A one-pot strategy for the synthesis of 2-aminobenzothiazole in water by copper catalysis

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List of Contents

1. General Remarks S2

2. Crystallographic description S3-S4

3. Spectral data (^{1}H NMR, ^{13}C NMR and HRMS) of compounds S5-S14

4. Copeies of Spectra (^{1}H NMR, ^{13}C NMR and HRMS) of compounds S15-S42

General remarks

Unless otherwise stated, all reagents were purchased from commercial sources and used without further purification. Reaction progress was monitored by TLC using silica gel 60 F_{254} (0.25mm) with detection by UV or iodine. Chromatography was performed using silica gel (60-120) mesh size with freshly distilled solvents. Columns were typically packed as slurry and equilibrated with the appropriate solvent system prior to use.^{1}H NMR (400 MHz) and ^{13}C NMR (100 MHz) spectra were recorded on FT-400 MHz instrument using TMS as an internal standard. Data are presented as follows: chemical shift (ppm), multiplicity (s = singlet, d = doublet, t = triplet, quin = quintet, m = multiplet, b = broad, brs = broad singlet, brm= broad multiplet, coupling constant *J* (Hz). Elemental analyses were carried out on a automatic carbon, hydrogen, nitrogen and sulfur analyser. Melting points were recorded and are uncorrected. IR spectra were recorded in KBr or neat.

Crystal data were collected with a Bruker Smart Apex-II CCD diffractometer by using graphite monochromated MoKα radiation (λ = 0.71073 Å) at 298 K. Cell parameters were retrived using SMART[1] software and refined with SAINT[1]on all observed reflections. Data reduction was performed with the SAINT software and corrected for Lorentz and polarization effects. Absorption corrections were applied with the program SADABS[2]. The structure was solved by direct methods implemented in SHELX-97[3] program and refined by full-matrix least-squares methods on F2. All non-hydrogen atomic positions were located in difference Fourier maps and refined anisotropically. The hydrogen atoms were placed in their geometrically generated positions. All the crystals were isolated in rectangular shape from ethyl acetate and hexane mixture at room temperature. CCDC numbers for compounds **2c** and **2l'**are CCDC- 858803 and CCDC- 878730 respectively. These data can be obtained from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif.

X-ray crystallographic data (CIF file) of **2c** and **2l'** as well as copies of ^{1}H and ^{13}C NMR and HRMS spectra of products are available. Supplementary data associated with this article can be found in the online version at doi:

References

1. *SMART, SAINT* and *XPREP,* Siemens Analytical X-ray Instruments Inc., Madison, Wisconsin, 1995.
2. G. M. Sheldrick, SADABS: Empirical Absorption and Correction Software, University of Gottingen, 1999-2003.
3. . G. M. Sheldrick, *SHELXS-97*, University of Gottingen, 1997

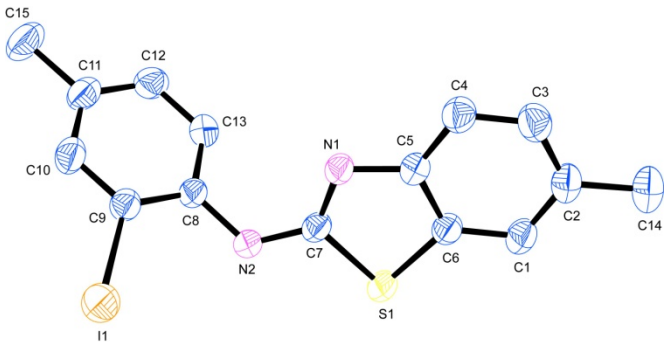


Fig. 2 ORTEP views of N-(2-Iodo-4-methylphenyl)-6-methylbenzo[d]thiazol-2-amine (**2l'**)

Crystallographic description of N-(2-Iodo-4-methylphenyl)-6-methylbenzo[d]thiazol-2-amine (**2l'**) $C_{15}H_{13}IN_2S$, crystal dimension 0.42 x 0.38 x 0.28, M_r = 380.24, monoclinic, space group $P2_1/c$, a = 10.3691(3), b = 17.6590(5), c = 8.2111 (2), α = 90.00, β = 97.2050 (10), γ = 90.00, V = 1491.65(7), Å^3, Z = 4, ρ_{calcd} = 1.693mg/m^3, μ = 2.274mm^{-1}, F(000) = 744, reflection collected/unique = 3452 / 2792, refinement method = full-matrix least-squares on F^2, final R indices [$I > 2\sigma(I)$]: R_1 = 0.0287, wR_2 = 0.0797, R indices (all data): R_1 =0.0345, wR_2 = 0.0836, goodness of fit = 1.043. CCDC-878730 (for N-(2-iodo-4-methylphenyl)-6-methylbenzo[d]thiazol-2-amine) contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif.

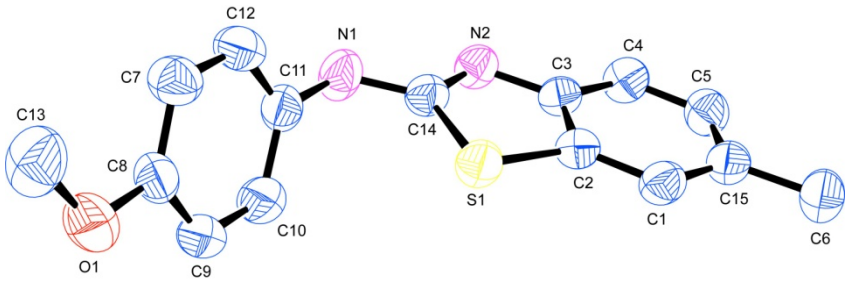


Fig. 3 ORTEP views of N-(4-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine (**2c**)

Crystallographic description of N-(4-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine (**2c**): $C_{15}H_{14}N_2OS$, crystal dimensions 0.45 x 0.35 x 0.25 mm, M_r = 270.35, monoclinic, space group P $2_1/c$, a = 12.7576(3), b = 5.59810(10), c = 21.6854(5)Å, α = 90.00, β = 117.7180(10), γ = 90.00, V = 1371.01(5)Å^3, Z = 4, ρ_{calcd} = 1.310 mg/m^3, μ = 0.229 mm^{-1}, F(000) = 568, reflection collected / unique = 3786 / 3046, refinement method = full-matrix least-squares on F^2, final R indices [$I > 2\sigma(I)$]: R_1 = 0.0428, wR_2 = , 0.1298, R indices (all data): R_1 = 0.0538, wR_2 = 0.1422, goodness of fit = 1.050. CCDC- 858803 (for **2c**) contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif.

1. *N-Phenylbenzo[d]thiazol-2-amine* (**1a**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **1a** (192 mg, 85%) as white solid; mp 160-162 ^{o}C; ν_{max} (KBr): 3455, 3234, 3188, 3129, 3053, 2936, 1625, 1602, 1571, 1446, 1224, 921, 744, 719 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.13-7.19 (2H, m, Ar. C–H), 7.31 (1H, t, *J* = 7.2 Hz, Ar. C–H), 7.40 (2H, m, Ar. C–H), 7.49 (2H, d, *J* = 7.2 Hz, Ar. C–H), 7.54 (1H, d, *J* = 8.0 Hz, Ar. C–H), 7.62 (1H, d, *J* = 7.6 Hz, Ar. C–H), 9.23 (1H, brs, N–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 119.3, 120.8, 121.1, 122.5, 124.7, 126.3, 129.8, 129.9, 140.2, 151.4, 165.6 ppm; HRMS (ESI): MH^+, found 226.0562. $C_{13}H_{10}N_2S$ requires 226.0565; elemental analysis: found C, 68.91; H, 4.42; N, 12.44; S, 14.21. $C_{13}H_{10}N_2S$ requires C, 68.99; H, 4.45; N, 12.38; S, 14.17%.

2. *N-p-Tolylbenzo[d]thiazol-2-amine* (**1b**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **1b** (211 mg, 88%) as white solid; mp 177-178 ^{o}C; ν_{max} (KBr): 3183, 3029, 2914, 1624, 1572, 1514, 1447, 1404, 1330, 1271, 1247, 919, 814, 744, 722 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 2.37 (3H, s, Ar–Me), 7.12 (1H, t, *J* = 8.0 Hz, Ar. C–H), 7.21 (2H, d, *J* = 8.0 Hz, Ar. C–H), 7.29 (1H, t, *J* = 8.0 Hz, Ar. C–H), 7.35−7.40 (2H, m, Ar. C–H), 7.50 (1H, d, *J* = 8.0 Hz, Ar. C–H), 7.60 (1H, d, *J* = 7.2 Hz, Ar. C–H), 9.17 (1H, brs, N–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 21.2, 119.2, 121.0, 121.4, 122.3, 123.5, 126.3, 130.3, 134.8, 137.6, 151.6, 166.2 ppm; elemental analysis: found C, 69.94; H, 5.07; N, 11.69; S, 13.39. $C_{14}H_{12}N_2S$ requires C, 69.97; H, 5.03; N, 11.65; S, 13.34%.

3. *N-(4-Methoxyphenyl)benzo[d]thiazol-2-amine* (**1c**). The general procedure was followed. The product was purified by column chromatography (30% EtOAc/hexane) to give the title compound **1c** (235 mg, 92%) as light bluish solid; mp 159-161 ^{o}C; ν_{max} (KBr): 3181, 2835, 1619, 1572, 1511, 1444, 1414, 1241, 1037, 918, 825, 744 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 3.83 (3H, s, Ar–OMe), 6.96 (2H, d, *J* = 8.4 Hz, Ar. C–H), 7.08 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.26 (1H, t, *J* = 8.4 Hz, Ar. C–H), 7.40 (3H, d, *J* = 8.4 Hz, Ar. C–H), 7.56 (1H, d, *J* = 8.0 Hz, Ar. C–H),

9.72 (1H, brs, N–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 55.7, 115.0, 118.9, 121.0, 122.0, 124.6, 126.2, 129.8, 133.2, 151.8, 157.6 ppm; elemental analysis: found C, 65.64; H, 4.75; N, 10.97; S, 12.46. $C_{14}H_{12}N_2OS$ requires C, 65.60; H, 4.72; N, 10.93; S, 12.51%.

4. *N-(2,6-Dimethylphenyl)benzo[d]thiazol-2-amine* (**1d**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **1d** (223 mg, 88%) as white solid; mp 223-225 ^{o}C; ν_{max} (KBr): 3173, 3127, 3066, 2850, 1613, 1567, 1447, 1326, 1310, 1269, 1251, 1208, 1017, 912, 849, 774, 752 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 2.39 (6H, s, 2 x Ar–Me), 7.01 (1H, m, Ar. C–H), 7.22 (5H, m, Ar. C–H), 7.48 (1H, m, Ar. C–H), 10.20 (1H, brs, N–H) ppm; ^{13}NMR ($CDCl_3$, 100 MHz): δ = 18.4, 118.3, 121.1, 121.5, 126.1, 128.4, 129.1, 130.4,137.4, 137.5, 152.3, 170.2 ppm; elemental analysis: found C, 70.80; H, 5.57; N, 11.04; S, 12.57. $C_{15}H_{14}N_2S$ requires C, 70.83; H, 5.55; N, 11.01; S, 12.61%.

5. *N-(4-Bromophenyl)benzo[d]thiazol-2-amine* (**1e**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **1e** (238 mg, 78%) as white solid; mp 216-217 ^{o}C, ν_{max} (KBr): 3174, 3069, 2956, 2899, 1619, 1584, 1562, 1454, 1448, 1445, 1311, 1298, 1270, 1246, 1226, 1070, 814, 748 cm^{-1}; ^{1}H NMR ($CDCl_3$ + DMSO-d_6, 400 MHz): δ = 7.15 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.32 (1H, t, *J* = 7.2 Hz, Ar. C–H), 7.43 (2H, d, *J* = 8.8 Hz, Ar. C–H), 7.61 (1H, d, *J* = 8.0 Hz, Ar. C–H), 7.66 (1H, d, *J* = 8.0 Hz, Ar. C–H), 7.76 (2H, d, *J* = 8.8 Hz, Ar. C–H), 10.34 (1H, brs, N–H) ppm; ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100 MHz): δ = 114.1, 119.9, 120.2, 120.9, 122.8, 129.1, 130.6, 131.8, 140.4, 152.5, 161.9 ppm; elemental analysis: found C, 51.20; H, 2.94; N, 9.21; S, 10.57. $C_{13}H_9N_2BrS$ requires C, 51.16; H, 2.97; N 9.18; S 10.51%.

6. *N-(3-Nitrophenyl)benzo[d]thiazol-2-amine* (**1f**). The general procedure was followed. The product was purified by column chromatography (30% EtOAc/hexane) to give the title compound **1f** (205 mg, 76%) as yellow solid; mp

190-193 ^{o}C; ν_{max} (KBr): 3448, 3227, 2924, 1619, 1567, 1533, 1460, 1445, 1351, 1243, 885, 745, 718 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.18 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.35 (1H, t, *J* = 7.8 Hz, Ar. C–H), 7.47 (1H, t, *J* = 8.4 Hz, Ar. C–H), 7.65 (1H, d, *J* = 8 Hz, Ar. C–H), 7.71 (1H, d, *J* = 8 Hz, Ar. C–H), 7.81 (1H, m, Ar. C–H), 8.15 (1H, m, Ar. C–H), 8.79 (1H, brs, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 112.3, 116.1, 119.8, 120.4, 122.6, 123.5, 125.7, 129.4, 130.2, 141.7, 148.4, 151.7, 161.2 ppm; HRMS (ESI): MH^+, found 272.0415. $C_{13}H_9N_3O_2S$ requires 272.0415; elemental analysis: found C, 57.52; H, 3.32; N, 15.53; S, 11.87. $C_{13}H_9N_3O_2S$ requires C, 57.55; H, 3.34; N, 15.49; S, 11.82%.

7. *N-(2-Chlorophenyl)benzo[d]thiazol-2-amine* (**1g**). The general procedure was followed. The product was purified by column chromatography (30% EtOAc/hexane) to give the title compound **1g** (200 mg, 77%) as white solid; mp 123-126 ^{o}C; ν_{max} (KBr): 3448, 3066, 2850, 1608, 1579, 1560, 1447, 1268, 1247, 1055, 917, 743 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 7.03 (1H, m, Ar. C–H), 7.19 (1H, m, Ar. C–H), 7.36 (2H, t, *J* = 8 Hz, Ar. C–H), 7.4 (1H, d, *J* = 8 Hz, Ar. C–H), 7.65 (1H, d, *J* = 8 Hz, Ar. C–H), 7.69 (1H, d, *J* = 8.4 Hz, Ar. C–H), 8.37 (1H, d, *J* = 8.0 Hz, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 120.1, 120.5, 120.9, 123.0, 123.2, 124.1, 126.2, 127.9, 129.6, 130.4, 136.6, 151.5, 162.3 ppm; HRMS (ESI): MH^+, found 261.0200. $C_{13}H_9ClN_2S$ requires 261.02; elemental analysis: found C, 59.84; H, 3.45; N, 10.80; S, 12.35. $C_{13}H_9ClN_2S$ requires C, 59.88; H, 3.48; N, 10.74; S, 12.30%.

8. *N-(4-(Trifluoromethyl)phenyl)benzo[d]thiazol-2-amine* (**1h**). The general procedure was followed. The product was purified by column chromatography (30% EtOAc/hexane) to give the title compound **1h** (200 mg, 68%) as white solid; mp 189-191 ^{o}C; ν_{max} (KBr): 3445, 2924, 2853, 1615, 1570, 1457, 1445, 1331, 1275, 1247, 1165, 1112, 1070, 838, 879, 754 cm^{-1}; ^{1}H NMR ($CDCl_3$ + DMSO-d_6, 400 MHz): δ = 7.17 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.34 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.57 (2H, d, *J* = 8.8 Hz, Ar. C–H), 7.65 (1H, d, *J* = 8 Hz, Ar. C–H), 7.69 (1H, d, *J* = 8 Hz, Ar. C–H), 7.91 (2H, d, *J* = 8.4 Hz, Ar. C–H), 9.96 (1H, brs, N–H) ppm; ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100 MHz): δ = 117.7, 120.0, 120.5, 122.7, 125.9, 126.1,

130.4,143.7, 152.1, 161.5 ppm; HRMS (ESI): MH^+, found 295.0437. $C_{14}H_9N_2SF_3$ requires 295.0439; elemental analysis: found C 57.11; H, 3.10; N, 9.56; S 10.94. $C_{14}H_9N_2SF_3$ requires C, 57.14; H, 3.08; N, 9.52; S 10.89%.

9. *4-(Benzo[d]thiazol-2-ylamino)benzonitrile* (**1i**). The general procedure was followed. The product was purified by column chromatography (30% EtOAc/hexane) to give the title compound **1i** (200 mg, 80%) as white solid; mp 192-195 ^oC; ν_{max} (KBr): 3434, 3305, 2923, 2223, 1612, 1598, 1537, 1440, 1330, 1258, 1176, 837, 750 cm^{-1}; ^1H NMR ($CDCl_3$ + DMSO-d_6, 400 MHz): δ = 7.11 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.27 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.52 (2H, d, *J* = 8.4 Hz, Ar. C–H), 7.58-7.62 (2H, m, Ar. C–H), 7.89 (2H, d, *J* = 8.8 Hz, Ar. C–H), 10.34 (1H, brs, N–H) ppm; ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100MHz): δ.= 103.3, 117.4, 119.1, 119.7, 120.2, 122.4, 125.5, 130.0, 132.6, 144.3, 151.5, 160.4 ppm; HRMS (ESI): MH^+, found 252.0512. $C_{14}H_9N_3S$ requires 252.0517; elemental analysis: found C, 66.93; H, 3.62; N, 16.77; S, 12.79. $C_{14}H_9N_3S$ requires C, 66.91; H, 3.61; N, 16.72; S, 12.76%.

10. *N-Cyclohexylbenzo[d]thiazol-2-amine* (**1j**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **1j** (100 mg, 43%) as white solid; mp 106-108 ^oC; ν_{max} (KBr): 3202, 3017, 2927, 2852, 1590, 1538, 1445, 1365, 1345, 1248, 1209, 1076, 885, 804, 746, 720 cm^{-1}; ^1H NMR ($CDCl_3$, 400 MHz): δ = 1.17−1.46 (5H, m, aliphatic C–H), 1.61−1.65 (1H, m, aliphatic C–H), 1.73−1.79 (2H, m, aliphatic C–H), 2.10 (2H, m, aliphatic C–H), 3.53 (1H, s, aliphatic C–H), 5.70 (1H, brs, N–H), 7.05 (1H, t, *J* = 8.0 Hz, Ar. C–H), 7.25−7.29 (1H, m, Ar. C–H), 7.51 (1H, d, *J* = 8.0 Hz, Ar. C–H), 7.56 (1H, d, *J* = 8.0 Hz, Ar. C–H) ppm; ^{13}C NMR (CDCl3, 100 MHz): δ = 24.9, 25.6, 25.63, 33.4, 33.45, 54.8, 118.8, 119.8, 120.9, 121.5, 123.4, 126.1, 129.2 ppm; elemental analysis: found C, 67.22; H, 6.91; N, 12.09; S, 13.87. $C_{13}H_{16}N_2S$ requires C, 67.20; H, 6.94; N, 12.06; S, 13.80%.

11. *N-(Naphthalen-1-yl)benzo[d]thiazol-2-amine* (**1k**). The general procedure was followed. The product was purified by column chromatography (30% EtOAc/hexane) to give the title compound **1k** (218 mg, 79%) as white solid; mp 195-197 ^{o}C; ν_{max} (KBr): 3437, 3043, 2850, 1660, 1562, 1448, 1396, 1271, 1260, 779, 752 722 cm^{-1}; ^{1}H NMR (DMSO-d_6, 400 MHz): δ = 7.08 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.25 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.49-7.57 (4H, m, Ar. C–H), 7.58 (1H, d, *J* = 8 Hz, Ar. C–H), 7.67 (1H, d, *J* = 8.8 Hz, Ar. C–H), 7.85-7.87 (1H, m, Ar. C–H), 8.08 (1H, d, *J* = 8 Hz, Ar. C–H), 8.24-8.26 (1H, m, Ar. C–H), 10.15 (1H, brs, N– H) ppm; ^{13}C NMR (DMSO-d_6, 100 MHz): δ = 119.0, 119.7, 121.4, 122.4, 122.6, 125.1, 126.2, 126.3, 126.4, 126.7, 127.4, 128.6, 130.4, 134.3, 136.5, 151.9, 164.9 ppm; HRMS (ESI): MH^{+}, found 277.0722. $C_{17}H_{12}N_2S$ requires 277.0721; elemental analysis: found C, 73.84; H, 4.39; N, 10.18; S, 11.65. $C_{17}H_{12}N_2S$ requires C, 73.88; H, 4.38; N, 10.14; S, 11.60%.

12. *N-(2-Methoxyphenyl)benzo[d]thiazol-2-amine* (**1l**). The general procedure was followed. The product was purified by column chromatography (3% EtOAc/hexane) to give the title compound **1l** (159 mg, 62%) as off-white solid; mp 154-156 ^{o}C; ν_{max} (KBr): 3432, 3178, 3131, 3076, 2938, 2880, 1611, 1566, 1500, 1449, 1291, 1255, 1115, 1048, 1018, 750 cm^{-1}; ^{1}H NMR (DMSO-d_6, 400 MHz): δ = 3.39 (3H, s, Ar–OMe), 6.98-7.00 (1H, m, Ar. C–H), 7.05-7.06 (2H, m, Ar. C–H), 7.13 (1H, t, *J* = 7.2 Hz, Ar. C–H), 7.29 (1H, t, *J* = 7.2 Hz, Ar. C–H), 7.56 (1H, d, *J* = 8 Hz, Ar. C–H), 7.77 (1H, d, *J* = 7.6 Hz, Ar. C–H), 8.45 (1H, d, *J* = 8 Hz, Ar. C–H), 9.81 (brs, 1H, N–H) ppm; ^{13}C NMR (DMSO-d_6, 100 MHz): δ = 55.7, 111.1, 118.9, 120.4, 120.6, 120.9, 122.1, 123.3, 125.7, 129.4, 130.5, 148.9, 151.7, 162.6 ppm; elemental analysis: found C, 65.56; H, 4.69; N, 10.97; S, 12.56. $C_{14}H_{12}N_2OS$ requires C, 65.60; H, 4.72; N, 10.93; S 12.51%.

13. *N-(2-Iodophenyl)benzo[d]thiazol-2-amine* (**1l'**). The general procedure was followed. The product was purified by column chromatography (2% EtOAc/hexane) to give the title compound **1l'** (151 mg, 43%) as white solid; mp 134-136 ^{o}C; ν_{max} (KBr): 3447, 2759, 1628, 1610, 1572, 1445, 1325, 1271, 1018, 918, 824, 753, 725

cm^{-1}; ^1H NMR (DMSO-d_6, 400 MHz): δ = 6.99 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.09 (1H, t, *J* = 7.2 Hz, Ar. C–H), 7.27 (1H, t, *J* = 7.2 Hz, Ar. C–H), 7.41-7.47 (2H, m, Ar. C–H), 7.67 (1H, d, *J* = 7.6 Hz, Ar. C–H), 7.72 (1H, d, *J* = 7.6 Hz, Ar. C–H), 7.93 (1H, d, *J* = 8.0 Hz, Ar. C–H); ^{13}C NMR (DMSO-d_6, 100 MHz): δ = 95.8, 117.9, 121.2, 121.8, 125.8, 127.2, 129.3, 139.4, 163.8; elemental analysis: found C, 44.36; H, 2.53; N, 7.99; S, 9.16. $C_{13}H_9IN_2S$ requires C, 44.33; H, 2.57; N, 7.95; S, 9.10%.

14. *N-(2-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine* (**2l**). The general procedure was followed. The product was purified by column chromatography (3% EtOAc/hexane) to give the title compound **2l** (175 mg, 65%) as white solid; mp 124-126 ^oC; ν_{max} (KBr): 3445, 3223, 3014, 1605, 1529, 1492, 1461, 1435, 1293, 1258, 1218, 1180, 1115, 1207, 818, 746 cm^{-1}; ^1H NMR ($CDCl_3$, 400 MHz): δ = 2.42 (3H, s, Ar–Me), 3.90 (3H, s, Ar–OMe), 6.89-6.91 (1H, m, Ar. C–H), 7.02-7.05 (2H, m, Ar. C–H), 7.16 (1H, d, *J* = 8.4 Hz, Ar. C–H), 7.45 (1H, s, Ar. C–H), 7.57 (1H, d, *J* = 8 Hz, Ar. C–H), 7.72 (1H, brs, N–H), 8.28-8.29 (1H, m, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 21.5, 55.8, 110.3, 117.9, 119.7, 120.9, 121.3, 122.8, 127.4, 129.7, 130.6, 132.5, 147.9, 150.1, 161.6 ppm; elemental analysis: found C, 63.68; H, 5.18; N, 10.42; S, 11.81. $C_{15}H_{14}N_2OS$ requires C, 63.64; H, 5.22; N, 10.36; S 11.86%.

15. *N-(2-Iodo-4-methylphenyl)-6-methylbenzo[d]thiazol-2-amine* (**2l'**). The general procedure was followed. The product was purified by column chromatography (2% EtOAc/hexane) to give the title compound **2l'** (205 mg, 54%) as white solid; mp 159-162 ^oC; ν_{max} (KBr): 3445, 2920, 1514, 1465, 1228, 1238, 1177, 1033, 809 cm^{-1}; ^1H NMR ($CDCl_3$, 400 MHz): δ = 2.31 (3H, s, Ar–Me), 2.41 (3H, s, Ar–Me), 7.15 (1H, d, *J* = 7.6 Hz, Ar. C–H), 7.21 (1H, d, *J* = 8.0 Hz, Ar. C–H), 7.42 (1H, s, Ar. C–H), 7.52 (1H, d, *J* = 8 Hz, Ar. C–H), 7.68 (1H, s, Ar. C–H), 7.92 (1H, d, *J* = 8 Hz, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 20.5, 21.5, 92.3, 119.4, 121.0, 121.8, 127.5, 130.4, 132.6, 136.3, 138.6, 139.9, 149.5, 163.6 ppm; elemental analysis: found C, 47.33; H, 3.49; N, 7.43; S, 8.37. $C_{15}H_{13}N_2SI$ requires C, 47.38; H, 3.45; N, 7.37; S, 8.43%.

16. *6-Methyl-N-phenylbenzo[d]thiazol-2-amine* (**2a**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **2a** (199 mg, 83%) as white solid; mp 163-165 ºC; ν_{max} (KBr): 3463, 3194, 2940, 1624, 1600, 1578, 1465, 1431, 1226, 1202, 805, 752 cm^{-1}; ^1H NMR ($CDCl_3$, 400 MHz): δ = 2.39 (3H, s, Ar–Me), 7.05 (1H, t, *J* = 7.2 Hz, Ar. C–H), 7.10 (1H, d, *J* = 8 Hz, Ar. C–H), 7.33 (2H, m, Ar. C□H), 7.39 (1H, s, Ar. C–H), 7.49 (1H, d, *J* = 8.4 Hz, Ar. C–H), 7.63 (2H, d, *J* = 7.6 Hz, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz) δ = 21.2, 118.9, 119.0, 120.6, 122.9, 127.0, 129.1, 130.0, 131.9, 140.4, 149.5, 162.7 ppm; elemental analysis: found C, 69.98; H, 5.01; N, 11.69; S, 13.39. $C_{14}H_{12}N_2S$ requires C, 69.97; H, 5.03; N, 11.66; S, 13.34%.

17. *N-(4-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine* (**2c**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **2c** (235 mg, 87%) as white solid; mp 167-170 °C; ν_{max} (KBr): 3461, 3178, 2903, 1610, 1574, 1510, 1450, 1325, 1278, 1244, 1033, 817, 778 cm^{-1}; ^1H NMR ($CDCl_3$ + DMSO-d_6, 400 MHz): δ = 2.35 (3H, s, Ar–Me), 3.79 (3H, s, Ar–OMe), 6.91 (2H, d, *J* = 8.8 Hz, Ar. C–H), 7.04 (1H, d, *J* = 8Hz, Ar. C–H), 7.23 (1H, d, *J* = 8 Hz, Ar. C–H), 7.32 (1H, s, Ar. C–H), 7.38 (2H, d, *J* = 8.4 Hz, Ar. C–H), 8.19 (1H, brs, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100 MHz): δ = 21.3, 55.6, 114.9, 118.1, 121.0, 124.0, 127.4, 129.3, 131.9, 133.2, 148.6, 157.4, 166.9 ppm; HRMS (ESI): MH^+, found 271.0830. $C_{15}H_{14}N_2OS$ requires 271.0827; elemental analysis: found C, 66.60; H, 5.24; N, 10.33; S, 11.93. $C_{15}H_{14}N_2OS$ requires C, 66.64; H, 5.22; N, 10.36; S, 11.86%.

18. *N-(4-Bromophenyl)-6-methylbenzo[d]thiazol-2-amine* (**2e**). The general procedure was followed. The product was purified by column chromatography (25% EtOAc/hexane) to give the title compound **2e** (249 mg, 78%) as white solid; mp 205-207 °C; ν_{max} (KBr): 3437, 3227, 2922, 1620, 1594, 1570, 1454, 1328, 1251, 1072, 805, 609 cm^{-1}; ^1H NMR (DMSO-d_6, 400 MHz): δ = 2.34 (3H, s, Ar–Me), 7.14 (1H, d, *J* = 8 Hz, Ar. C–H), 7.51 (3H, m, Ar. C–H), 7.60 (1H, s, Ar. C–H), 7.75 (2H, d, *J*

= 8.8 Hz, Ar. C–H), 10.53 (1H, s, N–H) ppm; ^{13}C NMR (DMSO-d_6, 100 MHz): δ = 19.1, 113.1, 119.1, 119.5, 120.9, 127.1, 130.1, 131.7, 131.9, 140.1, 149.8, 160.5 ppm; elemental analysis: found C, 52.62; H, 3.49; N, 8.82; S, 10.10. $C_{14}H_{11}N_2SBr$ requires C, 52.68; H, 3.47; N, 8.78; S, 10.05%.

19. *6-Methyl-N-(3-nitrophenyl)benzo[d]thiazol-2-amine* (**2f**). The general procedure was followed. The product was purified by column chromatography (30% EtOAc/hexane) to give the title compound **2f** (228 mg, 80%) as yellow solid; mp 195-197 ^{o}C; ν_{max} (KBr): 3437, 3083, 2923, 1623, 1574, 1534, 1463, 1346, 1251, 799, 706 cm^{-1}; ^{1}H NMR ($CDCl_3$ + DMSO-d_6, 400 MHz): δ = 2.44 (3H, S, Ar–Me), 7.21 (1H, d, *J* = 8.4 Hz, Ar. C–H), 7.48 (1H, s, Ar. C–H), 7.52 (1H, t, *J* = 8.4 Hz, Ar. C–H), 7.61 (1H, d, *J* = 8 Hz, Ar. C–H), 7.93 (2H, d, *J* = 8 Hz, Ar. C–H), 8.53 (1H, s, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100 MHz): δ = 20.8, 111.9, 115.7, 119.1, 120.2, 123.2, 126.7, 129.2, 129.9, 132.2, 141.5, 148.2, 149.2, 160.2 ppm; HRMS (ESI): MH^+, found 286.0600. $C_{14}H_{11}N_3O_2S$ requires 286.0600; elemental analysis: found C, 58.88; H, 3.92; N, 14.78; S, 11.31%. $C_{14}H_{11}N_3O_2S$ requires C, 58.93; H, 3.89; N, 14.73; S, 11.24%.

20. *N-(4-Bromo-2-methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine* (**2m**). The general procedure was followed. The product was purified by column chromatography (15% EtOAc/hexane) to give the title compound **2m** (261 mg, 75%) as off-white solid; mp 139-142 ^{o}C; ν_{max} (KBr): 3394, 2921, 1600, 1566, 1548, 1522, 1475, 1413, 1320, 1246, 1212, 1178, 1162, 1127, 1021, 867, 810, 786 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 2.43 (3H, s, Ar–Me), 3.89 (3H, s, Ar–OMe), 6.74 (1H, d, *J* = 8.8 Hz, Ar. C–H), 7.10 (1H, d, *J* = 8.8 Hz, Ar. C–H), 7.17-7.26 (1H, m, Ar. C–H), 7.46 (1H, s, Ar. C–H), 7.63 (2H, d, *J* = 8 Hz, Ar. C–H), 8.63 (1H, s, N–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 21.5, 56.1, 111.3, 113.7, 120.1, 120.3, 120.9, 124.8, 127.5, 130.6, 130.9, 132.9, 146.5, 150.0, 160.4 ppm; elemental analysis: found C, 51.53; H, 3.79; N, 8.06; S, 9.13. $C_{15}H_{13}BrN_2OS$ requires C, 51.58; H, 3.75; N, 8.02; S, 9.18%.

21. *2-Morpholinobenzo[d]thiazole* (**3n**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **3n** (202 mg, 92%) as white solid; mp 119-120 ^{o}C; ν_{max} (KBr): 2918, 2854, 1591, 1537, 1442, 1378, 1230, 1066, 1032, 945, 854, 756 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 3.59 (4H, t, *J* = 4.8 Hz, aliphatic C–H), 3.79 (4H, t, *J* = 4.8 Hz, aliphatic C–H),7.09 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.29 (1H, t, *J* = 8 Hz, Ar. C–H), 7.59 (2H, d, *J* = 8.4 Hz, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 48.6, 66.3, 119.4,120.9, 121.8, 126.2, 130.7, 152.6, 169.1 ppm; elemental analysis: found C, 59.93; H, 5.52; N, 12.77; S, 14.50. $C_{11}H_{12}N_2OS$ requires C, 59.97; H, 5.49; N, 12.72; S, 14.56%.

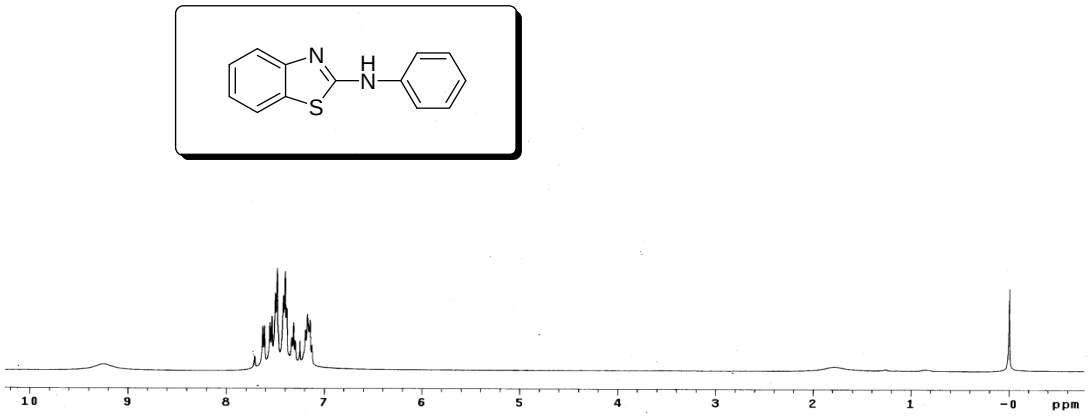
22. *2-(Piperidin-1-yl)benzo[d]thiazole* (**4n**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **4n** (196 mg, 90%) as white solid; mp 95-98 ^{o}C; ν_{max} (KBr): 2934, 2922, 2849, 1588, 1534, 1440, 1382, 1332, 1257, 1234, 1209, 1120, 1006, 760 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 1.67 (6H, s, aliphatic C–H), 3.58 (4H, s, aliphatic C–H), 7.03 (1H, t, *J* = 8.0 Hz, Ar. C–H), 7.26 (1H, t, *J* = 8.0 Hz, Ar. C–H), 7.55 (2H, dd, J_1 = 8.0 Hz, J_2 = 5.2 Hz, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 24.3, 25.4, 49.7, 118.9, 120.7, 121.1, 126.0, 130.8, 153.1, 169.0 ppm; elemental analysis: found C, 66.07; H, 6.50; N, 12.76; S, 14.60. $C_{12}H_{14}N_2S$ requires C, 66.02; H, 6.46; N, 12.83; S, 14.69%.

23. *2-(Pyrrolidin-1-yl)benzo[d]thiazole* (**5n**). The general procedure was followed. The product was purified by column chromatography (30% EtOAc/hexane) to give the title compound **5n** (169 mg, 83%) as white solid; mp 102–103 ^{o}C; ν_{max} (KBr): 2924, 2851, 1604, 1544, 1442, 1363, 1314, 1278, 1166, 1119, 853 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 2.04 (4H, m, aliphatic C–H), 3.57 (4H, s, alphatic C–H), 7.02 (1H, t, *J* = 7.6 Hz, Ar. C–H), 7.26 (1H, t, *J* = 8.0 Hz, Ar. C–H), 7. 57 (2H, t, *J* = 8.0 Hz, Ar. C–H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 25.8, 48.8, 118.8, 120.8, 121.2, 126.1, 130.6, 153.1, 165.6 ppm; elemental analysis: found C, 64.62; H, 5.94; N, 13.76; S, 15. 74. $C_{11}H_{12}N_2S$ calculated C, 64.67; H, 5.92; N, 13.71; S, 15.70%.

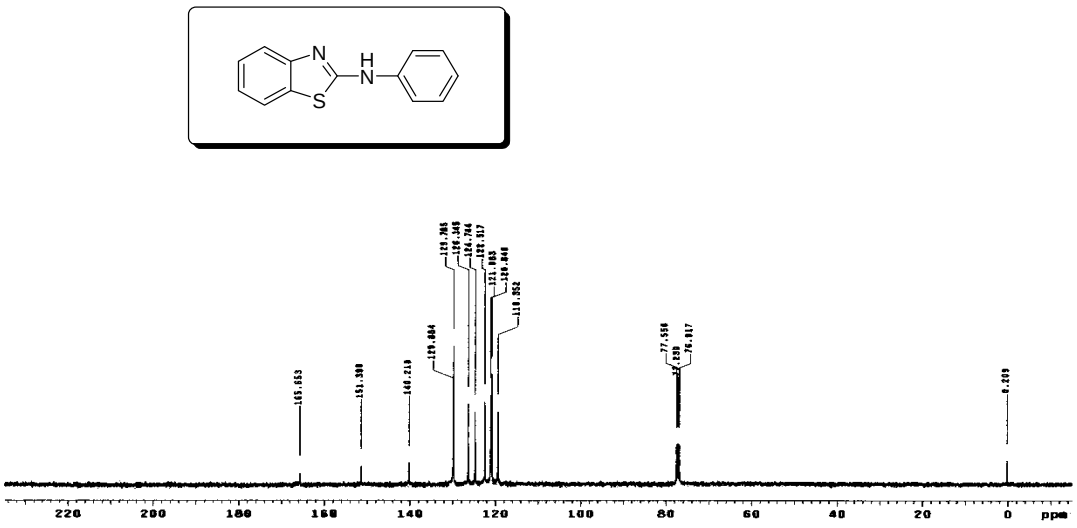
24. *6-Methyl-2-morpholinobenzo[d]thiazole* (**3o**). The general procedure was followed. The product was purified by column chromatography (20% EtOAc/hexane) to give the title compound **3o** (200 mg, 85%) as pale white solid; mp 134-136 ^{o}C; ν_{max} (KBr): 2963, 2912, 2856, 1599, 1575, 1544, 1464, 1434, 1352, 1281, 1235, 1113, 1026, 943, 811 cm^{-1}; ^{1}H NMR ($CDCl_3$, 400 MHz): δ = 2.37 (3H, s, Ar–Me), 3.56 (4H, t, *J* = 4.8 Hz, aliphatic C–H), 3.79 (4H, t, *J* = 4.8 Hz, aliphatic C–H), 7.09 (1H, d, *J* = 8.0 Hz, Ar. C–H), 7.39 (1H, s, Ar. C–H), 7.44 (1H, d, *J* = 8.0 Hz, Ar. C-H) ppm; ^{13}C NMR ($CDCl_3$, 100 MHz): δ = 21.4, 48. 6, 66.4, 119.1, 120.9, 127.4, 130.8, 131.6, 150.4, 168.6 ppm; elemental analysis: found C, 61.56; H, 6.00; N, 11.91; S, 13.74. $C_{12}H_{14}N_2OS$ requires C, 61.51; H, 6.02; N, 11.96; S, 13.68%.

SPECTRA

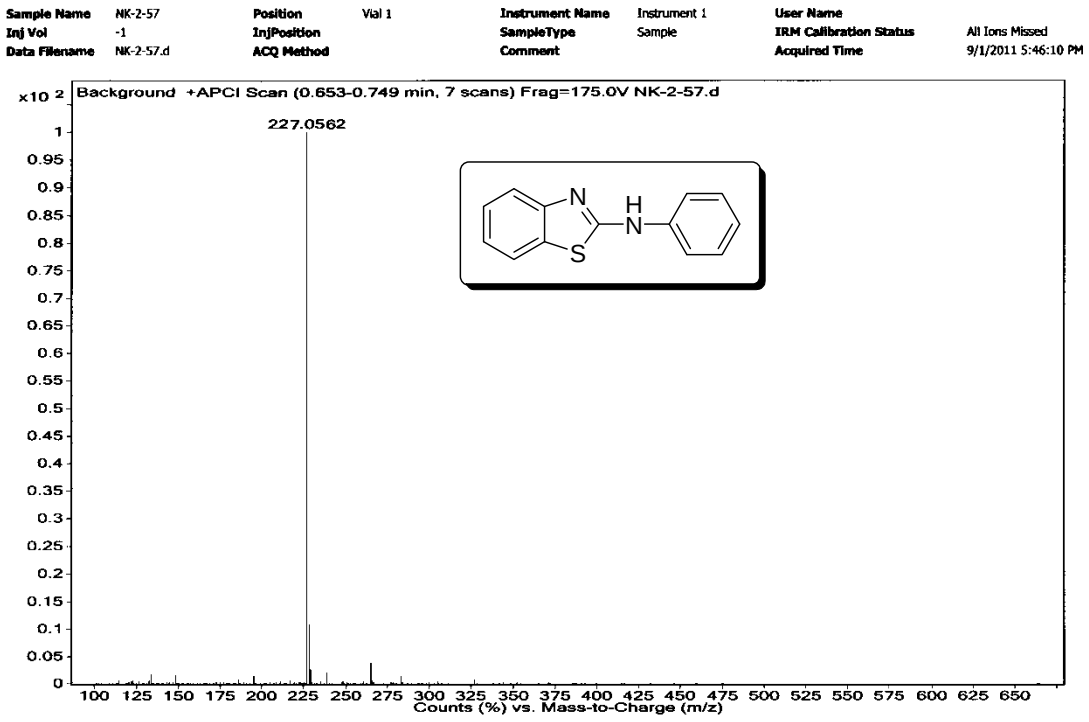
_N_-Phenylbenzo[d]thiazol-2-amine (1a): ^{1}H NMR ($CDCl_3$, 400 MHz)



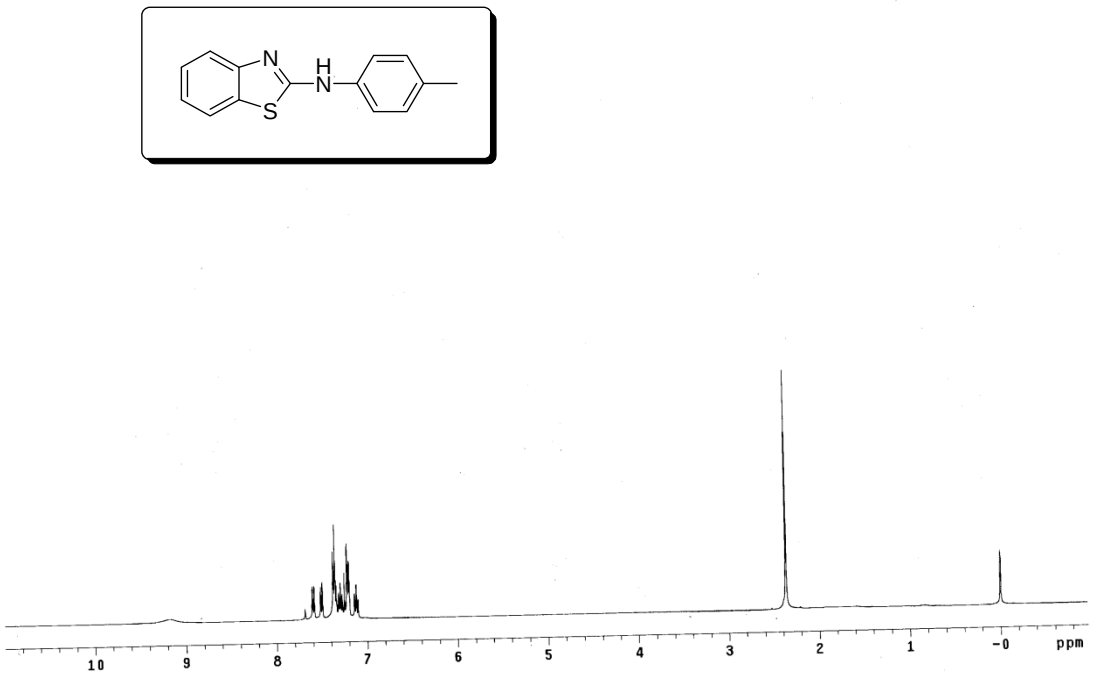
_N_-Phenylbenzo[d]thiazol-2-amine (1a): ^{13}C NMR ($CDCl_3$, 100 MHz)



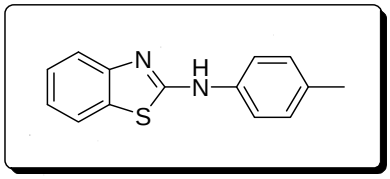
N-Phenylbenzo[d]thiazol-2-amine (1a): HRMS Spectra

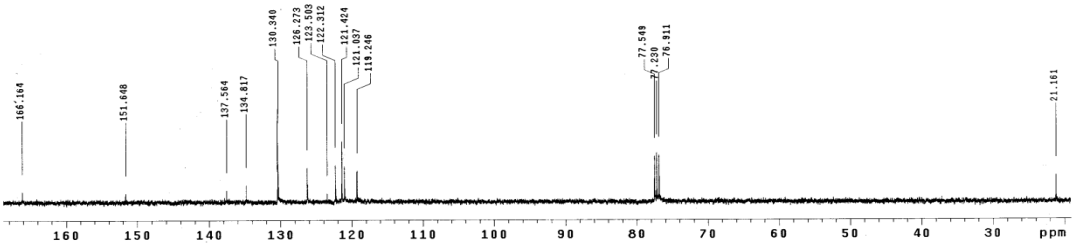


N-*p*-Tolylbenzo[d]thiazol-2-amine (1b): ^{1}H NMR ($CDCl_3$, 400 MHz)

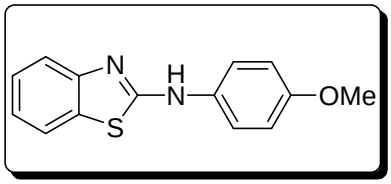


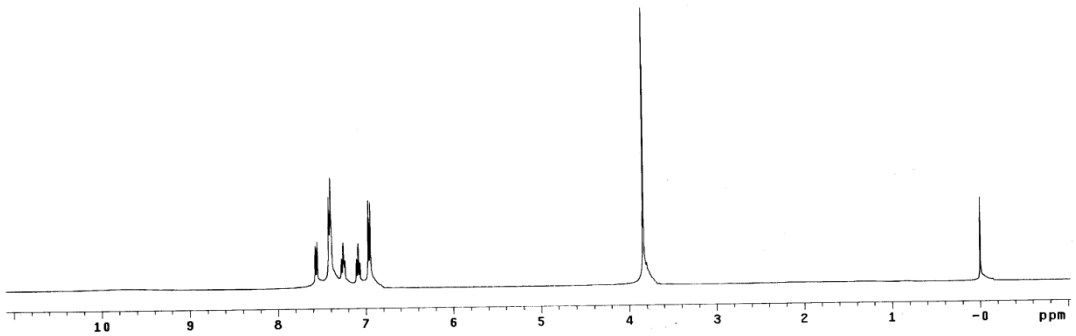
_N_-_p_-Tolylbenzo[d]thiazol-2-amine (1b): ^{13}C NMR ($CDCl_3$, 100 MHz)



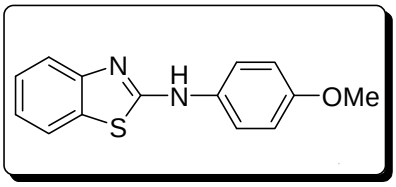


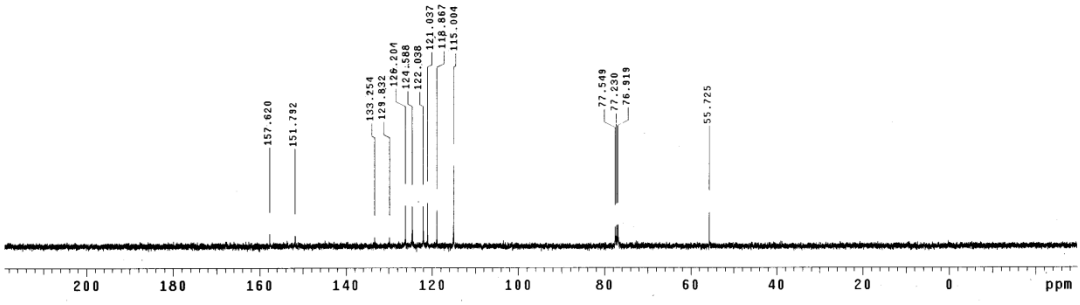
_N_-(4-Methoxyphenyl)benzo[d]thiazol-2-amine (**1c**): **^{1}H NMR ($CDCl_3$, 400 MHz)**



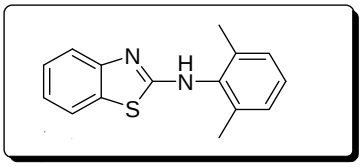


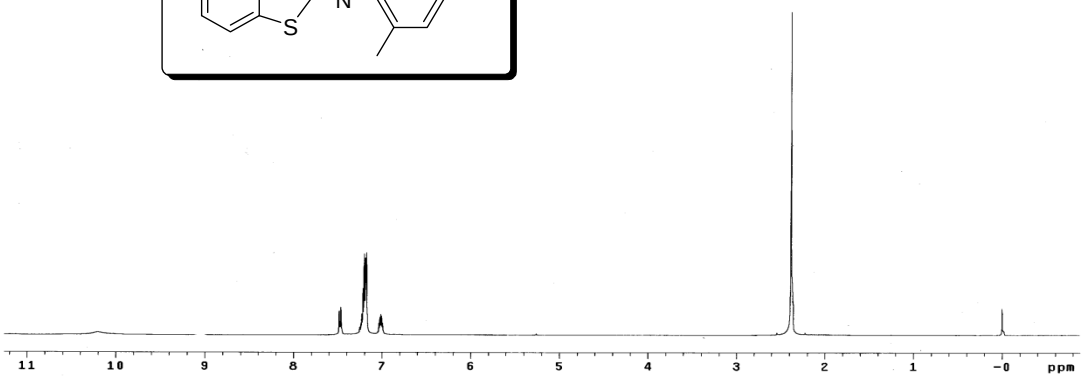
_N_-(4-Methoxyphenyl)benzo[d]thiazol-2-amine (**1c**): **^{13}CNMR ($CDCl_3$, 100 MHz)**



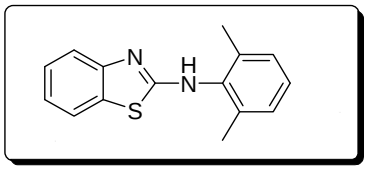


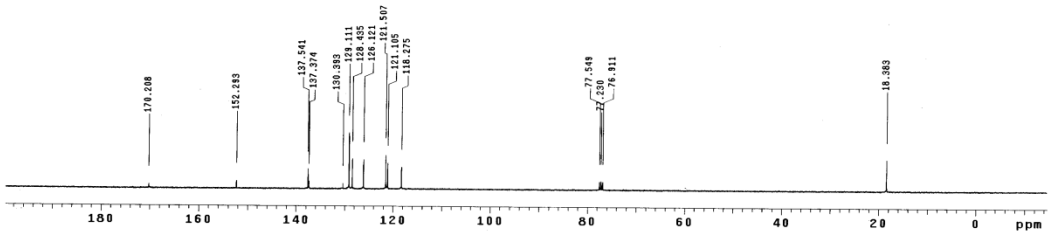
2-(2,6-Dimethylphenyl)benzo[d]thiazole (1d): ^{1}H NMR ($CDCl_3$, 400 MHz)



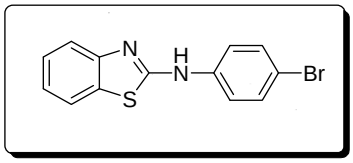


2-(2,6-Dimethylphenyl)benzo[d]thiazole (**1d**): **^{13}CNMR ($CDCl_3$, 100 MHz)**

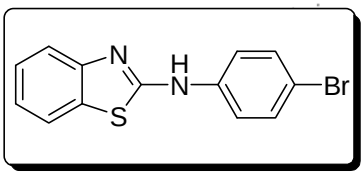


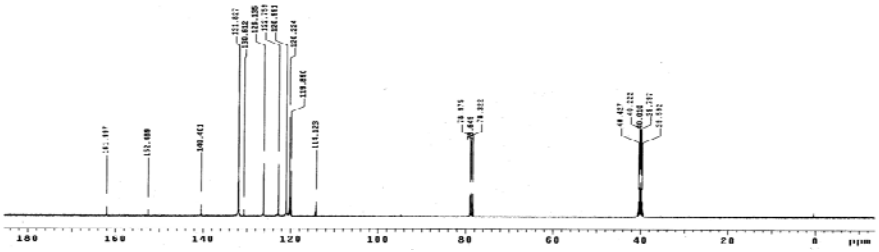


***N*-(4-Bromophenyl)benzo[d]thiazol-2-amine** (**1e**): **^{1}H NMR ($CDCl_3$ +$^{-}$DMSO-d_6, 400 MHz):**

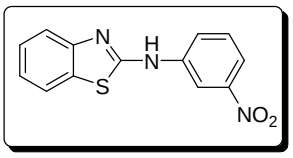


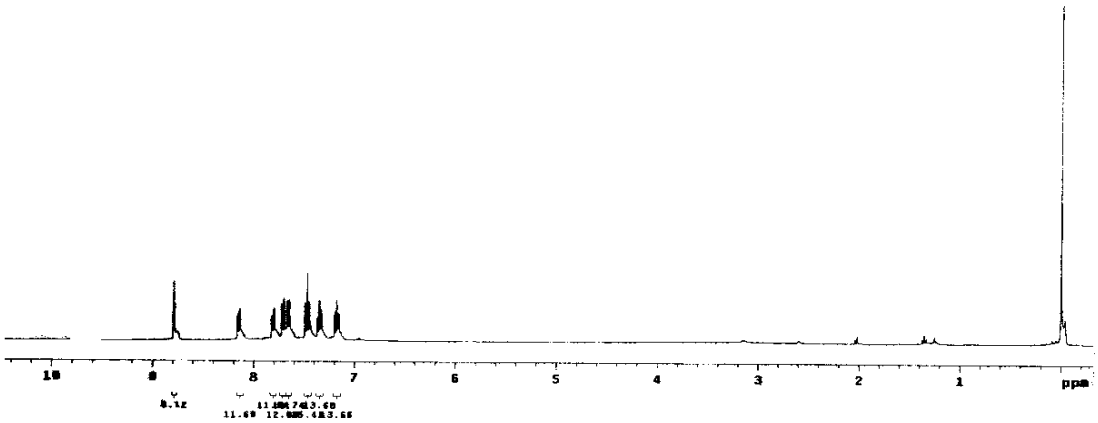
***N*-(4-Bbromophenyl)benzo[d]thiazol-2-amine (1e): ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100 MHz):**



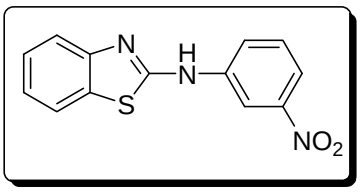


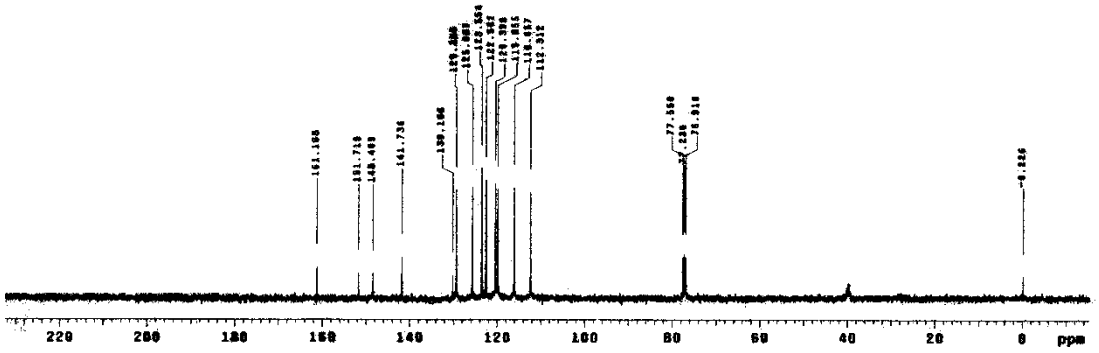
***N*-(3-Nitrophenyl)benzo[d]thiazol-2-amine (1f): ^{1}H NMR ($CDCl_3$, 400 MHz)**



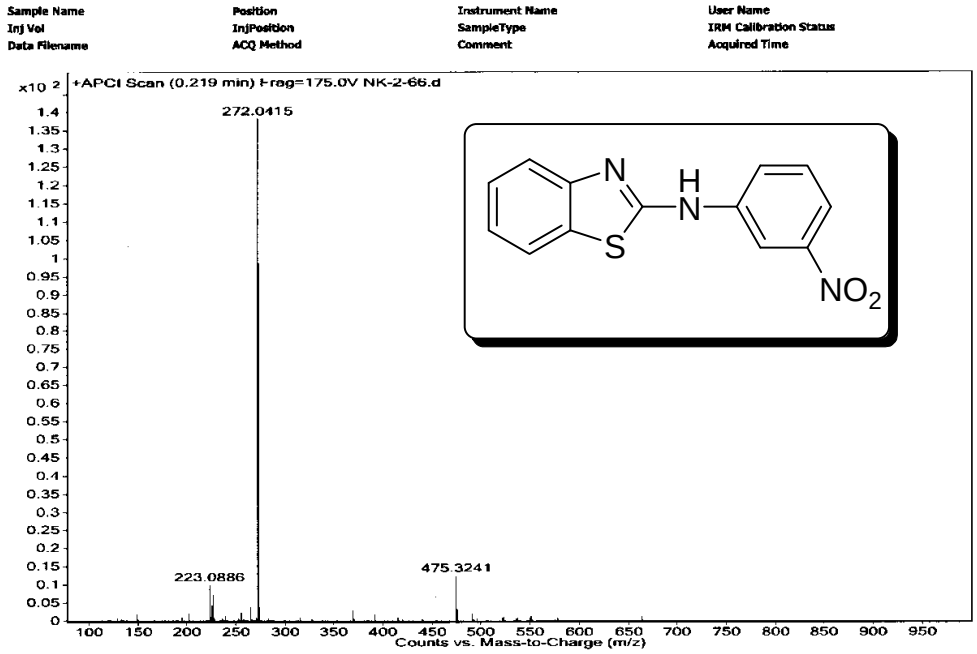


N-(3-Nitrophenyl)benzo[d]thiazol-2-amine (1f): ^{13}C NMR (CDCl$_3$, 100 MHz)

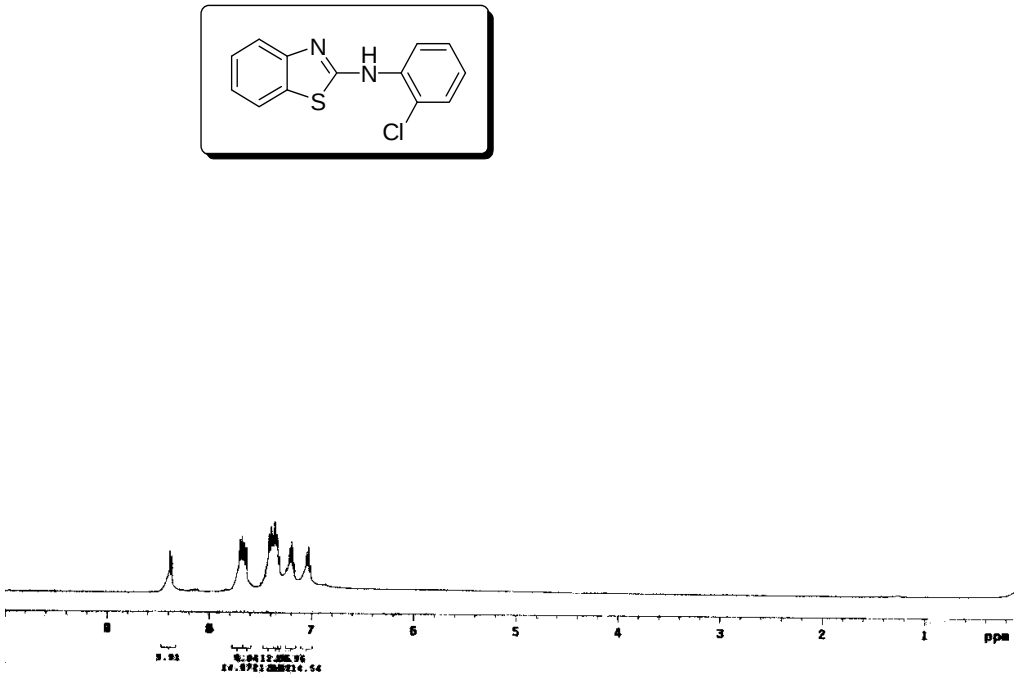




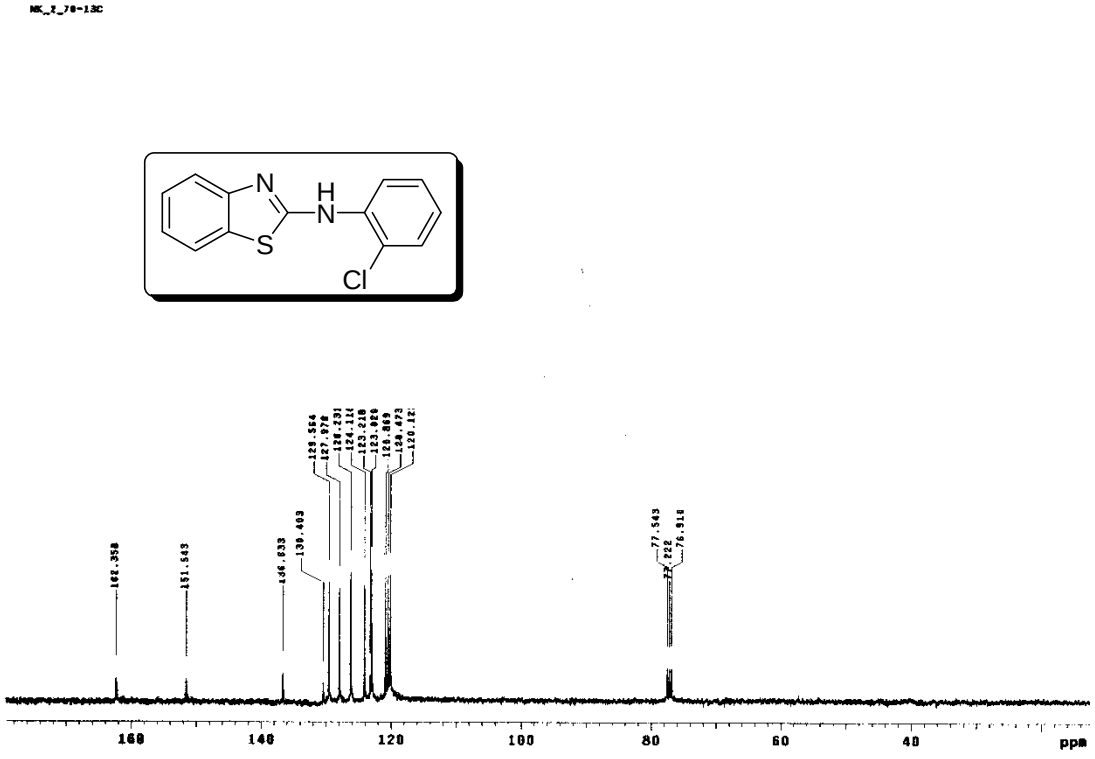
N-(3-Nitrophenyl)benzo[d]thiazol-2-amine (1f): HRMS Spectra



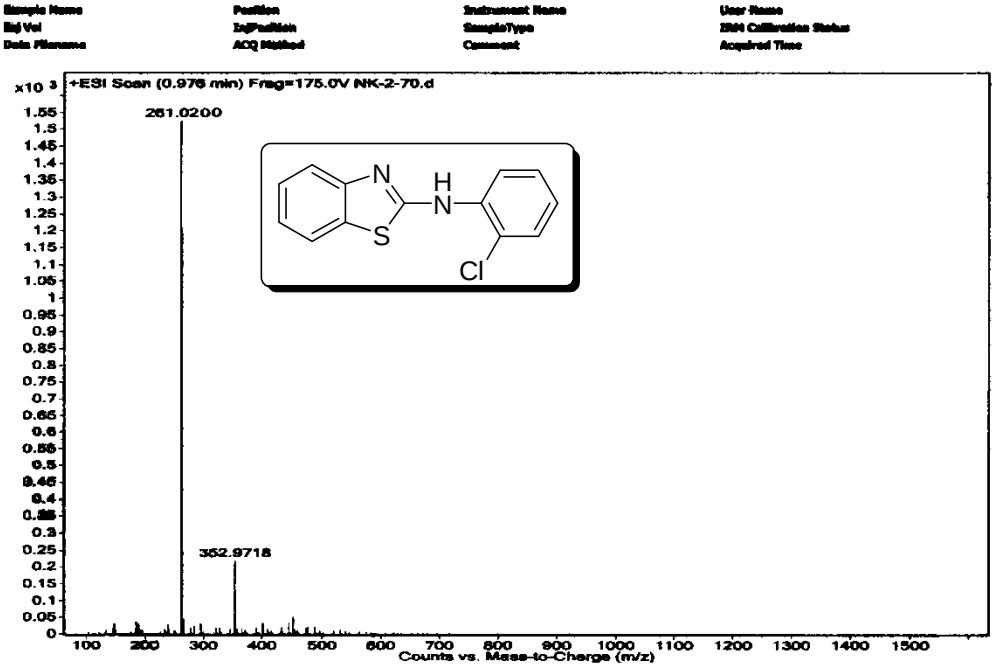
_N_-(2-Chlorophenyl)benzo[d]thiazol-2-amine (1g): ^{1}H NMR ($CDCl_3$, 400 MHz)



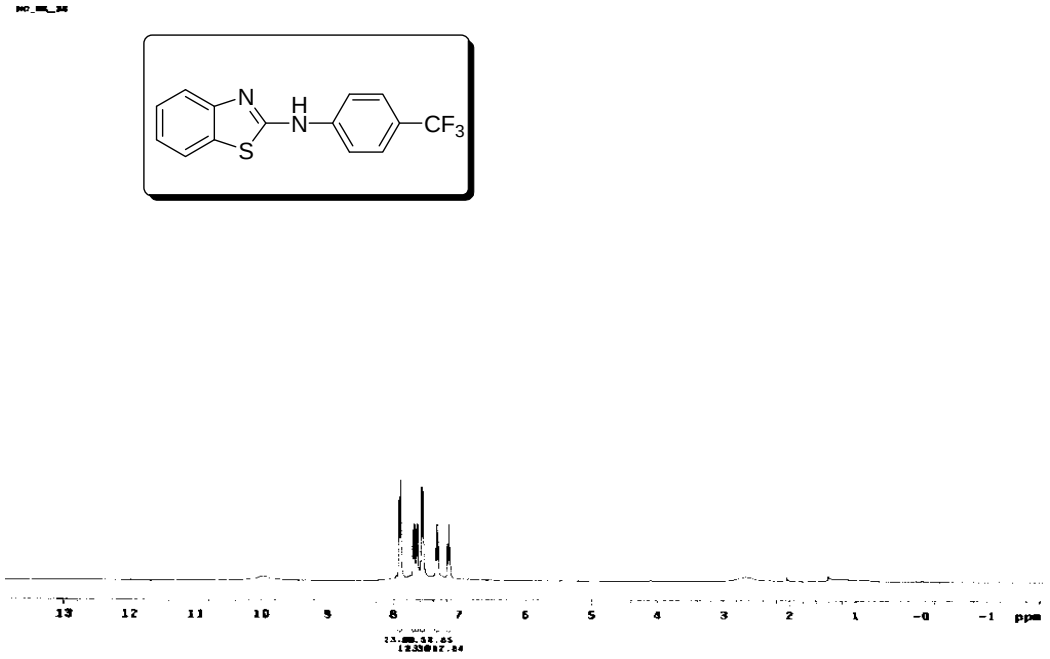
_N_-(2-Chlorophenyl)benzo[d]thiazol-2-amine (1g): ^{13}C NMR ($CDCl_3$, 100 MHz):



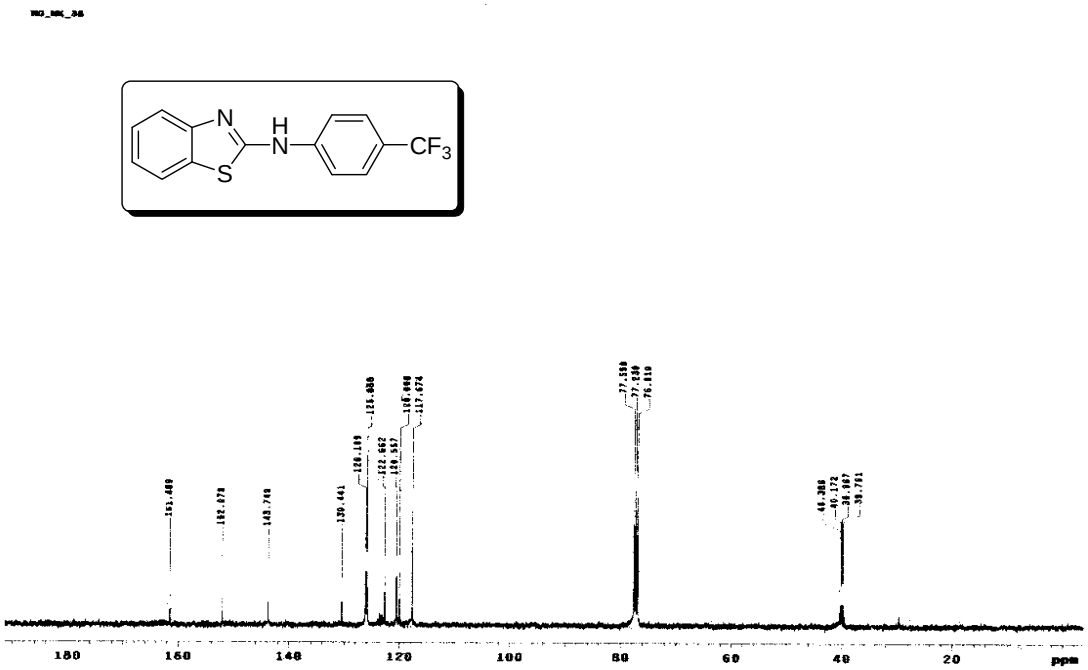
_N_-(2-Chlorophenyl)benzo[d]thiazol-2-amine (1g): HRMS Spectra



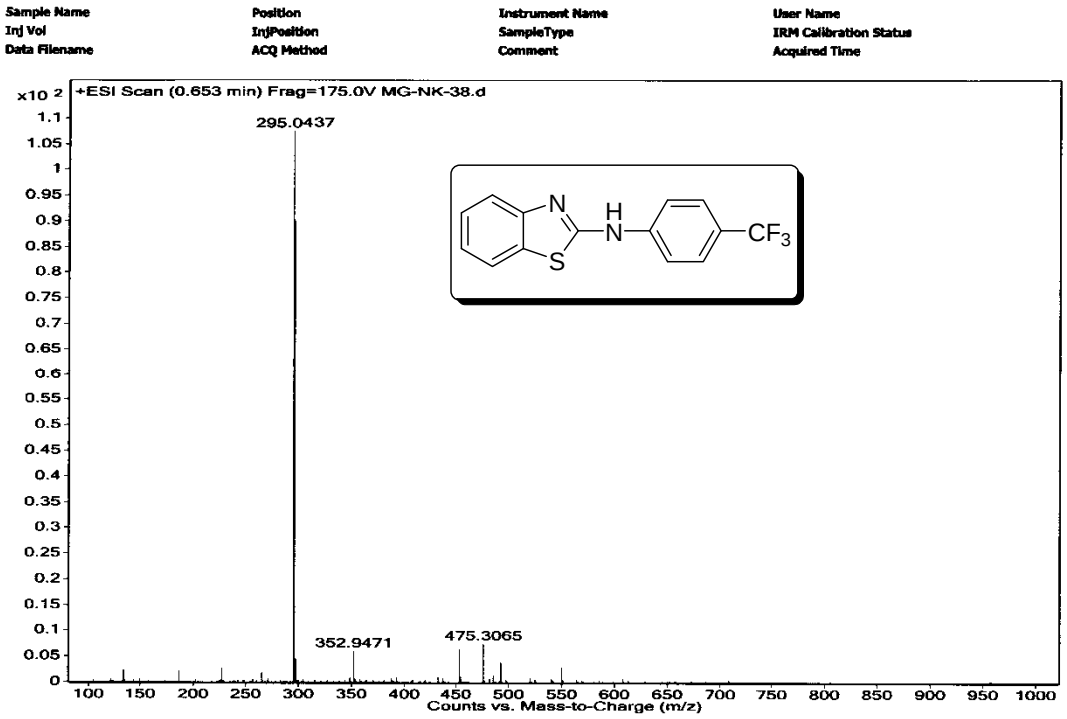
_N_-(4-(Trifluoromethyl)phenyl)benzo[d]thiazol-2-amine (1h): ^{1}H NMR ($CDCl_3$ + DMSO-d_6, 400 MHz)



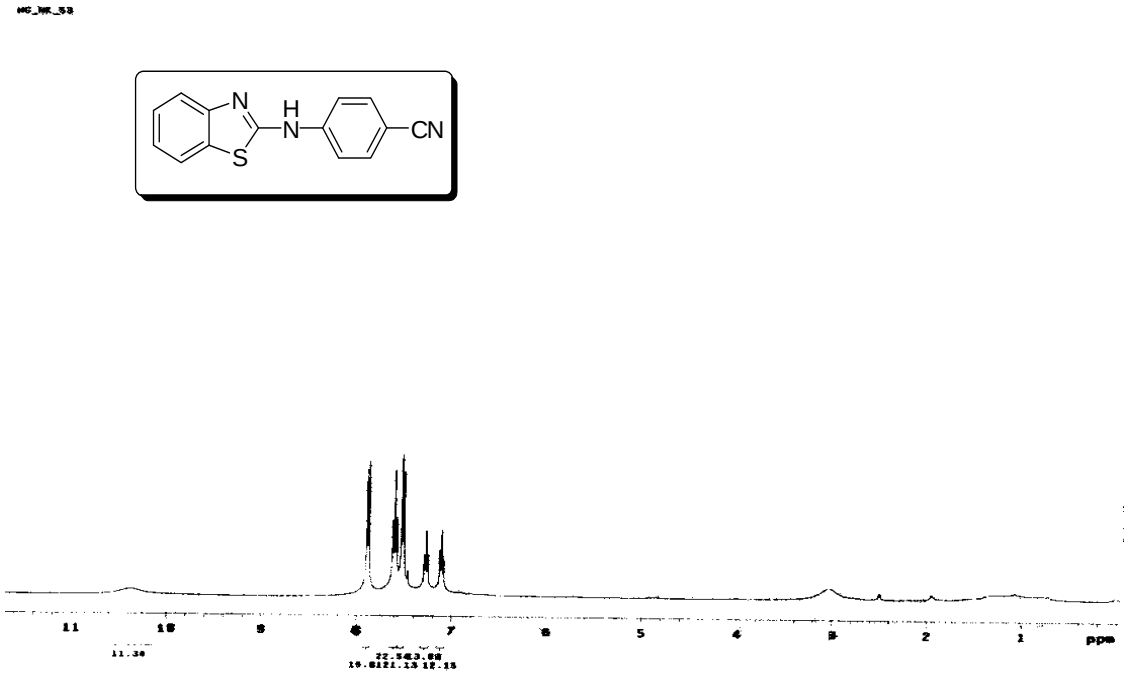
***N*-(4-(Trifluoromethyl)phenyl)benzo[d]thiazol-2-amine (1h): ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100 MHz)**



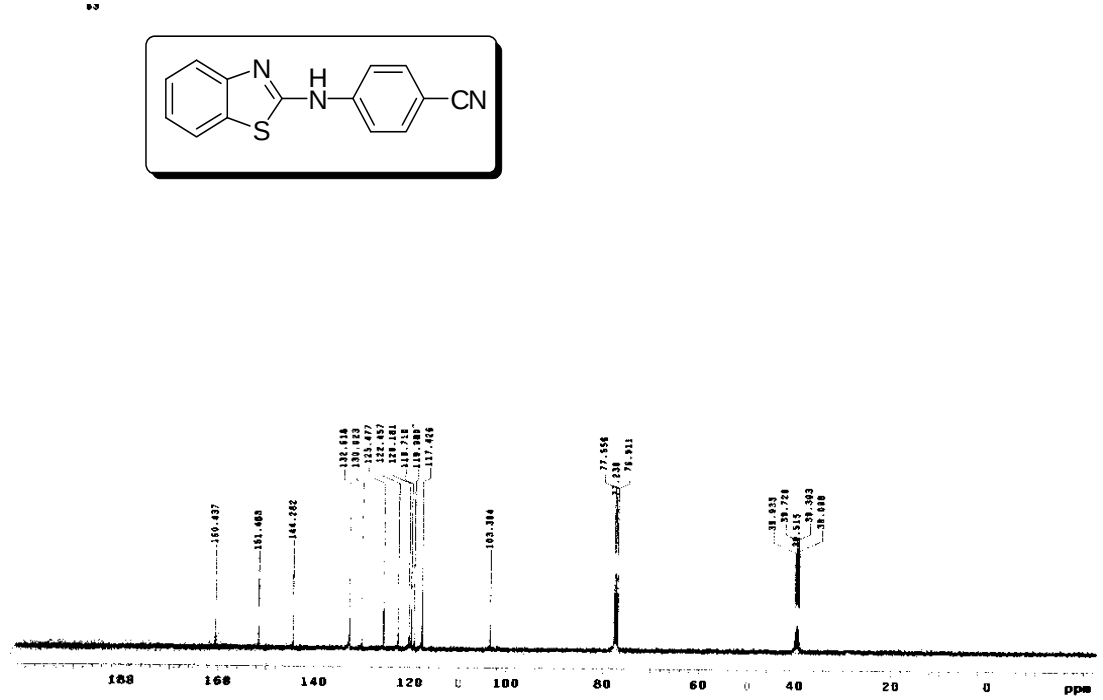
***N*-(4-(Trifluoromethyl)phenyl)benzo[d]thiazol-2-amine (1h): HRMS Spectra**



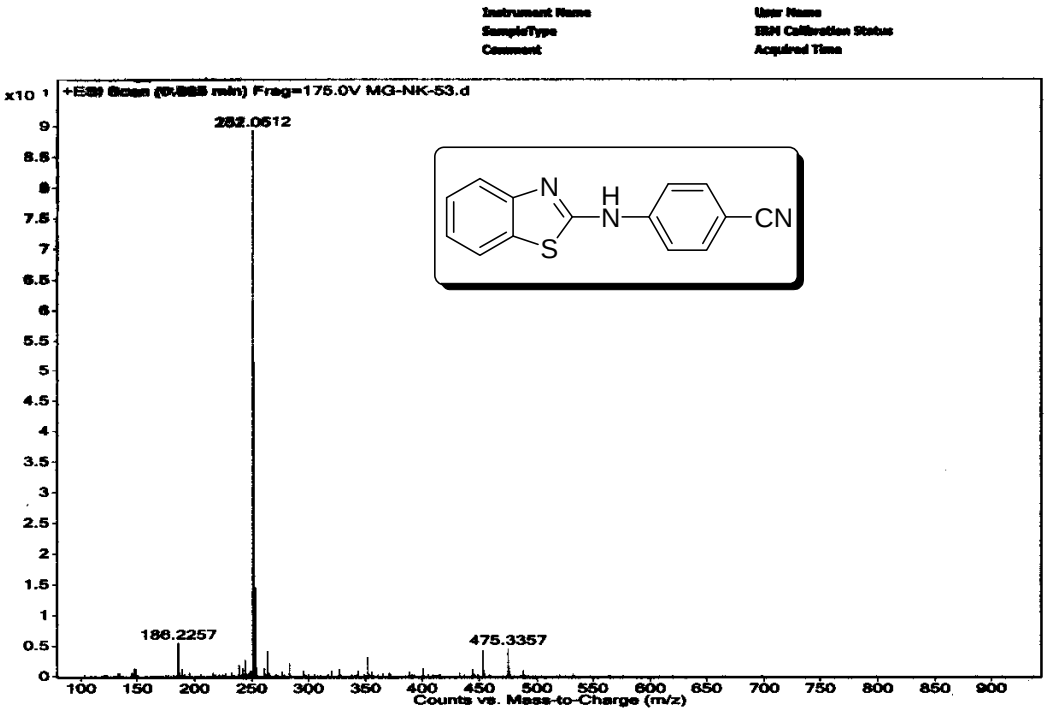
4-(Benzo[d]thiazol-2-ylamino)benzonitrile (1i): ^{1}H NMR ($CDCl_3$ + DMSO-d_6, 400 MHz)



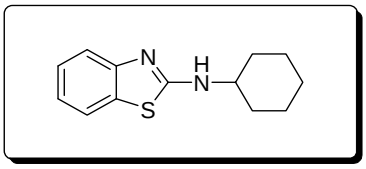
4-(Benzo[d]thiazol-2-ylamino)benzonitrile (1i): ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100 MHz)

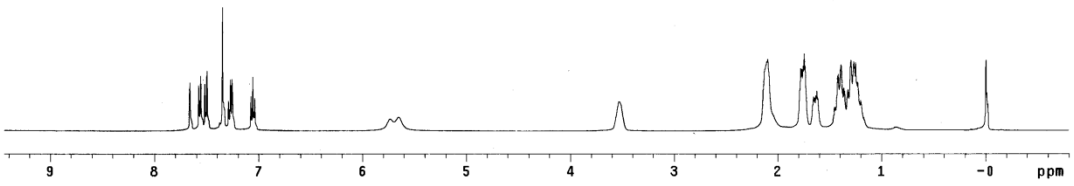


4-(Benzo[d]thiazol-2-ylamino)benzonitrile (1i): HRMS Spectra

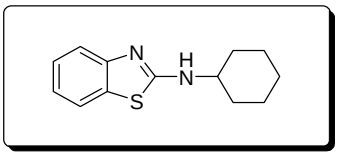


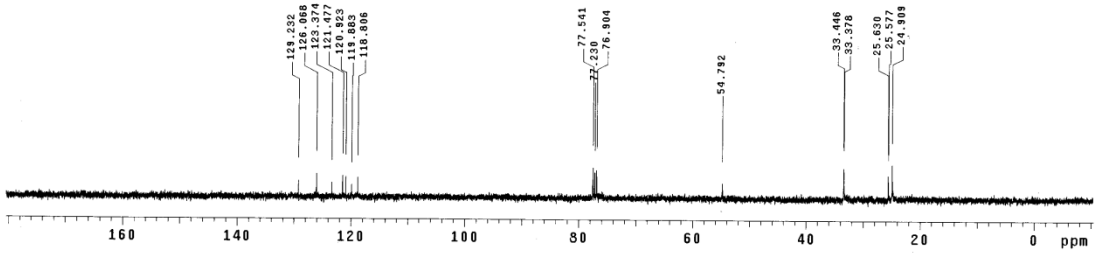
N-Cyclohexylbenzo[d]thiazol-2-amine (1j): ^{1}H NMR ($CDCl_3$, 400 MHz)



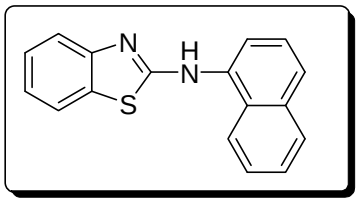


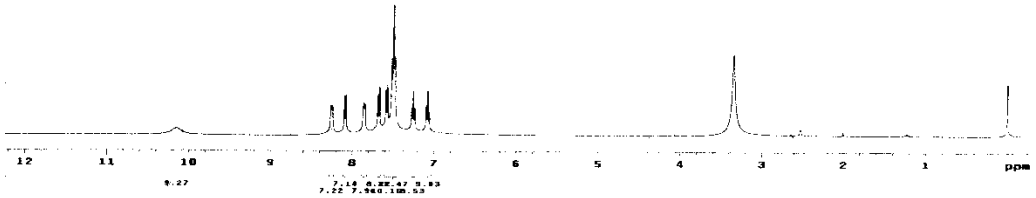
N-Cyclohexylbenzo[d]thiazol-2-amine (1k): ^{13}C NMR (CDCl$_3$, 100 MHz)



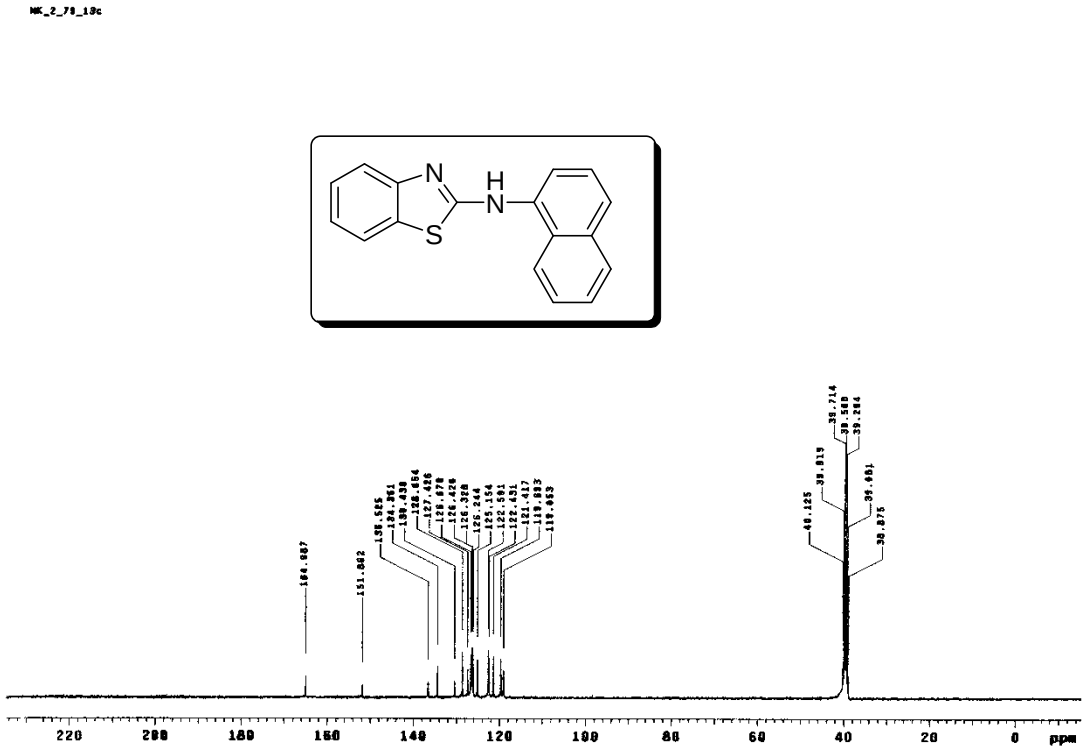


1*N*-(Naphthalen-1-yl)benzo[d]thiazol-2-amine (1k): ^{1}H NMR (400 MHz, DMSO-d$_6$)

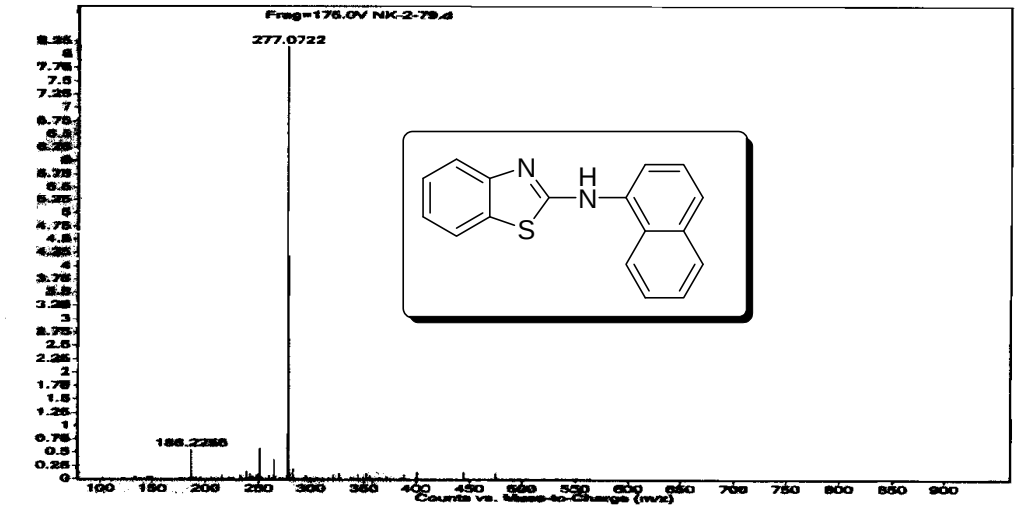




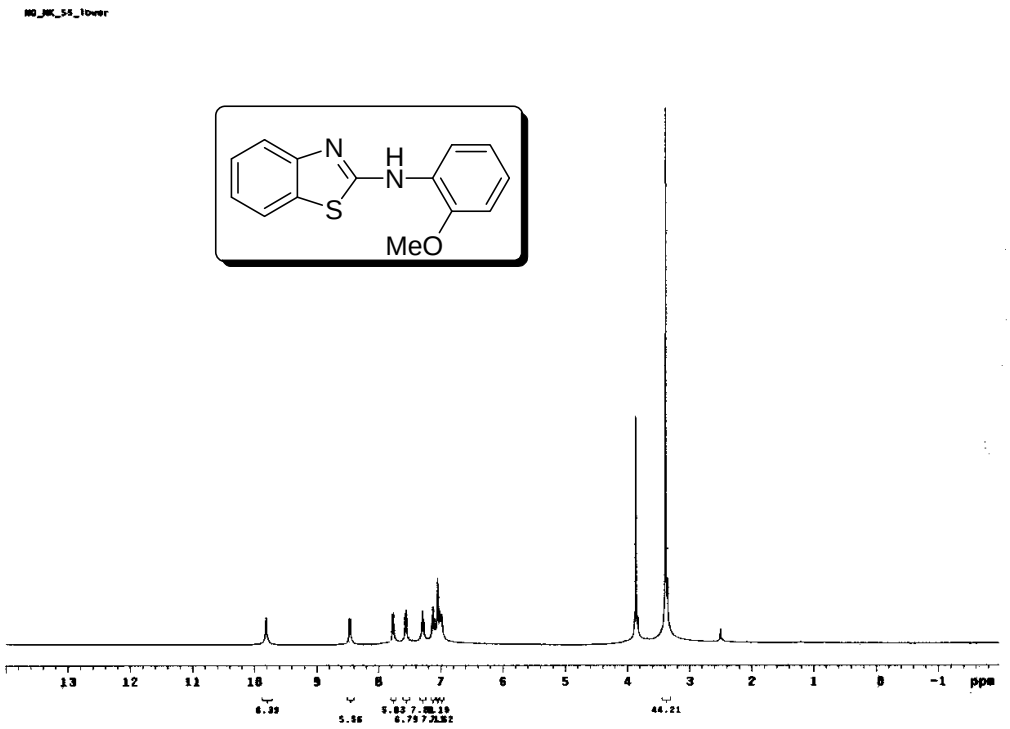
1*N*-(Naphthalen-1-yl)benzo[d]thiazol-2-amine (**1k**): **^{13}C NMR** (**DMSO-d$_6$, 100 MHz**)



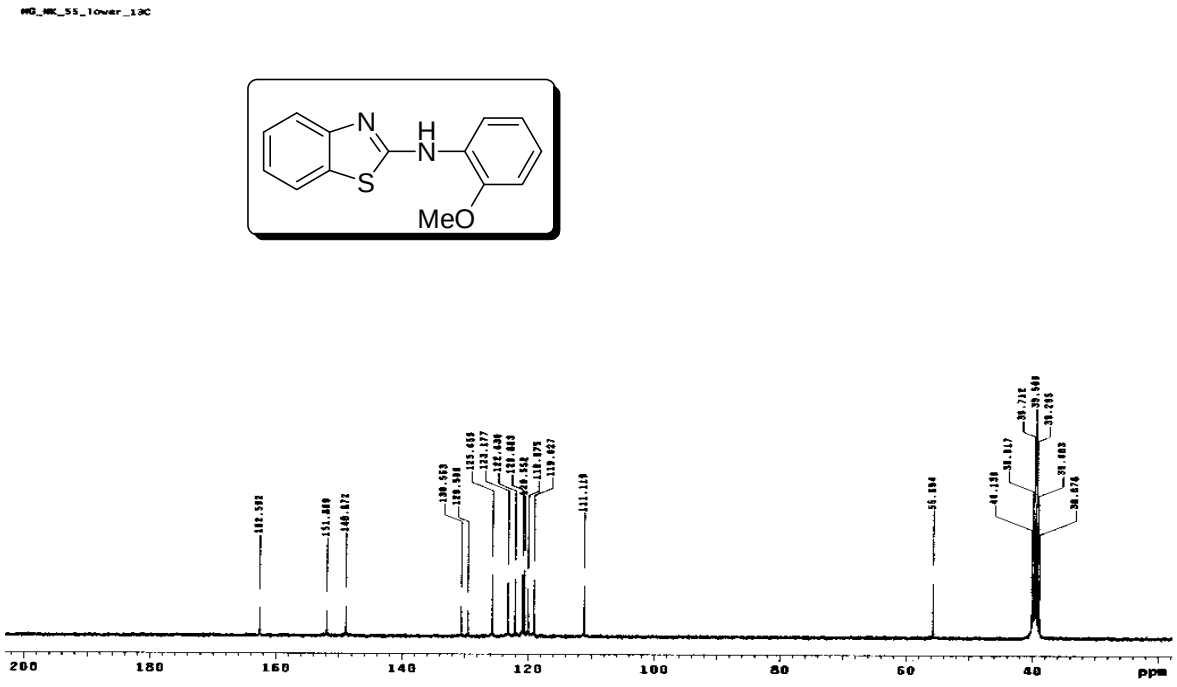
1*N*-(Naphthalen-1-yl)benzo[d]thiazol-2-amine (**1k**): **HRMS spectra**



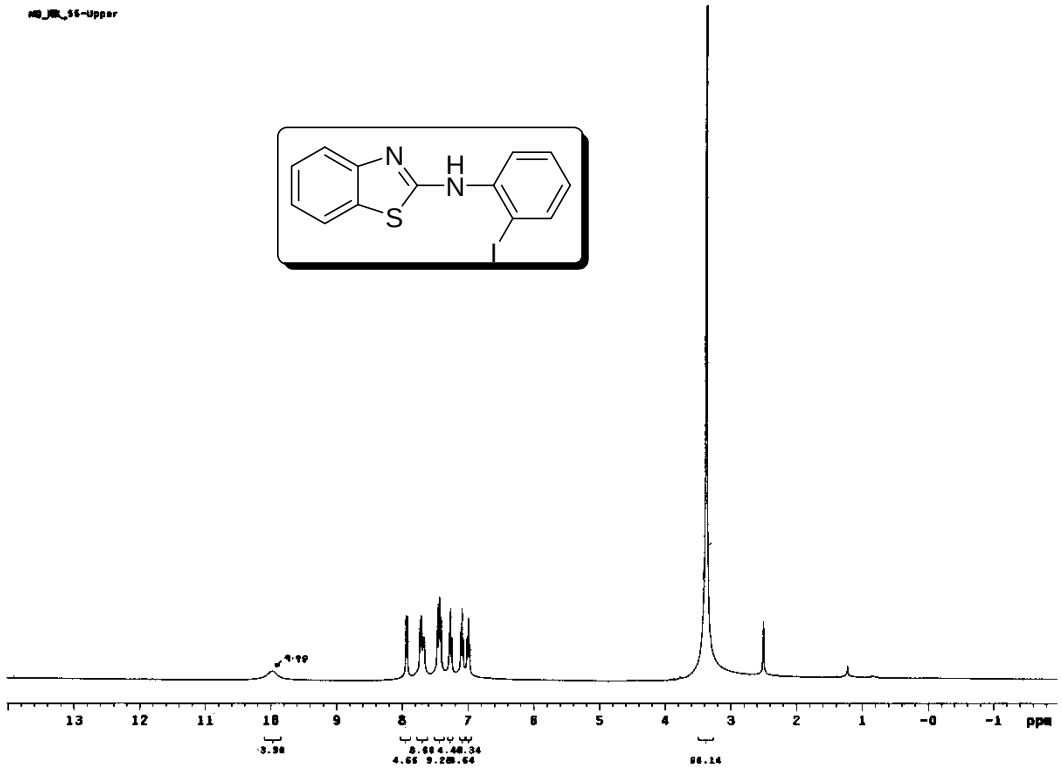
_N_-(2-Methoxyphenyl)benzo[d]thiazol-2-amine (1l): ^{1}H NMR (DMSO-d$_6$, 400 MHz)



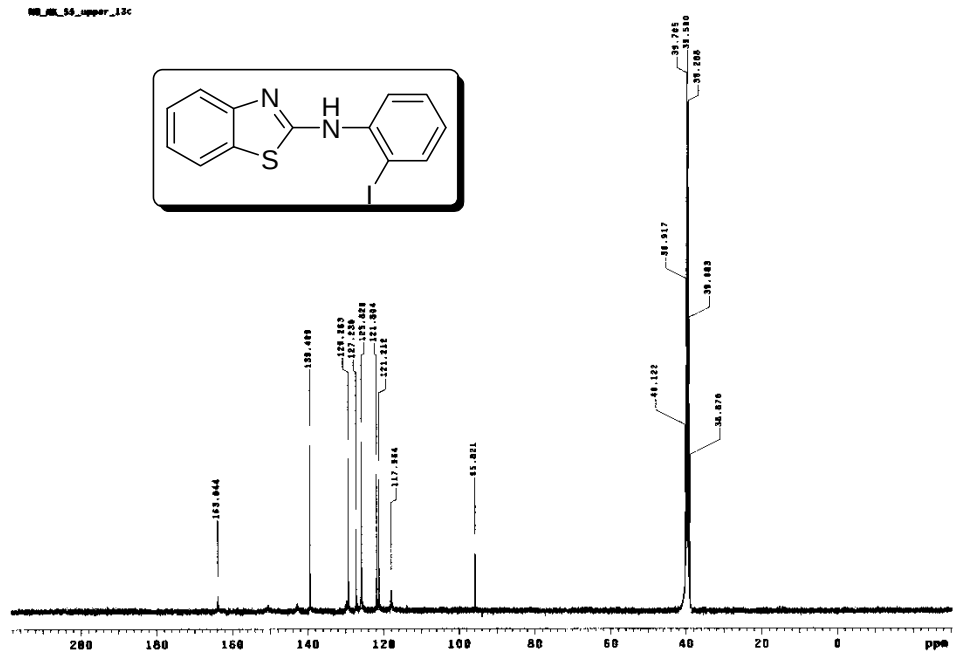
_N_-(2-Methoxyphenyl)benzo[d]thiazol-2-amine (1l): ^{13}C NMR (DMSO-d$_6$, 100 MHz)



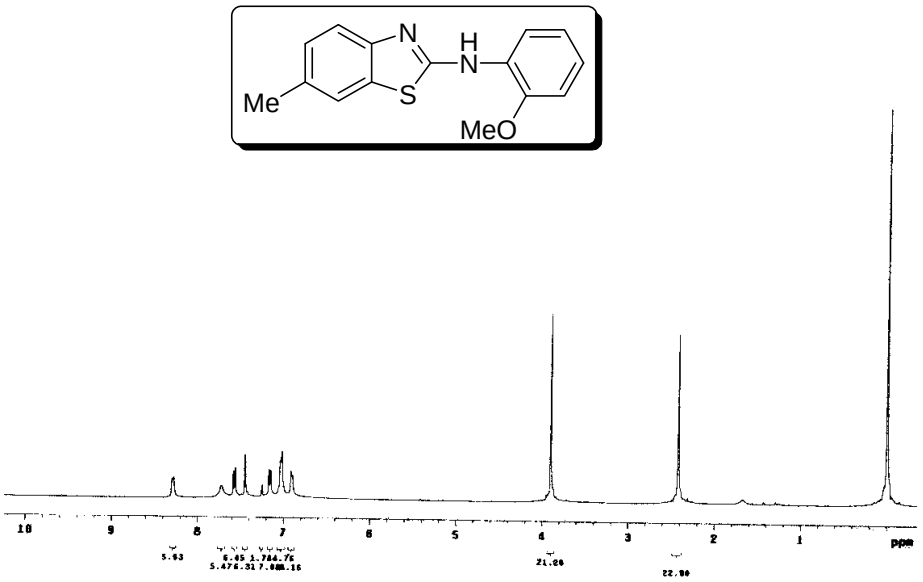
***N*-(2-Iodophenyl)benzo[d]thiazol-2-amine (1l'): ^{1}H NMR (DMSO-d$_6$, 400 MHz)**



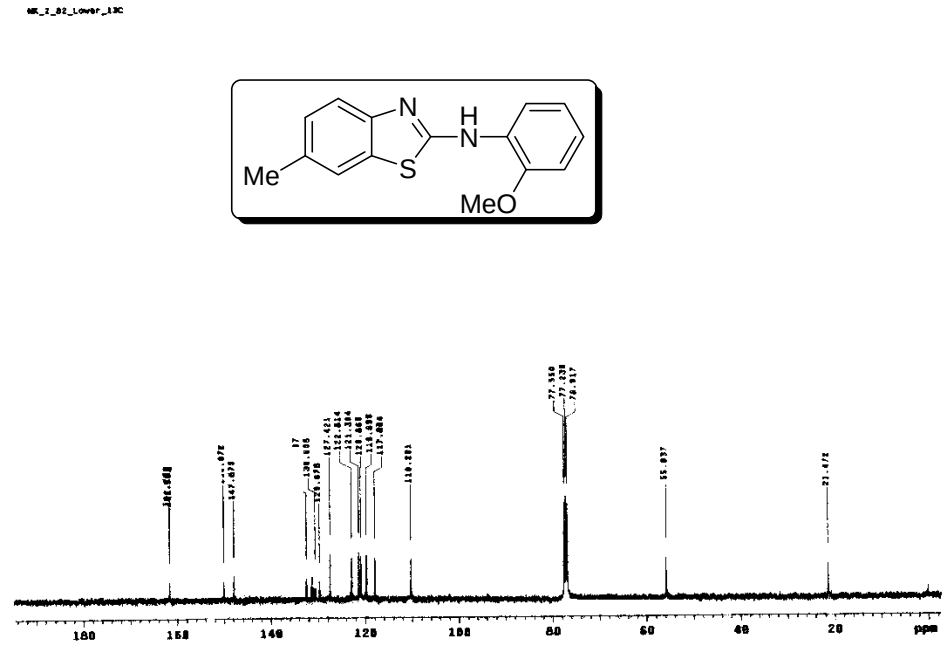
***N*-(2-Iodophenyl)benzo[d]thiazol-2-amine (1l'): ^{13}C NMR (DMSO-d$_6$, 100 MHz)**



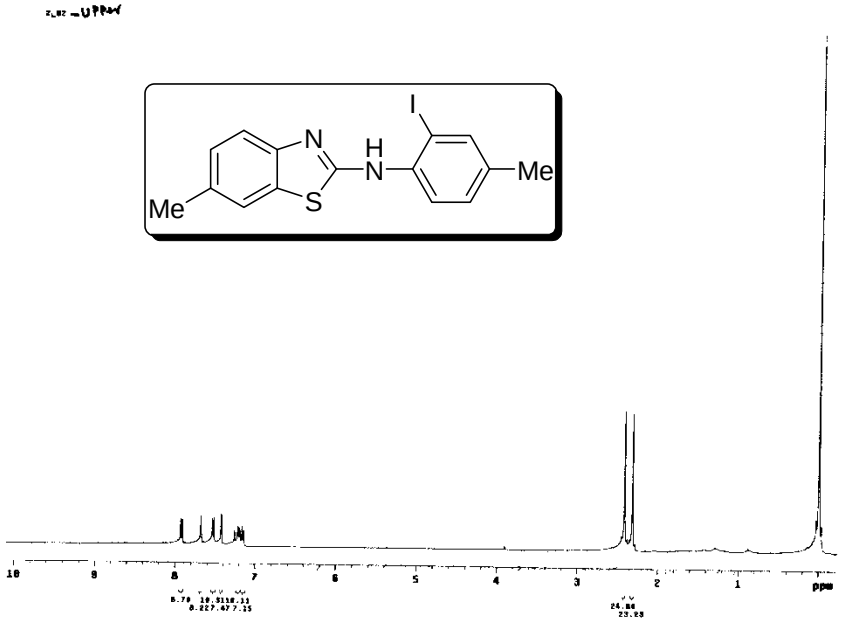
***N*-(2-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine** (**2l**): **^{1}H NMR** (**$CDCl_3$, 400 MHz**)



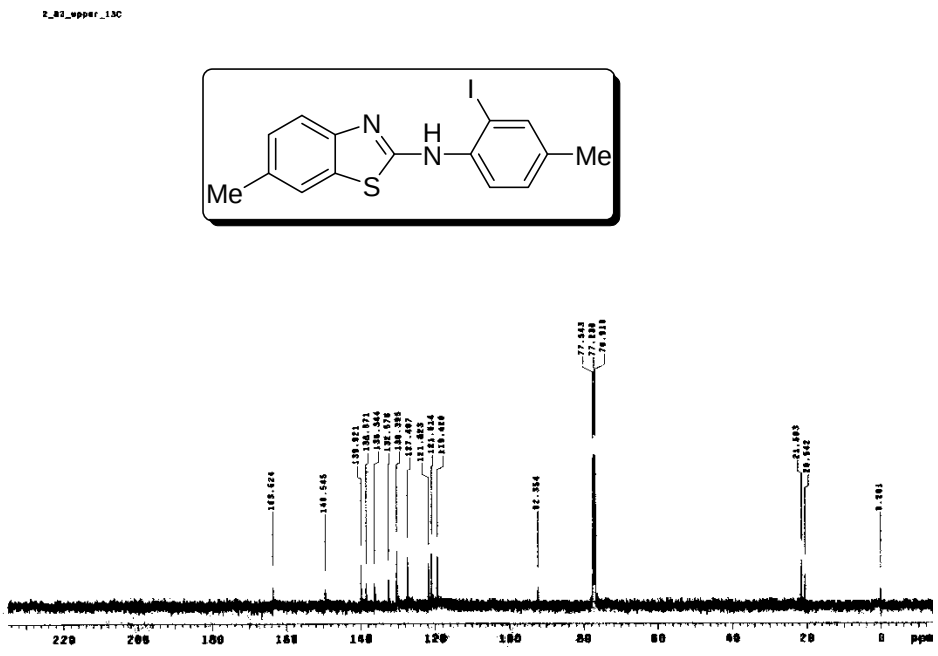
***N*-(2-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine** (**2l**): **^{13}C NMR** (**$CDCl_3$, 100 MHz**)



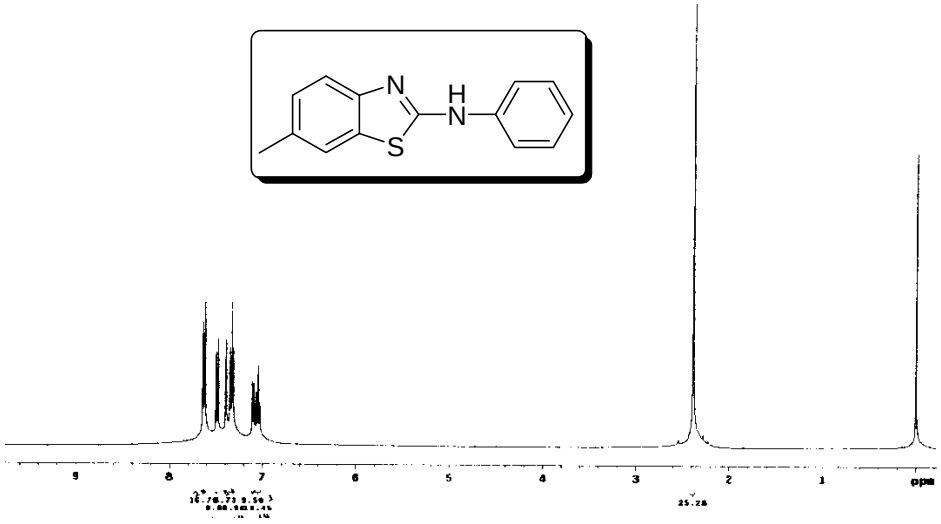
***N*-(2-Iodo-4-methylphenyl)-6-methylbenzo[d]thiazol-2-amine (2l'): ^{1}H NMR (CDCl$_3$, 400 MHz)**



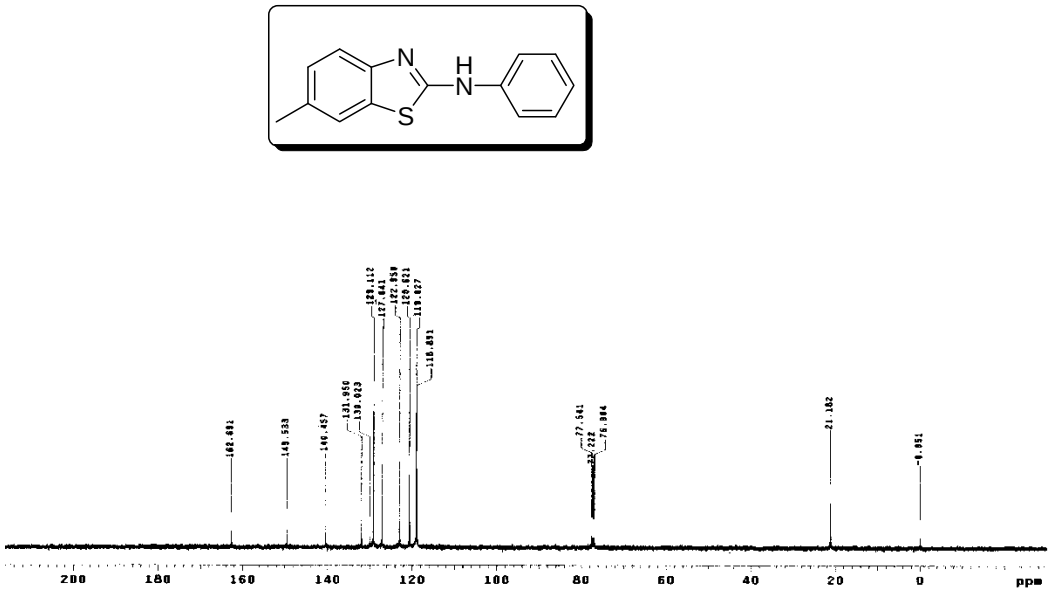
***N*-(2-Iodo-4-methylphenyl)-6-methylbenzo[d]thiazol-2-amine (2l'): ^{13}C NMR (CDCl$_3$, 100 MHz)**



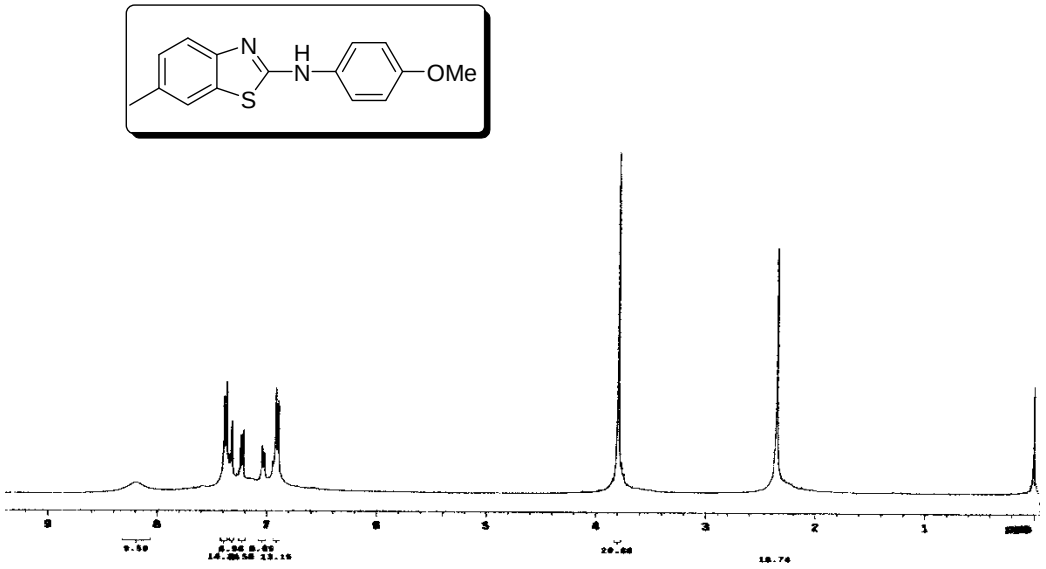
6-Methyl-*N*-phenylbenzo[d]thiazol-2-amine (2a): ^{1}H NMR ($CDCl_3$, 400 MHz)



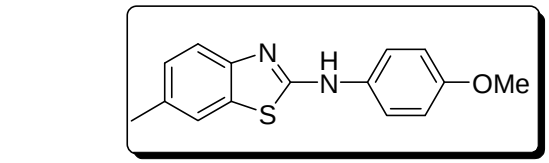
6-Methyl-*N*-phenylbenzo[d]thiazol-2-amine (2a): ^{13}C NMR ($CDCl_3$, 400 MHz)

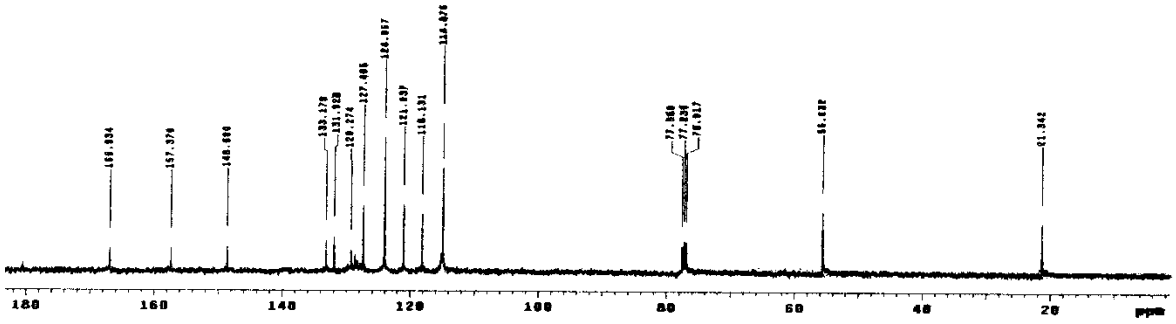


***N*-(4-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine (2c): ^{1}H NMR ($CDCl_3$, 400 MHz)**

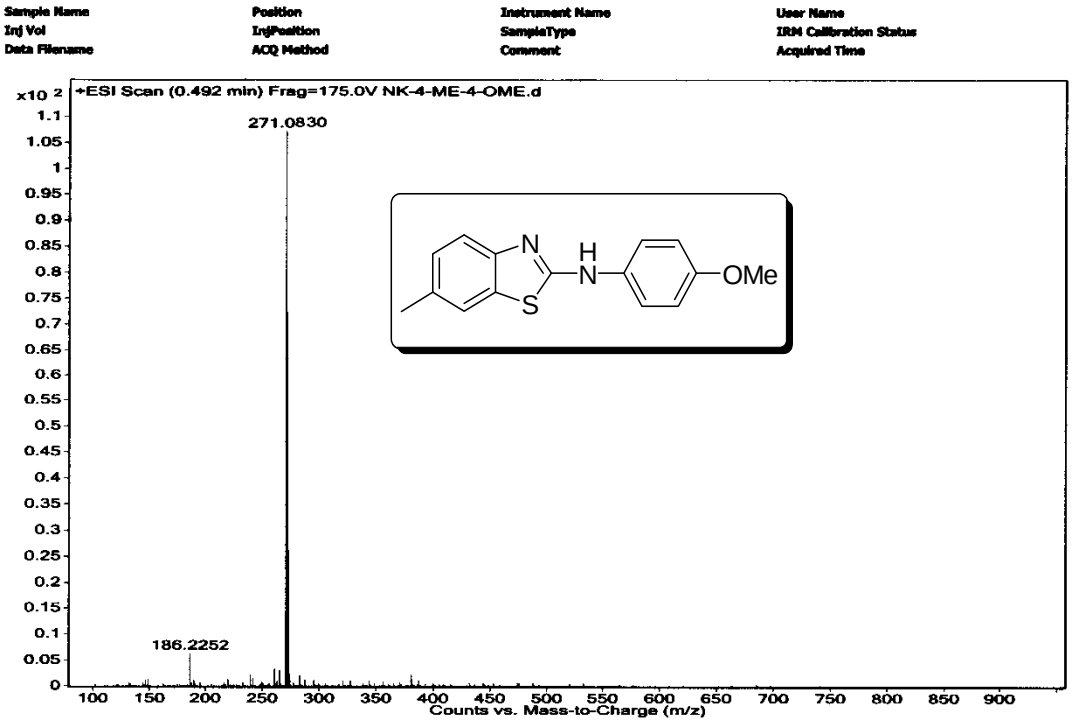


***N*-(4-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine (2c): ^{13}C NMR ($CDCl_3$, 100 MHz)**

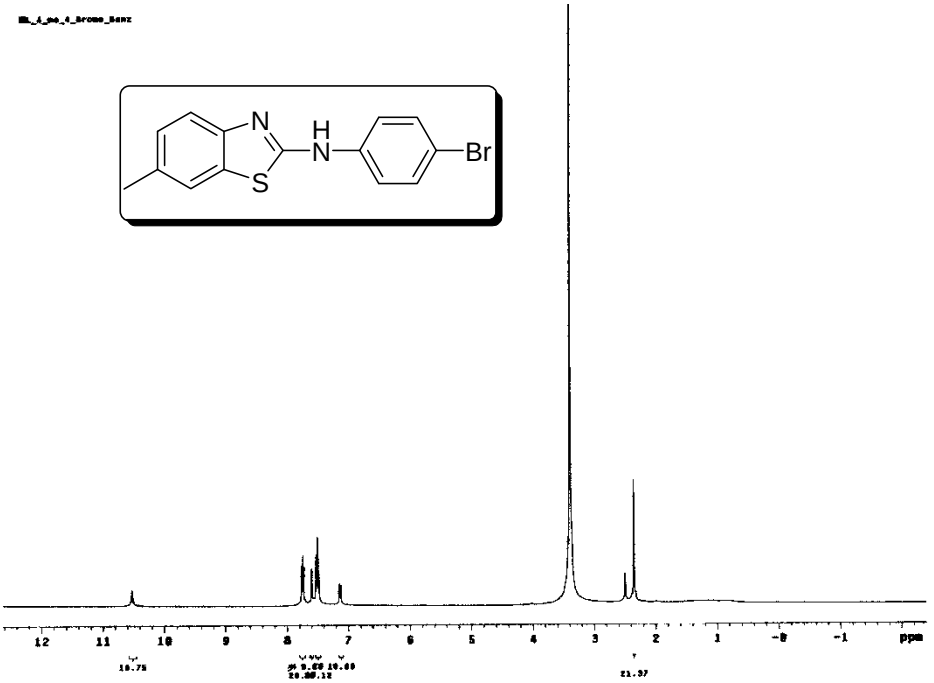




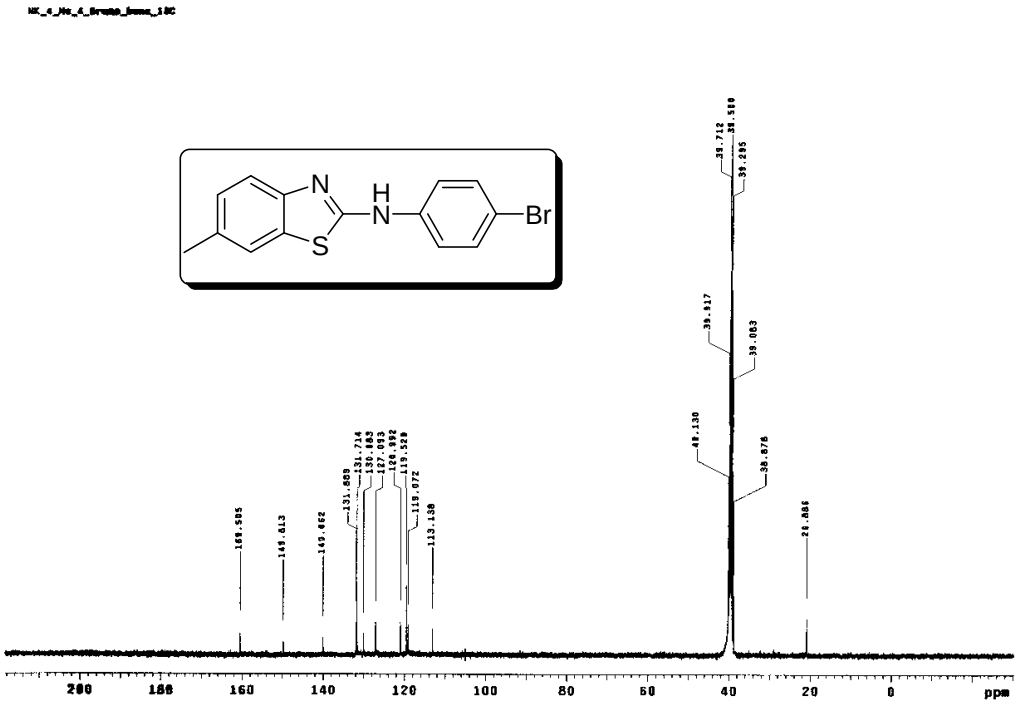
_N_-(4-Methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine (2c): HRMS Spectra



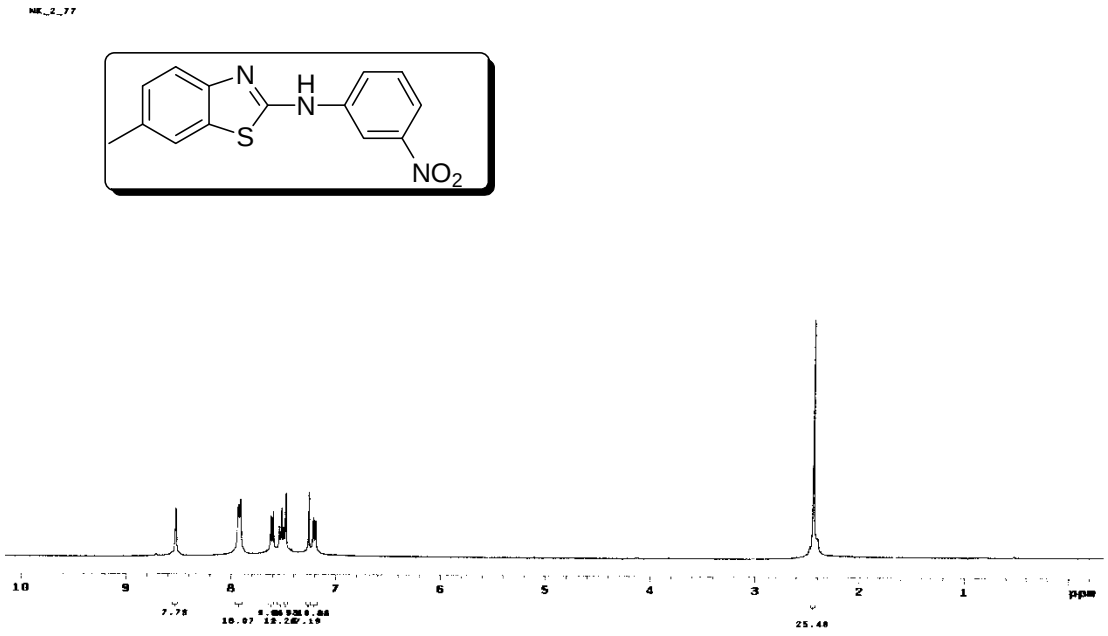
_N_-(4-Bromophenyl)-6-methylbenzo[d]thiazol-2-amine (2e): ^{1}H NMR (DMSO-d$_6$, 400 MHz)



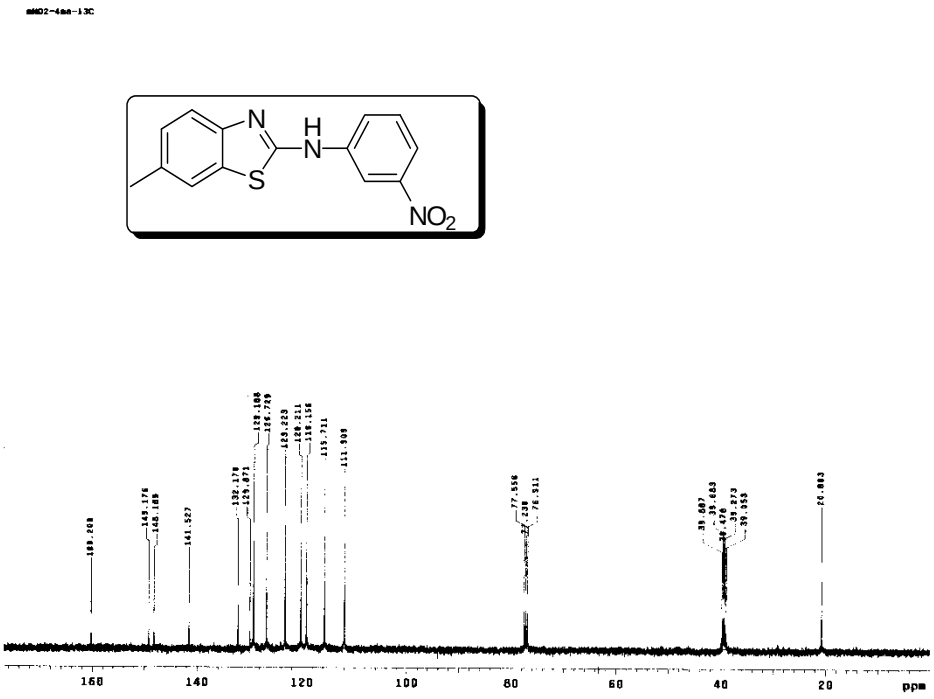
_N_-(4-Bromophenyl)-6-methylbenzo[d]thiazol-2-amine (**2e**): **^{13}C NMR** (**DMSO-d_6, 100 MHz**)



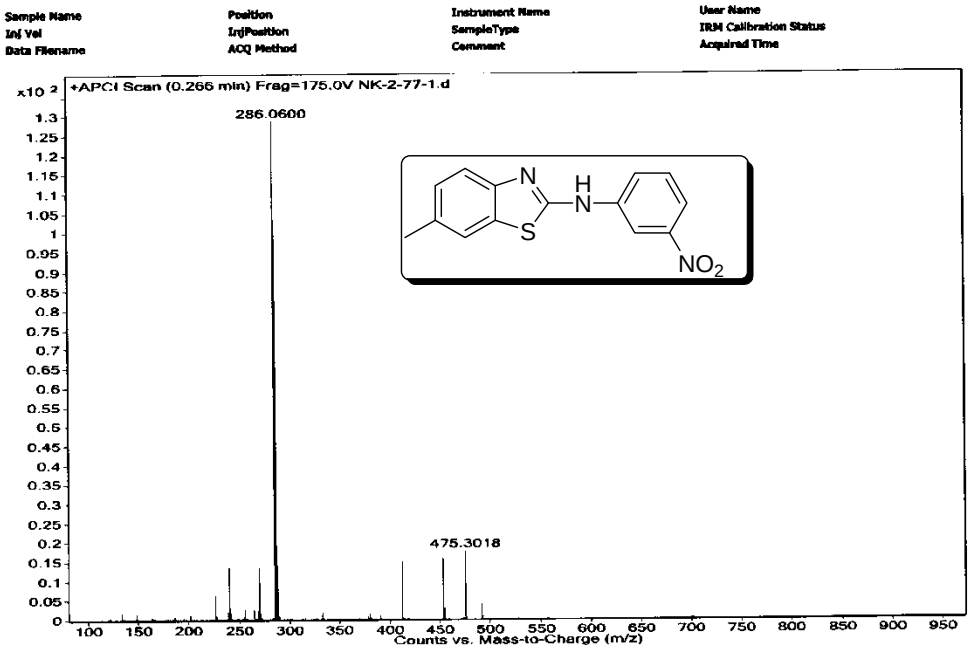
6-Methyl-_N_-(3-nitrophenyl)benzo[d]thiazol-2-amine (**2f**): **^{1}H NMR** (**$CDCl_3$ + DMSO-d_6, 400 MHz**)



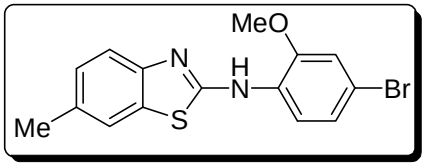
6-Methyl-*N*-(3-nitrophenyl)benzo[d]thiazol-2-amine (2f): ^{13}C NMR ($CDCl_3$ + DMSO-d_6, 100 MHz)

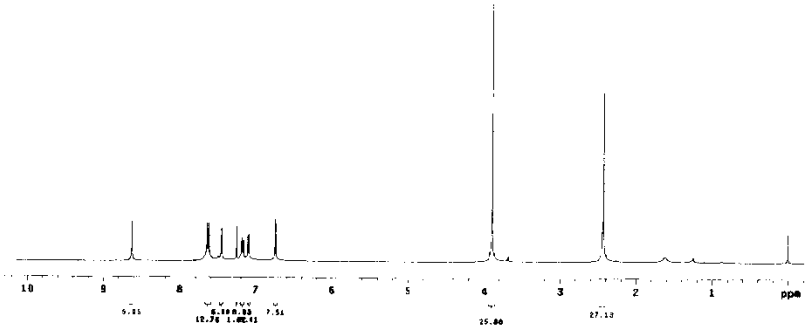


6-Methyl-*N*-(3-nitrophenyl)benzo[d]thiazol-2-amine (2f): HRMS spectra

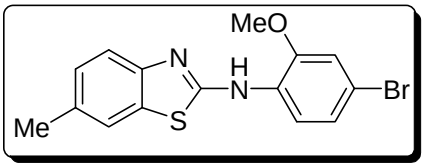


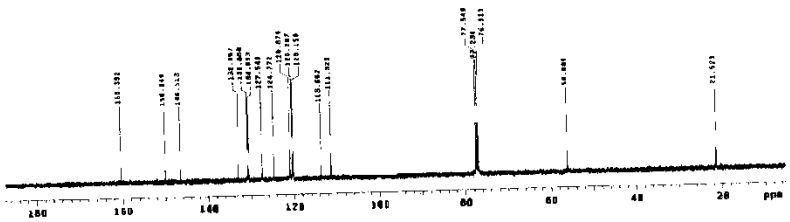
***N*-(4-Bromo-2-methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine (2m): ^{1}H NMR (CDCl$_3$, 400 MHz)**



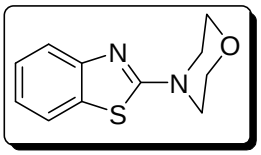


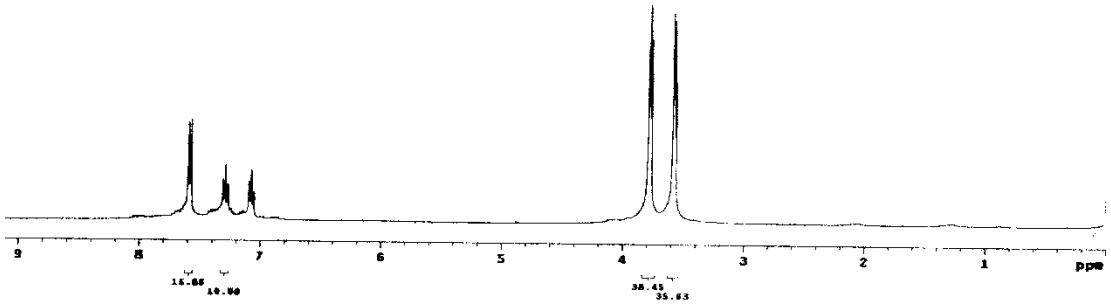
***N*-(4-Bromo-2-methoxyphenyl)-6-methylbenzo[d]thiazol-2-amine (2m): ^{13}C NMR (CDCl$_3$, 100 MHz)**



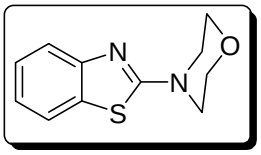


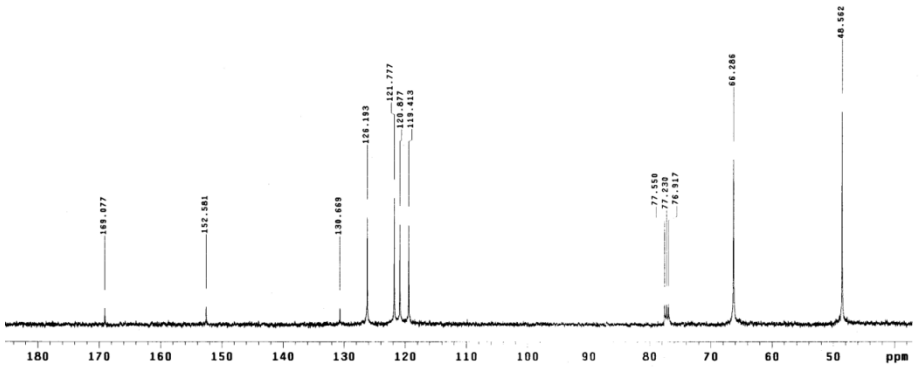
2-Morpholinobenzo[d]thiazole (3n): ^{1}H NMR ($CDCl_3$, 400 MHz)



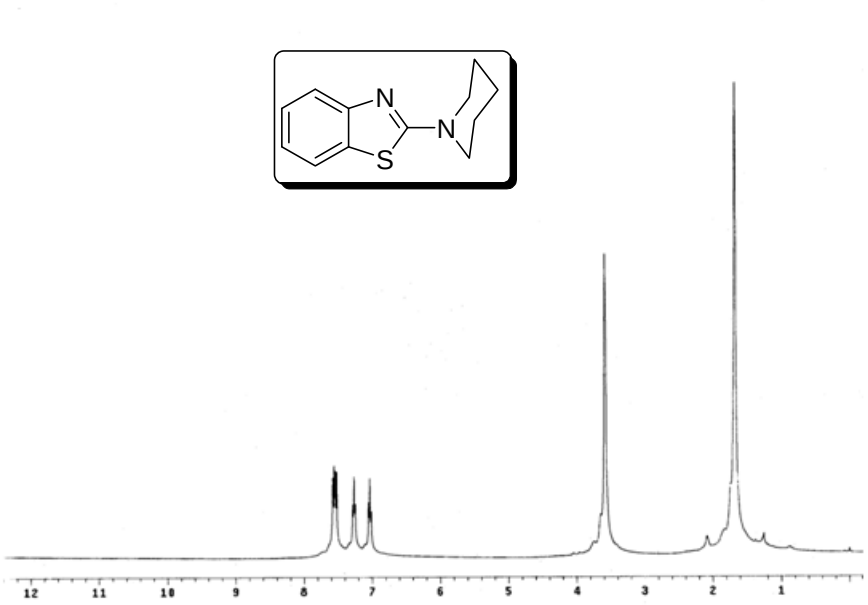


2-Morpholinobenzo[d]thiazole (3n): ^{13}C NMR ($CDCl_3$, 100 MHz)

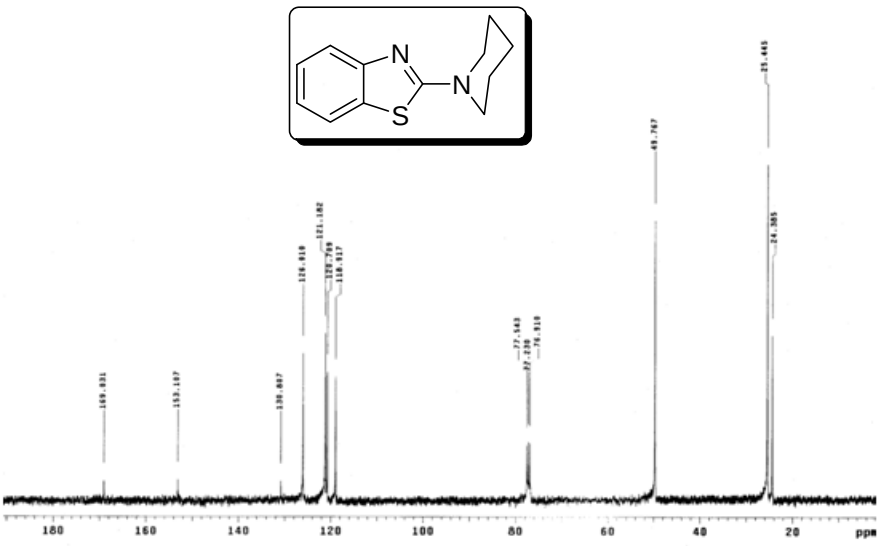




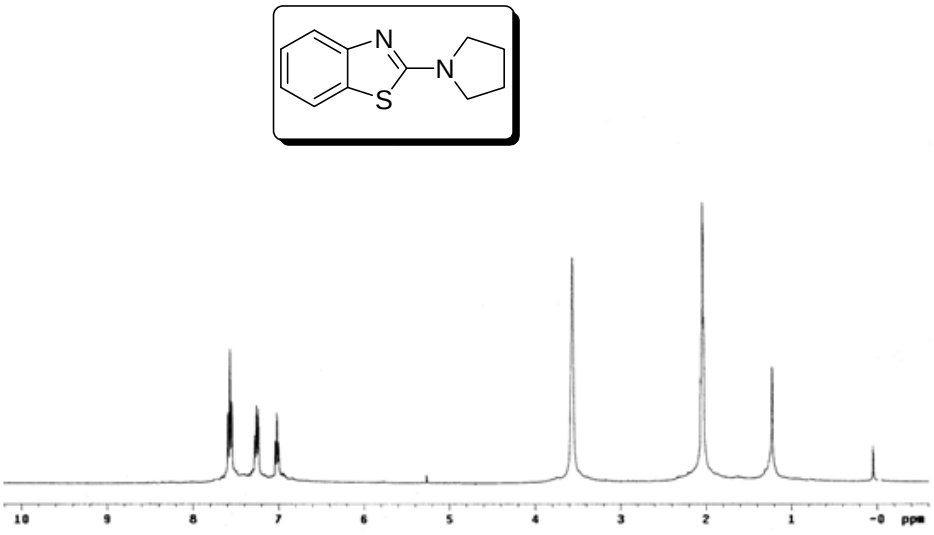
2-(Piperidin-1-yl)benzo[d]thiazole (4n): ^{1}H NMR ($CDCl_3$, 400 MHz)



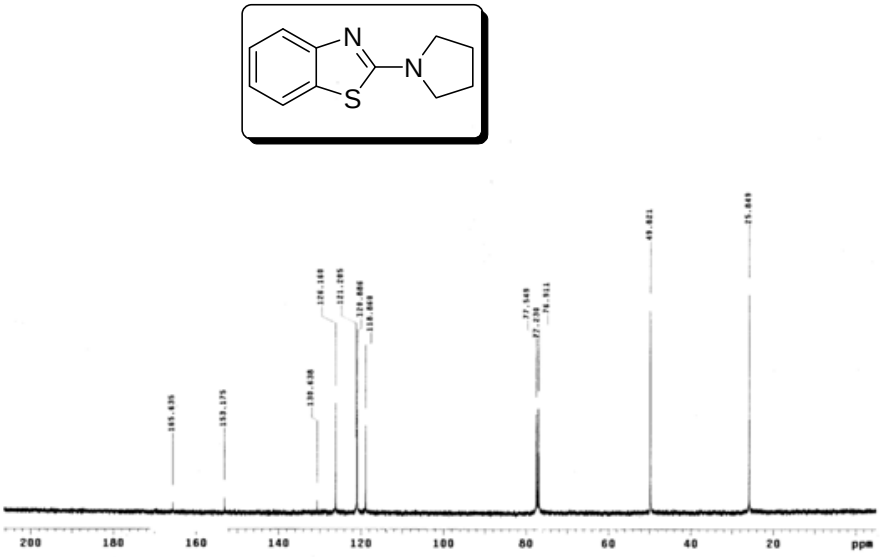
2-(Piperidin-1-yl)benzo[d]thiazole (4n): ^{13}C NMR ($CDCl_3$, 100 MHz)



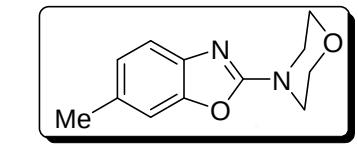
2-(Pyrrolidin-1-yl)benzo[d]thiazole (5n): ^{1}H NMR ($CDCl_3$, 400 MHz)

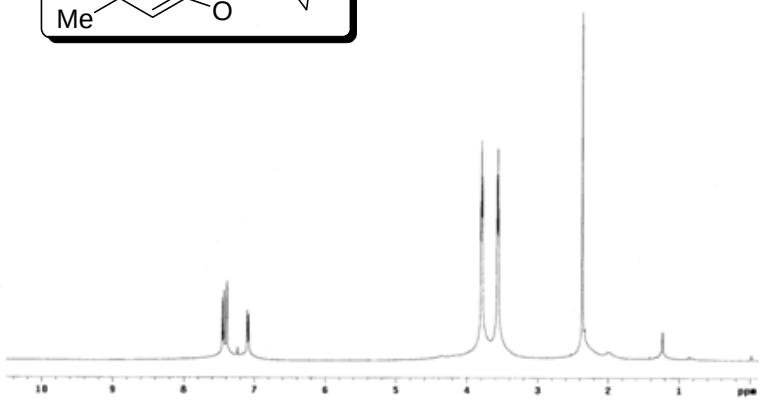


2-(Pyrrolidin-1-yl)benzo[d]thiazole (5n): ^{13}C NMR ($CDCl_3$, 100 MHz)



6-Methyl-2-morpholinobenzo[d]thiazole (**3o**): **^{1}H NMR ($CDCl_3$, 400 MHz)**





6-Methyl-2-morpholinobenzo[d]thiazole (**3o**): **^{13}C NMR ($CDCl_3$, 100 MHz**