

Supporting Information

Diethylamine - Dess Martin periodinane: An efficient catalyst - oxidant combination in sequential, one-pot synthesis of difficult to access 2-amino-3,5-dicarbonitrile-6-sulfanylpyridines

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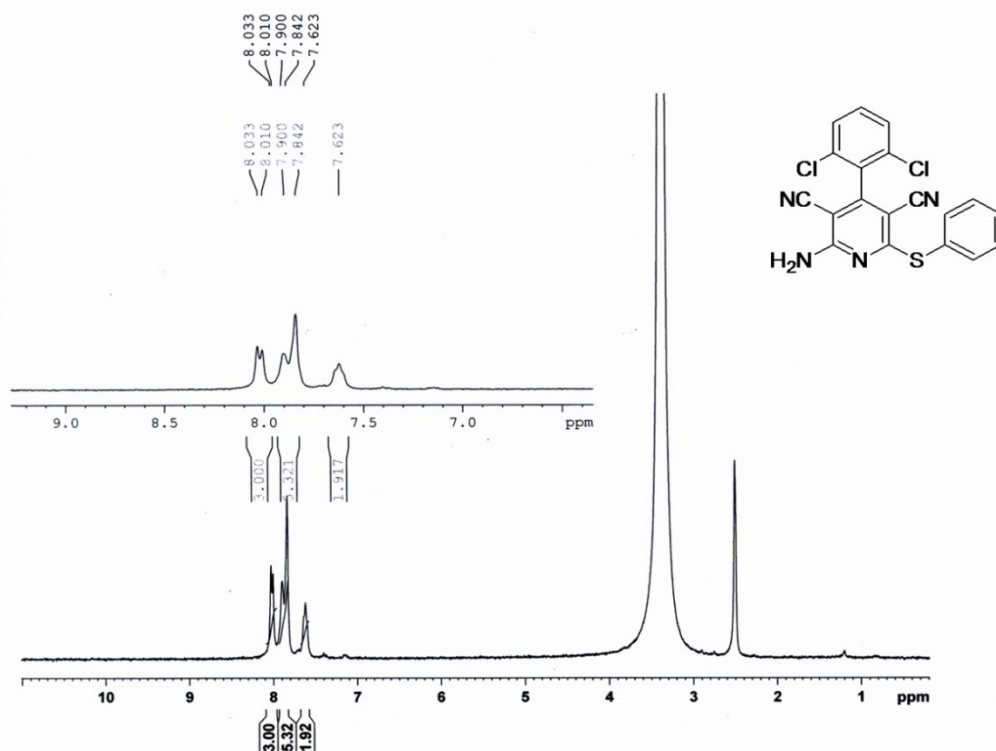
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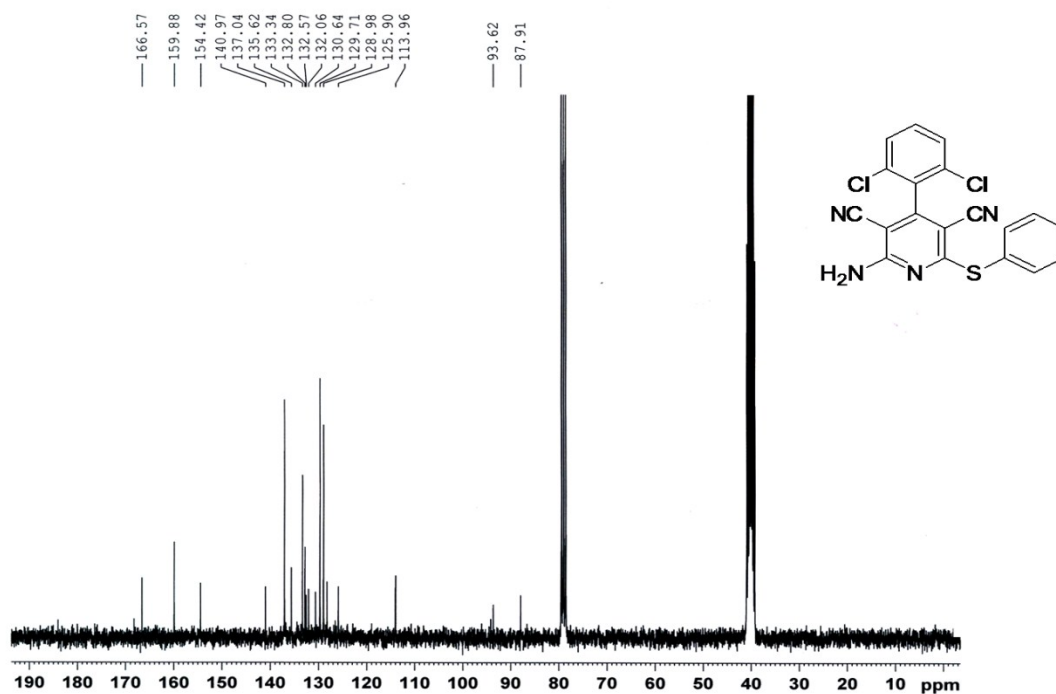
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Representative procedure for sequential, one-pot synthesis of 2-amino-3,5-dicarbonitrile - 6-sulfanylpyridines:

To a well-stirred solution of 2,6-disubstituted benzaldehyde, malononitrile and thiol (1: 2:1 mmol) in ethanol (3 mL) was added diethylamine (20 mol %) and stirring was continued at ambient temperature. Upon completion of the reaction (TLC), resultant dihydropyridine, was (***either isolated or***) dissolved using dimethylformamide (2 ml). To the resulting solution, Dess Martin periodinane (1 mmol) was added and stirring continued. In most of the cases, an exothermic reaction took place. Upon completion of oxidation (TLC) water (10 mL) was added and stirring was continued till free flowing solid separates out. Resultant solid was filtered, washed with water, dried, washed again with chloroform and dried. Resultant 2-amino-3,5-dicarbonitrile-6-sulfanylpyridine, was found to be pure and did not require any further purification.

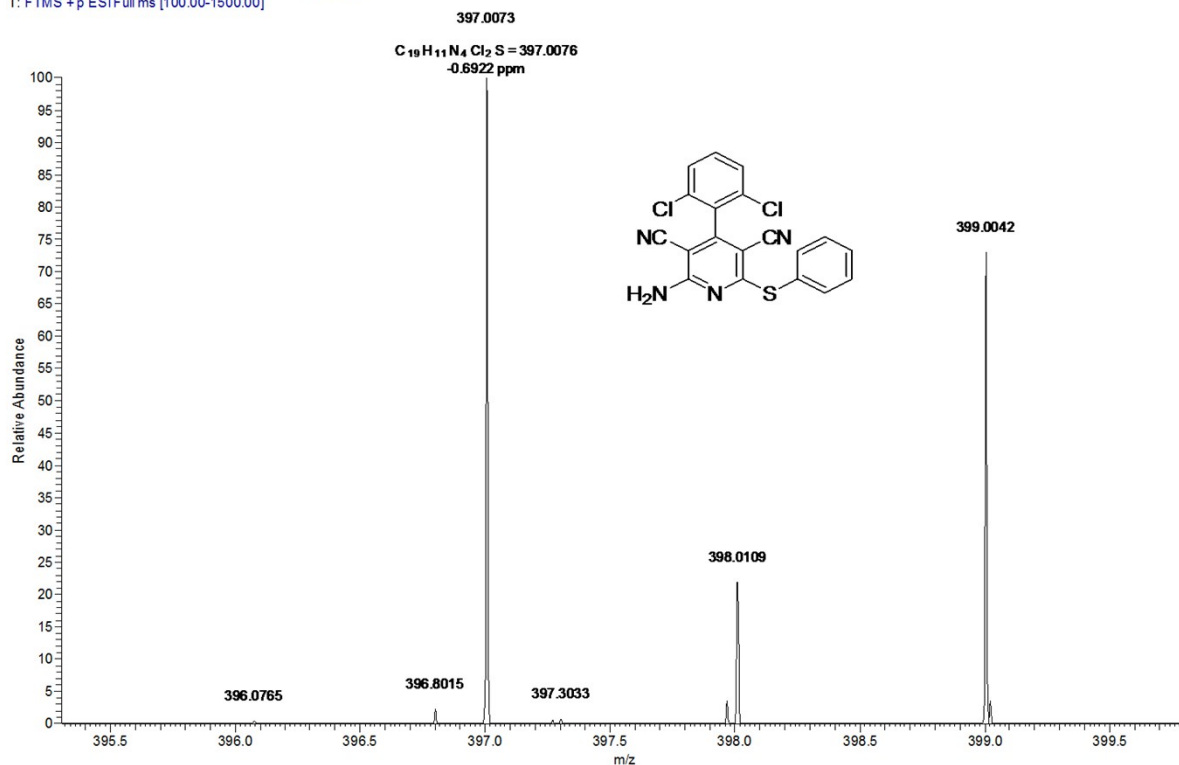


Spectrum 1. ¹H – NMR of compound 5a

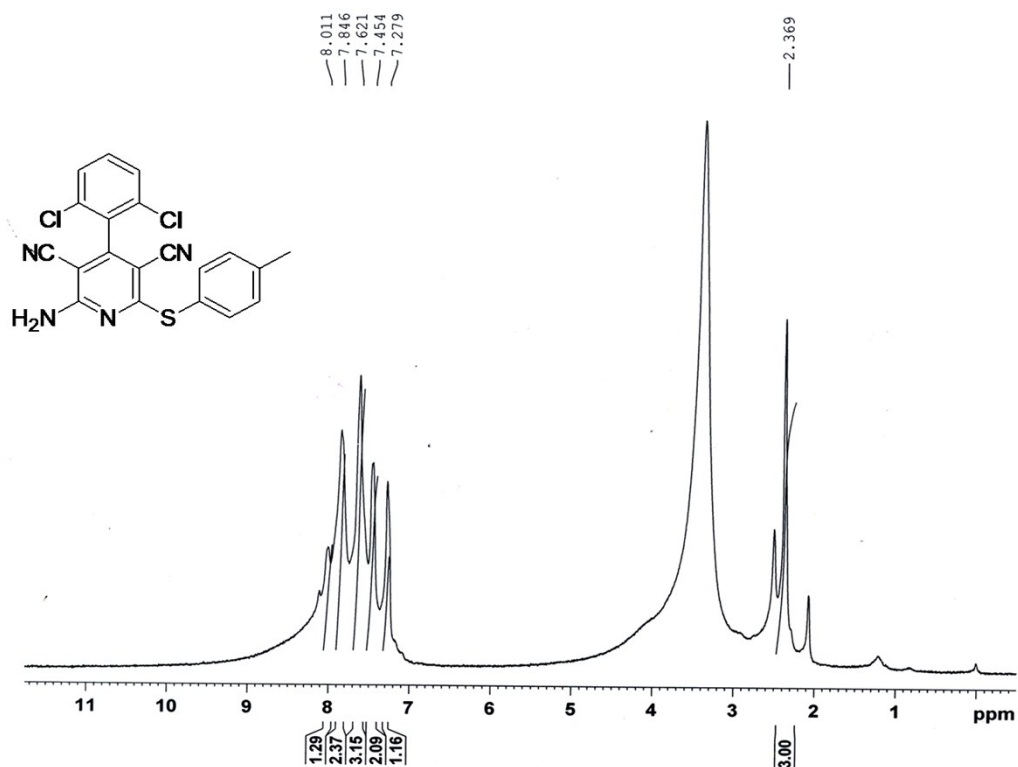


Spectrum 2. ¹³C – NMR of compound 5a

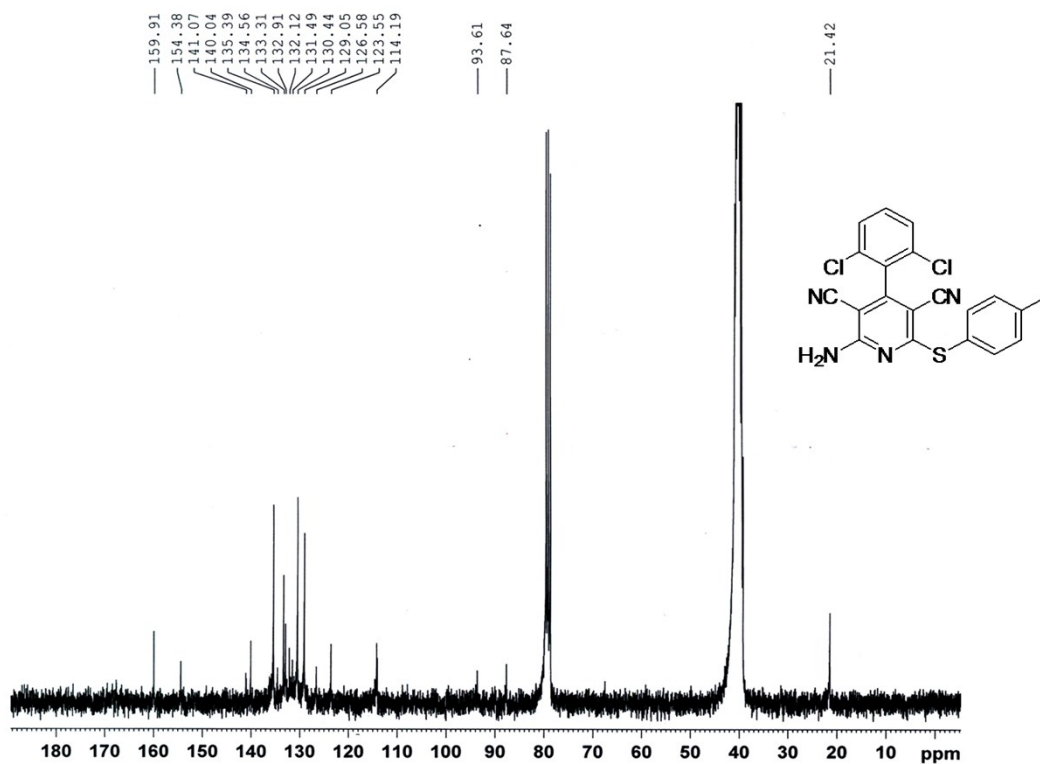
RK-9_161121123956#119 RT: 0.53 AV: 1 NL: 3.03E7
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 3. HRMS of compound 5a

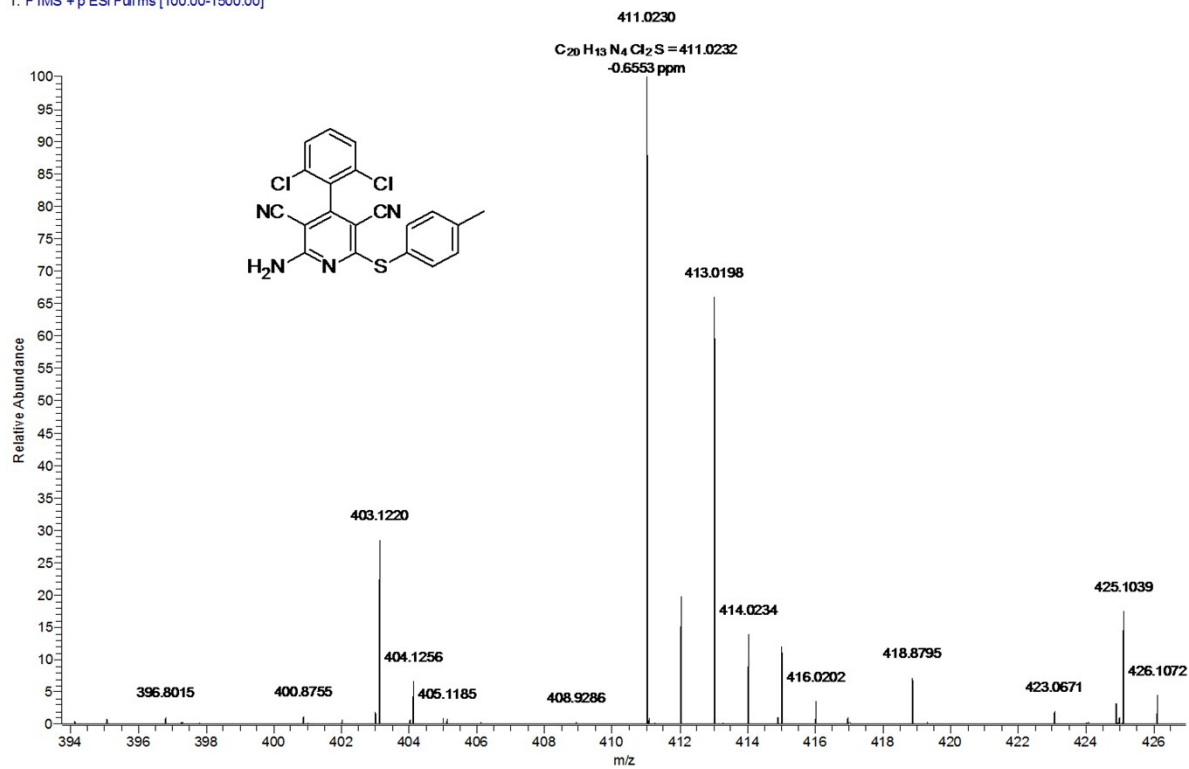


Spectrum 4. ¹H – NMR of compound 5b

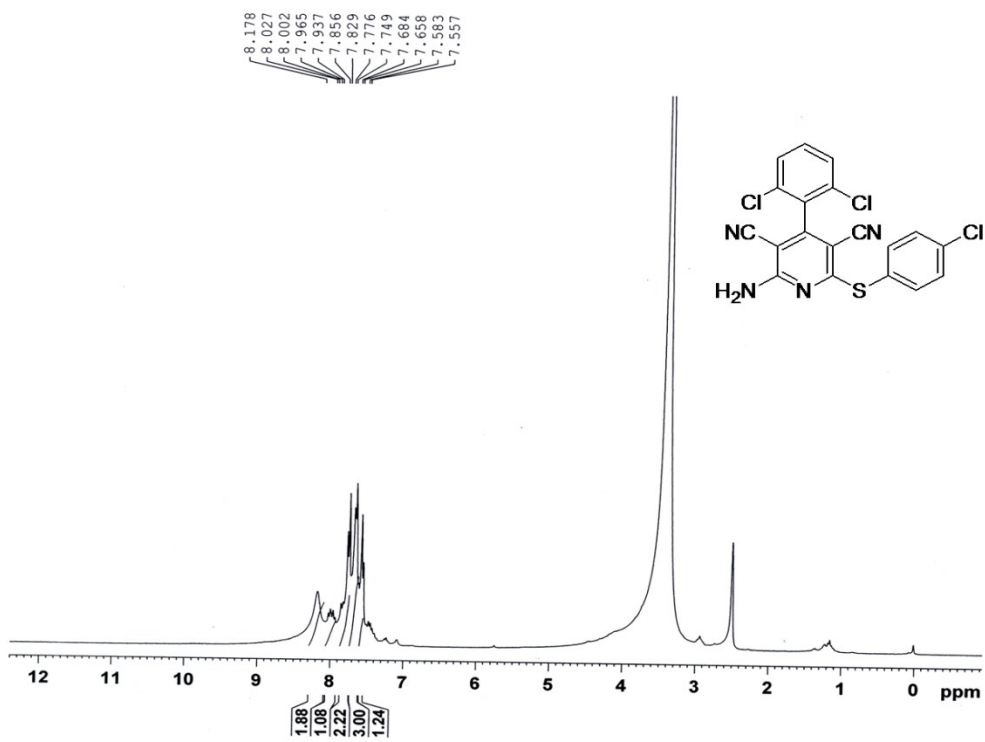


Spectrum 5. ¹³C – NMR of compound 5b

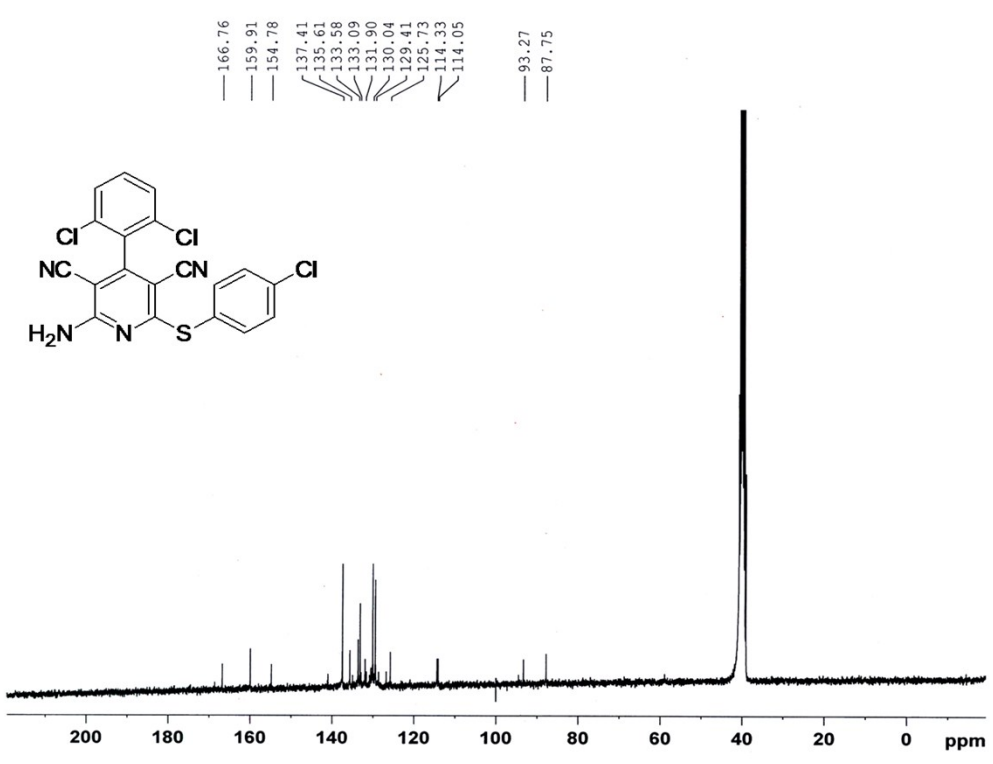
RK-8_161121123645 #138 RT: 0.61 AV: 1 NL: 3.25E7
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 6. HRMS of compound 5c

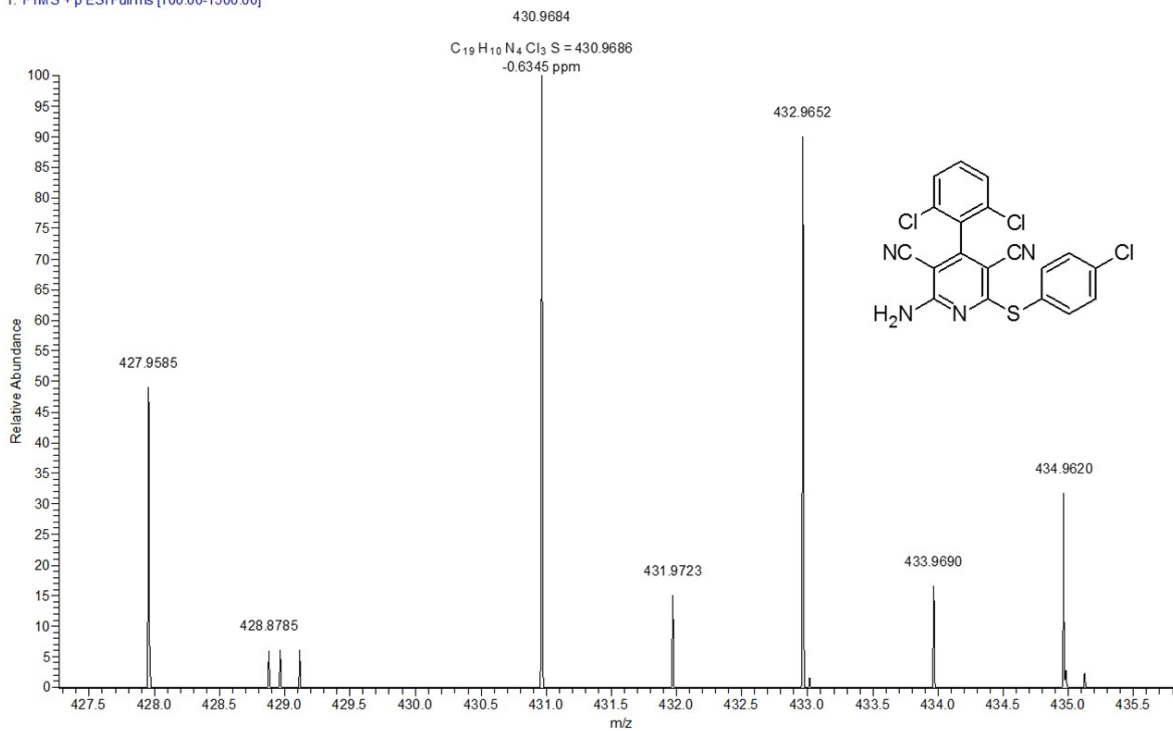


Spectrum 7. ¹H – NMR of compound 5c

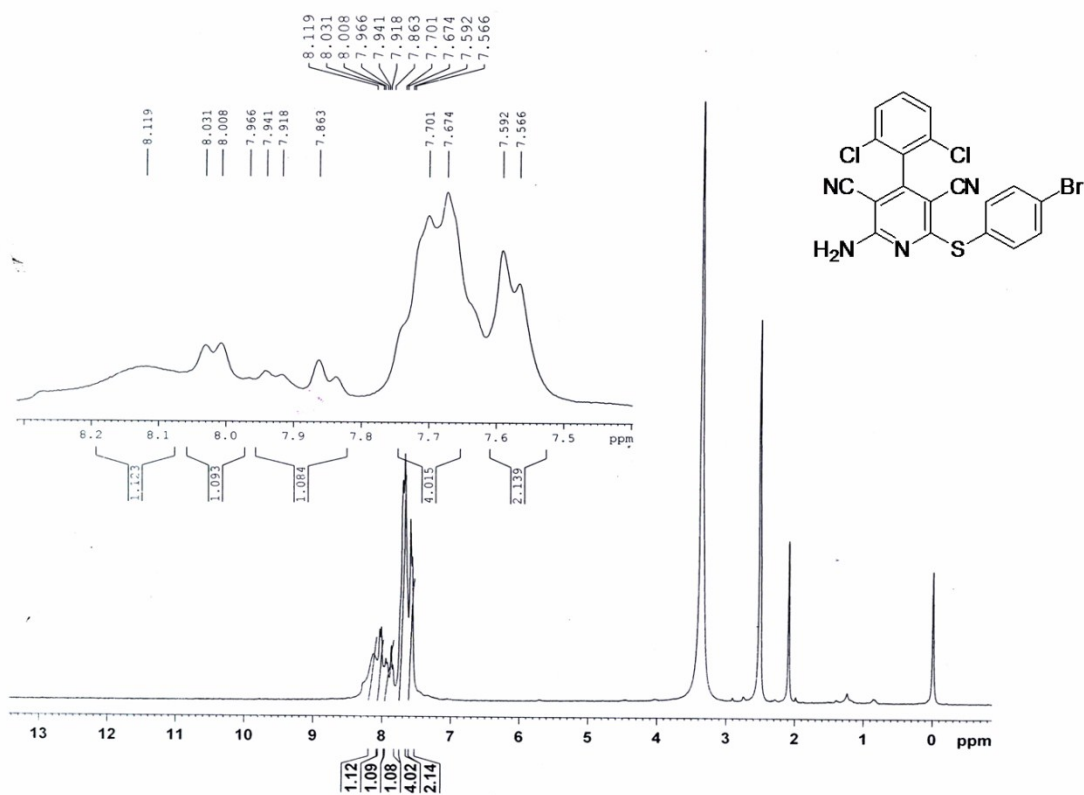


Spectrum 8. ¹³C – NMR of compound 5c

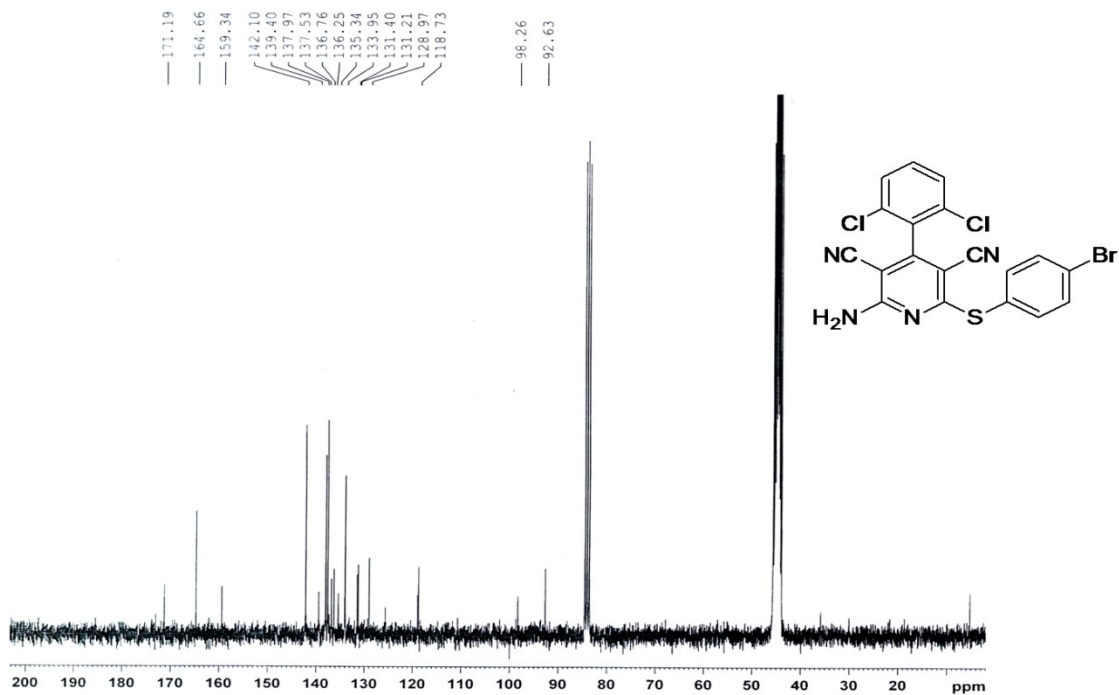
DM-26 #127 RT: 0.57 AV: 1 NL: 8.64E6
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 9. HRMS of compound 5c

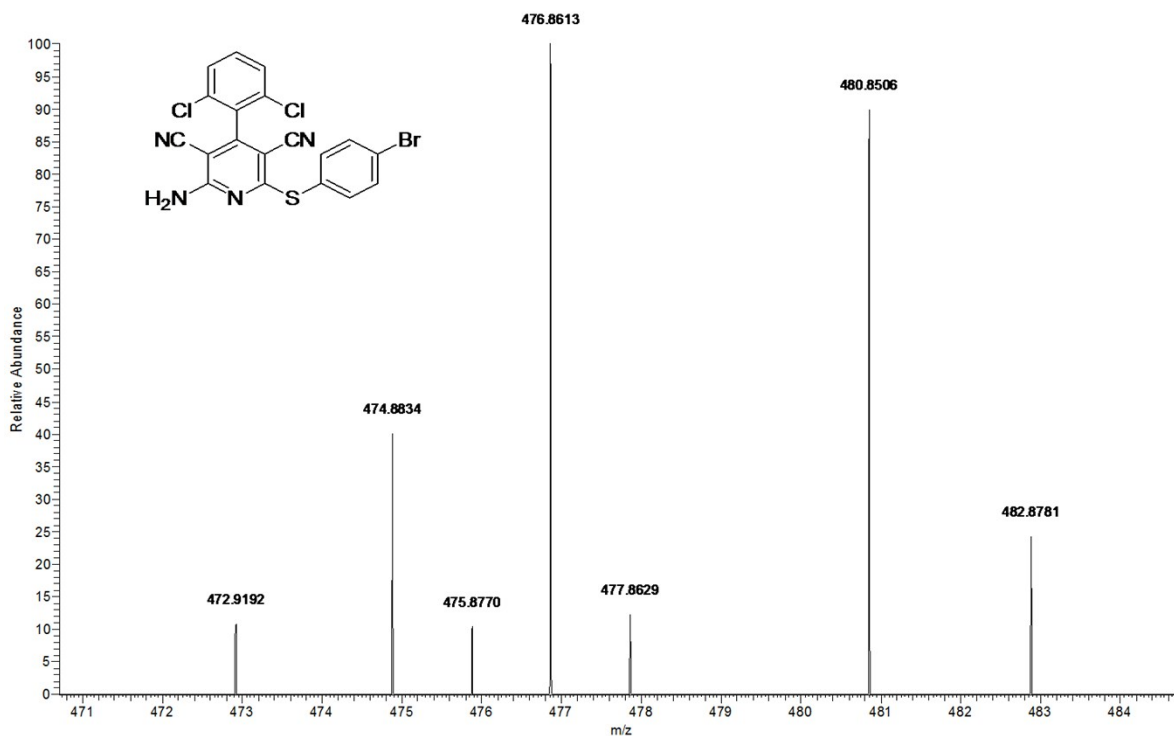


Spectrum 10. ¹H – NMR of compound 5d

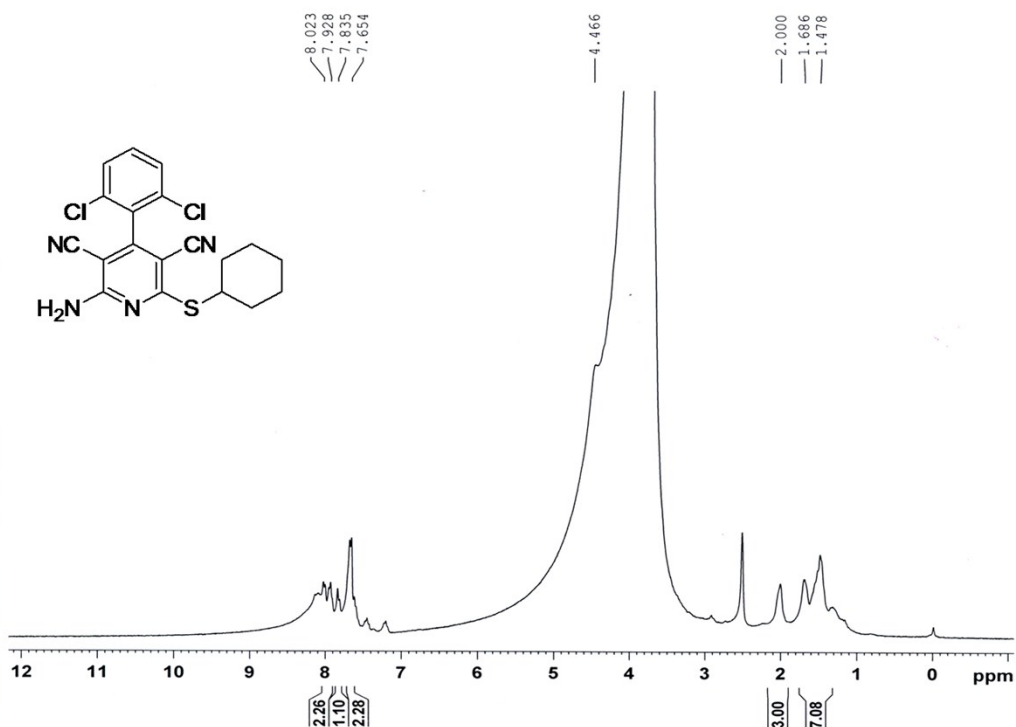


Spectrum 11. ^{13}C – NMR of compound 5d

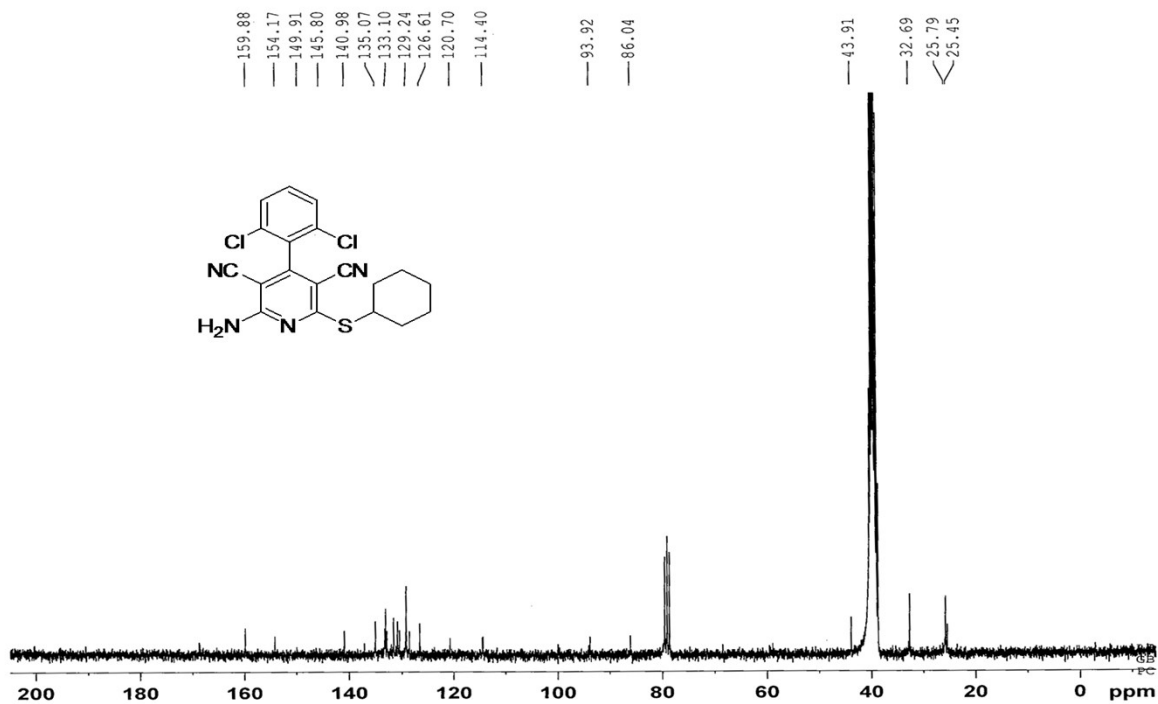
RK-4_161121122404#396 RT: 1.76 AV: 1 NL: 4.09E5
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 12. HRMS of compound 5d

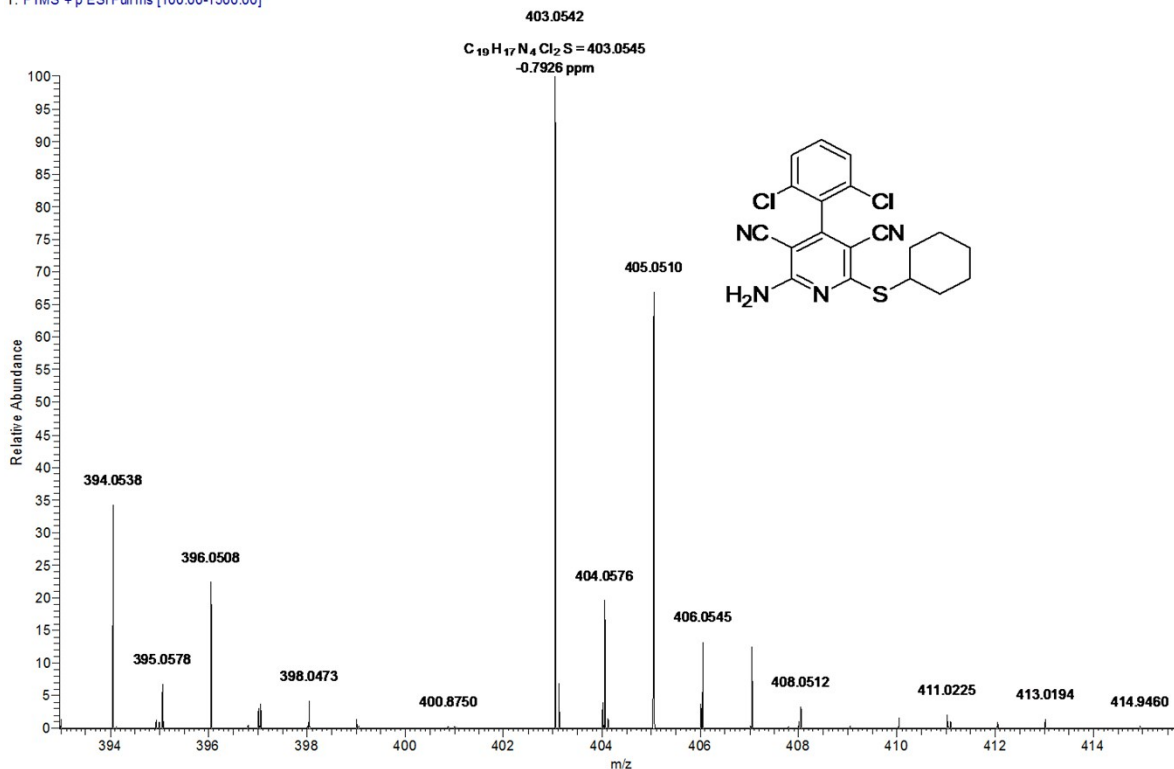


Spectrum 13. ¹H – NMR of compound 5e

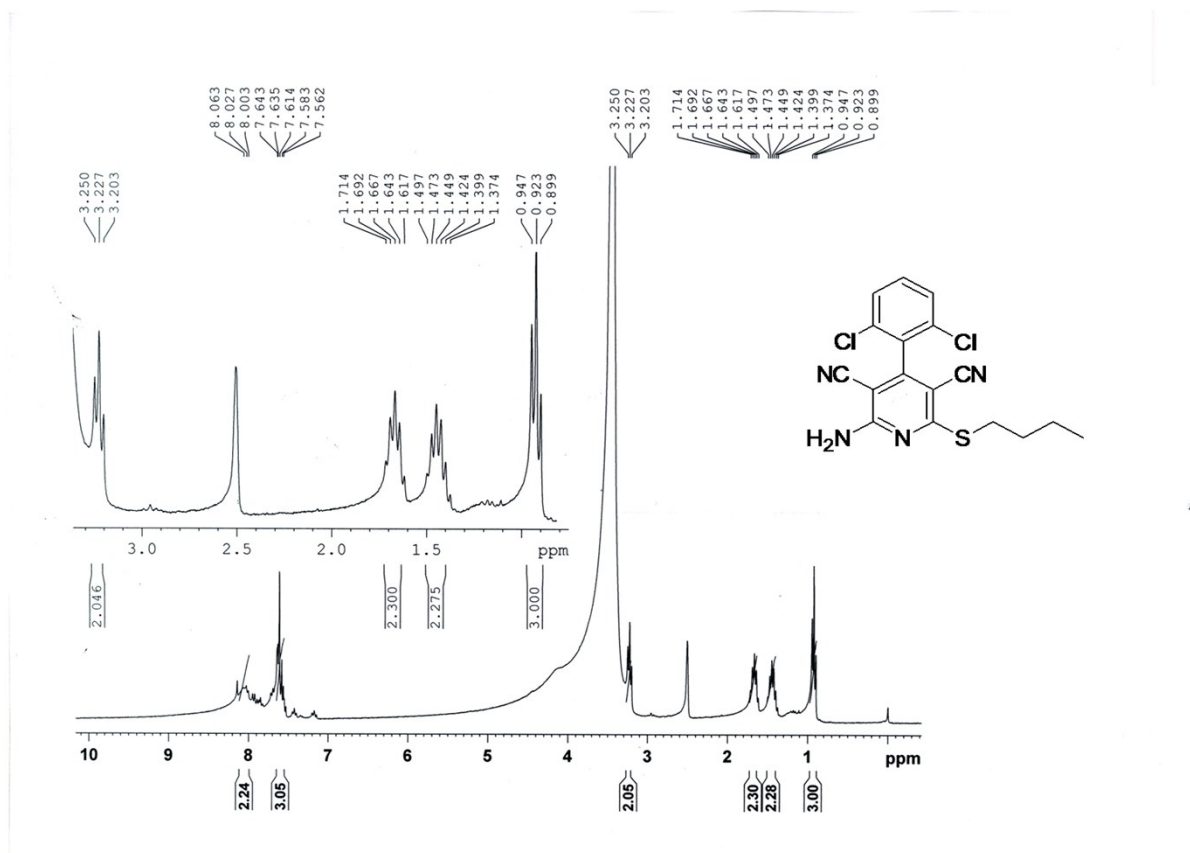


Spectrum 14. ¹³C – NMR of compound 5e

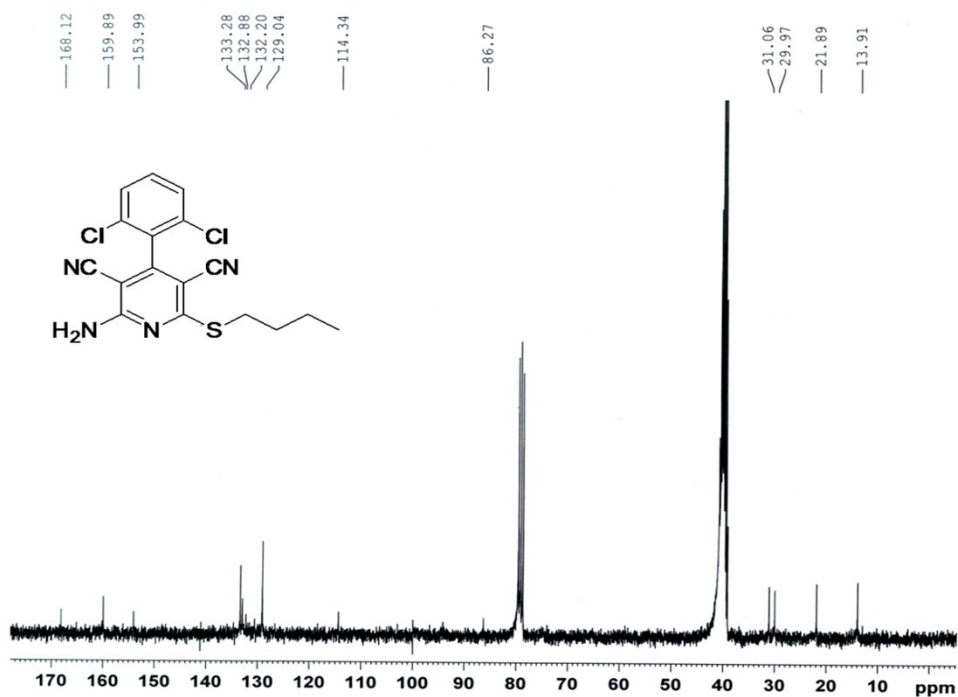
RK-10#128 RT: 0.57 AV: 1 NL: 5.51E7
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 15. HRMS of compound 5e

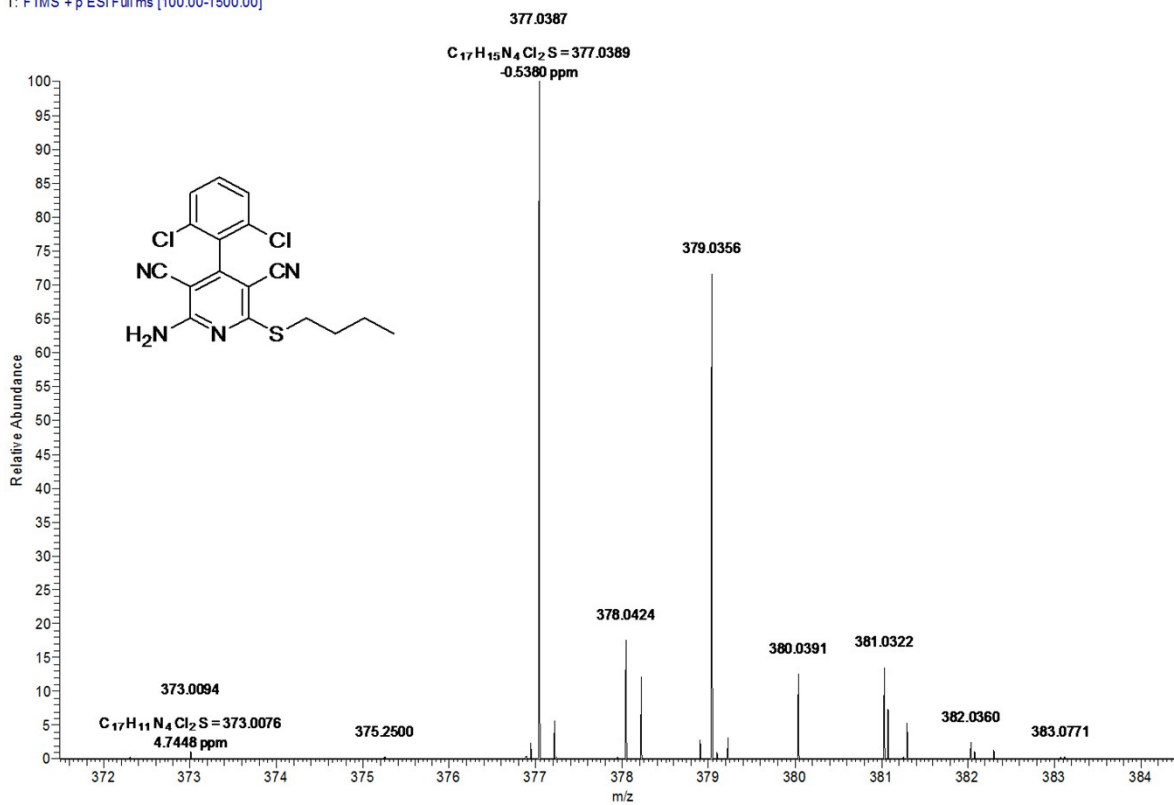


Spectrum 16. 1H - NMR of compound 5f

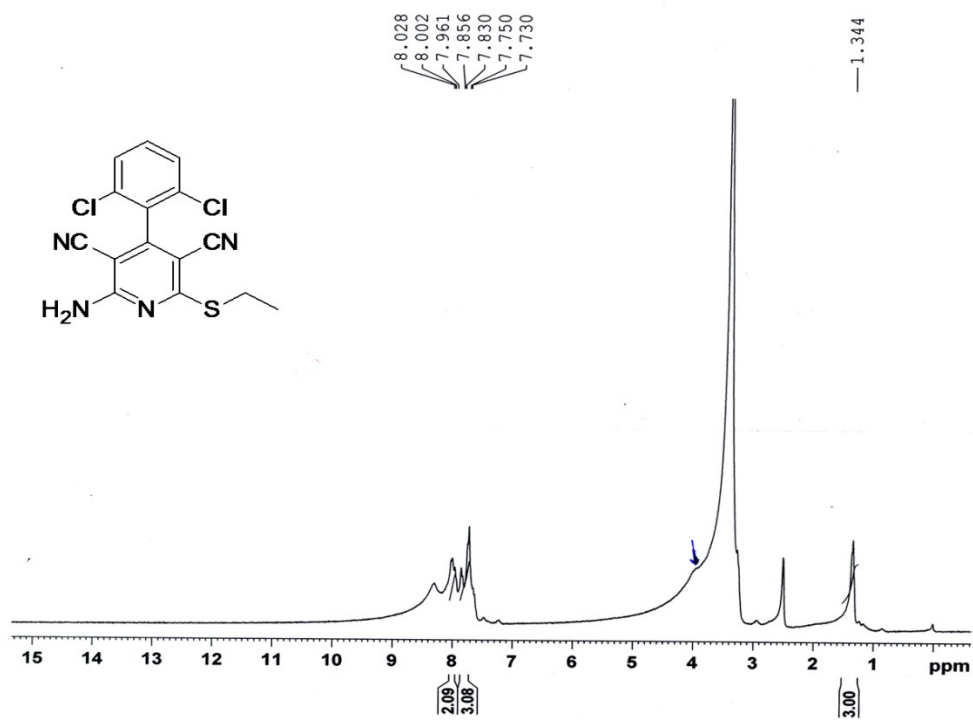


Spectrum 17. ¹³C – NMR of compound 5f

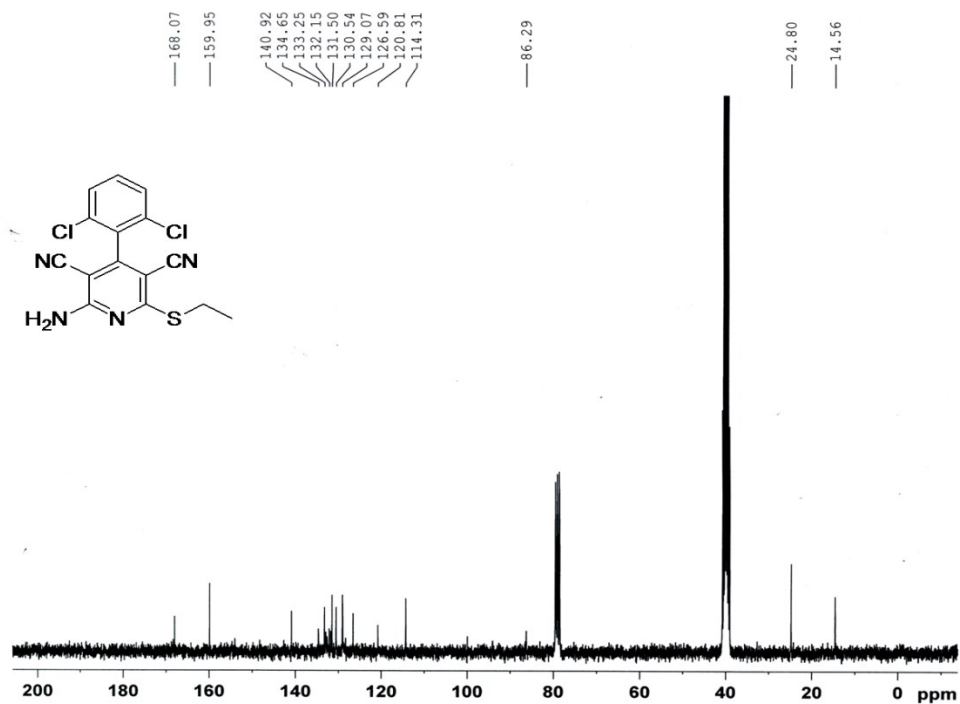
RK-11#136 RT: 0.60 AV: 1 NL: 2.21E7
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 18. HRMS of compound 5f

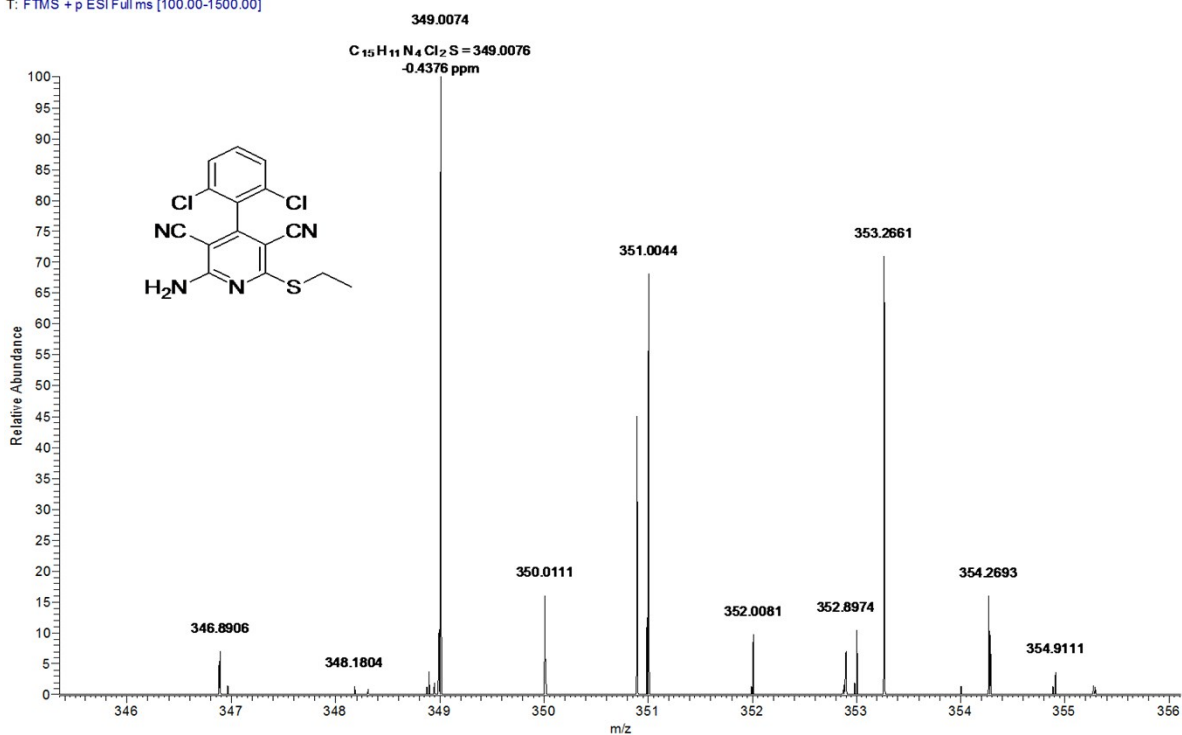


Spectrum 19. $^1\text{H-NMR}$ of compound 5g

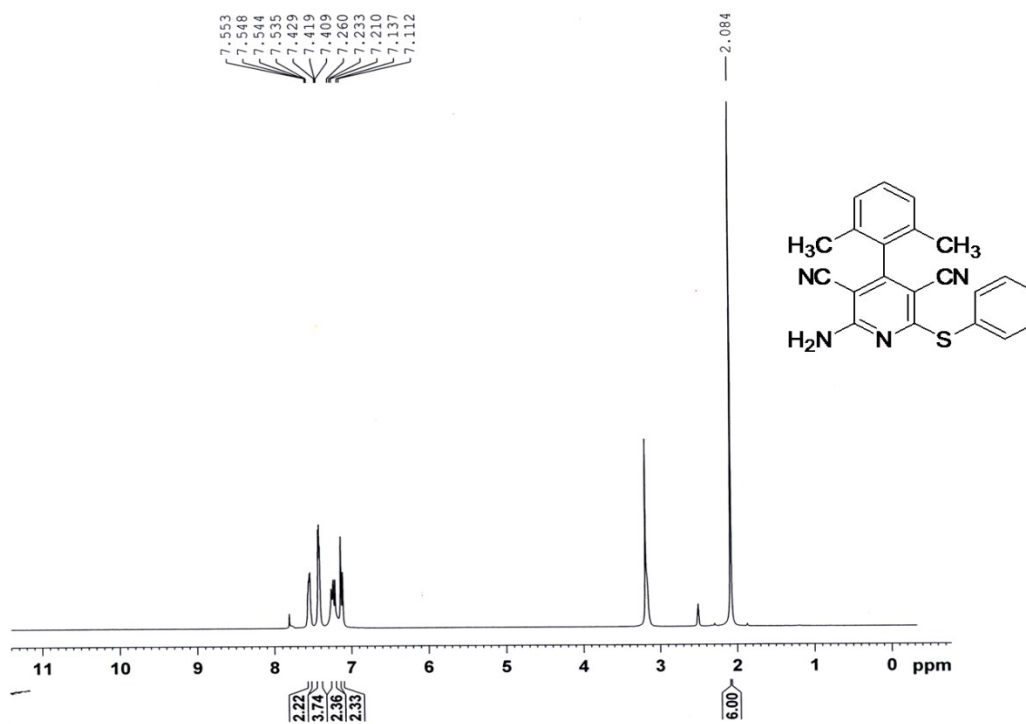


Spectrum 20. $^{13}\text{C-NMR}$ of compound 5g

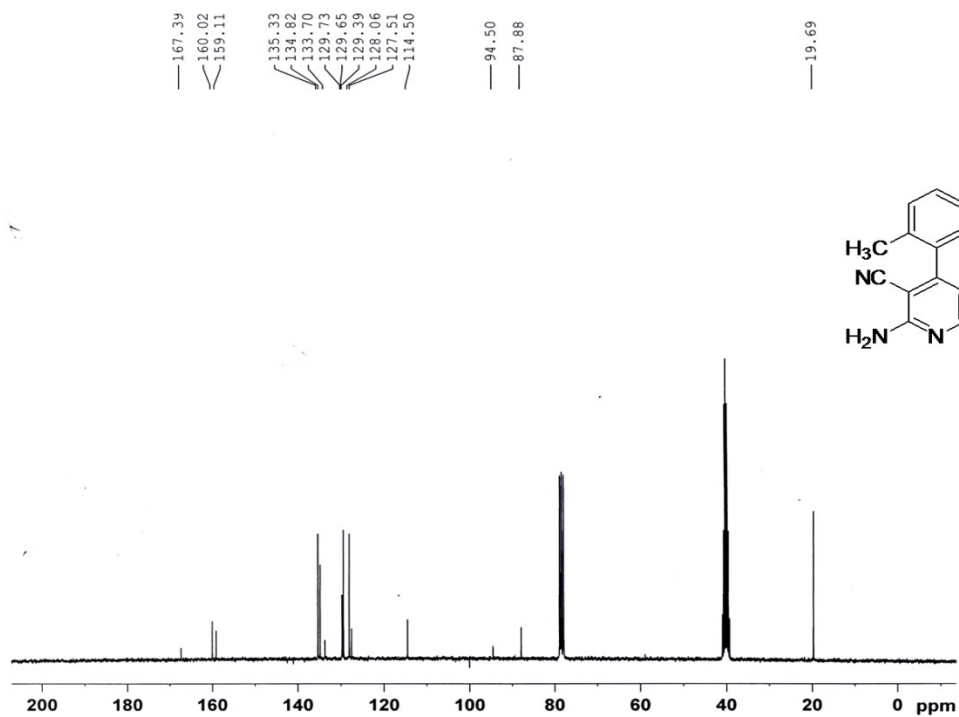
RK-12#287 RT: 1.28 AV: 1 NL: 1.93E6
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 21. HRMS of compound 5g

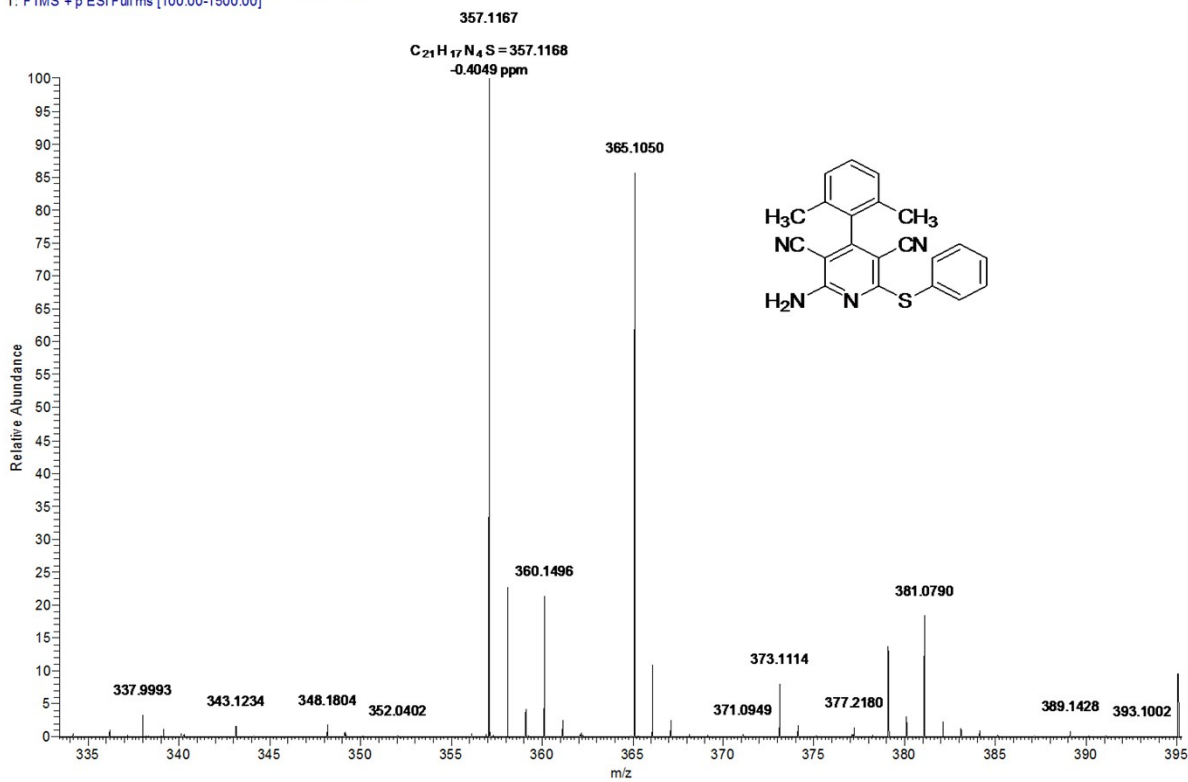


Spectrum 22. 1H – NMR of compound 5h

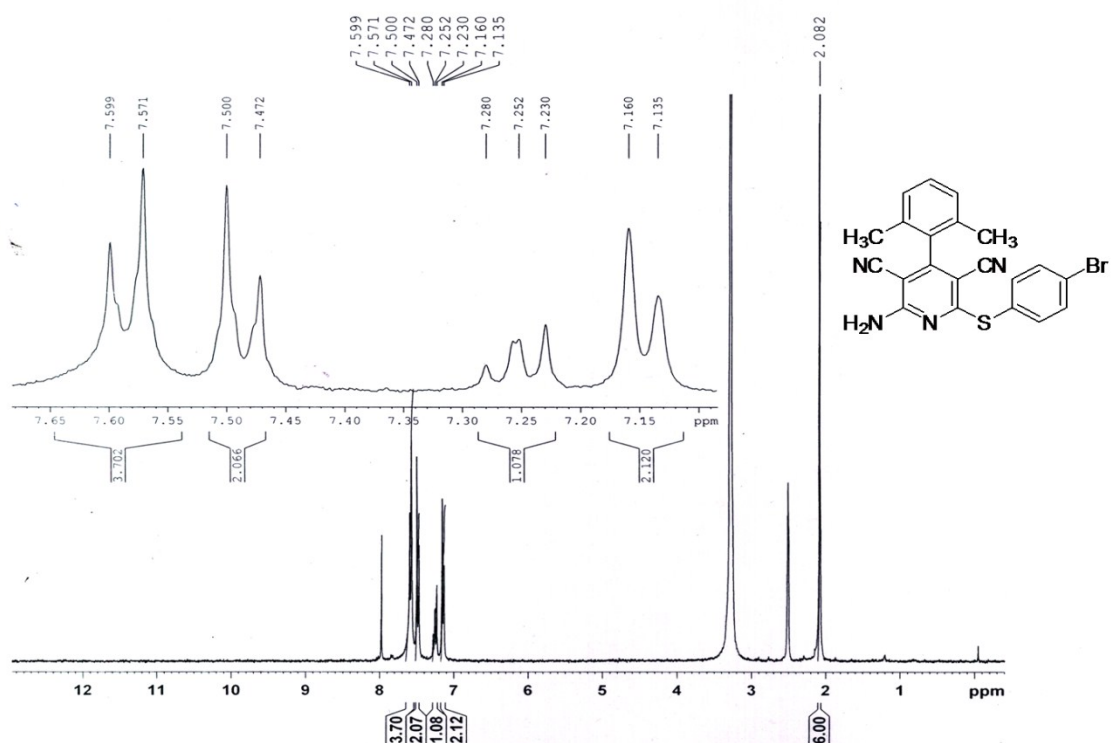


Spectrum 23. ^{13}C – NMR of compound 5h

RK-3_161121122057#107 RT: 0.48 AV: 1 NL: 6.15E8
T: FTMS +p ESI Full ms [100.00-1500.00]

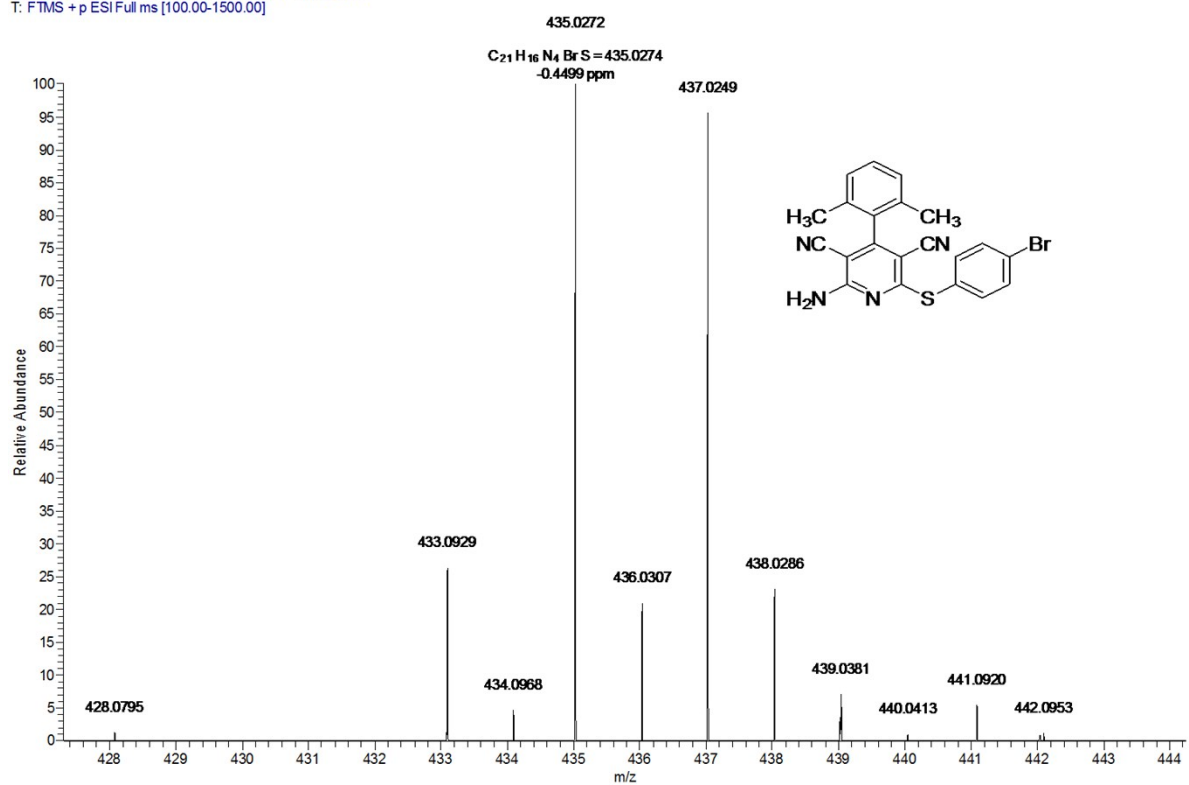


Spectrum 24. HRMS of compound 5h

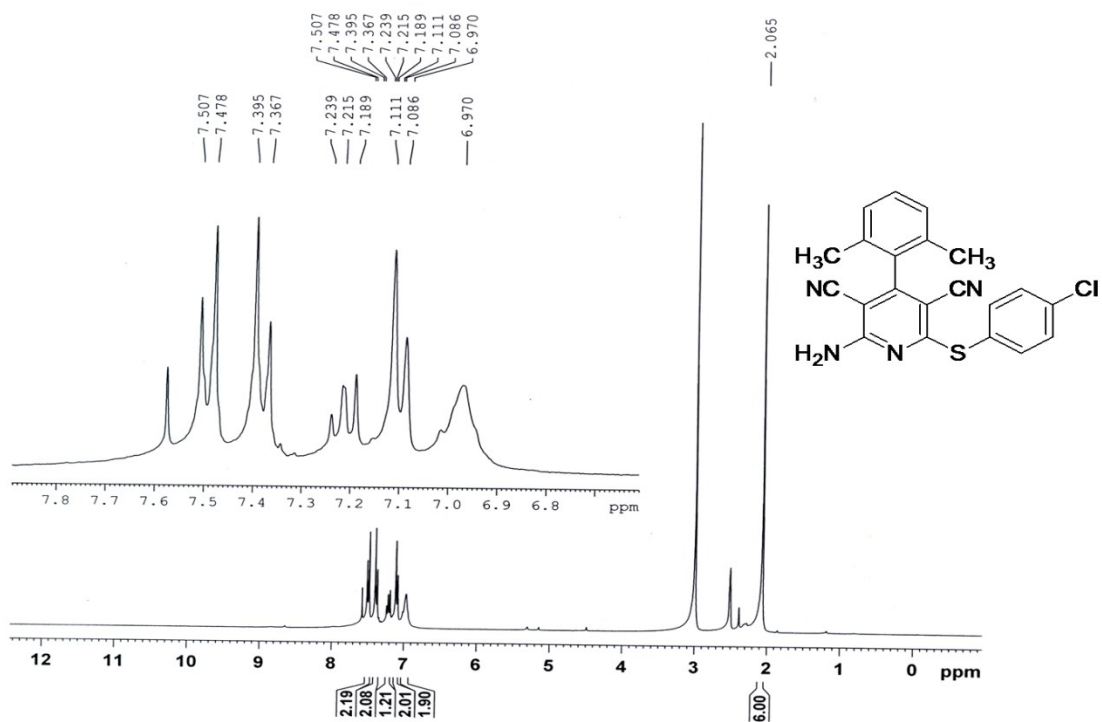


Spectrum 25. ¹H – NMR of compound 5i

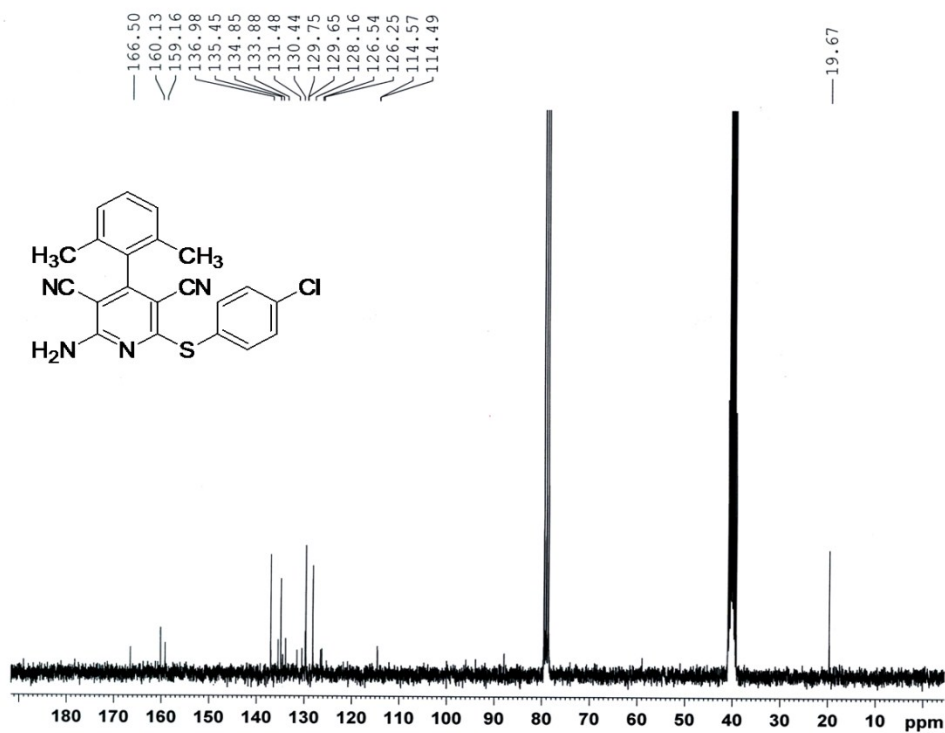
RK-1_161121121436#110 RT: 0.49 AV: 1 NL: 2.56E7
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 26. HRMS of compound 5i

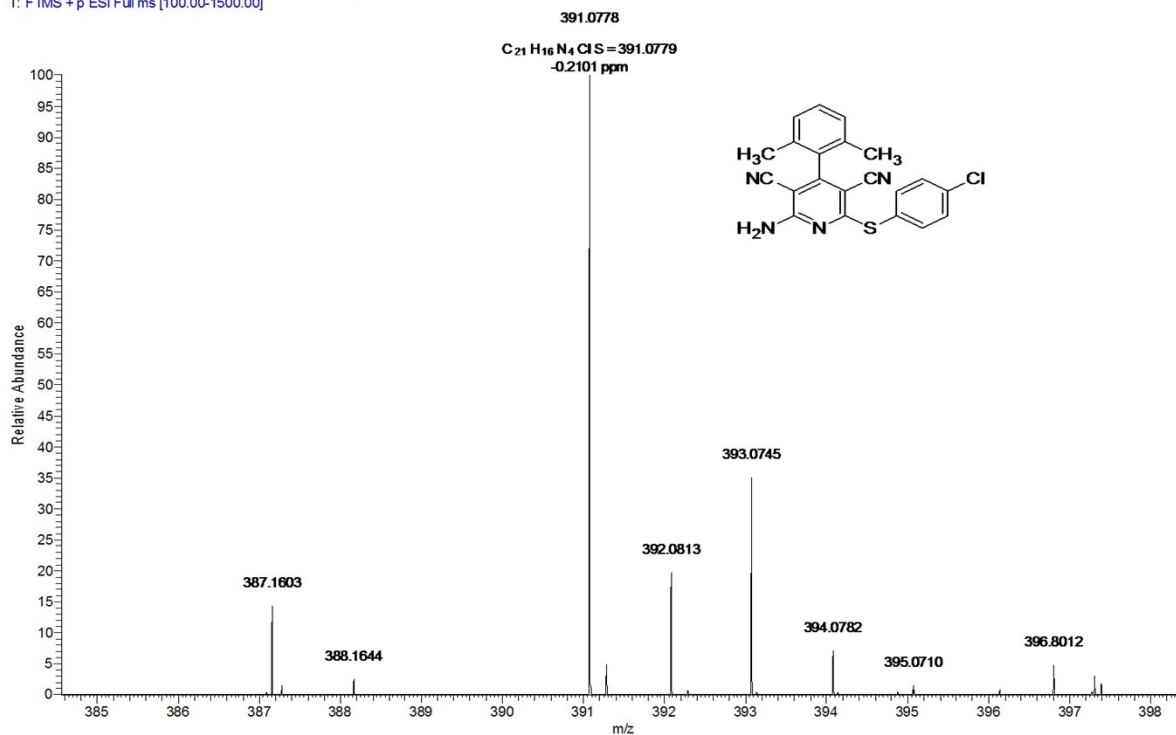


Spectrum 27. ¹H – NMR of compound 5j

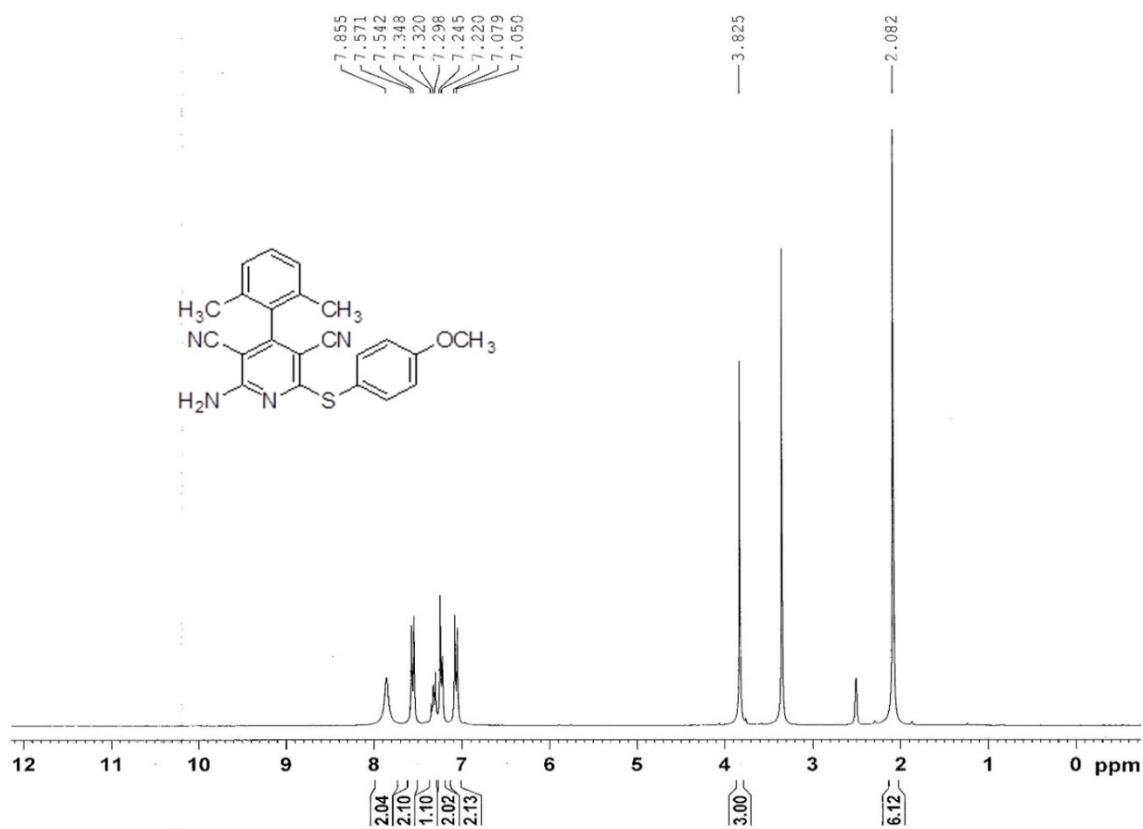


Spectrum 28. ¹³C – NMR of compound 5j

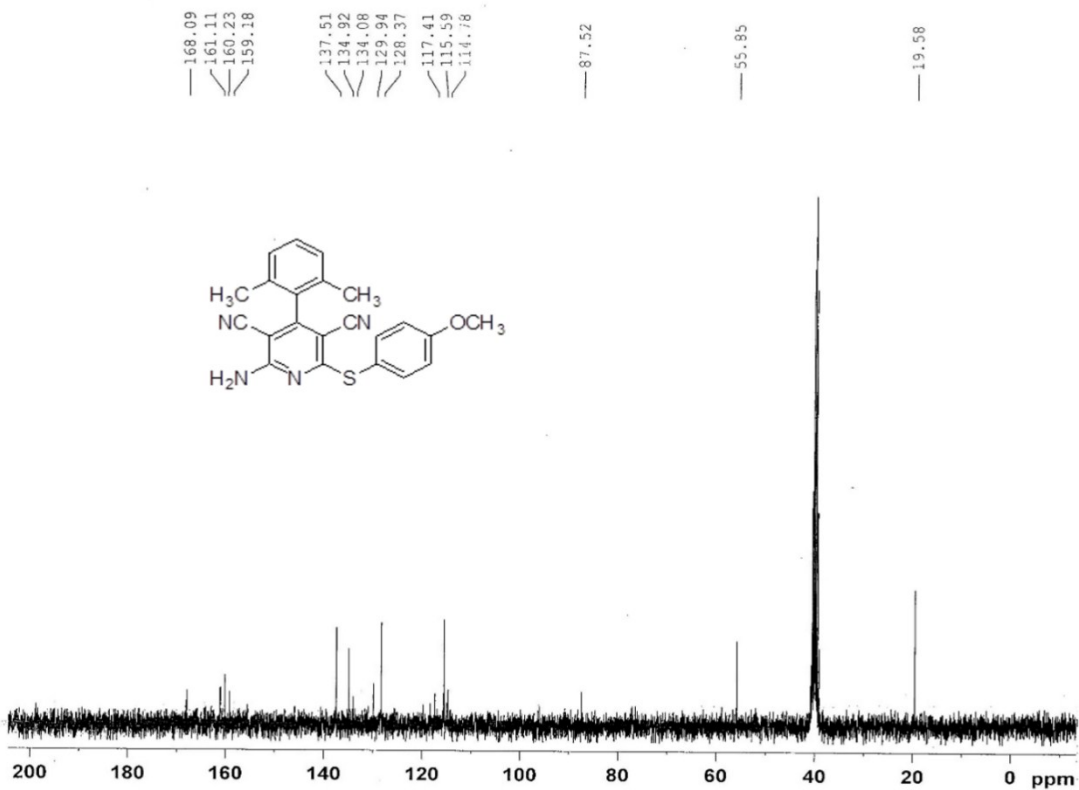
RK-2_161121121744 #139 RT: 0.62 AV: 1 NL: 1.96E7
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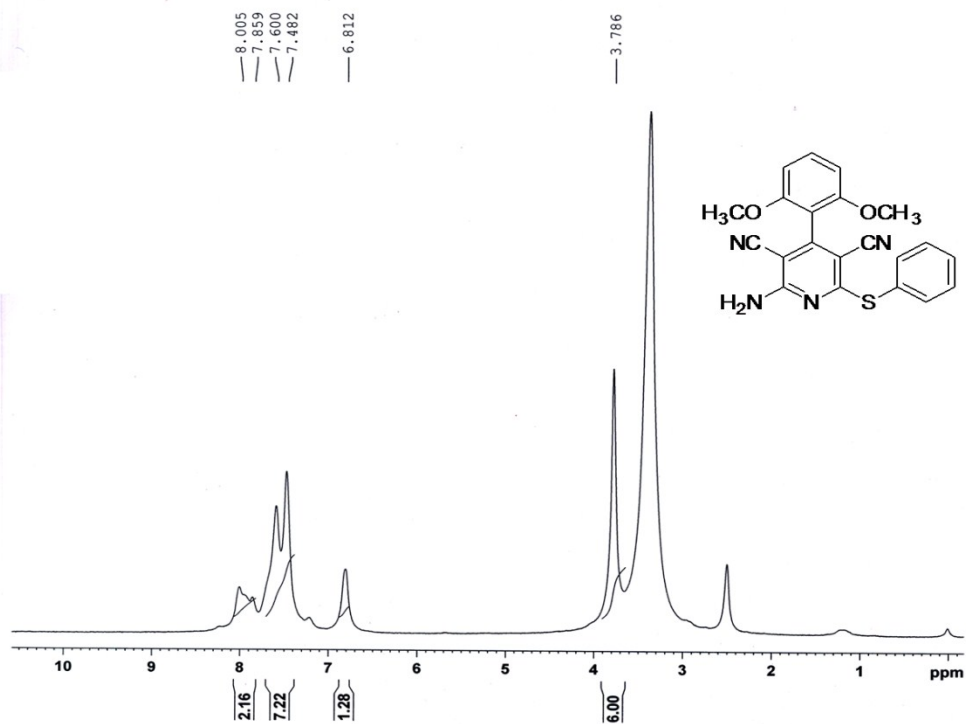
Spectrum 29. HRMS of compound 5j



Spectrum 30. ¹H – NMR of compound 5k

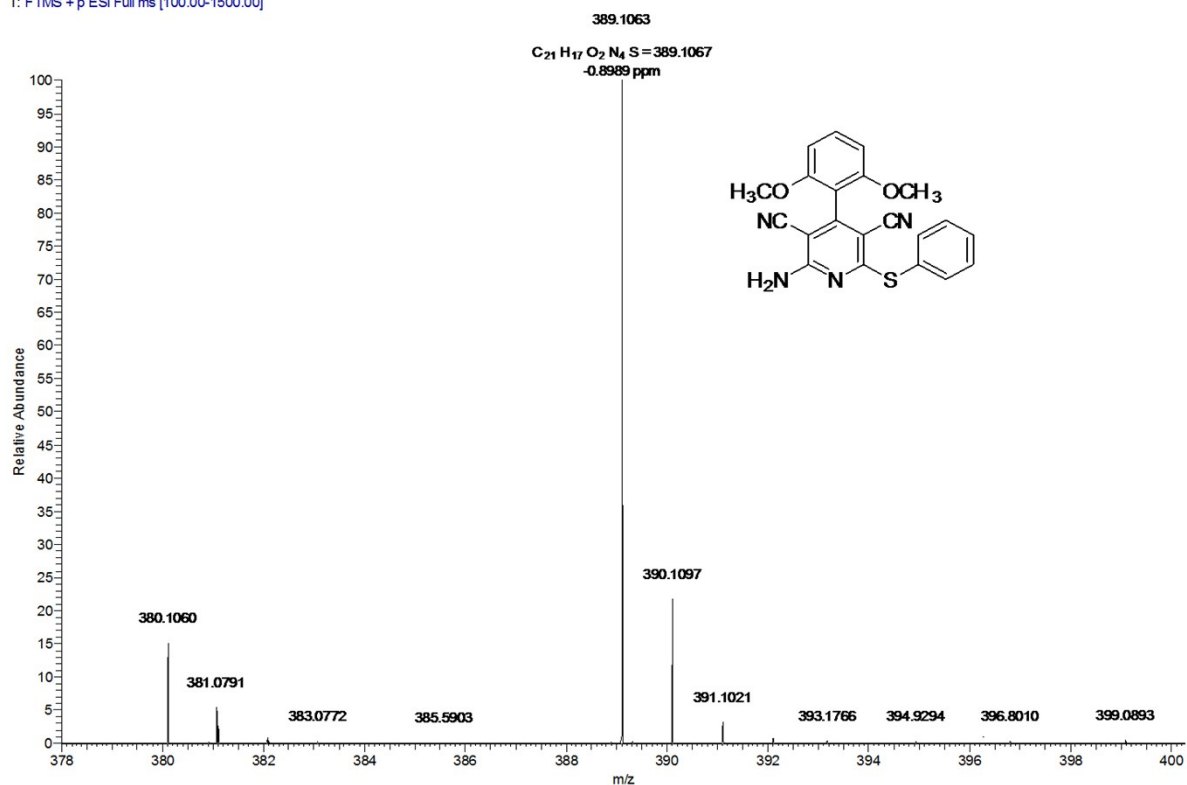


Spectrum 31. ^{13}C – NMR of compound 5k

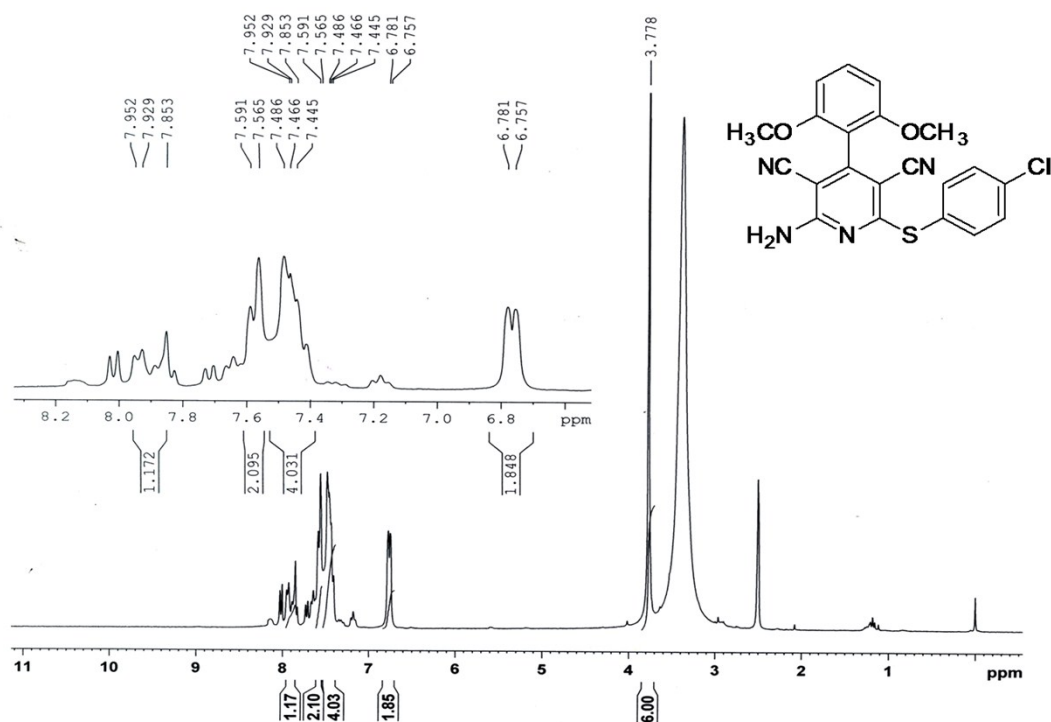


Spectrum 32. ^1H – NMR of compound 5l

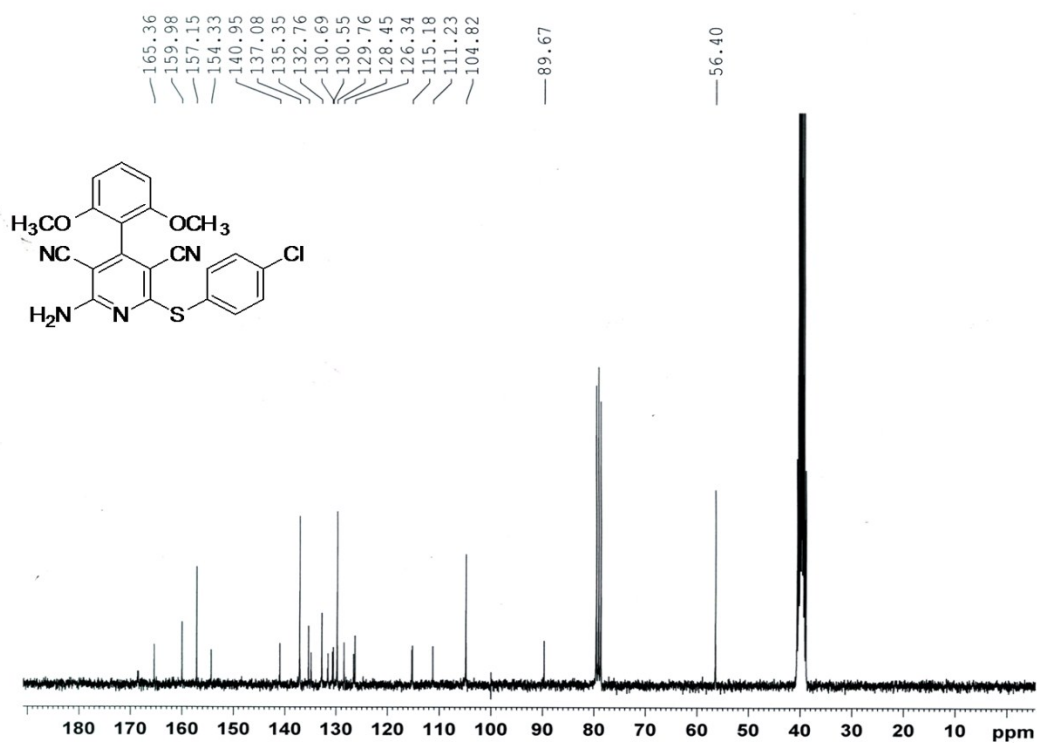
RK-5_161121122715 #102 RT: 0.45 AV: 1 NL: 5.61E8
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 33. HRMS of compound 5l

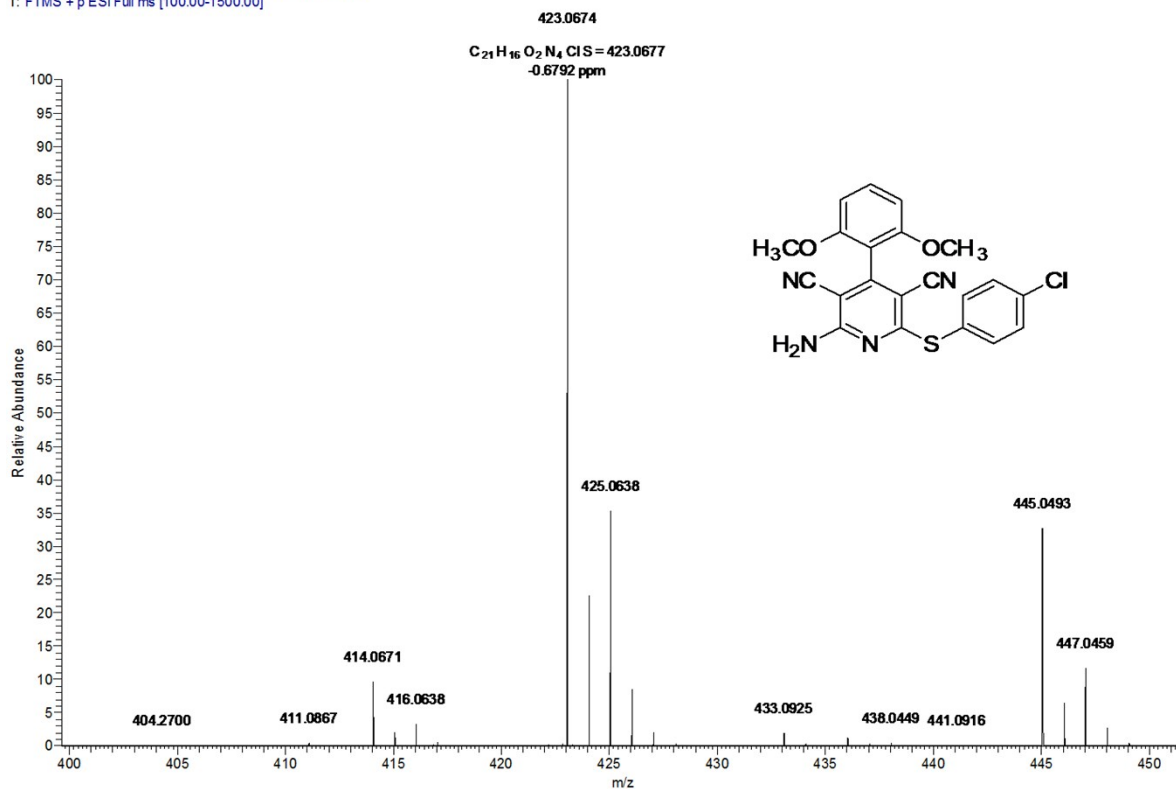


Spectrum 34. ¹H – NMR of compound 5m

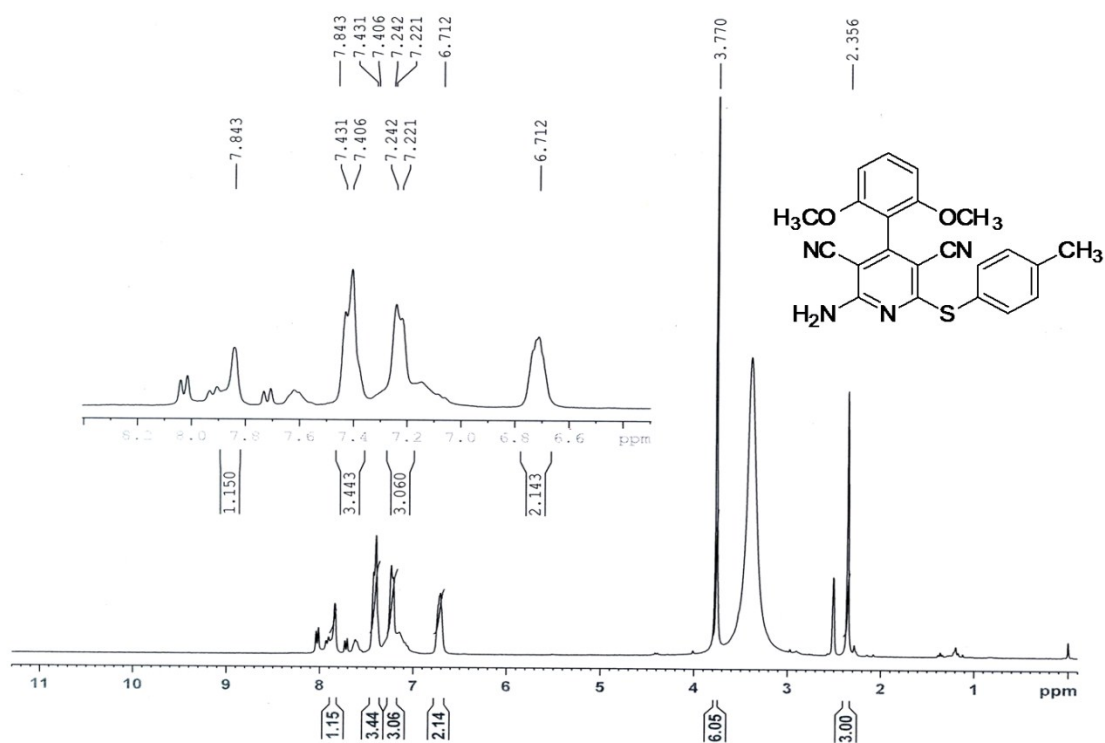


Spectrum 35. ¹³C – NMR of compound 5m

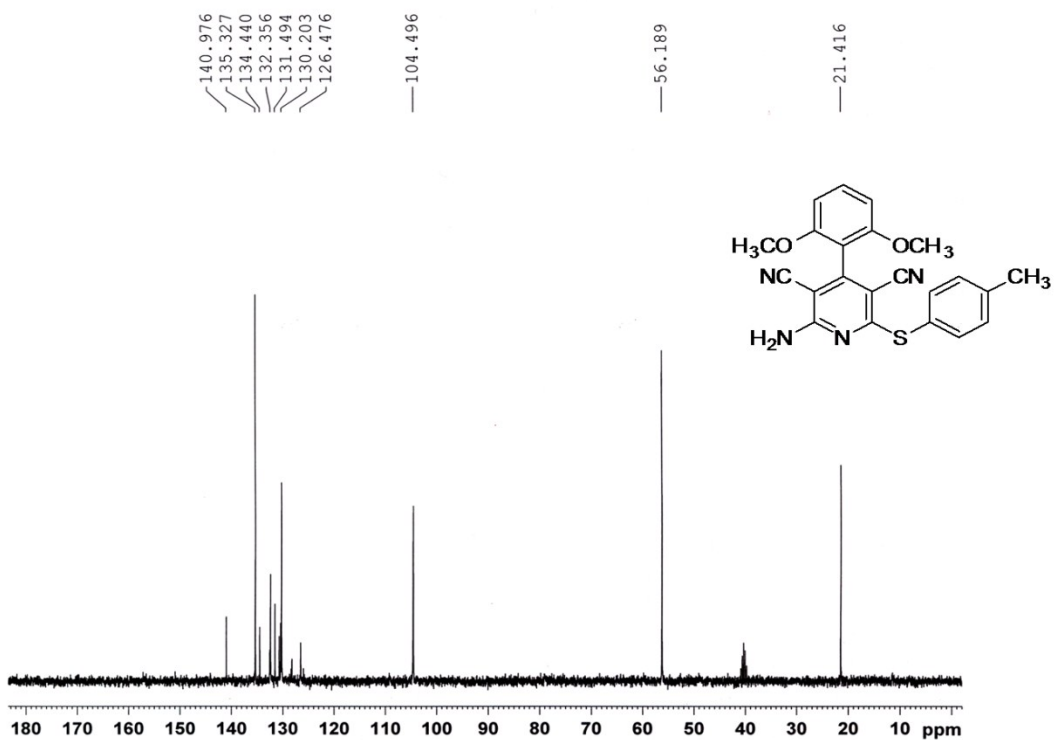
RK-6_161121123023#119 RT: 0.53 AV: 1 NL: 3.14E8
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 36. HRMS of compound 5m

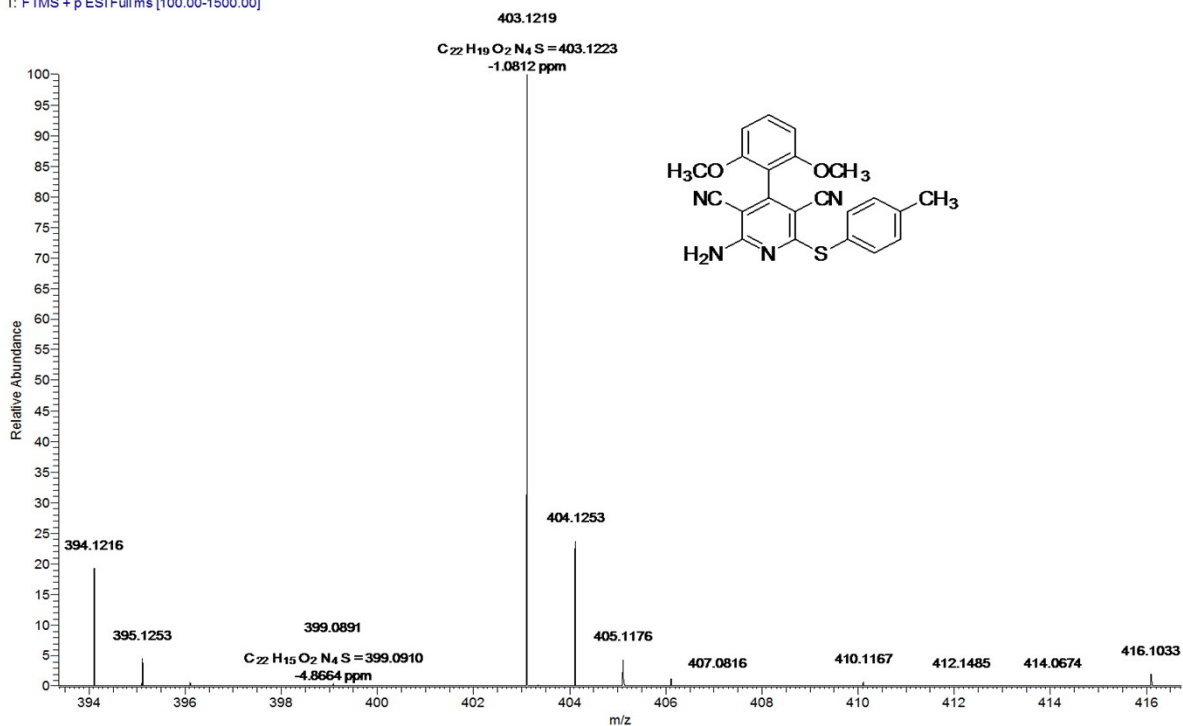


Spectrum 37. ¹H – NMR of compound 5n

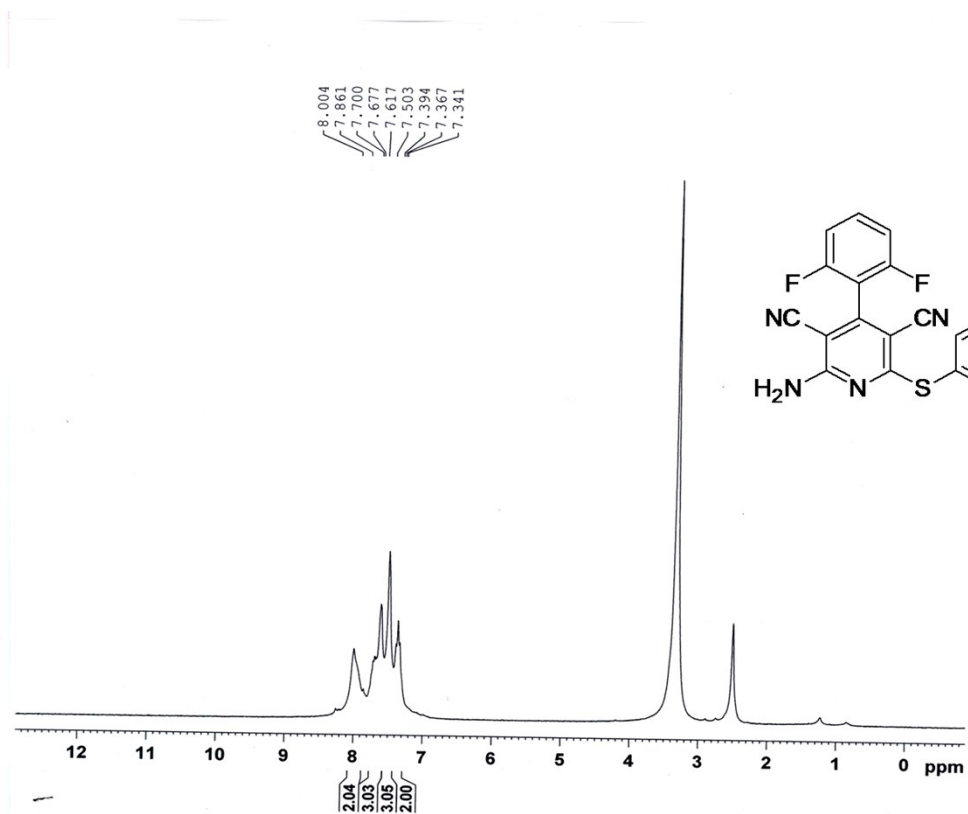


Spectrum 38. ¹³C – NMR of compound 5n

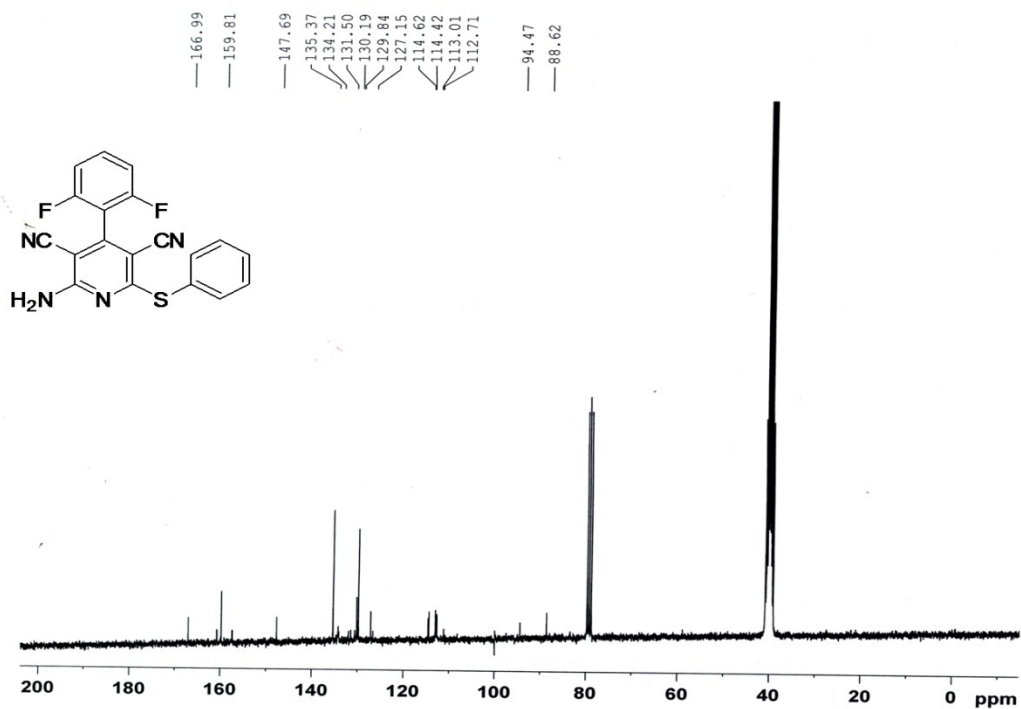
RK-7_161121123335#102 RT: 0.45 AV: 1 NL: 4.40E8
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 39. HRMS of compound 5n

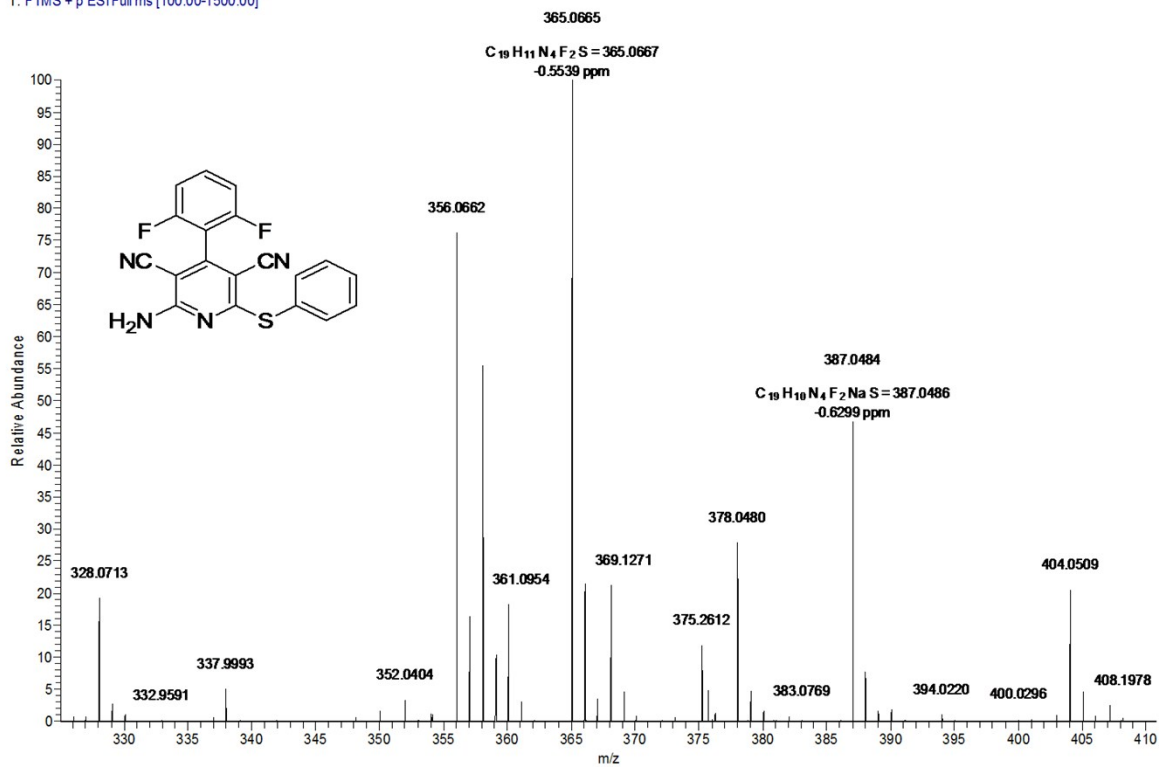


Spectrum 40. ¹H – NMR of compound 5o

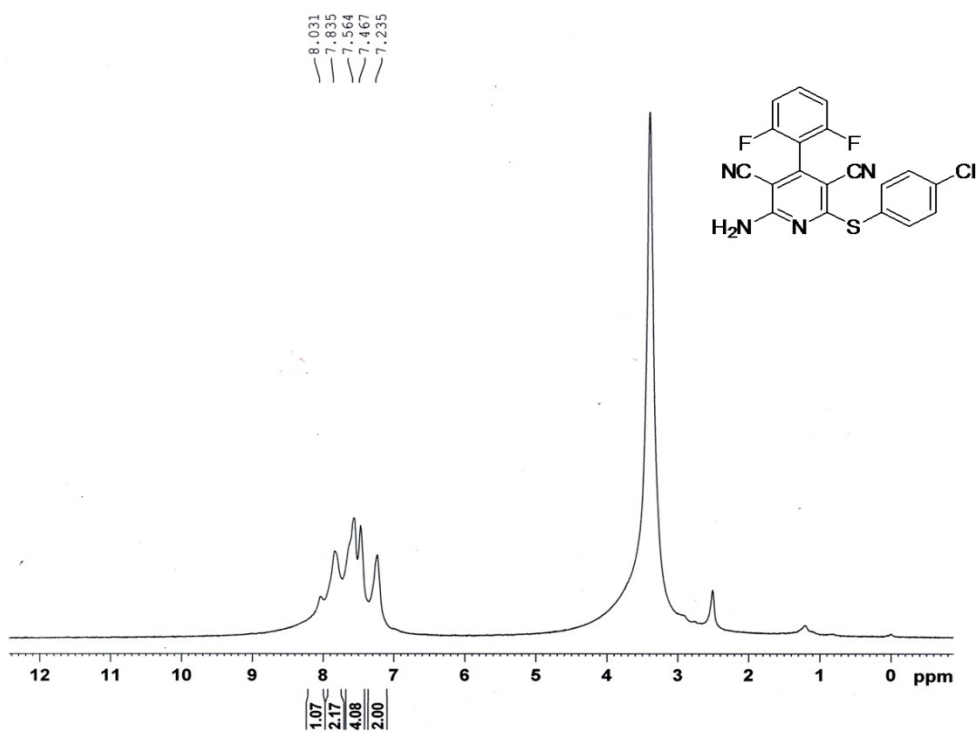


Spectrum 41. ^{13}C – NMR of compound 5o

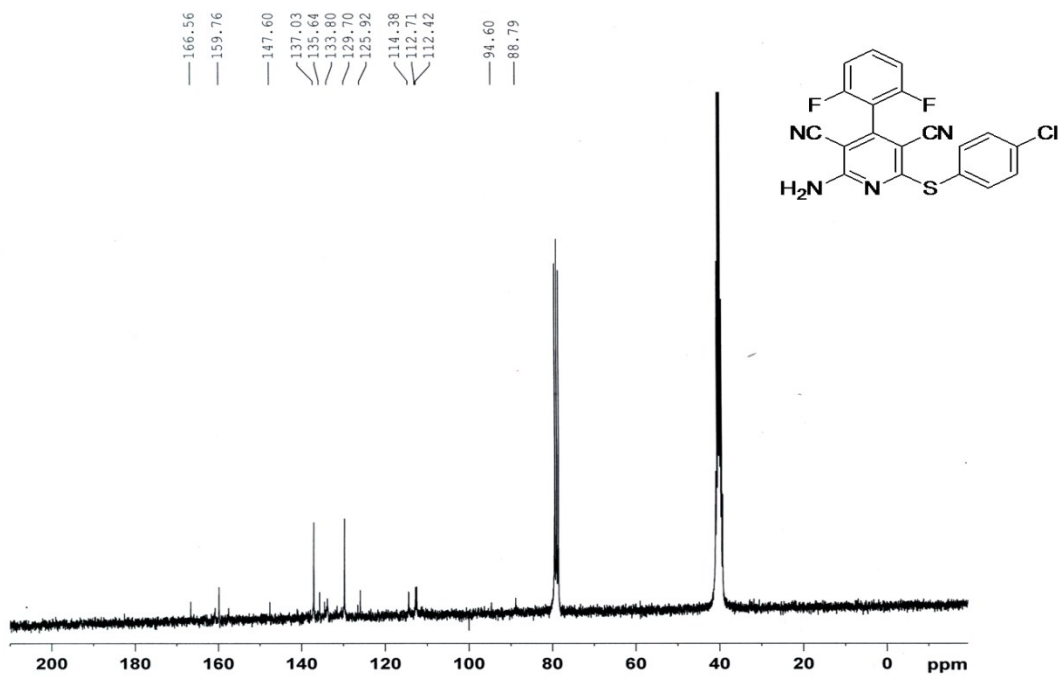
DM-27 #114 RT: 0.51 AV: 1 NL: 1.40E8
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 42. HRMS of compound 5o

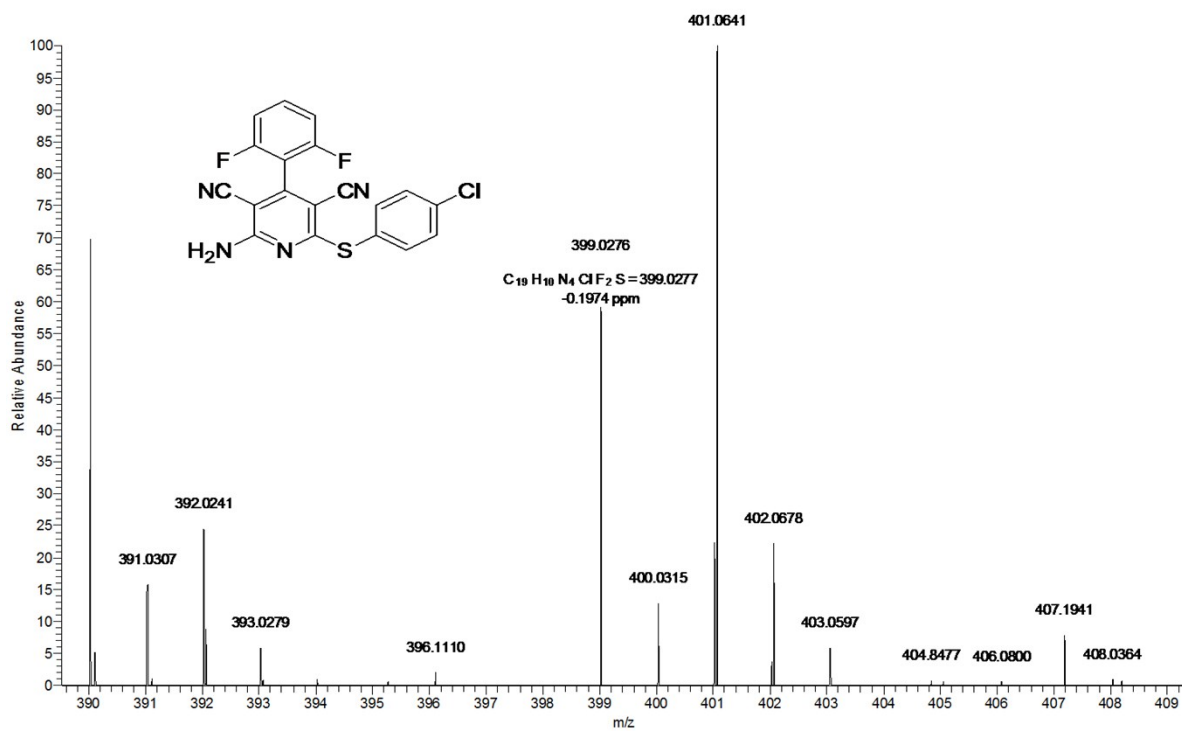


Spectrum 43. ¹H – NMR of compound 5p

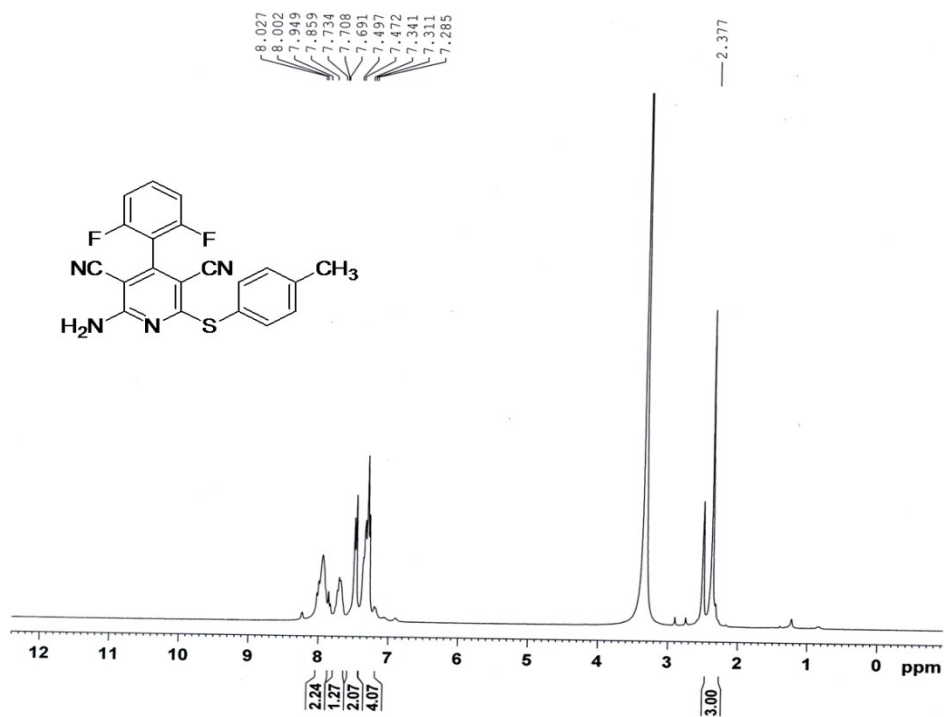


Spectrum 44. ¹³C – NMR of compound 5p

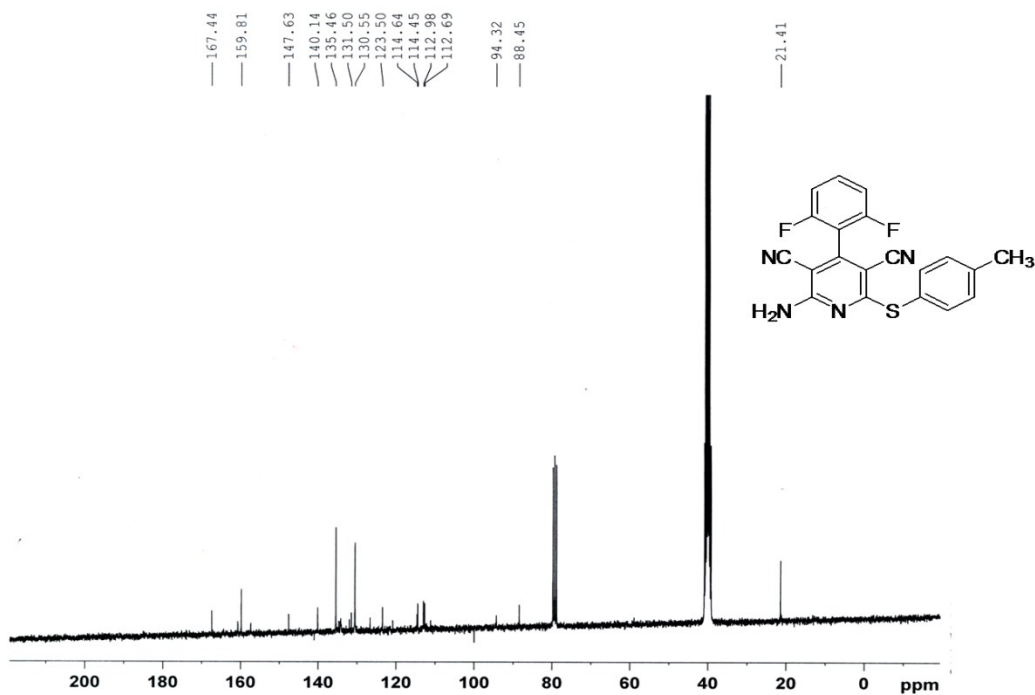
DM-29 #122 RT: 0.54 AV: 1 NL: 2.31E7
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 45. HRMS of compound 5p

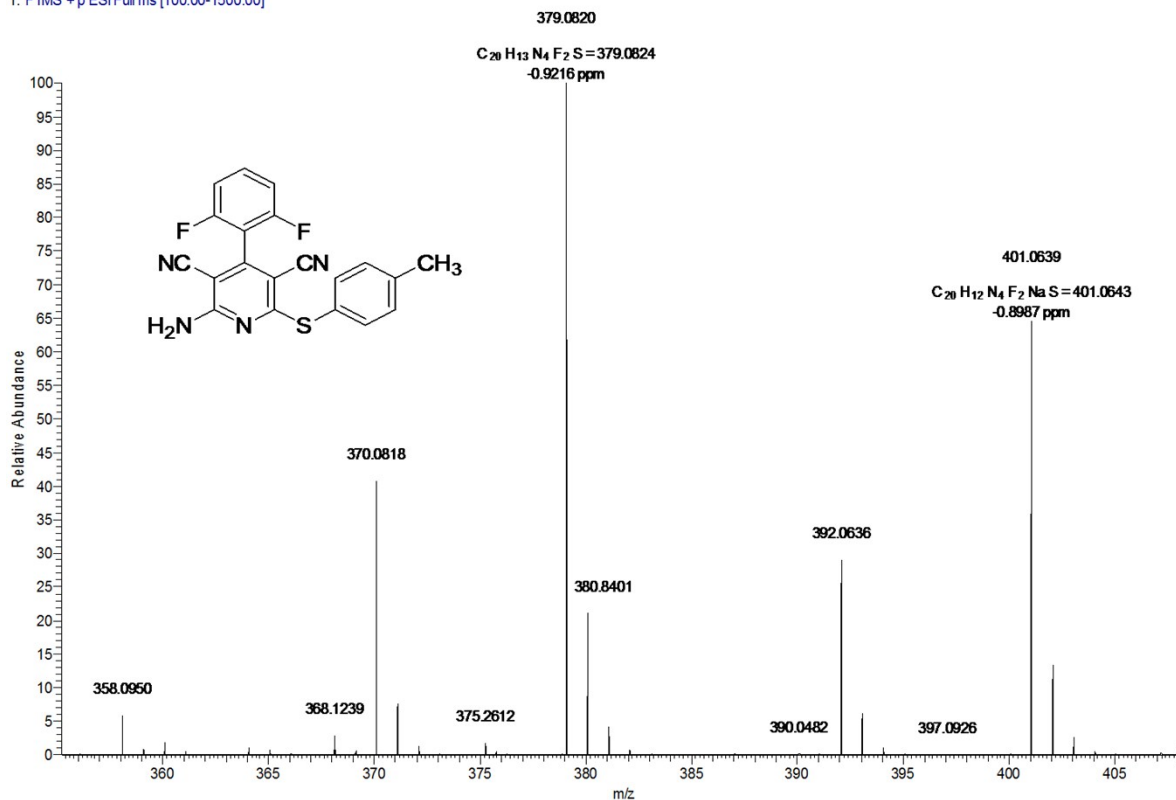


Spectrum 46. ¹H – NMR of compound 5q

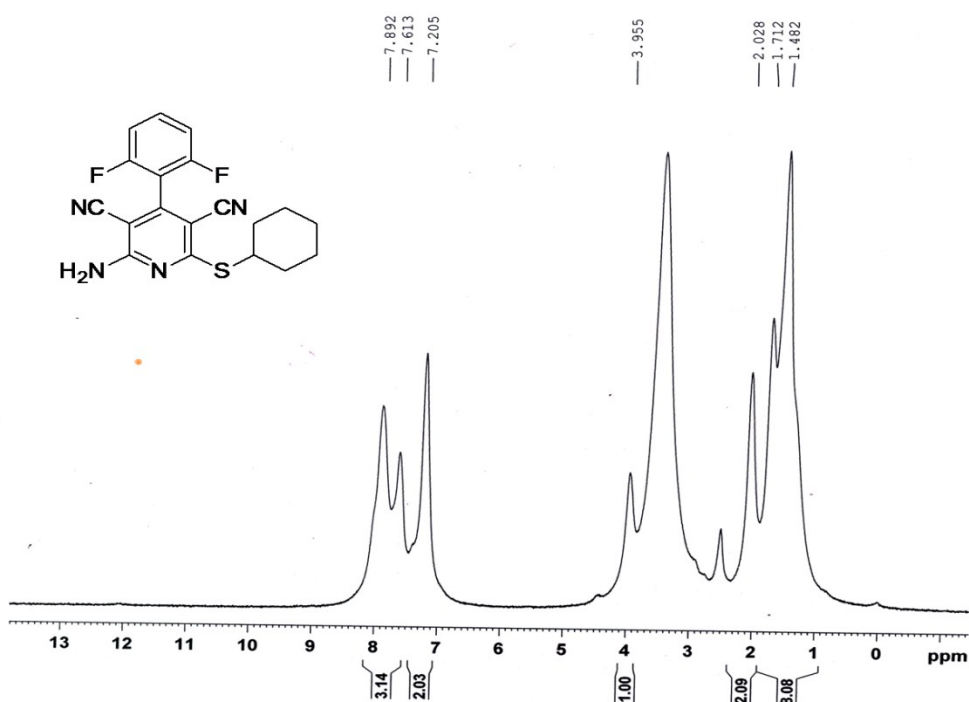


Spectrum 47. ^{13}C – NMR of compound 5q

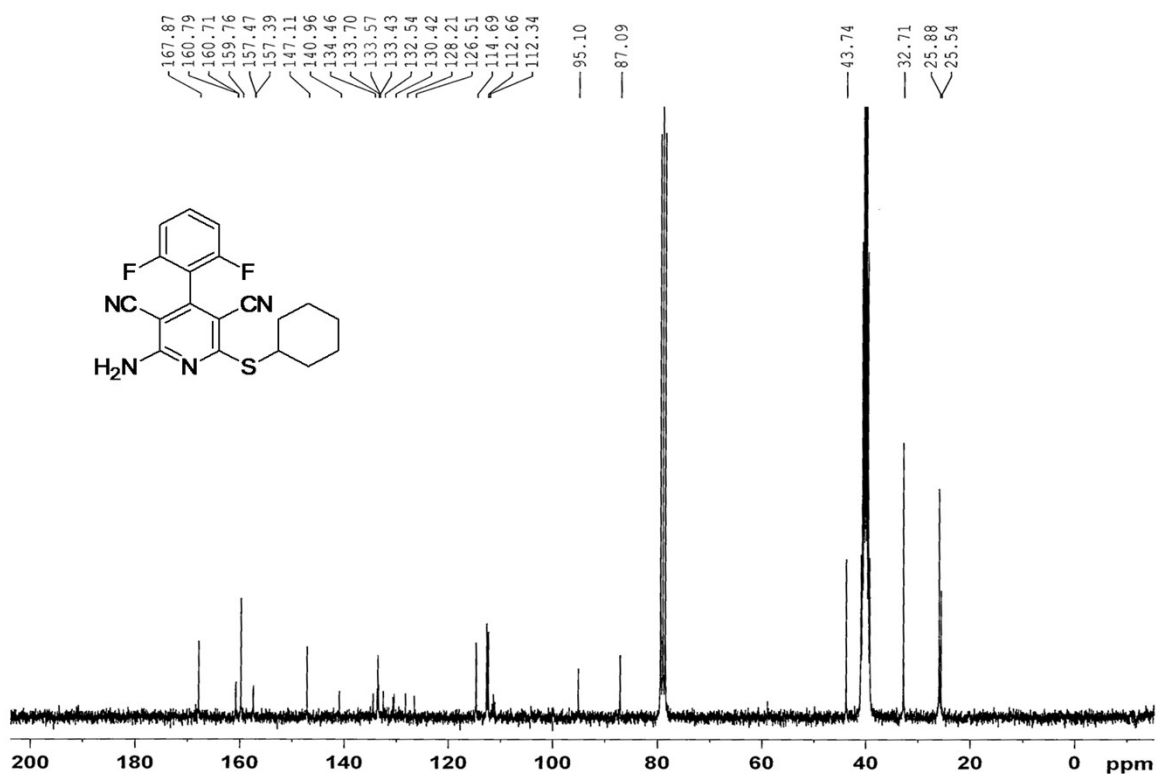
DM-28 #124 RT: 0.55 AV: 1 NL: 6.68E8
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 48. HRMS of compound 5q

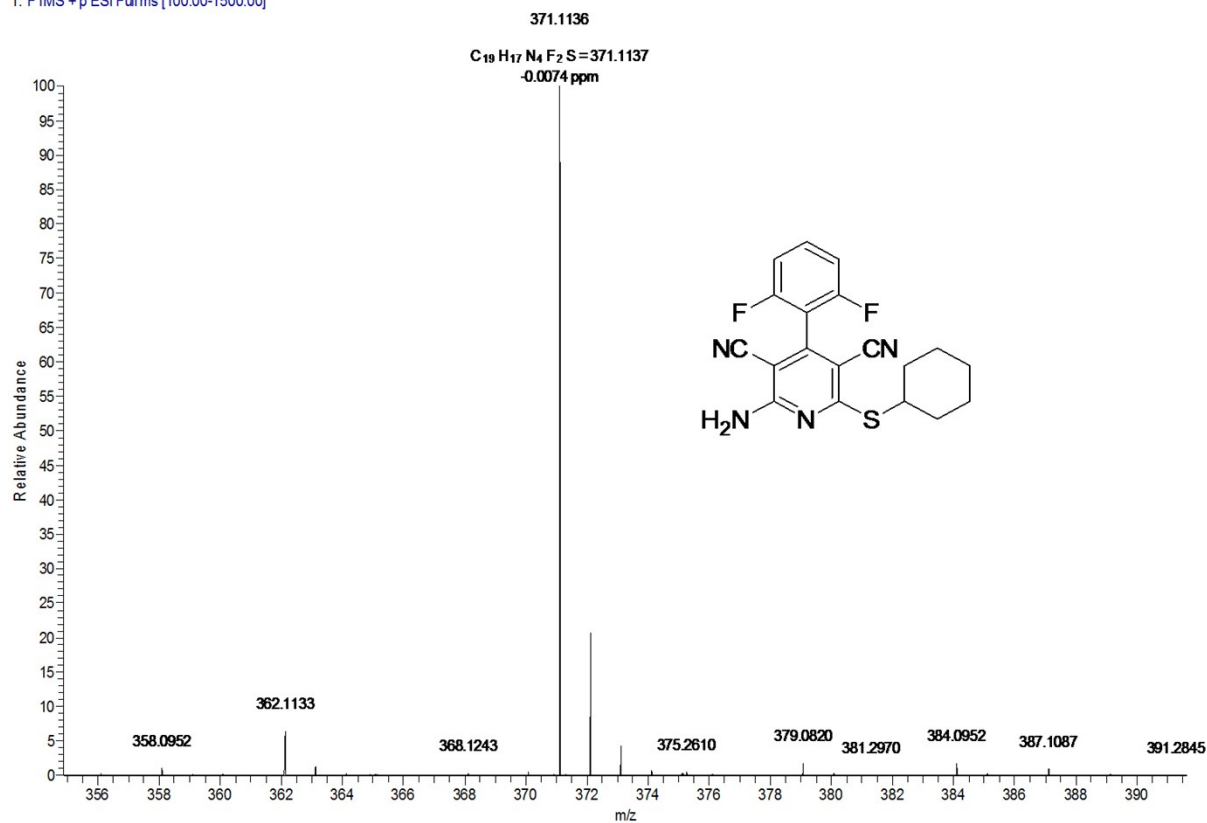


Spectrum 49. ¹H – NMR of compound 5r



Spectrum 50. ¹³C – NMR of compound 5r

DM-3C #167 RT: 0.74 AV: 1 NL: 6.80E8
T: FTMS + p ESI Full ms [100.00-1500.00]



Spectrum 51. HRMS of compound 5r

Spectral data of Dihydropyridine dicarbonitriles, 4.

2-Amino-4-(2,6-dichlorophenyl)-6-(phenylsulfanyl)-1,4-dihydropyridine-3,5-dicarbonitrile, 4a:

White solid; M. P. 218-220 °C; **¹H-NMR** (DMSO-d⁶, 300 MHz): 5.63 (s, 1H), 5.98 (s, 1H), 7.35 – 7.45 (m, 3H), 7.48 – 7.55 (m, 5H), 9.16 (s, 1H); **¹³C-NMR**(DMSO-d⁶, 75 MHz): 39.4, 52.67, 88.5, 117.9, 120.2, 129.1, 130.2, 130.3, 130.7, 131.1, 135.7, 143.2, 152.0 ppm.

2-Amino-4-(2,6-dichlorophenyl)-6-[(4-methylphenyl)sulfanyl]-1,4-dihydropyridine-3,5-

dicarbonitrile, 4b: White solid; M. P. 218-220 °C; **¹H-NMR** (DMSO-d⁶, 300 MHz): 2.32 (s, 3H), 5.58 (s, 1H), 5.76 (s, 1H), 7.21 (brs, 2H), 7.36 – 7.55 (br d, 2H), 8.78 (s, 1H); **¹³C-NMR** (DMSO-d⁶, 75 MHz): 21.2, 39.2, 52.9, 58.9, 87.4, 117.7, 120.2, 126.1, 128.8, 129.7, 130.3, 130.6, 131.9, 135.4, 135.7, 139.1, 143.9, 151.9 ppm.

2-Amino-6-[(4-chlorophenyl)sulfanyl]-4-(2,6-dichlorophenyl)-1,4-dihydropyridine-3,5-

dicarbonitrile, 4c: Pale yellow solid; M. P. 284-286 °C; **¹H-NMR** (DMSO-d⁶, 300 MHz): 5.60 (s, 1H), 5.66 (brs, 2H), 7.20 (d, 1H, J = 7.3 Hz), 7.35 (s, 4H), 7.42 (d, 2H, J = 6.6 Hz), 8.86 (brs, 1H); **¹³C-NMR**(DMSO-d⁶, 75 MHz): 39.2, 53.1, 88.4, 117.4, 120.1, 128.6, 129.7, 129.85, 133.1, 134.7, 135.5, 142.9, 151.8 ppm.

2-Amino-6-[(4-bromophenyl)sulfanyl]-4-(2,6-dichlorophenyl)-1,4-dihydropyridine-3,5-

dicarbonitrile, 4d: Off white solid; M. P. 278-280 °C; **¹H-NMR** (DMSO-d⁶, 300 MHz): 5.36 (brs, 2H), 5.61 (s, 1H), 7.14 (t, 1H, J = 8.4 Hz), 7.31 (t, 4H, J = 8.4 Hz), 7.47 (d, 2H, J = 8.4 Hz), 8.75 (brs, 1H); **¹³C-NMR**(DMSO-d⁶, 75 MHz): 39.0, 55.3, 88.6, 128.7, 129.2, 129.5, 132.4, 132.7, 133.1, 135.2, 137.1, 142.7, 151.7.

2-Amino-6-(cyclohexylsulfanyl)-4-(2,6-dichlorophenyl)-1,4-dihydropyridine-3,5-dicarbonitrile,

4e: Pale yellow solid; M. P. 188-190 °C; **¹H-NMR** (DMSO-d⁶, 300 MHz): 1.31 – 1.40 (m, 6H), 1.56 (d, 1H, J = 5.1 Hz), 1.74 (d, 3H, J = 3.9 Hz), 1.95 (d, 1H, J = 7.5 Hz), 5.51 (s, 1H), 5.83 (s, 2H), 7.27 – 7.33 (m, 1H), 7.43 (d, 2H, J = 8.1 Hz), 9.15 (brs, 1H); **¹³C-NMR**(DMSO-d⁶, 75 MHz): 25.4, 25.5, 33.1, 33.4, 46.4, 52.8, 87.5, 118.1, 120.3, 129.1, 130.1, 135.9, 144.3, 151.8 ppm.

2-Amino-6-(butylsulfanyl)-4-(2,6-dichlorophenyl)-1,4-dihydropyridine-3,5-dicarbonitrile, 4f:

Pale yellow solid; M. P. 118-120 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 0.88 (t, 3H, J = 7.5 Hz), 1.39 (sextet, 2H, J = 7.5 Hz), 1.58 (quintet, 2H, J = 7.5 Hz), 2.86 - 2.92 (m, 2H), 5.50 (s, 1H), 5.65 (s, 2H), 7.21 (t, 1H, J = 7.8 Hz), 7.35 (d, 2H, J = 7.5 Hz), 9.07 (s, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 13.1, 20.8, 31.1, 32.1, 38.4, 52.5, 85.4, 117.3, 119.7, 128.1, 135.2, 144.7, 151.1 ppm.

2-Amino-4-(2,6-dichlorophenyl)-6-(ethylsulfanyl)-1,4-dihydropyridine-3,5-dicarbonitrile, 4g:

Grey solid; M. P. 158-160 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 1.29 (t, 3H, J = 7.5 Hz), 2.91 - 2.95 (m, 2H), 5.51 (s, 1H), 5.67 (s, 2H), 7.23 (d, 1H, J = 8.4 Hz), 7.35 (d, 2H, J = 7.8 Hz), 7.24 (t, 1H, J = 6.2 Hz), 9.08 (s, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 15.3, 27.4, 39.0, 53.1, 86.2, 114.3, 117.9, 120.3, 128.8, 129.7, 132.4, 133.4, 135.8, 145.0, 151.7, 159.9, 168.1 ppm.

2-Amino-4-(2,6-dimethylphenyl)-6-(phenylsulfanyl)-1,4-dihydropyridine-3,5-dicarbonitrile, 4h:

Off white solid; M. P. 276-278 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 2.32 (s, 6H), 5.20 (s, 1H), 5.75 (s, 2H), 6.99 - 7.04 (m, 3H), 7.38 - 7.50 (m, 5H), 8.94 (s, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 37.3, 54.2, 91.3, 118.0, 120.5, 127.6, 128.9, 130.1, 130.5, 131.1, 138.2, 141.4, 150.9 ppm.

2-Amino-6-[(4-chlorophenyl)sulfanyl]-4-(2,6-dimethylphenyl)-1,4-dihydropyridine-3,5-

dicarbonitrile, 4j: Off white solid; M. P. 300-302 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 2.31 (s, 6H), 5.15 (s, 1H), 5.56 (s, 2H), 6.95 - 7.04 (m, 3H), 7.37 - 7.45 (m, 4H), 8.81 (s, 1H); ¹³C-NMR (DMSO-d⁶, 75 MHz): 37.2, 54.5, 91.1, 117.8, 120.4, 127.6, 128.9, 129.9, 132.9, 134.6, 137.9, 141.2, 150.7 ppm.

2-Amino-6-[(4-methoxyphenyl)sulfanyl]-4-(2,6-dimethylphenyl)-1,4-dihydropyridine-3,5-

dicarbonitrile, 4k: Yellow solid; M. P. 298 - 300 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 2.07 (s, 6H), 2.88 (s, 3H), 5.10 (s, 1H), 5.44 (s, 2H), 6.91 - 6.96 (m, 3H), 7.11 (d, 2H, J = 7.5 Hz), 7.42 - 7.45 (m, 2H), 8.37 (s, 1H); ¹³C-NMR (DMSO-d⁶, 75 MHz): 19.7, 37.0, 55.5, 87.6, 94.2, 115.0, 117.6, 128.0, 129.6, 133.7, 134.8, 137.3, 150.7, 159.0, 160.0, 161.0, 168.5 ppm.

2-Amino-4-(2,6-dimethoxyphenyl)-6-(phenylsulfanyl)-1,4-dihydropyridine-3,5-dicarbonitrile, 4l:

Yellow solid; M. P. 140-142 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 3.73 (s, 6H), 5.09 (s, 1H), 5.50

(s, 1H), 5.57 (s, 1H), 6.63 (d, 2H, J = 8.1 Hz), 7.19 (t, 1H, J = 8.1 Hz), 7.31 – 7.34 (m, 1H), 7.37 – 7.39 (m, 1H), 8.87 (brs, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 31.7, 56.5, 92.0, 105.0, 118.7, 119.1, 121.2, 128.2, 129.2, 129.9, 129.9, 131.7, 140.8, 151.9, 158.9 ppm.

2-Amino-4-(2,6-dimethoxyphenyl)-6-[(4-methylphenyl)sulfanyl]-1,4-dihydropyridine-3,5-dicarbonitrile, 4m: Yellow solid; M. P. 198-200 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 2.31 (s, 3H), 3.72 (s, 6H), 5.06 (s, 1H), 5.49 (s, 1H), 5.56 (s, 1H), 6.61 (d, 2H, J = 8.1 Hz), 7.20 (d, 3H, J = 8.1 Hz), 7.32 (d, 2H, J = 8.1 Hz), 8.71 (s, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 21.2, 31.7, 54.3, 56.4, 91.1, 104.9, 118.8, 119.2, 121.4, 127.7, 129.1, 130.5, 130.7, 138.3, 141.5, 151.9, 158.9 ppm.

2-Amino-6-[(4-chlorophenyl)sulfanyl]-4-(2,6-dimethoxyphenyl)-1,4-dihydropyridine-3,5-dicarbonitrile, 4n: Yellow solid; M. P. 182-184 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 3.72 (s, 6H), 5.08 (s, 1H), 5.40 (s, 1H), 5.44 (s, 1H), 6.58 (d, 2H, J = 6.3 Hz), 7.17 (t, 1H, J = 7.5 Hz), 7.38 (s, 4H), 8.81 (brs, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 31.7, 54.4, 56.4, 92.0, 105.0, 118.6, 119.0, 121.3, 129.2, 130.4, 131.6, 133.7, 140.6, 151.8, 158.8 ppm.

2-Amino-4-(2,6-difluorophenyl)-6-(phenylsulfanyl)-1,4-dihydropyridine-3,5-dicarbonitrile, 4o: White solid; M. P. 264-266 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 4.90 (s, 1H), 5.83 (s, 2H), 7.02 (t, 2H, J = 8.4 Hz), 7.33 – 7.42 (m, 6H), 9.14 (s, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 32.5, 53.3, 89.3, 112.1, 112.4, 118.0, 118.7, 120.5, 128.6, 130.0, 130.2, 130.8, 142.5, 151.6, 159.5, 159.6, 162.8, 162.9 ppm.

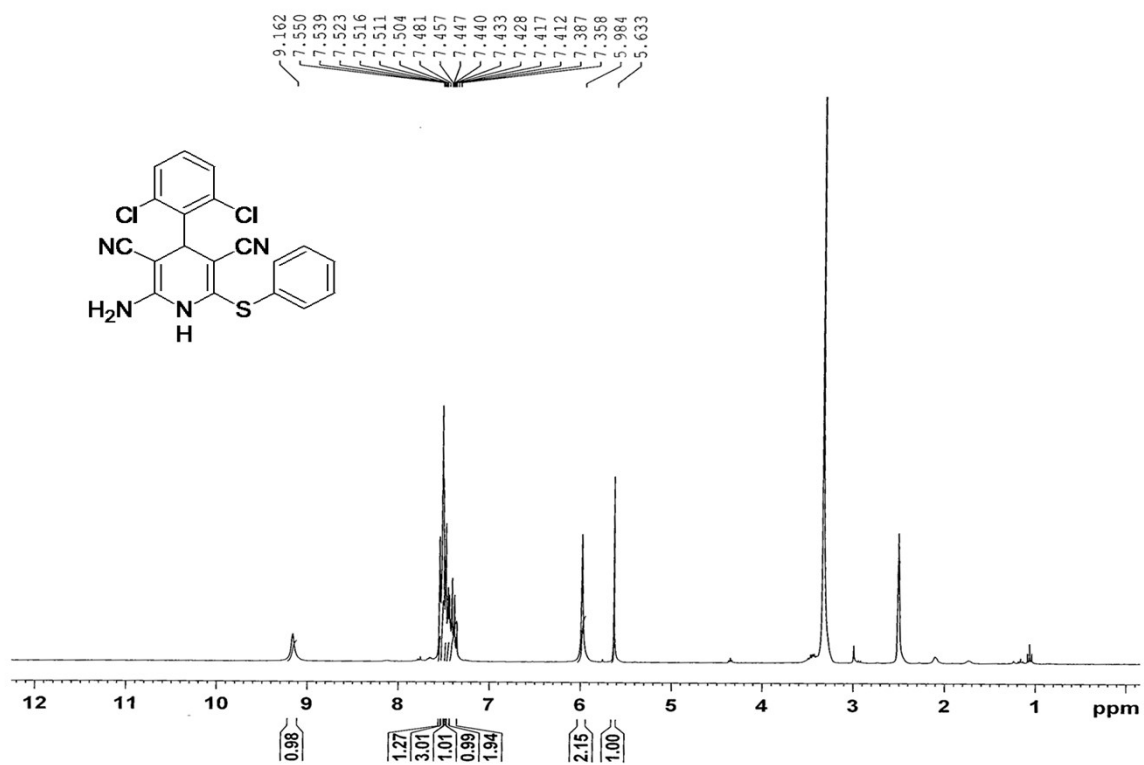
2-Amino-6-[(4-chlorophenyl)sulfanyl]-4-(2,6-difluorophenyl)-1,4-dihydropyridine-3,5-dicarbonitrile, 4p: White solid; M. P. 242-244 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 4.87 (s, 1H), 5.68 (s, 2H), 6.41 (t, 2H, J = 8.4 Hz), 7.29 – 7.40 (m, 5H), 9.03 (brs, 1H); ¹³C-NMR (DMSO-d⁶, 75 MHz): 32.4, 53.6, 89.1, 111.9, 112.2, 117.8, 118.5, 120.4, 129.3, 129.9, 132.2, 134.3, 137.0, 142.4, 151.4, 159.5, 159.6, 162.8, 162.9 ppm.

2-Amino-4-(2,6-difluorophenyl)-6-[(4-methylphenyl)sulfanyl]-1,4-dihydropyridine-3,5-dicarbonitrile, 4q: White solid; M. P. 238-240 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 2.31 (s, 3H), 4.86 (s, 1H), 5.72 (s, 2H), 6.94 (t, 2H, J = 8.4 Hz), 7.18 (d, 2H, J = 8.1 Hz), 7.26 – 7.31 (m,

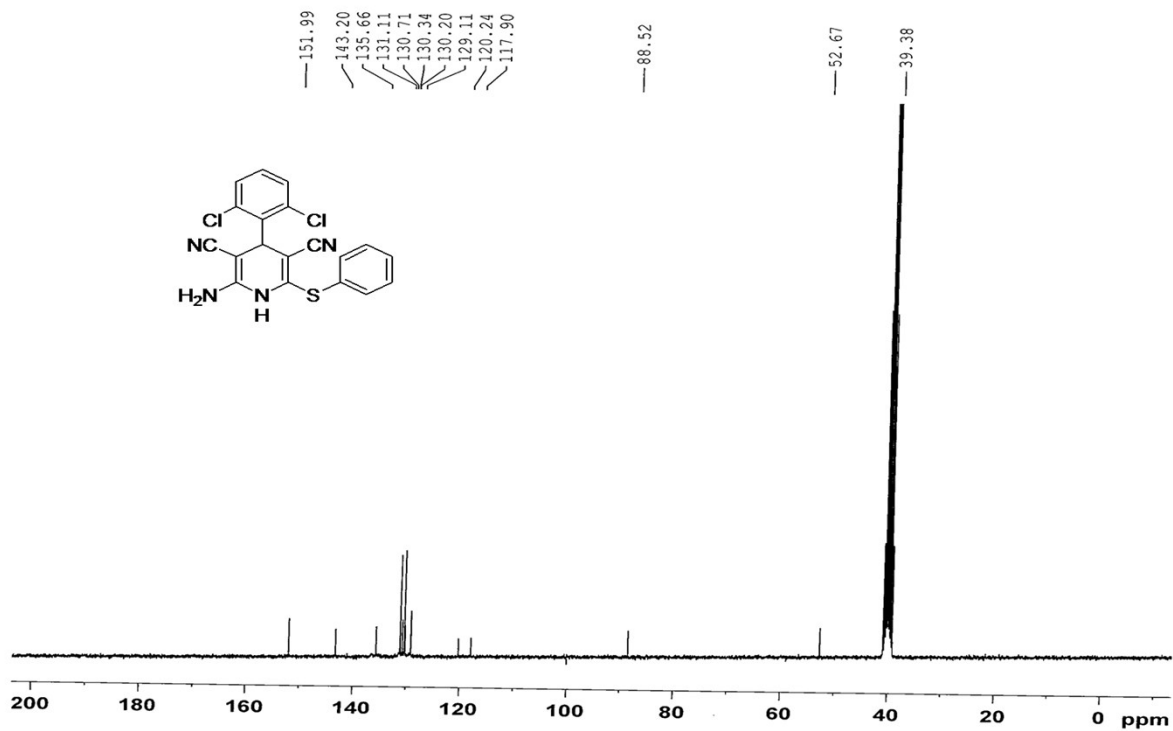
3H), 8.91 (brs, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 21.2, 32.4, 53.4, 88.2, 111.9, 112.2, 118.1, 120.5, 126.7, 130.0, 130.6, 131.1, 138.8, 143.3, 151.4, 159.5, 159.6, 162.9, 163.0 ppm.

2-Amino-6-(cyclohexylsulfanyl)-4-(2,6-difluorophenyl)-1,4-dihydropyridine-3,5-dicarbonitrile,

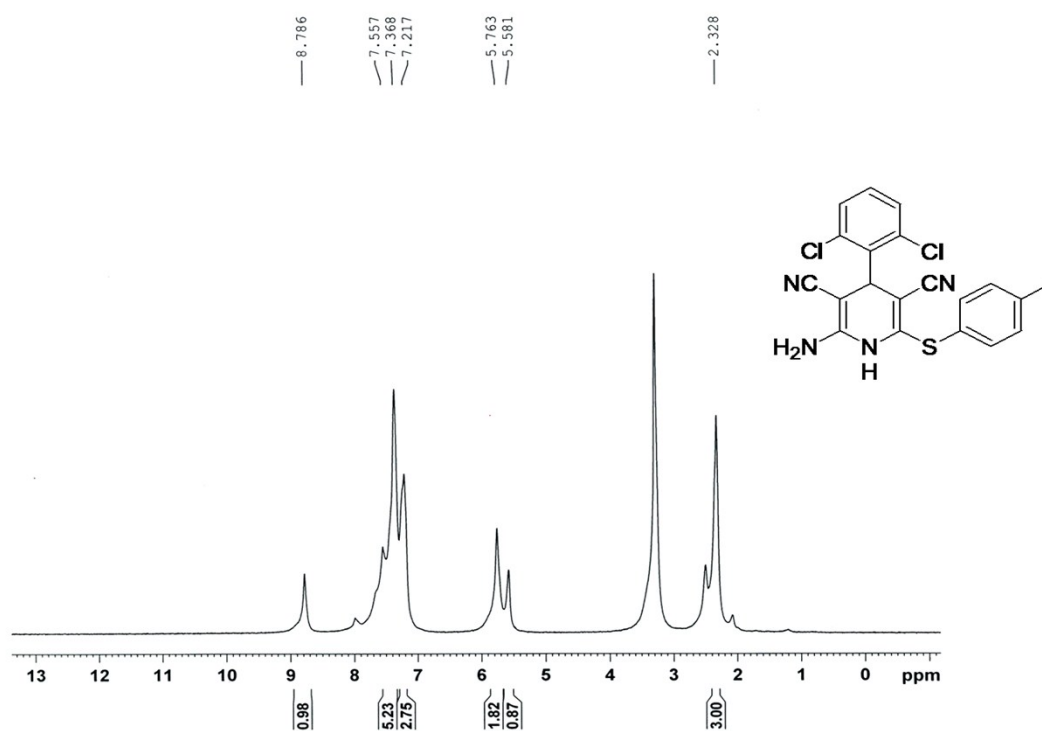
4r: Off white solid; M. P. 248-250 °C; ¹H-NMR (DMSO-d⁶, 300 MHz): 1.25 – 1.35 (m, 4H), 1.43 – 1.91 (m, 6H), 3.27 (d, 1H), 4.81 (s, 1H), 5.45 (s, 2H), 6.82 – 6.88 (m, 1H), 7.07 – 7.32 (m, 2H), 9.04 (s, 1H); ¹³C-NMR(DMSO-d⁶, 75 MHz): 25.4, 25.7, 32.2, 32.7, 46.8, 53.7, 88.7, 111.7, 112.0, 118.5, 120.6, 129.6, 129.7, 143.6, 151.3, 159.6, 159.6, 162.9, 163.0 ppm.



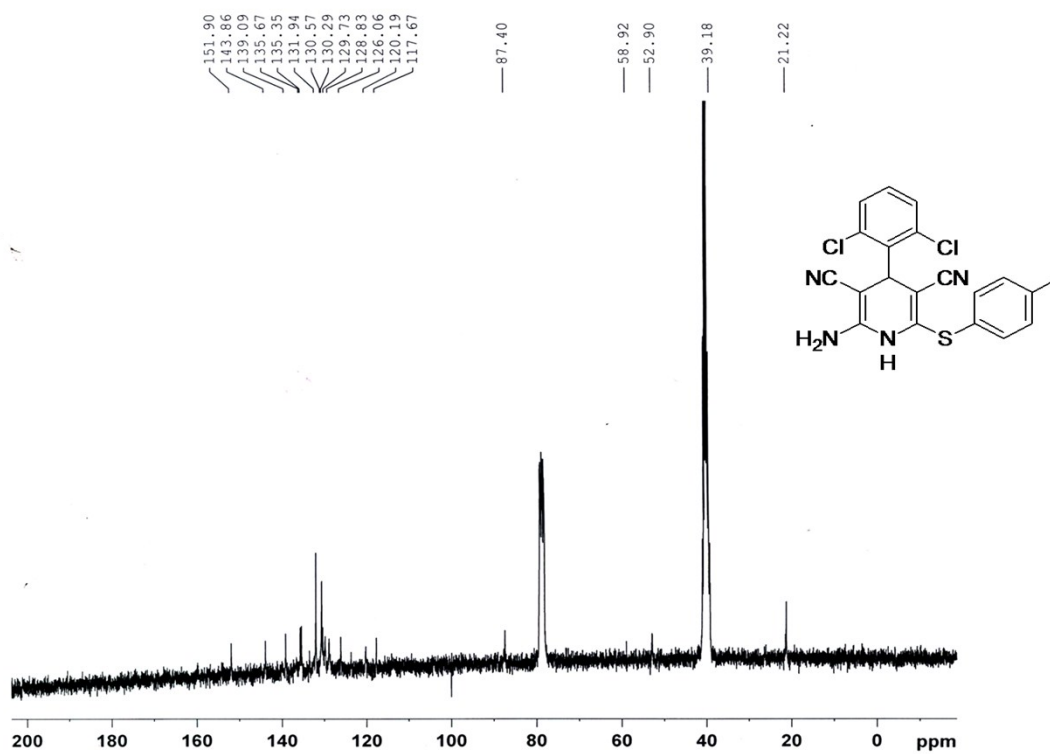
Spectrum 1. ¹H – NMR of compound 4a



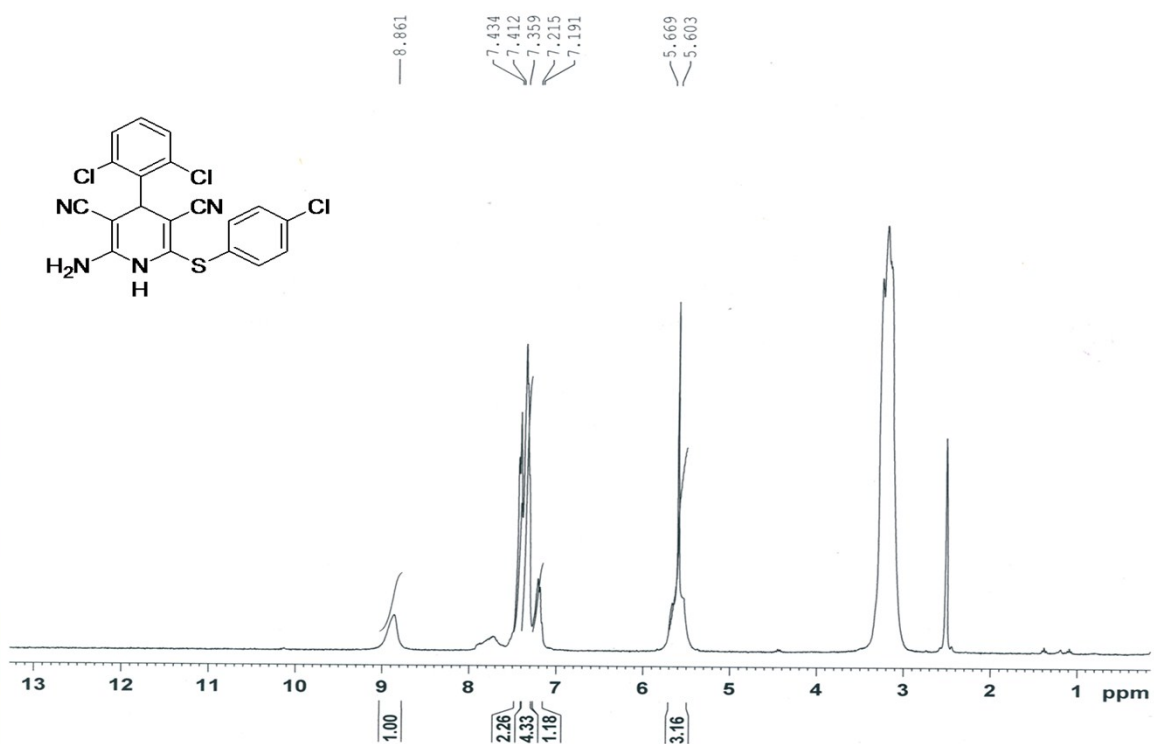
Spectrum 2. ¹³C – NMR of compound 4a



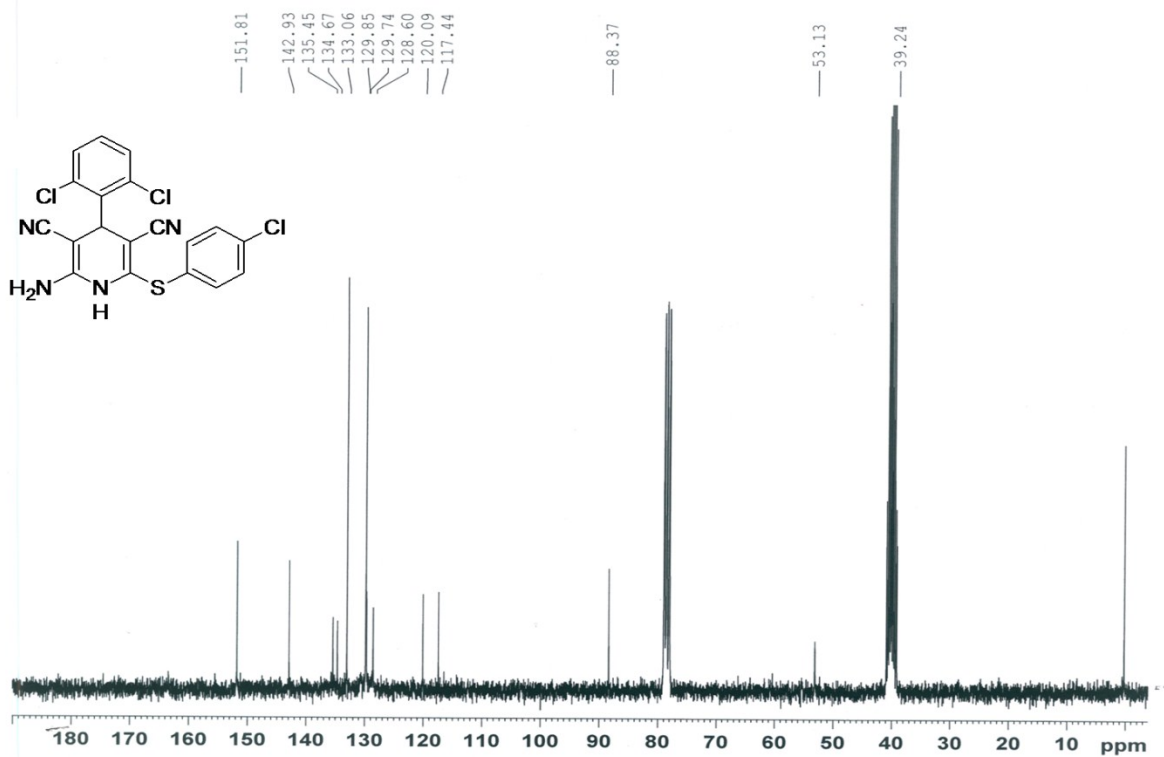
Spectrum 3. ^1H – NMR of compound 4b



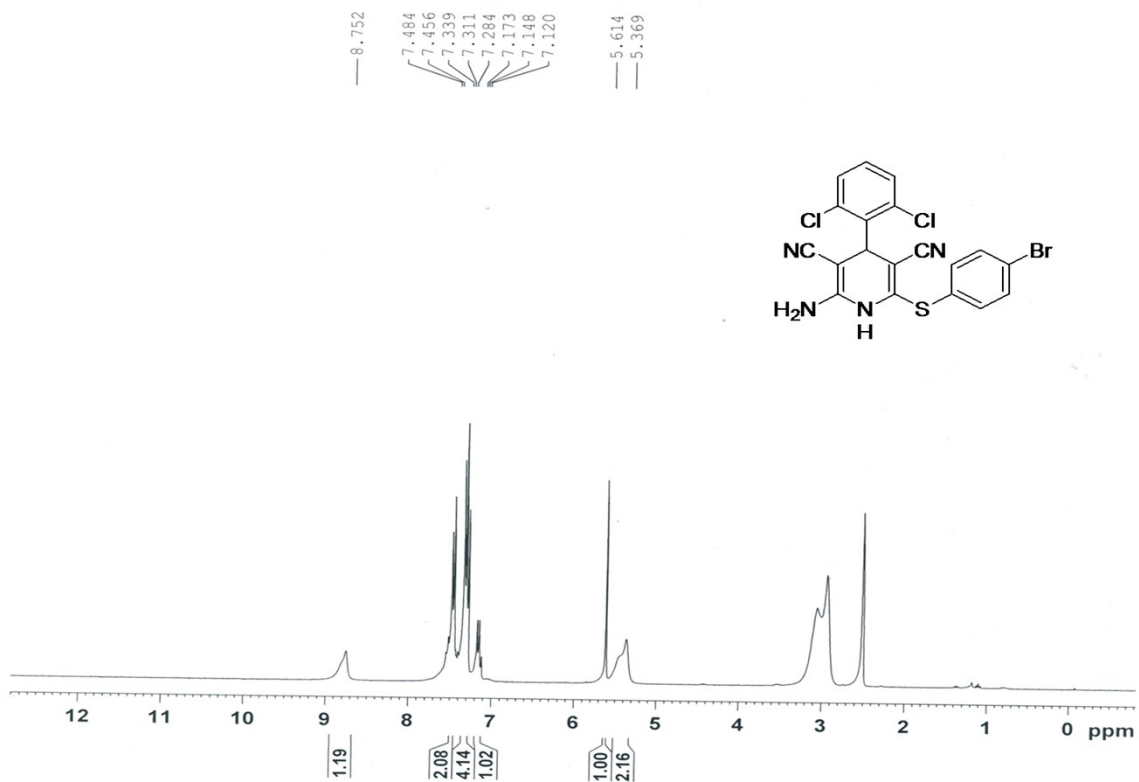
Spectrum 4. ^{13}C – NMR of compound 4b



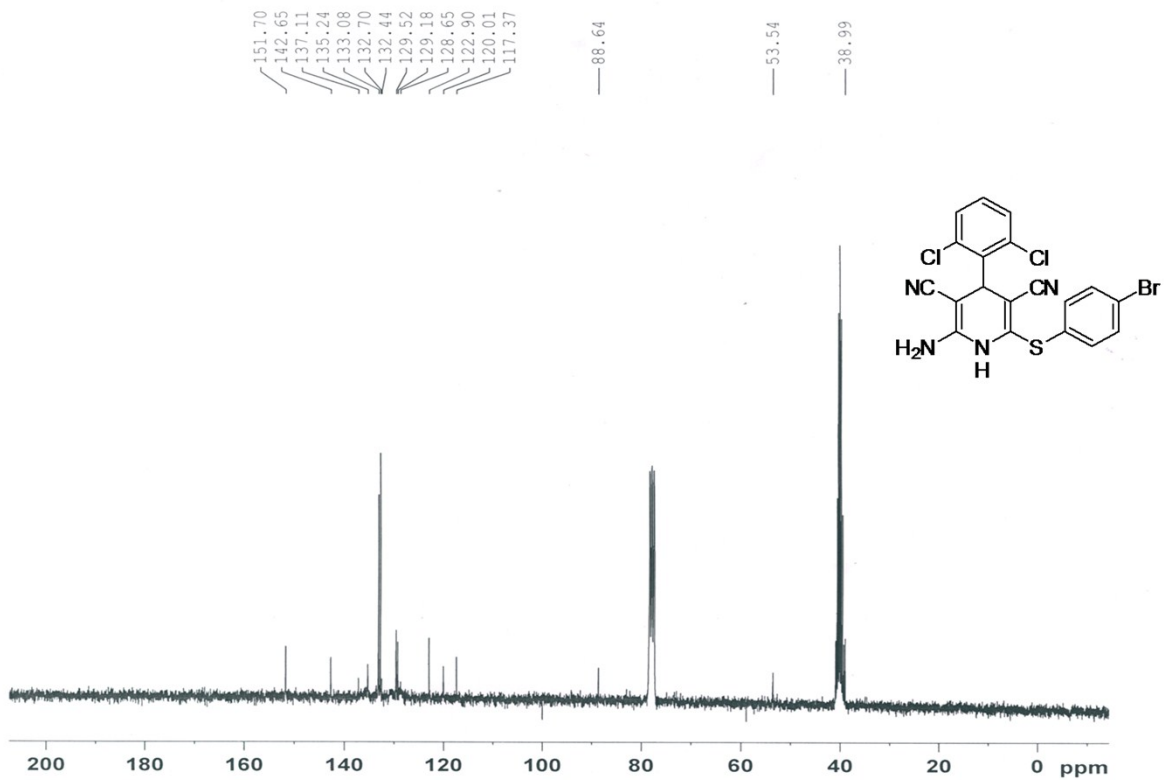
Spectrum 5. ¹H – NMR of compound 4c



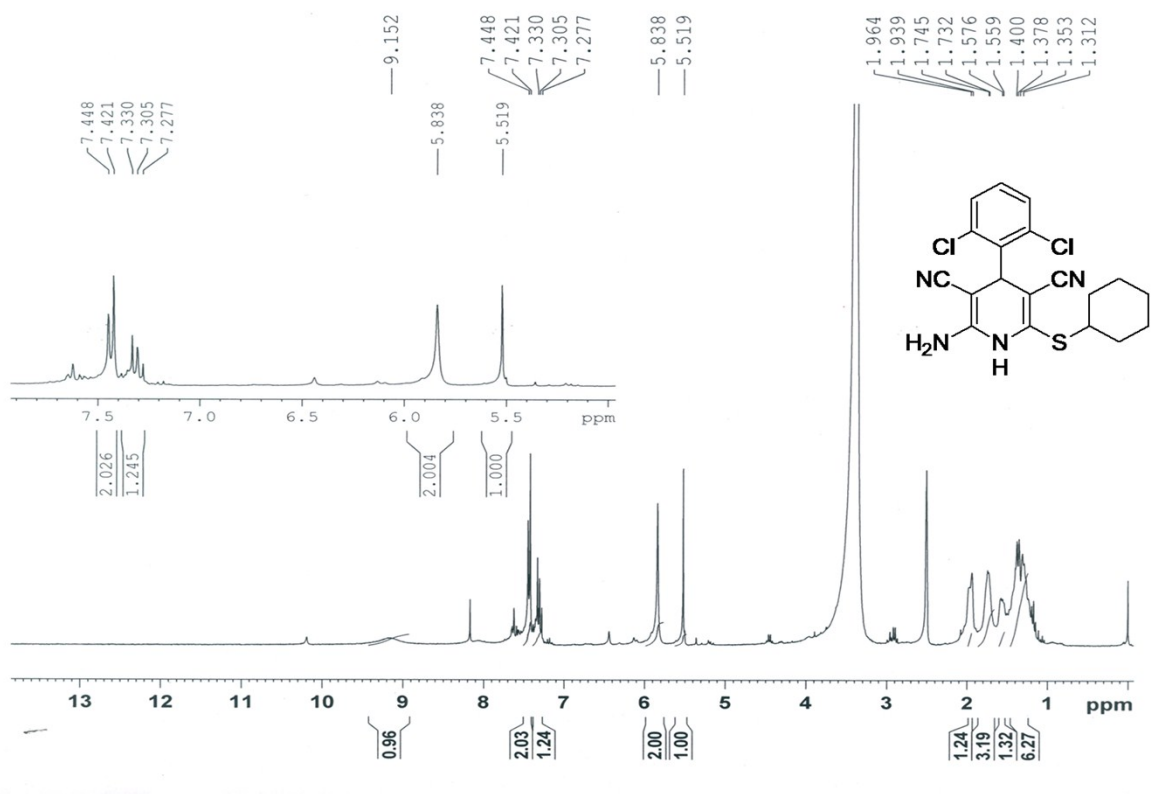
Spectrum 6. ¹³C – NMR of compound 4c



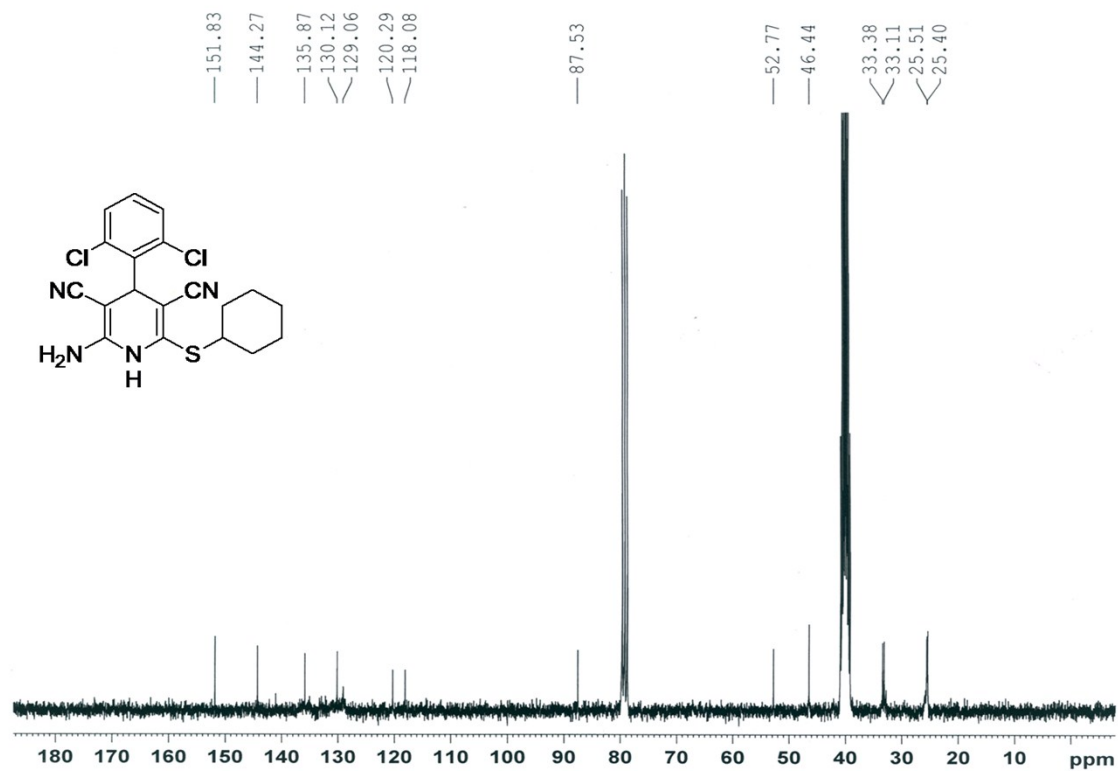
Spectrum 7. $^1\text{H-NMR}$ of compound 4d



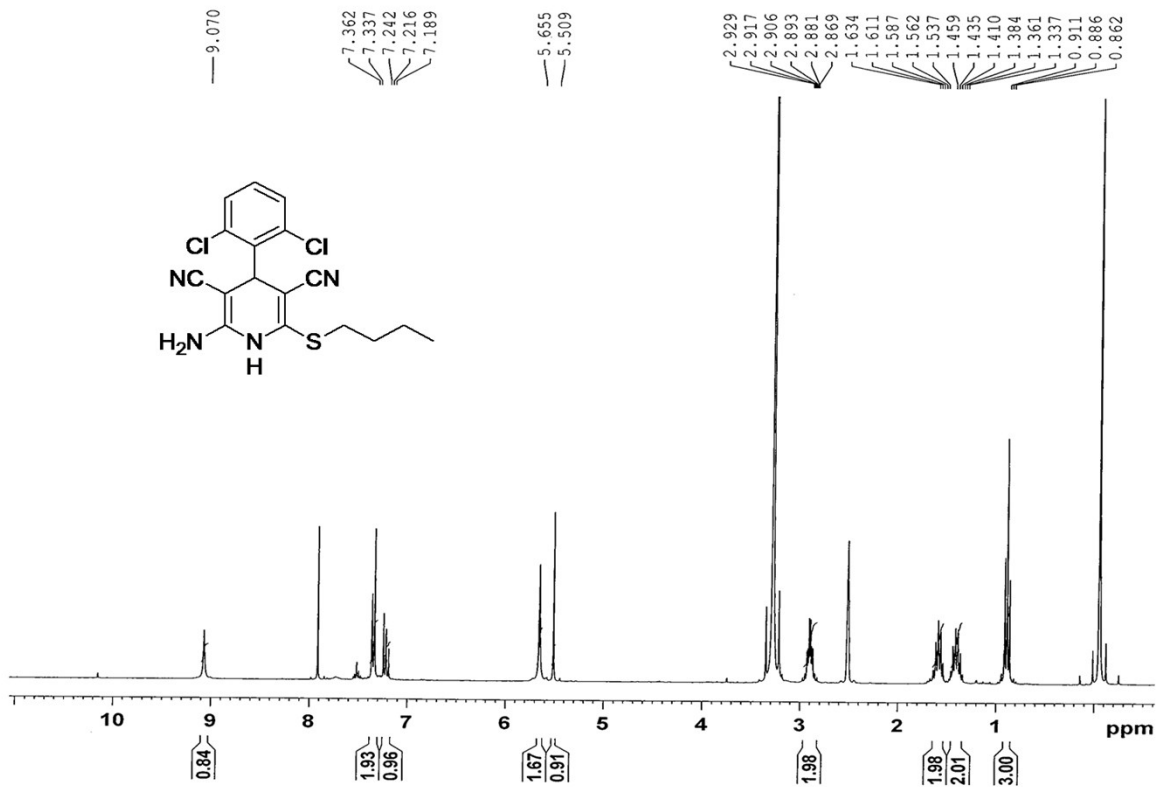
Spectrum 8. $^{13}\text{C-NMR}$ of compound 4d



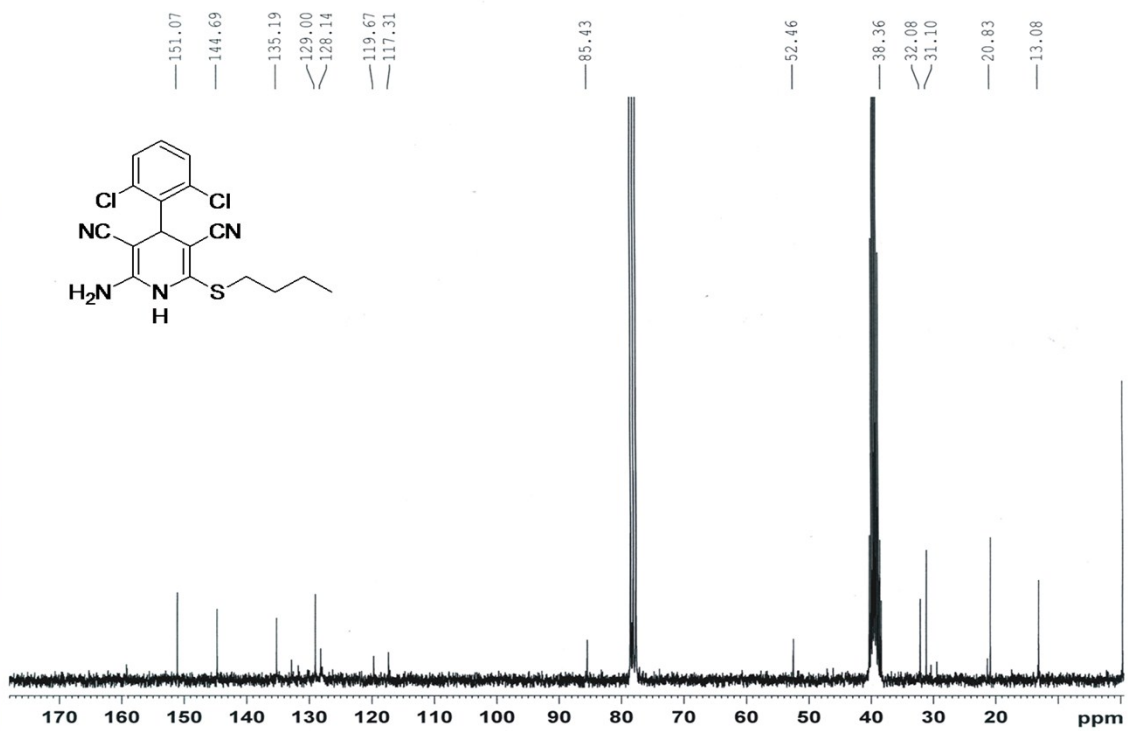
Spectrum 9. ¹H – NMR of compound 4e



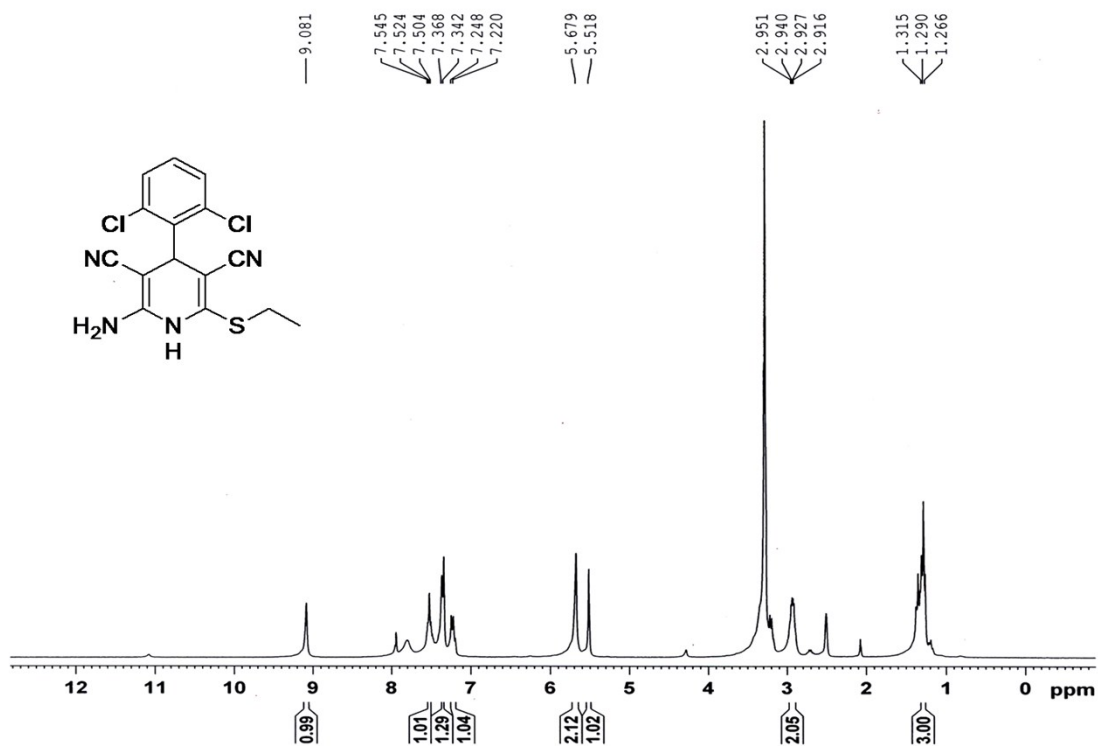
Spectrum 10. ¹³C – NMR of compound 4e



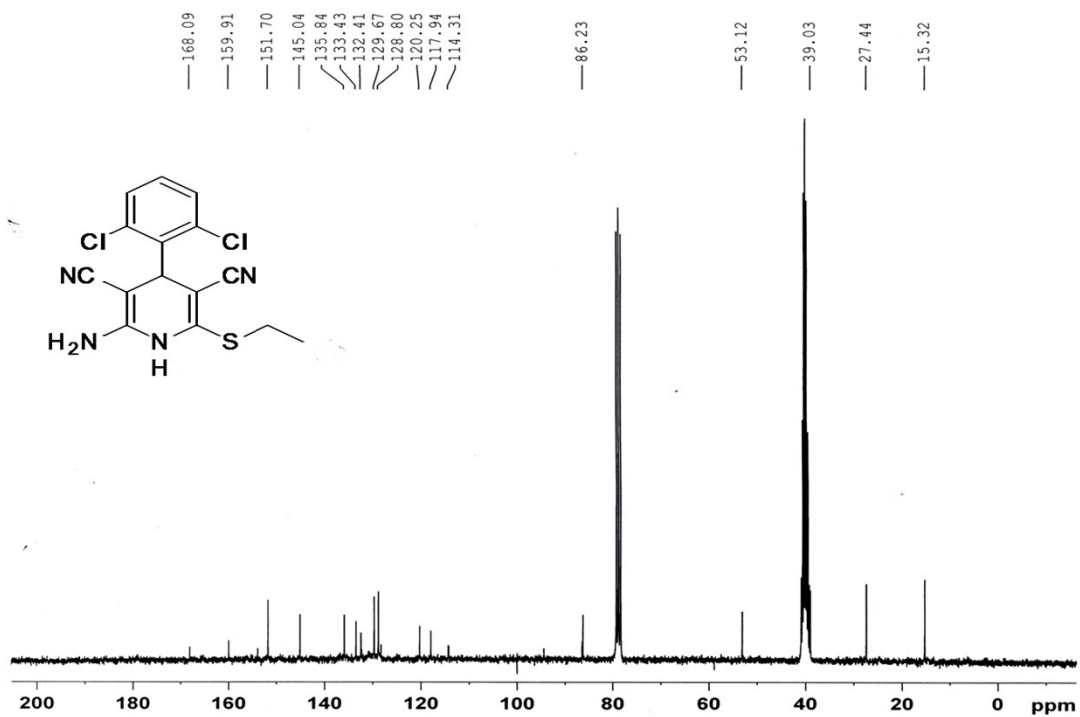
Spectrum 11. ¹H – NMR of compound 4f



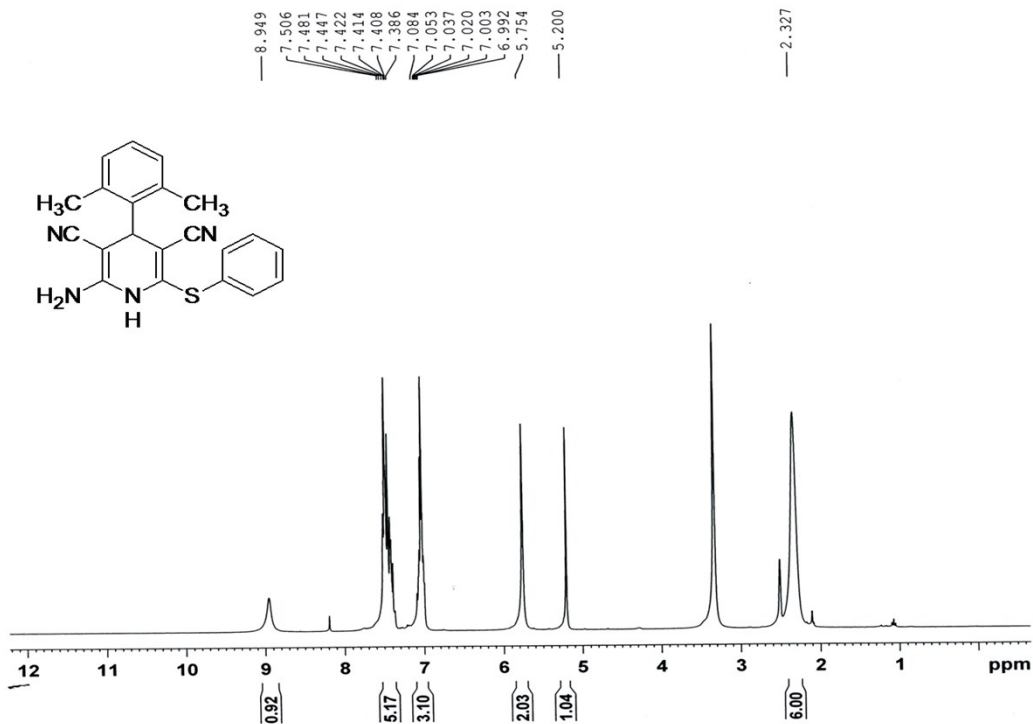
Spectrum 12. ¹³C – NMR of compound 4f



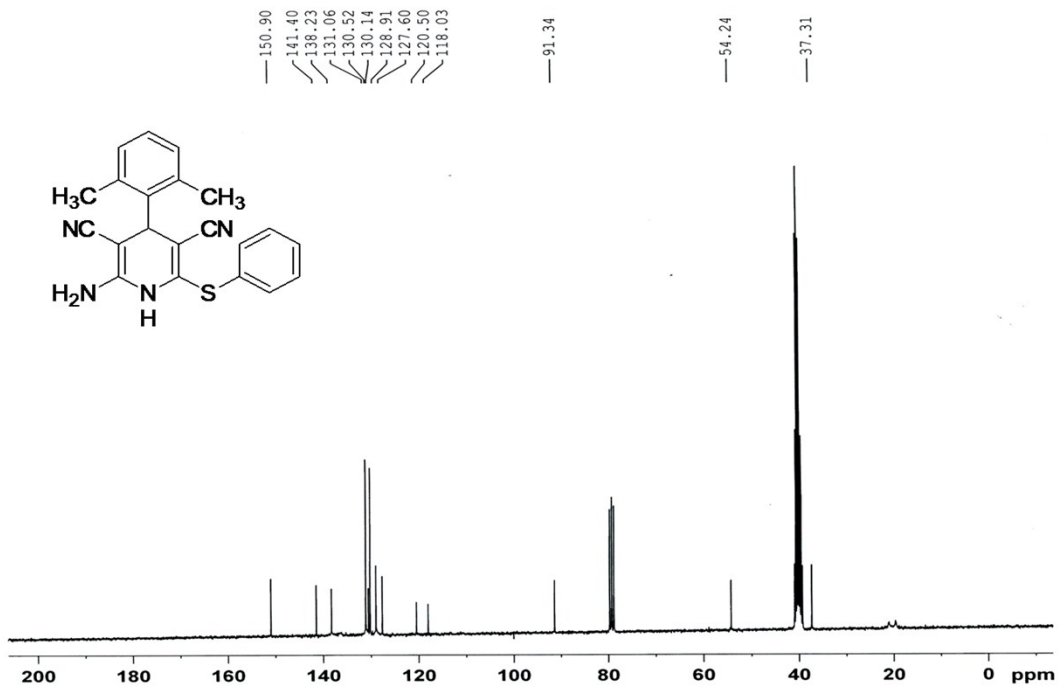
Spectrum 13. ¹H – NMR of compound 4g



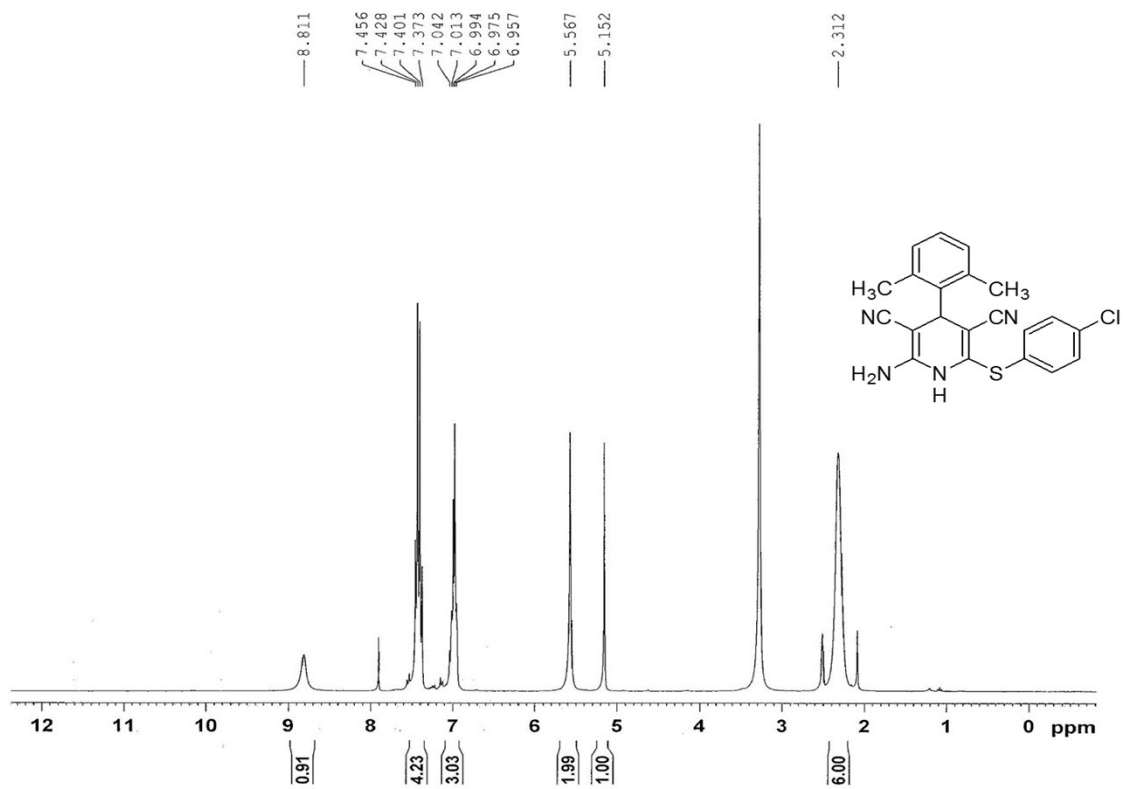
Spectrum 14. ¹³C – NMR of compound 4g



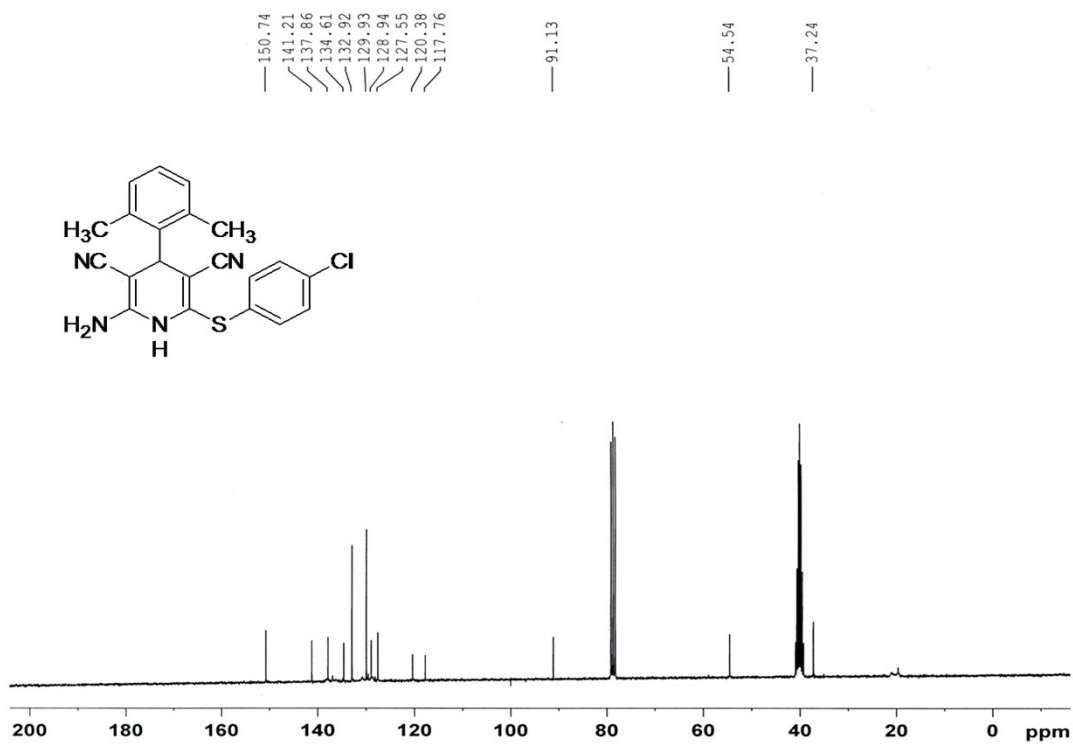
Spectrum 15. ^1H – NMR of compound 4h



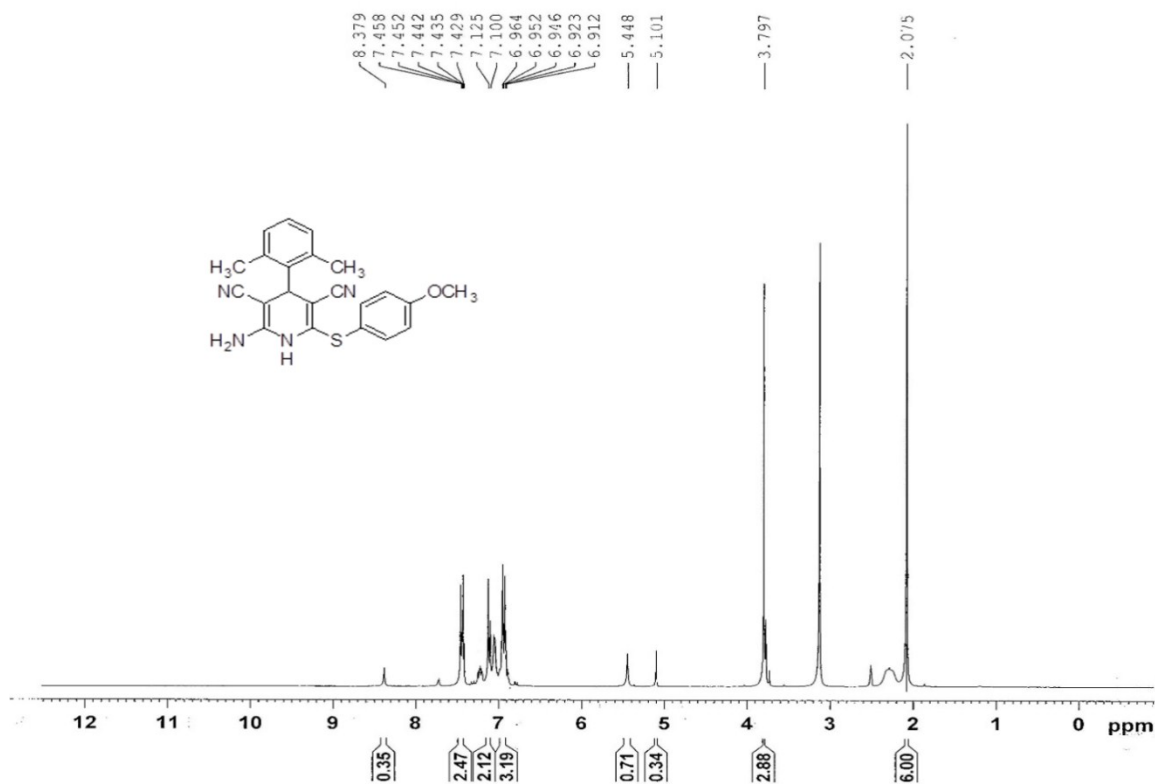
Spectrum 16. ^{13}C – NMR of compound 4h



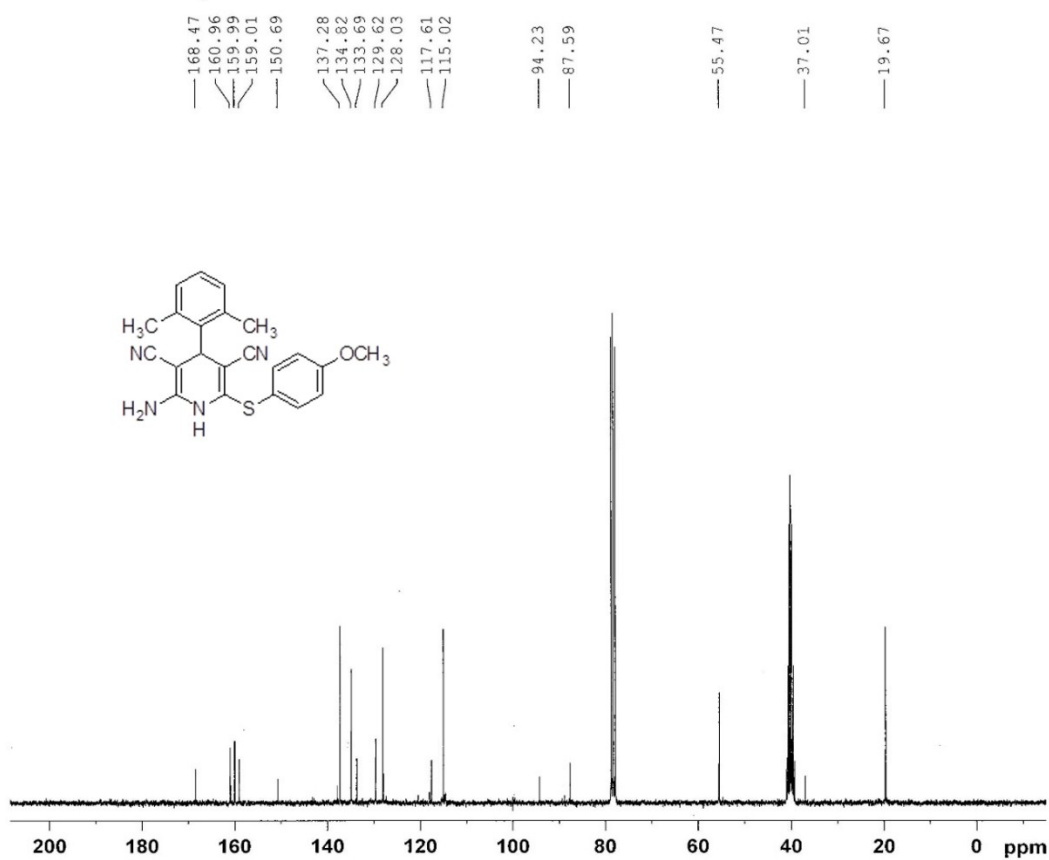
Spectrum 17. ¹H – NMR of compound 4j



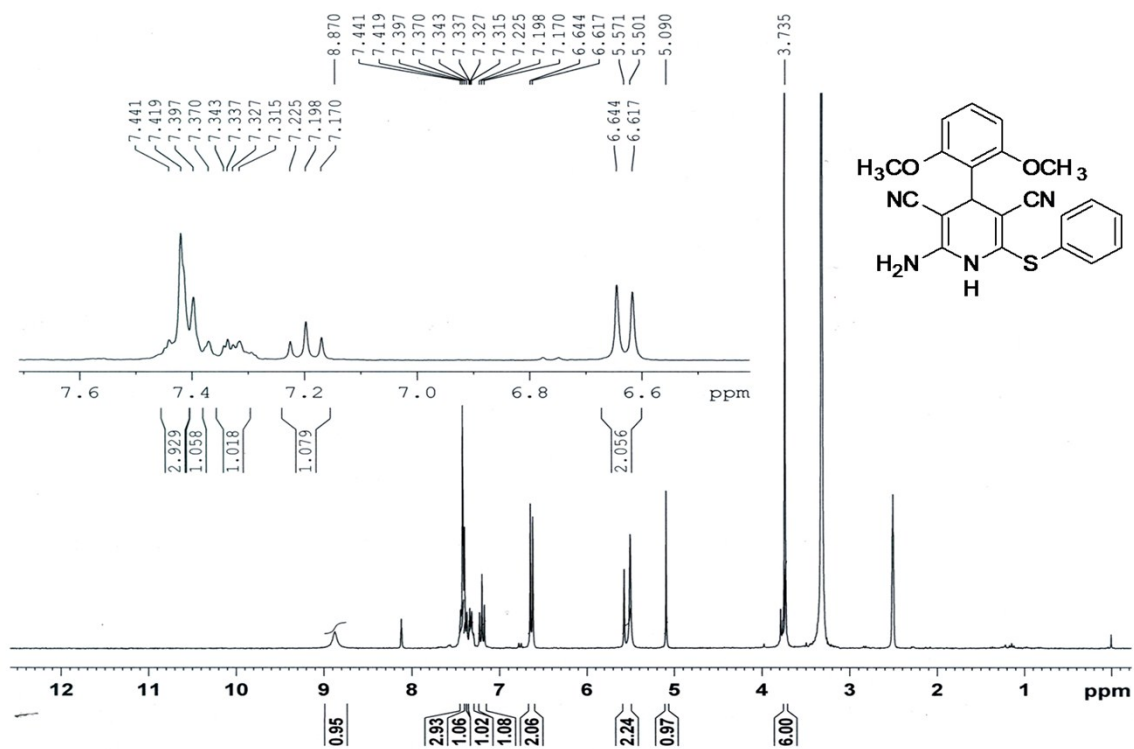
Spectrum 18. ¹³C – NMR of compound 4j



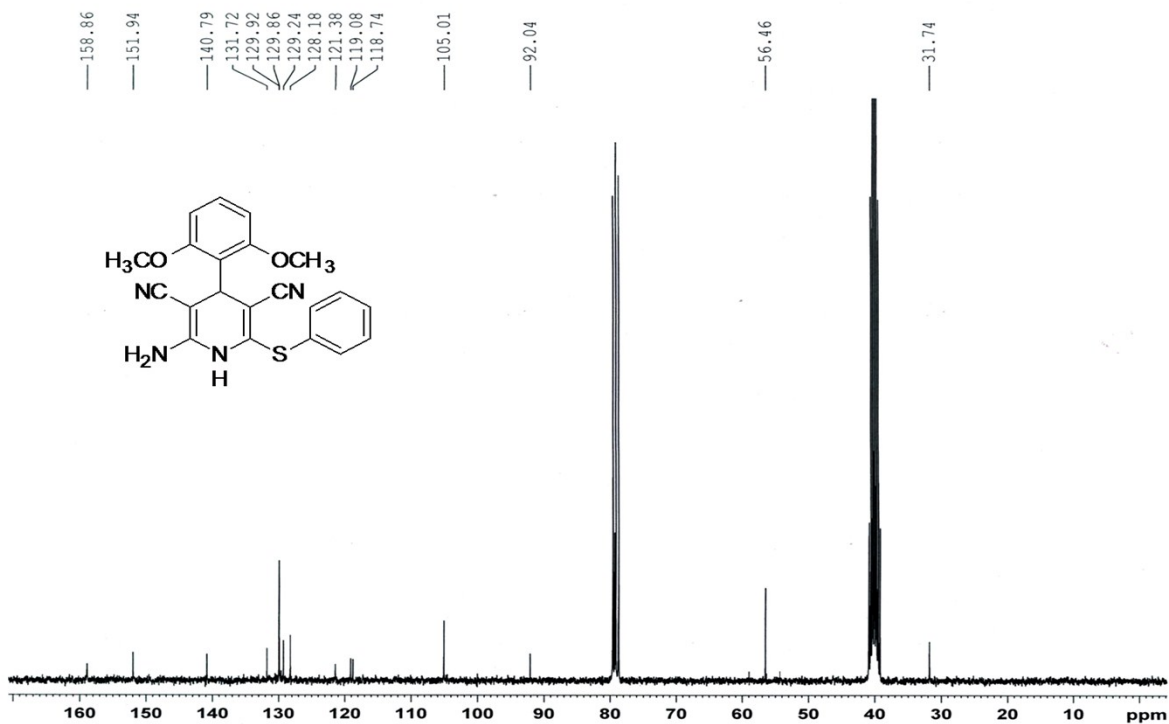
Spectrum 19. ¹H – NMR of compound 4k



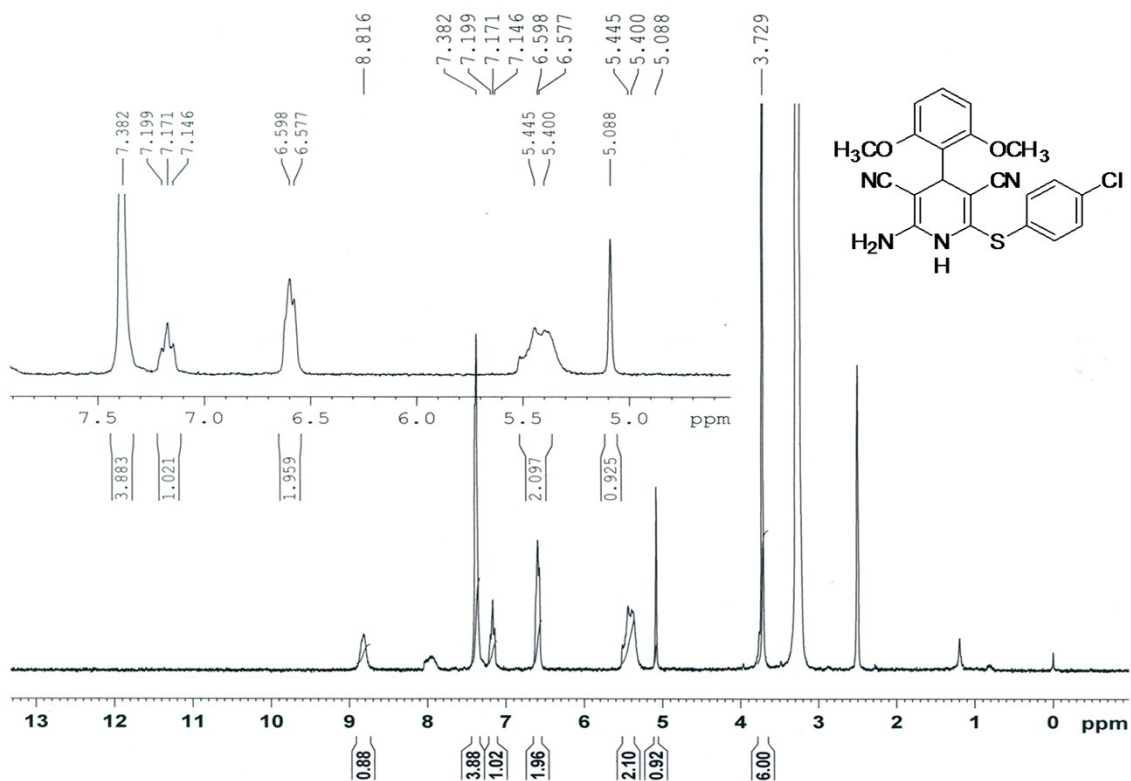
Spectrum 20. ¹³C – NMR of compound 4k



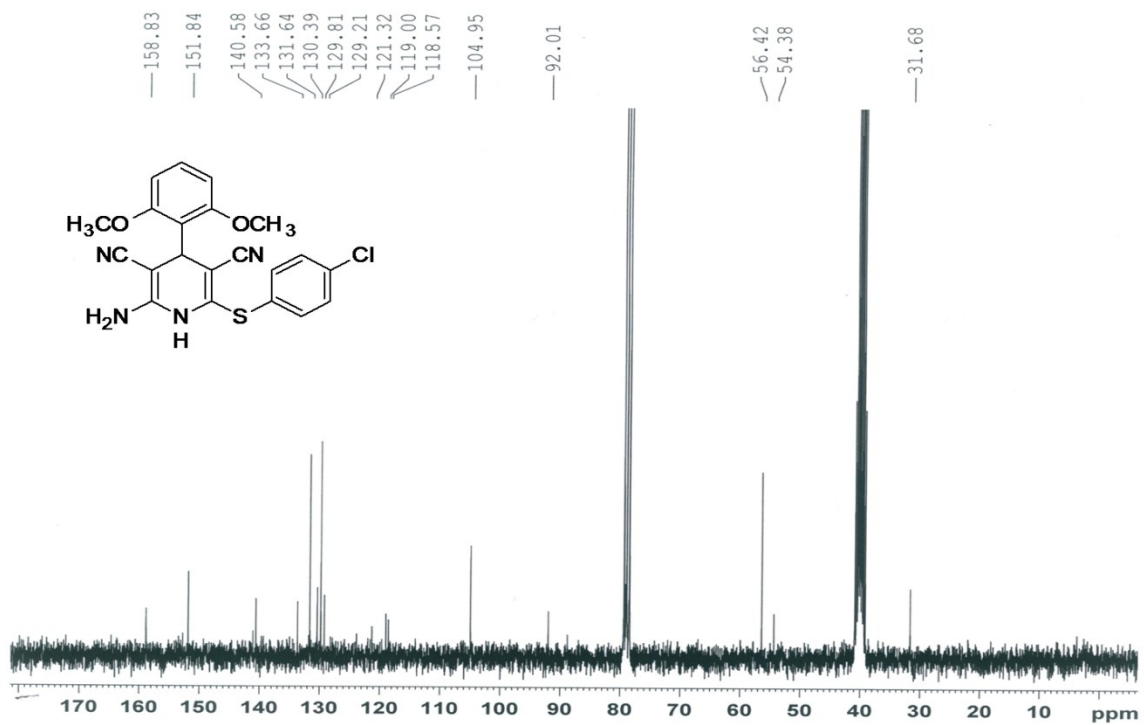
Spectrum 21. ¹H – NMR of compound 4l



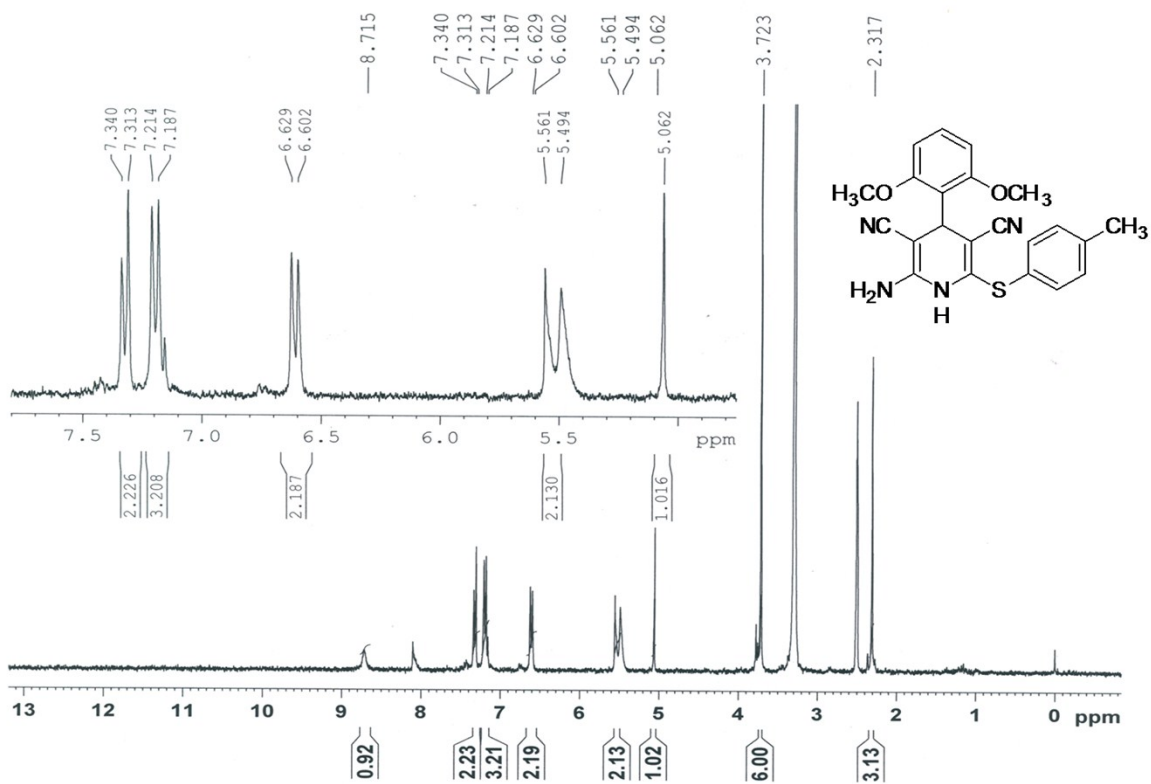
Spectrum 22. ¹³C – NMR of compound 4l



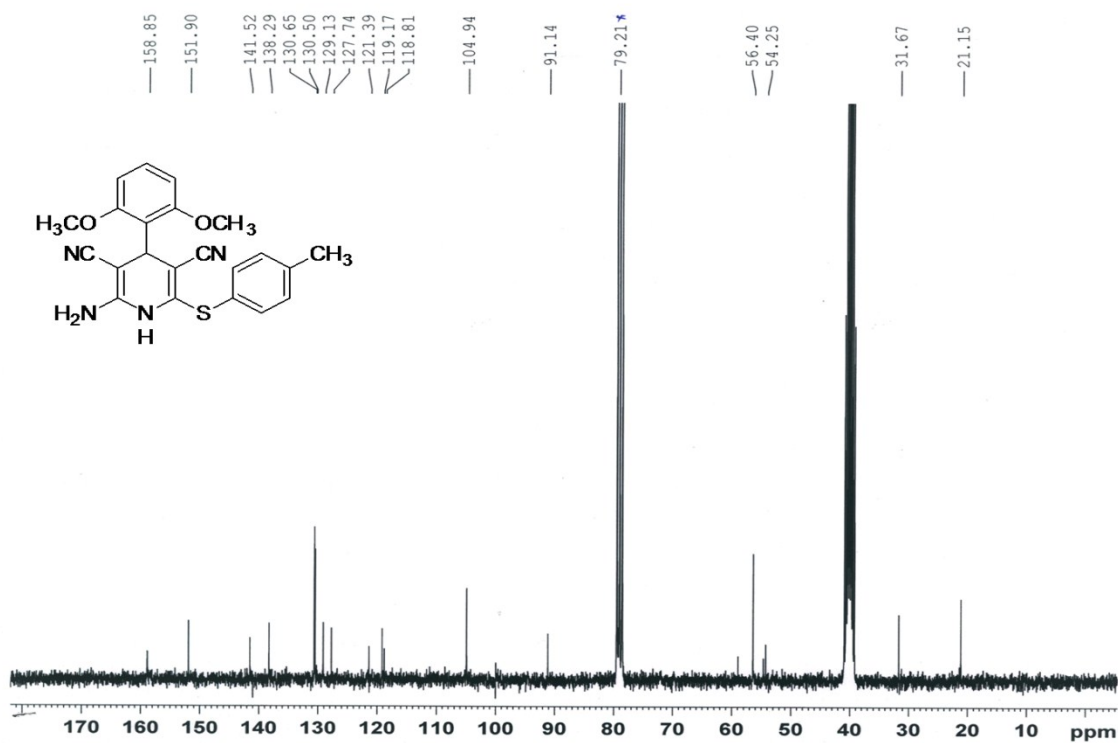
Spectrum 23. ^1H – NMR of compound 4m



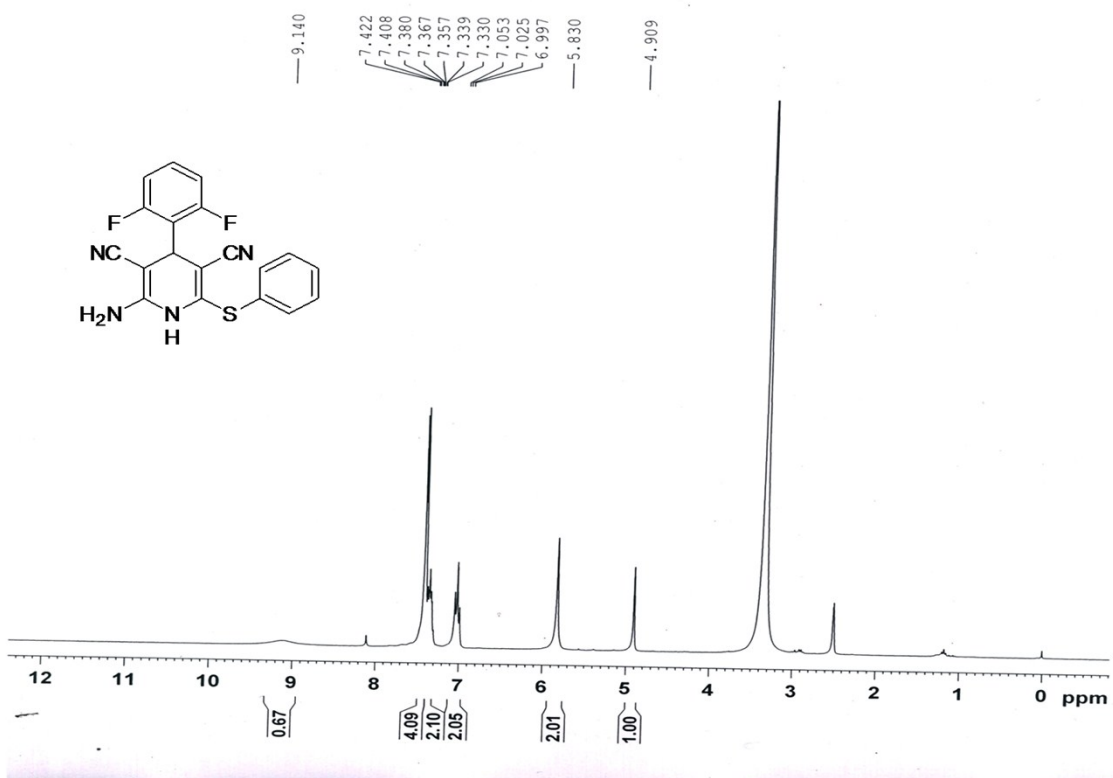
Spectrum 24. ^{13}C – NMR of compound 4m



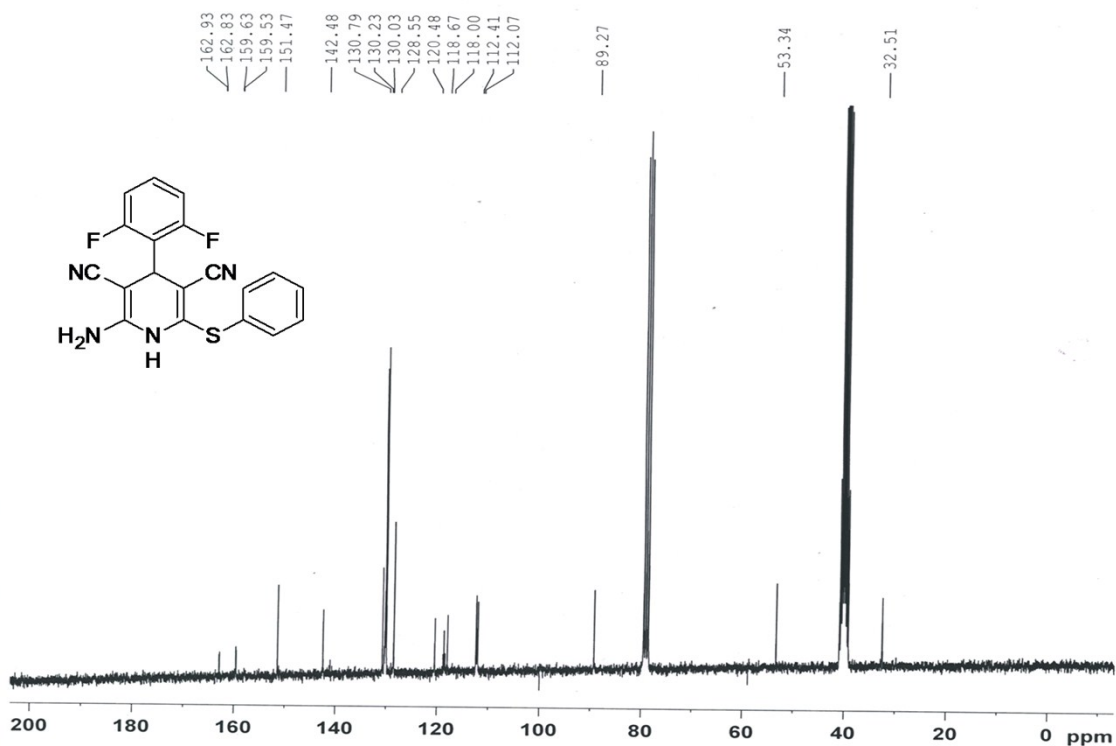
Spectrum 25. ¹H – NMR of compound 4n



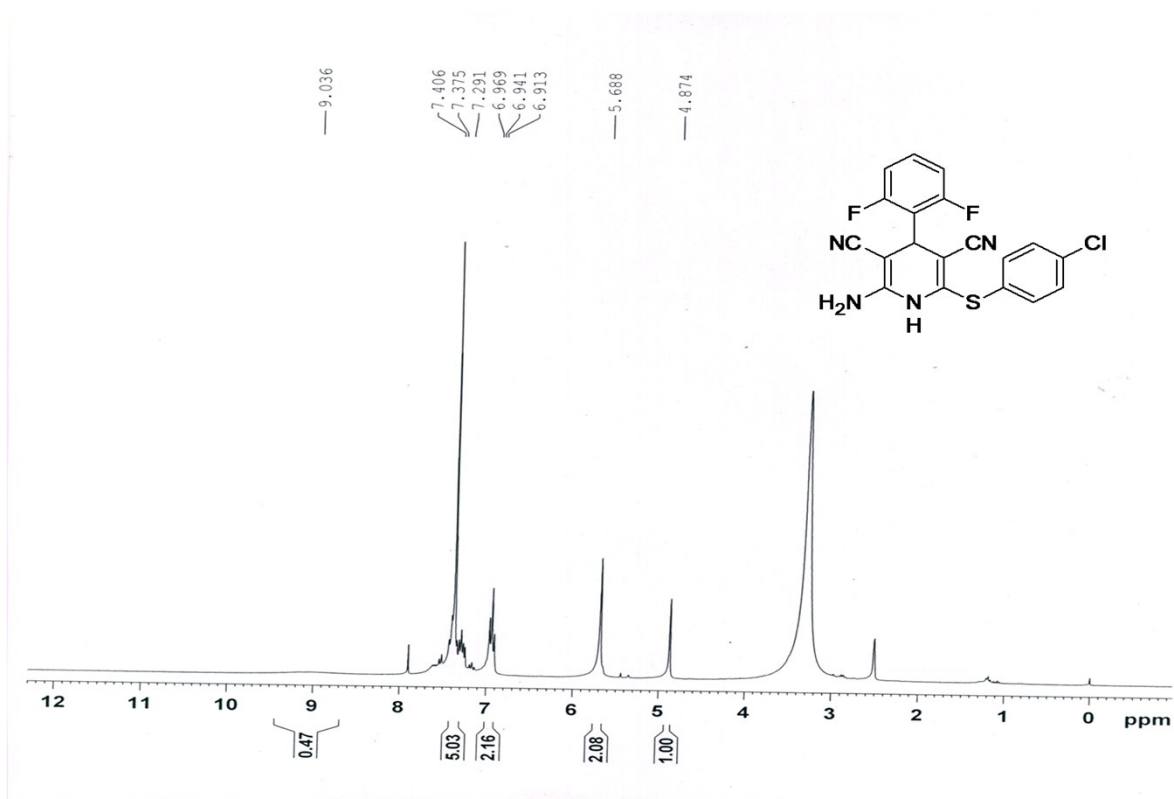
Spectrum 26. ¹³C – NMR of compound 4n



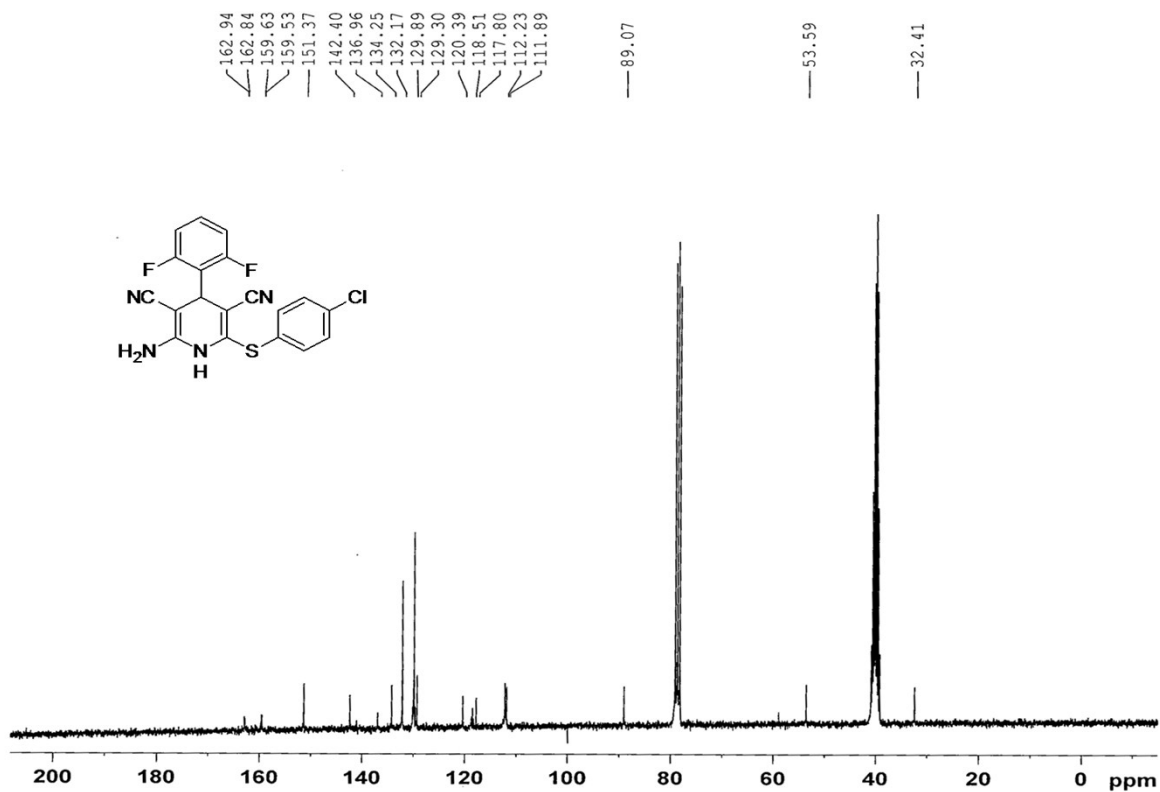
Spectrum 27. $^1\text{H-NMR}$ of compound 4o



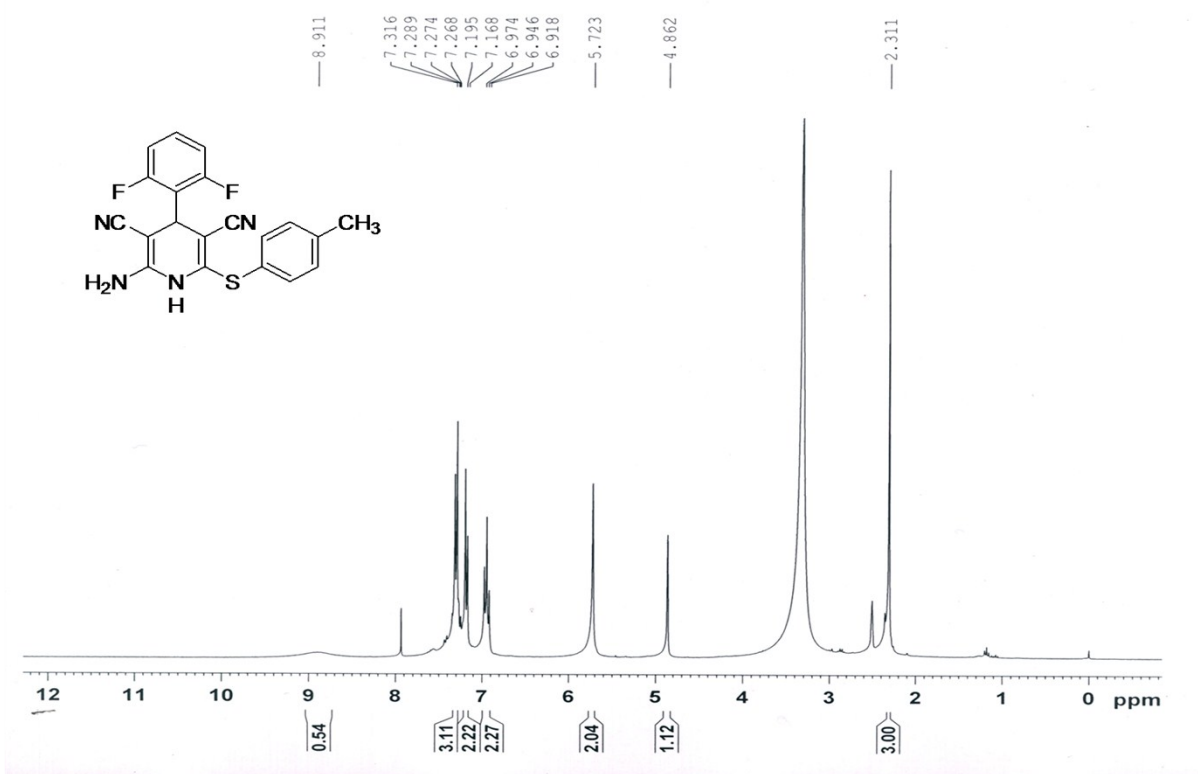
Spectrum 28. $^{13}\text{C-NMR}$ of compound 4o



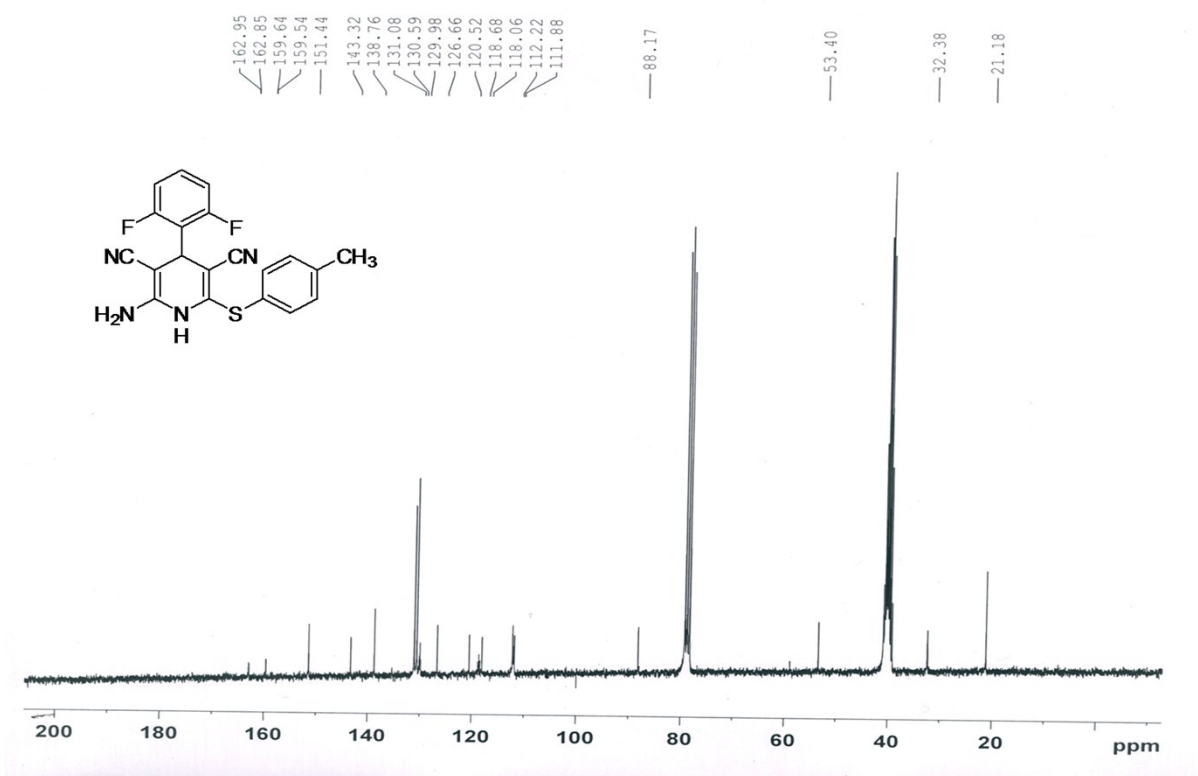
Spectrum 29. ^1H – NMR of compound 4p



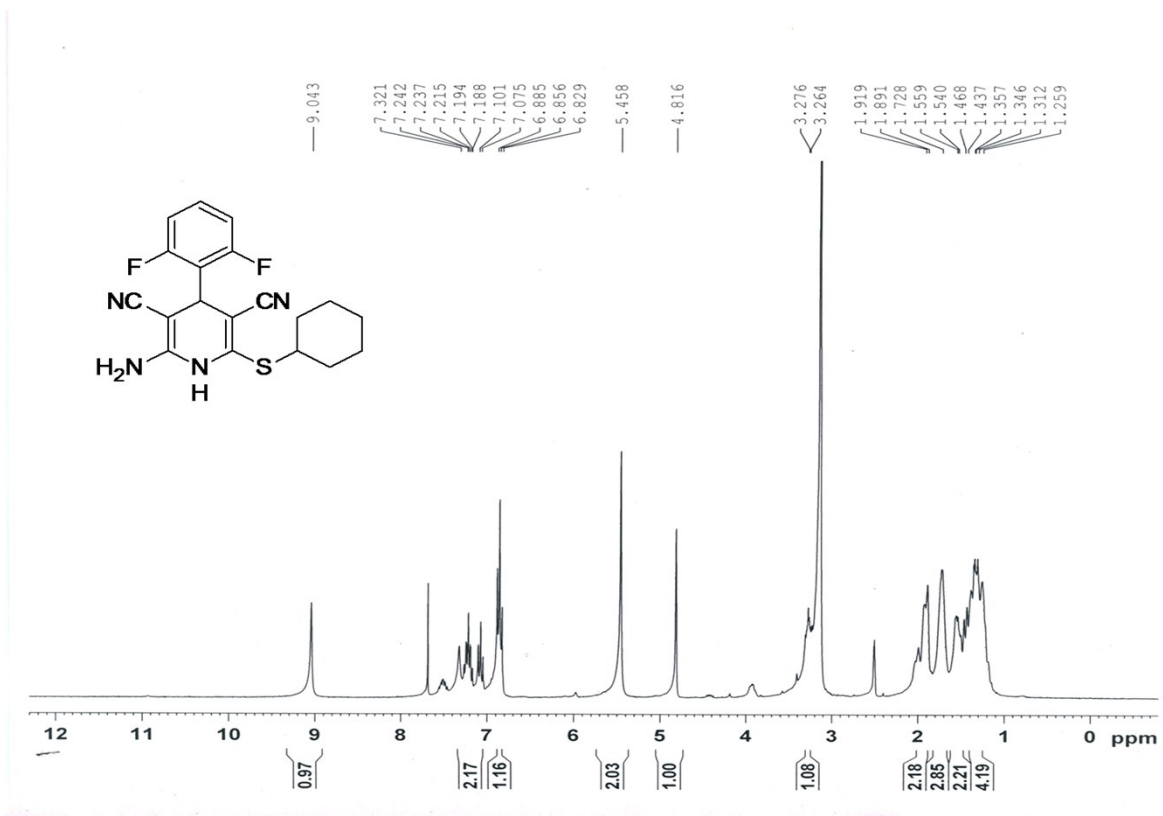
Spectrum 30. ^{13}C – NMR of compound 4p



Spectrum 31. ¹H – NMR of compound 4q



Spectrum 32. ¹³C – NMR of compound 4q



Spectrum 33. ¹H – NMR of compound 4r