

Supporting Information

CuI Nanoparticles supported on novel polymer-layered double hydroxides nanocomposite an efficient heterogeneous nanocatalyst for the synthesis of *bis-N*-arylsulfonamides

Jamshid Babamoradi, Ramin Ghorbani-Vaghei*, Sedigheh Alavinia

Department of Organic Chemistry, Faculty of Chemistry, Bu-Ali Sina University 65174, Hamedan, Iran
Fax/Tel +98(811)8257407; E-mail: ghorbani@basu.ac.ir

Spectral data of compounds:

*N*¹,*N*³-di-*p*-tolylbenzene-1,3-disulfonamide:

M.p. 282–284 °C, ¹H NMR (250 MHz, DMSO-*d*₆) δ 10.32 (s, 2H), 8.36–7.47 (m, 4H), 6.92 (d, *J* = 18.0 Hz, 8H), 2.15 (s, 6H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 143.74, 138.33, 138.02, 133.41, 131.17, 130.53, 129.23, 128.91, 128.34, 127.91, 124.65, 18.99. MS *m/z*: 416.

*N*¹,*N*³-bis(4-methoxyphenyl)benzene-1,3-disulfonamide:

M.p. 269–270 °C, ¹H NMR (250 MHz, DMSO-*d*₆) δ 10.12 (s, 1H), 8.07 (s, 1H), 7.81 (d, *J* = 7.8 Hz, 1H), 7.65 (t, *J* = 7.9 Hz, 1H), 6.87 (d, *J* = 8.5 Hz, 2H), 6.75 (d, *J* = 8.7 Hz, 2H), 3.72 (s, 3H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 157.33, 140.86, 131.08, 130.89, 129.71, 125.50, 124.46, 114.80, 55.58. MS *m/z*: 448.

*N*¹,*N*³-bis(2,3-dimethoxyphenyl)benzene-1,3-disulfonamide:

M.p. 279–281 °C, ¹H NMR (250 MHz, DMSO-*d*₆) δ 9.57 (s, 1H), 8.90 (d, *J* = 5.4 Hz, 1H), 8.20 – 7.83 (m, 1H), 7.70 (dd, *J* = 7.8 Hz, 1H), 7.02 (d, *J* = 8.4 Hz, 1H), 6.68–6.15 (m, 2H), 3.68 (s, 4H), 3.26 (s, 3H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 159.70, 155.32, 145.96, 142.70, 142.06, 130.65, 129.65, 127.49, 125.43, 117.35, 105.15, 99.29, 55.76, 55.52. MS *m/z*: 508.

*N*¹,*N*³-di(naphthalen-1-yl)benzene-1,3-disulfonamide:

M.p. 276–277 °C, ¹H NMR (250 MHz, DMSO-*d*₆) δ 10.55 (s, 1H), 8.92 (d, *J* = 5.6 Hz, 1H), 8.12 (d, *J* = 9.8 Hz, 2H), 7.99 (d, *J* = 8.4 Hz, 3H), 7.84 (dt, *J* = 23.4, 8.7 Hz, 6H), 7.73 – 7.17 (m, 11H), 6.97 (d, *J* = 7.4 Hz, 1H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 146.46, 142.31, 141.56, 134.36, 134.16, 132.24, 131.15, 130.91, 130.10, 129.65, 128.76, 128.43, 127.92, 127.64, 127.40, 127.23, 126.86, 126.75, 126.63, 126.02, 125.85, 125.45, 124.05, 123.55, 122.62, 120.35. MS *m/z*: 488.

***N*¹,*N*³-bis(3-bromophenyl)benzene-1,3-disulfonamide:**

M.p. 240–242 °C; ¹H NMR (250 MHz, DMSO-*d*₆) δ 10.79 (s, 1H), 8.19 (s, 1H), 7.97 (d, *J* = 8.2 Hz, 1H), 7.75 (t, *J* = 7.9 Hz, 1H), 7.17 (d, *J* = 17.1 Hz, 3H), 7.01 (d, *J* = 8.0 Hz, 1H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 147.34, 140.72, 139.04, 132.34, 131.63, 131.43, 131.12, 128.35, 127.78, 125.37, 123.45, 123.11, 122.35, 119.24, 118.68, 116.68, 113.46. MS *m/z*: 546.

***N*¹,*N*³-bis(4-bromophenyl)benzene-1,3-disulfonamide:**

M.p. 330–332 °C; ¹H NMR (250 MHz, DMSO-*d*₆) δ 10.67 (s, 2H), 8.14 (s, 1H), 7.88 (s, 3H), 7.54 – 7.10 (m, 4H), 6.96 (s, 4H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 146.33, 140.63, 136.80, 132.57, 131.94, 131.40, 128.25, 125.47, 122.72, 117.47, 117.31. MS *m/z*: 546.

***N*¹,*N*³-bis(2,3-dimethylphenyl)benzene-1,3-disulfonamide:**

M.p. 298–300 °C; ¹H NMR (250 MHz, DMSO-*d*₆) δ 9.84 (s, 1H), 8.00 (s, 1H), 7.83 (s, 1H), 7.71 (t, *J* = 7.6 Hz, 1H), 7.00 (s, 1H), 6.93 (d, *J* = 7.1 Hz, 1H), 6.59 (s, 1H), 2.14 (s, 3H), 1.92 (s, 3H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 142.07, 138.77, 138.27, 134.45, 131.69, 130.95, 130.85, 129.42, 128.93, 128.08, 126.70, 125.95, 125.33, 125.22, 121.03, 20.52, 20.23, 14.55, 13.85. MS *m/z*: 444.

***N*¹,*N*³-di-*o*-tolylbenzene-1,3-disulfonamide:**

M.p. 300–302 °C; ¹H NMR (250 MHz, DMSO-*d*₆) δ 9.90 (s, 2H), 8.2 – 7.62 (m, 4H), 6.99 (d, *J* = 59.4 Hz, 8H), 1.97 (s, 5H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 145.39, 142.21, 134.94, 134.65, 132.22, 131.34, 130.99, 128.07, 127.29, 127.07, 126.87, 126.33, 125.09, 122.25, 18.08. MS *m/z*: 416.

***N*¹,*N*³-bis(4-iodophenyl)benzene-1,3-disulfonamide:**

M.p. 302–305 °C; ¹H NMR (250 MHz, DMSO-*d*₆) δ 10.67 (s, 1H), 8.20 (s, 1H), 7.92 (d, *J* = 7.4 Hz, 1H), 7.72 (d, *J* = 7.4 Hz, 1H), 7.53 (d, *J* = 8.3 Hz, 2H), 6.82 (d, *J* = 8.3 Hz, 2H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 144.76, 143.87, 143.64, 140.66, 138.41, 137.98, 137.31, 131.48, 131.40, 126.67, 125.51, 122.82, 119.71, 89.38.

***N*¹,*N*³-di(pyridin-2-yl)benzene-1,3-disulfonamide:**

M.p. 290–292 °C; ¹H NMR (250 MHz, DMSO-*d*₆) δ 13.59 (s, 2H), 8.92 (s, 5H), 8.56 (s, 3H), 8.08 (t, *J* = 49.6 Hz, 6H), 7.70 (s, 1H), 7.15 (d, *J* = 8.3 Hz, 2H), 6.81 (s, 1H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 154.20, 146.78, 144.33, 143.82, 142.27, 142.01, 141.21, 135.90, 130.45, 129.77, 129.17, 127.78, 127.04, 124.56, 123.93, 115.05, 114.76, 113.89, 112.47. MS *m/z*: 390.

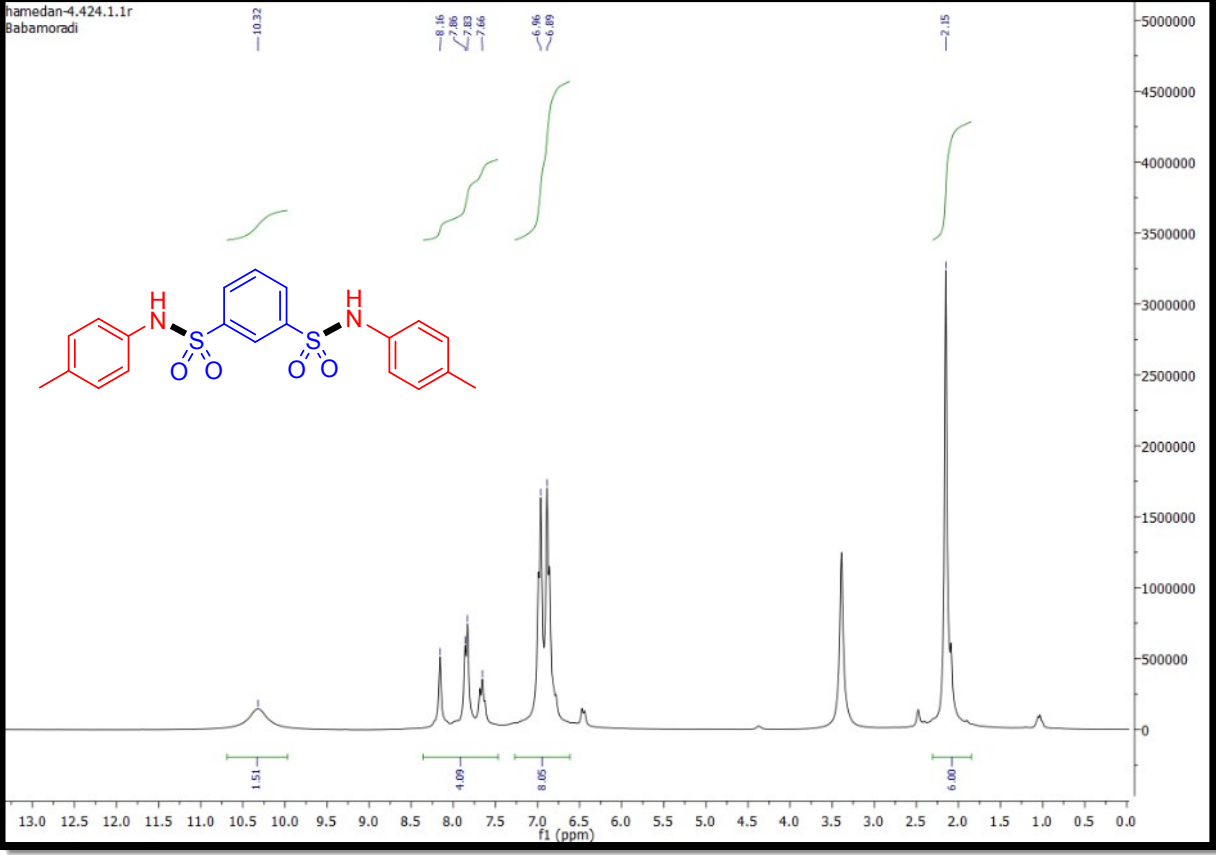
***N*¹,*N*³-bis(4-fluorophenyl)benzene-1,3-disulfonamide:**

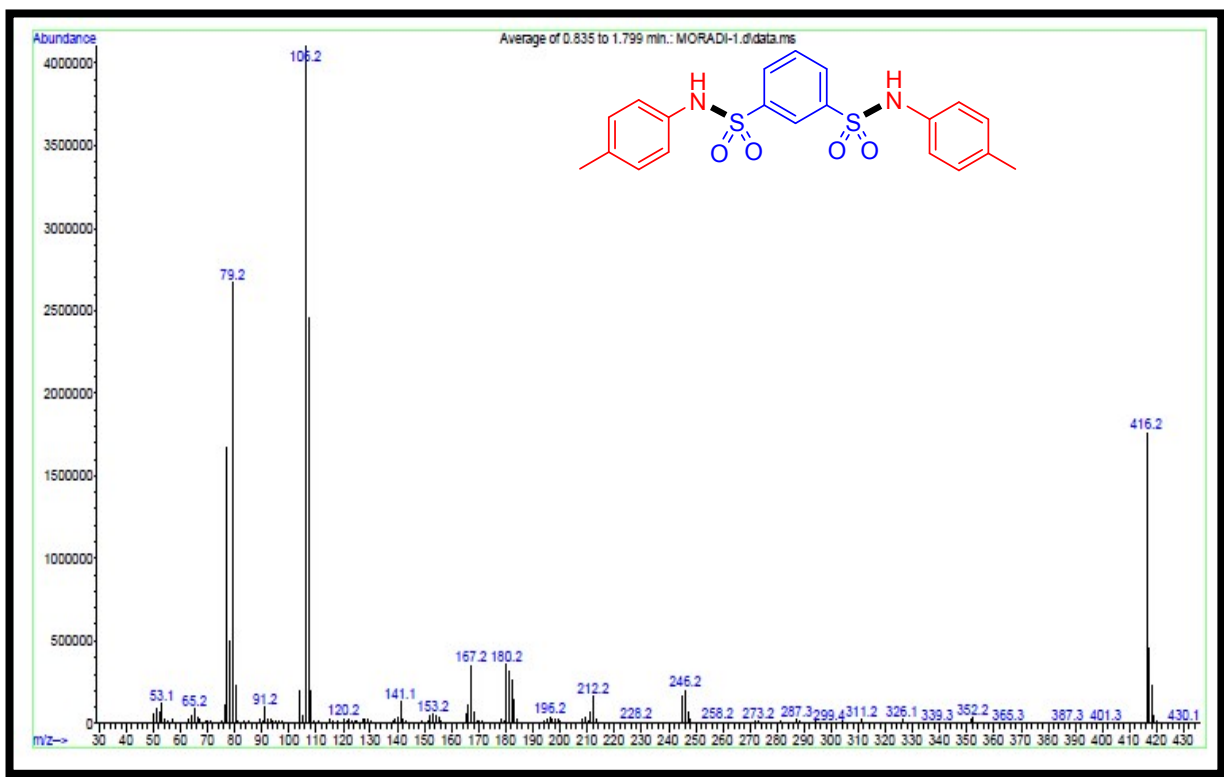
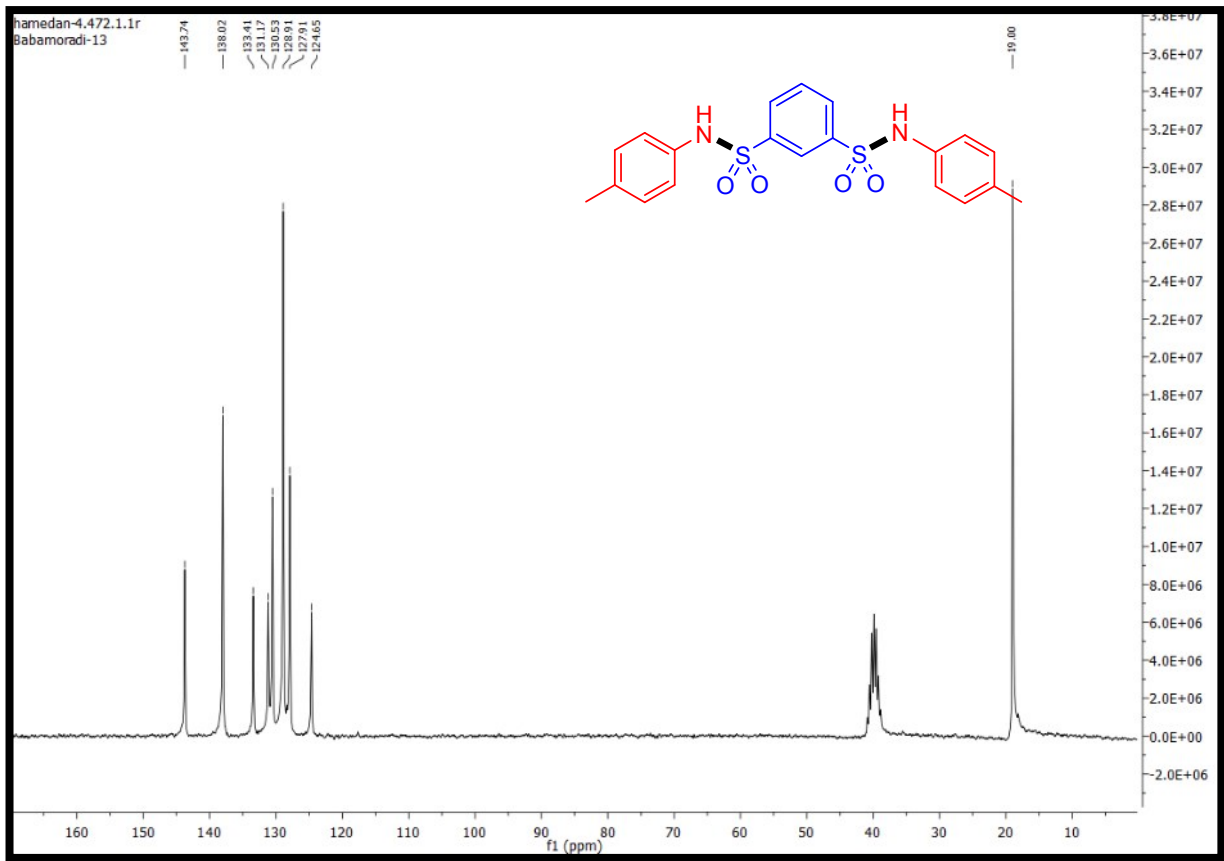
M.p. 326–328 °C; ¹H NMR (250 MHz, DMSO-*d*₆) δ 10.43 (s, 2H), 8.08 (s, 2H), 7.99–7.72 (m, 2H), 7.70 (s, 2H), 7.00 (s, 8H). ¹³C NMR (63 MHz, DMSO-*d*₆) δ 159.85 (d, *J* = 242), 140.62, 133.48, 131.20 (d, *J* = 7.0), 128.17, 125.47, 123.90 (d, *J* = 8.19 Hz), 116.35 (d, *J* = 22.68 Hz), MS *m/z*: 424.

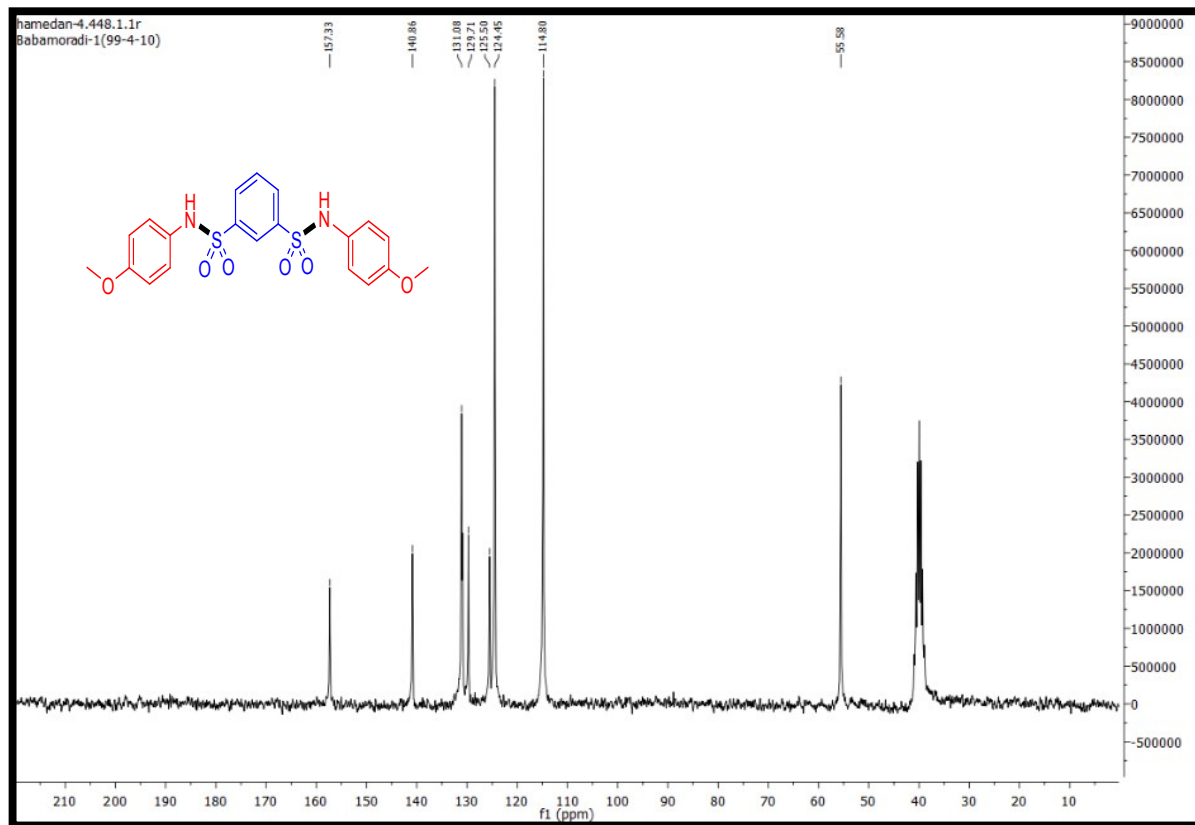
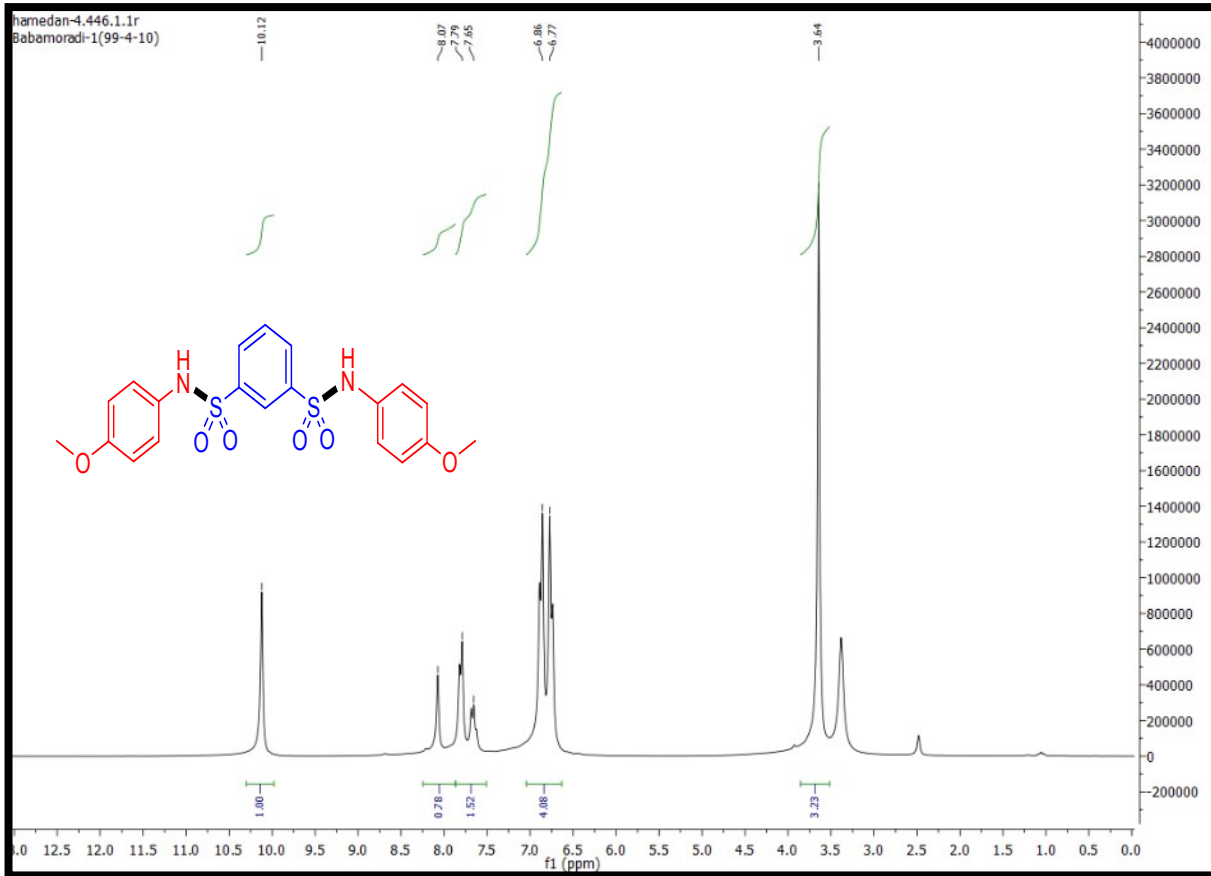
***N*¹,*N*³-bis(2,6-dimethylphenyl)benzene-1,3-disulfonamide:**

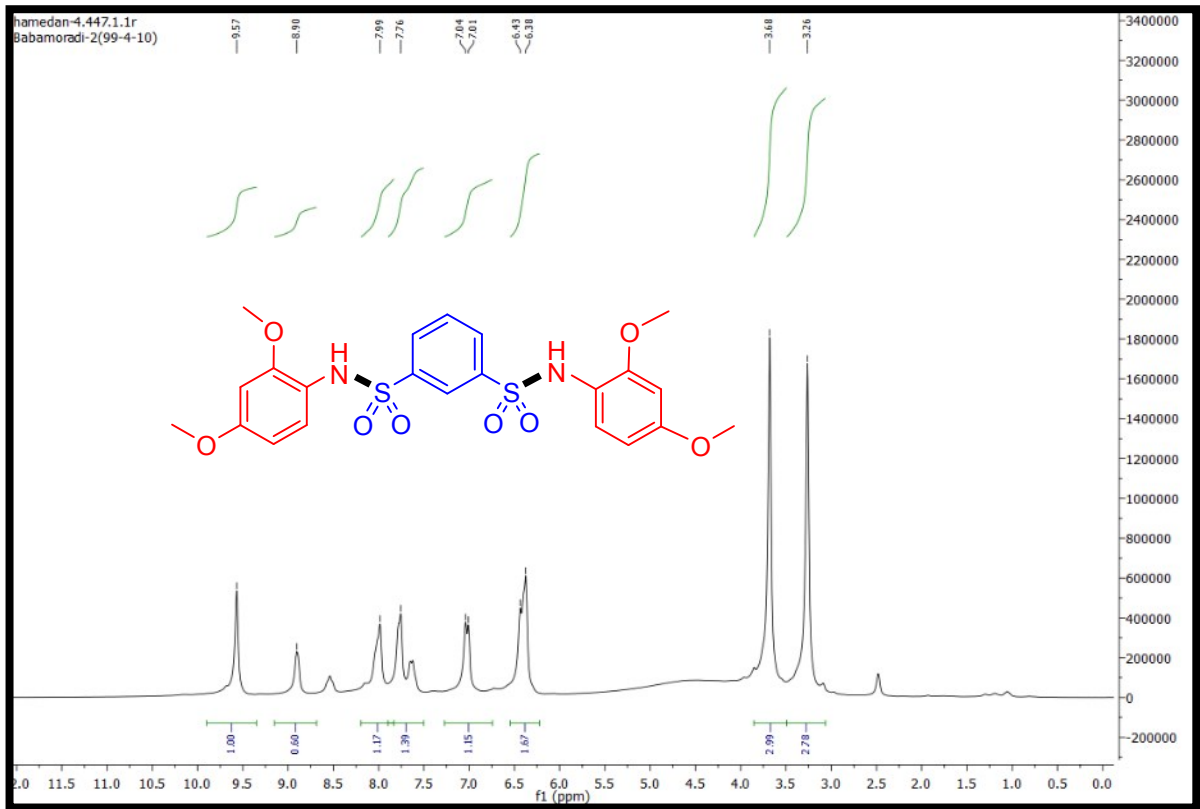
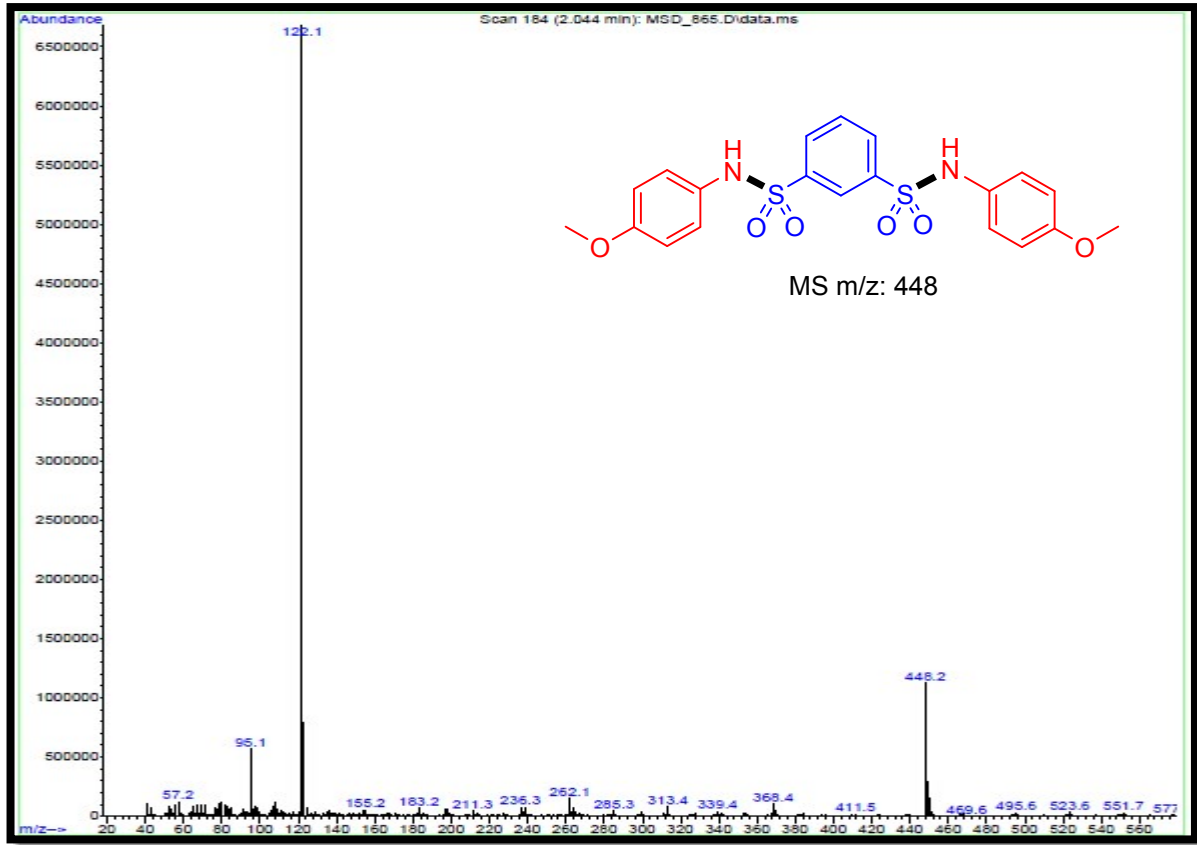
307–308 °C; ¹³C NMR (63 MHz, DMSO-*d*₆) δ 142.18, 136.67, 135.01, 131.88, 130.93, 128.02, 127.35, 125.05, 40.59, 40.26, 39.92, 39.59, 39.26, 20.84, 17.96. MS *m/z*: 444.

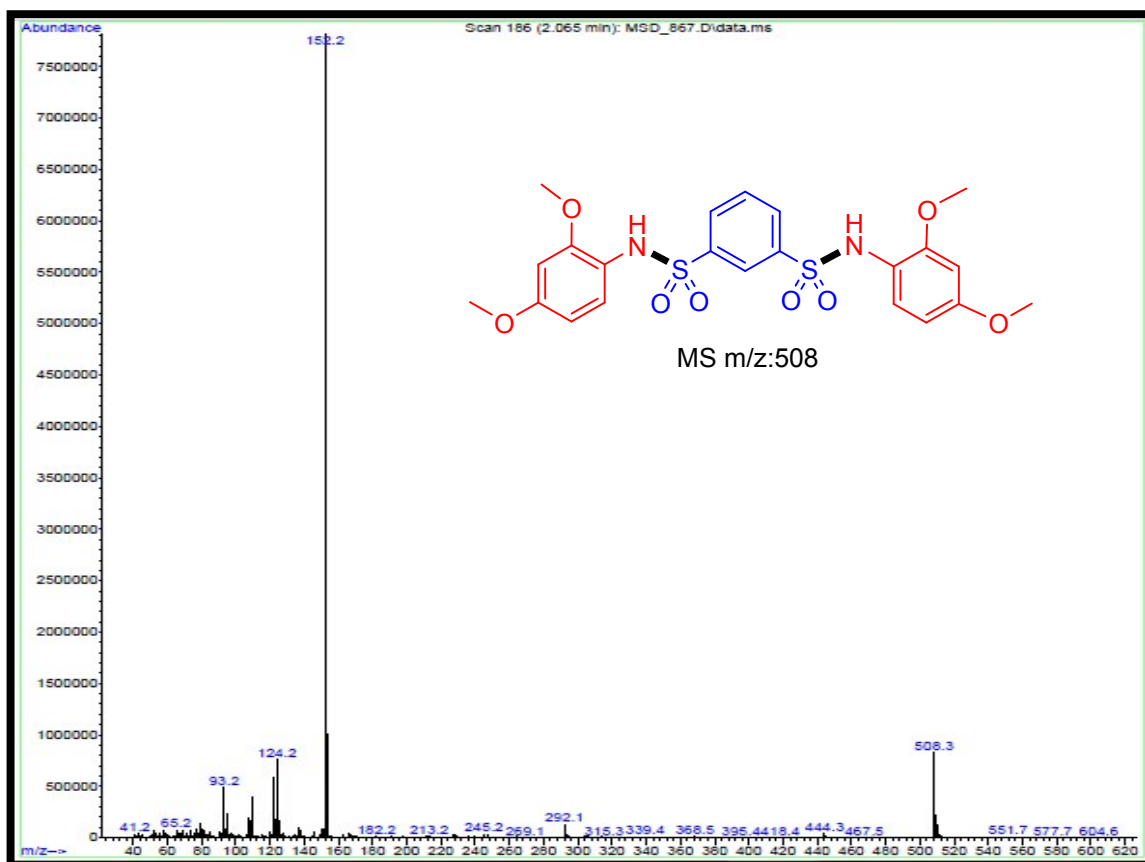
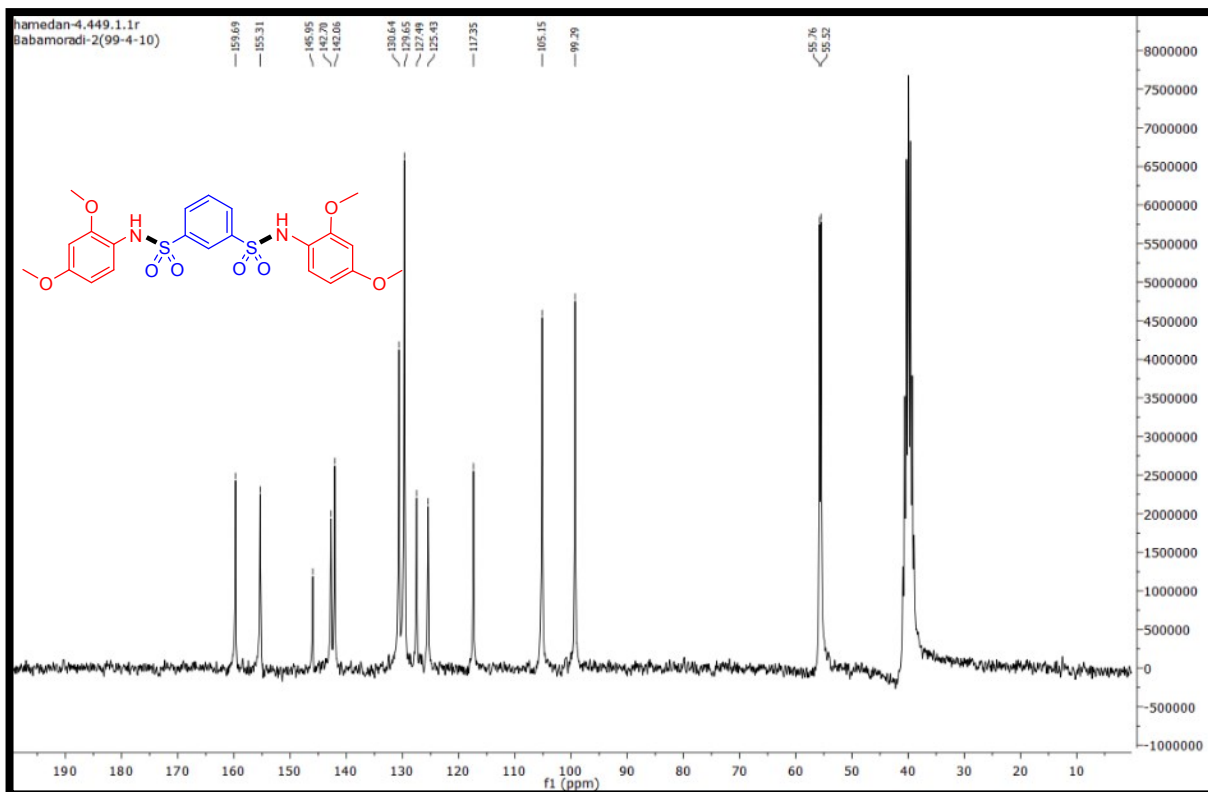
hamedan-4.424.1.1r
Babamoradi

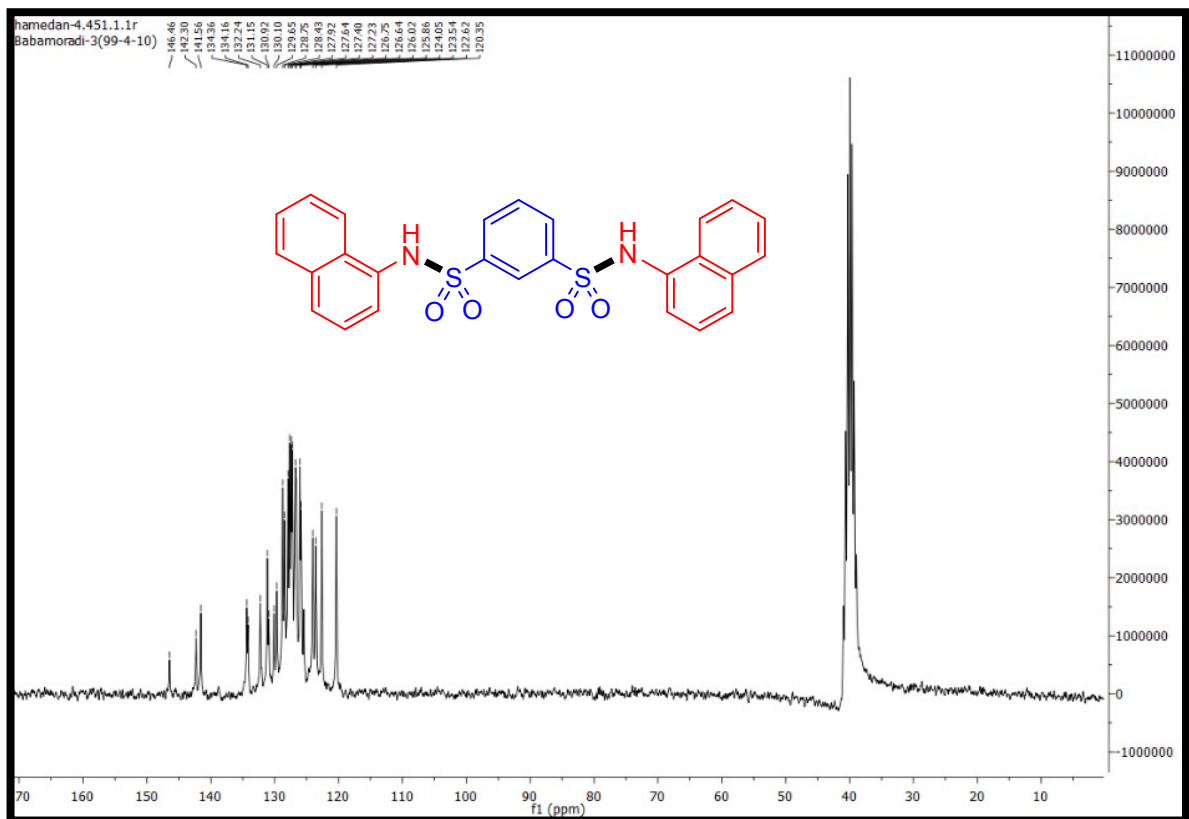
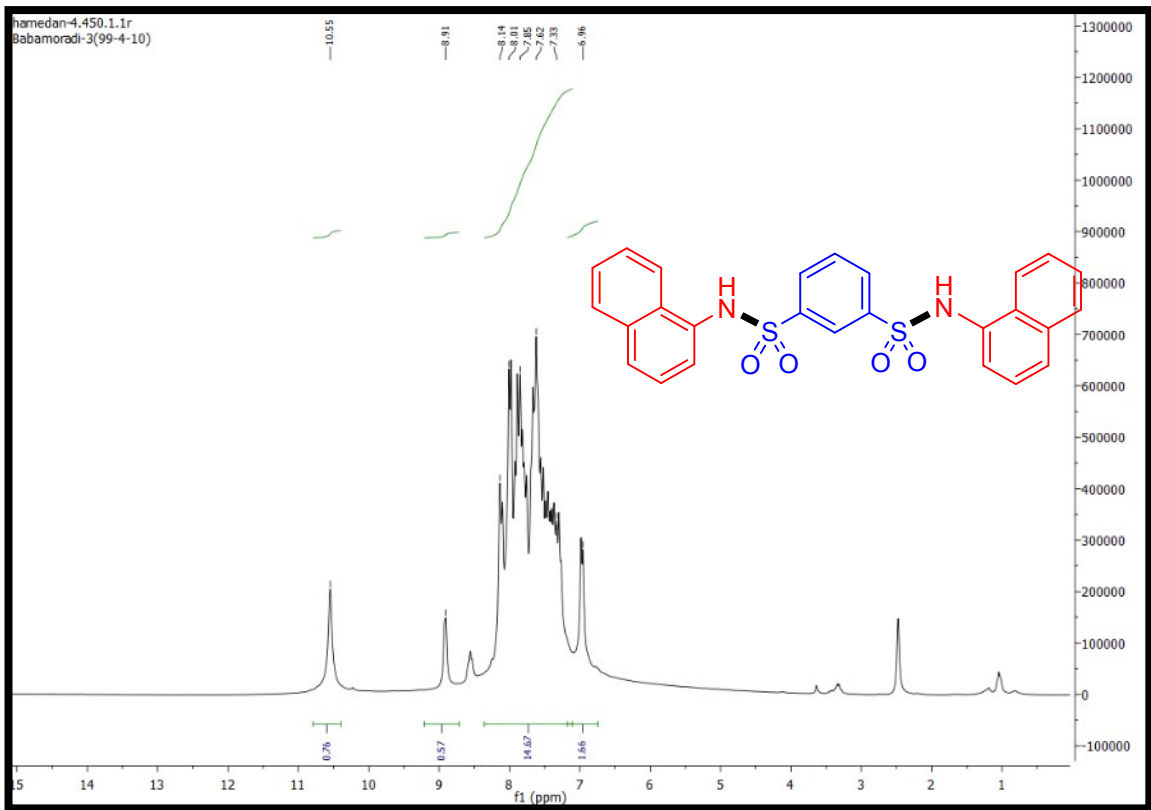


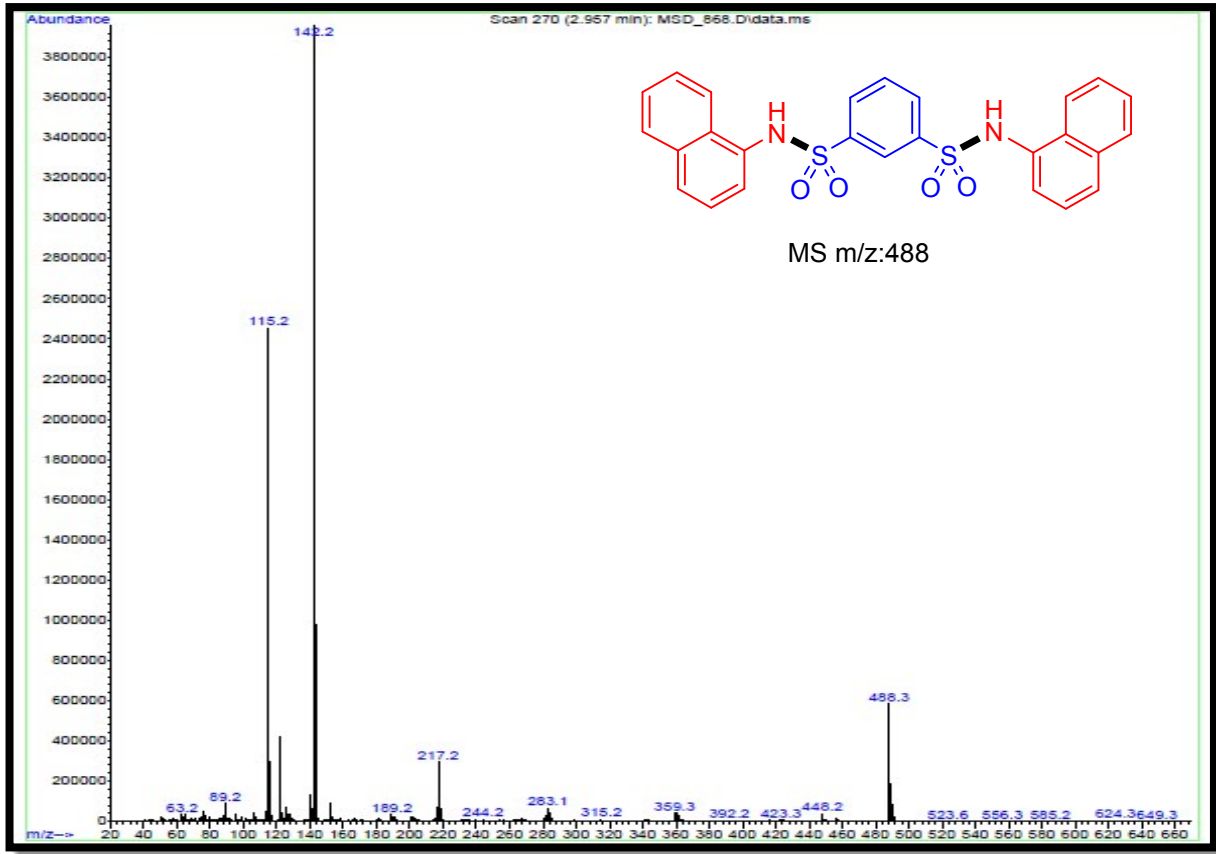


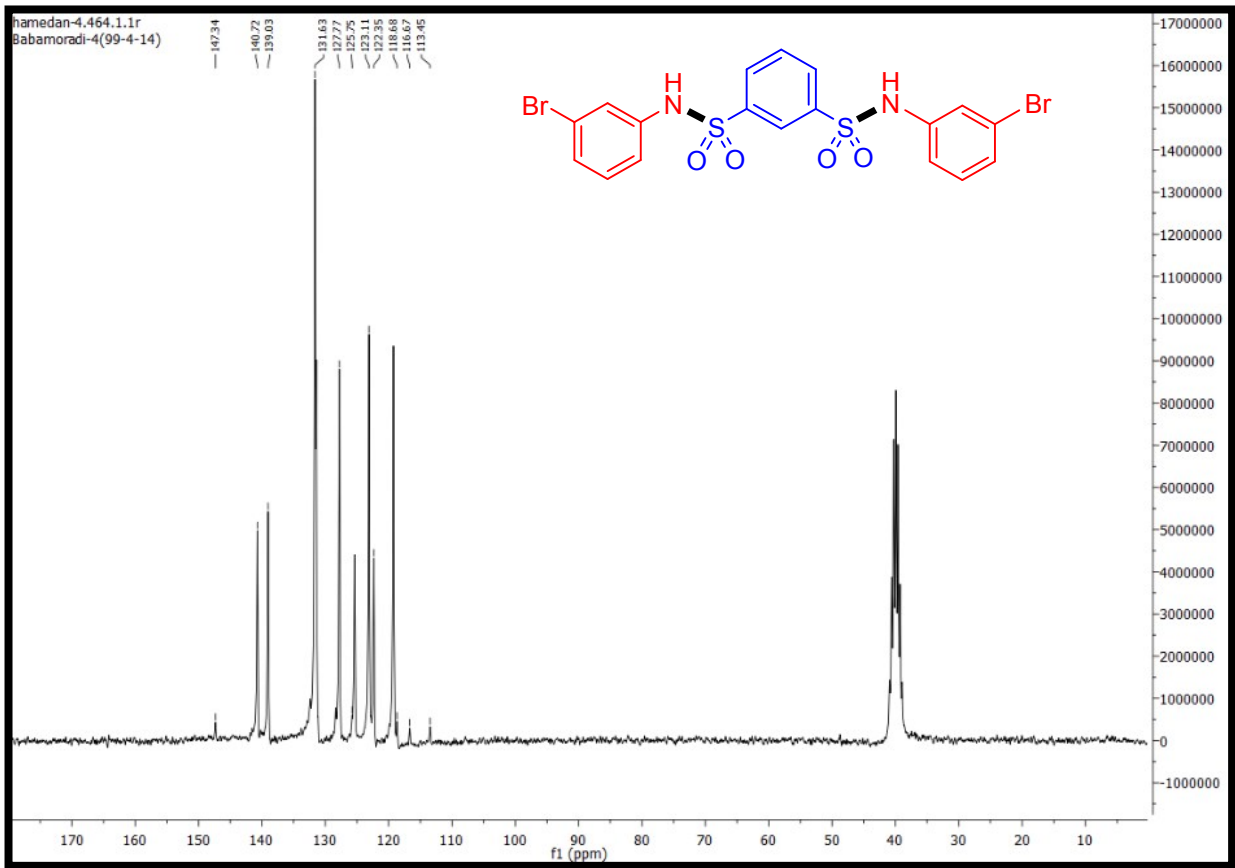
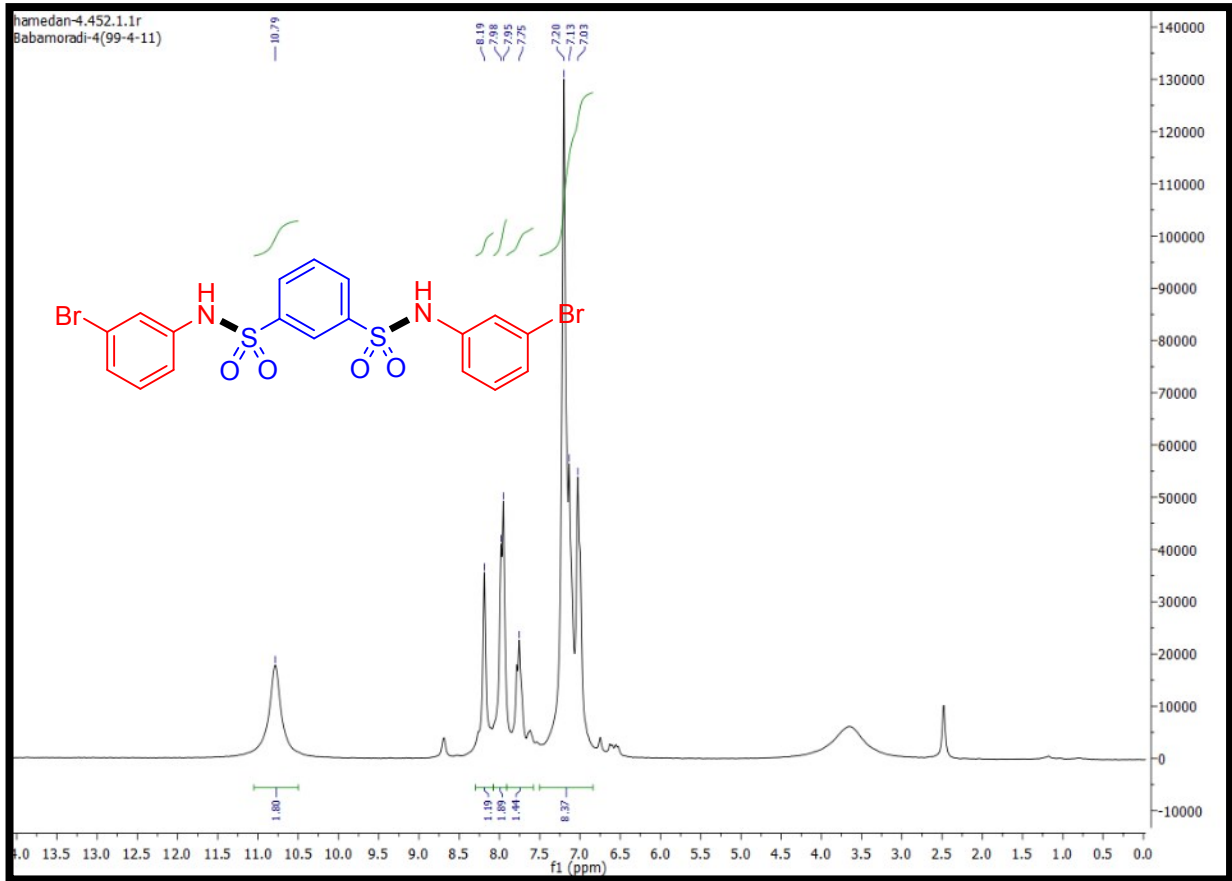


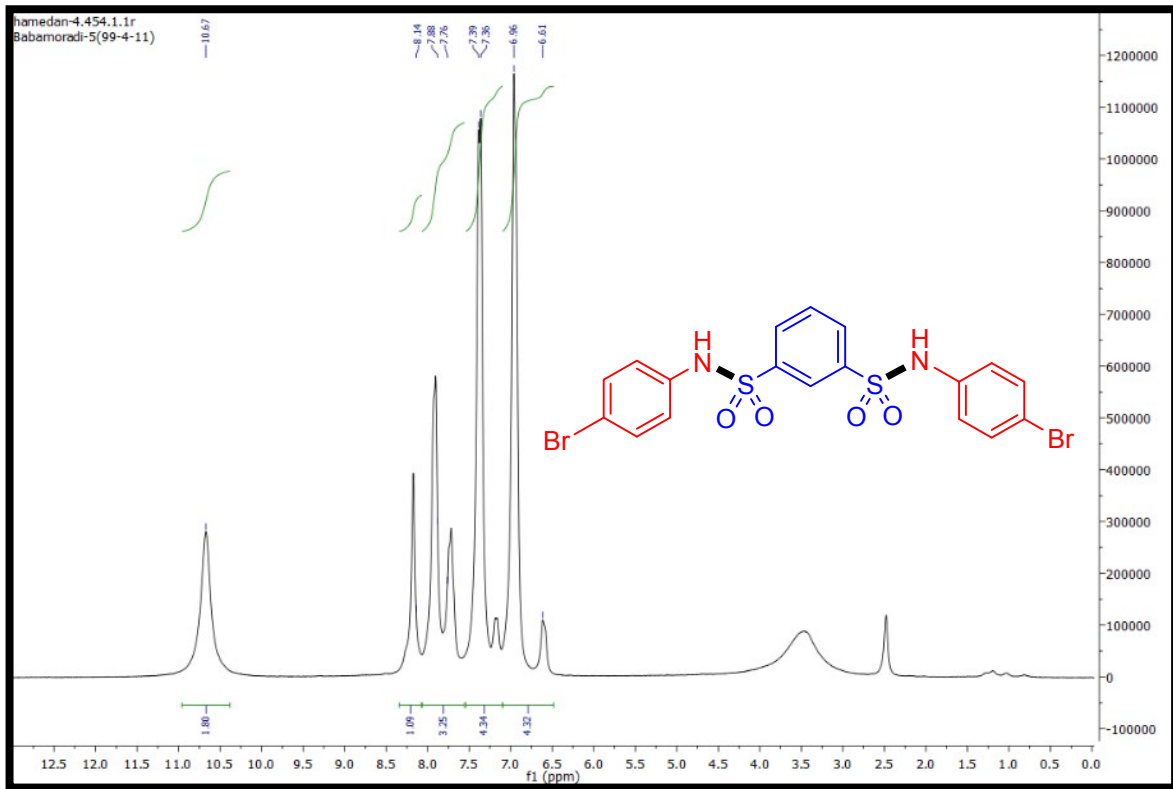
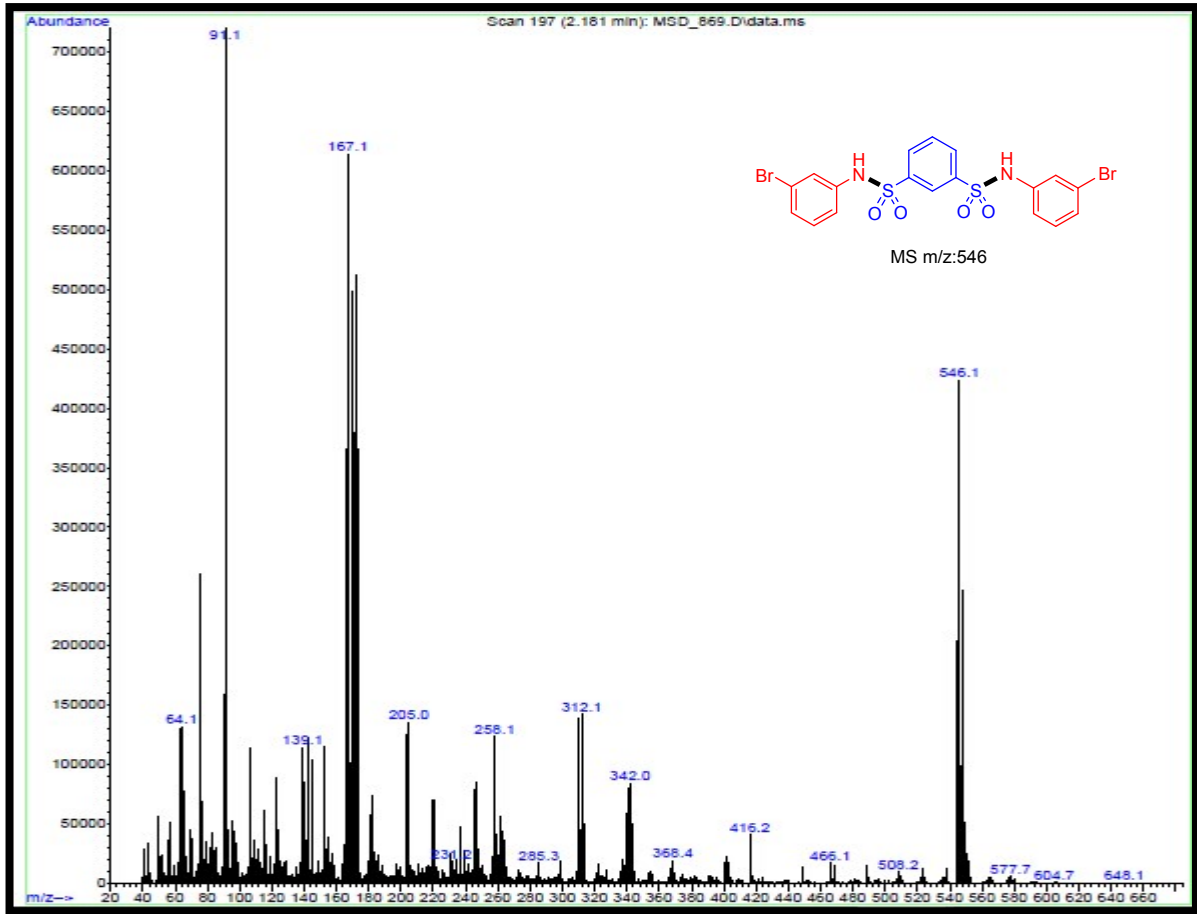


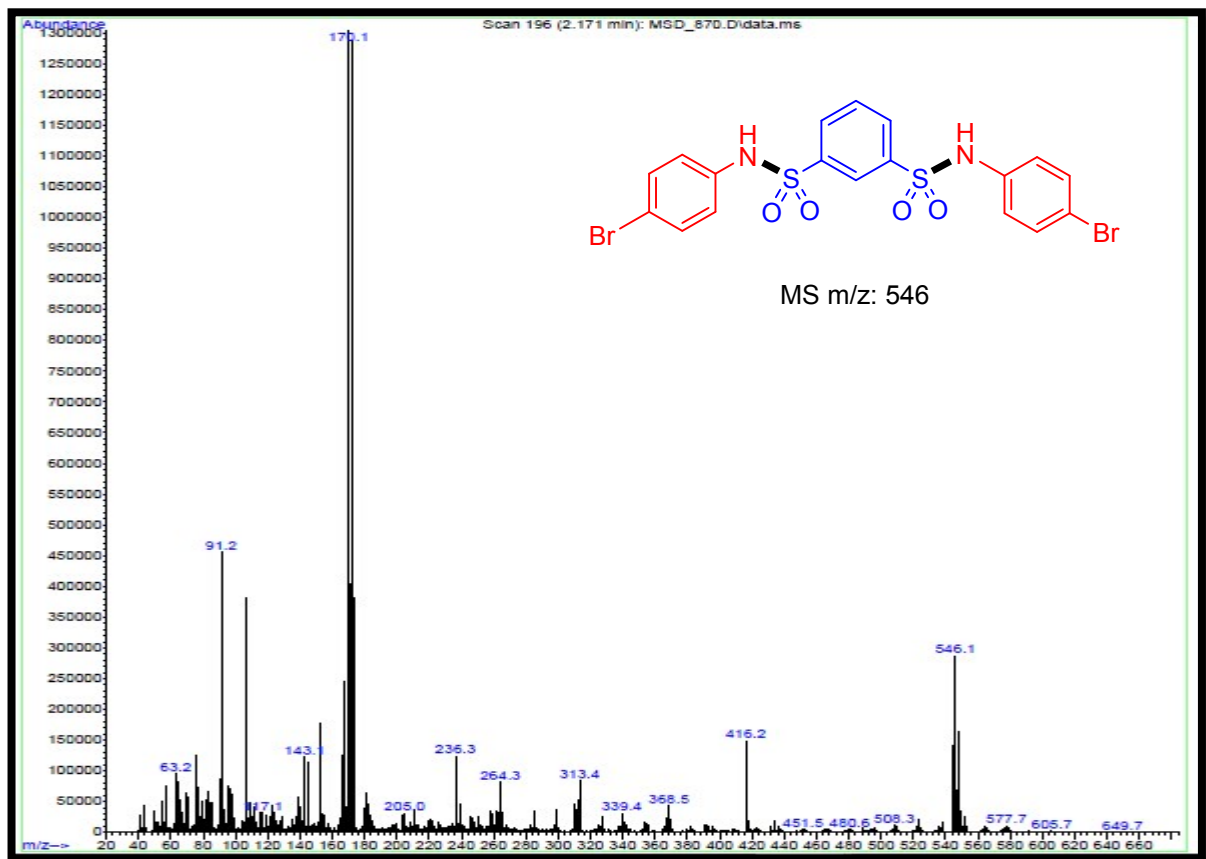
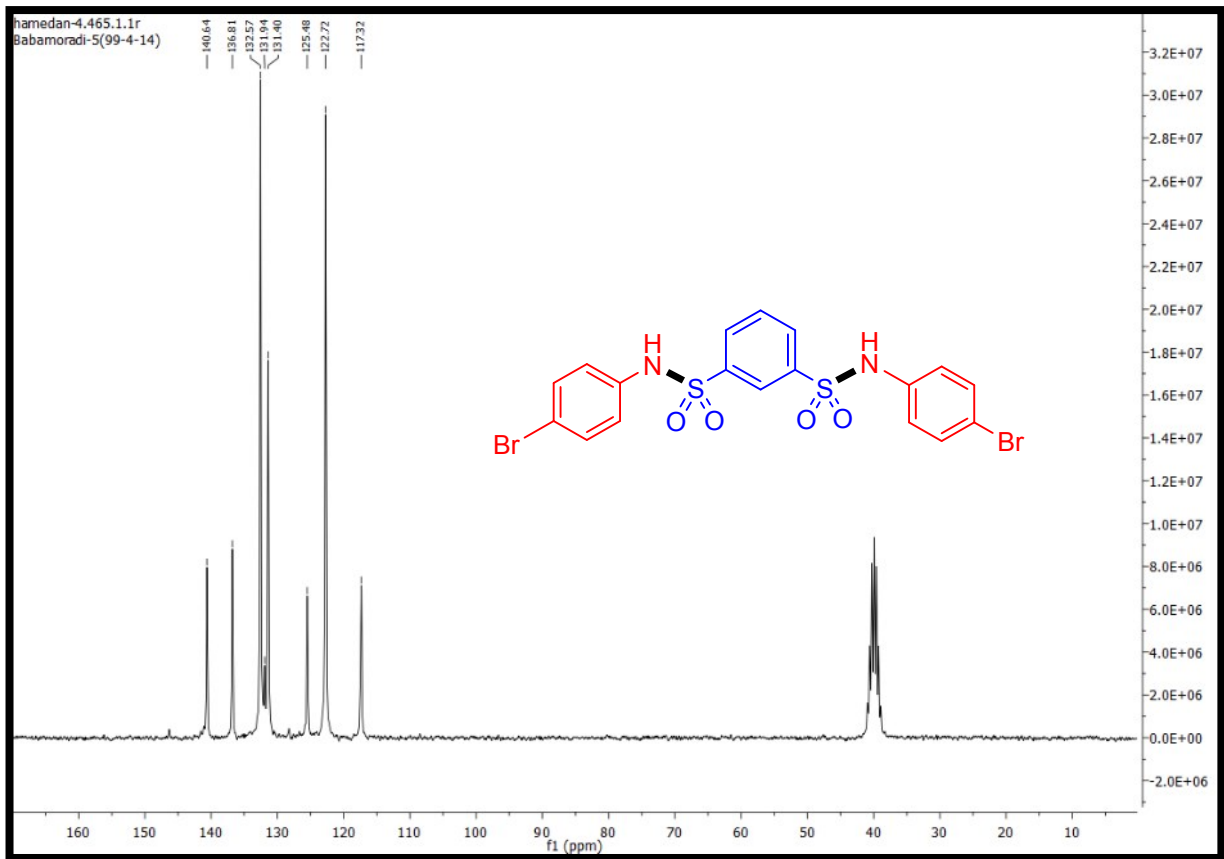


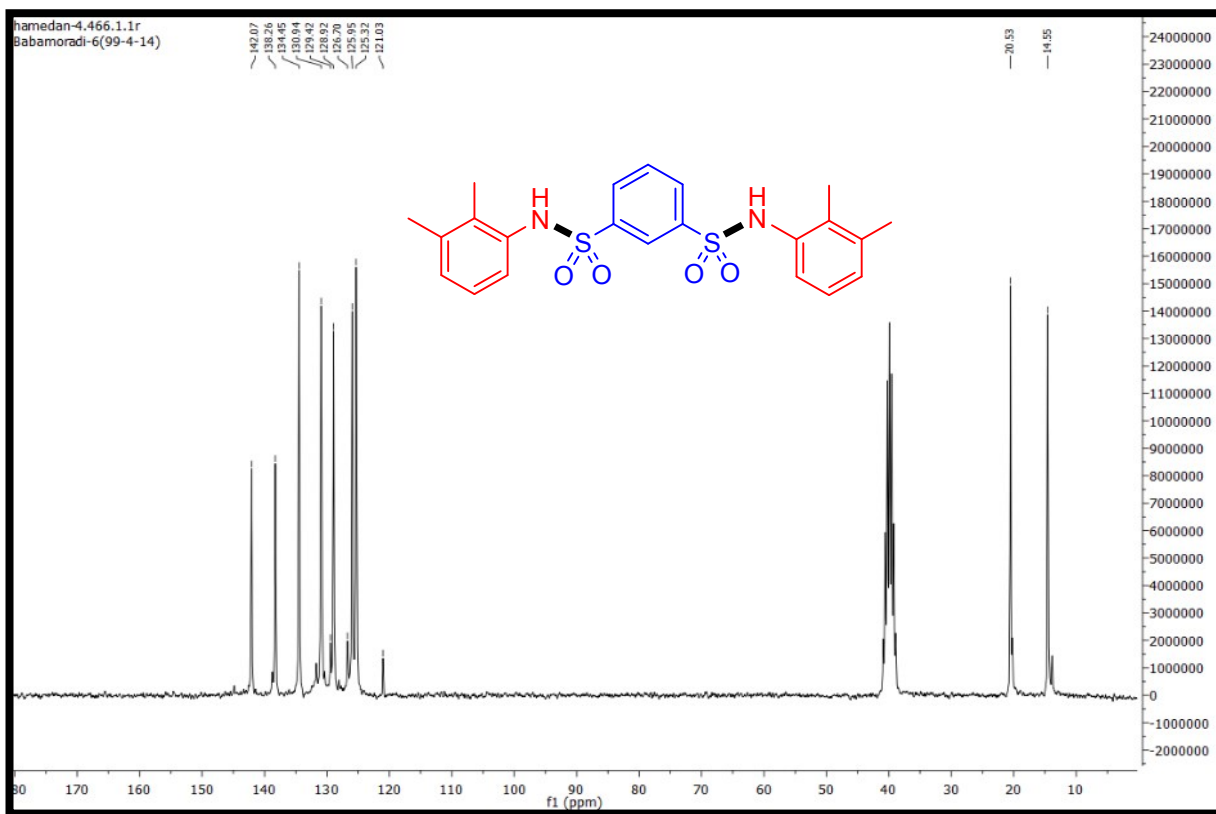
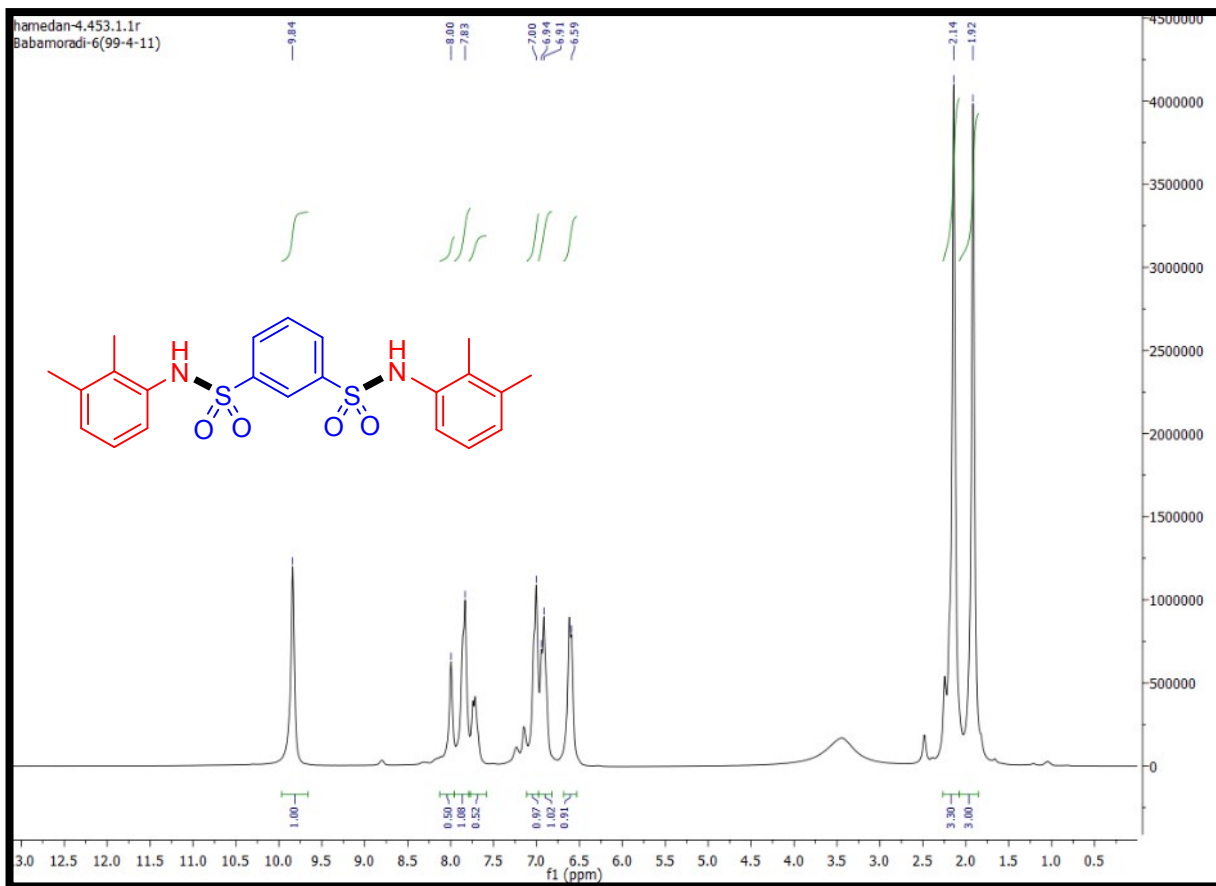


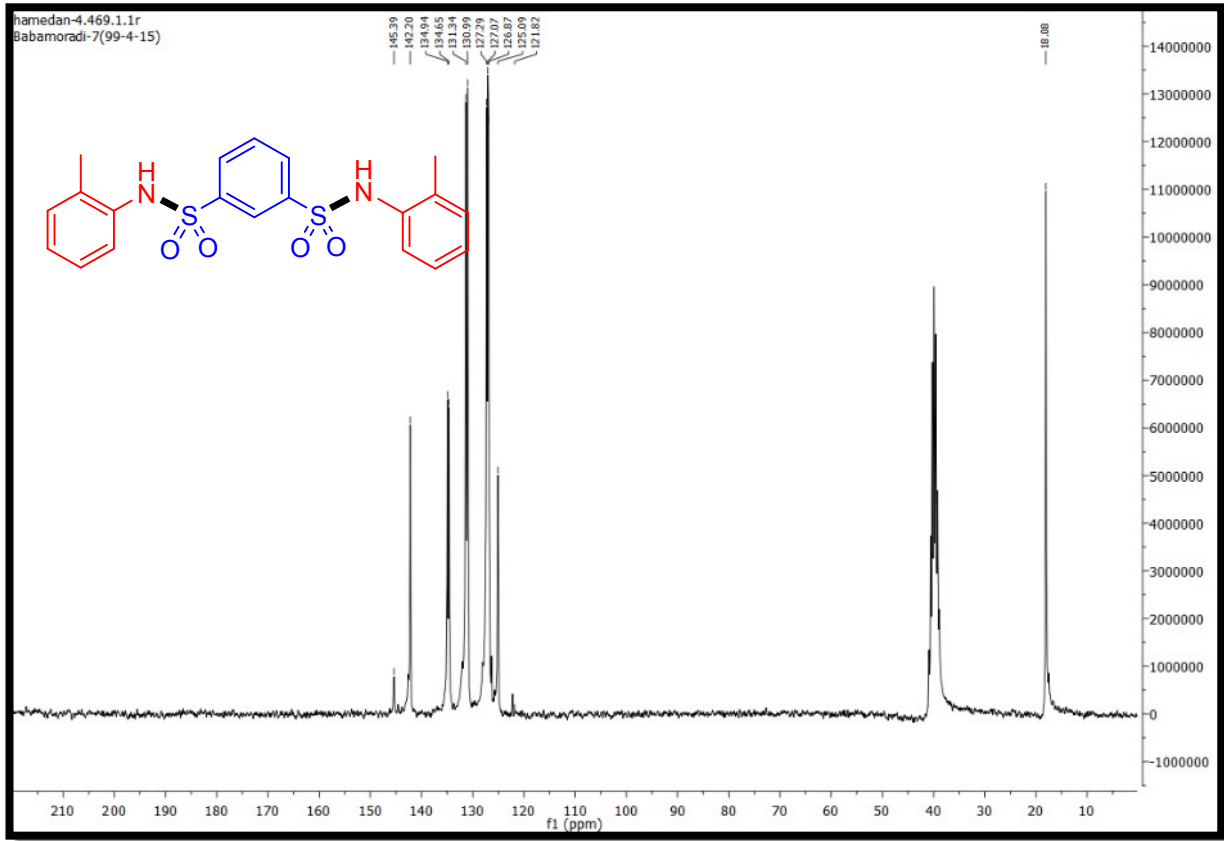
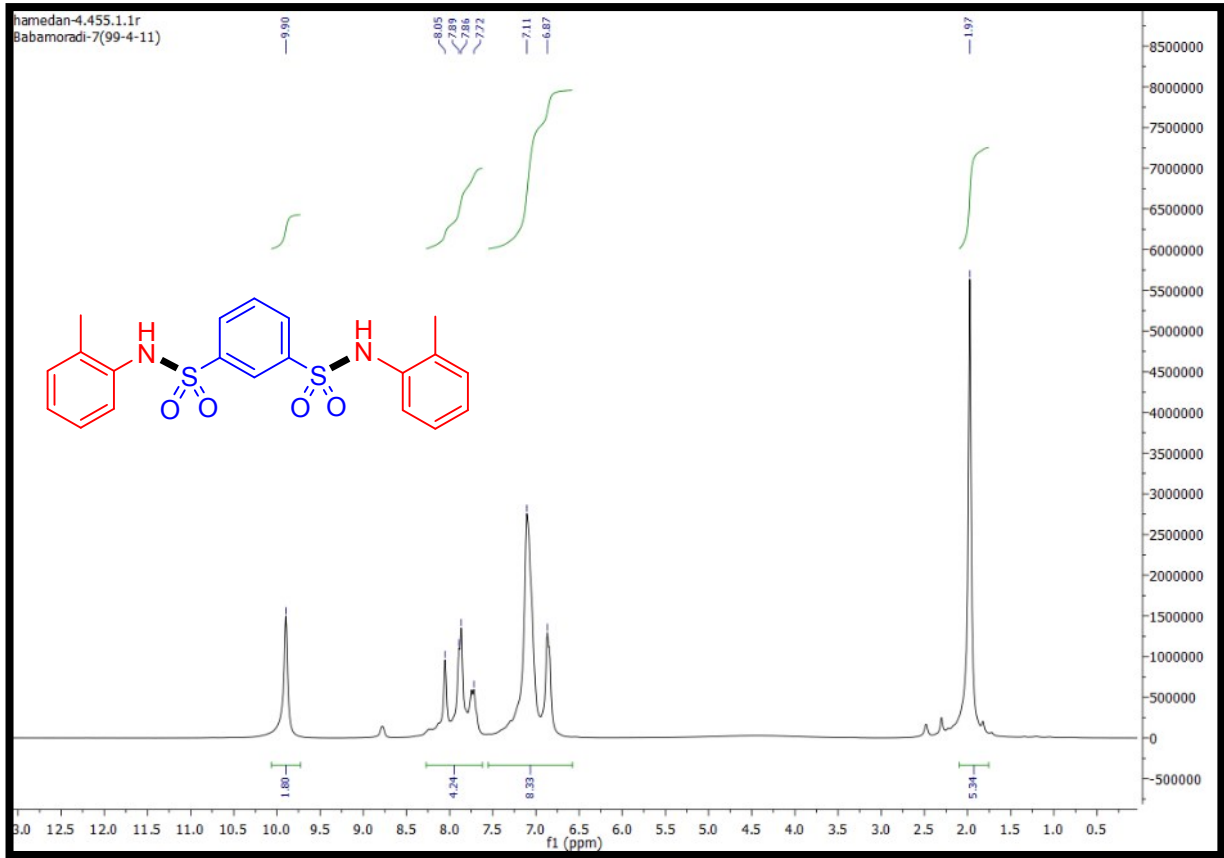


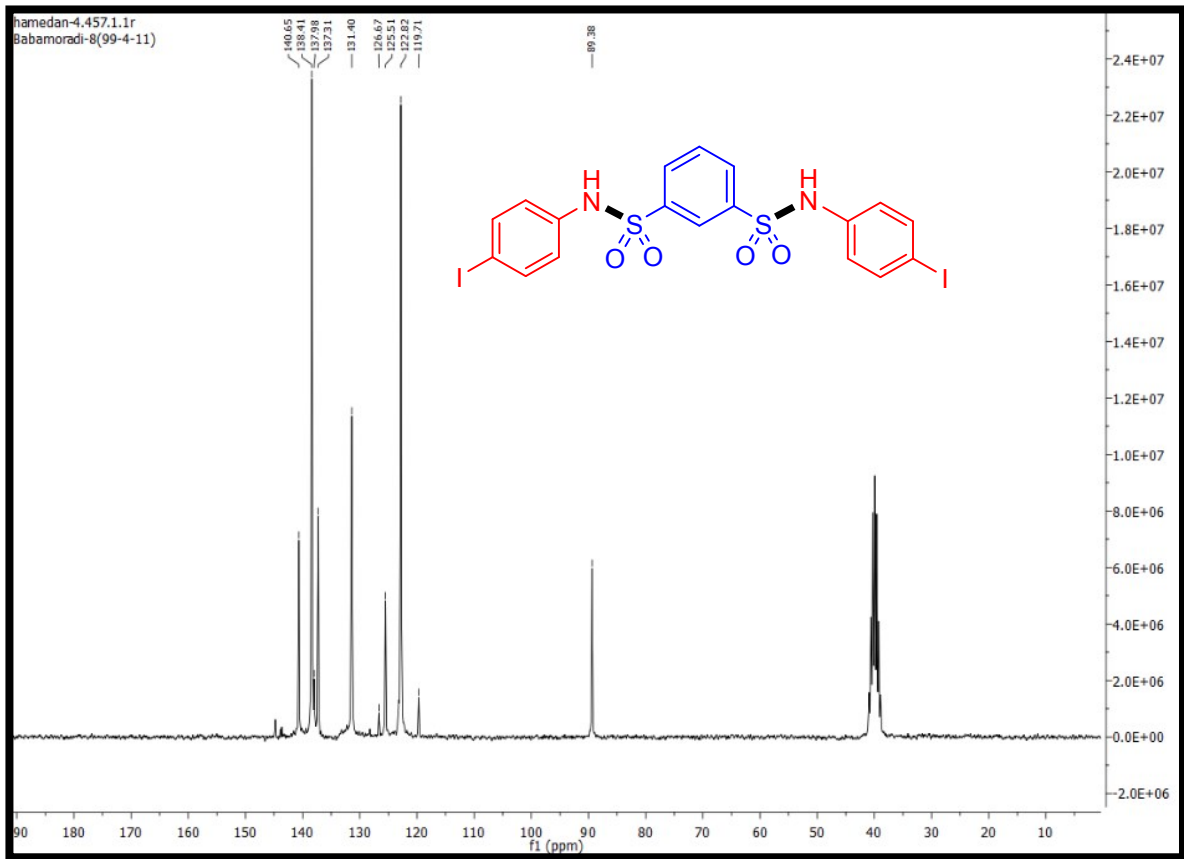
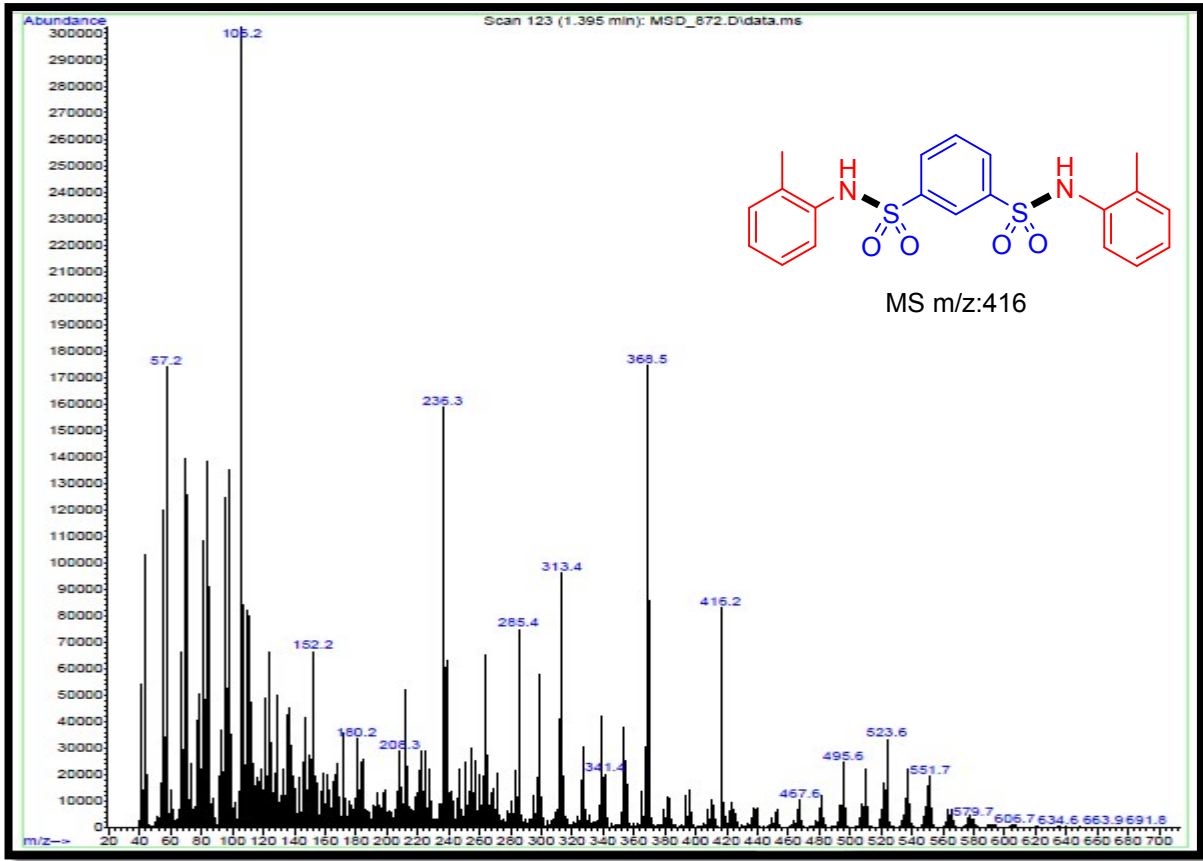




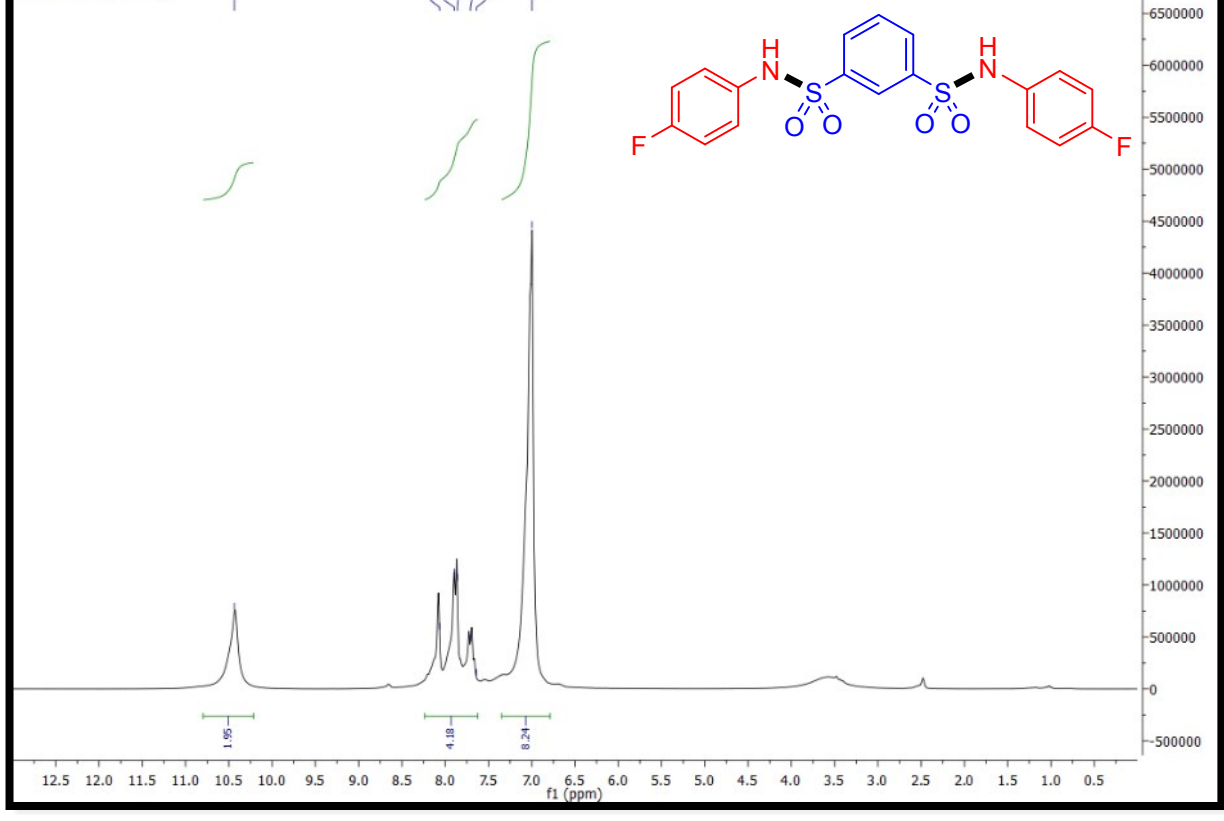


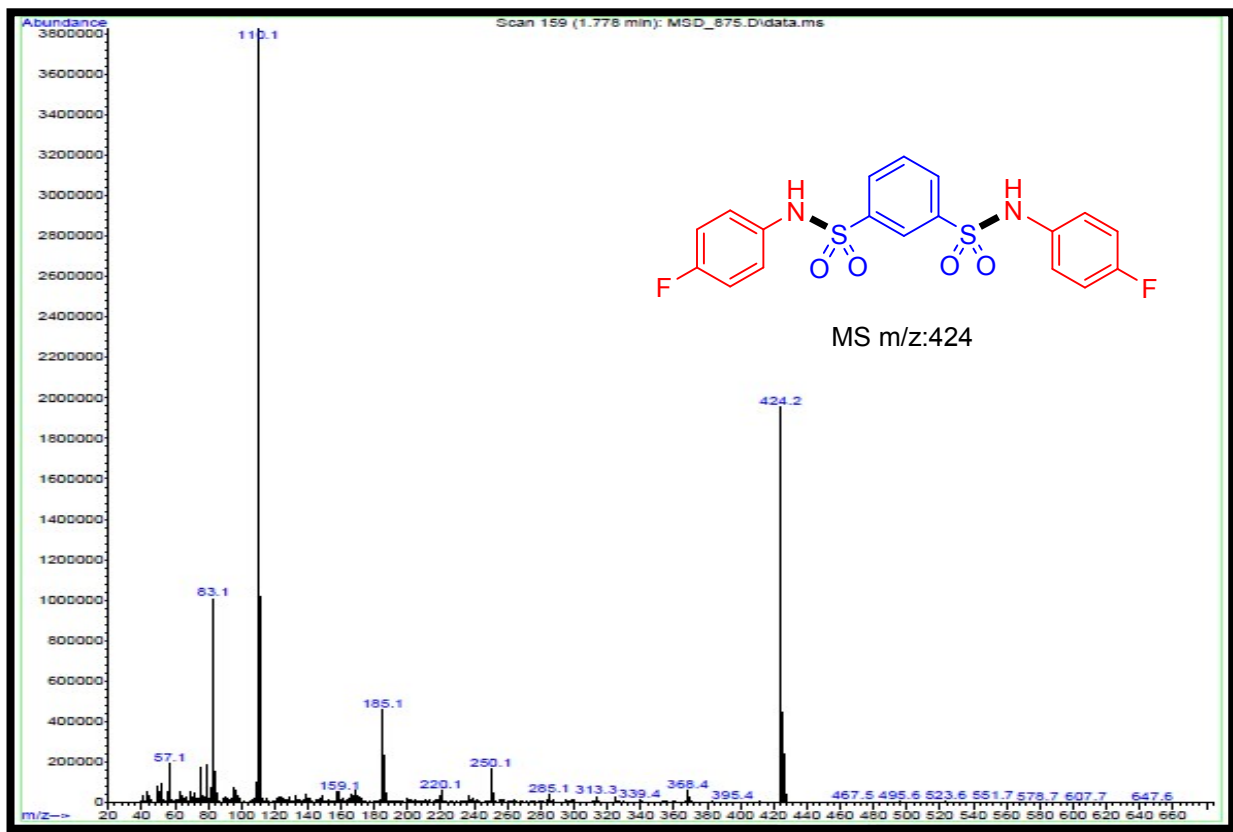
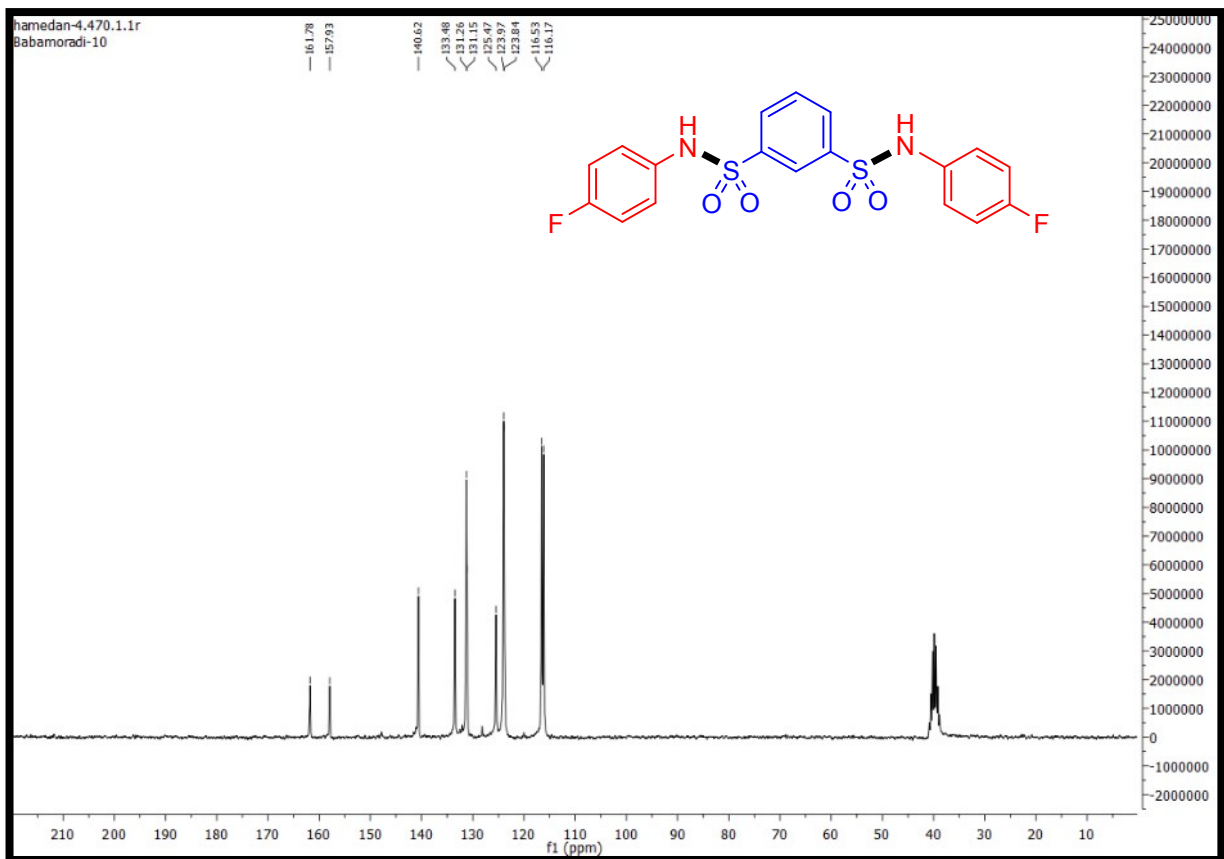






hamedan-4.459.1.1r
Babamoradi-10(99-4-11)





hamedan-4.478.1.1r
Babamoradi-12(99-4-25)

141.79
137.07
135.02
131.90
131.39
131.00
127.37
125.05

30.67
17.77

