 128.97, 128.02, 127.19, 125.17, 122.93, 122.71, 117.93, 116.18, 114.25, 109.30, 61.85, 39.71. **MASS (*m*/*z*):** 467.10 (M^+, 100%). **ELEMENTAL ANALYSIS:** found: C, 61.86; H, 4.59; N, 5.91; $C_{24}H_{22}N_2O_6S$ requires C, 61.79; H, 4.75; N, 6.00.

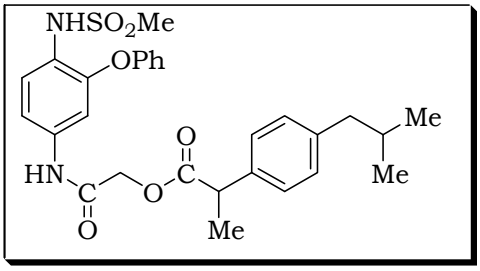
2-(6-Methoxy-naphthalen-2-yl)-propionic acid (4-methane sulfonylamino-3-phenoxy-phenylcarbamoyl)-methyl ester (4h)



Colour: Off white. **M.P:** 196-200 ºC.(d) **R_f:** 0.84 ($CHCl_3$: Ethyl acetate = 9:1).**IR (KBr) ν_{max}/cm^{-1}:** 3464, 3386, 3060, 2936, 1742, 1692, 1607. **^{1}H NMR (400 MHz, $CDCl_3$):** δ 7.70 (d, 2H, *J* 9.1 Hz), 7.67 (bs, 1H, D_2O exchangeable, NH), 7.41-7.33 (m, 4H), 7.21-7.12 (m, 4H), 6.91 (d, 2H, *J* 8.0 Hz), 6.82 (s, 1H), 6.58 (s, 1H), 5.81 (dd, 1H *J* 8.8, 2.2 Hz), 4.87 (d, 1H, *J* 15.8 Hz), 4.38 (d, 1H, *J* 15.7 Hz), 3.98 (q, 1H, *J* 7.0Hz), 3.96 (s, 3H), 2.89 (s, 3H), 1.65 (d, 3H, *J* 7.3 Hz). **^{13}C NMR (50 MHz, DMSO-*d*$_6$):** δ 184.6, 173.5, 164.2, 162.5, 158.3, 157.1, 146.4, 135.4, 133.2, 129.2, 128.3, 126.8, 126.3, 125.7, 121.2,

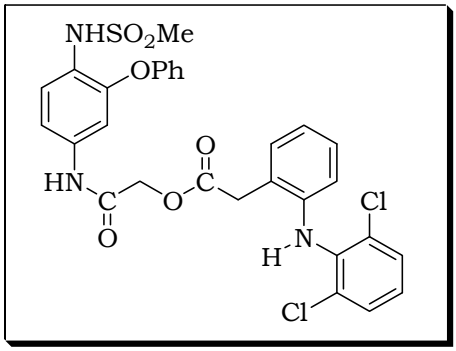
118.6, 116.6, 115.8, 112.4, 105.7, 102.9, 62.7, 55.1, 52.2, 44.1, 18.5. **MASS (*m*/*z*):** 549.30 (M^+, 100%). **ELEMENTAL ANALYSIS:** found: C, 63.62; H, 5.02; N, 4.98. $C_{29}H_{28}N_2O_7S$ requires C, 63.49; H, 5.14; N, 5.11.

2-(4-Isobutyl-phenyl)-propionic acid (4-methanesulfonyl amino-3-phenoxy-phenylcarbamoyl)-methyl ester (4i)



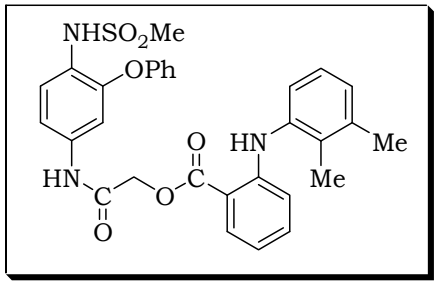
Colour: Off White.**M.P:** 48-50 ºC.**R_f:** 0.50 ($CHCl_3$).**IR (KBr) ν_{max}/cm^{-1}:** 3336, 3284, 2954, 2931, 2868, 1746, 1693, 1612, 1590, 1537.**^{1}H NMR (400 MHz, $CDCl_3$):** δ 7.50 (d, 1H, *J* 8.7 Hz), 7.38 (t, 2H, *J* 7.7 Hz), 7.26-7.07 (m, 7H), 6.97 (d, 2H, *J* 7.6 Hz), 6.66 (s, 1H), 6.60 (d, 1H, *J* 7.7 Hz), 4.82 (d, 1H, *J* 15.7 Hz), 4.41 (d, 1H, *J* 15.7Hz), 3.81 (q, 1H, *J* 7.0 Hz), 2.93 (s, 3H), 2.42 (d, 2H, *J* 6.9 Hz), 1.85-1.79 (m, 1H),1.54 (d, 3H, *J* 7.3 Hz), 0.89 (d, 6H, *J* 6.2 Hz).**^{13}C NMR (50 MHz, $CDCl_3$):** δ 172.5, 165.2, 155.6, 147.6, 141.5, 137.1, 134.6, 130.2, 129.9, 127.1, 124.5, 122.9, 118.2, 115.6, 110.7, 62.4, 44.9, 44.8, 39.3, 30.2, 22.3, 17.7.**MASS (*m*/*z*):** 525.3 (M^+, 100%).**ELEMENTAL ANALYSIS:** found: C, 64.23; H, 6.02; N, 5.60; $C_{28}H_{32}N_2O_6S$ requires C, 64.10; H, 6.15; N, 5.34.

[2-(2, 6-Dichloro-phenylamino)-phenyl]-acetic acid (4-methane sulfonylamino-3-phenoxy-phenylcarbamoyl)-methyl ester (4j)



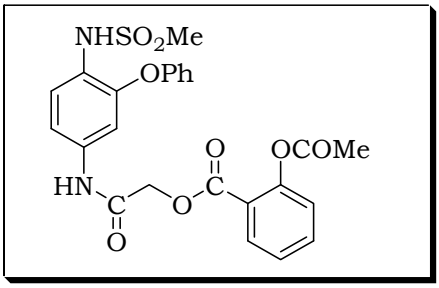
Colour: Off White.**M.P:** 122-123 ºC.**R_f:** 0.57($CHCl_3$: Ethyl acetate = 9:1).**IR (KBr) ν_{max}/cm^{-1}: ^{1}H NMR (400 MHz, $CDCl_3$):** δ 7.51 (d, 1H, *J* 8.7 Hz), 7.38-7.33 (m, 4H), 7.28-7.14 (m, 4H), 7.06-6.87 (m, 6H), 6.69 (s, 1H, NH, D_2O exchangeable), 6.42 (d, 1H, *J* 8.2 Hz), 6.28 (s, 1H, NH, D_2O exchangeable), 4.69 (s, 2H), 3.92 (s, 2H), 2.95 (s, 3H).**^{13}C NMR (100 MHz, $CDCl_3$):** δ 180.06, 169.7, 164.7, 155.7, 147.7, 142.4, 137.0, 134.5, 130.8, 130.2, 129.9, 128.9, 128.7, 124.9, 124.5, 122.9, 122.7, 122.2, 118.5, 117.9, 115.7, 110.3, 62.9, 39.4, 38.2. **MASS (*m*/*z*):** 614 (M^+, 100%).**ELEMENTAL ANALYSIS:** found: C, 56.34; H, 4.01; N, 6.52; $C_{29}H_{25}Cl_2N_3O_6S$ requires C, 56.68; H, 4.10; N, 6.84;

2-(2,3-Dimethyl-phenylamino)-benzoic acid (4-methanesulfonyl amino-3-phenoxy-phenylcarbamoyl)-methyl ester (14k)



Colour: Pale yellow.**M.P:** 140-141 ºC.**R_f:** 0.5 ($CHCl_3$).**IR (KBr) ν_{max}/cm^{-1}:** 3338, 2925, 1687, 1608, 1508, 1327, 1218, 1156, 1098.**^{1}H NMR (400 MHz, $CDCl_3$):** δ 9.08 (1H, NH), 7.96 (dd, 1H, *J* 8.0, 1.1 Hz), 7.80 (bs, 1H, NH, D_2O exchangeable), 7.61 (d, 1H, *J* 8.4Hz), 7.41-7.05 (m, 9H), 7.01 (d, 2H, *J* 7.7 Hz), 6.75-6.68 (m, 3H), 4.88 (s, 2H), 2.97 (s, 3H), 2.33 (s, 3H), 2.15 (s, 3H).**^{13}C NMR (50 MHz, DMSO-d_6):** δ 167.2, 165.5, 155.7, 151.0, 148.6, 138.0, 137.9, 137.3, 134.7, 131.6, 131.5, 129.9, 127.8, 126.7, 126.0, 123.9, 122.9, 122.7, 119.2, 116.3, 113.9, 113.3, 109.9, 108.8, 62.70, 40.75, 20.16, 13.53. **MASS (*m*/*z*):** 560.30 (M^+, 100%).**ELEMENTAL ANALYSIS:** found: C, 64.15; H, 5.09; N, 7.60. $C_{30}H_{29}N_3O_6S$ requires C, 64.39; H, 5.22; N, 7.51.

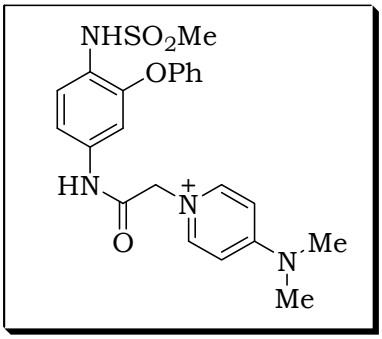
2-Acetoxy-benzoic acid (4-methanesulfonylamino-3-phenoxy-phenylcarbamoyl)-methyl ester (4l)



Colour: Off white; **M.P:** 147-148 ºC; **R_f:** 0.39 ($CHCl_3$: Ethyl acetate =9:1); **IR (KBr) ν_{max}/cm^{-1}:** 3249, 3154, 3099, 2944, 1758, 1730, 1674, 1610, 1555, 1507.**^{1}H NMR (400 MHz, DMSO-d_6):** δ 10.28 (s, 1H, NH, D_2O exchangeable), 9.26 (s, 1H, NH, D_2O exchangeable), 8.00 (d, 1H, *J* 6.5 Hz), 7.71 (t, 1H, *J* 6.5Hz), 7.45-7.16 (m, 8H), 7.07 (d, 2H, *J* 8.0 Hz), 4.81 (s, 2H), 2.96 (s, 3H), 2.24 (s, 3H).**^{13}C NMR (100 MHz, DMSO-d_6):** δ 169.1, 165.1, 163.5, 155.8, 152.9, 151.1, 150.2, 137.3, 134.4, 130.1, 127.9, 126.3,

124.2, 124.0, 122.9, 122.4, 119.3, 113.9, 108.7, 63.1, 40.3, 20.7.**MASS (*m*/*z*):** 499.1 (M^+, 100%).**ELEMENTAL ANALYSIS:** found: C, 57.69; H, 4.49; N, 5.28.$C_{24}H_{22}N_2O_8S$ requires C, 57.82; H, 4.45; N, 5.62.

2-(4-Dimethylamino-pyridin-1-yl)-*N*-(4-methanesulphonyl amino-3-phenoxy-phenylcarbamoyl)-methyl ester (5)



Colour: White.**M.P:** 264-265 ºC.**IR (KBr) ν_{max}/cm^{-1}:** 3408, 3175, 3045, 1710, 1652, 1607, 1332, 1221.**^{1}H NMR (400 MHz, DMSO-d_6):** δ 10.93 (1H, NH, D_2O exchangeable), 9.30 (bs, 1H, NH, D_2O exchangeable), 8.20 (d, 2H, *J* 7.6 Hz), 7.32-7.29 (m, 3H), 7.17-6.98 (m, 5H), 6.85 (d, 2H, *J* 7.9 Hz), 5.13 (s, 2H), 3.19 (s, 6H), 2.96 (s, 3H).**^{13}C NMR (100 MHz, DMSO-d_6):** δ 164.7, 155.9, 155.8, 151.1, 143.3, 137.4, 130.0, 127.8, 124.0, 123.1, 119.2, 114.0, 108.9, 107.1, 58.3, 40.4, 38.9.**MASS (*m*/*z*):** 441 (M^+, 100%).

SPECTRA OF COMPOUNDS

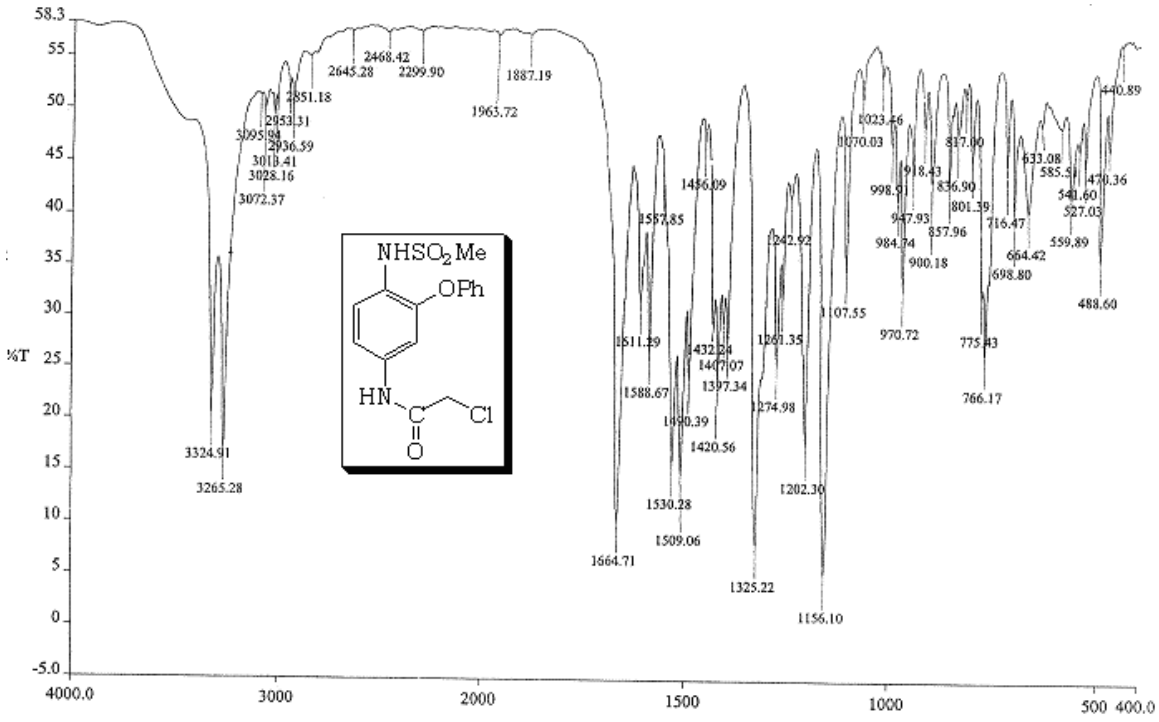


Figure 1: IR spectrum of **2**

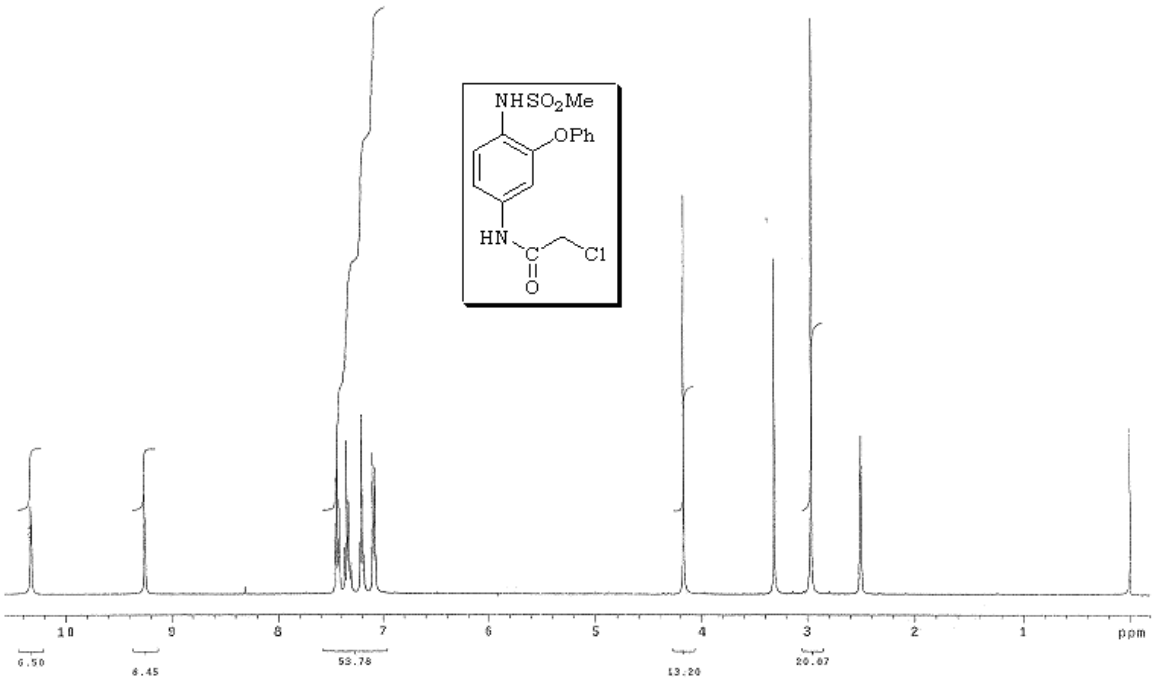


Figure 2: ^{1}H NMR (DMSO-***d*$_6$**, 400 MHz) spectrum of **2**

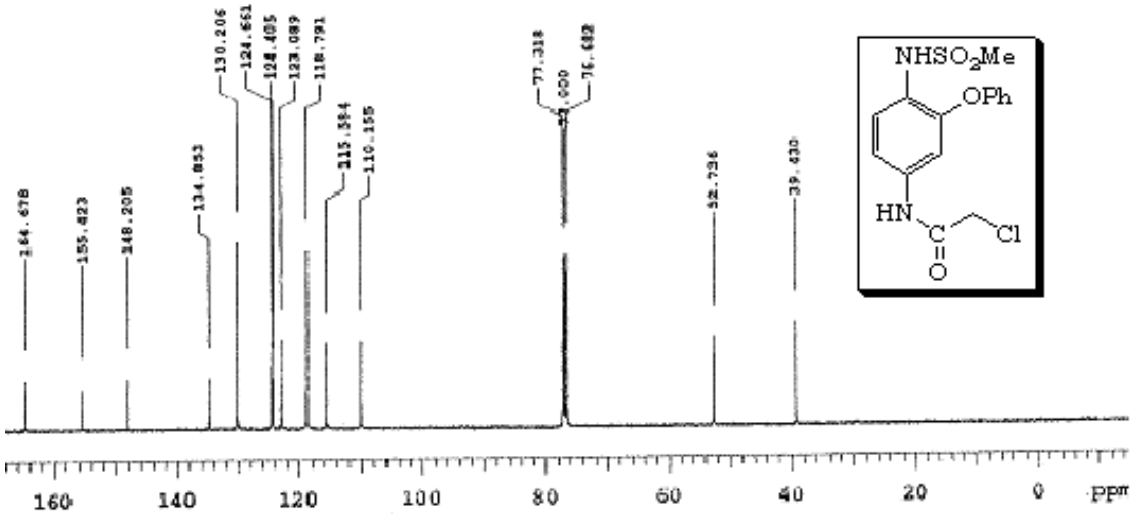


Figure 3: ^{13}C NMR (DMSO-***d*$_6$**, 100 MHz) spectrum of **2**

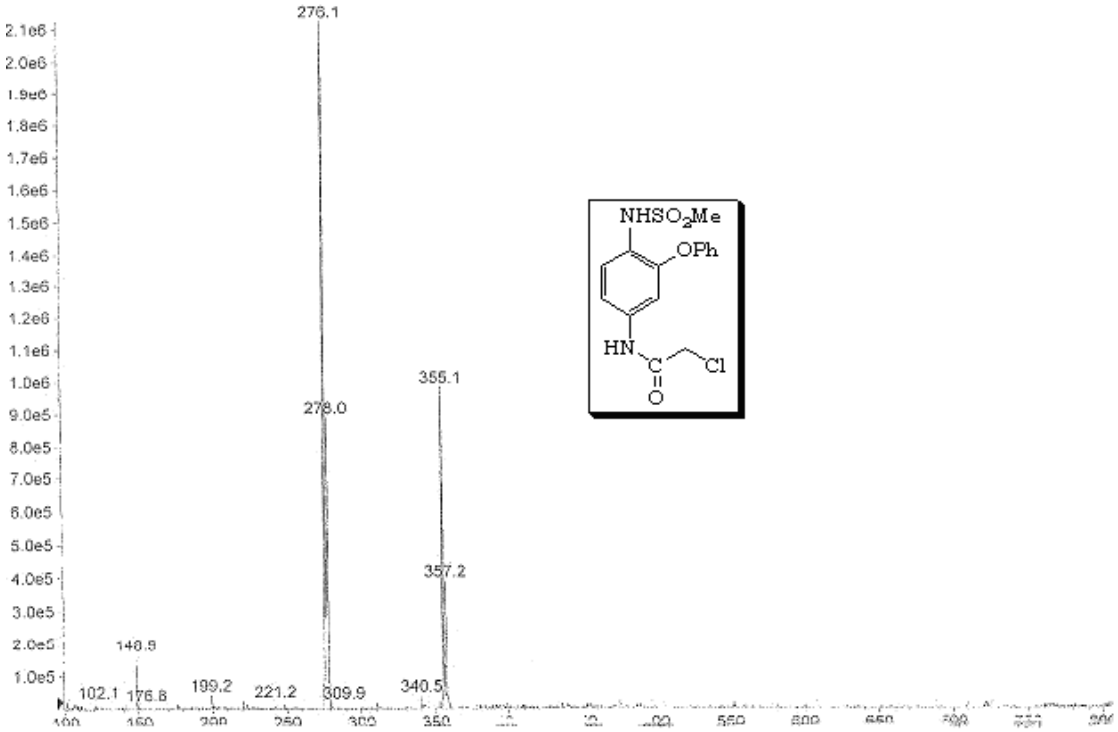


***Figure* 4: Mass (+Ve) spectrum of 2**

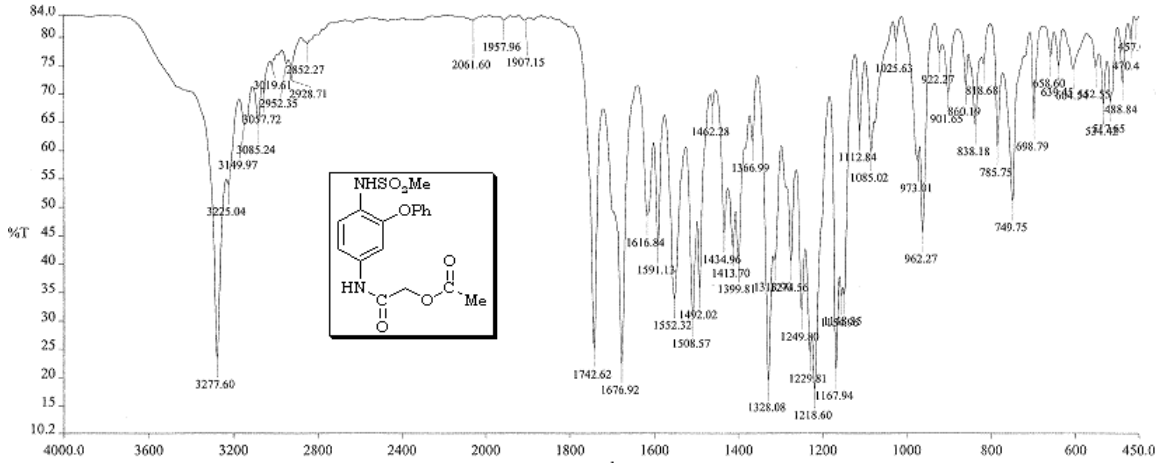


Figure* 5: IR spectrum of **4a*

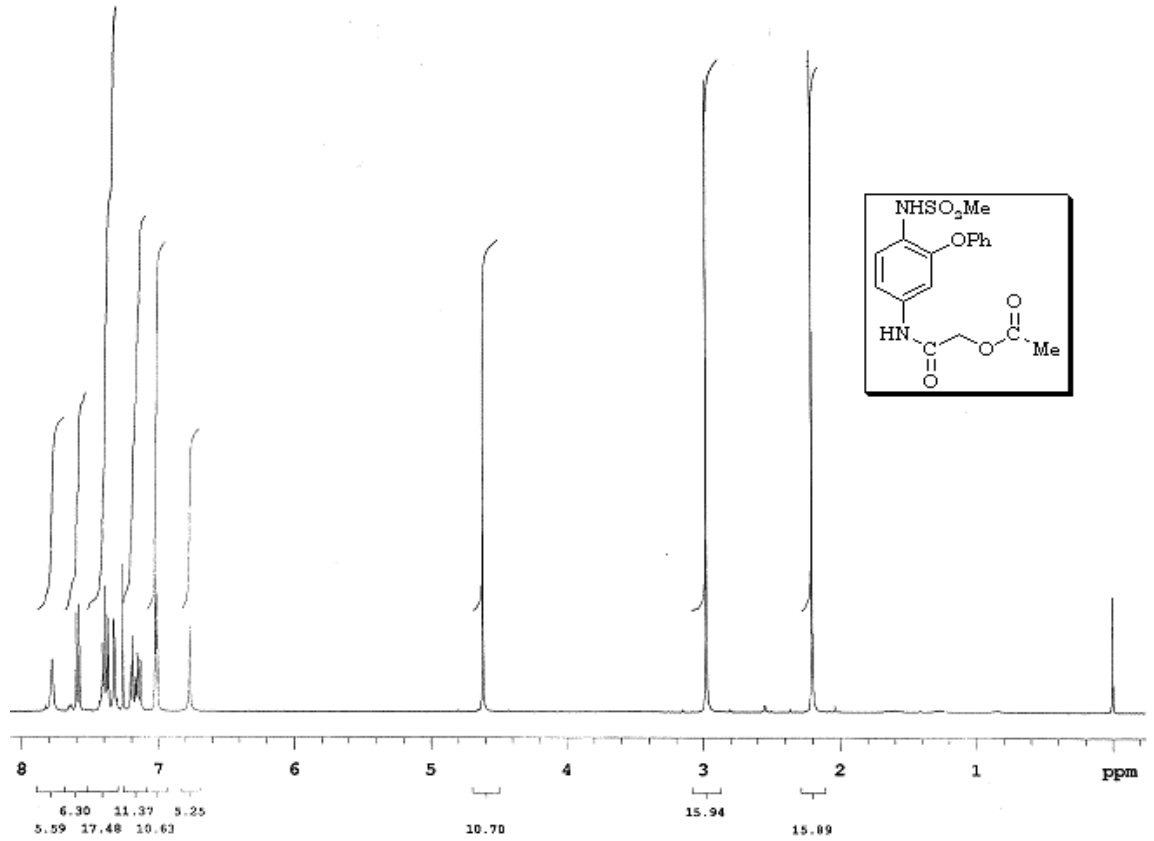


Figure 6: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4a**

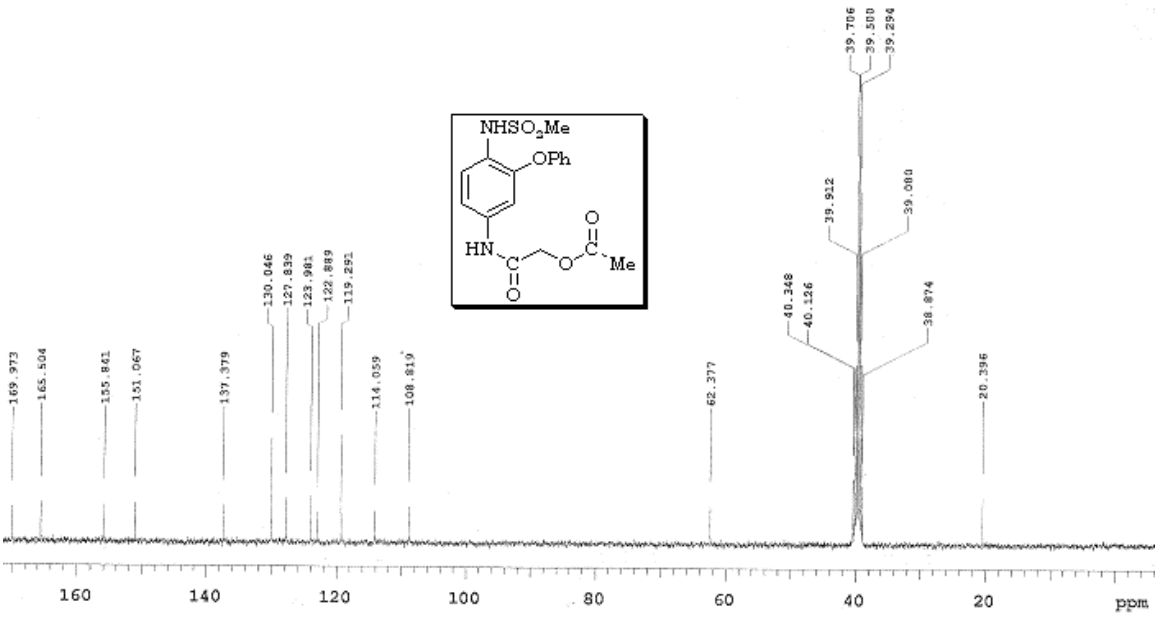


Figure 7: ^{13}C NMR spectrum (DMSO-***d*****$_6$**, 100 MHz) of **4a**

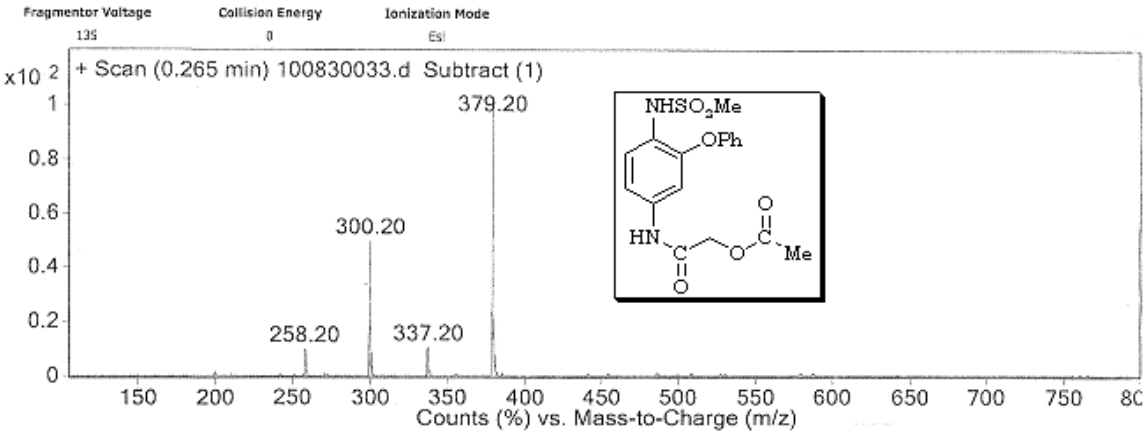


Figure 8: Mass (+Ve) spectrum of **4a**

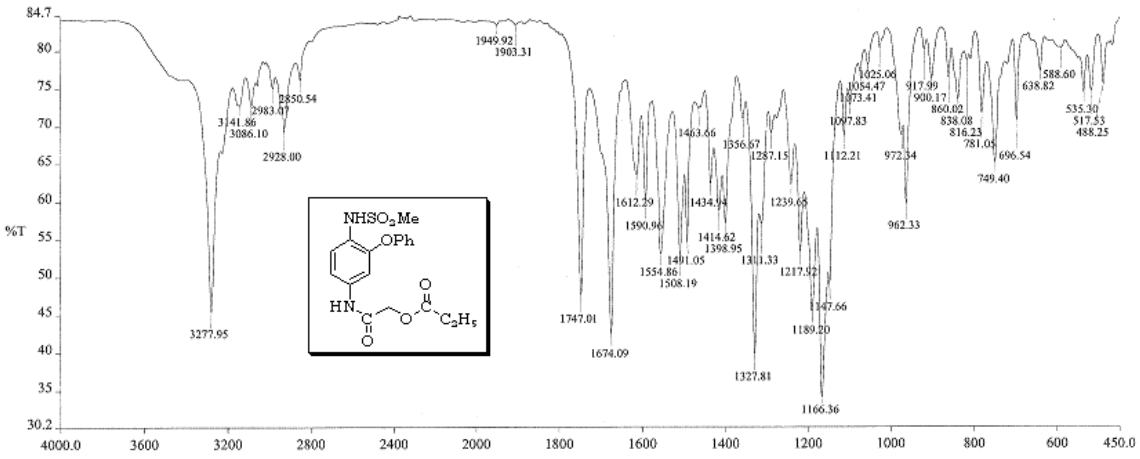


Figure 9: IR spectrum of **4b**

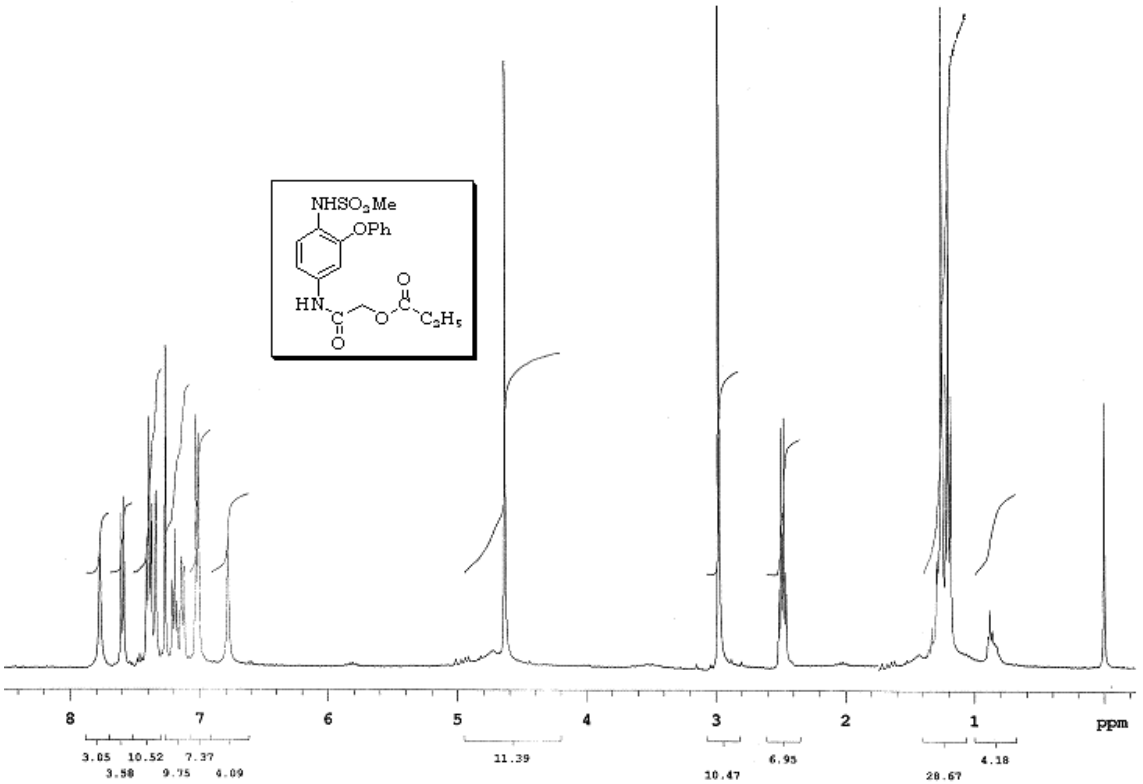


Figure 10: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4b**

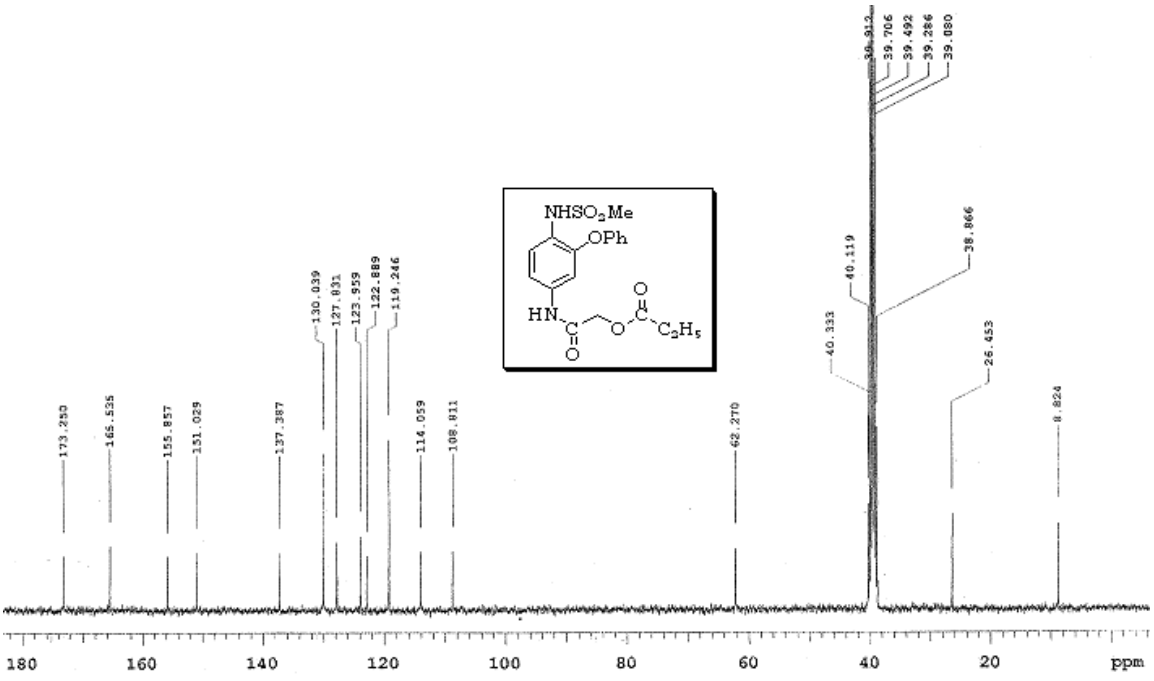


Figure 11: ^{13}C NMR spectrum (DMSO-***d*$_6$**, 100 MHz) of **4b**

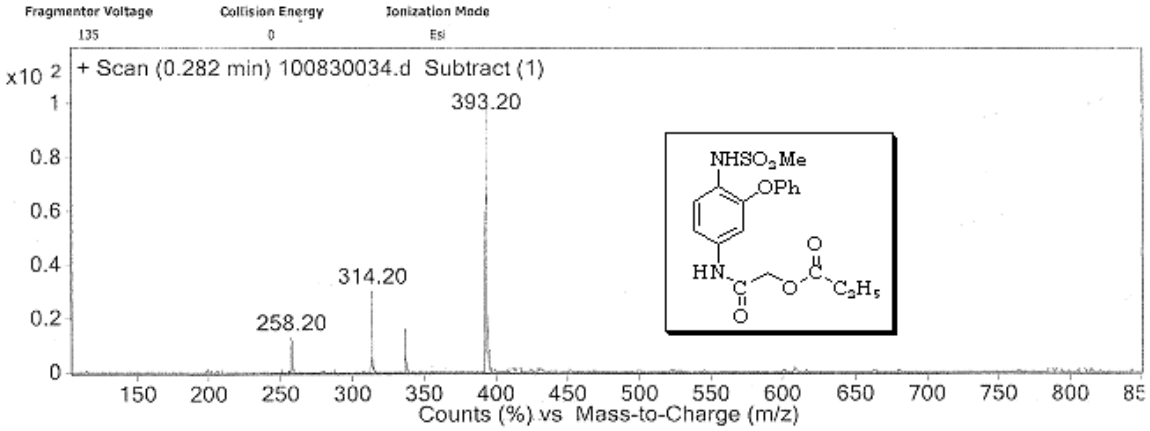


Figure 12: Mass (+Ve) spectrum of **4b**

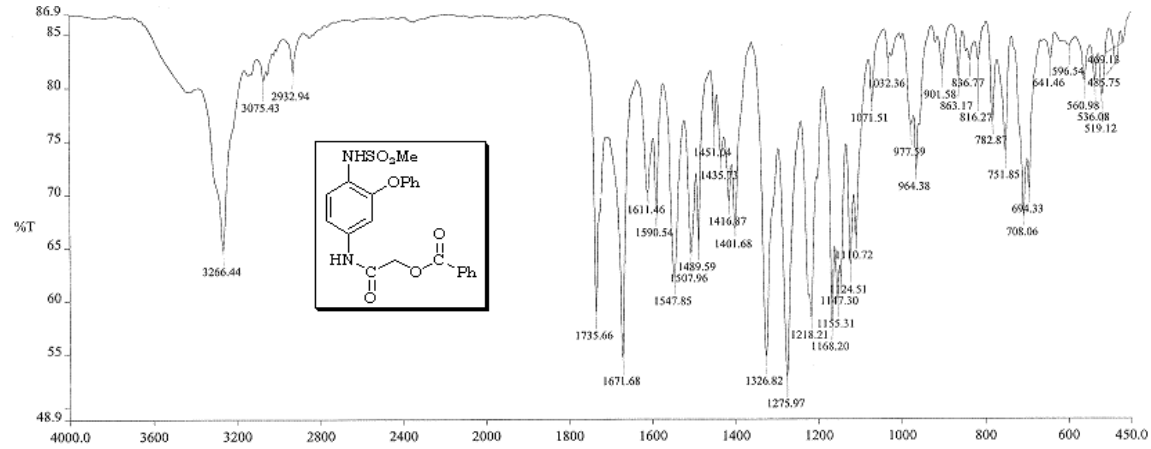


Figure 13: IR spectrum of **4c**

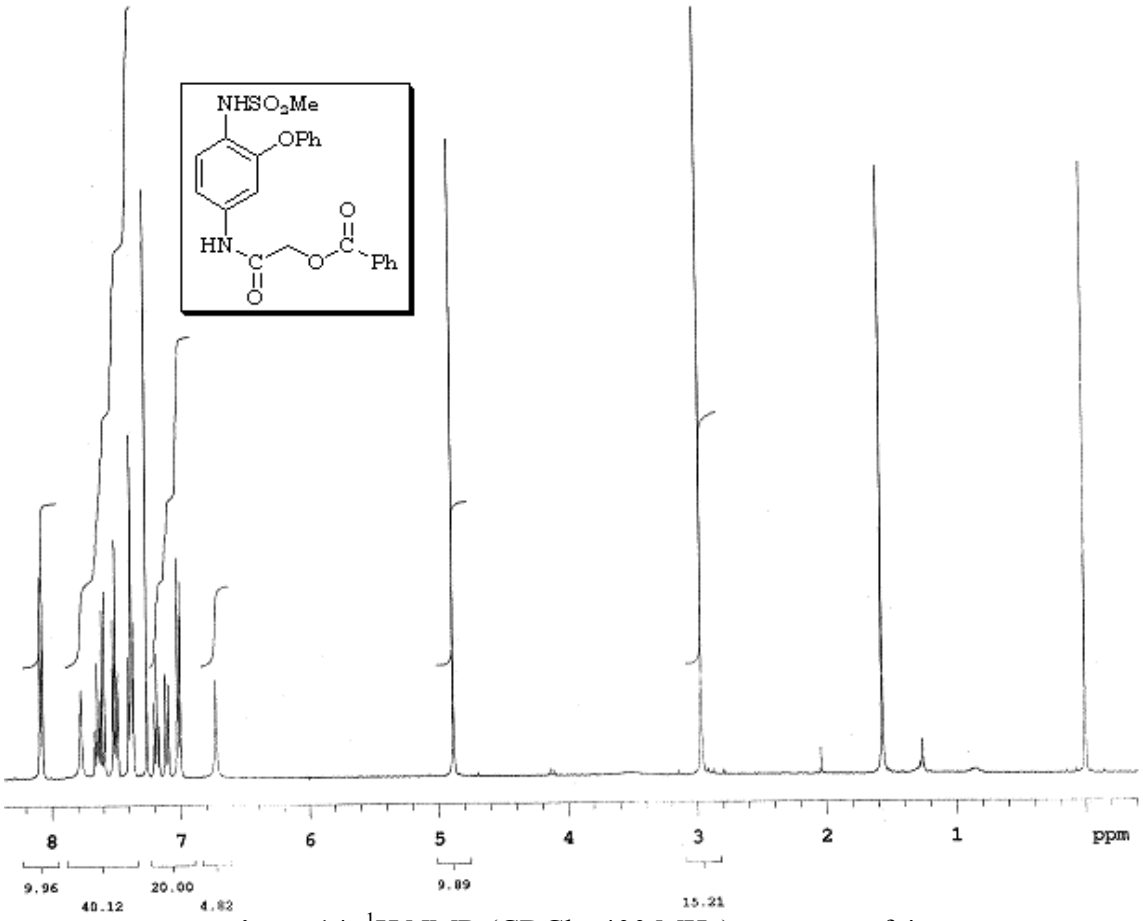


Figure 14: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4c**

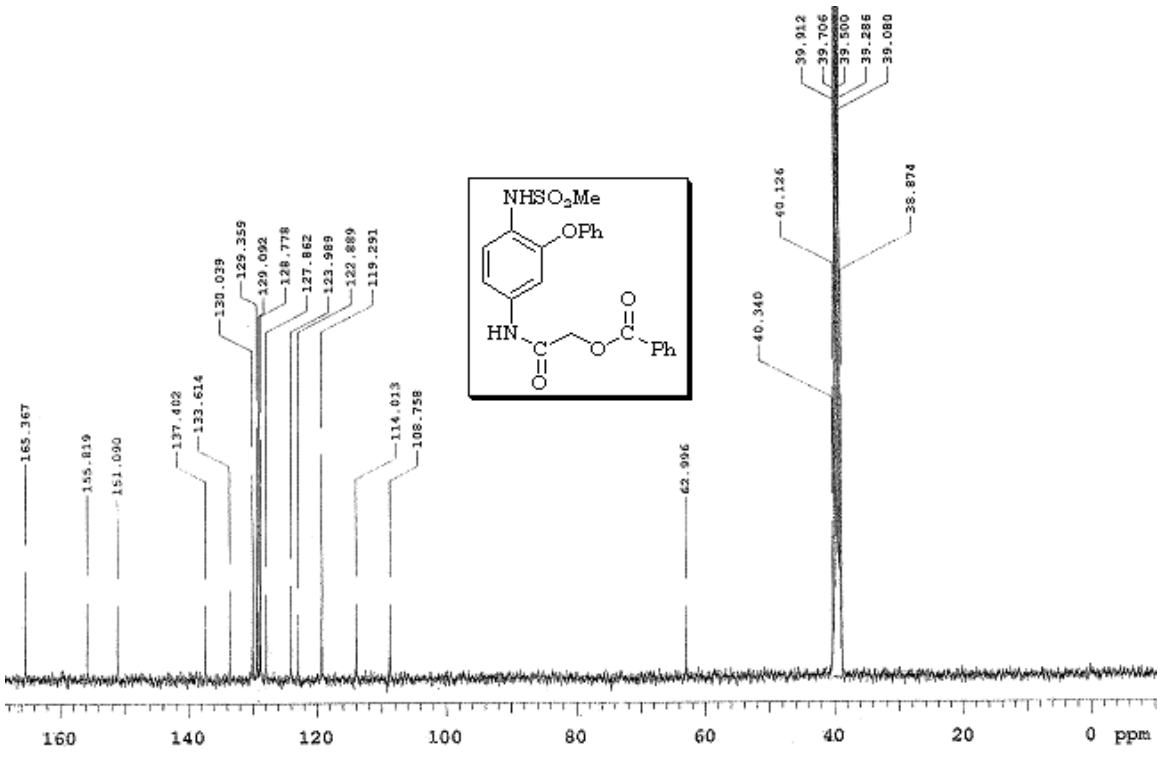


Figure 15: ^{13}C NMR spectrum (DMSO-d_6, 100 MHz) of **4c**

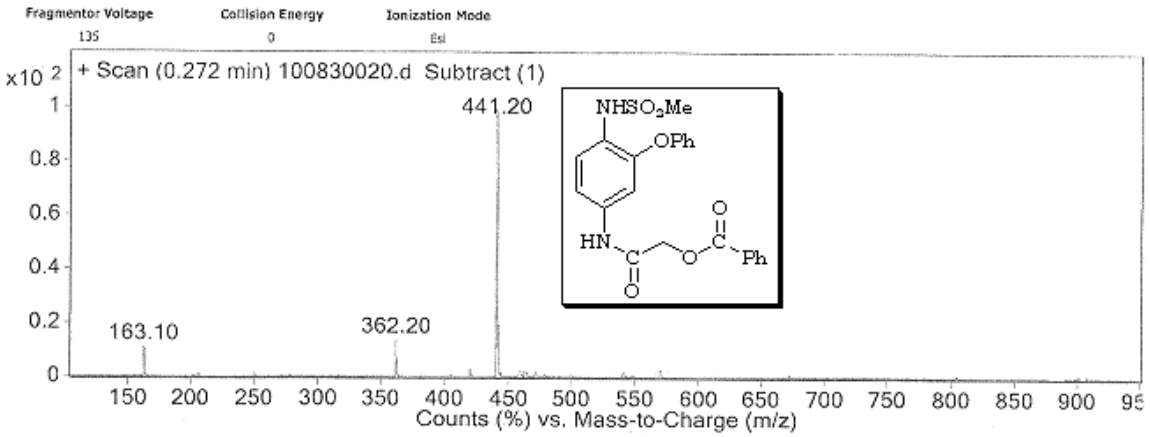


Figure 16: Mass (+Ve) spectrum of**4c**

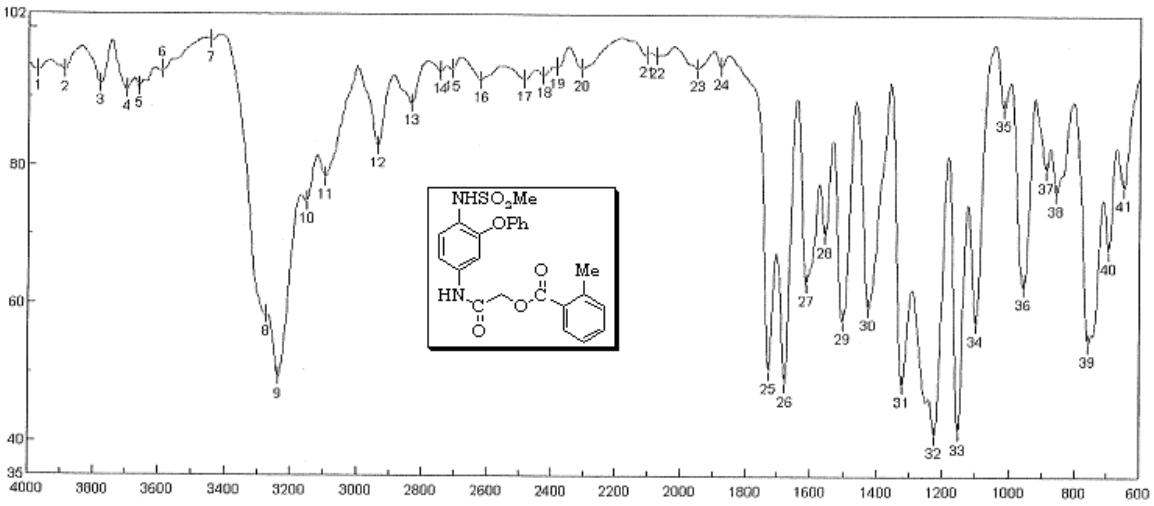


Figure 17: IR spectrum of **4d**

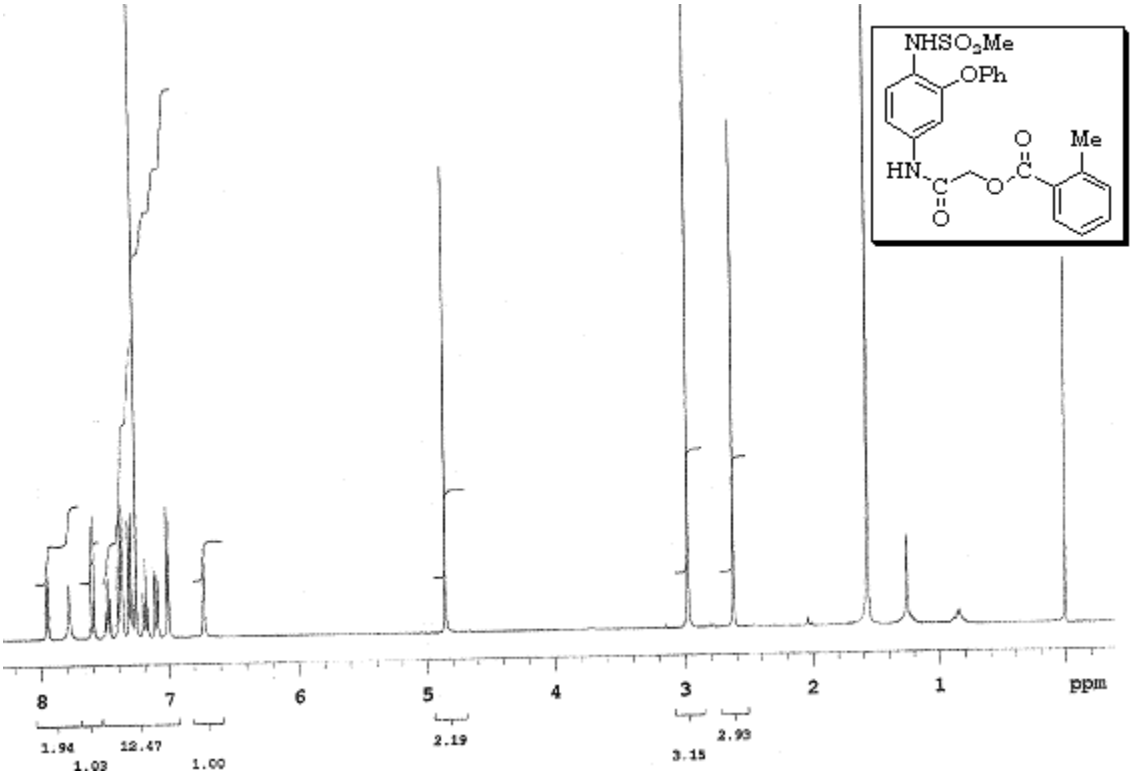


Figure 18: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4d**

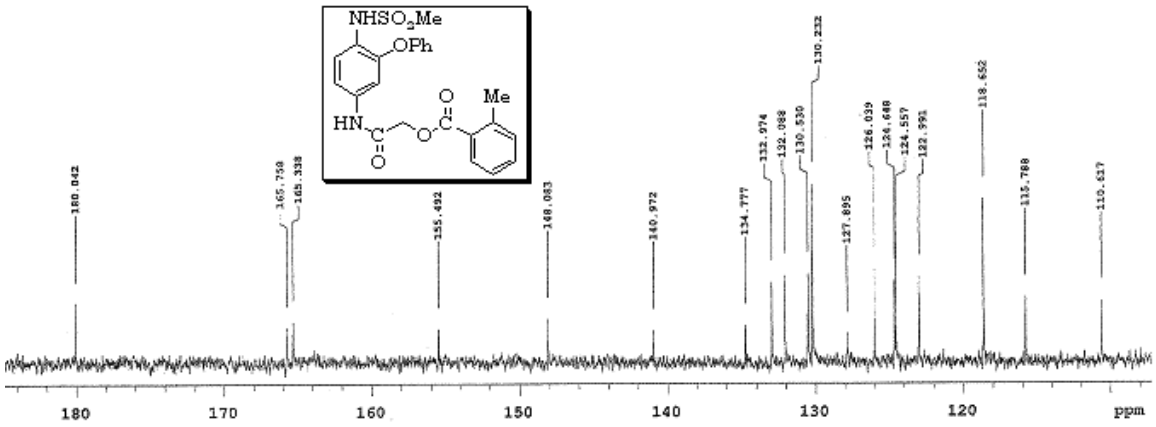


Figure 19: ^{13}C NMR spectrum ($CDCl_3$, 100 MHz) of **4d**

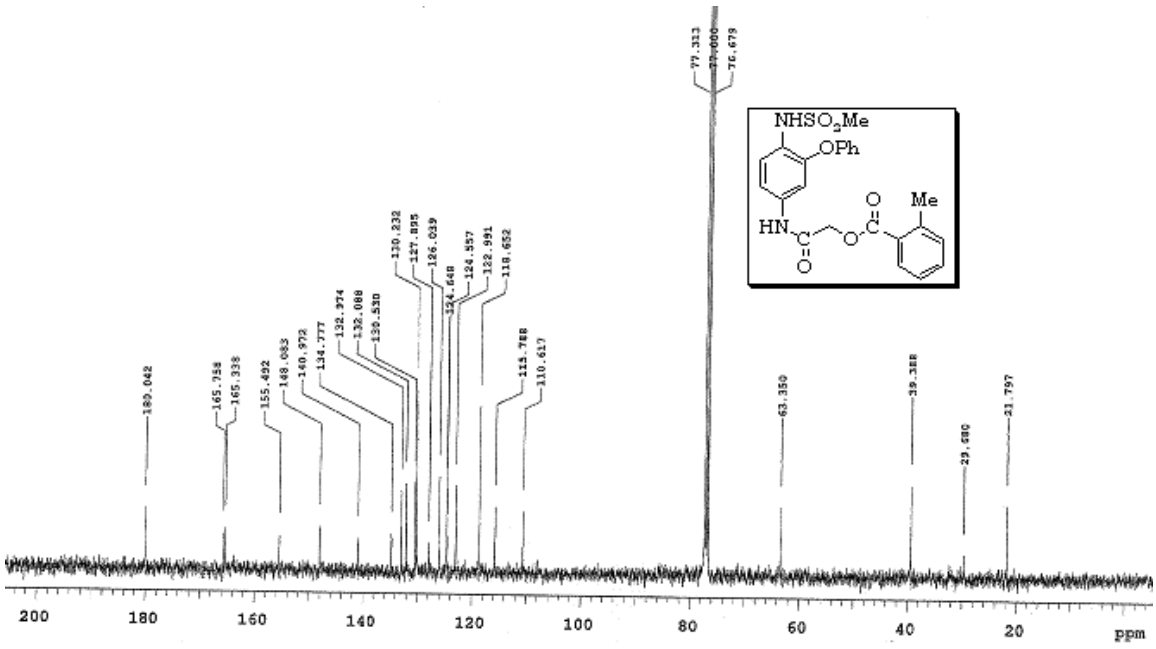


Figure 20: ^{13}C NMR spectrum ($CDCl_3$, 100 MHz) of **4d**

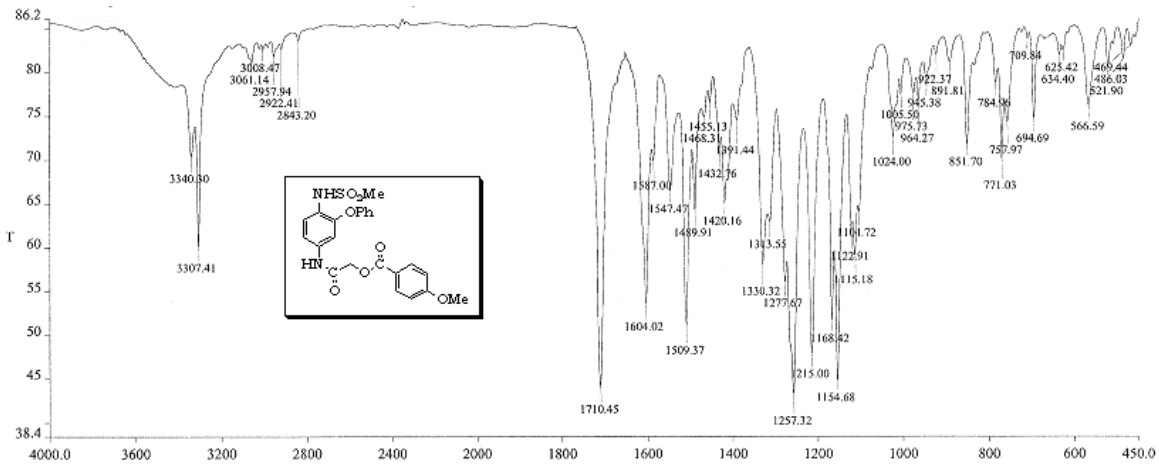


Figure 21: IR spectrum of **4e**

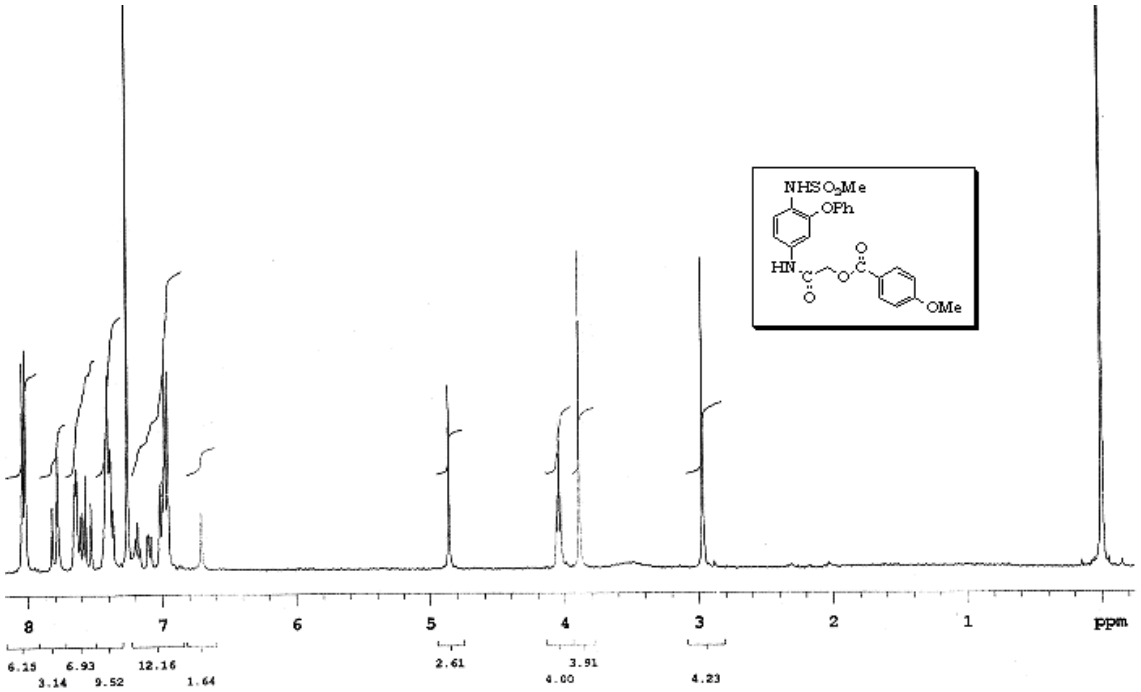


Figure 22: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4e**

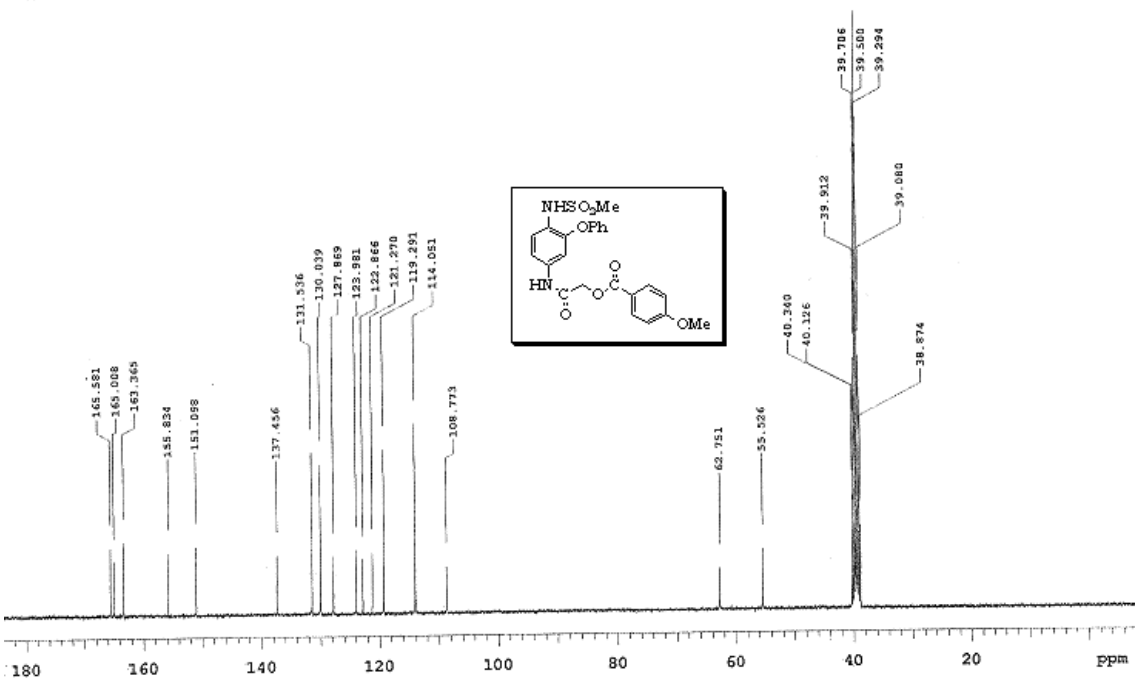


Figure 23: ^{13}C NMR spectrum (DMSO-d_6, 100 MHz) of **4e**

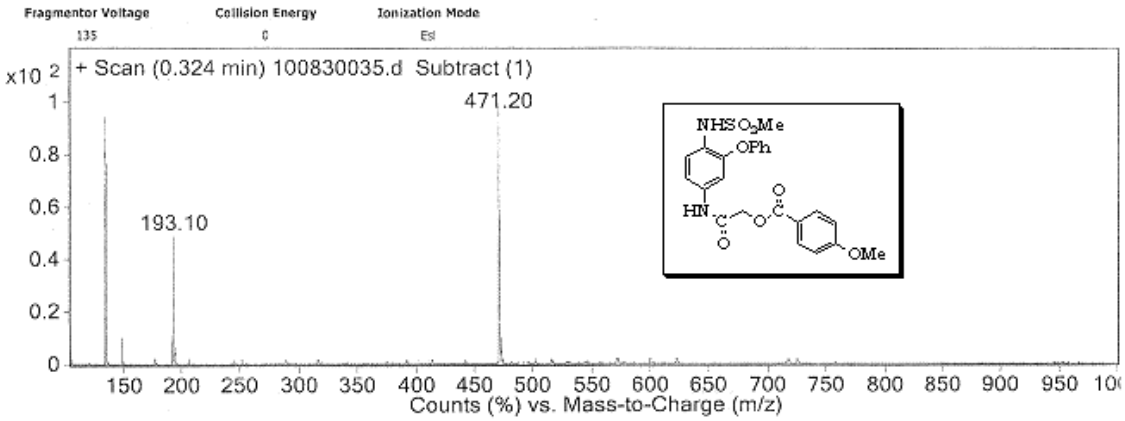


Figure 24: Mass (+Ve) spectrum of **4e**

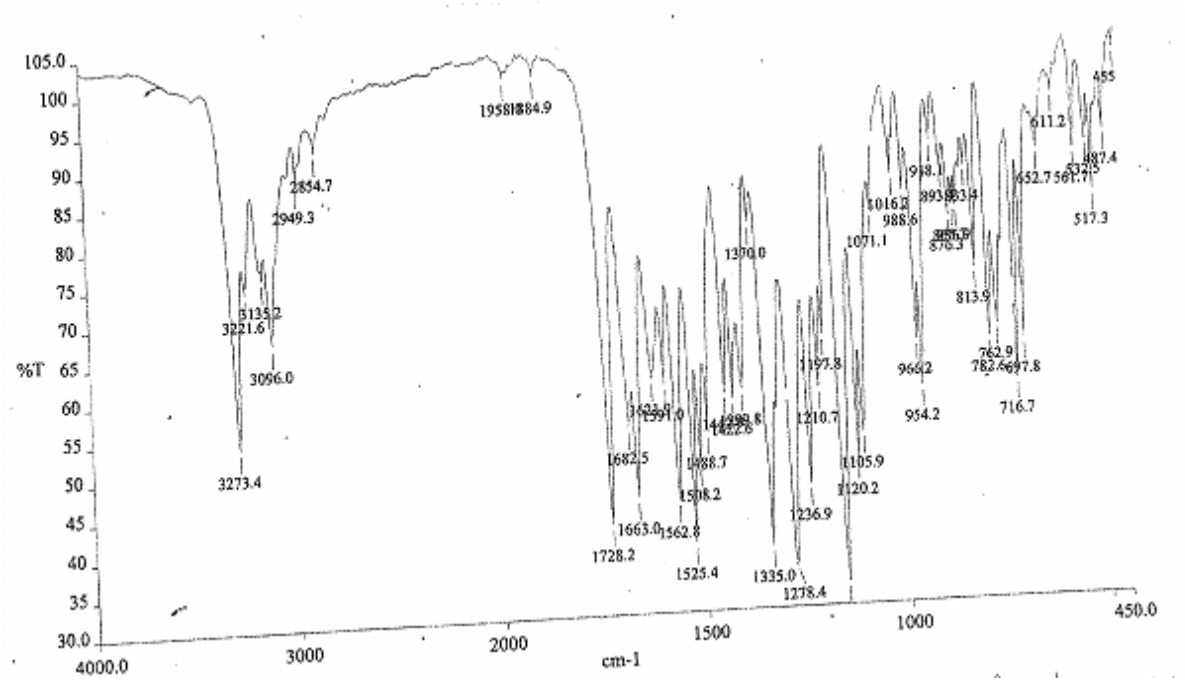


Figure 25: IR spectrum of **4f**

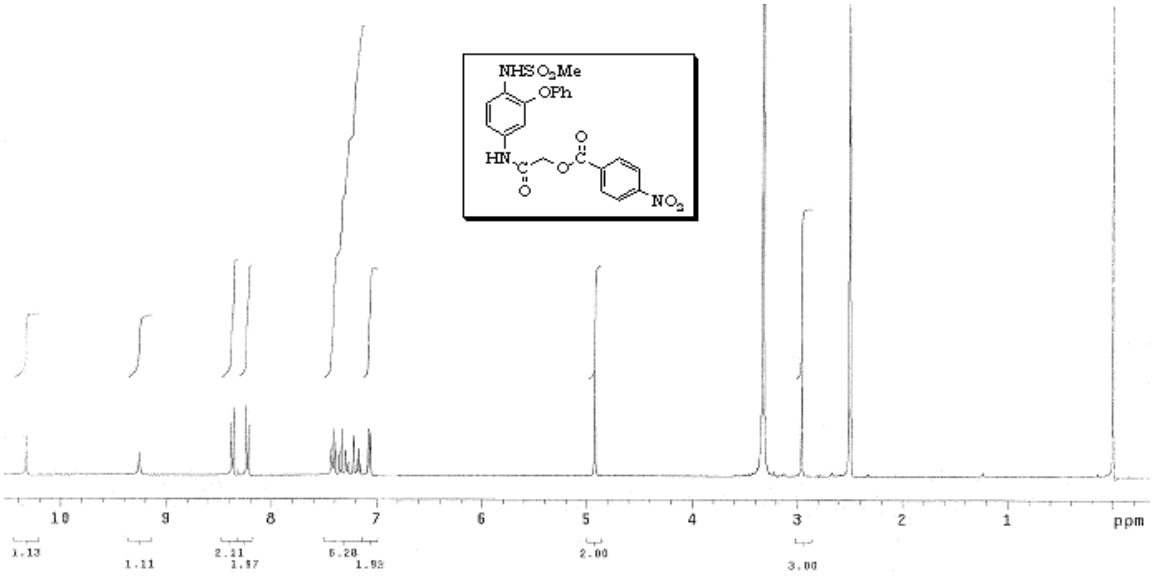


Figure 26: ^{1}H NMR (DMSO-d_6, 400 MHz) spectrum of **4f**

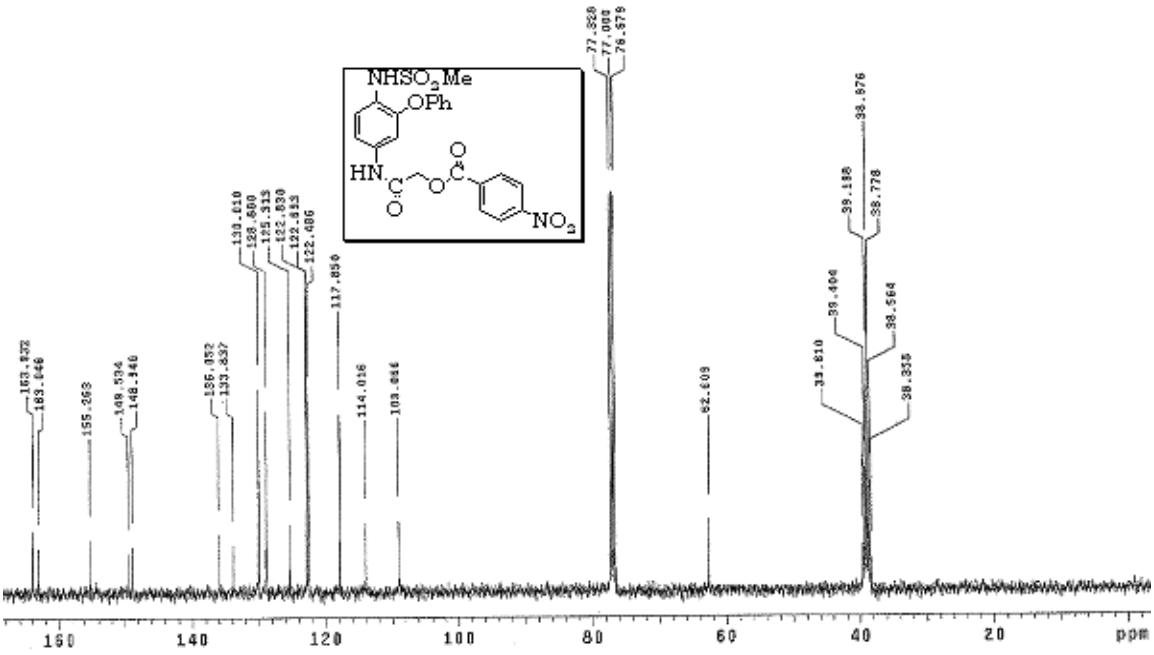


Figure 27: ^{13}C NMR spectrum ($CDCl_3$, 100 MHz) of **4d**

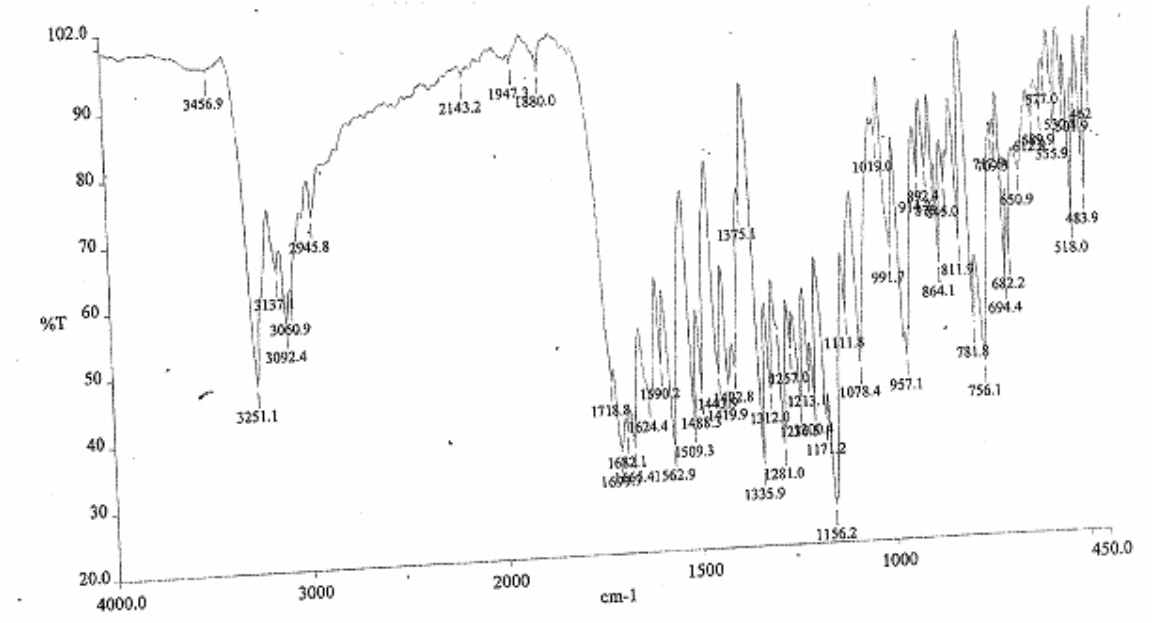


Figure 28: IR spectrum of **4g**

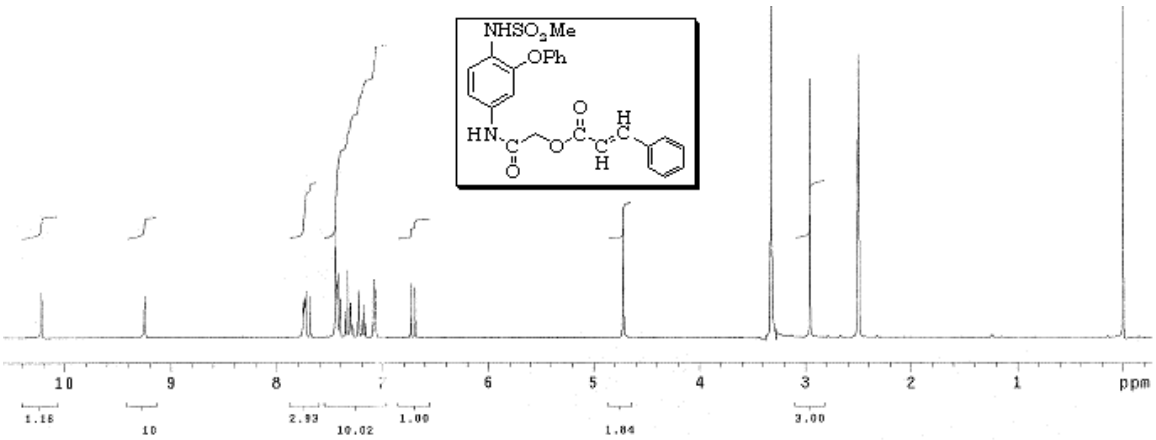


Figure 29: ^{1}H NMR (DMSO-***d*$_6$**, 400 MHz) spectrum of **4g**

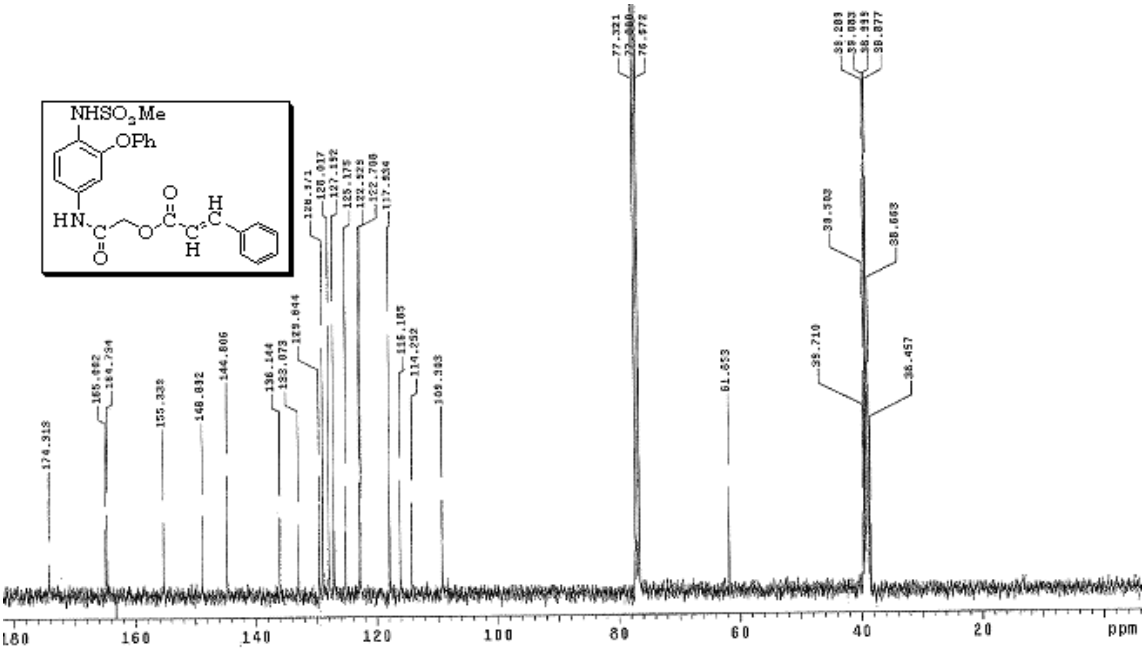


Figure 30: ^{13}C NMR spectrum ($CDCl_3$ + DMSO-***d*$_6$**, 100 MHz) of **4g**

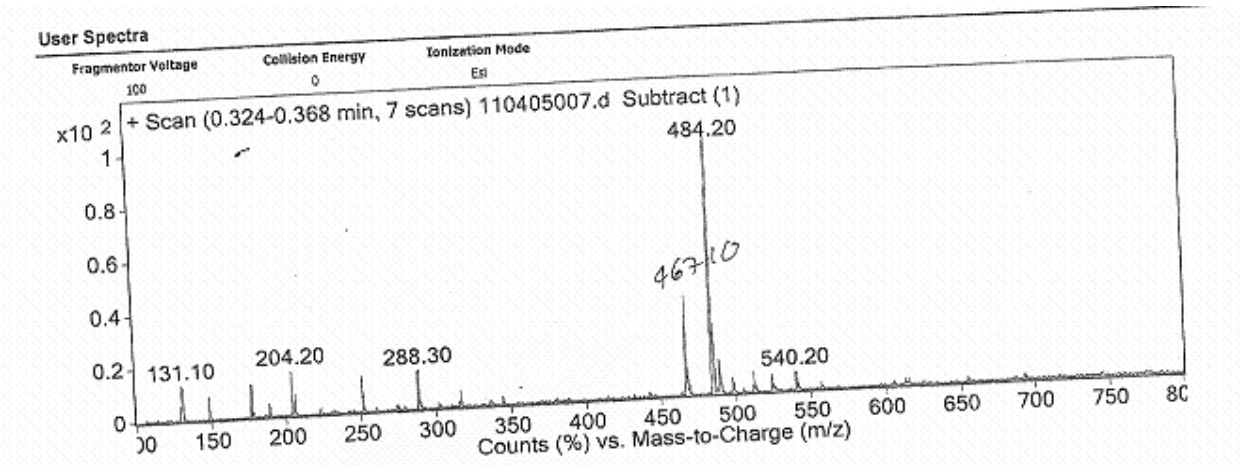


Figure 31: Mass (+Ve) spectrum of **4g**

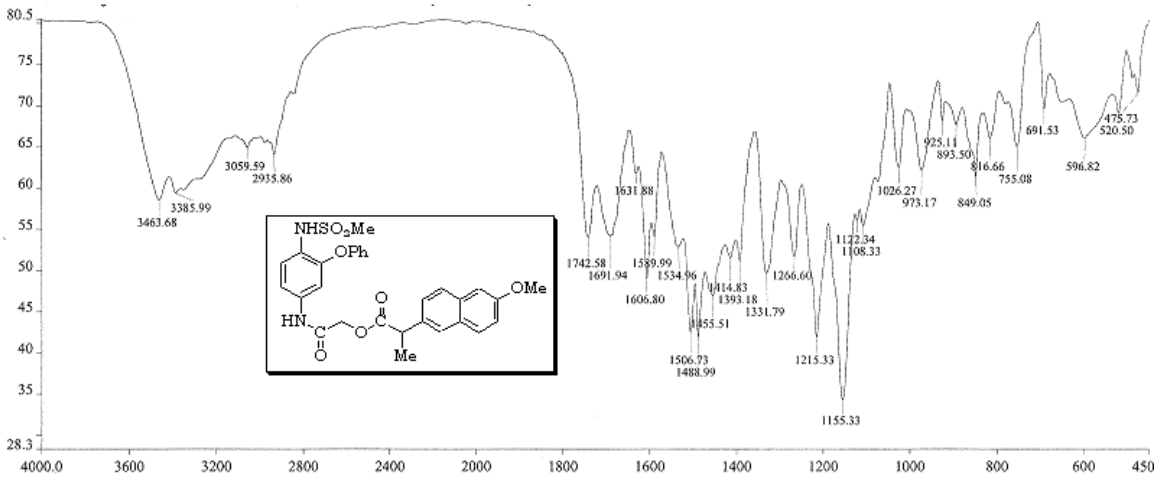


Figure 32: IR spectrum of **4h**

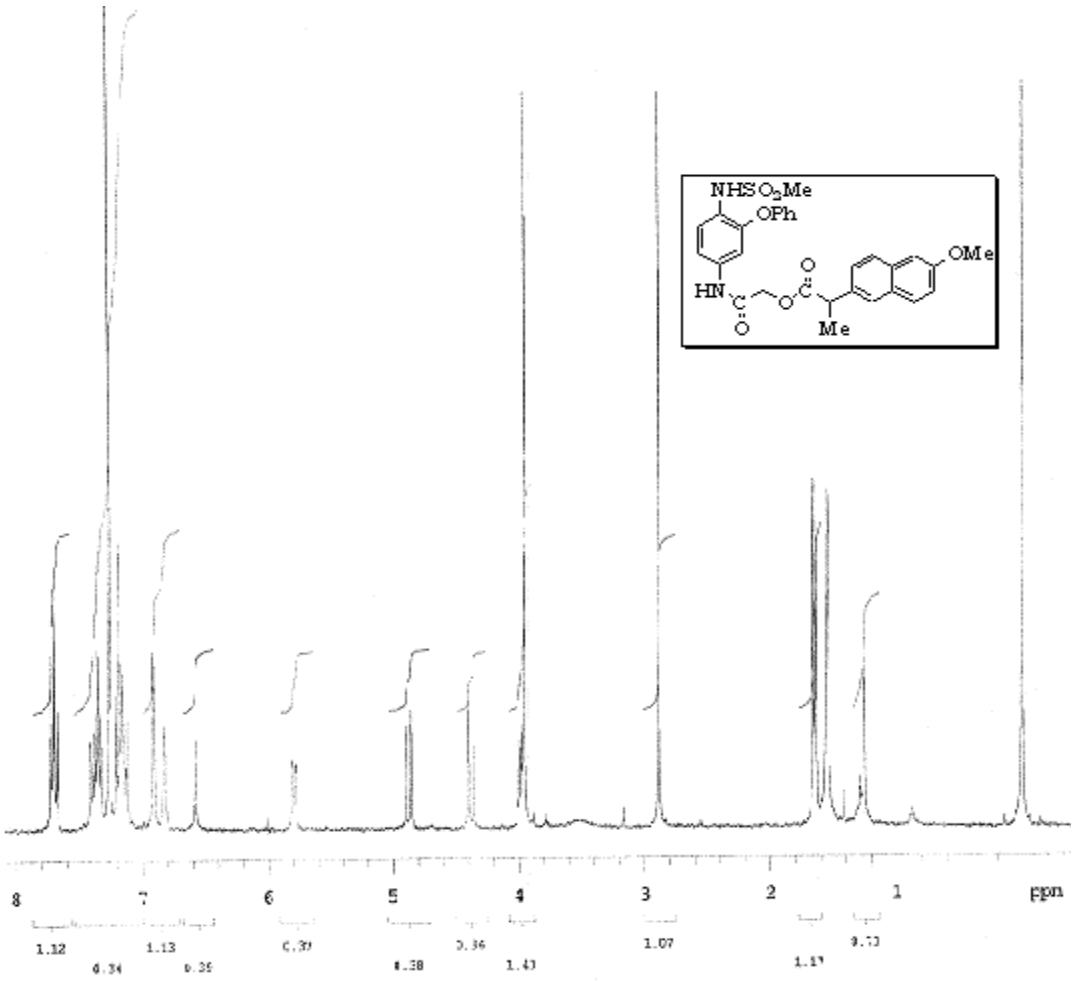


Figure 33: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4h**

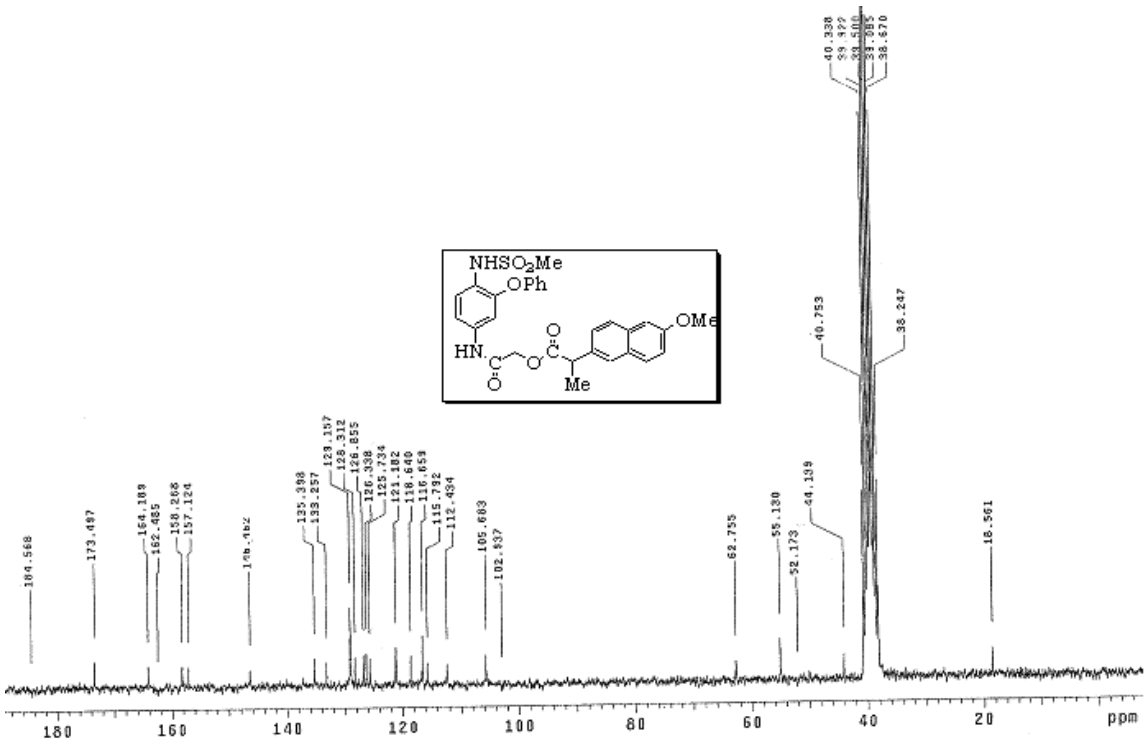


Figure 34: ^{13}C NMR spectrum (DMSO-***d*$_6$**, 50 MHz) of **4h**

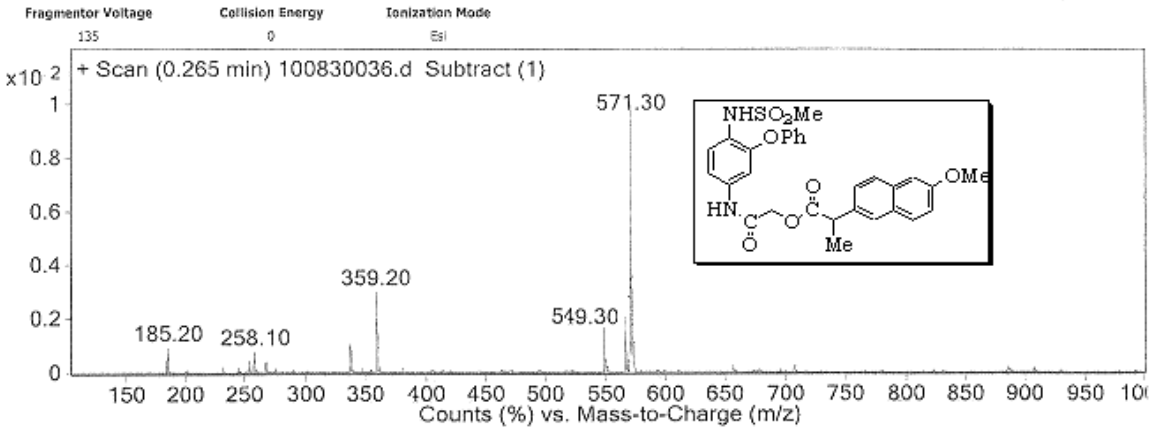


Figure 35: Mass (+Ve) spectrum of **4h**

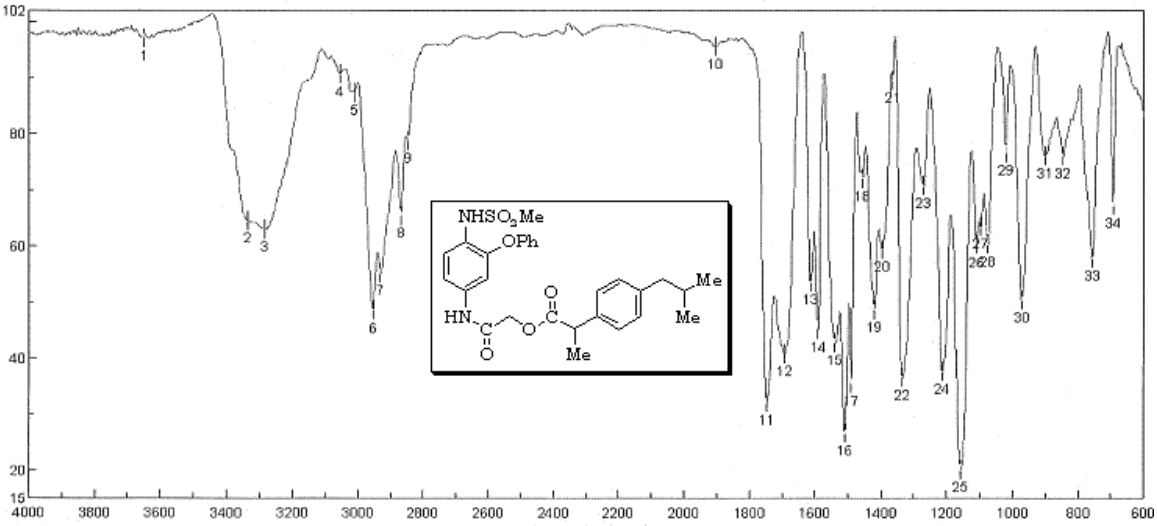


Figure 36: IR spectrum of **4i**

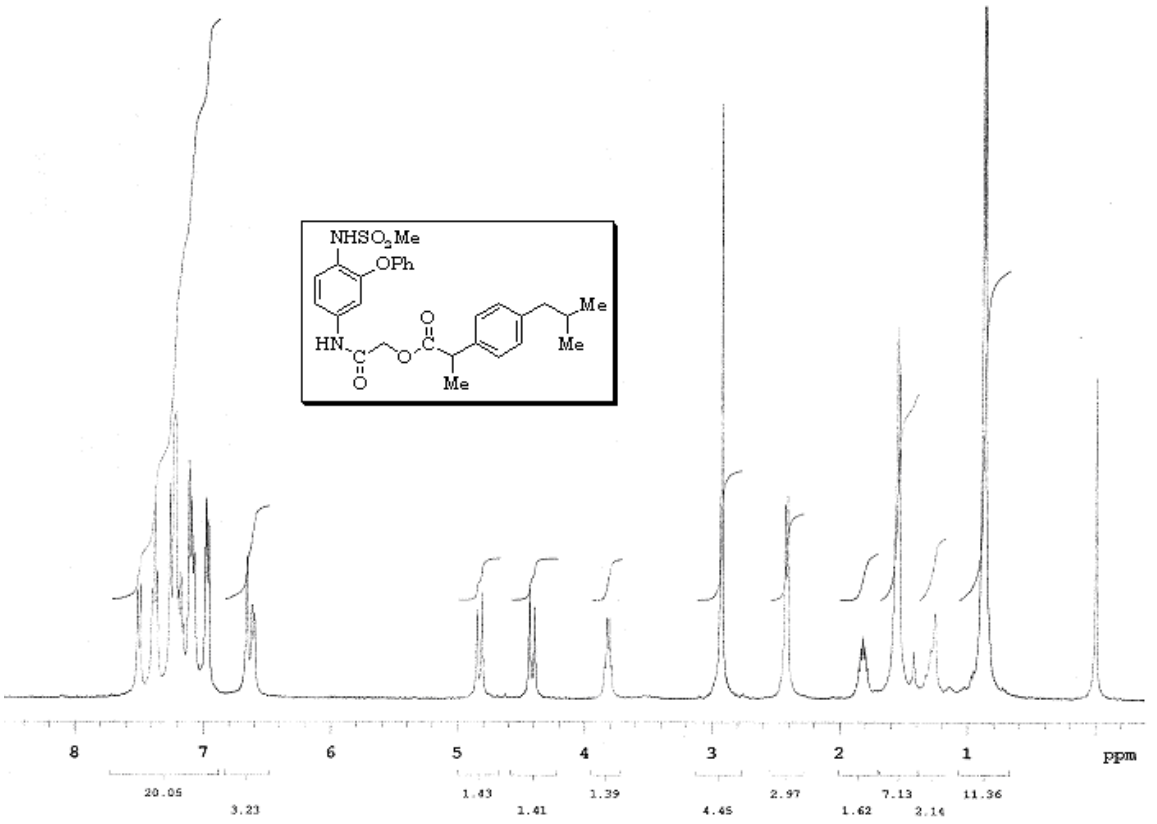


Figure 37: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4i**

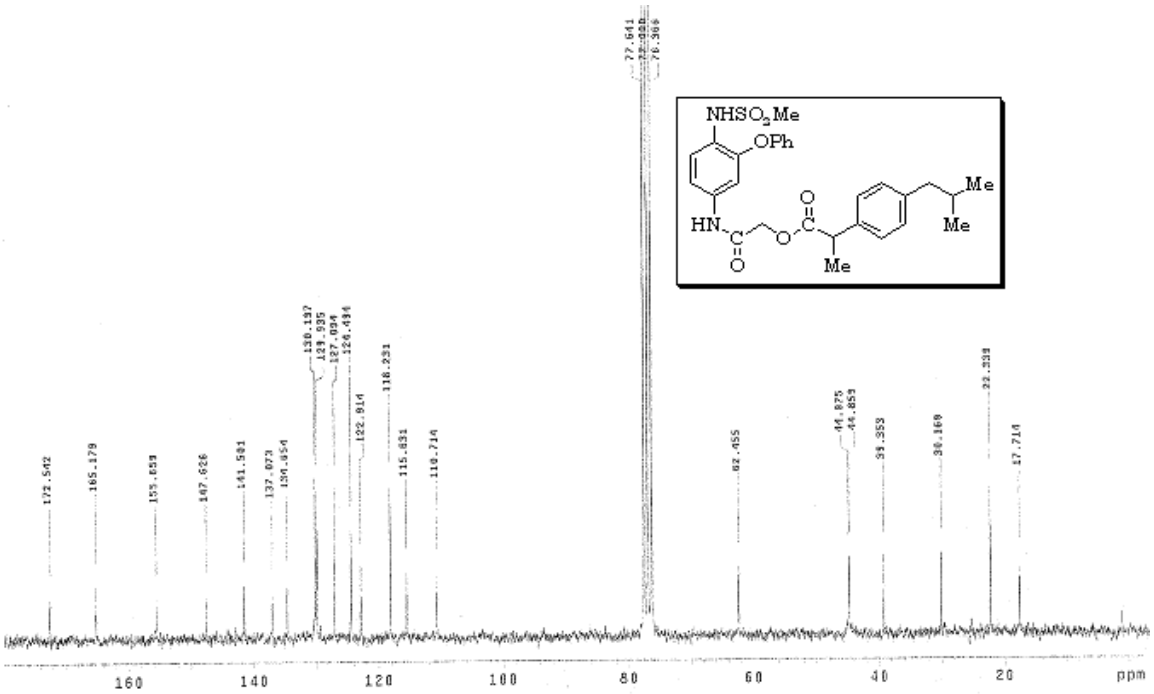


Figure 38: ^{13}C NMR spectrum ($CDCl_3$, 50 MHz) of **4i**

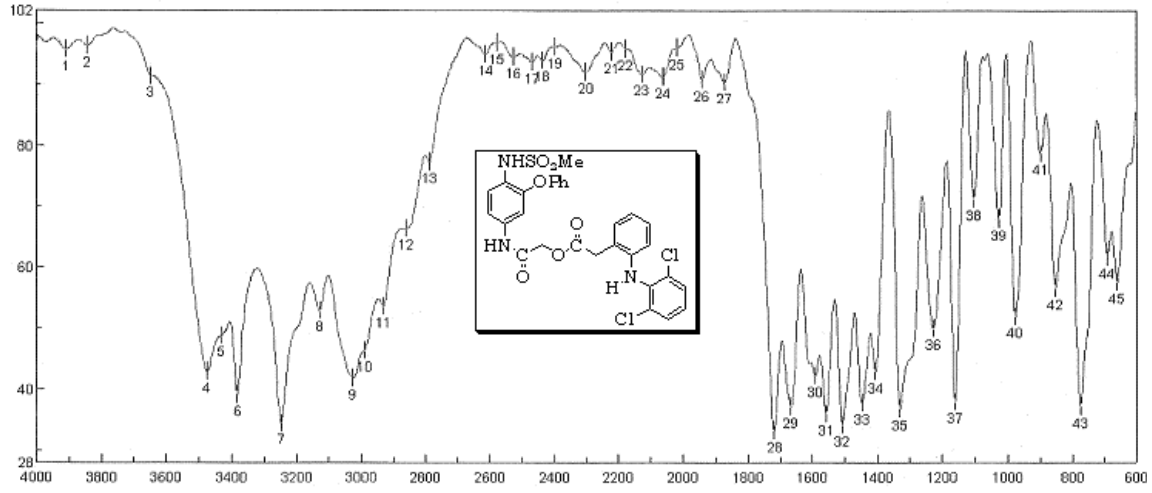


Figure 39: IR spectrum of **4j**

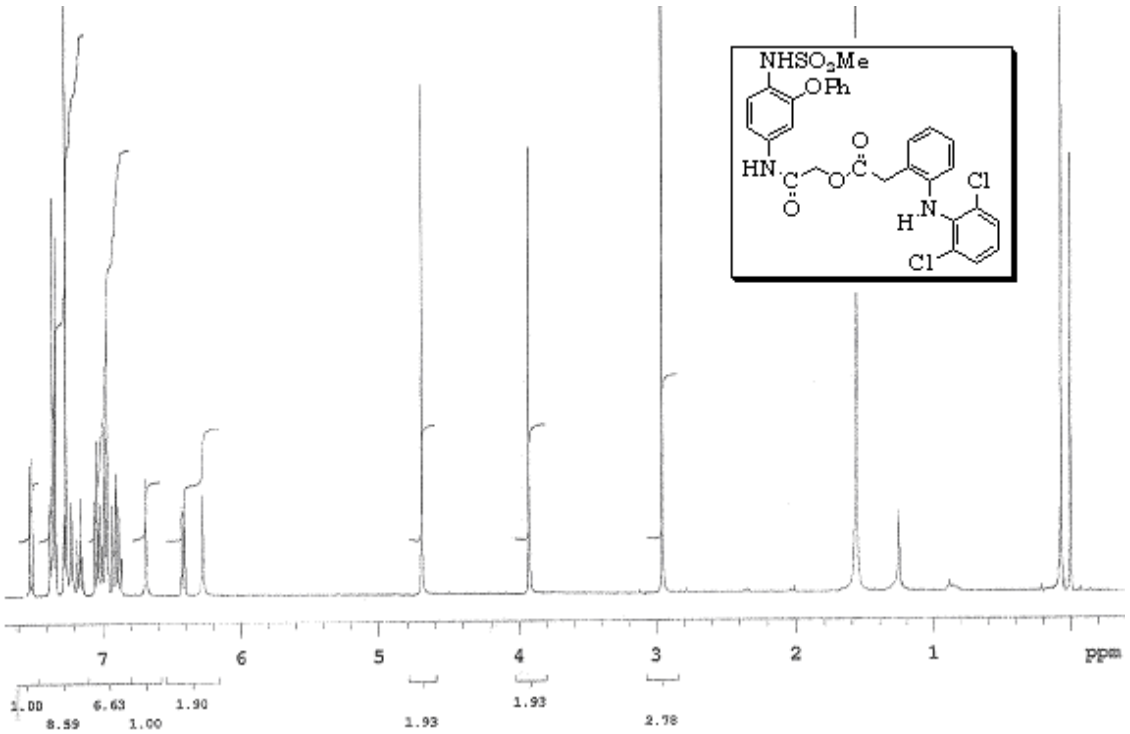


Figure 40: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4j**

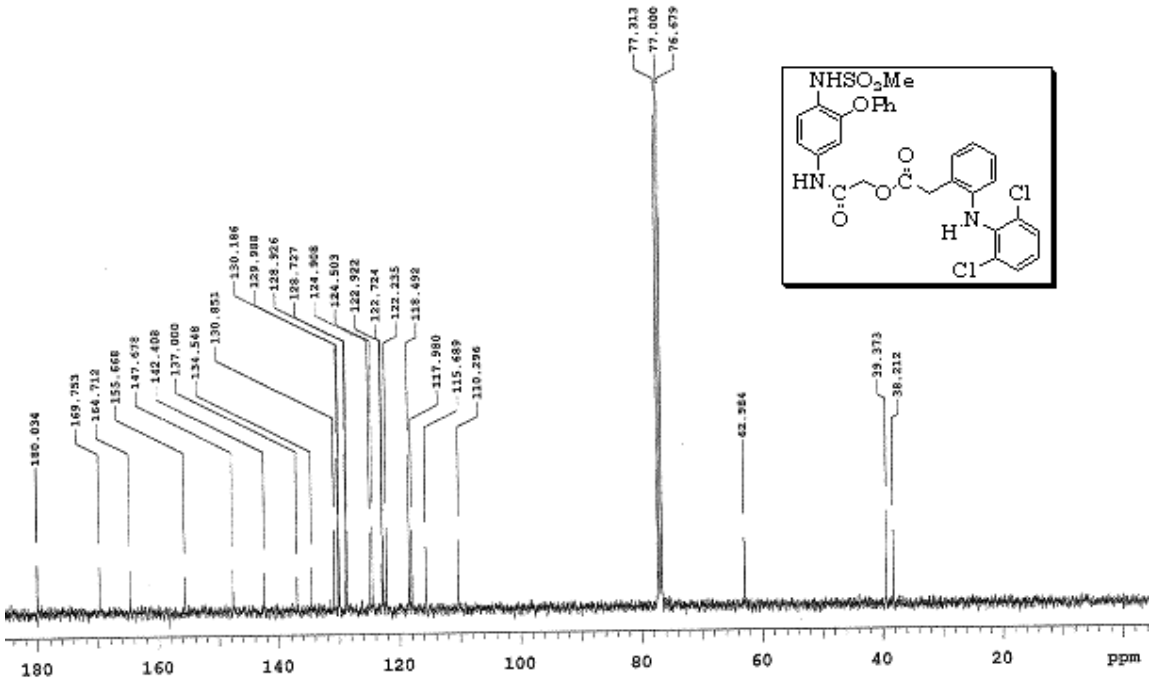


Figure 41: ^{13}C NMR spectrum ($CDCl_3$, 100 MHz) of **4j**

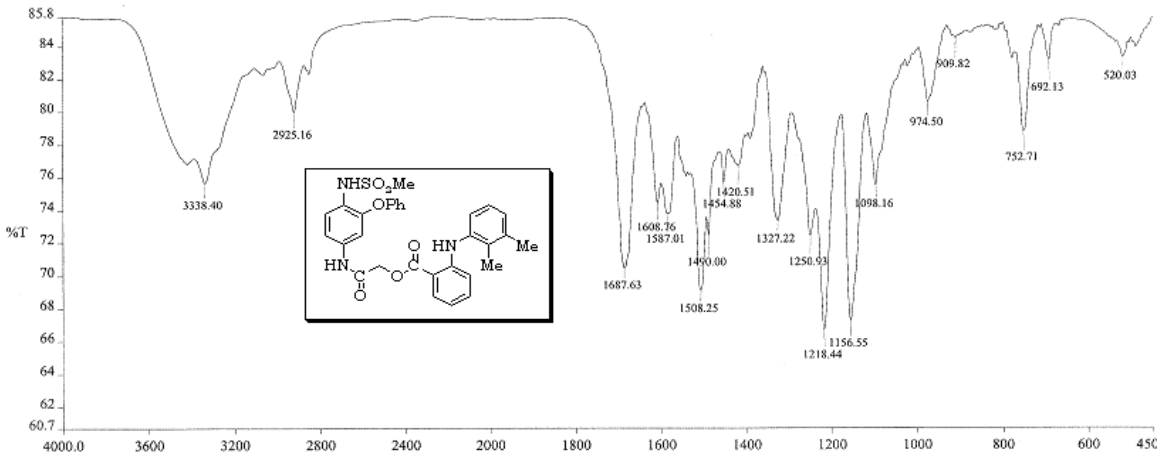


Figure 42: IR spectrum of **4k**

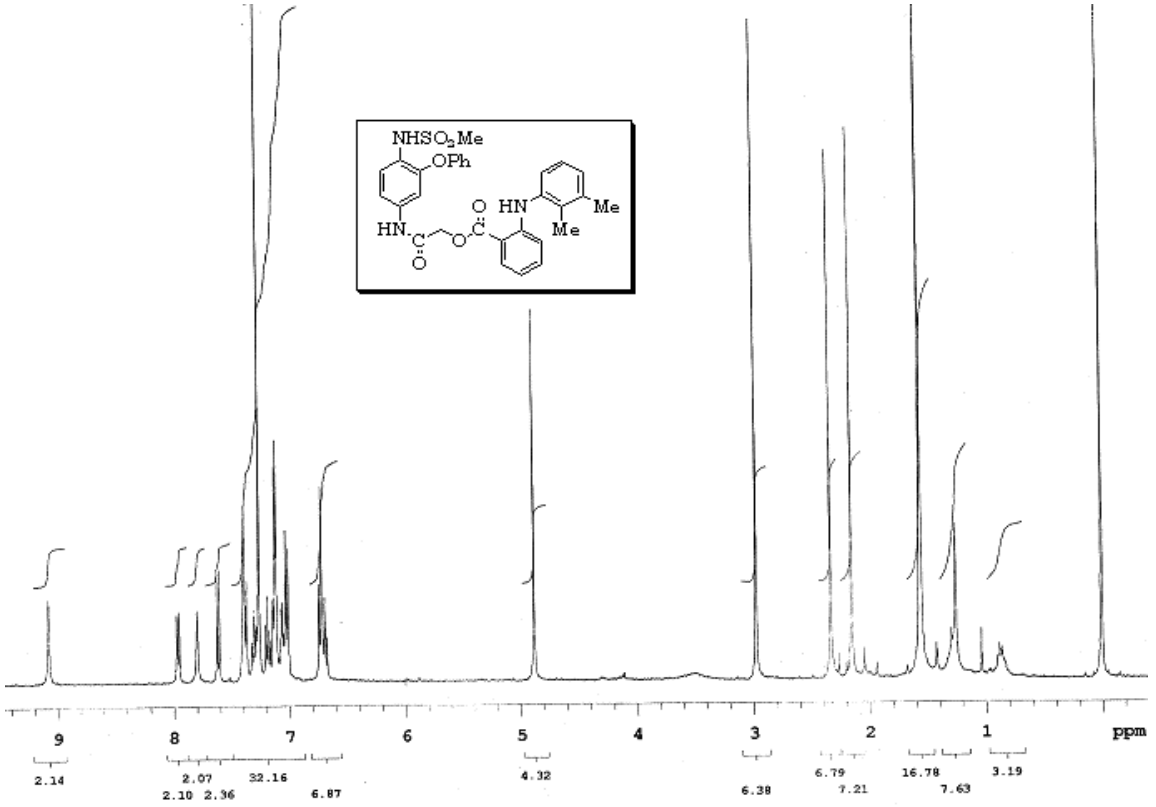


Figure 43: ^{1}H NMR ($CDCl_3$, 400 MHz) spectrum of **4k**

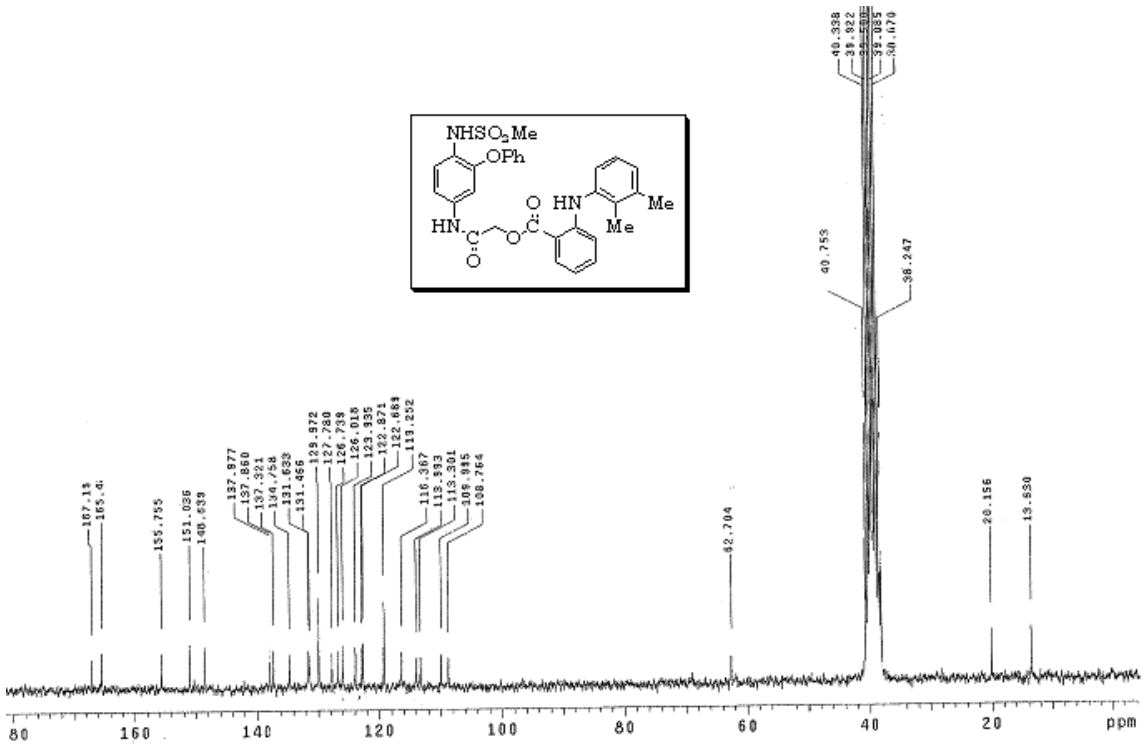


Figure 44: ^{13}C NMR spectrum (DMSO-d_6, 50 MHz) of **4k**

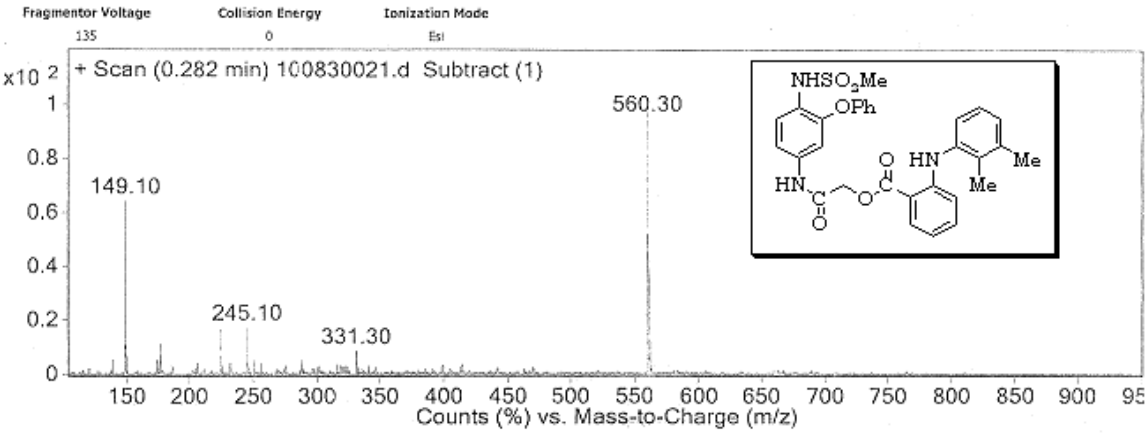


Figure 45: Mass (+Ve) spectrum of **4k**

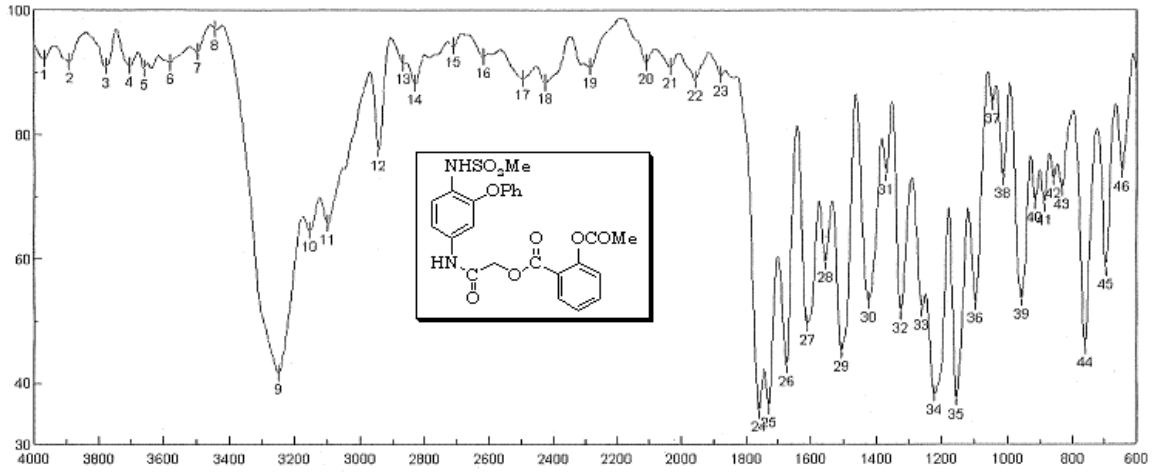


Figure 46: IR spectrum of **4l**

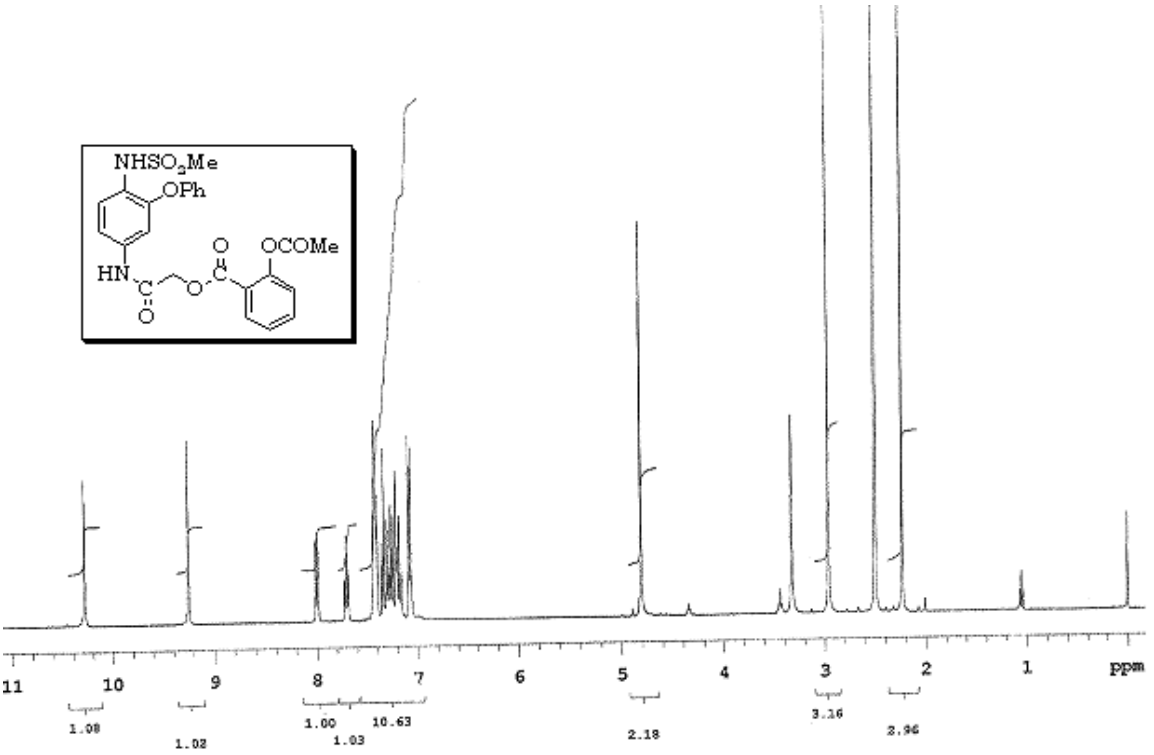


Figure 47: ^{1}H NMR (DMSO-d_6, 400 MHz) spectrum of **4l**

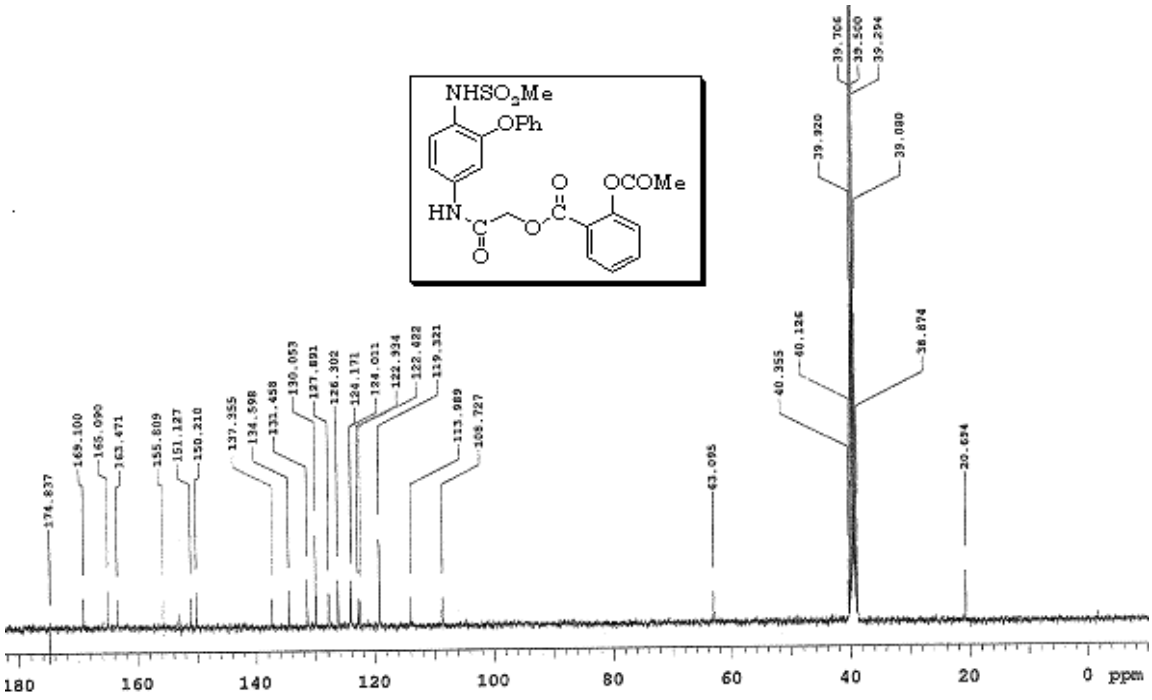


Figure 48: ^{13}C NMR spectrum (DMSO-d_6, 100 MHz) of **4l**

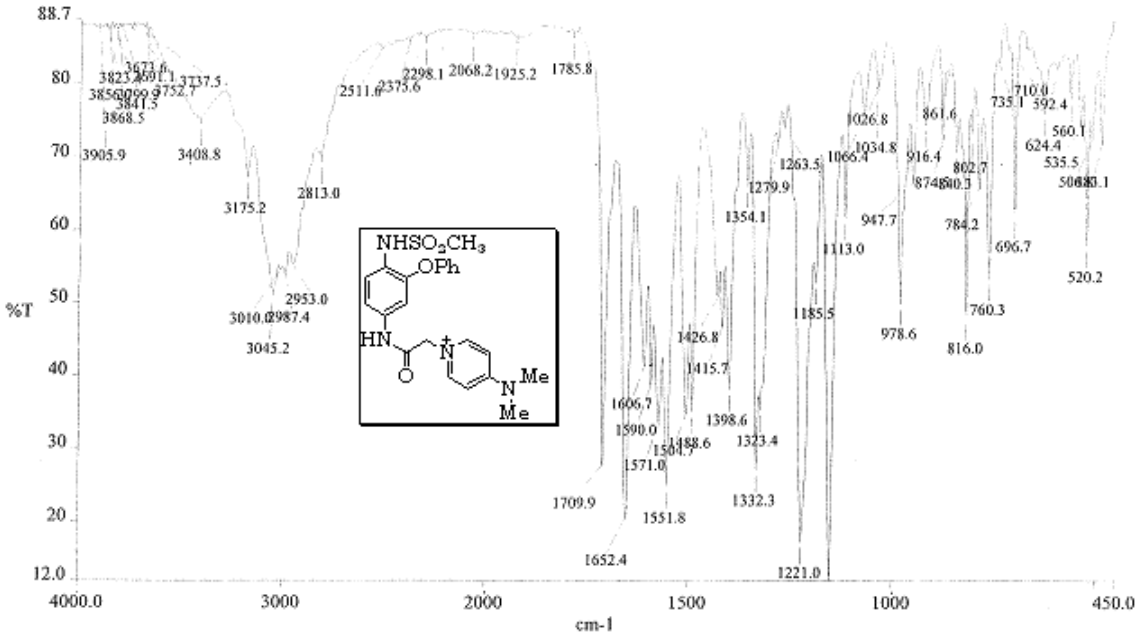


Figure 49: IR spectrum of **5**

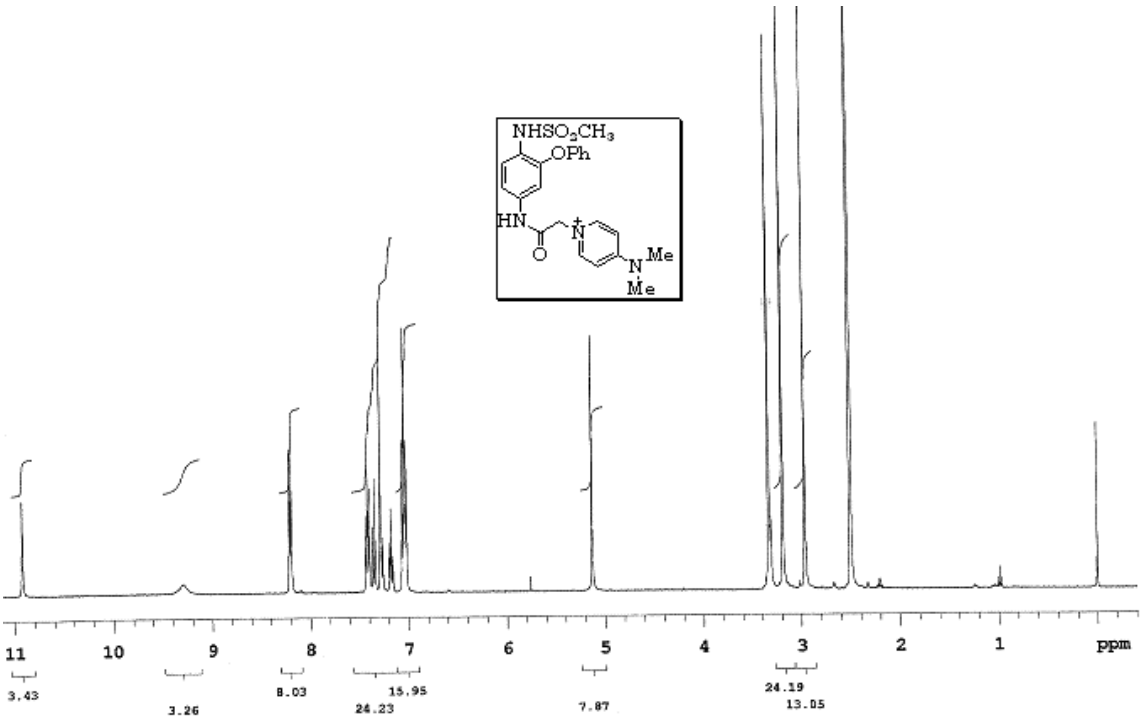


Figure 50: ^{1}H NMR (DMSO-***d*$_6$**, 400 MHz) spectrum of **5**

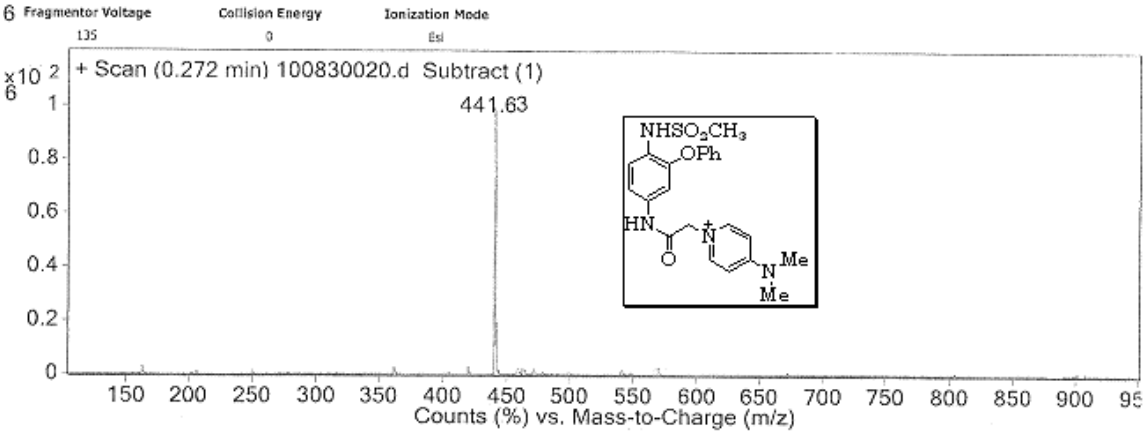


Figure 51: Mass (+Ve) spectrum of **5**

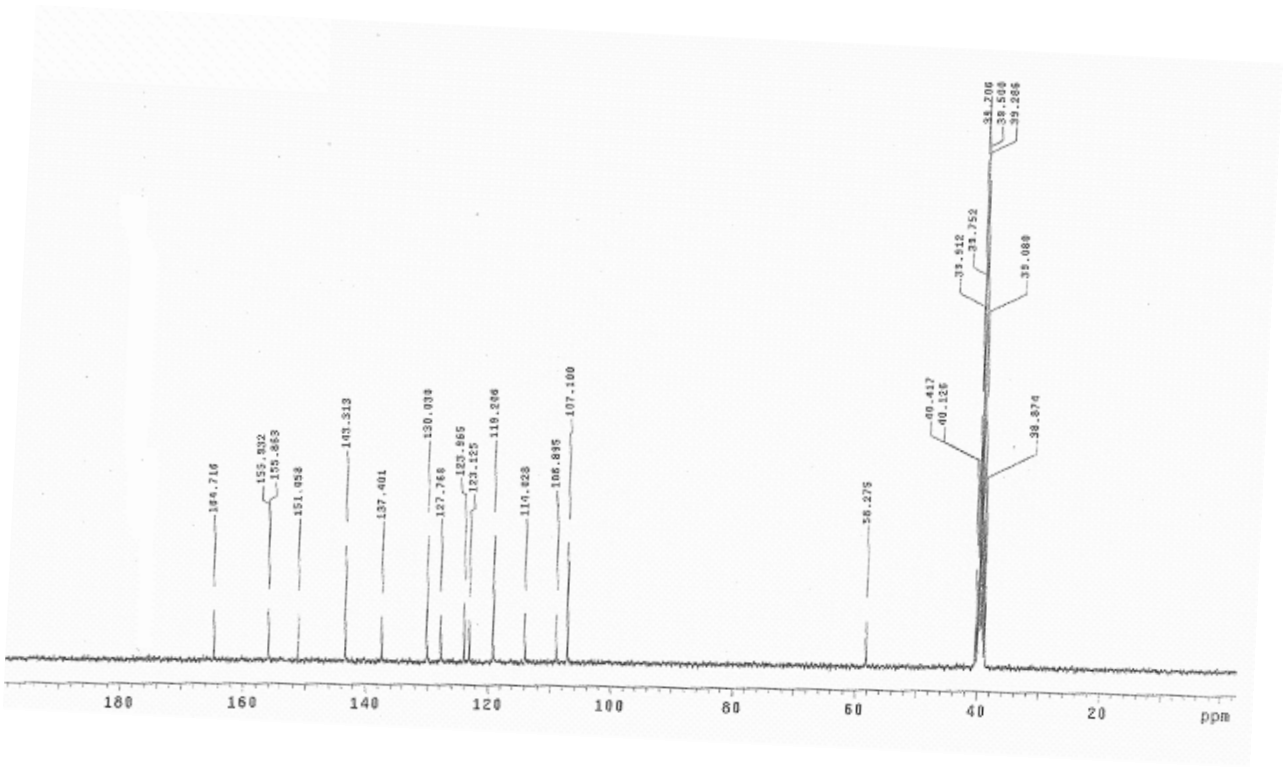


Figure 52: ^{13}C NMR (DMSO-d_6, 100 MHz) spectrum of **5**