

Supplementary Information

Copper Fluorapatite assisted synthesis of new 1,2,3-triazoles bearing benzothiazolyl moiety and their antibacterial and anticancer activities

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General

All reagents and solvents were obtained from commercial suppliers and used without further purification. The Copper fluorapatite were prepared according to reported procedures⁵³ and prepared catalyst was tested by one example with standard reaction condition of published paper. All the various azides were synthesized from the reported procedures.⁶² Reactions were monitored by thin layer chromatography (TLC) on silica gel plates (GF 254) using UV light to visualize the course of the reactions. ¹H NMR spectra and ¹³C NMR spectra were respectively recorded at 300 MHz and 100 MHz spectrometer using CDCl₃ and DMSO-d₆ as solvent at room temperature. Chemical shifts (δ) are reported in ppm with TMS as internal standard. Abbreviations for signal couplings are: s, singlet; d, doublet; t, triplet; m, multiplet. Routine monitoring of reaction was performed by TLC using 0.25 mm E. Merck precoated silica gel TLC plates (60 F254).

Experimental

4.1.1 Synthesis of Benzothiazolylphenoxy methyl alkyne (3)

A mixture of 4-(benzo[d]thiazol-2-yl)phenol (**1**) (0.0044 mol, 1 gm) and propargyl bromide (0.0048 mol, 0.52 gm) (**2**) was dissolved in DMF (10 ml) and to this solution K₂CO₃ (0.0088 mol, 1.22 gm) was added. The reaction mass was stirred at room temperature for 2h. The progress of the reaction was monitored by TLC. After 2 h, the reaction mass was poured on ice cold water. The off white solid obtained was filtered, washed with water and crystallized from ethanol.

Yield: 74 %, M.P.: 122-124°C; Off White Solid; IR (KBr) ν cm⁻¹: 3274 (Aromatic C-H stretching), 2127 (C≡C stretching), 1601 (C=C stretching) and 1241(C-O stretching); ¹H NMR (300 MHz, CDCl₃) δ ppm = 2.57 (s, 1H, Alkynyl-CH), 4.77 (s, 2H, OCH₂) and 7.06-8.08 (m, 8H, merged peaks, Ar-H); ¹³C NMR (100 MHz, CDCl₃) δ ppm = 55.78, 75.93, 77.86, 115.17, 121.42, 122.80, 124.78, 126.13, 127.15, 128.97, 134.78, 154.08, 159.62, 167.49; HRMS (ESI) calcd. for C₁₆H₁₁NOS [M+H]⁺: 266.0595; found 266.0630.

4.1.2 General procedure for the synthesis of compounds (5a-t)

Benzothiazolyl phenoxy methyl alkyne (**3**) (0.0004 mol, 0.1 gm) and various azides (**4a-t**) (0.0004 mol, 0.047 gm) were dissolved in DCM (5 ml). To this stirred solution CuFAP (50 mg) and triethyl amine (0.0004 mol, 0.056 ml) were added and stirring was continued at rt. The progress of the reaction was monitored by TLC. After stirring for 1h, reaction mixture

was diluted with 10 ml DCM followed by filtration to recover the catalyst. The filtrate was concentrated in vacuo to get the crude product, which was further purified by crystallization to obtain 1,2,3-triazole product.

4.1.2.1 2-(4-((1-Phenyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5a)

Yield: 94 %, M.P.: 168-171°C; White Solid; IR (KBr) ν cm⁻¹: 3273 (Aromatic C-H stretching), 1599 (C=C stretching) 1466 (N-N stretching), 1400 cm⁻¹ (N=N stretching); ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.40 (s, 2H, CH₂), 7.13-8.10 (m, 14H, merged signals, 13 Ar-H and triazolyl-H); ¹³C NMR (100 MHz, CDCl₃) δ ppm = 62.31, 115.41, 120.82, 121.28, 121.72, 123.08, 125.07, 126.43, 127.29, 129.15, 129.40, 129.99, 135.09, 137.12, 154.39, 160.62, 167.80; HRMS (ESI)⁺ calcd. for C₂₂H₁₆N₄OS [M+H]⁺: 385.1038; found 385.1132.

4.1.2.2 2-(4-((1-(2-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5b)

Yield: 86 %, M.P.: 166-168°C; White Solid; IR (KBr) ν cm⁻¹: 3124 (Aromatic C-H stretching), 1593 (C=C stretching), 1481 (N-N stretching), 1420 (N=N stretching); ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.36 (s, 2H, OCH₂), 7.09-8.06 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 62.17, 115.31, 118.69, 121.00, 121.06, 121.69, 123.04, 125.06, 127.29, 129.18, 129.37, 131.04, 135.02, 135.81, 137.85, 144.89, 154.30, 157.32, 160.45, 167.71; HRMS (ESI)⁺ calcd. for C₂₂H₁₆ClN₄OS [M+H]⁺: 419.0689 and found 419.0745.

4.1.2.3 2-(4-((1-(3-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5c)

Yield: 88 %, M.P.: 146-148 °C; White Solid; IR (KBr) ν cm⁻¹: 3097 (Aromatic C-H stretching), 1594 (C=C stretching), 1481 (N-N stretching), 1399 (N=N stretching); ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.39 (s, 2H, OCH₂), 7.11-8.07 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 62.38, 115.47, 120.89, 121.80, 123.15, 125.15, 126.50, 127.35, 129.23, 129.47, 130.06, 134.51, 134.70, 135.16, 135.30, 135.61, 135.80, 137.00, 137.19, 144.80, 154.45, 160.68; HRMS (ESI)⁺ calcd. for C₂₂H₁₆ClN₄OS [M+H]⁺: 419.0689; found 419.0740.

4.1.2.4 2-((1-(4-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5d)

Yield: 94 %, M.P.: 202-205 °C; White Solid; IR (KBr) ν cm⁻¹: 3056 (Aromatic C-H stretching), 1596 (C=C stretching), 1480 (N-N stretching), 1420 (N=N stretching); ¹H NMR (300 MHz, DMSO-*d*₆) δ ppm = 5.40 (s, 2H, OCH₂), 7.28 9.07 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, DMSO-*d*₆) δ ppm = 61.97, 116.28, 122.61, 122.96, 123.23, 123.89, 125.88, 126.67, 127.27, 129.63, 130.62, 133.80, 134.97, 136.06, 144.36, 154.37, 161.15, 167.66; HRMS (ESI)⁺ calcd. for C₂₂H₁₆ClN₄OS [M+H]⁺: 419.0689 and found 419.0739.

4.1.2.5 2-((1-(2-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5e)

Yield: 87 %, M.P.: 133-136 °C; White Solid; IR (KBr) ν cm⁻¹: 3042 (Aromatic C-H stretching), 1600 (C=C stretching), 1476 (N-N stretching), 1431 (N=N stretching); ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.41 (s, 2H, OCH₂), 7.12-8.09 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 62.02, 115.21, 118.51, 121.47, 122.81, 124.82, 124.95, 126.28, 127.00, 128.16, 128.47, 129.12, 131.26, 133.88, 134.80, 136.33, 137.40, 160.36, 164.64, 167.57; HRMS (ESI)⁺ calcd. for C₂₂H₁₆BrN₄OS [M+H]⁺: 463.0183 and found 463.0770.

4.1.2.6 2-((1-(3-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5f)

Yield: 85 %, M.P.: 173-175 °C; White Solid; IR (KBr) ν cm⁻¹: 2914 (Aromatic C-H stretching), 1599 (C=C stretching), 1485 (N-N stretching), 1418 (N=N stretching); ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.40 (s, 2H, OCH₂), 7.14-8.10 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (100 MHz, CDCl₃) δ ppm = 62.04, 115.18, 119.07, 120.96, 121.55, 122.90, 123.38, 123.70, 124.92, 126.27, 127.17, 129.23, 131.33, 131.99, 134.70, 134.86, 137.80, 153.71, 154.17, 160.30; HRMS (ESI)⁺ calcd. for C₂₂H₁₆BrN₄OS[M+H]⁺: 463.0183 and found 463.0214.

4.1.2.7 2-((1-(2-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5g)

Yield: 93 %, M.P.: 169-172 °C; White Solid; IR (KBr) ν cm⁻¹: 2913 (Aromatic C-H stretching), 1595 (C=C stretching), 1469 (N-N stretching), 1422 (N=N stretching); ¹H NMR (300 MHz, CDCl₃) δ ppm = 3.90 (s, 3H, OCH₃), 5.39 (s, 2H, OCH₂), 7.08-8.22 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 55.91, 62.09, 112.16, 115.21, 117.92, 121.19, 121.45, 122.78, 124.79, 125.41, 125.81, 126.15, 126.84, 129.08, 130.18, 131.53, 134.78, 151.01, 153.90, 160.51, 167.71; HRMS (ESI)⁺ calcd. for C₂₃H₁₉N₄O₂S [M+H]⁺: 415.1184 and found 415.1243.

4.1.2.8 2-((1-(4-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole (5h)

Yield: 91 %, M.P.: 184-186 °C; White solid; IR (KBr) ν cm⁻¹: 3135 (Aromatic C-H stretching), 2880 (Aromatic C-H stretching), 1597 (C=C stretching), 1478 (N-N stretching), 1444 (N=N stretching); ¹H NMR (300 MHz, DMSO-d₆) δ ppm = 3.74 (s, 3H, OCH₃), 5.35 (s, 2H, OCH₂), 6.91-8.33 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (100 MHz, DMSO-d₆) δ ppm = 55.21, 61.30, 114.08, 115.57, 120.89, 122.26, 122.54, 125.23, 126.62, 128.96, 131.48, 134.29, 142.11, 153.69, 156.91, 160.61, 163.67, 167.10; HRMS (ESI)⁺ calcd. for C₂₃H₁₈N₄O₂S [M+H]⁺: 415.1184; found 415.1216.

4.1.2.9 2-((1-(2,4-Difluorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5i)

Yield: 93 %, M.P.: 158-161°C; White Solid; IR (KBr) ν cm⁻¹: 3084 (Aromatic C-H stretching), 1603 (C=C stretching), 1466 (N-N stretching), 1445 (N=N stretching); ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.31 (s, 2H, OCH₂), 7.01-8.08 (m, 12H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 61.96, 115.11, 118.49, 120.79, 120.86, 121.49, 122.83, 124.65, 126.20, 127.09, 128.97, 129.17, 130.83, 134.81, 135.60, 137.66, 144.69, 154.10, 157.32, 160.24, 167.51; LCMS (ESI)⁺ calcd. for C₂₂H₁₅F₂N₄OS [M+H]⁺: 421.09 and found 421.09.

4.1.2.10 2-((1-Mesityl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5j)

Yield: 89 %, M.P.: 145-147 °C; White solid; ¹H NMR (300 MHz, CDCl₃) δ ppm = 1.94 (s, 6H, 2xCH₃), 2.33 (s, 3H, CH₃), 5.39 (s, 2H, CH₂), 6.91- 8.06 (m, 11H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (100 MHz, CDCl₃) δ ppm = 16.80, 20.41, 61.21, 115.50, 122.00, 122.30, 124.27, 124.97, 125.71, 126.35, 128.12, 128.66, 133.07, 134.06, 134.25, 139.40,

142.18, 153.45, 160.31, 166.80; HRMS (ESI)⁺ calcd. for C₂₅H₂₃N₄OS [M+H]⁺: 427.1548 and found 427.1582.

4.1.2.11 2-(4-((1-Benzyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5k)

Yield: 94 %, M.P.: 199-201 °C; White solid; ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.27 (s, 2H, OCH₂), 5.33 (s, 2H, N-CH₂), 7.06-8.06 (m, 14H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (100 MHz, CDCl₃) δ ppm = 52.22, 61.29, 115.48, 119.20, 122.17, 122.47, 123.75, 125.10, 125.80, 126.48, 128.85, 128.88, 134.24, 138.37, 142.05, 153.65, 160.55, 164.12, 166.96; HRMS (ESI)⁺ calcd. for C₂₃H₁₉N₄OS [M+H]⁺: 399.1235 and found 399.1281.

4.1.2.12 2-(4-((1-(4-Fluorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole (5l)

Yield: 95 %, M.P.: 161-164 °C; White solid; ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.25 (s, 2H, OCH₂), 5.50 (s, 2H, N-CH₂), 7.01-8.03 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 53.75, 62.37, 115.40, 116.30, 116.52, 121.74, 122.78, 123.09, 125.09, 126.45, 127.25, 129.36, 130.19, 130.27, 130.44, 135.09, 154.41, 160.63, 164.36, 167.82; HRMS (ESI)⁺ calcd. for C₂₃H₁₈FN₄OS [M+H]⁺: 417.1141 and found 417.1200.

4.1.2.13 2-(4-((1-(2-Chlorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5m)

Yield: 89 %, M.P.: 144-146 °C; White solid; ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.28 (s, 2H, OCH₂), 5.69 (s, 2H, N-CH₂), 7.06-8.06 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 51.29, 62.29, 115.37, 121.68, 123.01, 123.37, 125.02, 126.38, 127.12, 127.79, 129.29, 130.12, 132.39, 133.69, 135.03, 154.34, 160.61, 167.79; HRMS (ESI)⁺ calcd. for C₂₃H₁₈ClN₄OS [M+H]⁺: 433.0812 and found 433.0893.

4.1.2.14 2-(4-((1-(3-Chlorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole (5n)

Yield: 88 %, M.P.: 158-161 °C; White solid; ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.26 (s, 2H, OCH₂), 5.69 (s, 2H, N-CH₂), 7.07-8.06 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 51.74, 62.36, 115.42, 121.72, 123.07, 123.34, 125.06, 126.42, 127.19, 127.84, 129.33, 130.17, 130.55, 130.63, 132.43, 133.74, 135.07, 154.38,

160.65, 167.84; HRMS (ESI)⁺ calcd. for C₂₃H₁₈ClN₄OS [M+H]⁺: 433.0812 and found 433.0893.

4.1.2.15 2-((4-(1-(4-Bromobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5o)

Yield: 87 %, M.P.: 191-194 °C; White solid; ¹H NMR (300 MHz, CDCl₃) δ ppm = 5.26 (s, 2H, OCH₂), 5.48 (s, 2H, N-CH₂), 7.04-8.03 (m, 13H, merged signals, Ar-H and triazolyl-H); ¹³C NMR (125 MHz, CDCl₃) δ ppm = 53.82, 62.37, 115.43, 121.75, 122.86, 123.11, 123.30, 125.10, 126.46, 127.27, 129.38, 129.93, 132.59, 133.60, 135.10, 154.41, 160.61, 167.82; HRMS (ESI)⁺ calcd. for C₂₃H₁₈BrN₄OS [M+H]⁺: 477.0340 and found 477.0390.

4.1.2.16 2-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-phenyl acetamide (5p)

Yield: 94 %, M.P.: 233-235 °C; White solid; ¹H NMR (300 MHz, DMSO-d₆) δ ppm = 5.31 (s, 2H, CH₂), 5.38 (s, 2H, OCH₂), 7.09-8.31 (m, 14H, merged signals, Ar-H and triazolyl-H), 10.48 (s, 1H, amido-NH); ¹³C NMR (125 MHz, DMSO-d₆) δ ppm = 52.22, 61.29, 115.48, 119.20, 122.17, 122.47, 123.75, 125.10, 125.80, 126.48, 128.85, 128.88, 134.24, 138.37, 142.05, 153.65, 160.55, 164.12, 166.96; HRMS (ESI)⁺ calcd. for C₂₄H₂₀N₅O₂S [M+H]⁺: 442.1293 and found 442.1340.

4.1.2.17 2-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(3-chloro phenyl)acetamide (5q)

Yield: 88 %, M.P.: 209-211°C; White solid; ¹H NMR (300 MHz, DMSO-d₆) δ ppm = 5.34 (s, 2H, CH₂), 5.43 (s, 2H, OCH₂), 7.17-8.35 (m, 13H, merged signals, Ar-H and triazolyl-H), 10.74 (s, 1H, amido-NH); ¹³C NMR (125 MHz, DMSO-d₆) δ ppm = 52.60, 61.66, 115.89, 118.02, 119.11, 122.61, 122.89, 123.92, 125.53, 126.19, 126.91, 129.26, 131.06, 133.58, 134.64, 140.19, 142.48, 154.06, 160.96, 165.04, 167.37; HRMS (ESI)⁺ calcd. for C₂₄H₁₉ClN₅O₂S [M+H]⁺: 476.0903 and found 476.0938.

4.1.2.18 2-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(4-chloro phenyl)acetamide (5r)

Yield: 92 %, M.P.: 220-222 °C; White solid; ¹H NMR (300 MHz, DMSO-d₆) δ ppm = 5.31 (s, 2H, CH₂), 5.38 (s, 2H, OCH₂), 7.24-8.32 (m, 13H, merged signals, Ar-H and triazolyl-H),

10.65 (s, 1H, amido-NH); ^{13}C NMR (125 MHz, DMSO- d_6) δ ppm = 52.72, 61.78, 116.01, 121.28, 122.74, 123.04, 126.31, 126.44, 127.04, 127.67, 127.67, 129.37, 132.09, 134.77, 137.86, 142.60, 154.17, 161.07, 164.89, 167.50; HRMS (ESI) $^+$ calcd. for $\text{C}_{24}\text{H}_{19}\text{ClN}_5\text{O}_2\text{S}$ [M+H] $^+$: 476.0903 and found 476.0935.

4.1.2.19 2-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(m-tolyl)acetamide (5s)

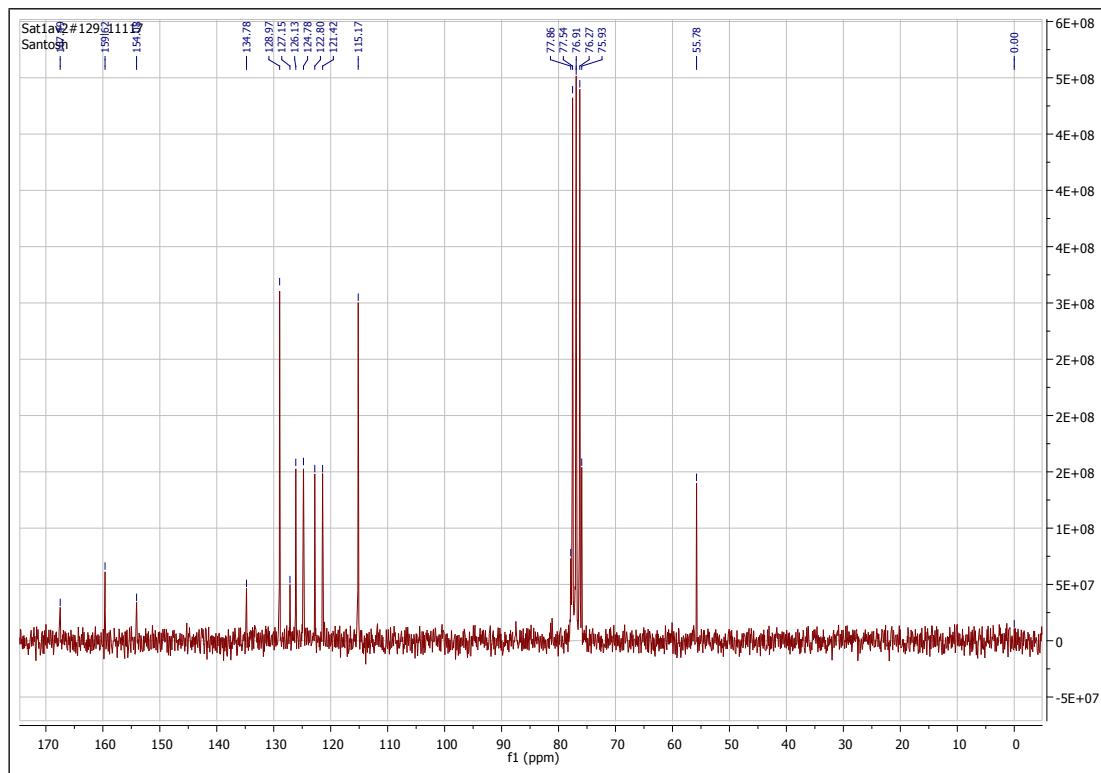
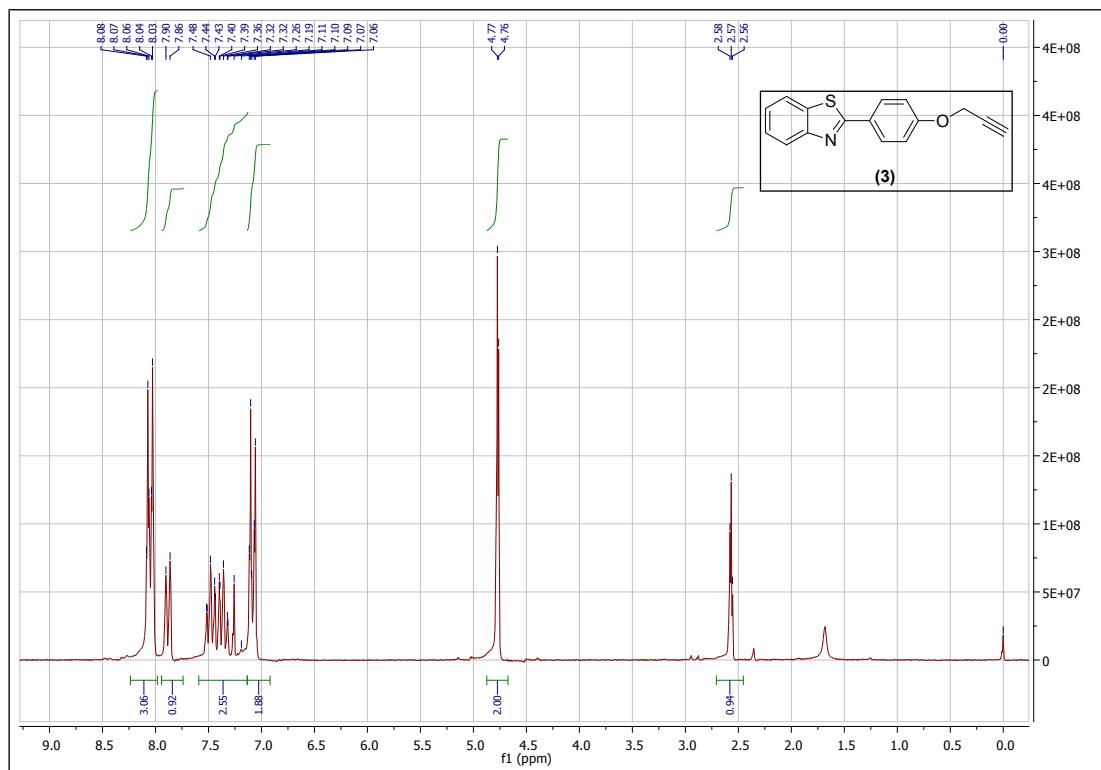
Yield: 87 %, M.P.: 204-206 °C; White solid; ^1H NMR (300 MHz, DMSO- d_6) δ ppm = 2.30 (s, 3H, CH₃), 5.33 (s, 2H, CH₂), 5.38 (s, 2H, OCH₂) 6.91-8.38 (m, 13H, merged signals, Ar-H and triazolyl-H), 10.46 (s, 1H, amido-NH); ^{13}C NMR (100 MHz, DMSO- d_6) δ ppm = 21.89, 52.76, 61.80, 116.03, 116.91, 120.27, 122.76, 123.04, 125.01, 125.68, 126.32, 127.06, 129.49, 129.41, 134.78, 136.67, 136.85, 138.30, 142.56, 154.19, 161.10, 164.62, 167.52; HRMS (ESI) $^+$ calcd. for $\text{C}_{25}\text{H}_{22}\text{N}_5\text{O}_2\text{S}$ [M+H] $^+$: 456.1450 and found 456.1481.

4.1.2.20 2-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(p-tolyl)acetamide (5t)

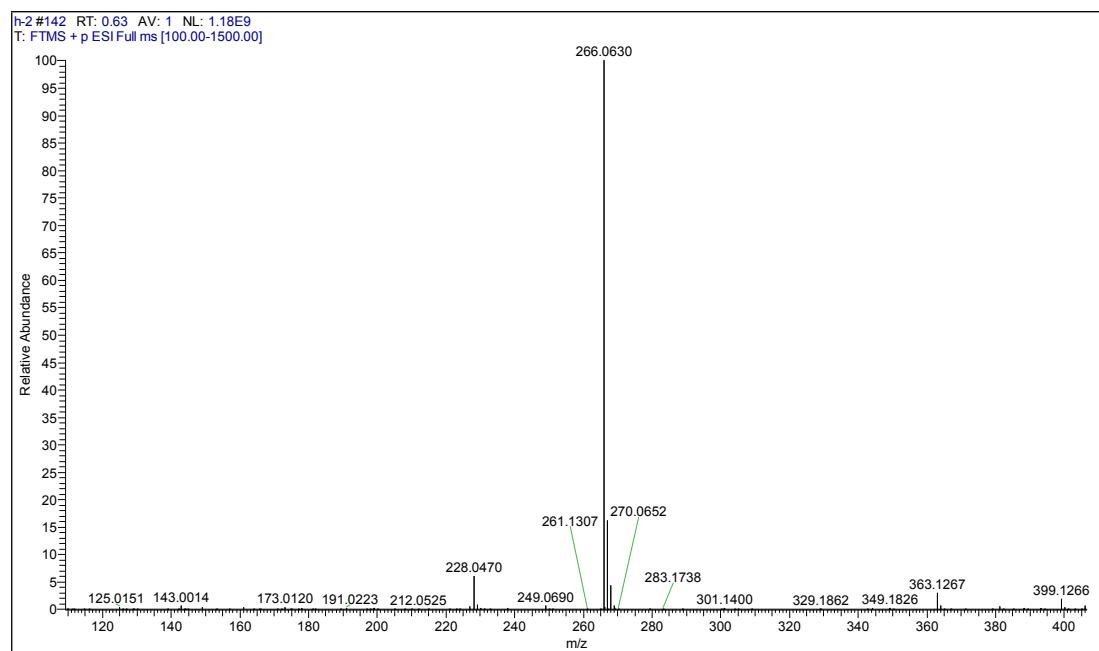
Yield: 92 %, M.P.: 240-243°C; White solid; ^1H NMR (300 MHz, CDCl₃) δ ppm = 2.28 (s, 3H, CH₃), 5.33 (s, 2H, CH₂), 5.37 (s, 2H, OCH₂), 7.14-8.34 (m, 13H, merged signals, Ar-H and triazolyl-H), 10.45 (s, 1H, amido-NH); ^{13}C NMR (125 MHz, CDCl₃) δ ppm = 20.80, 52.55, 61.62, 115.85, 119.55, 122.58, 122.86, 125.50, 126.14, 126.88, 129.23, 129.65, 133.10, 134.61, 136.24, 138.87, 142.38, 154.01, 160.92, 164.25, 167.34; HRMS (ESI) $^+$ calcd. for $\text{C}_{25}\text{H}_{22}\text{N}_5\text{O}_2\text{S}$ [M+H] $^+$: 456.1450 and found 456.1482.

4.1.1 2-(4-(Prop-2-yn-1-yloxy)phenyl)benzo[d]thiazole (3)

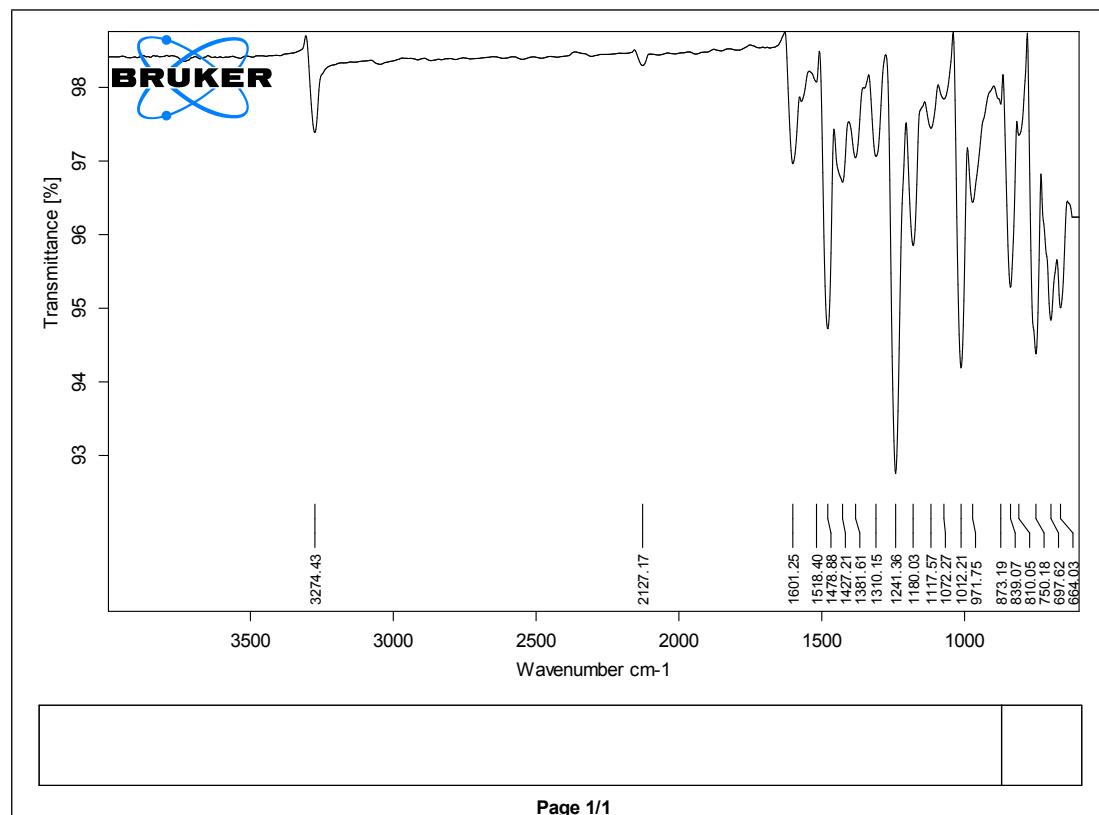
¹H NMR and ¹³C NMR of 2-(4-(Prop-2-yn-1-yloxy)phenyl)benzo[d]thiazole (3)



HRMS of 2-(4-(Prop-2-yn-1-yloxy)phenyl)benzo[d]thiazole (**3**)

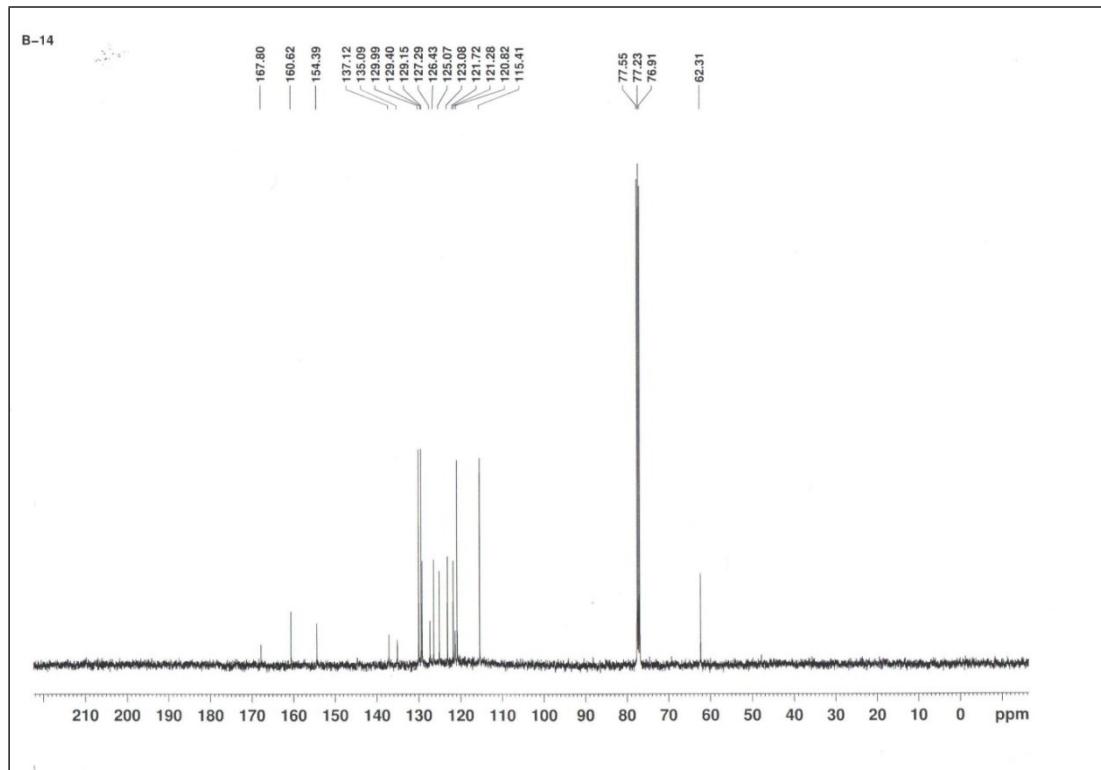
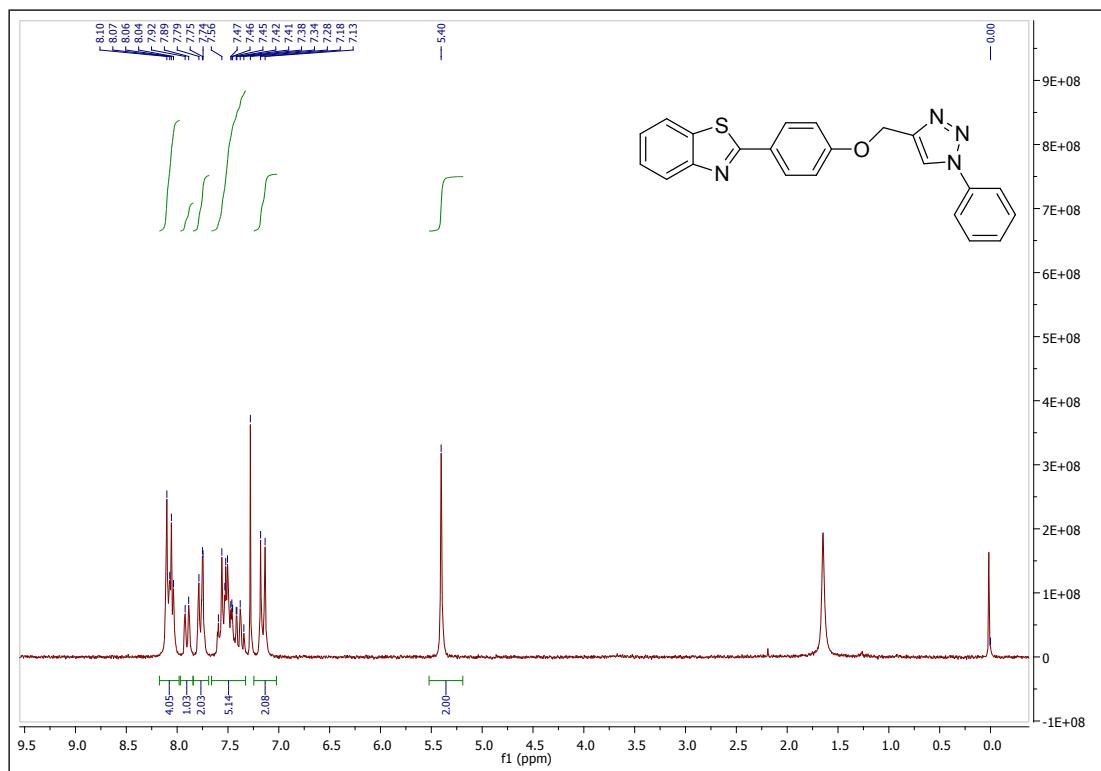


IR of 2-(4-(Prop-2-yn-1-yloxy)phenyl)benzo[d]thiazole (**3**)

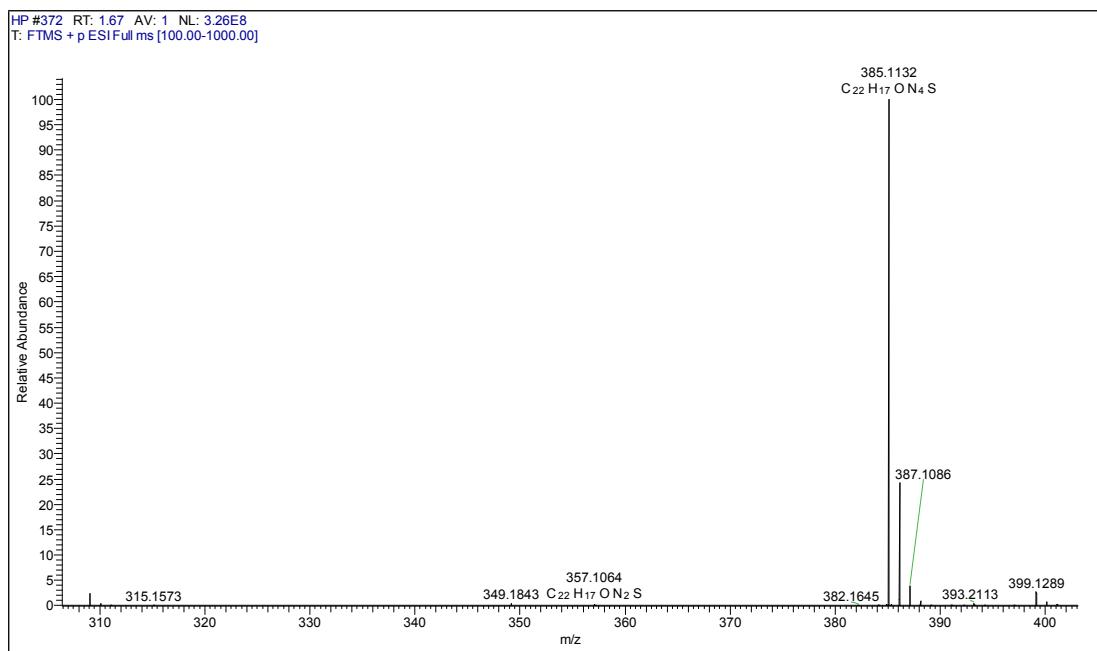


4.1.2.1 2-(4-((1-Phenyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5a**)

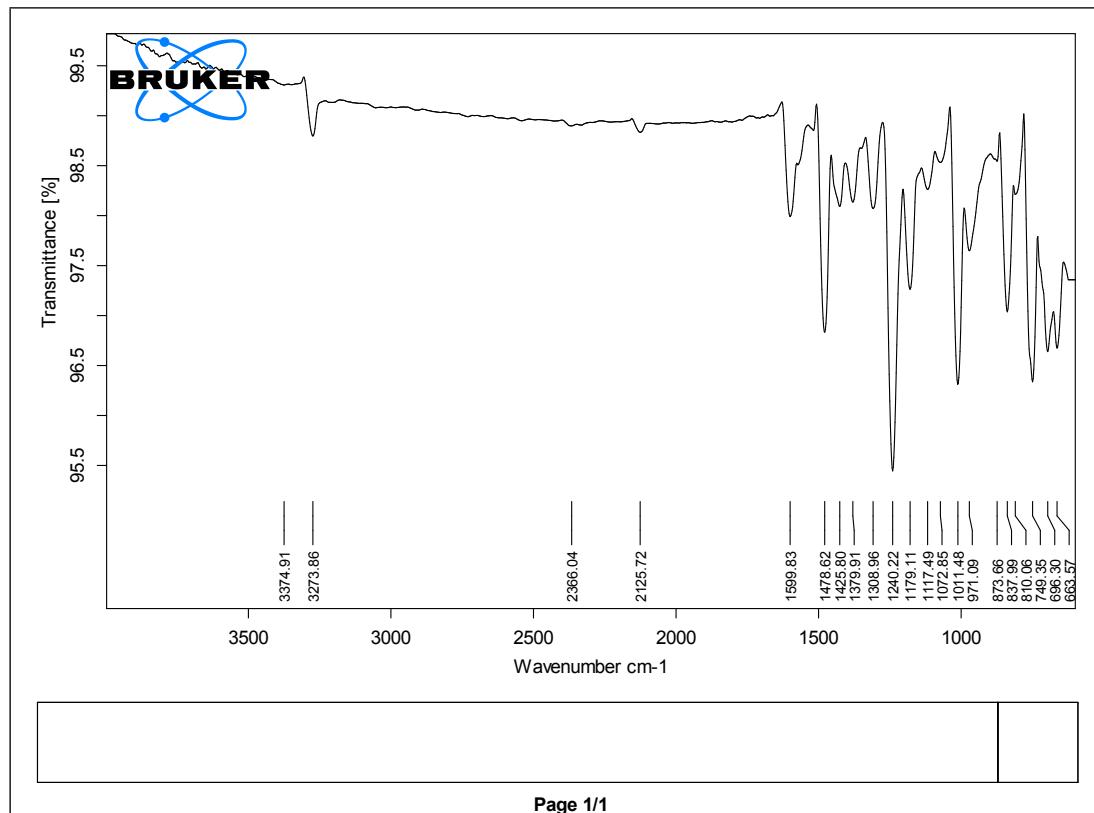
¹H NMR and ¹³C NMR of 2-(4-((1-Phenyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5a**)



HRMS of 2-(4-((1-Phenyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5a**)

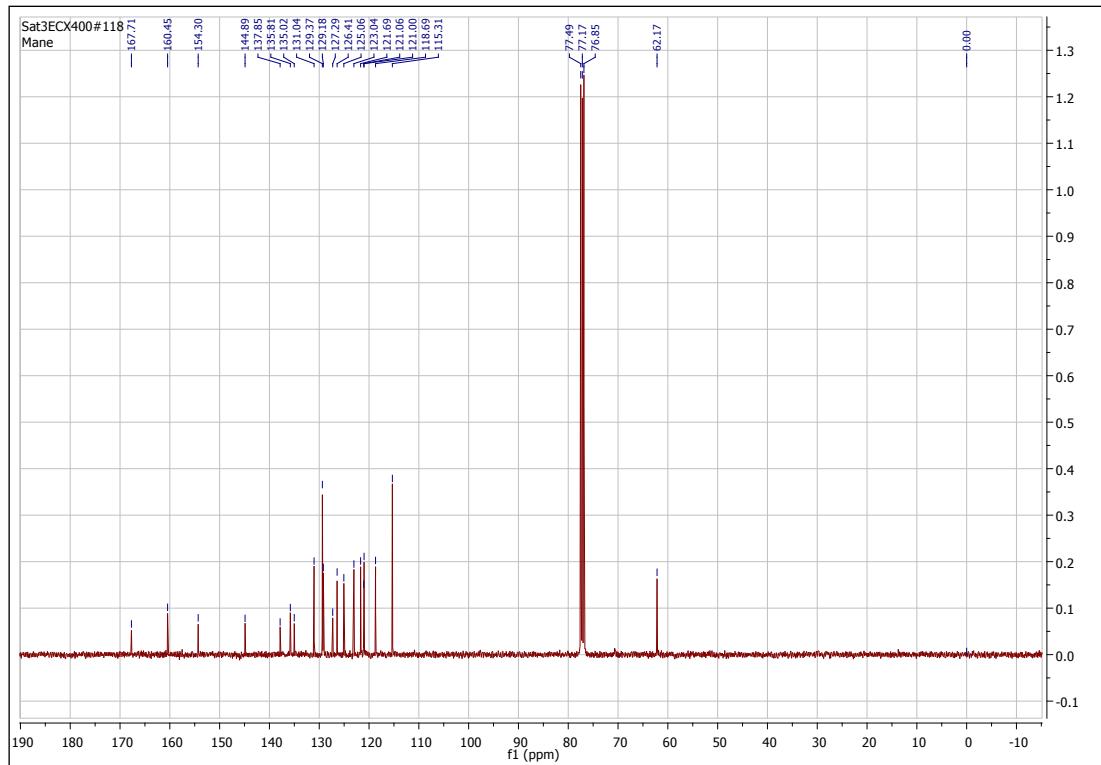
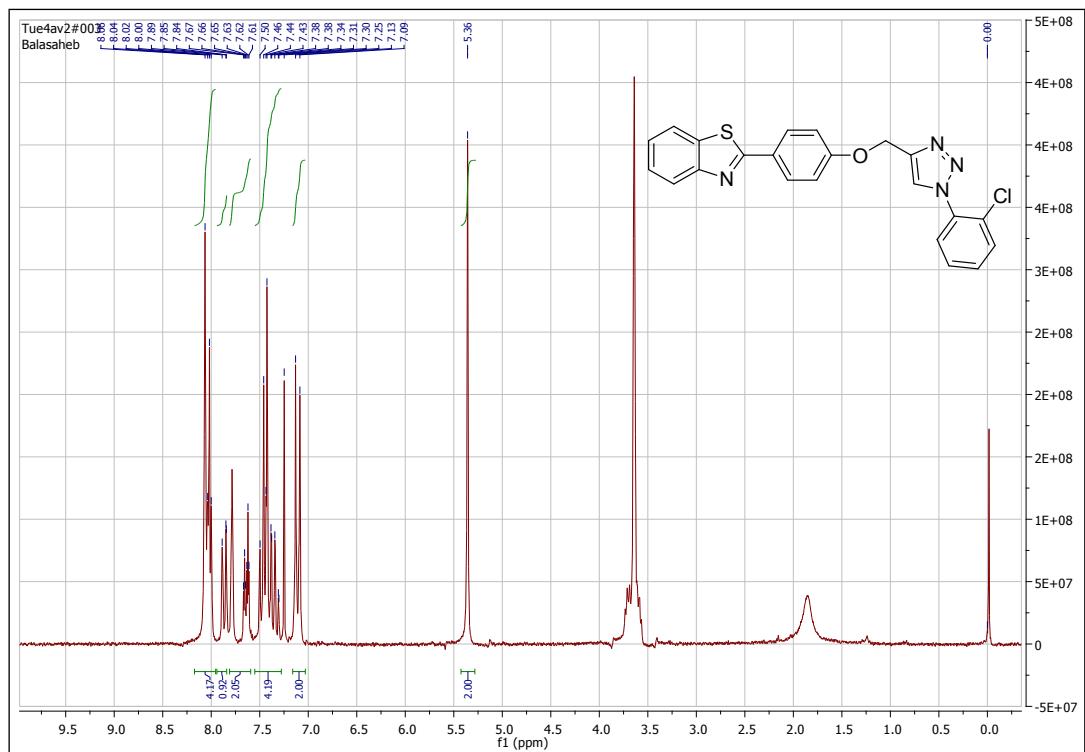


IR of 2-(4-((1-Phenyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5a**)

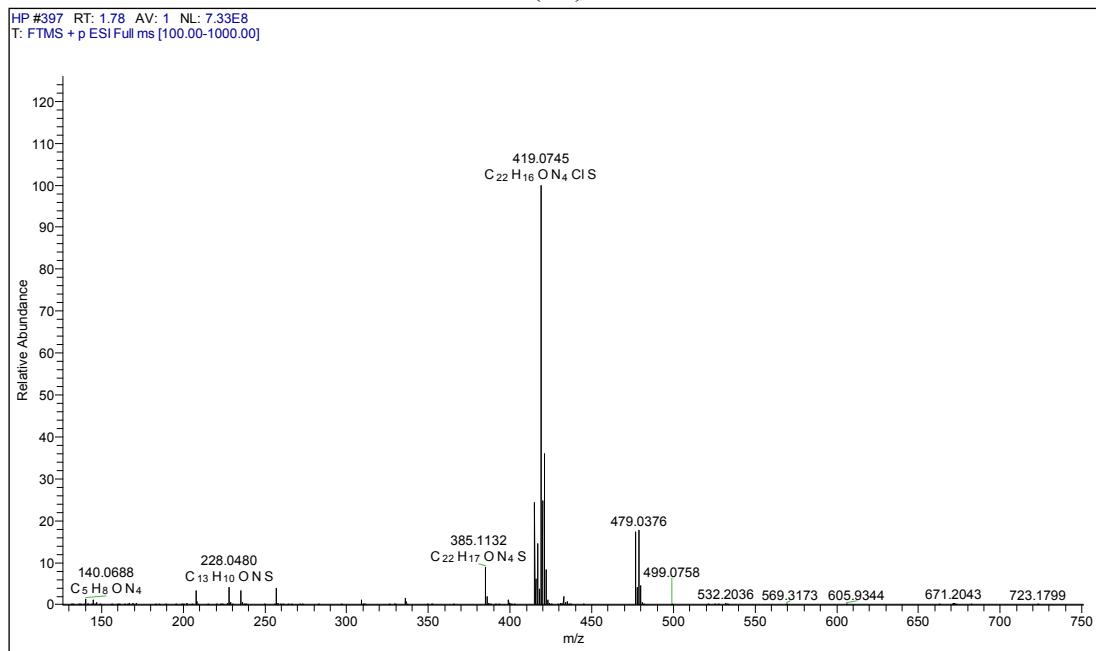


**4.1.2.2 2-(4-((1-(2-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole
(5b)**

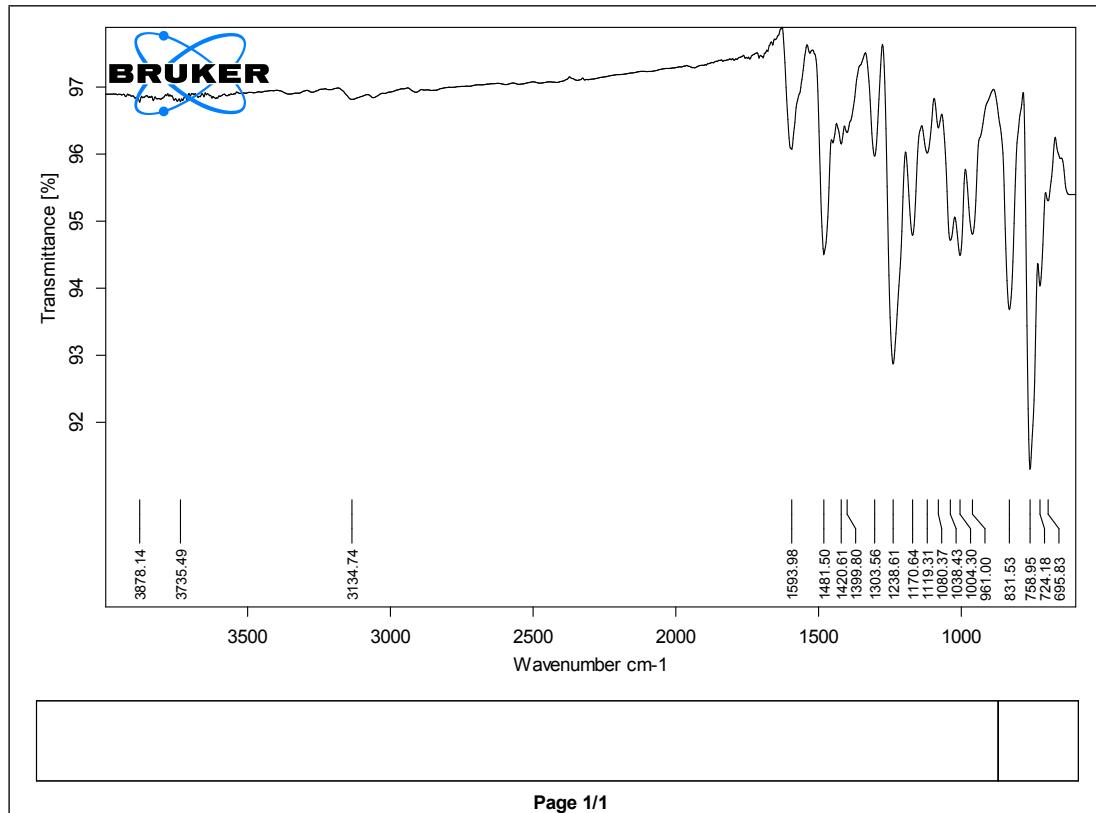
¹H and ¹³C NMR of 2-(4-((1-(2-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole (**5b**)



HRMS of 2-((4-((1-(2-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole
(5b)

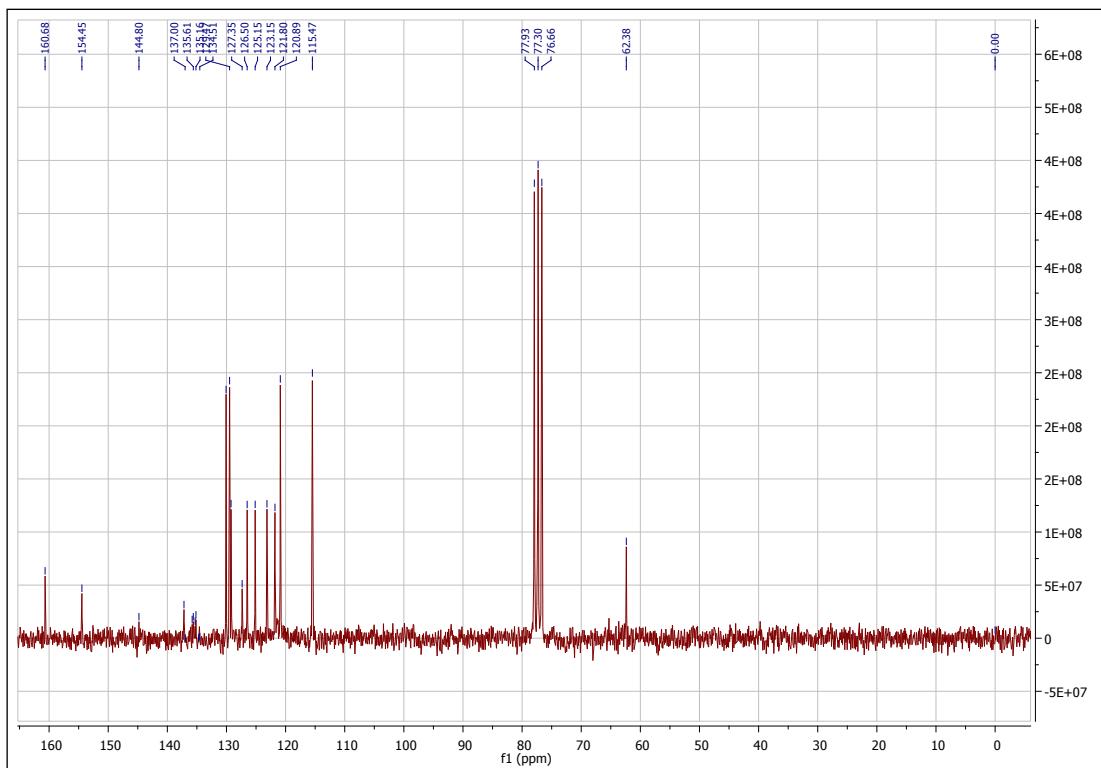
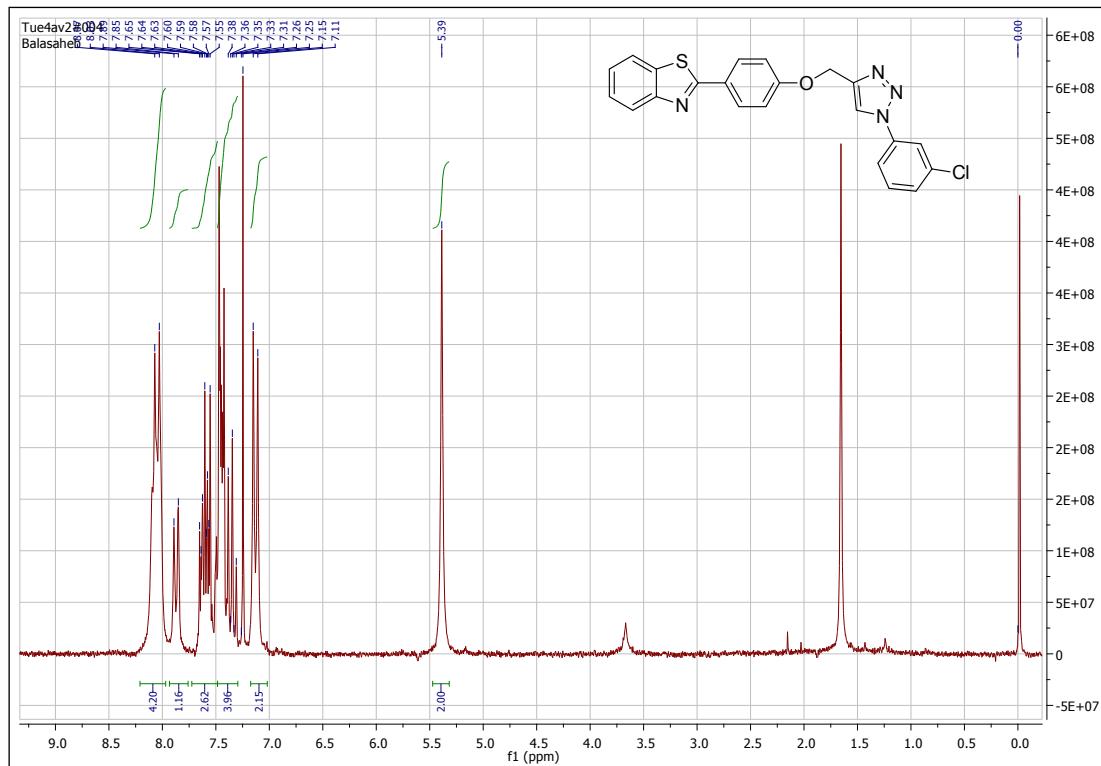


IR of 2-((4-((1-(2-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole
(5b)

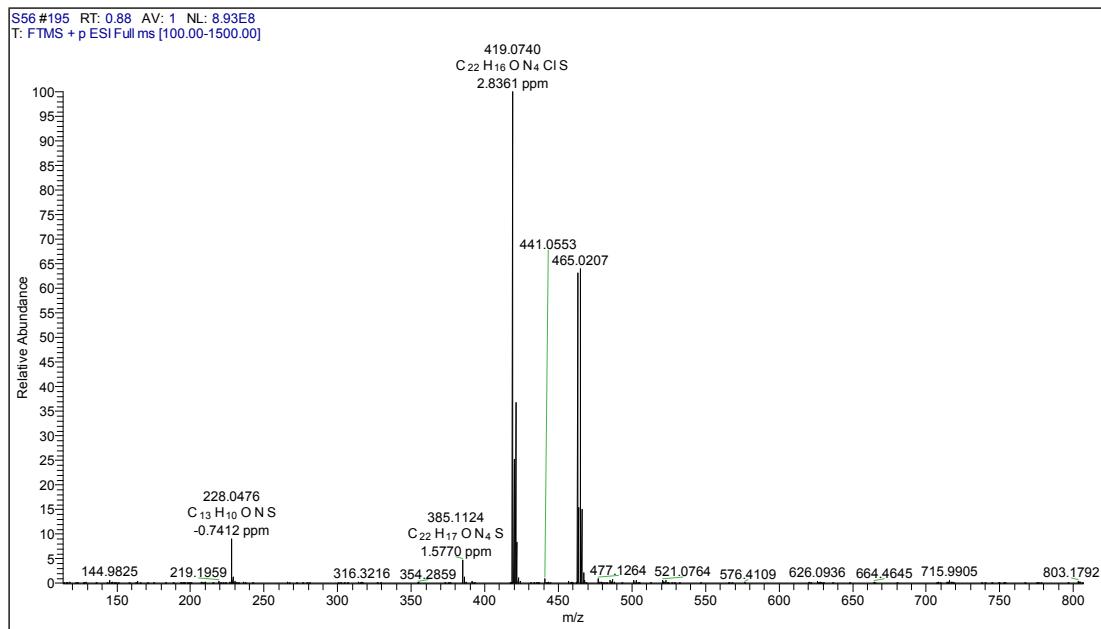


4.1.2.3 2-(4-((1-(3-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5c)

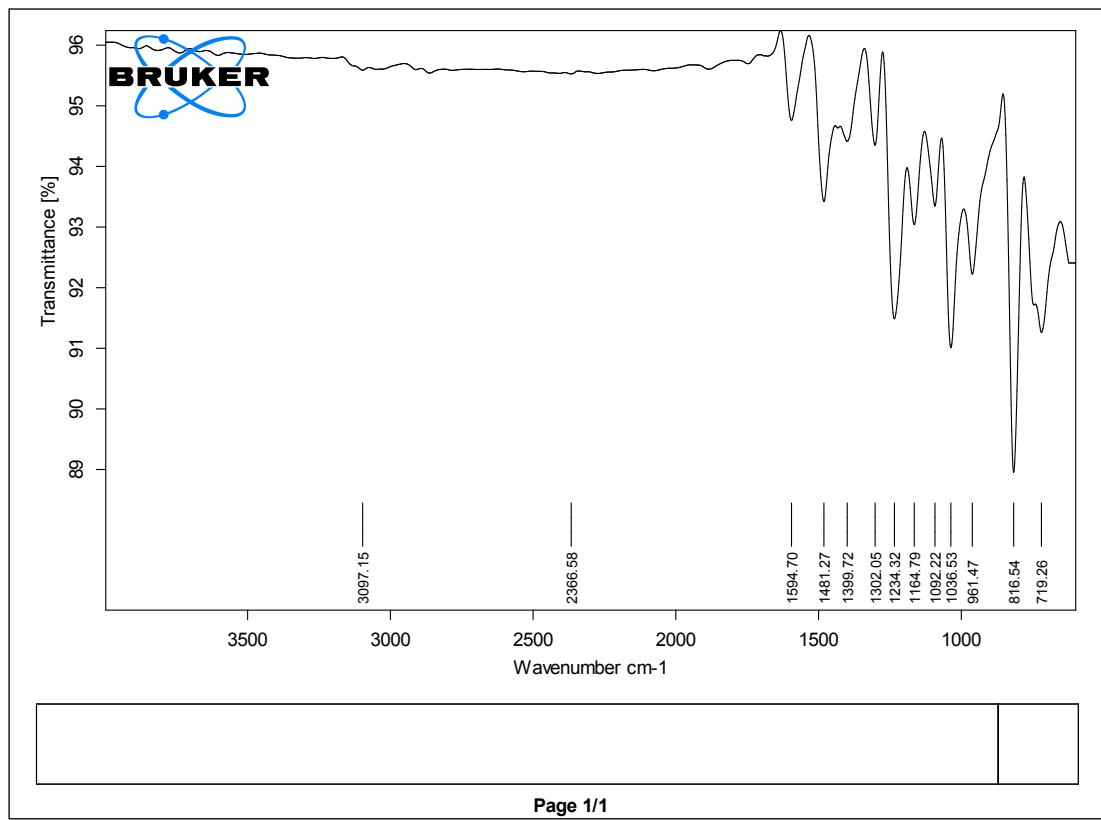
¹H NMR and ¹³C NMR of 2-(4-((1-(3-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5c)



HRMS of 2-(4-((1-(3-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole
(5c)

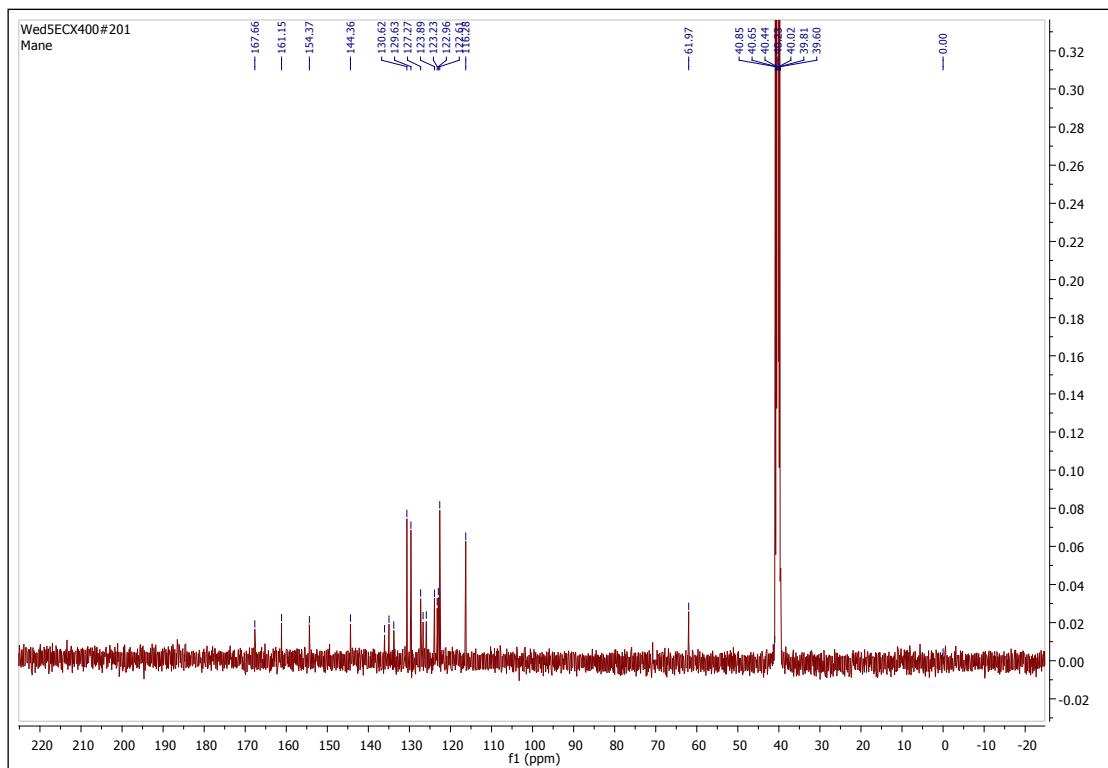
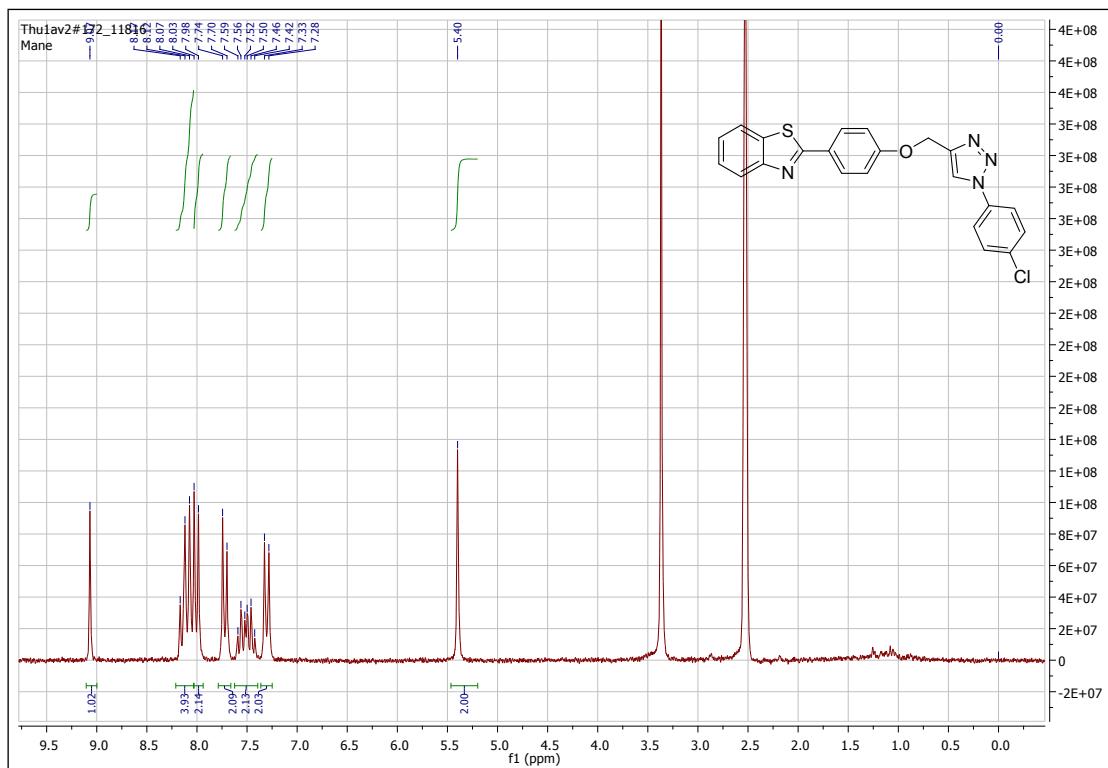


IR of 2-(4-((1-(3-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole **(5c)**

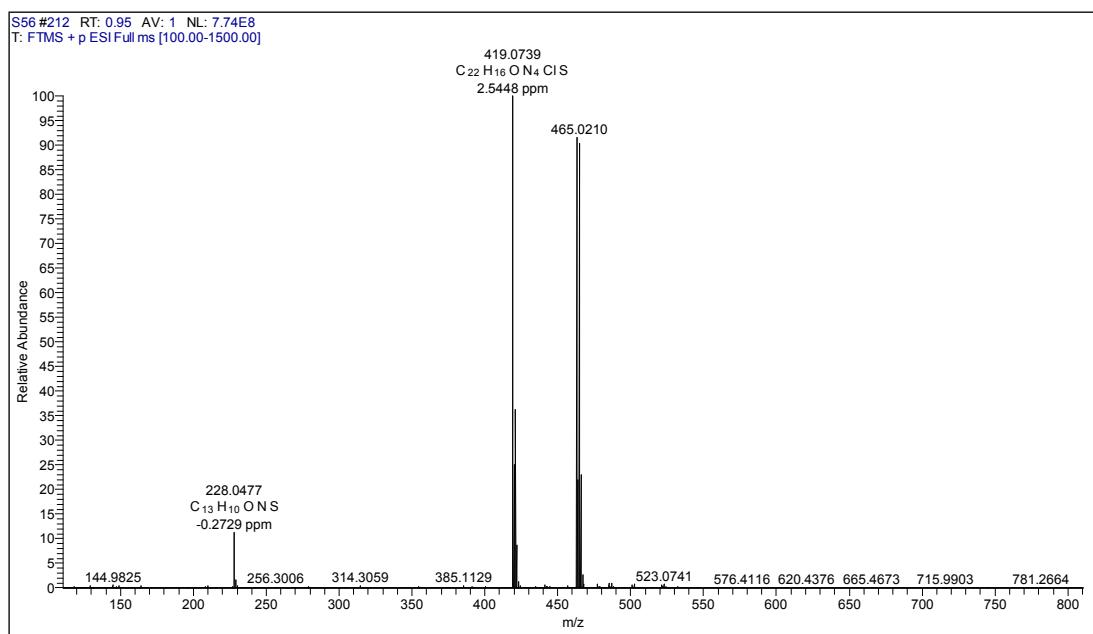


4.1.2.4 2-((1-(4-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5d**)**

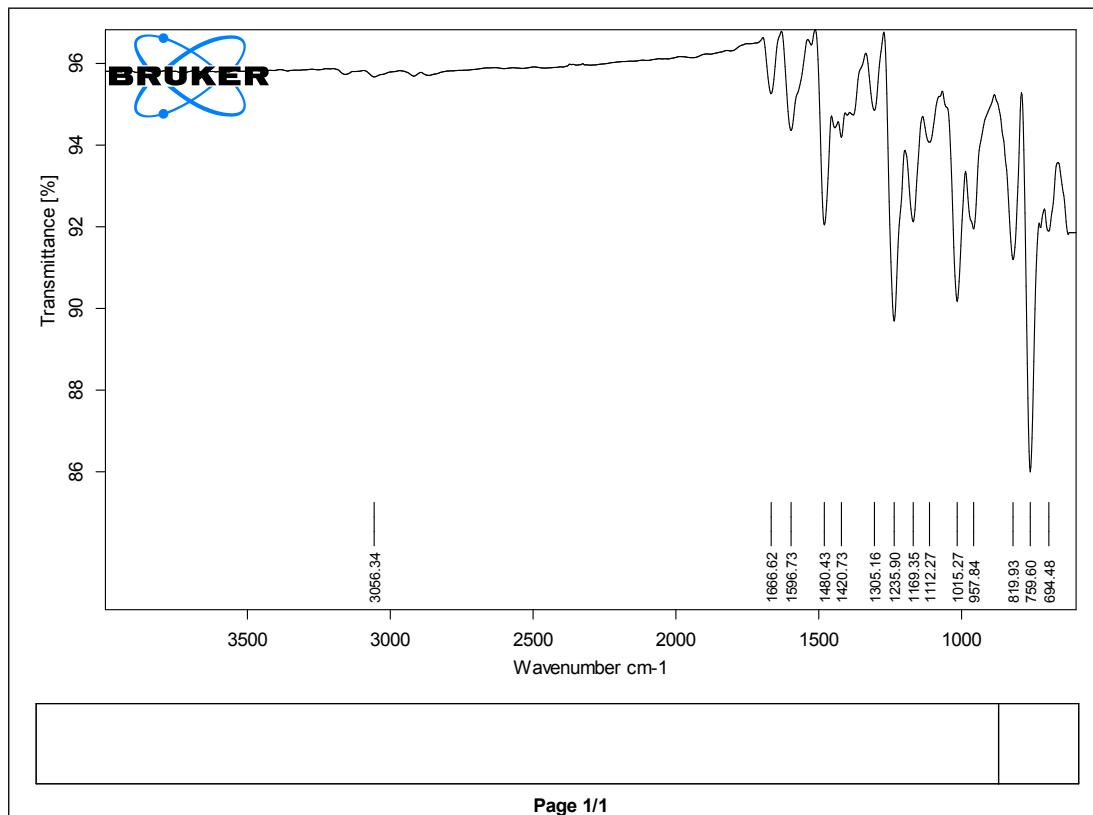
¹H NMR and ¹³C NMR of 2-((1-(4-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5d**)



HRMS of 2-((4-((1-(4-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole
(5d)

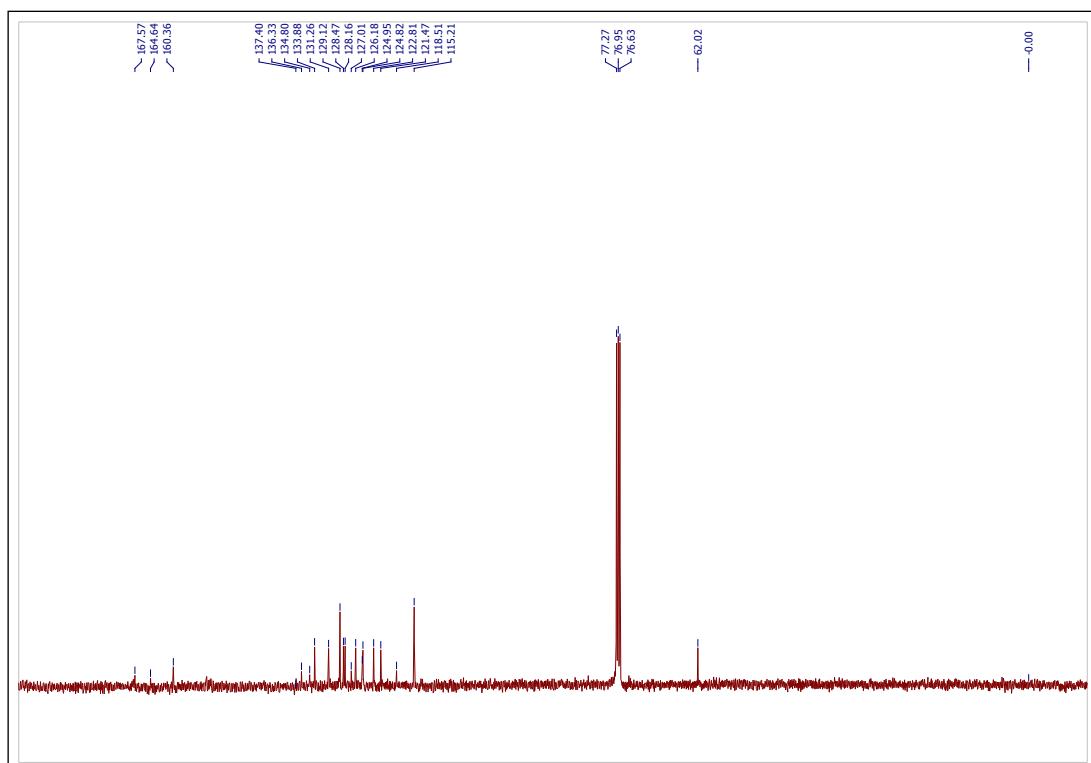
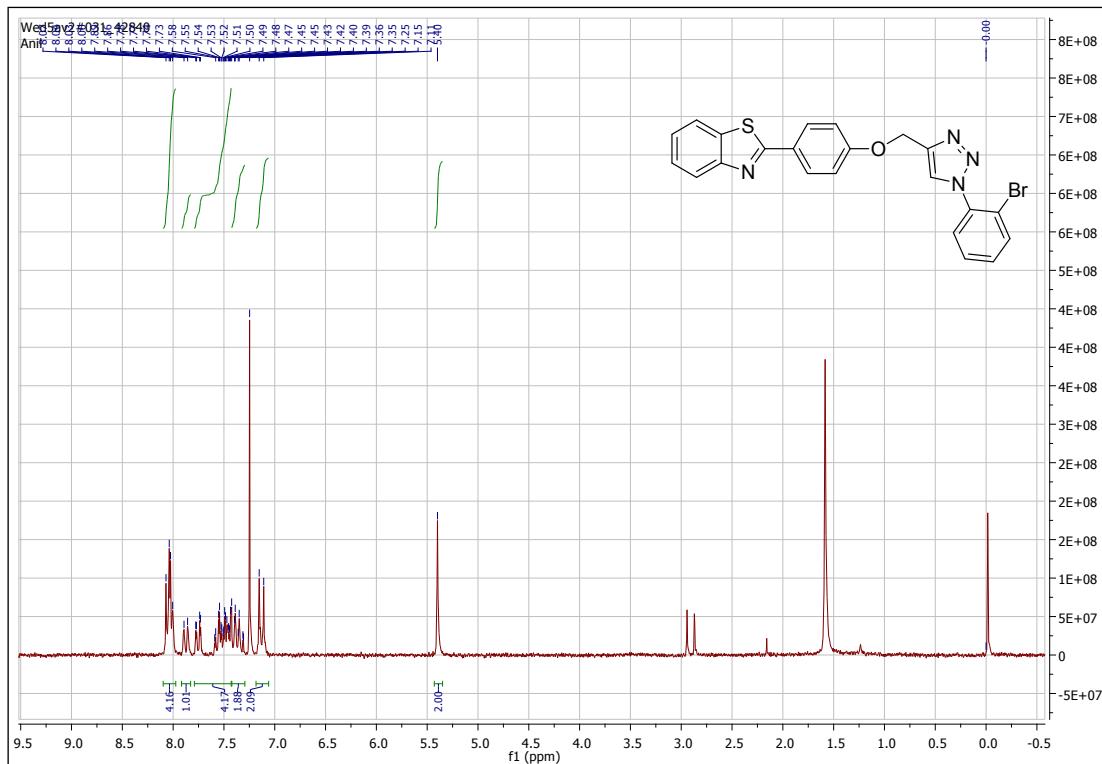


IR of 2-((4-((1-(4-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5d**)

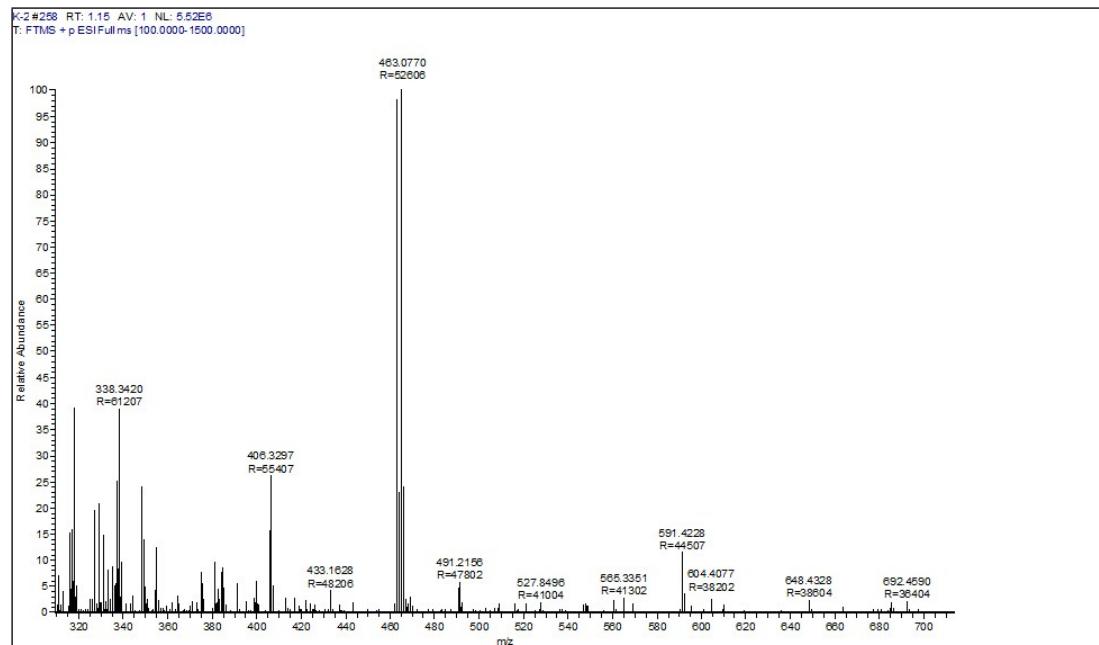


4.1.2.5 2-((1-(2-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5e)

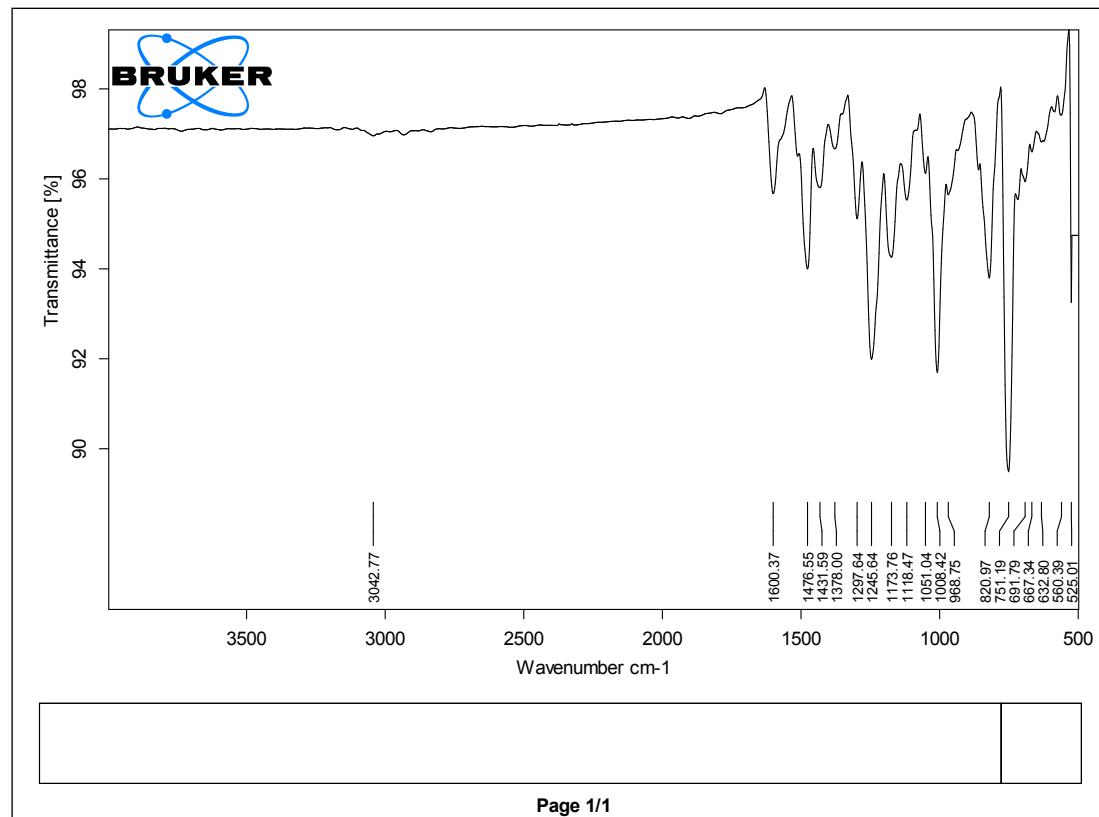
¹H NMR and ¹³C NMR of 2-((1-(2-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5e)



HRMS of 2-(4-((1-(2-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole
(5e)

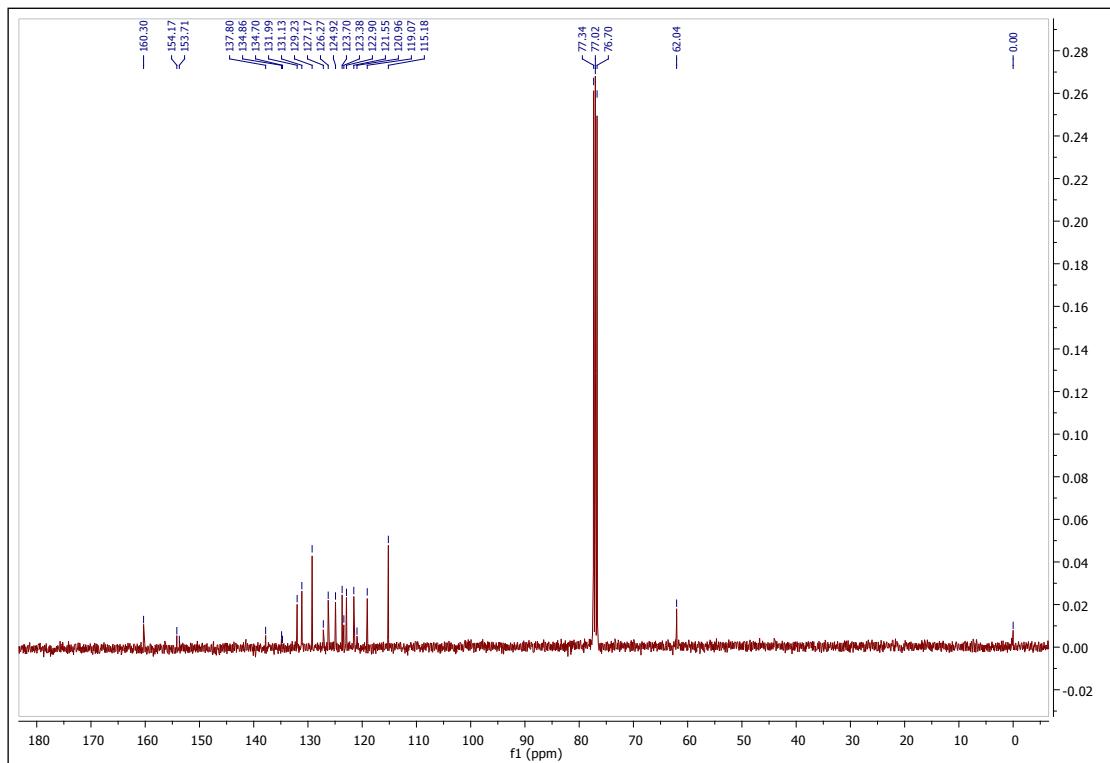
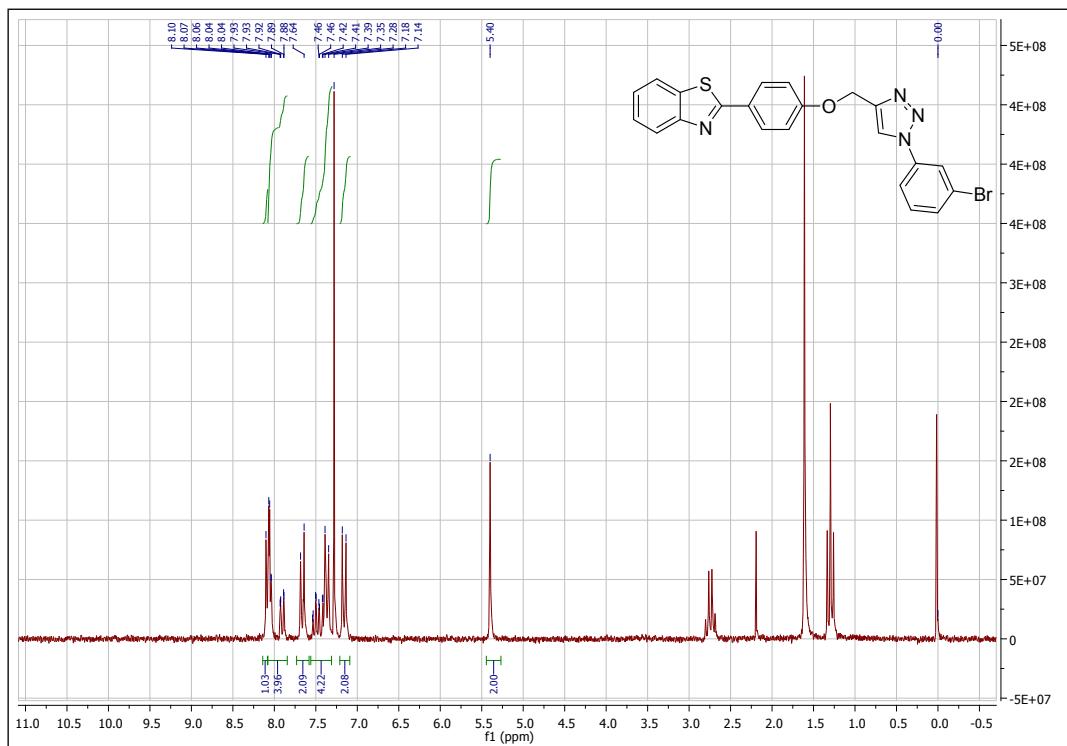


IR of 2-(4-((1-(2-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole **(5e)**

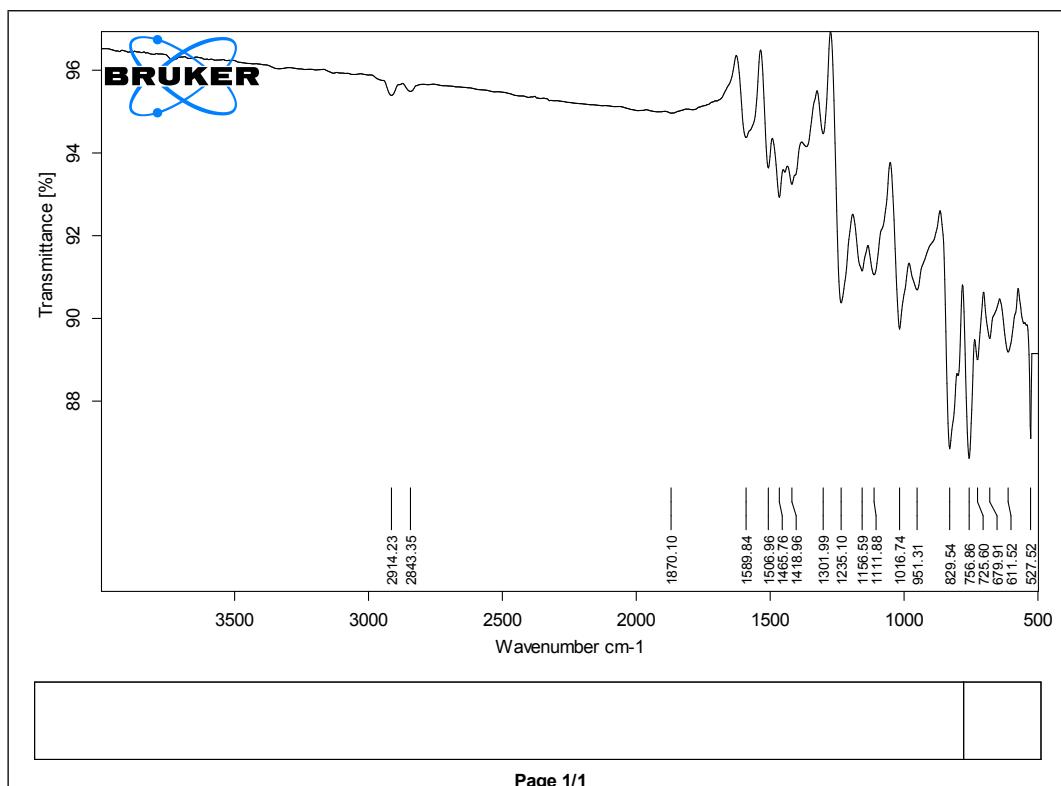


4.1.2.6 2-(4-((1-(3-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5f)

¹H NMR and ¹³C NMR of 2-(4-((1-(3-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole (**5f**)

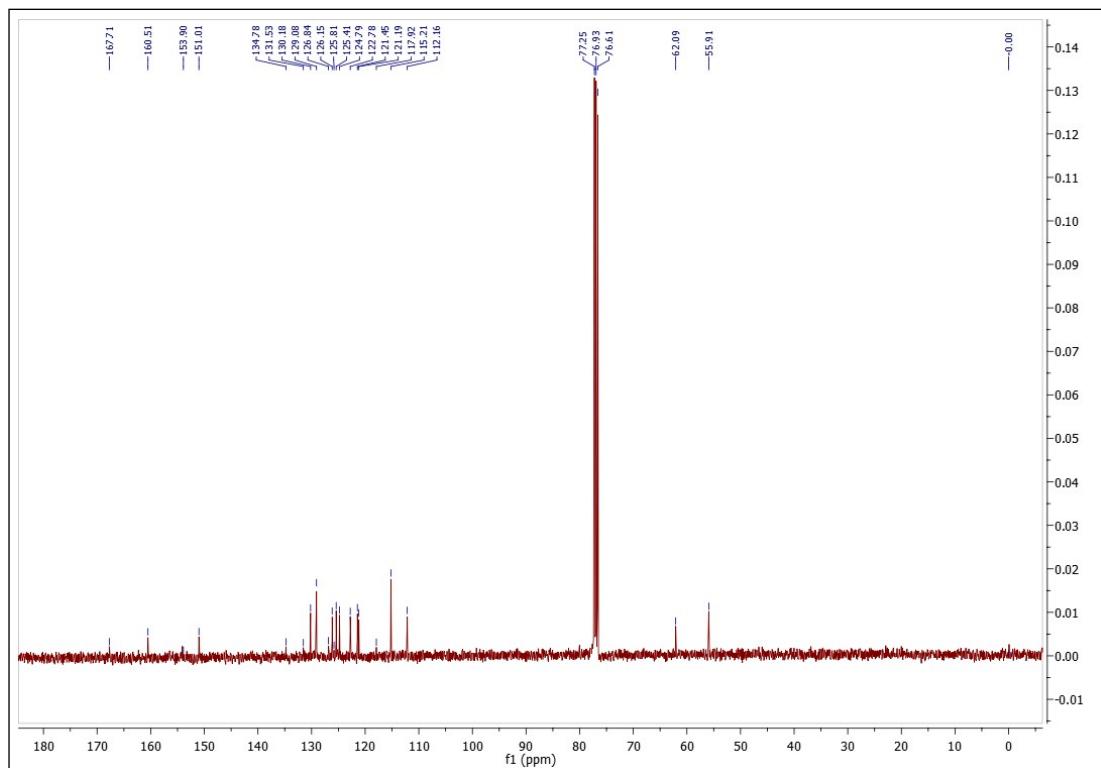
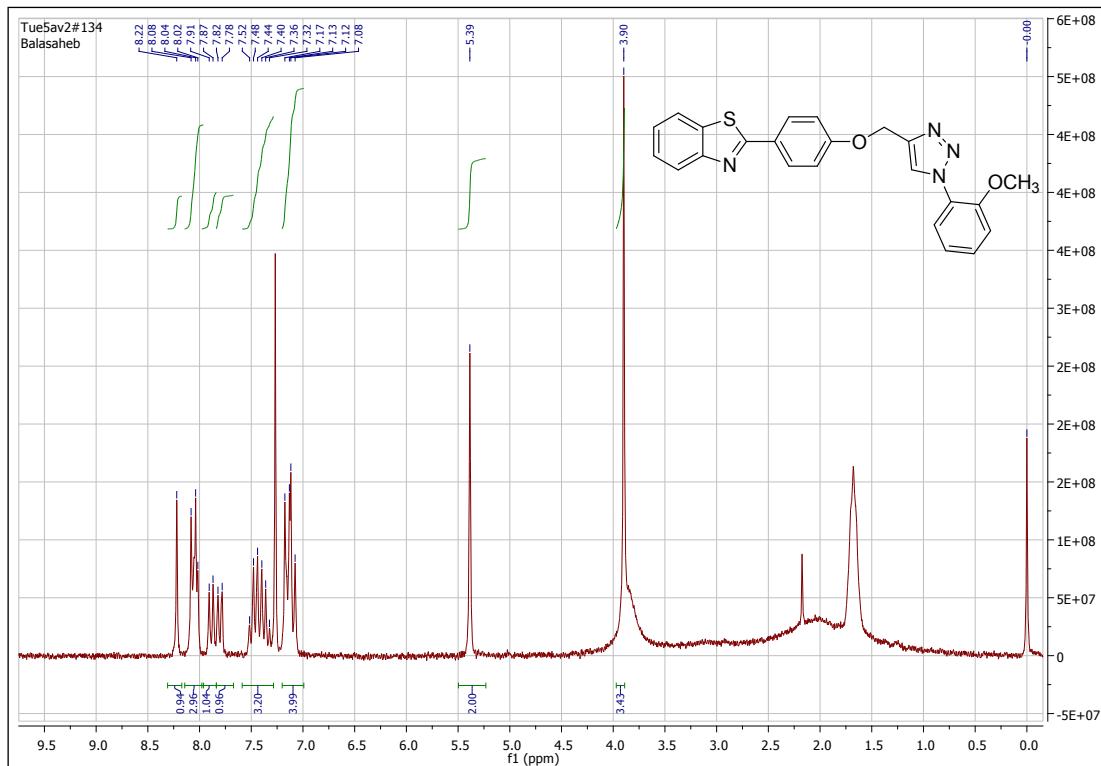


IR 2-(4-((1-(3-Bromophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d] thiazole (**5f**)

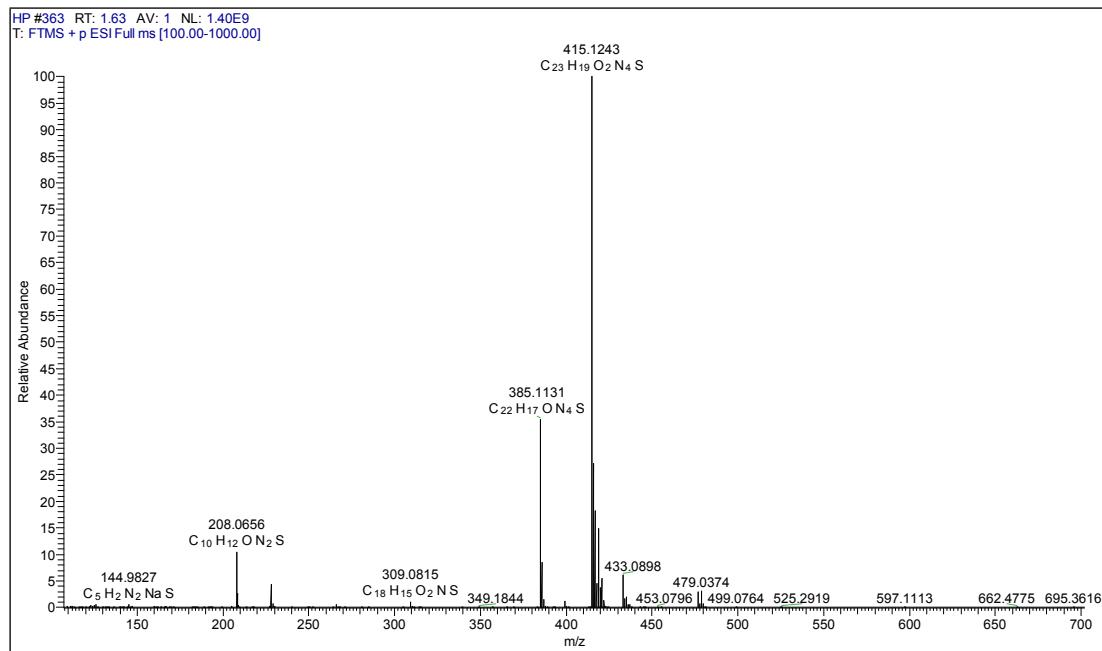


4.1.2.7 2-(4-((1-(2-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole (5g)

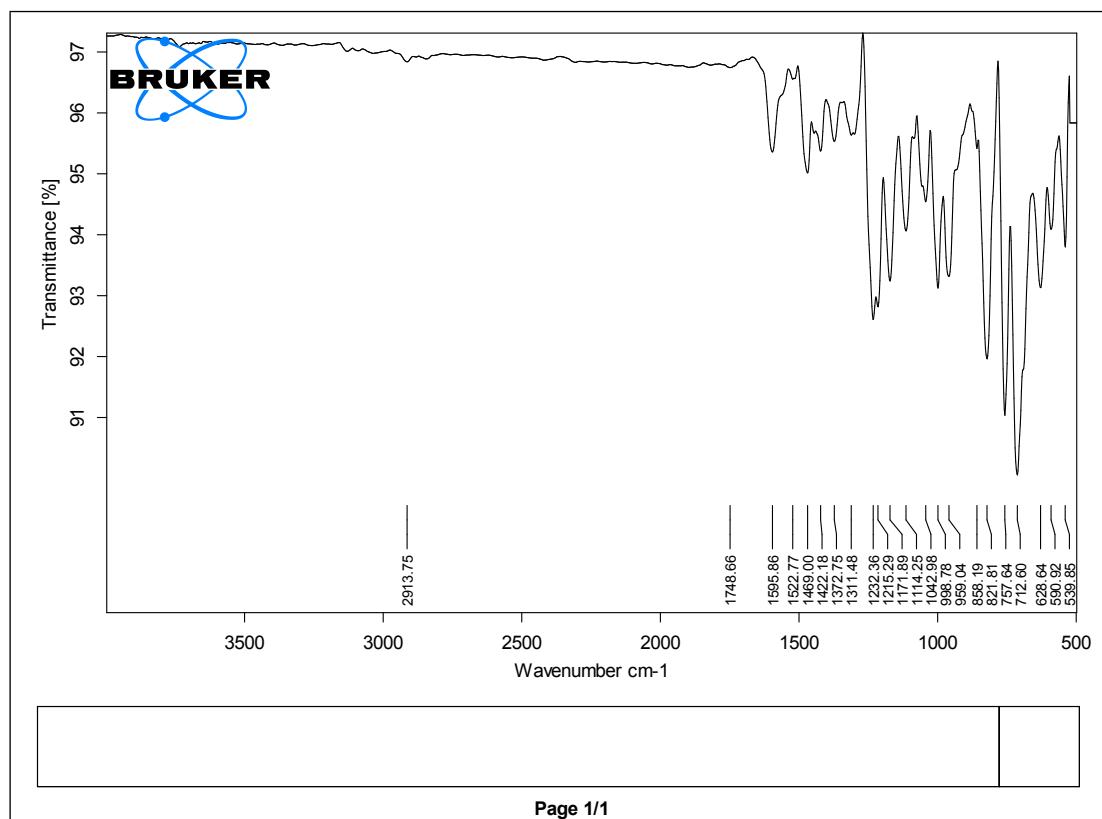
¹H NMR and ¹³C NMR of 2-(4-((1-(2-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole (5g)



HRMS of 2-(4-((1-(2-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole (**5g**)

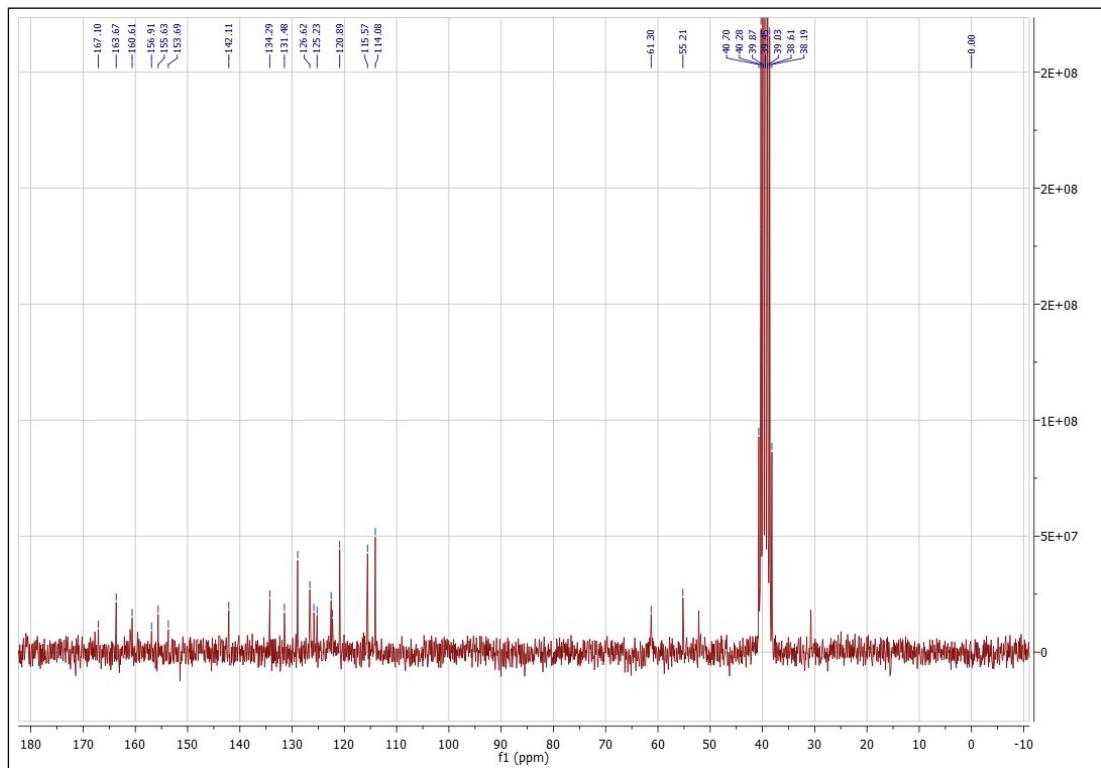
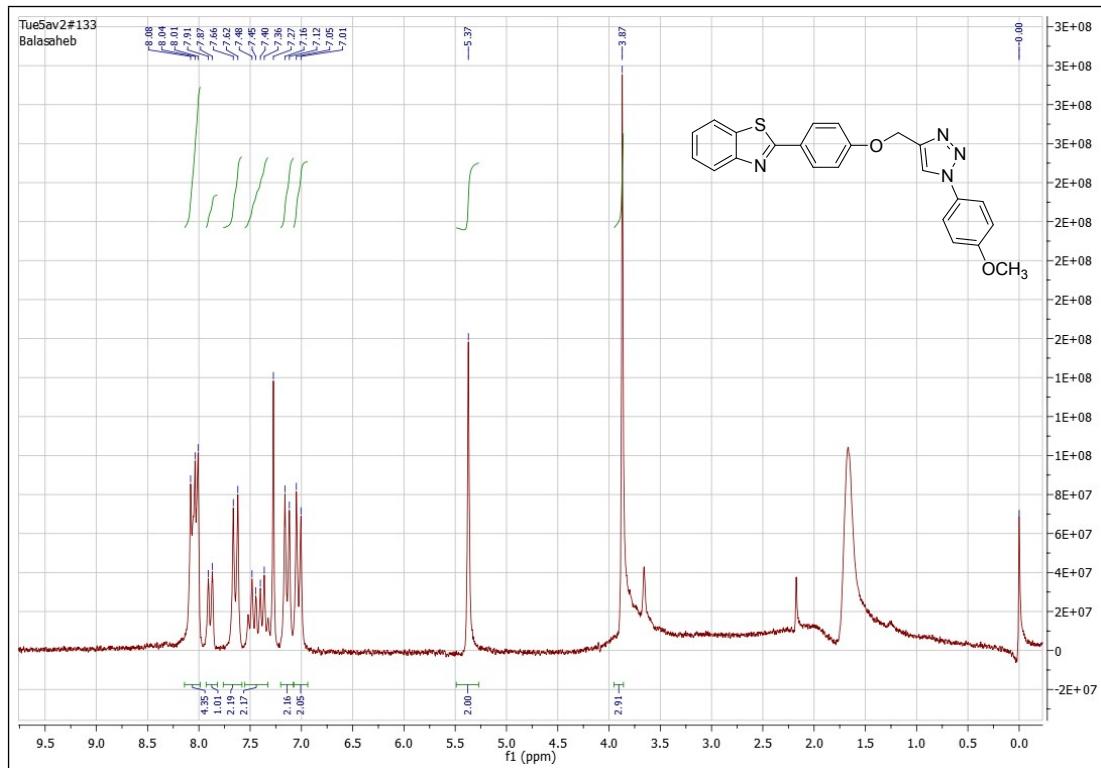


IR of 2-(4-((1-(2-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole (**5g**)

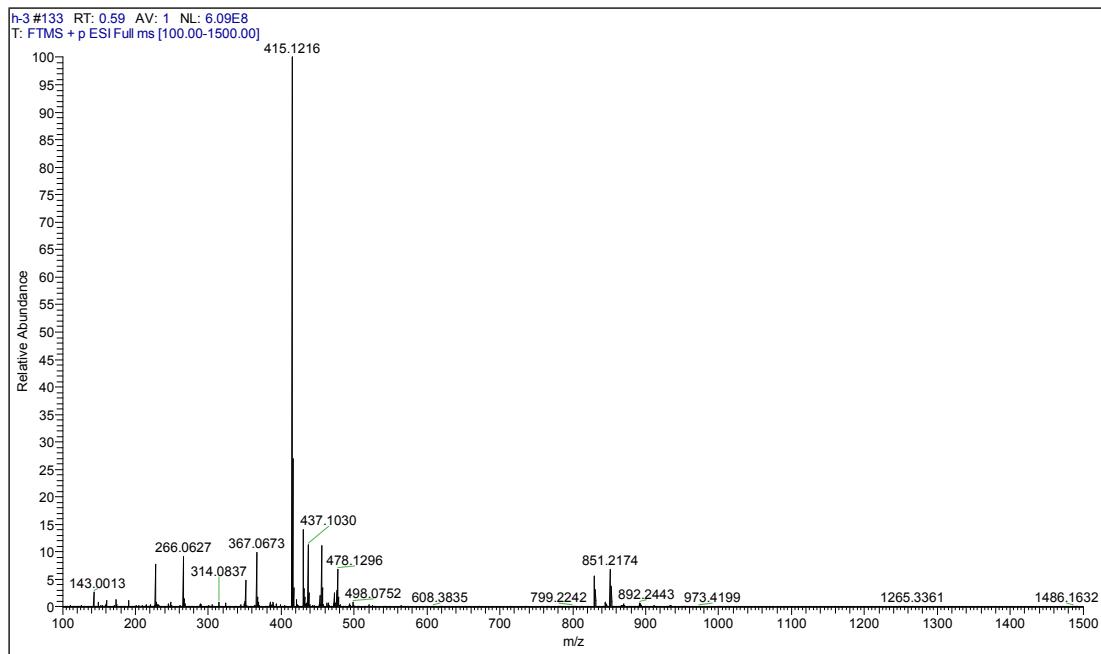


4.1.2.8 2-(4-((1-(4-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5h)

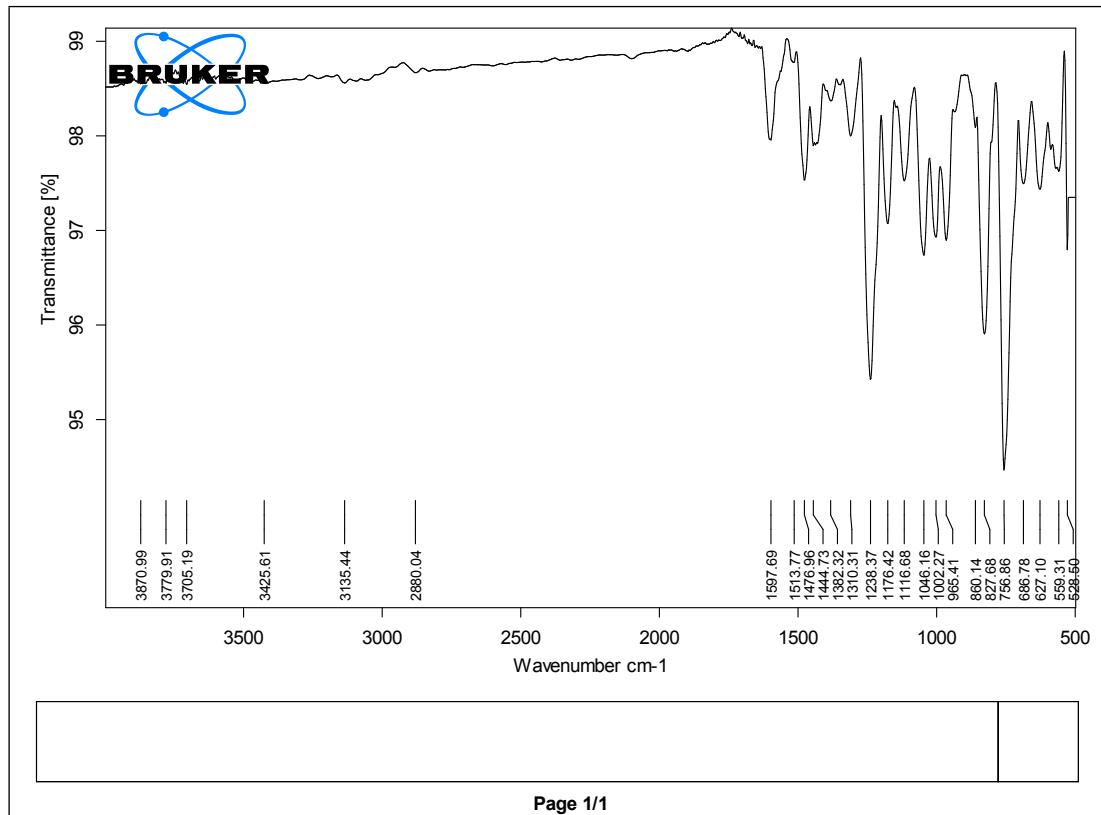
¹H NMR and ¹³C NMR of 2-(4-((1-(4-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5h)



HRMS of 2-((1-(4-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole (**5h**)

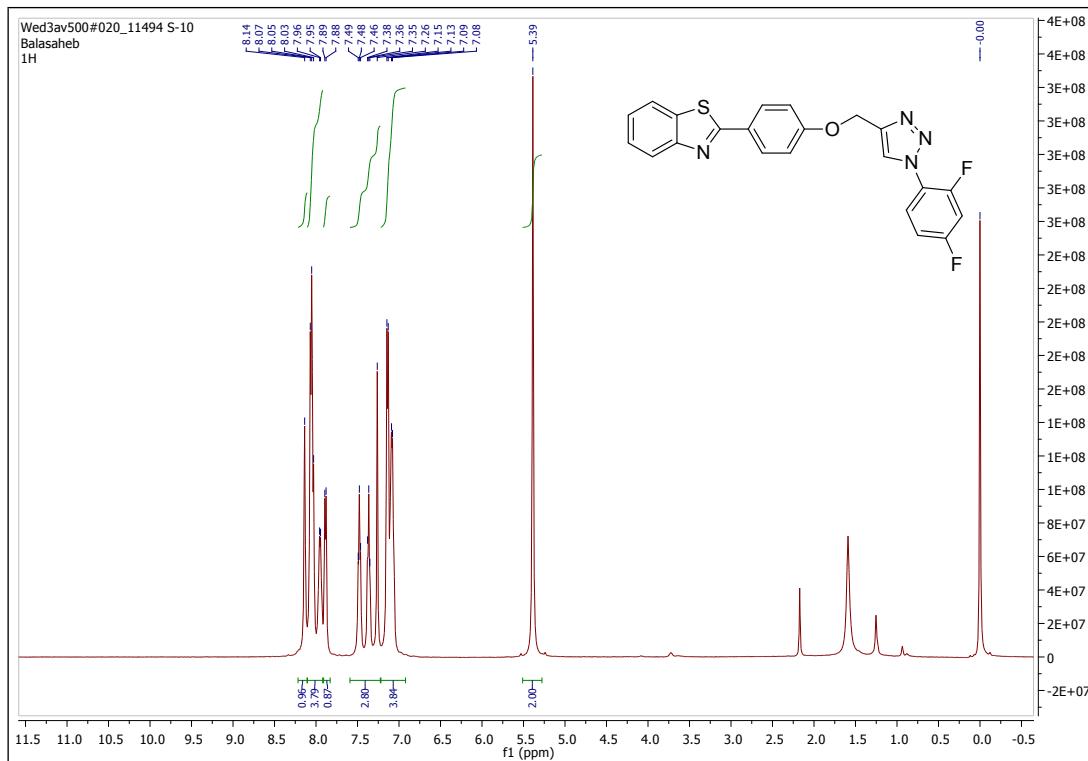


IR of 2-((1-(4-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole (**5h**)

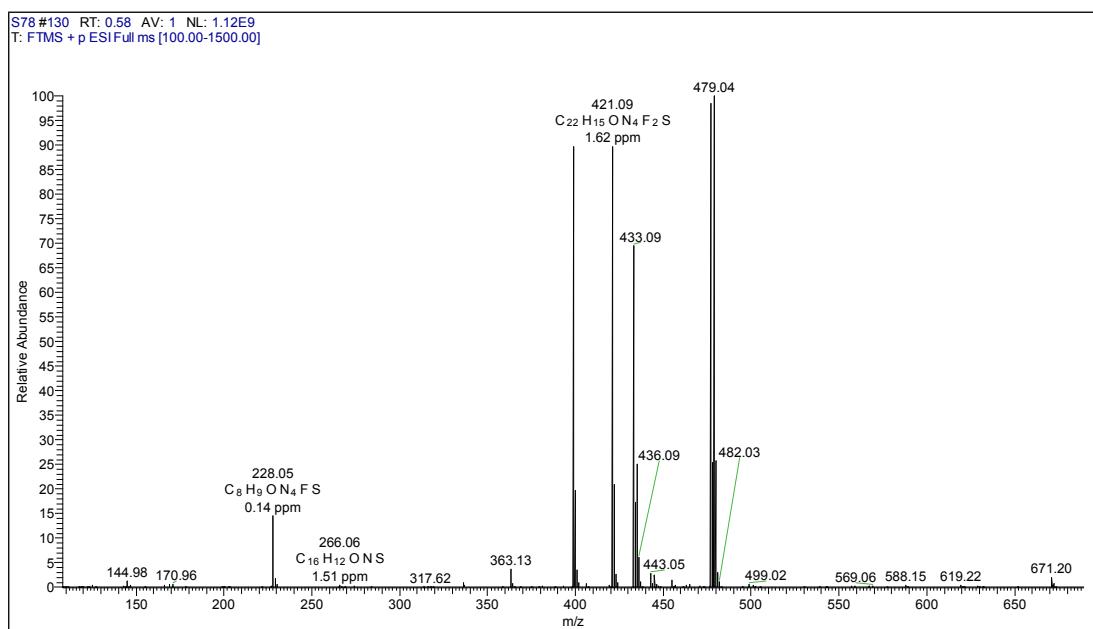


4.1.2.9 2-(4-((1-(2,4-Difluorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5i)

¹H NMR and ¹³C NMR of 2-(4-((1-(2,4-Difluorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5i)

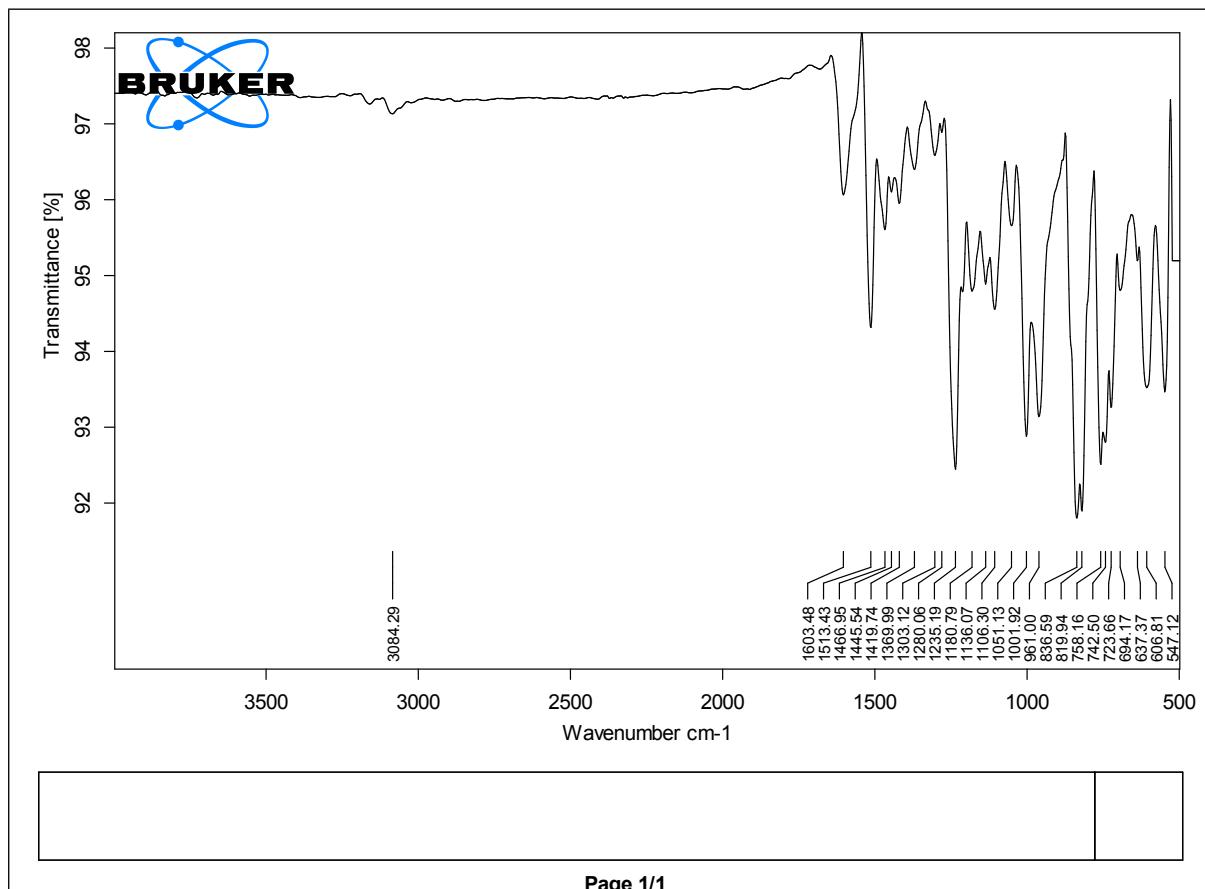


LCMS of 2-(4-((1-(2,4-Difluorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5i)



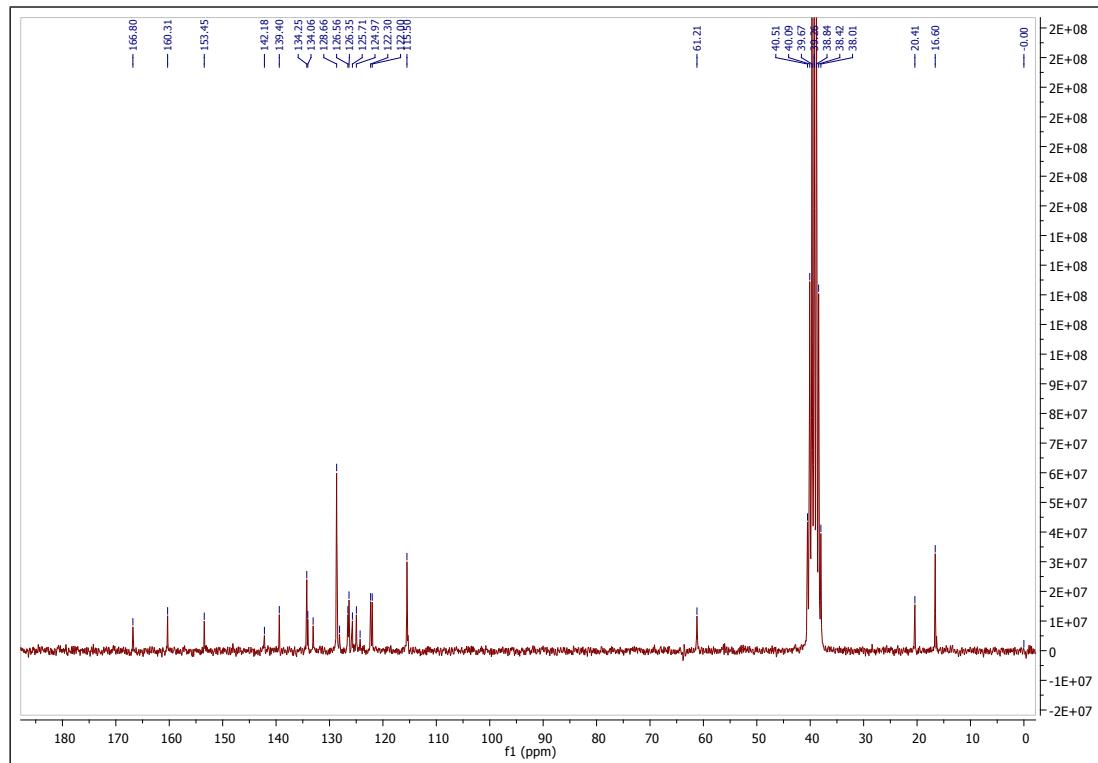
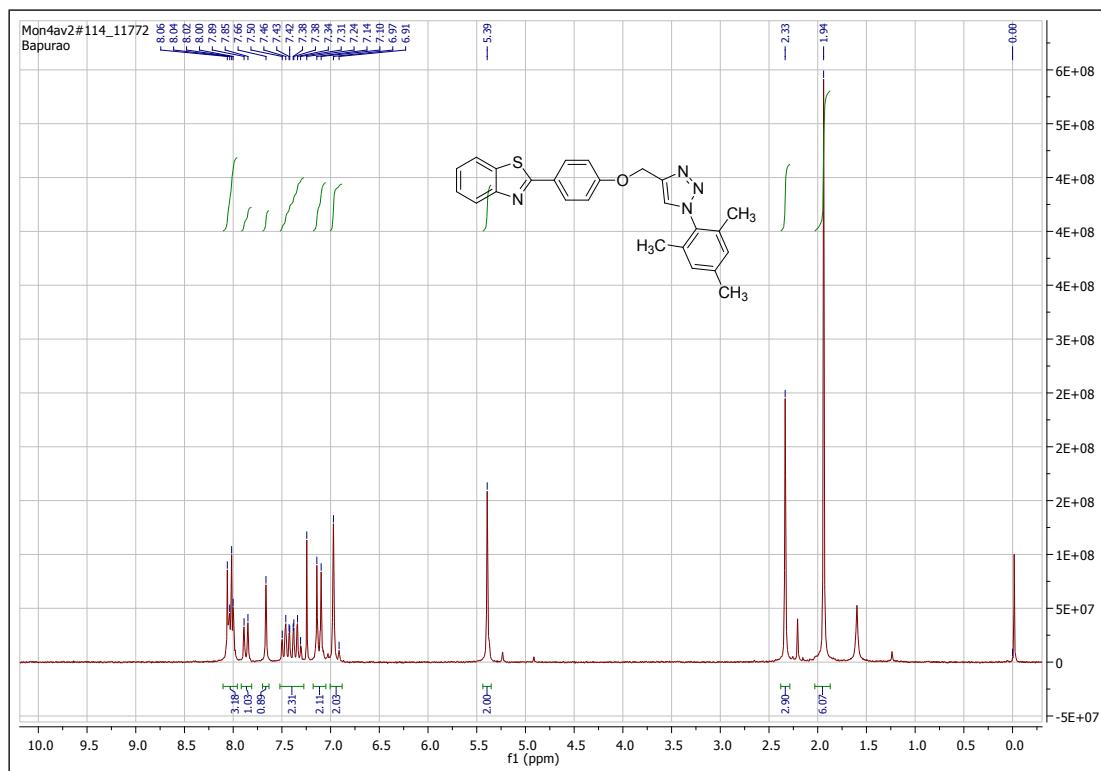
IR of 2-(4-((1-(2,4-Difluorophenyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole

(5i)

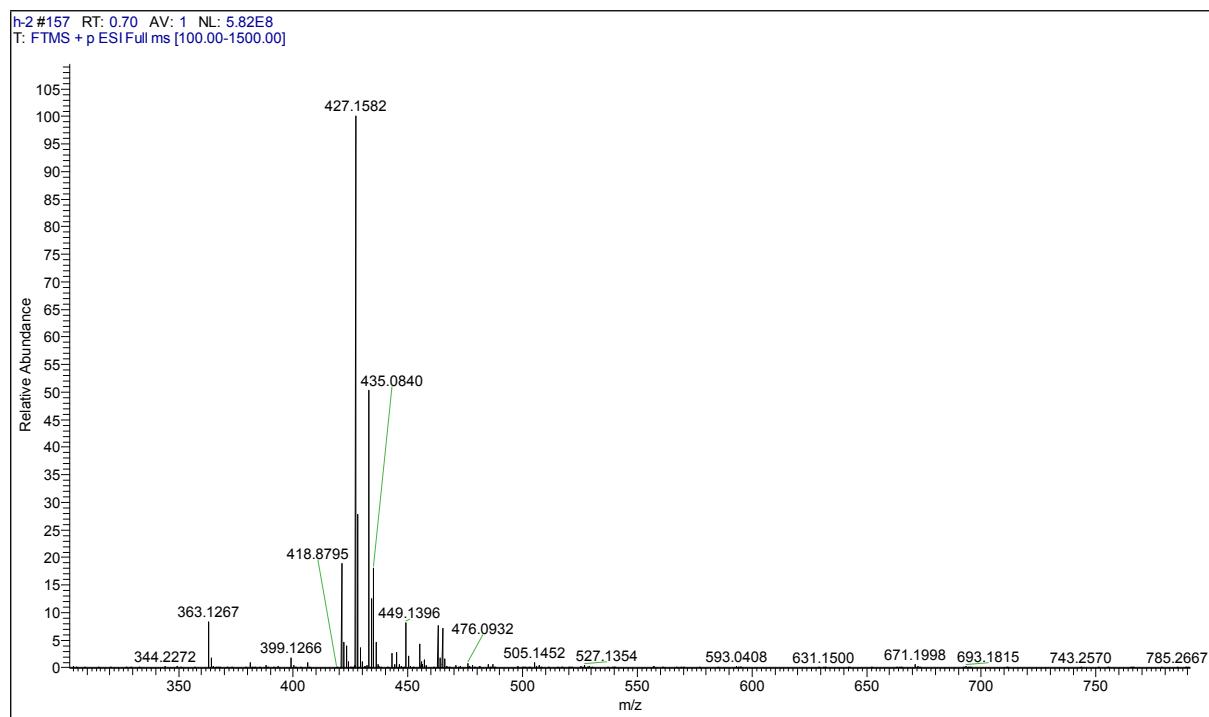


4.1.2.10 2-(4-((1-Mesityl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5j)

¹H NMR and ¹³C NMR of 2-(4-((1-Mesityl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5j)

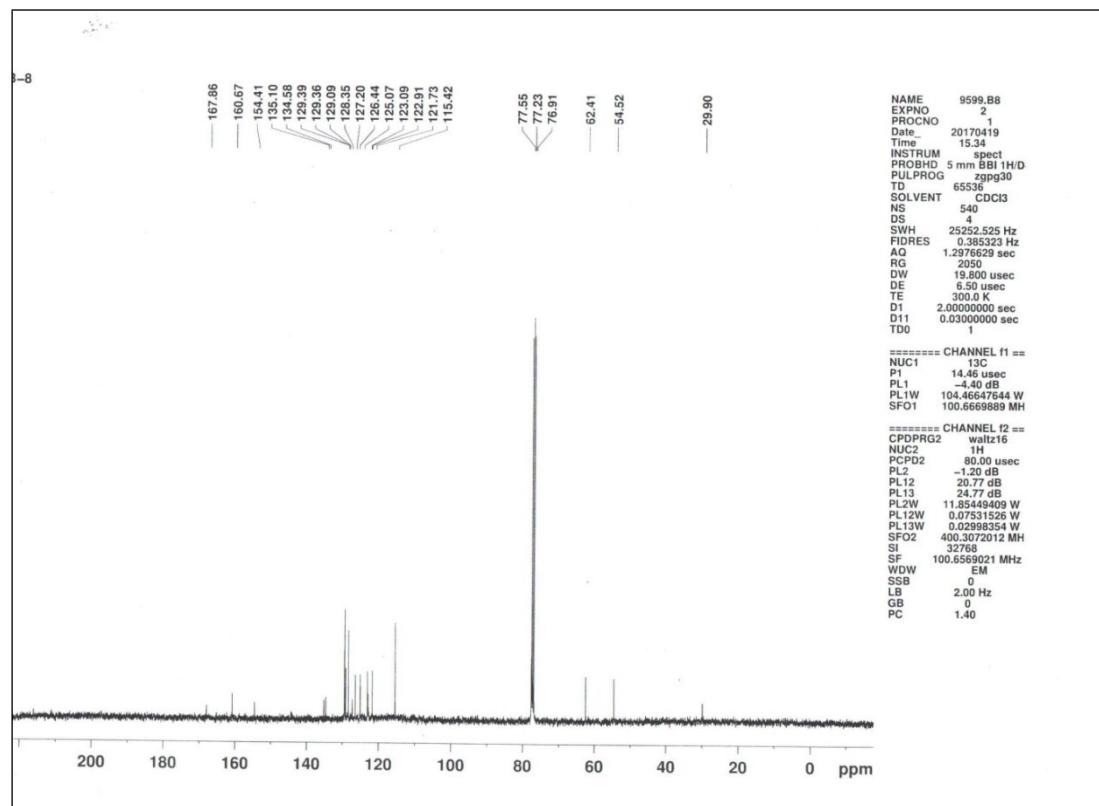
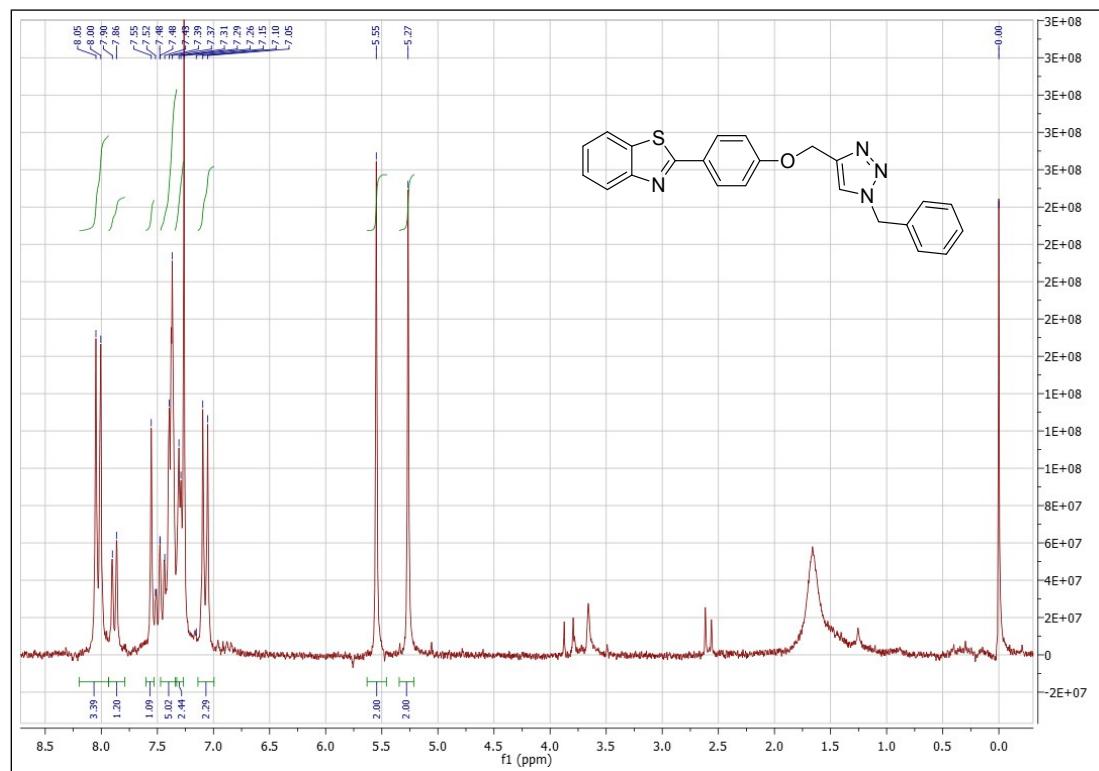


HRMS of 2-((4-((1-Mesityl-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole (**5j**)

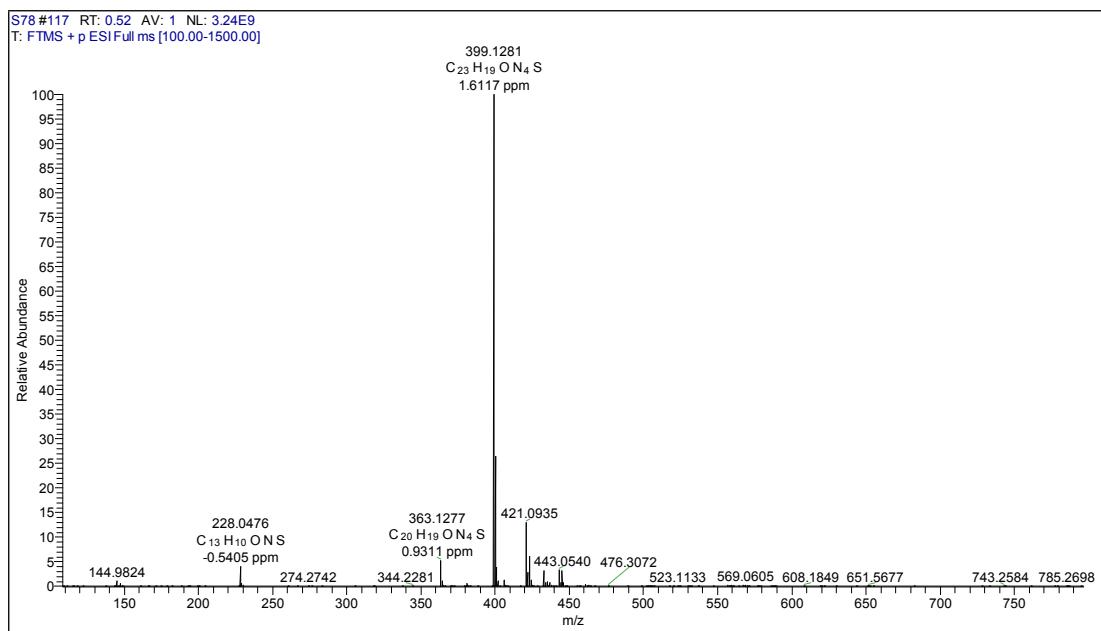


4.1.2.11 2-(4-((1-Benzyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5k**)

¹H NMR and ¹³C NMR 2-(4-((1-Benzyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5k**)

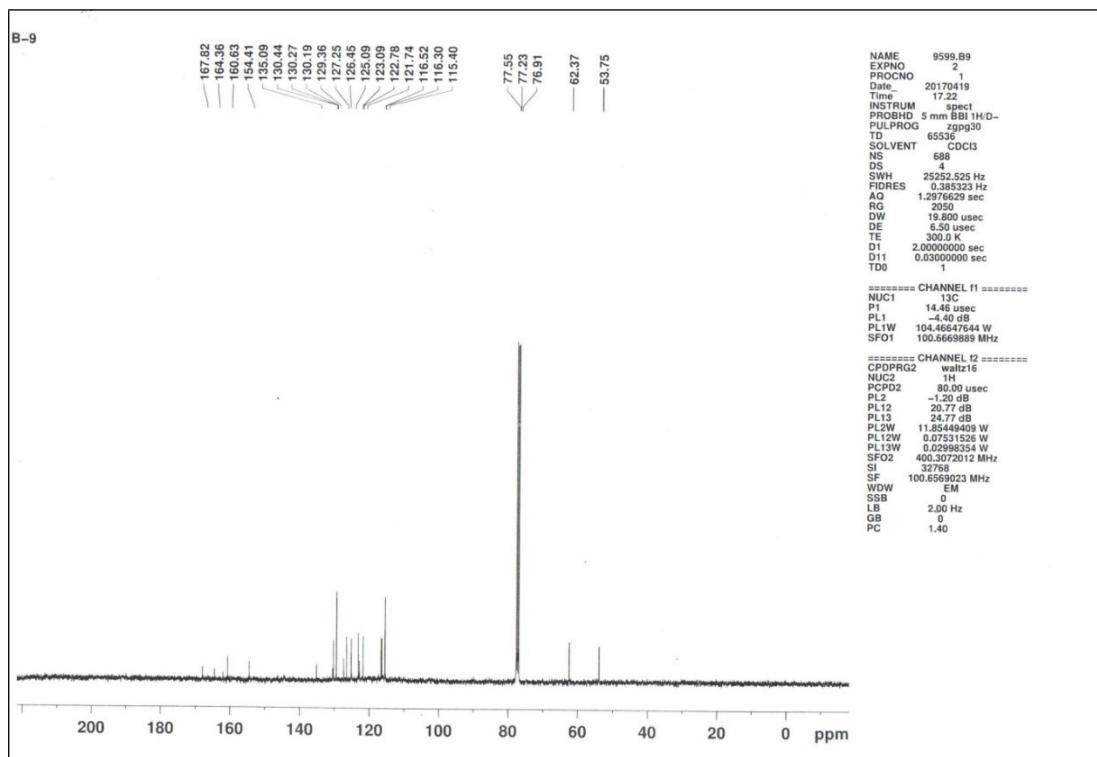
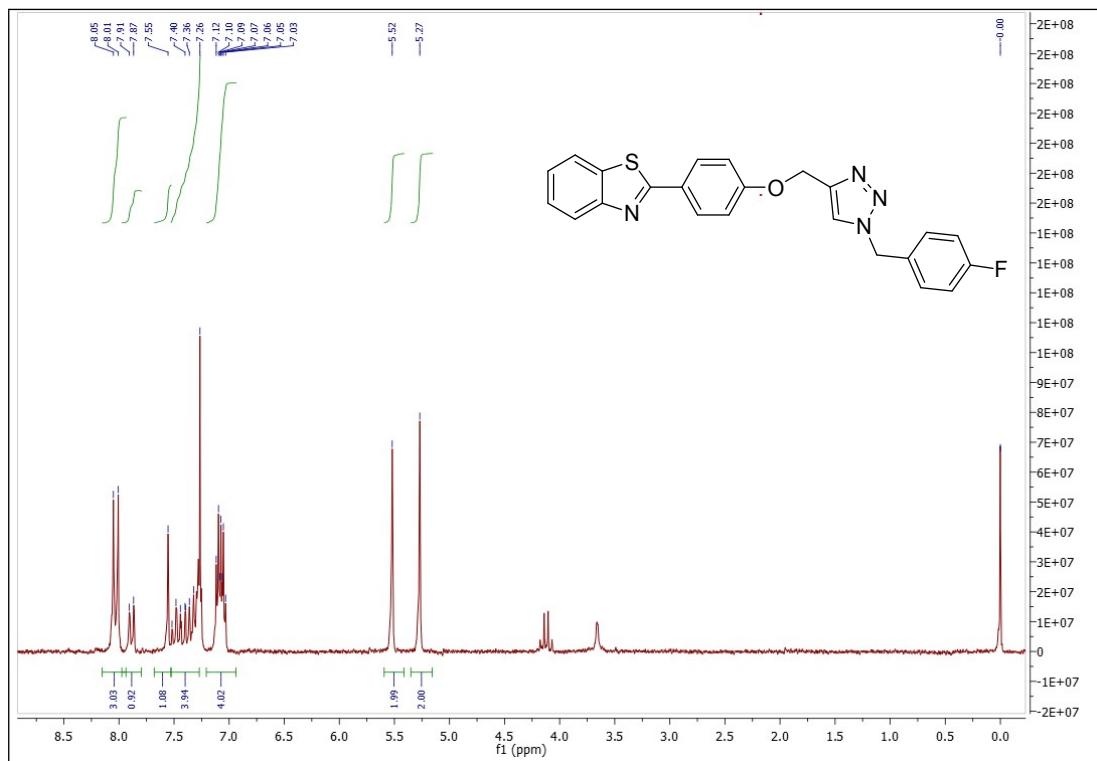


HRMS of 2-(4-((1-Benzyl-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (**5k**)

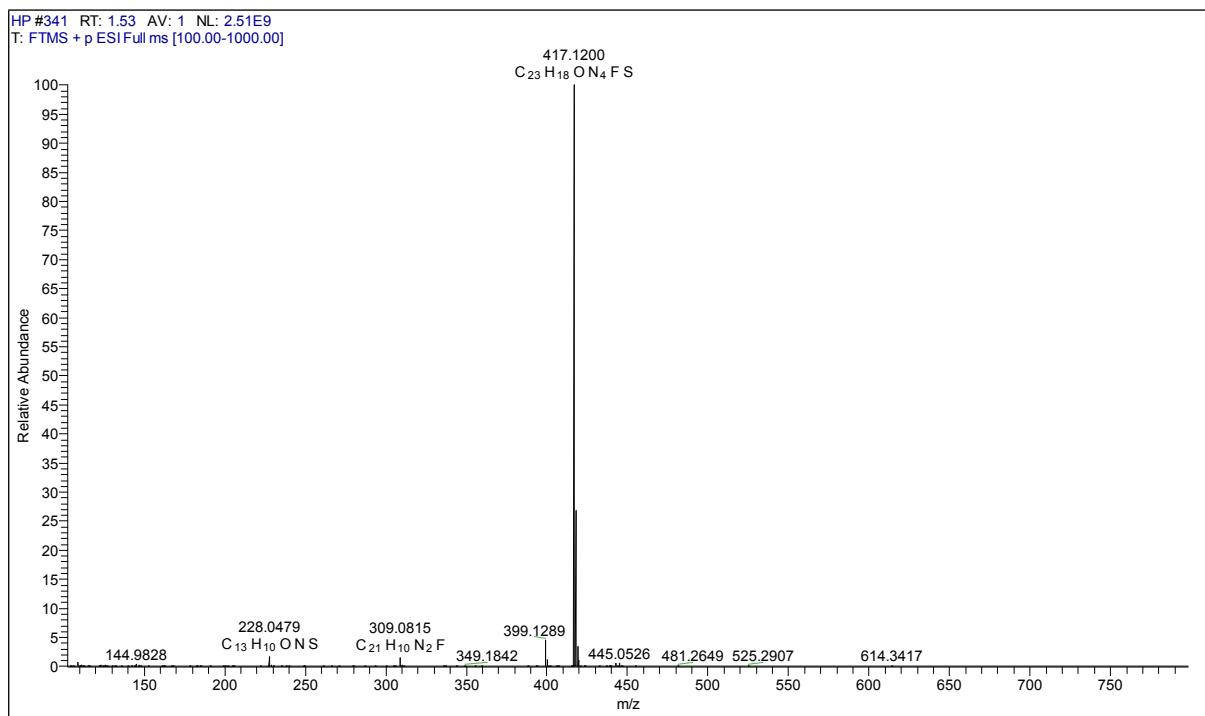


4.1.2.12 2-(4-((1-(4-Fluorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d] thiazole (5l)

¹H NMR and ¹³C NMR of 2-(4-((1-(4-Fluorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d] thiazole (5l)

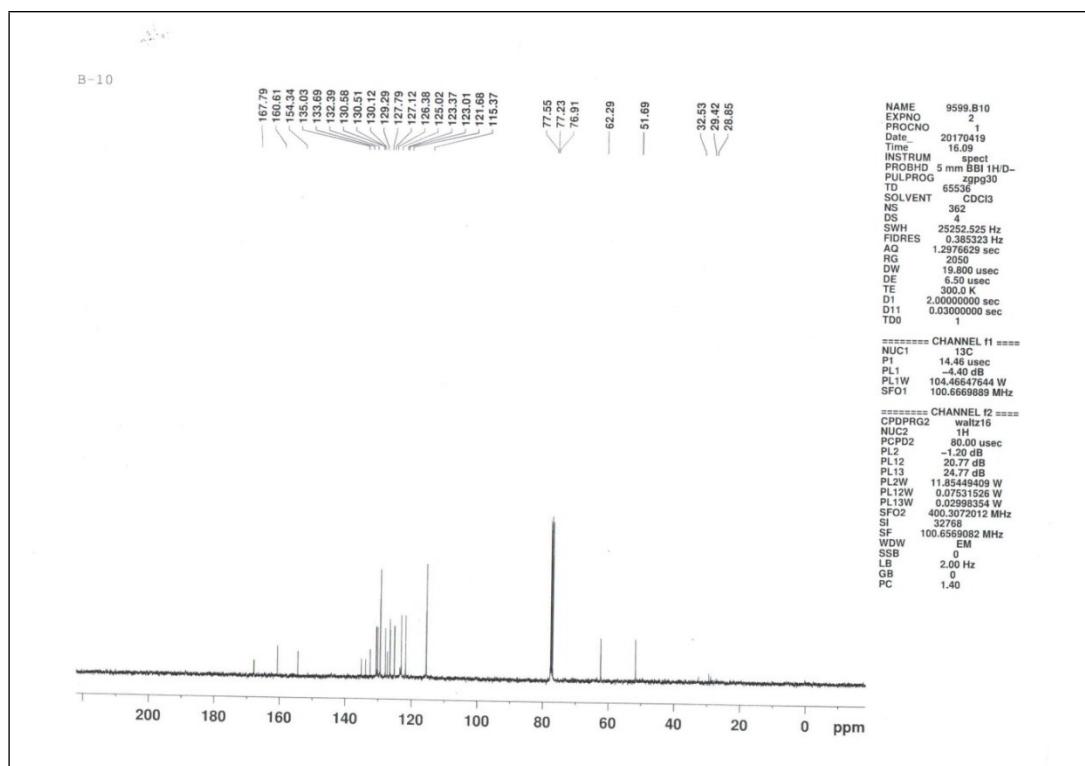
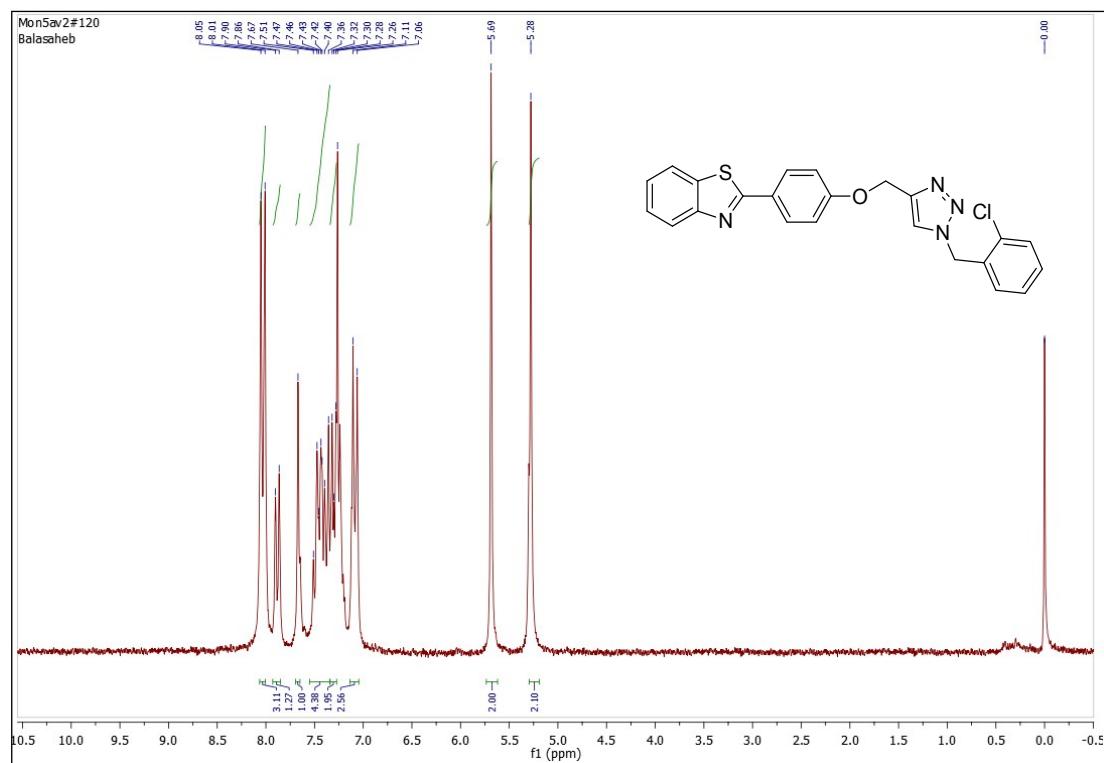


HRMS of 2-((4-((1-(4-Fluorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole
(5l)

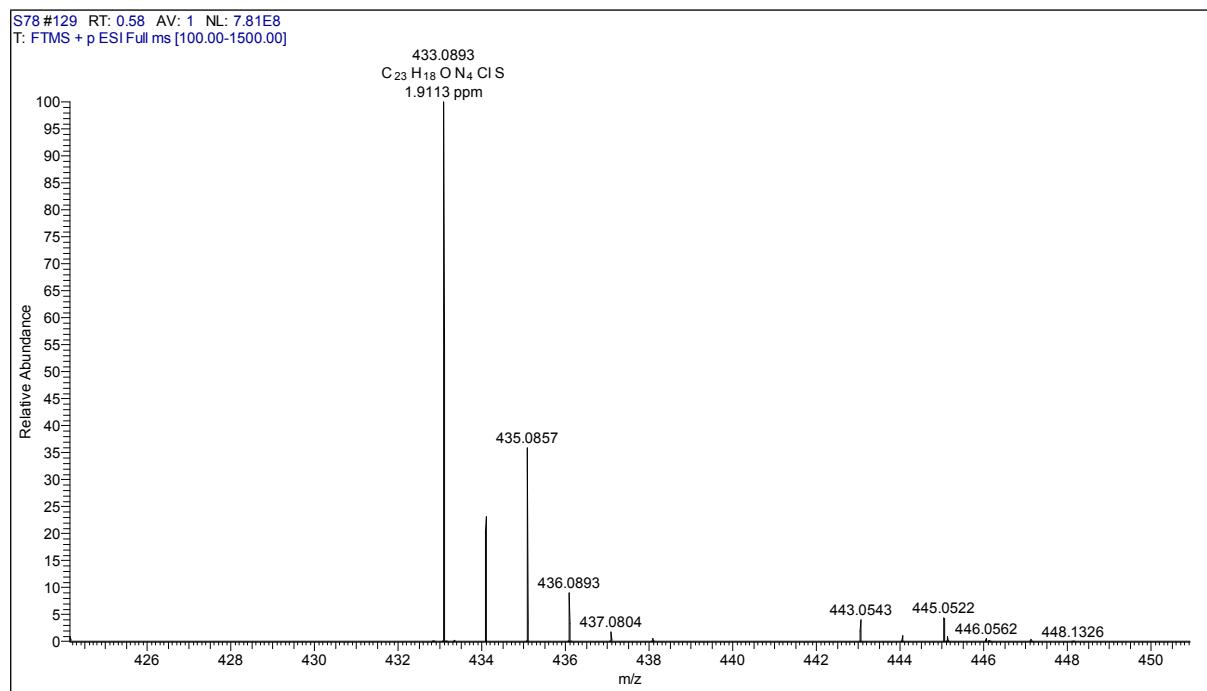


4.1.2.13 2-(4-((1-(2-Chlorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5m)

¹H NMR and ¹³C NMR of 2-(4-((1-(2-Chlorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5m)

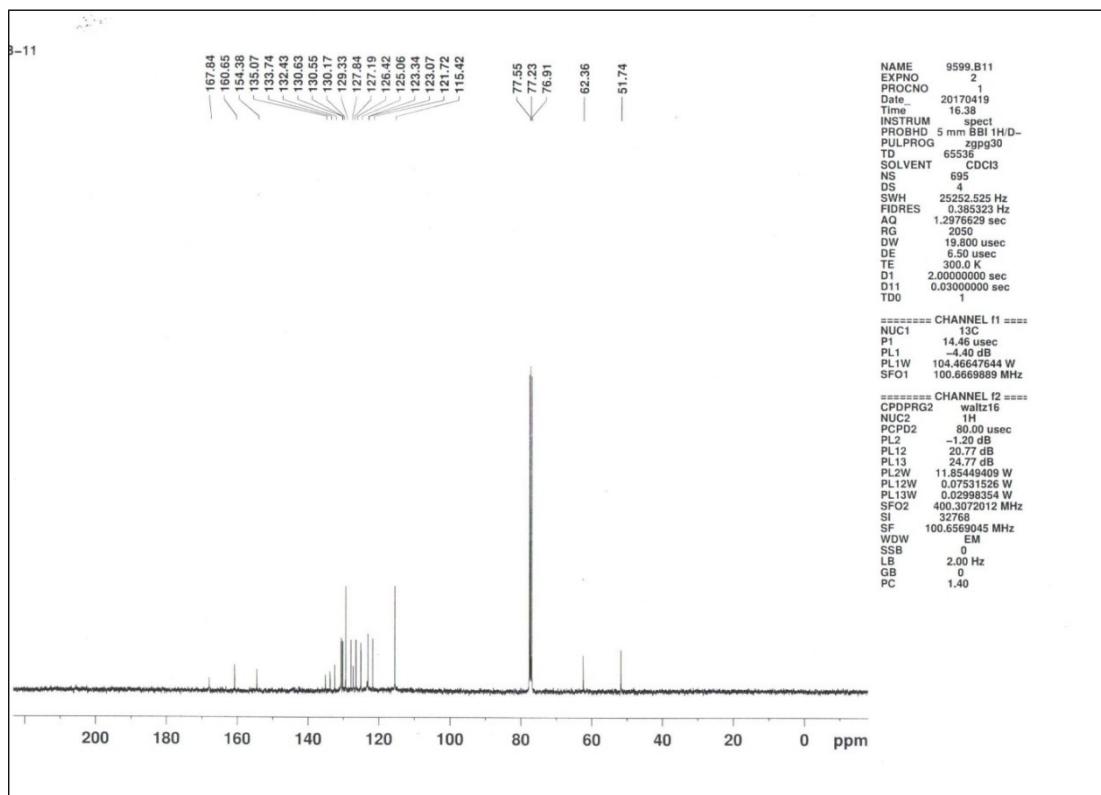
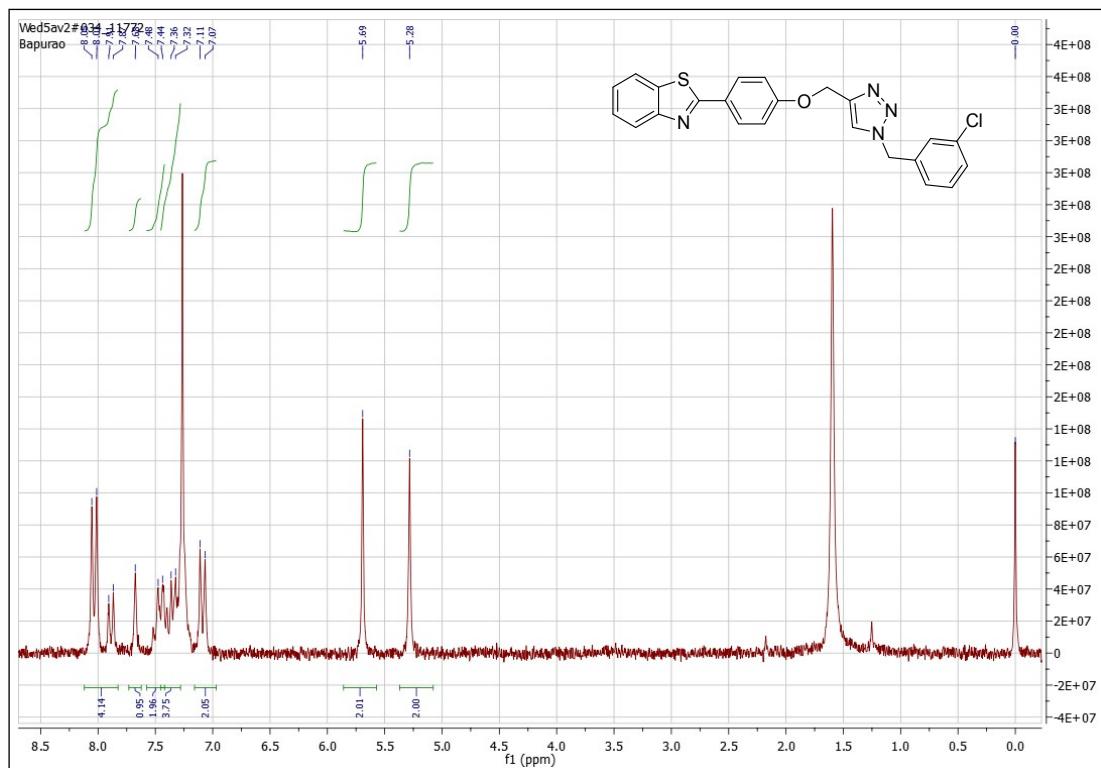


HRMS of 2-((4-((1-(2-Chlorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole
(5m)

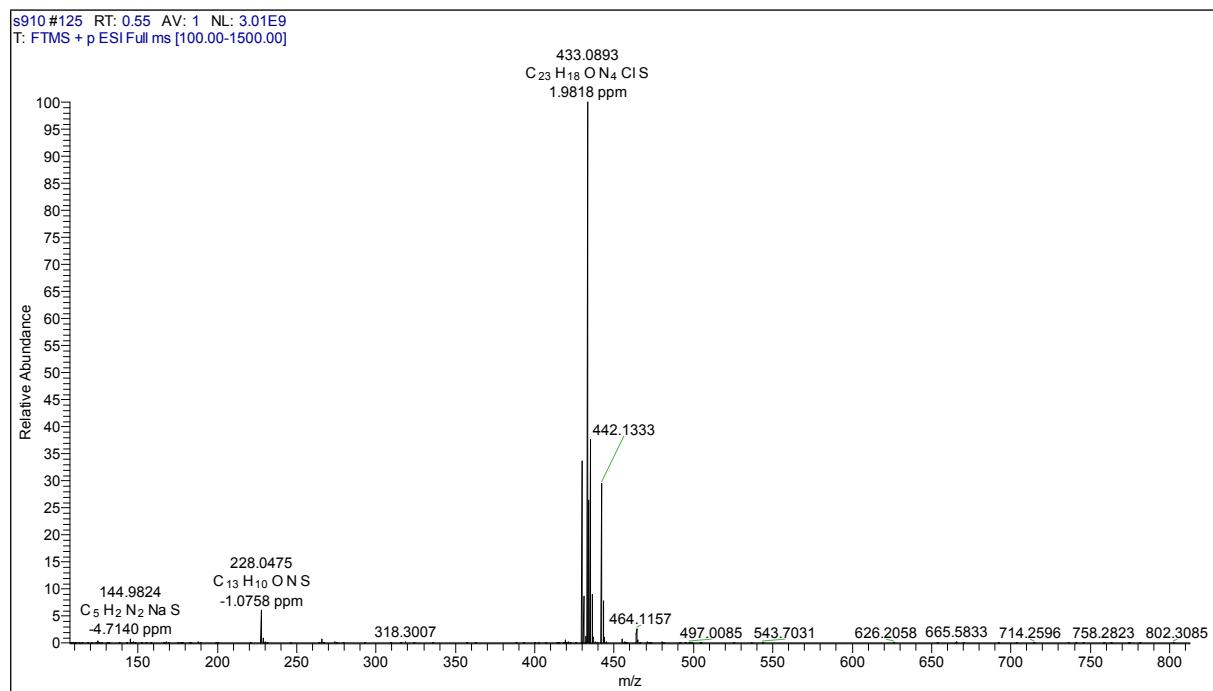


4.1.2.14 2-(4-((1-(3-Chlorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5n)

¹H NMR and ¹³C NMR 2-(4-((1-(3-Chlorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5n)

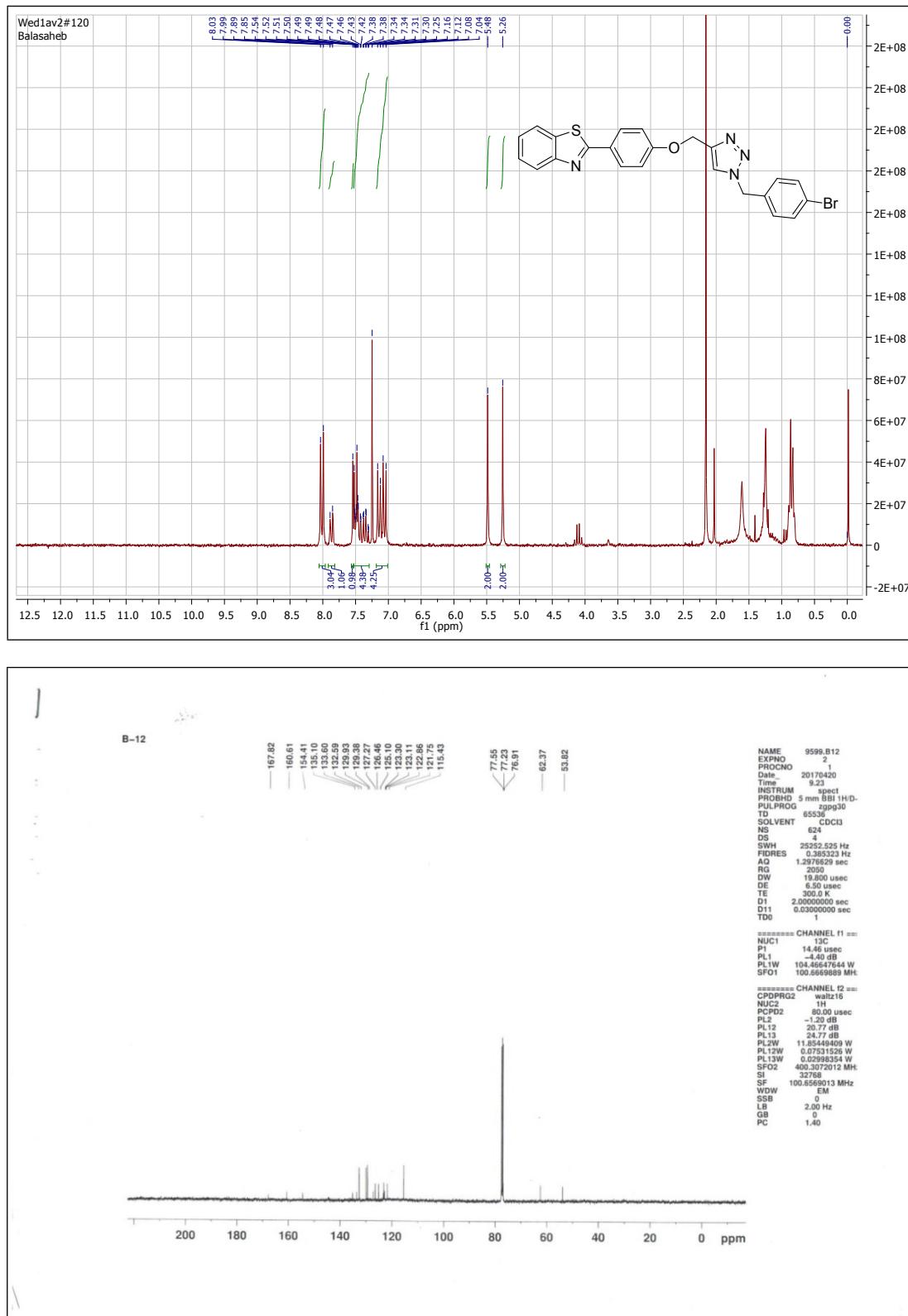


HRMS of 2-((4-((1-(3-Chlorobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole
(5n)

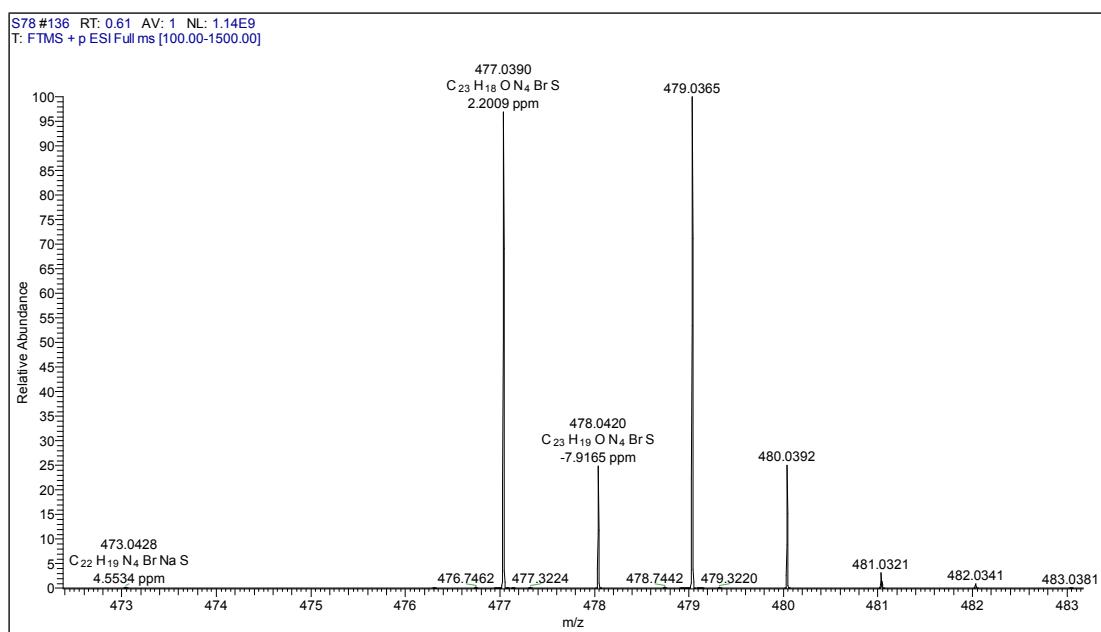


4.1.2.15 2-(4-((1-(4-Bromobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d]thiazole (5o)

¹H NMR and ¹³C NMR of 2-(4-((1-(4-Bromobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl)benzo[d] thiazole (5o)

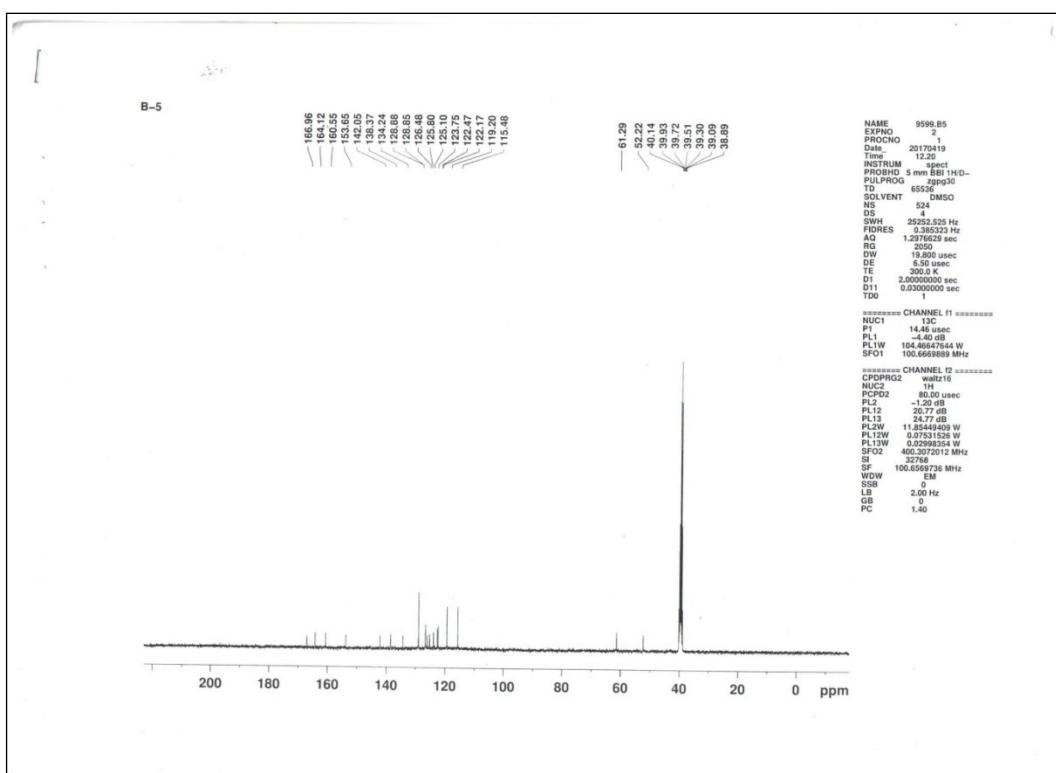
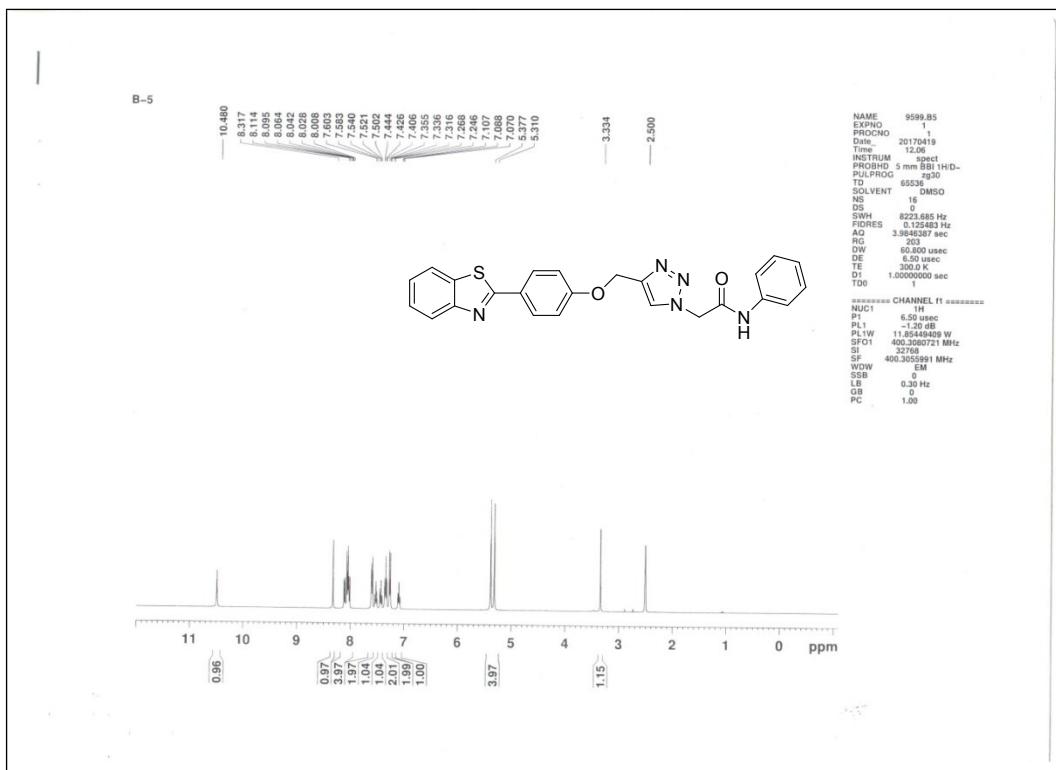


HRMS of 2-((4-((1-(4-Bromobenzyl)-1H-1,2,3-triazol-4-yl)methoxy)phenyl) benzo[d]thiazole
(5o)

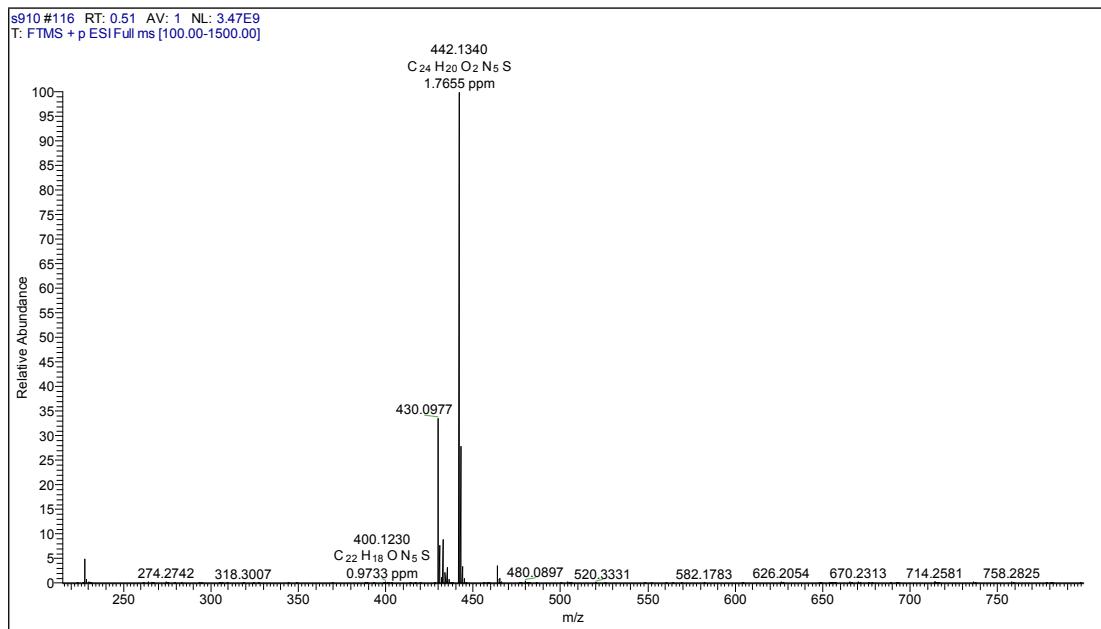


4.1.2.16 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-phenyl acetamide (5p)

¹H NMR and ¹³C NMR of 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-phenyl acetamide (5p)

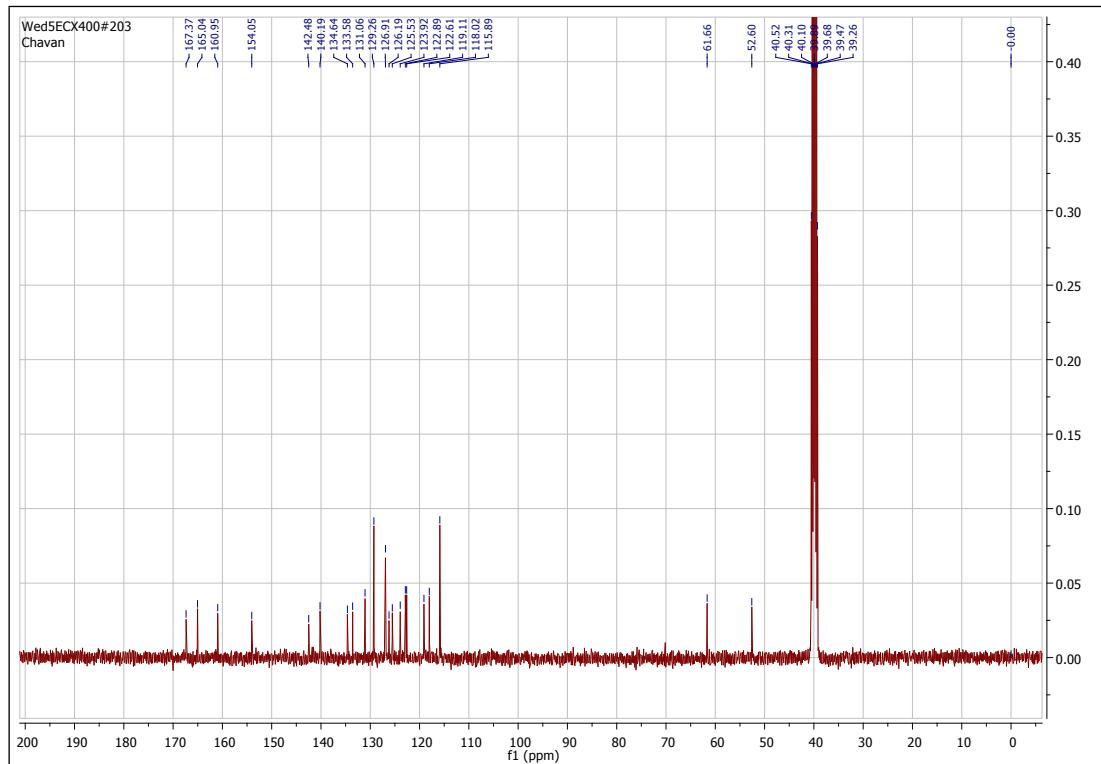
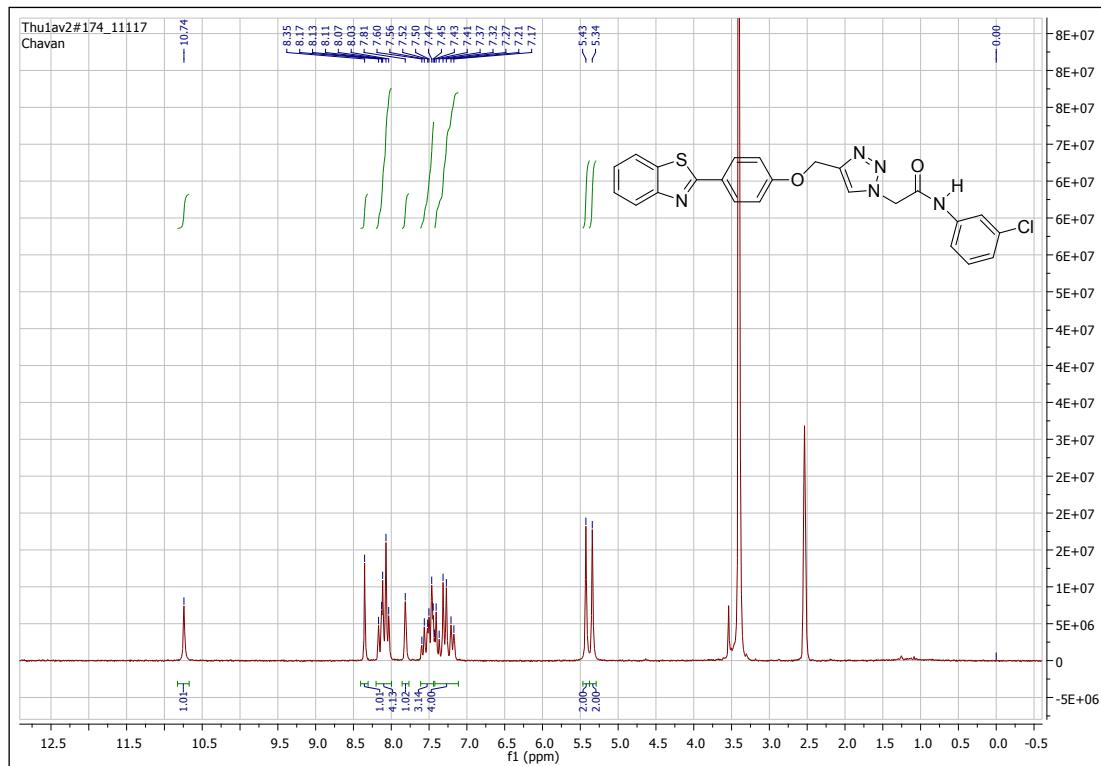


HRMS of 2-((4-(4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-phenyl acetamide (**5p**)

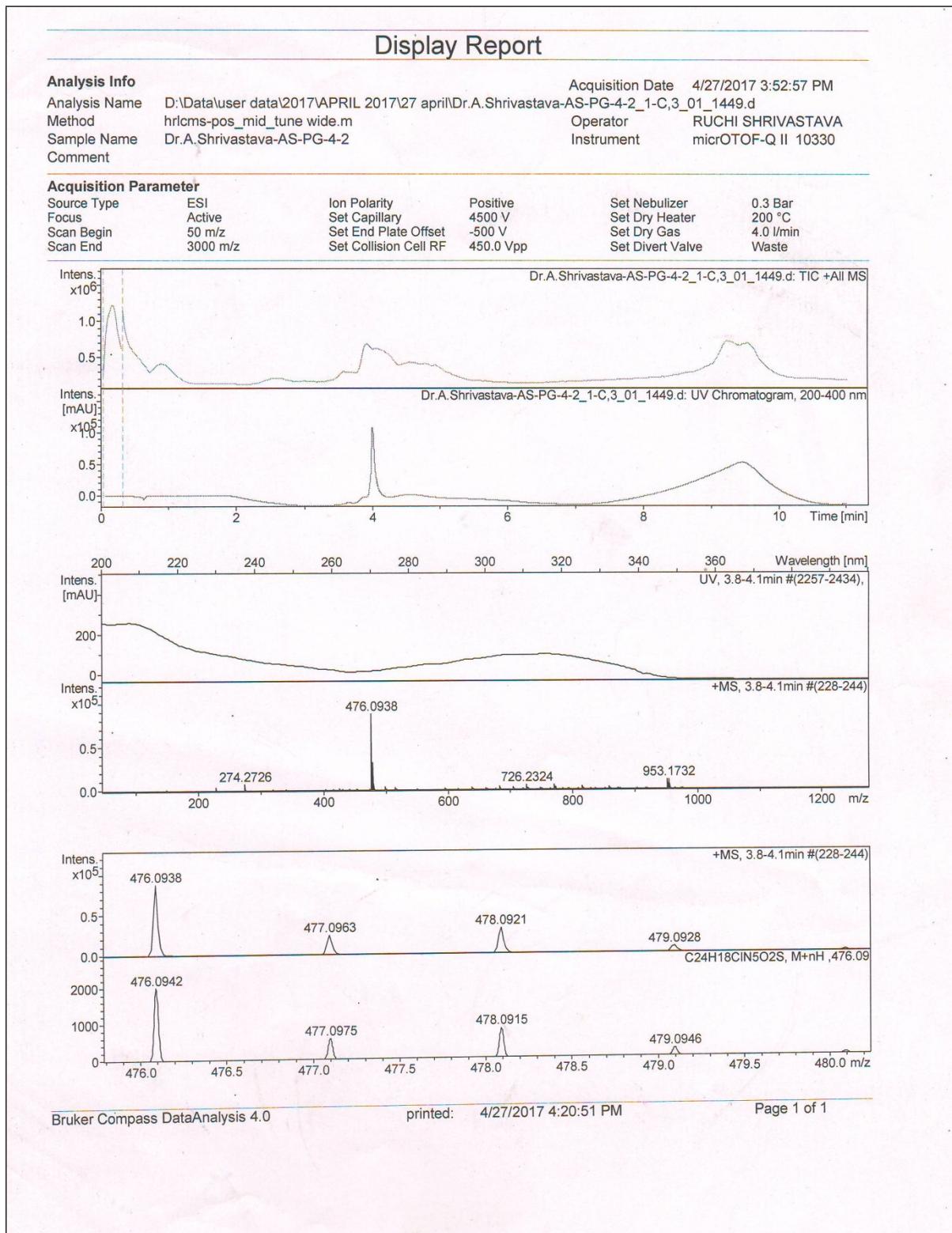


4.1.2.17 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(3-chlorophenyl) acetamide (5q**)**

¹H NMR and ¹³C NMR of 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(3-chlorophenyl)acetamide (**5q**)

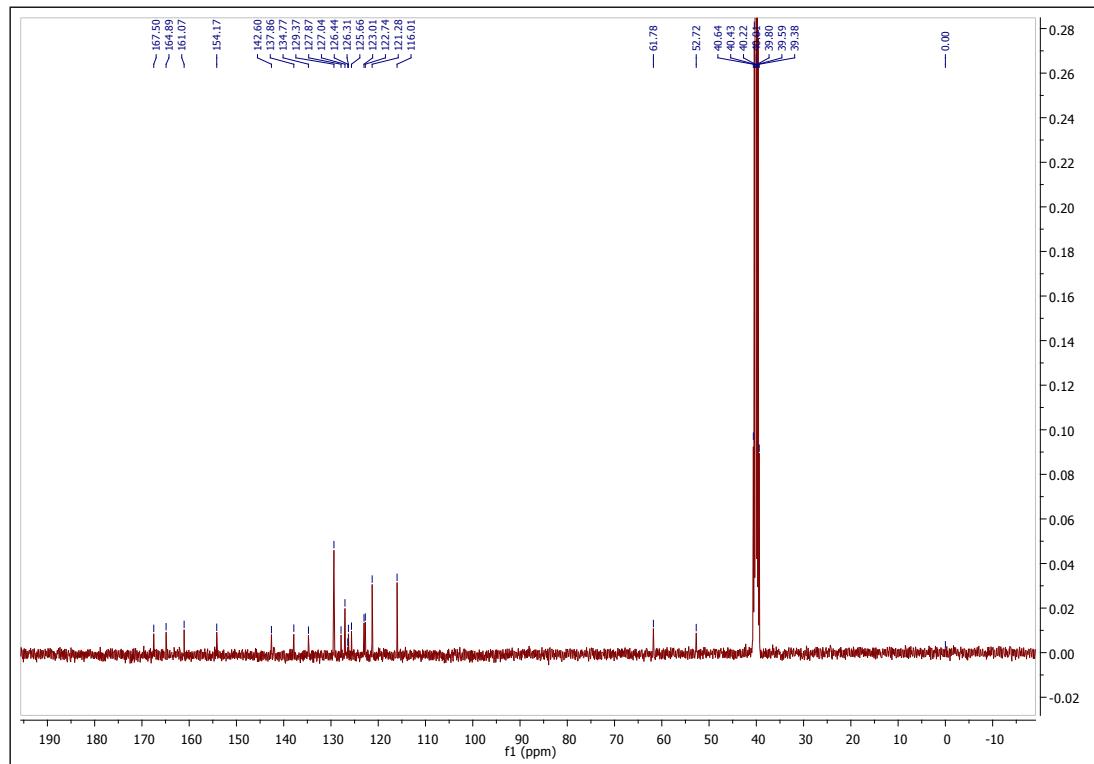
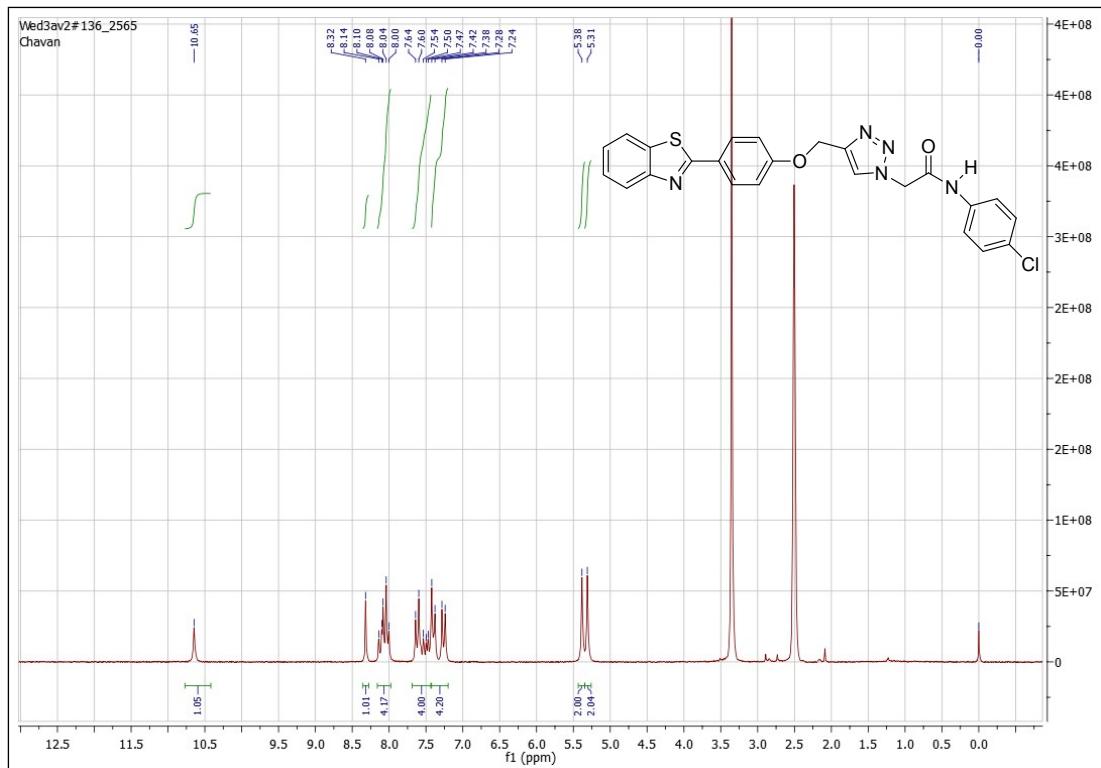


HRMS of 2-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(3-chlorophenyl)acetamide (**5q**)

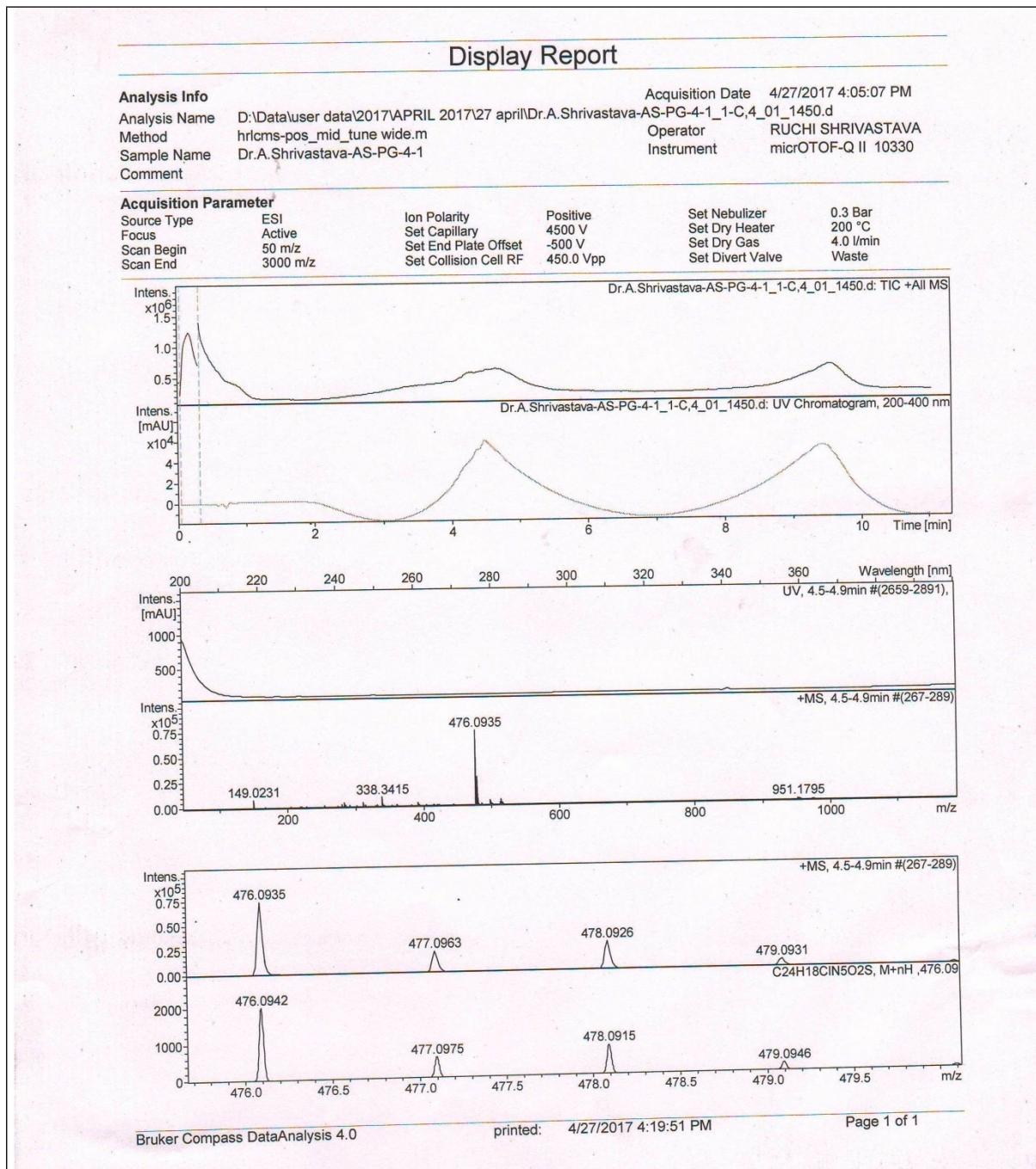


4.1.2.18 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(4-chlorophenyl)acetamide (5r)

^1H NMR and ^{13}C NMR of 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(4-chlorophenyl)acetamide (**5r**)

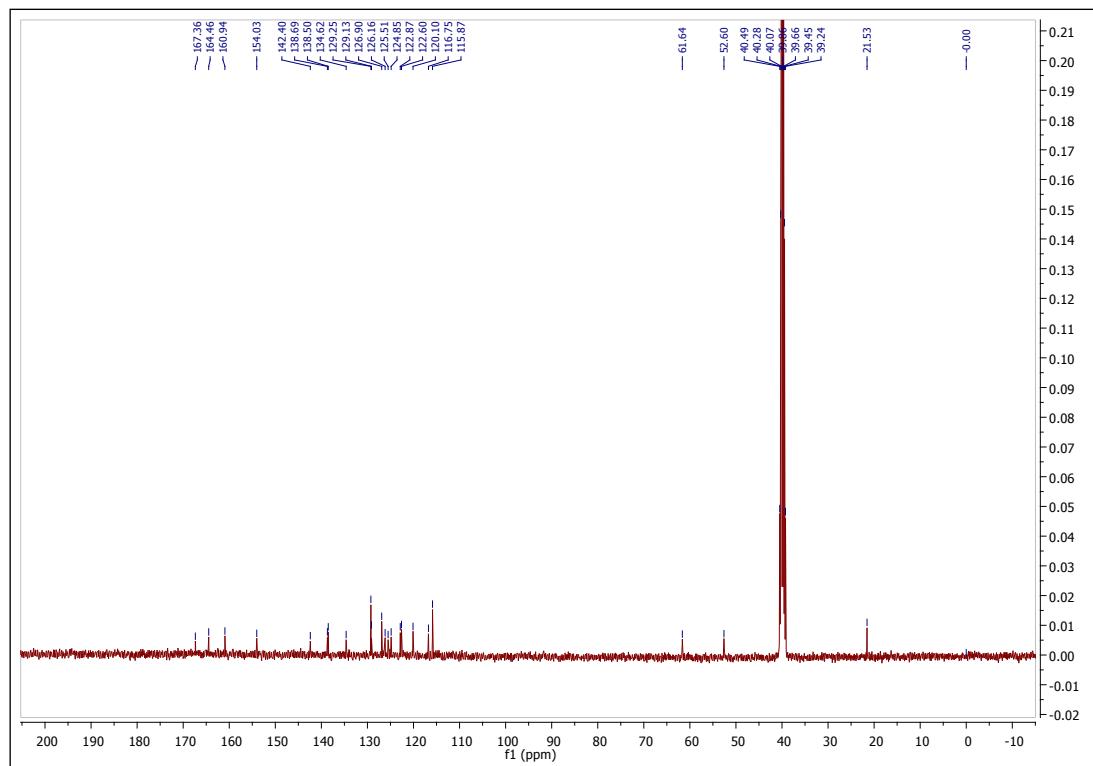
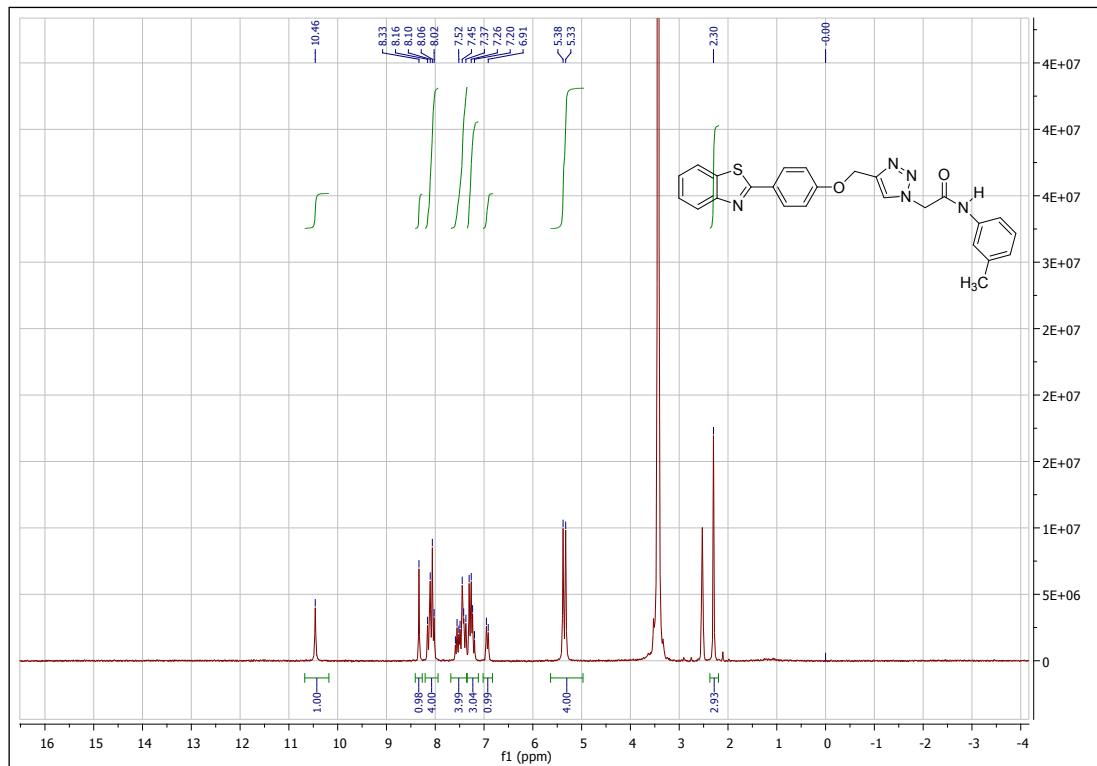


HRMS of 2-((4-(4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(4-chlorophenyl)acetamide (5r**)**

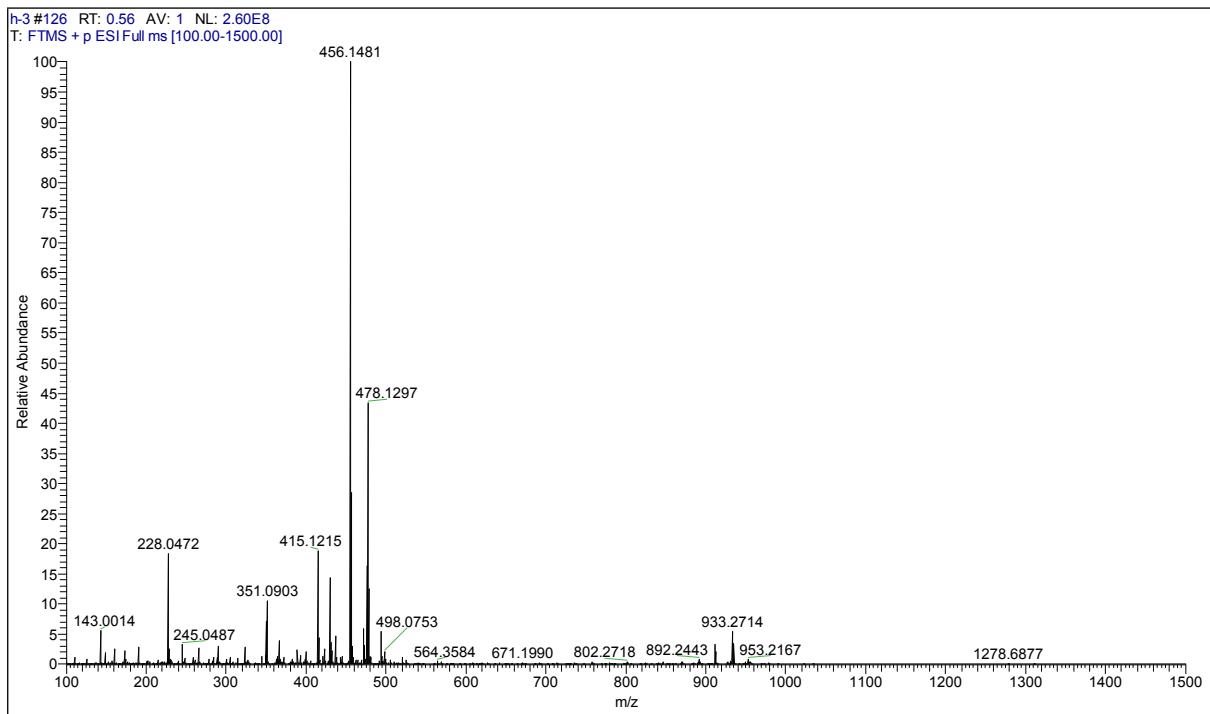


4.1.2.19 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(m-tolyl) acetamide (5s**)**

¹H NMR and ¹³C NMR of 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(m-tolyl)acetamide (**5s**)

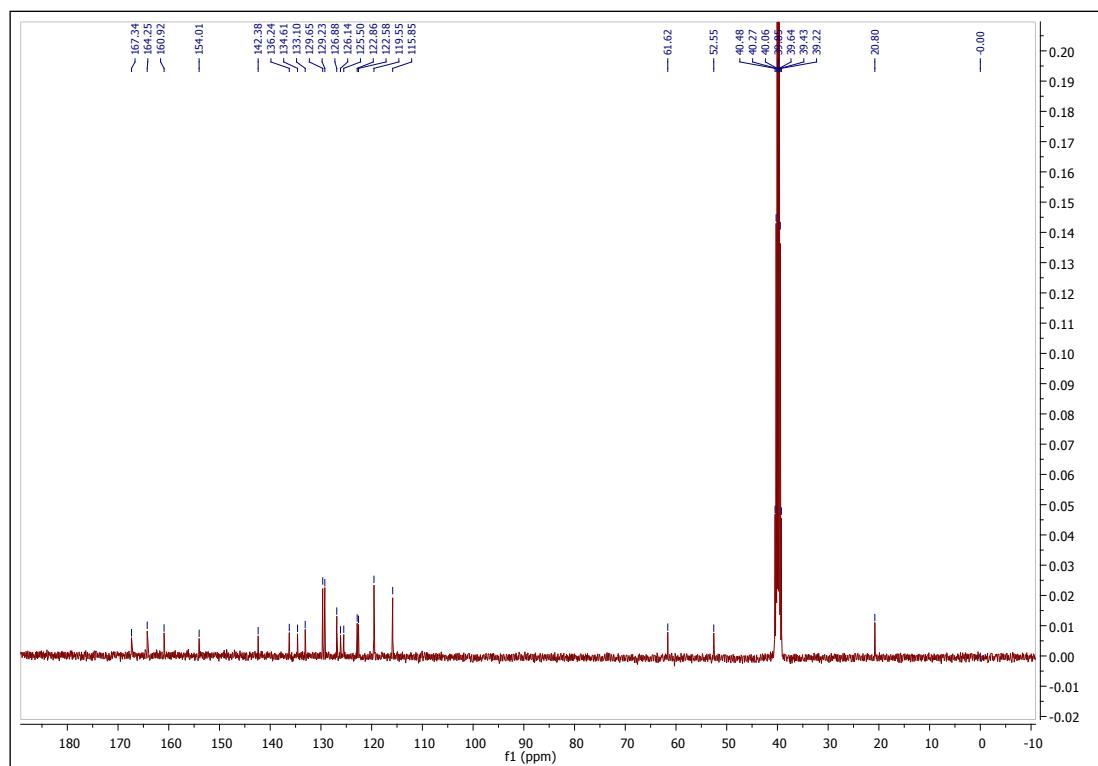
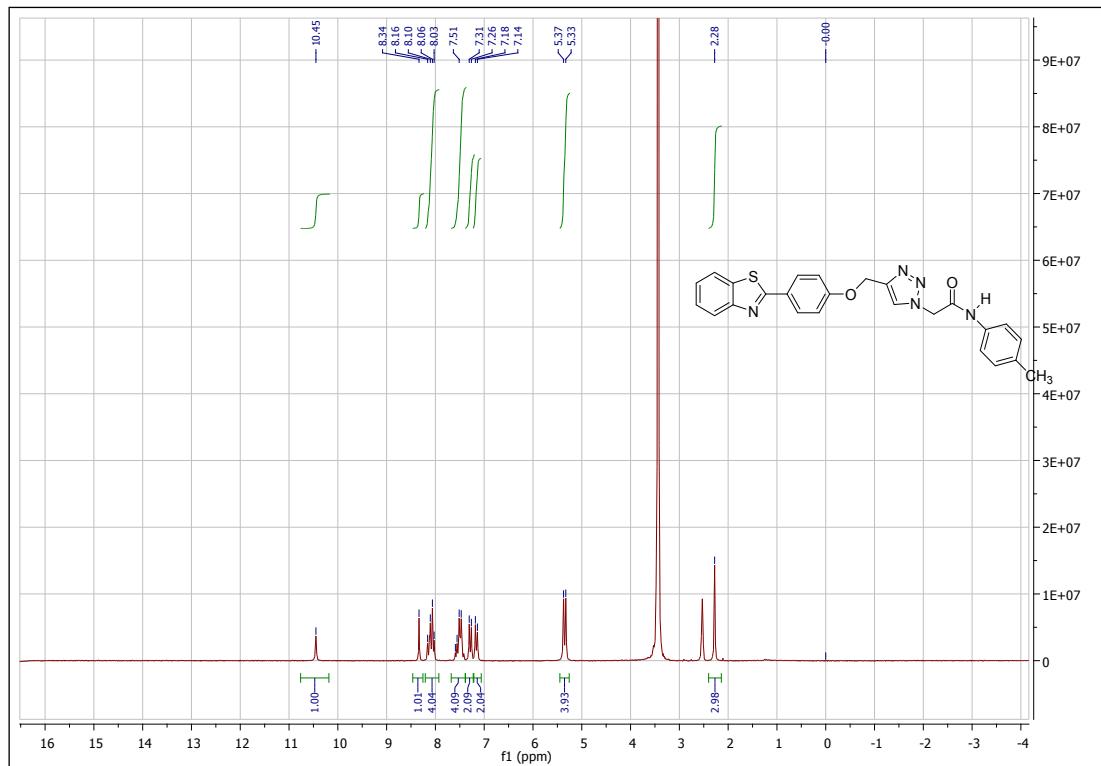


HRMS of 2-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(m-tolyl)acetamide (**5s**)



4.1.2.20 2-(4-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(p-tolyl) acetamide (5t)

¹H NMR and ¹³C NMR of 2-(4-((4-(benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(p-tolyl)acetamide (**5t**)



HRMS of 2-((4-(Benzo[d]thiazol-2-yl)phenoxy)methyl)-1H-1,2,3-triazol-1-yl)-N-(p-tolyl)acetamide (**5t**)

