Supplementary Information

Synthesis, antimicrobial and antimalarial activity of novel carbazole derivatives

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Compound 3: 1-((9H-carbazol-4-yl)oxy)-3-(piperazin-1-yl)propan-2-ol

FTIR (KBr) cm-1: 3294.42 (O-H), 3136.25 (C-H), 2983.88 (N-H), ^{1}H NMR, (DMSO d6, ppm): 2.73-2.44 (m, 2H of N-CH_2 & 8H of CH_2 of piperazine ring), 4.23-4.12 (m, 2H of O-CH_2, 1H of O-CH), 6.71-6.69 (1H, d, 8Hz, ArH`), 7.13-7.11 (1H,d, 8Hz ArH), 7.20-7.16 (1H, t, 7.2 Hz, 6.8Hz, ArH), 7.39-7.29 (2H, m, ArH), 7.50-7.48 (1H, d, 8 Hz, ArH), 8.32-8.30 (1H, d, 8Hz, ArH), 10.35 (bs, OH), 11.35 (bs, NH of Piperazine ring), 12.22 (bs, NH of carbazole ring). Mass obtained: 326.2 (M+H), Exact mass: 325.18.

Compound 5a: 2-(4-(3-((9H-carbazol-4-yl)oxy)-2-hydroxypropyl)piperazin-1-yl)-1-phenylpropan-1-one

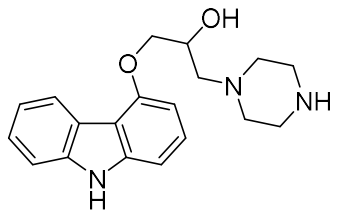
FTIR (KBr) cm^{-1}: 1345 (CH_3), 3057 (N-H), 3560-2933 (b, O-H), 1681 (C=0). ^{1}H NMR (DMSO-d6, ppm): δ 1.1 (d, 3H, -CH_3), 2.57-2.44 (m, 8H of N-CH_2, 1H of N-CH), 4.16-4.10 (m, 2H of N-CH_2, 1H of O-CH), 4.28 (1H, m, O-CH_2), 4.93 (1H, m, O-CH_2), 6.67-6.65 (d, 1H, 8 Hz, ArH), 7.12-7.05 (m, 2H, ArH), 7.27-7.25 (1H, d, 6.8Hz, ArH), 7.33-7.25 (2H, m, ArH), 7.48-7.42 (1H, d, 8 Hz, ArH), 7.5 (1H, t, 8 Hz), 7.61-7.59 (1H, d, 7.2 Hz, ArH), 8.04 (2H, m, ArH), 8.06-8.04 (1H, d, 7.2 Hz, ArH), 10.39 (bs, OH), 12.27 (bs, NH of carbazole ring) ^{13}C NMR: δ 200, 155.46, 141.55, 139.35, 136.66, 133.39, 133.03, 129.1, 128.89, 127.8 126.9, 124.9, 122.9, 122.2, 118.9, 112.0, 110.7, 104.2, 100.9, 71.2, 69.42, 67.17, 63.0, 61.7, 54.43, 27.28, 10.45. Mass obtained: 458.3 [M+1], Exact mass: 457.24.

Compound 5b: 2-(4-(3-((9H-carbazol-4-yl)oxy)-2-hydroxypropyl)piperazin-1-yl)-1-(3-chlorophenyl)propan-1-one

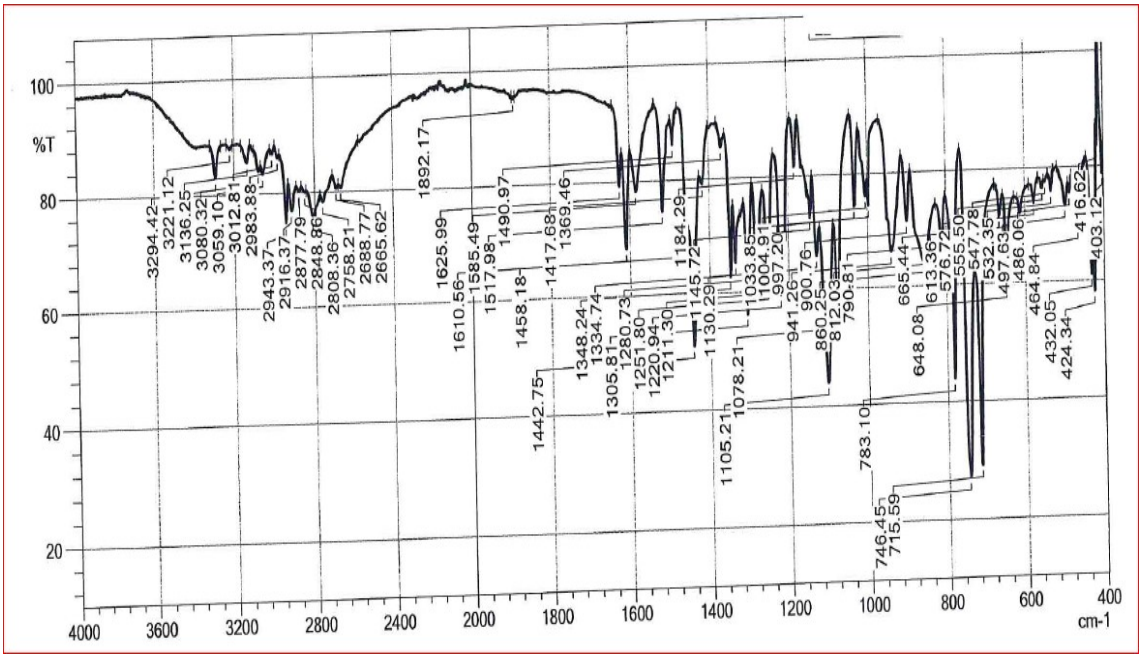
FTIR (KBr) cm^{-1}: 1341 (CH_3), 3400 (N-H), 3487-3057.17 (b, O-H), 2933.7 (C-H), 1685.7 (C=O) ^{1}H NMR (DMSO-d6, ppm): δ 1.2 (d, 3H, -CH_3), 2.62-2.44 (m, 8H of N-CH_2, 1H of N-CH), 4.16-4.09 (m, 2H of N-CH_2, 1H of O-CH), 4.28-4.24 (1H, m, O-CH_2), 4.95 (1H, m, O-CH_2), 6.68-6.66 (d, 1H, 8 Hz, ArH), 7.15-7.06 (m, 2H, ArH), 7.35-7.26 (2H, m, ArH), 7.46-7.44 (1H, d, 8 Hz, ArH), 7.5 (1H, t, 8 Hz), 7.68-7.66 (1H, dd, 6 Hz, ArH), 8.00 (1H, dd, 6.8 Hz, ArH),8.05 (1H, m, ArH), 8.22 (1H, m, ArH), 10.29 (bs, OH), 12.24 (bs, NH of carbazole ring), ^{13}C NMR (ppm): δ 199.34, 155.48, 141.58, 139.38, 138.45, 133.7, 133.03, 130.8, 128.81, 127.8, 126.9, 124.9, 123.0, 122.2, 118.9, 112.0, 110.7, 104.2, 100.9, 72.51, 69.42, 67.17, 63.36, 61.76, 54.43, 27.28, 9.7. Mass obtained: 492.3 [M+1], Exact mass: 491.20.

Compound 5c*:* 2- (4-(3-((9H-carbazol-4-yl) oxy) -2-hydroxypropyl)piperazin-1-yl)-1-(4-(methylthio)phenyl) ethan-1 -one

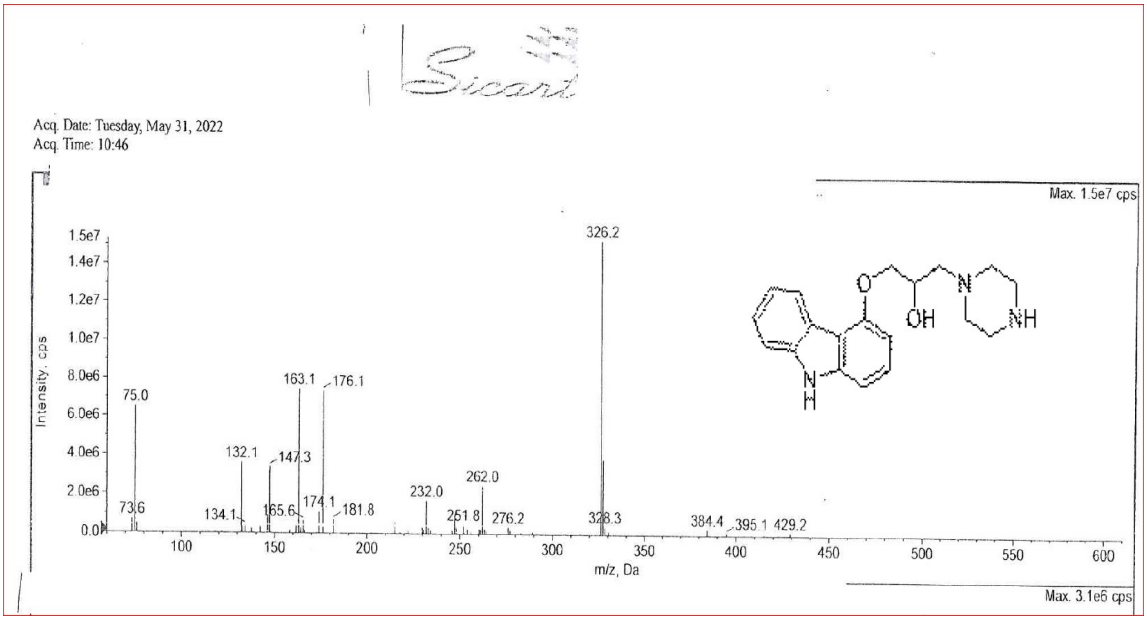
FTIR (KBr, cm^{-1}): 1361 (CH_3), 3318 (NH), 3481-3033 (b, OH), 2972.31 (C-H), 1671 (C=O). ^{1}H NMR ($CDCl_3$): δ 1.3 (d, 3H, -CH_3), 2.5 (3H, S, S-CH_3), 2.86-2.63 (8H, m, N-CH_2), 2.97-2.90 (2H, m, -N-CH_2), 3.81 (2H,S, -N-CH_2), 4.27-4.24 (1H,m, -O-CH), 4.34-4.31 (2H, m, O-CH_2), 6.71-6.69 (1H, d, 8Hz, ArH), 7.09-7.07 (1H, d, 8Hz, ArH), 7.30-7.23 (3H,m, ArH), 7.36-7.34 (1H, d, 8Hz ArH), 7.42-7.40 (2H, m, ArH), 7.96-7.94 (2H, dd, ArH), 8.30-8.28 (1H, d, 8 Hz, ArH), 10.21 (bs, OH), 12.38 (bs, NH of carbazole ring). ^{13}C NMR: 195.43, 146.2, 140.81, 138.60, 132.29, 128.60, 126.66, 125.01, 124.94, 122.97, 122.53, 119.68, 109.95, 103.76, 101.20, 70.31, 65.68, 64.33, 60.96, 53.58, 26.98. Mass obtained: 490.4 [M+1], Exact mass: 489.21.



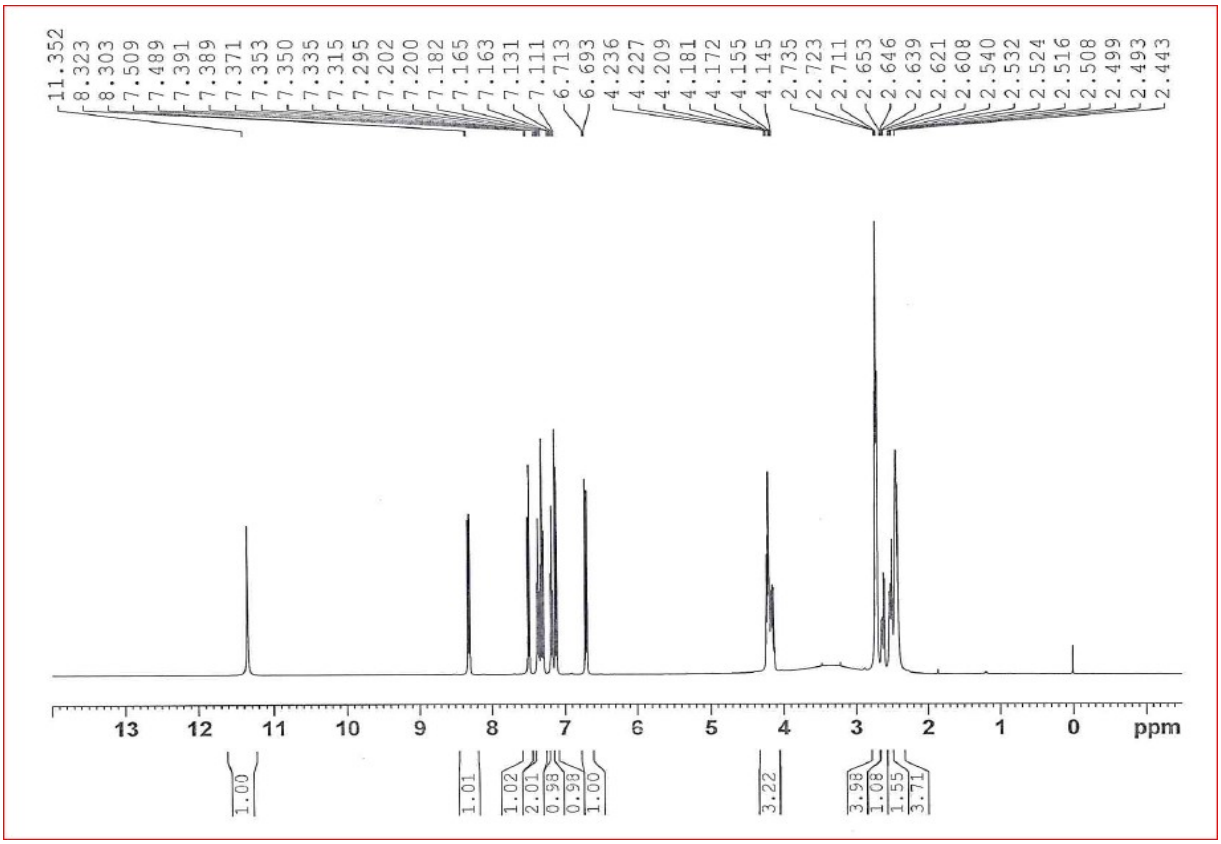
Compound 3



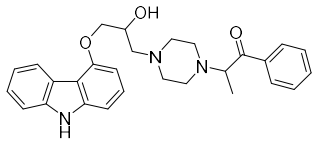
IR spectra of Compound 3



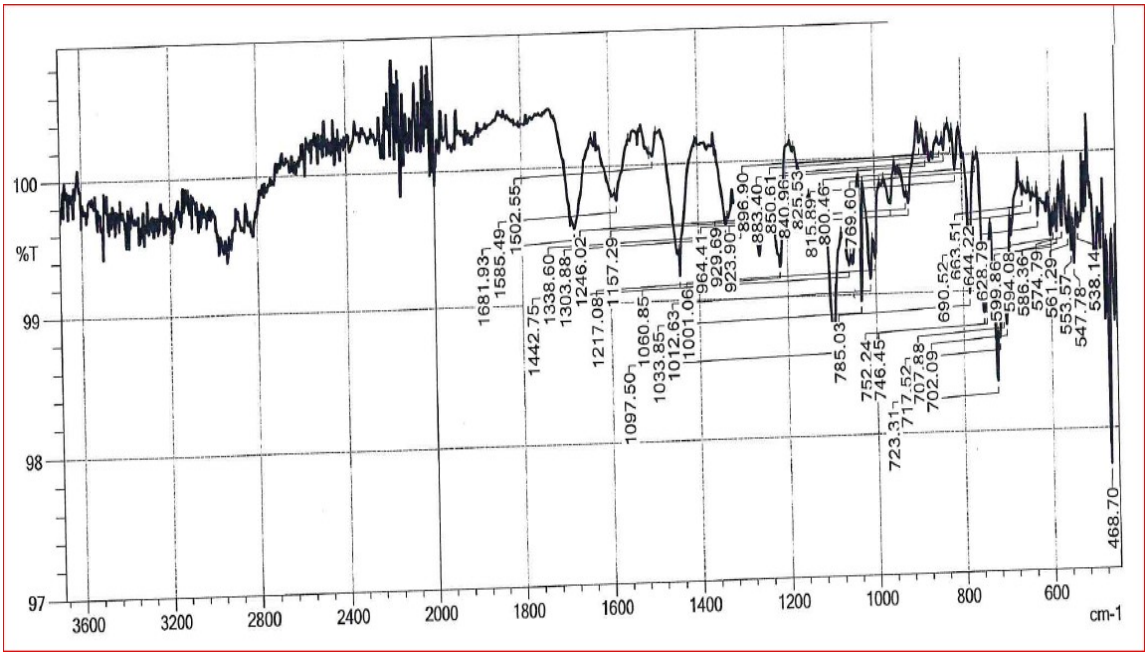
Mass spectra of Compound 3



^{1}H NMR spectra of Compound 3



Compound 5a



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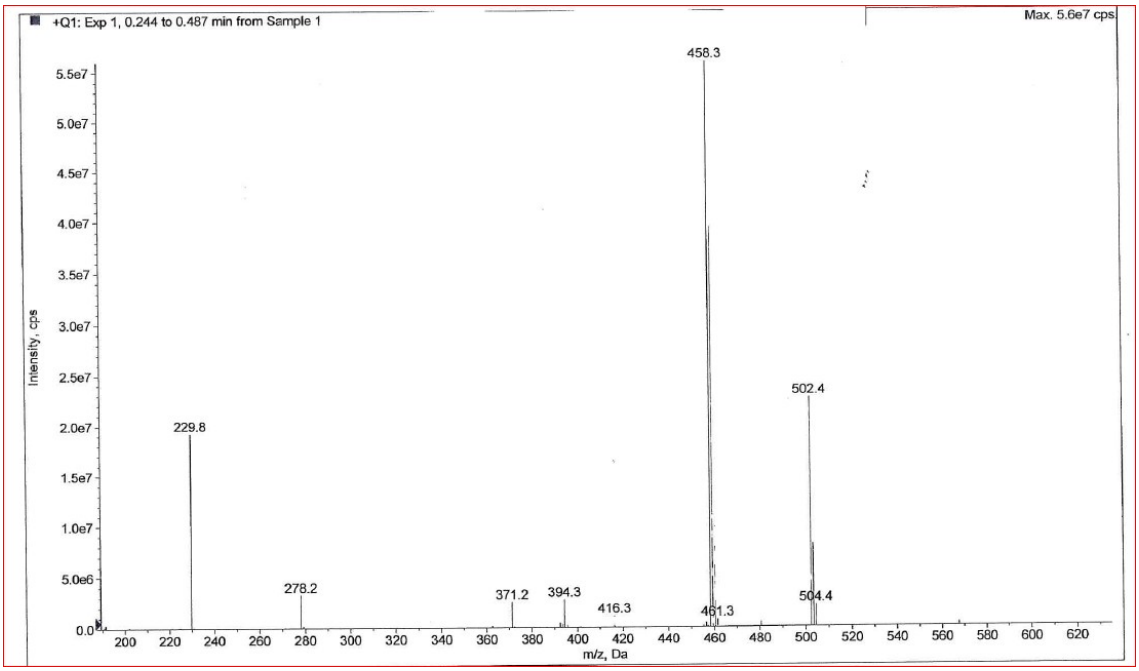

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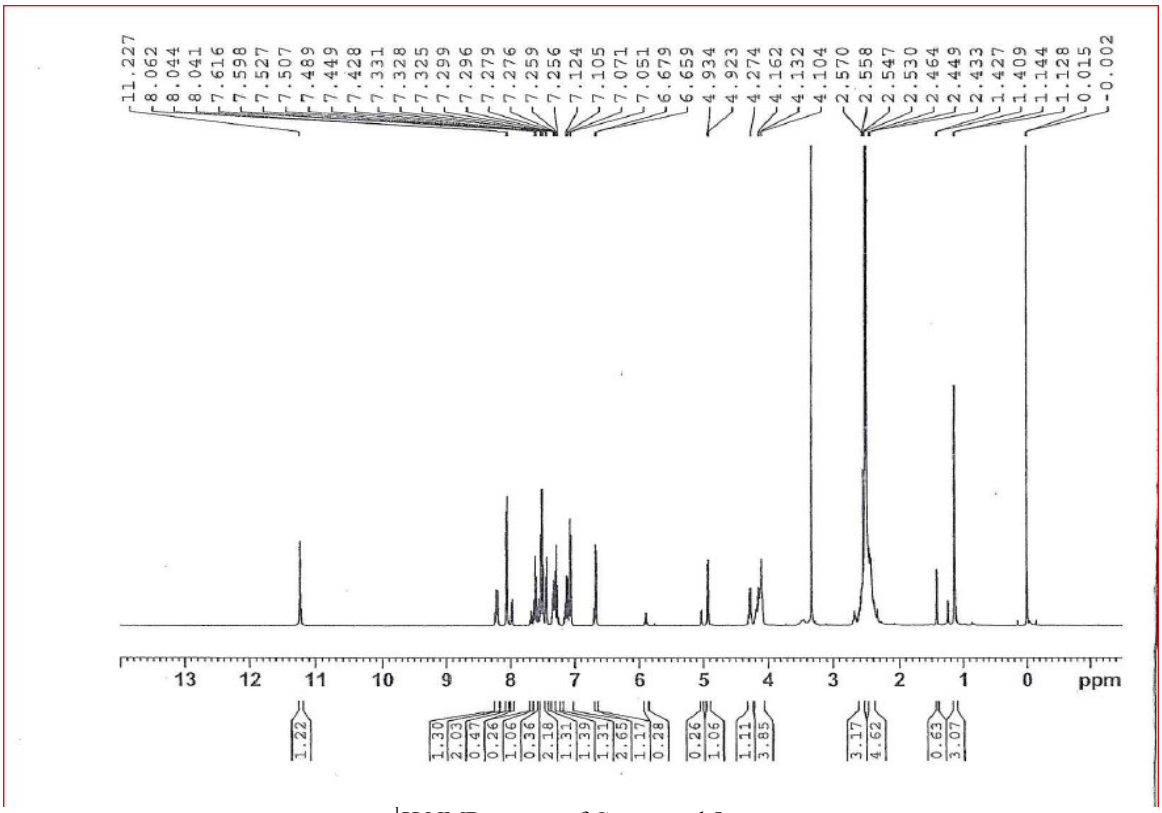

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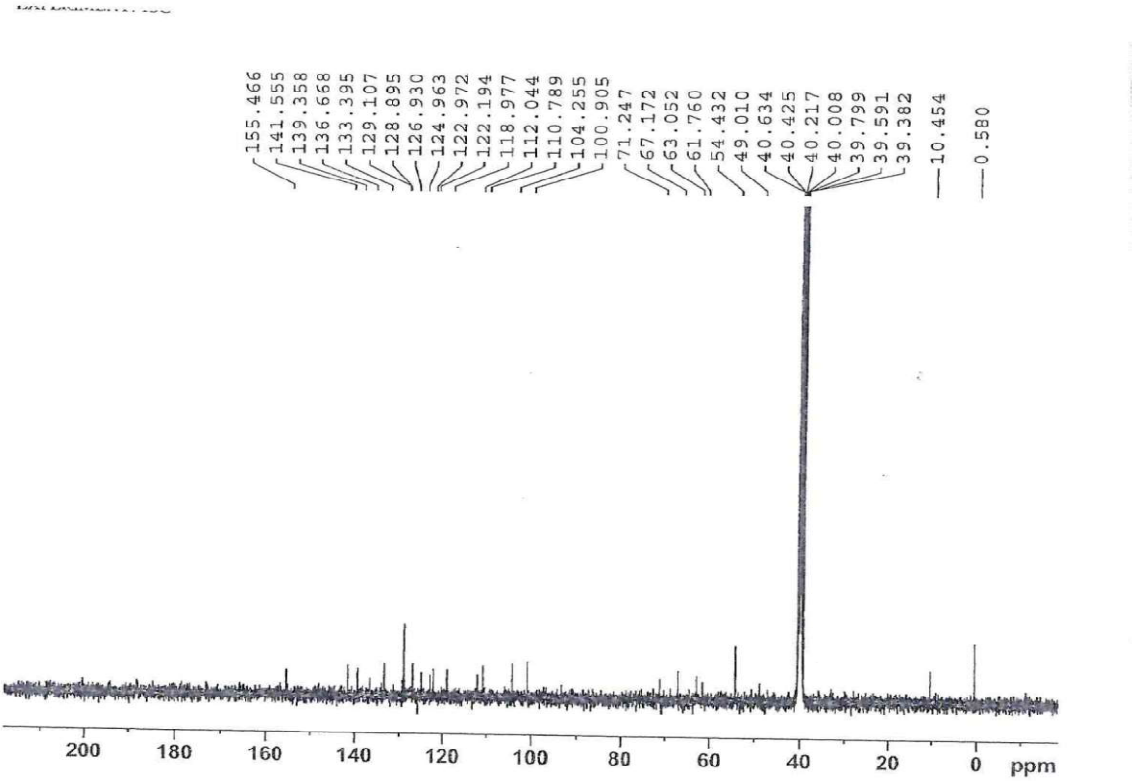
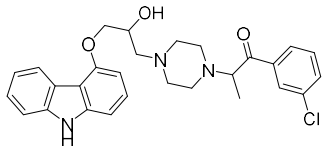
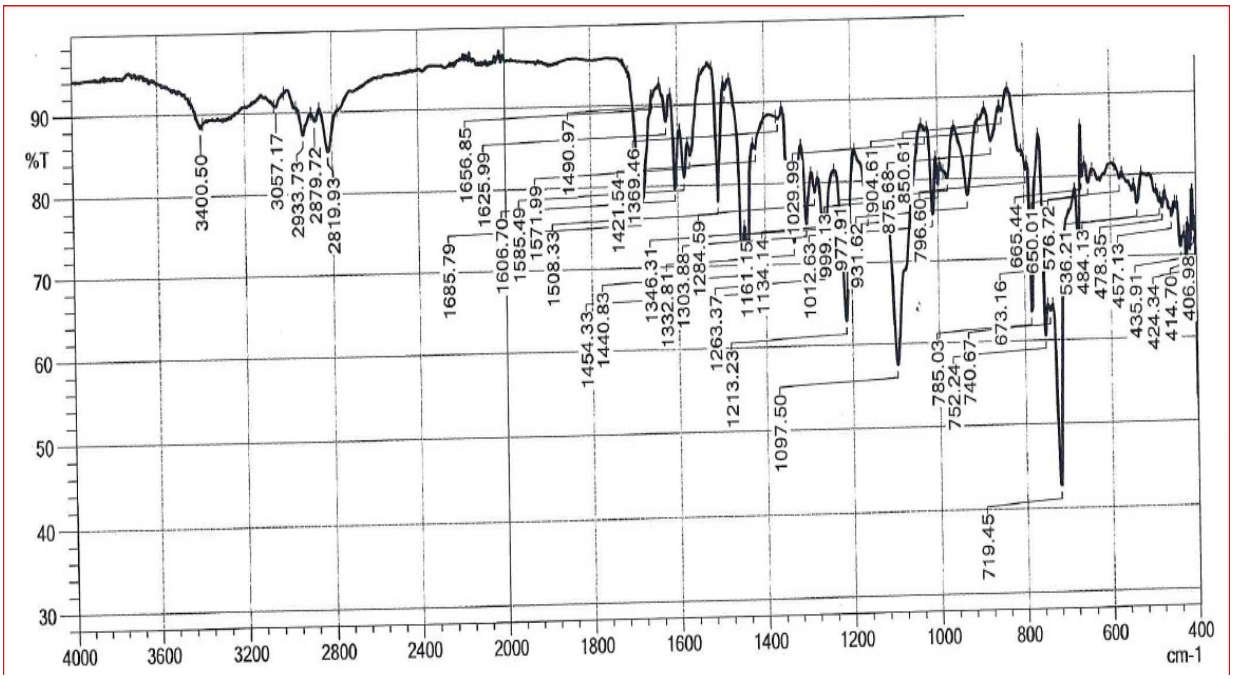


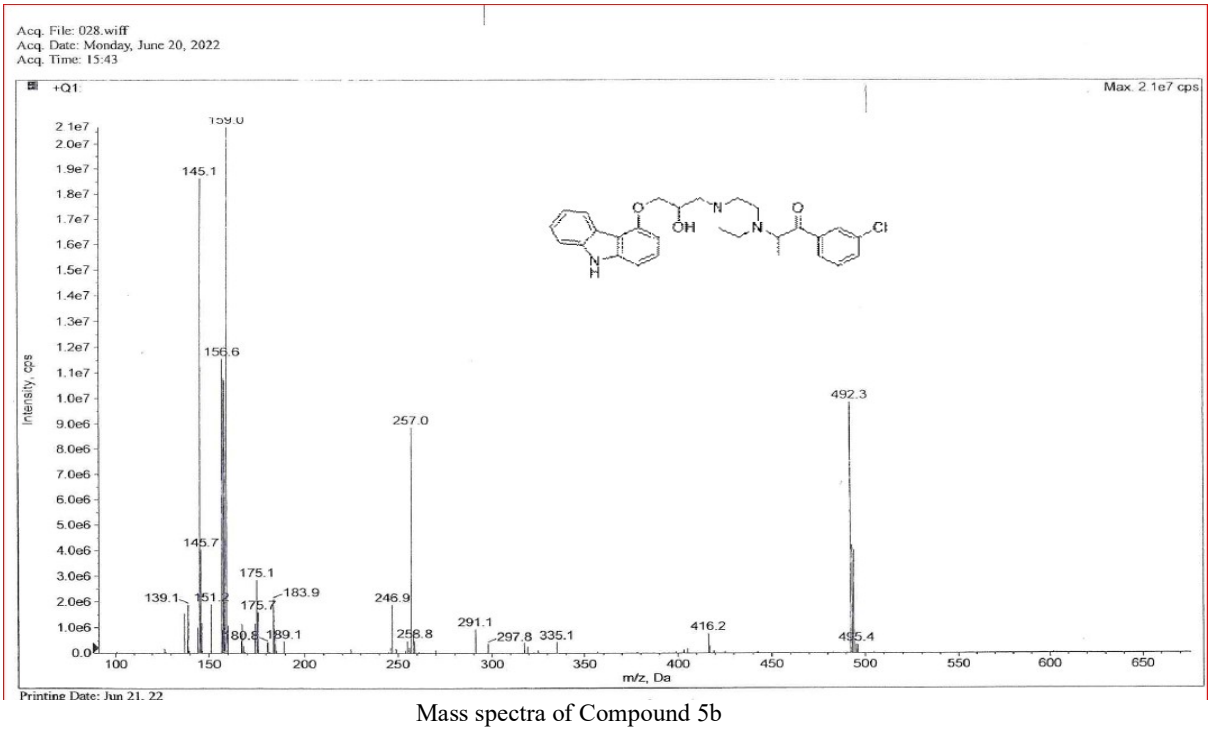
^{13}C NMR spectra of Compound 5a



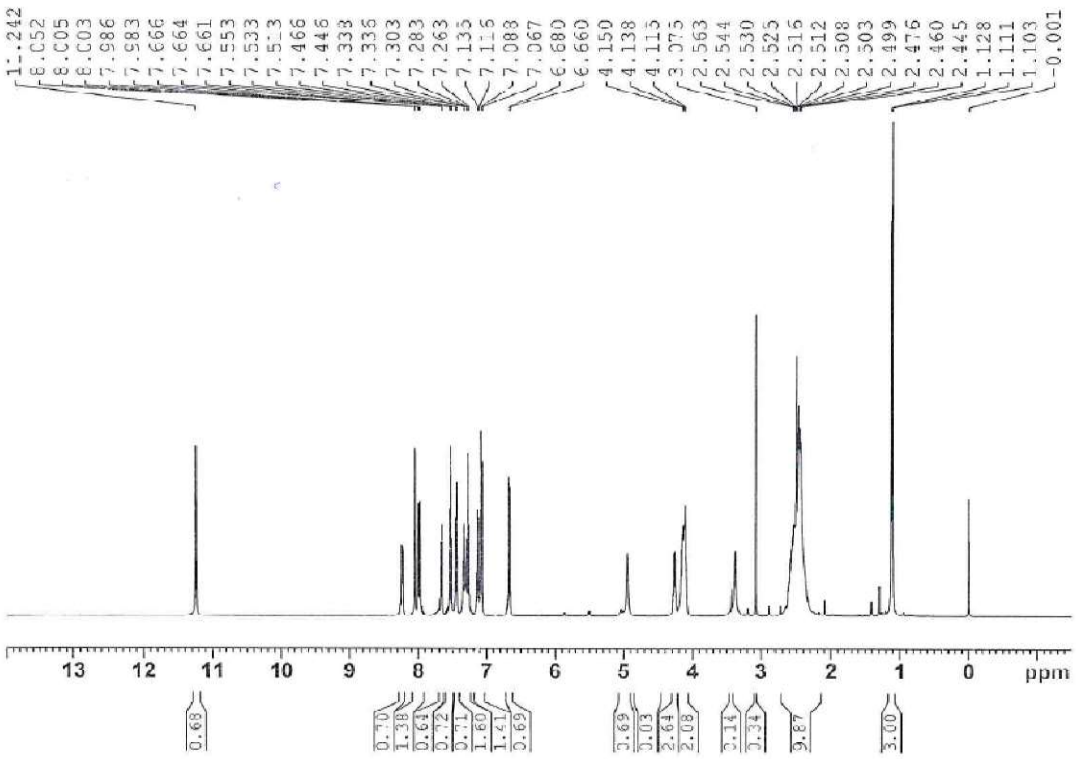
Compound 5b



IR spectra of Compound 5b



Mass spectra of Compound 5b



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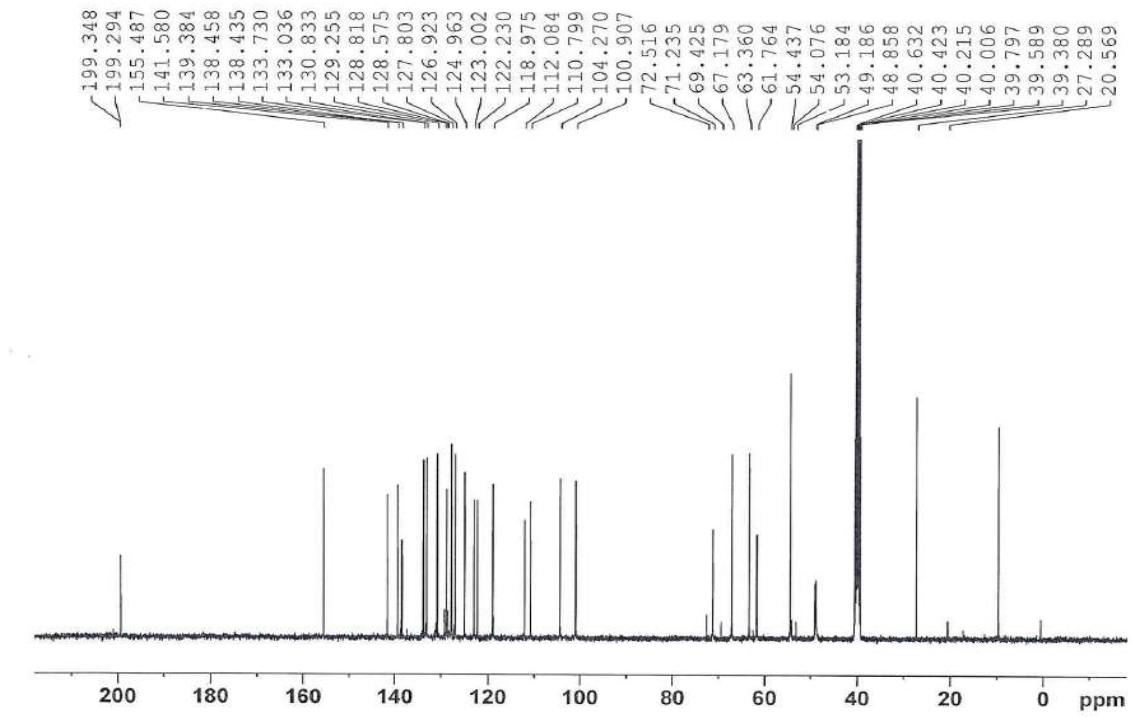

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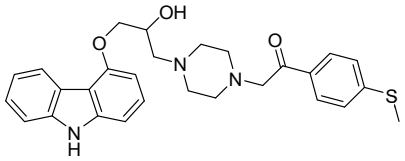
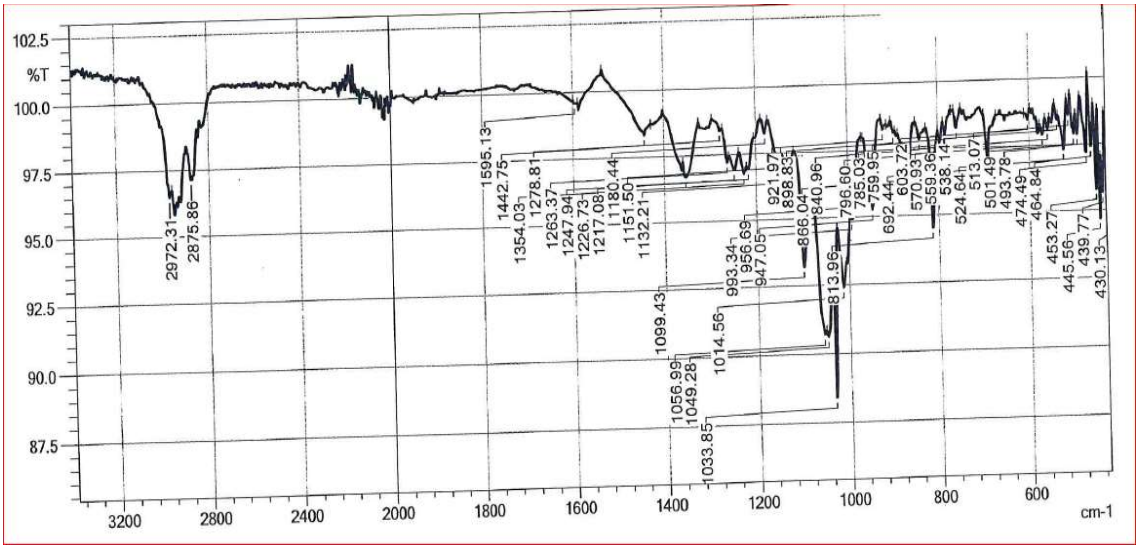


Compound 5c



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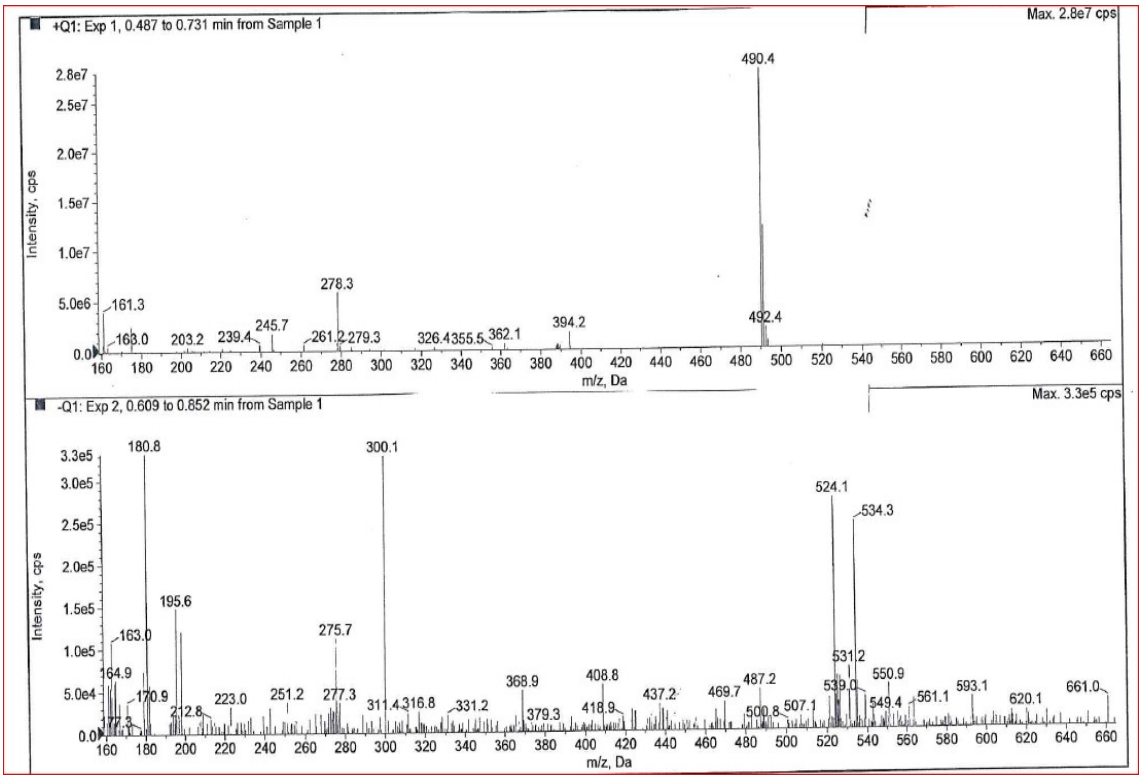
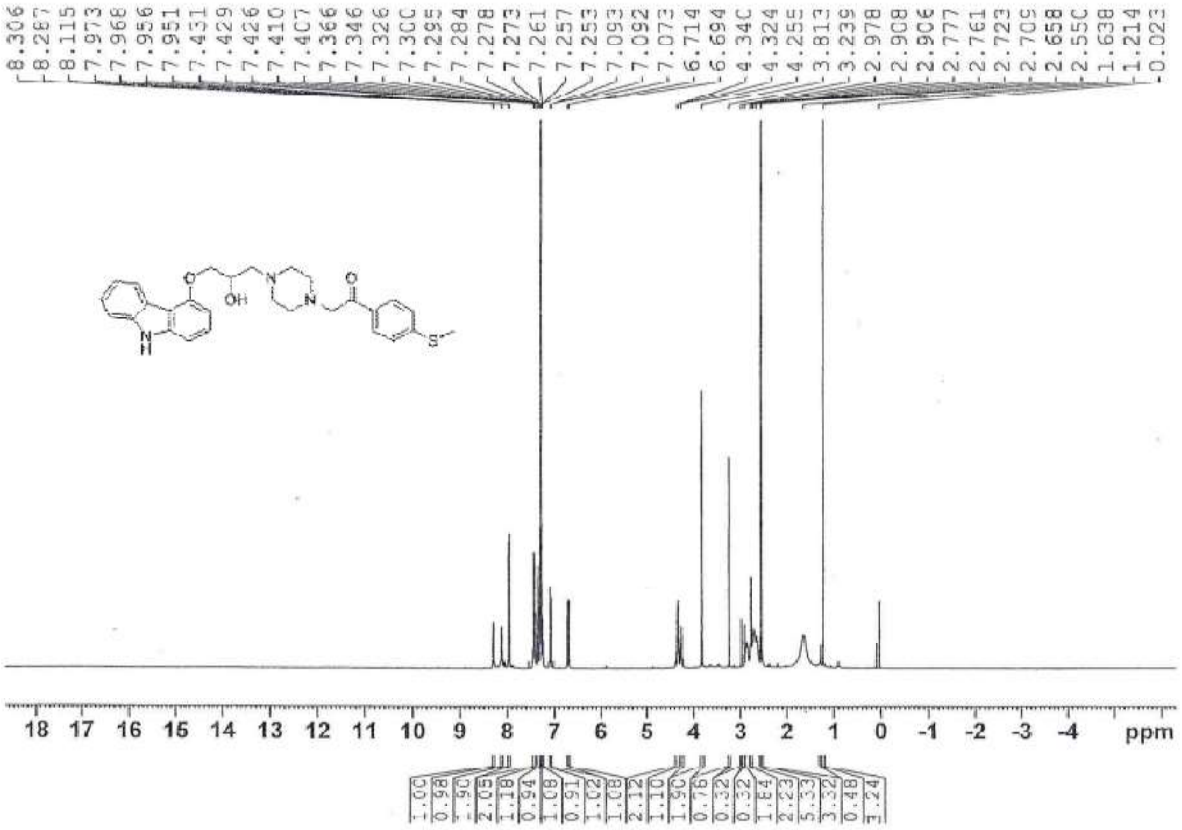


Mass spectra of Compound 5c



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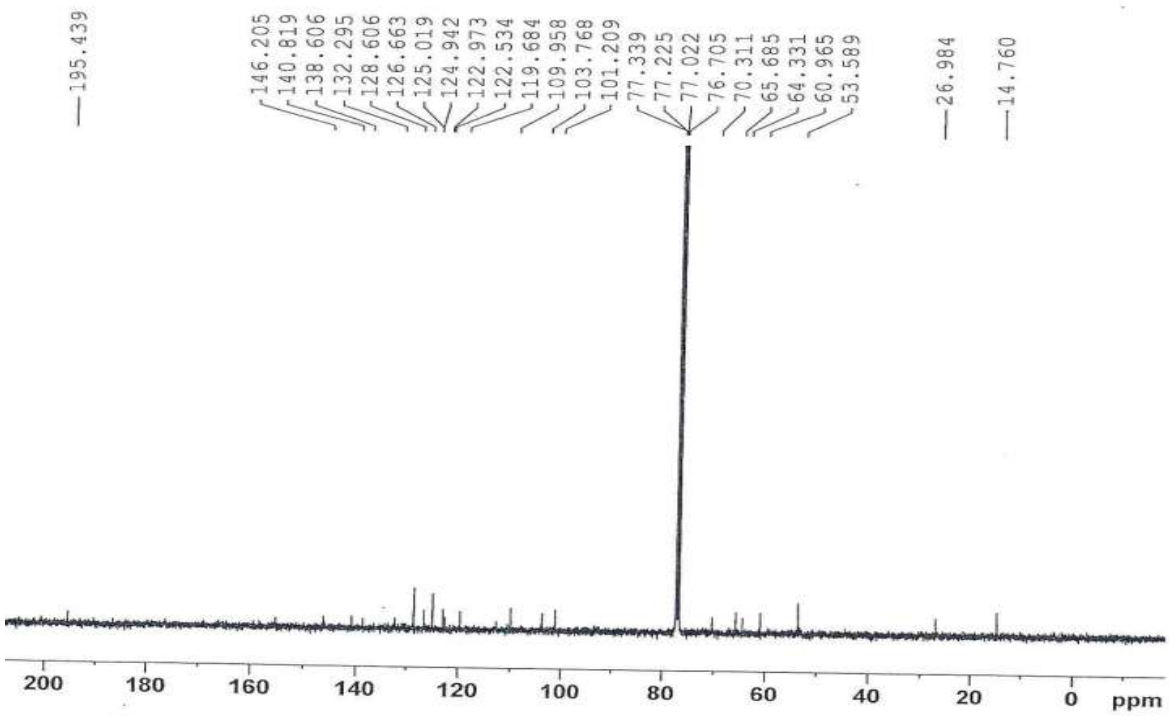

^{13}C NMR spectra of Compound 5C