

## Electronic Supplementary Information (ESI)

### Direct *N*-Alkylation of Amino-azoles with Alcohols Catalyzed by an Iridium Complex/Base System

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#### General Experimental Details

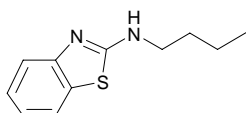
Infrared spectra were recorded on a Nicolet iS10 FT-IR spectrometer. High-resolution mass spectra (HRMS) were obtained on a HPLC-Q-ToF MS(Micro) spectrometer and are reported as *m/z* (relative intensity). Accurate masses are reported for the molecular ion  $[M+H]^+$ . Melting points were measured on a X-6 micro-melting apparatus (Beijing Tech Instrument Co., Ltd). Proton nuclear magnetic resonance ( $^1\text{H}$  NMR) spectra were recorded at 500 MHz using a Bruker Avance 500 spectrometer. Chemical shifts are reported in delta ( $\delta$ ) units, parts per million (ppm) downfield from trimethylsilane or ppm relative to the center of the singlet at 7.26 ppm for  $\text{CDCl}_3$  and 2.50 ppm for  $\text{DMSO-d}_6$ . Coupling constants *J* values are reported in Hertz (Hz), and the splitting patterns were designated as follows: s, singlet; d, doublet; t, triplet; m, multiplet; b, broad. Carbon-13 nuclear magnetic resonance ( $^{13}\text{C}$  NMR) spectra were recorded at 125 MHz using a Bruker Avance 500 spectrometer. Chemical shifts are reported in delta ( $\delta$ ) units, ppm relative to the center of the triplet at 77.0 ppm for  $\text{CDCl}_3$  and 39.5 ppm for  $\text{DMSO-d}_6$ .  $^{13}\text{C}$  NMR spectra were routinely run with broadband decoupling.

$[\text{Cp}^*\text{IrCl}_2]_2$  ( $\text{Cp}^*$  = pentamethylcyclopentadienyl) and  $[\text{Ir}(\text{cod})\text{Cl}]_2$  ( $\text{cod}$  = 1,5-cyclooctadiene) were prepared according to literature methods.<sup>1,2</sup> Commercially unavailable amino-azoles were synthesized according to the previously reported procedures.<sup>3,4</sup> Reaction tubes were purchased from Beijing Synthware Glass Inc. All reactions were run under an atmosphere of nitrogen, unless otherwise indicated. Analytical thin-layer chromatography (TLC) was carried out using 0.2-mm commercial silica gel plates.

#### General Procedure for direct *N*-alkylation of amino-azoles with alcohols catalyzed by an iridium complex/base system

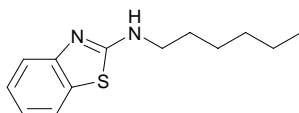
To an oven-dried, nitrogen purged 20 ml Schlenk tube were added amino-azole (1mmol),  $[\text{Cp}^*\text{IrCl}_2]_2$  (0.002 mmol, 0.2 mol%), base (0.2 mmol, 20 mol%) and alcohol (5 mmol, 500 mol%). The resulting mixture was heated at 150 °C for 12h, followed by the mixture of the reaction was allowed to cool to ambient temperature. The mixture of the reaction was concentrated in *vacuo* and purified by flash column chromatography with hexane/ethyl acetate to afford the corresponding product.

### ***N*-butylbenzo[d]thiazol-2-amine (3aa)<sup>5</sup>**



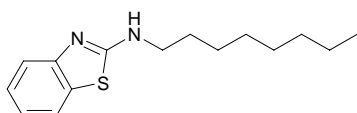
mp 69.6-70.6 °C (lit.<sup>5</sup> mp 68 °C); <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.58 (d, *J* = 7.9 Hz, 1H, ArH), 7.52 (d, *J* = 8.1 Hz, 1H, ArH), 7.29 (t, *J* = 7.6 Hz, 1H, ArH), 7.07 (t, *J* = 7.6 Hz, 1H, ArH), 5.49 (br s, 1H, NH), 3.42 (t, *J* = 7.1 Hz, 2H, CH<sub>2</sub>N), 1.68 (quint, *J* = 7.3 Hz, 2H, CH<sub>2</sub>), 1.45 (sext, *J* = 7.4 Hz, 2H, CH<sub>2</sub>), 0.97 (t, *J* = 7.4 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 168.0, 152.4, 130.2, 125.9, 121.2, 120.7, 118.5, 45.4, 31.6, 20.0, 13.7.

### ***N*-hexylbenzo[d]thiazol-2-amine (3ab)<sup>6</sup>**



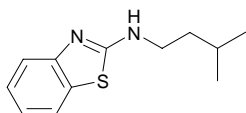
mp 58.5-59.4 °C (lit.<sup>6</sup> mp 53.2-55.4 °C); <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.58 (d, *J* = 7.9 Hz, 1H, ArH), 7.53 (d, *J* = 8.1 Hz, 1H, ArH), 7.29 (t, *J* = 7.7 Hz, 1H, ArH), 7.10 (t, *J* = 7.5 Hz, 1H, ArH), 5.39 (br s, 1H, NH), 3.41 (t, *J* = 7.1 Hz, 2H, CH<sub>2</sub>N), 1.68 (quint, *J* = 7.3 Hz, 2H, CH<sub>2</sub>), 1.41 (quint, *J* = 7.2 Hz, 2H, CH<sub>2</sub>), 1.34-1.30 (m, 4H, 2xCH<sub>2</sub>), 0.90 (t, *J* = 7.1 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 168.0, 152.5, 130.2, 125.8, 121.2, 120.7, 118.5, 45.7, 31.4, 29.5, 26.5, 22.5, 13.9.

### ***N*-octylbenzo[d]thiazol-2-amine (3ac)**



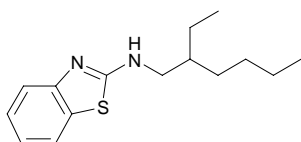
mp 43.0-44.3 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.58 (d, *J* = 7.7 Hz, 1H, ArH), 7.50 (d, *J* = 8.1 Hz, 1H, ArH), 7.28 (t, *J* = 7.8 Hz, 1H, ArH), 7.06 (t, *J* = 7.6 Hz, 1H, ArH), 6.29 (br s, 1H, NH), 3.38 (t, *J* = 7.1 Hz, 2H, CH<sub>2</sub>N), 1.67 (quint, *J* = 7.3 Hz, 2H, CH<sub>2</sub>), 1.38 (quint, *J* = 7.3 Hz, 2H, CH<sub>2</sub>), 1.33-1.23 (m, 8H, 4xCH<sub>2</sub>), 0.87 (t, *J* = 7.0 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 168.0, 152.5, 130.2, 125.8, 121.2, 120.7, 118.5, 45.7, 31.4, 29.5, 29.2, 29.1, 26.8, 22.6, 14.0; FTIR (net, cm<sup>-1</sup>) 3196, 2915, 1606, 1557, 1468, 1125; HRMS-EI (70 eV) *m/z* calcd for C<sub>15</sub>H<sub>23</sub>N<sub>2</sub>S [M+H]<sup>+</sup> 263.1582, found 263.1585.

### ***N*-isopentylbenzo[d]thiazol-2-amine (3ad)**



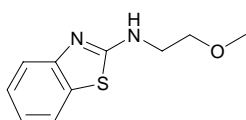
mp 76.8-77.7 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.58 (d, *J* = 8.0 Hz, 1H, ArH), 7.53 (d, *J* = 8.0 Hz, 1H, ArH), 7.29 (t, *J* = 7.7 Hz, 1H, ArH), 7.07 (t, *J* = 7.6 Hz, 1H, ArH), 5.45 (brs, 1H, NH), 3.43 (t, *J* = 7.4 Hz, 2H, CH<sub>2</sub>N), 1.72 (m, 1H, CH), 1.58 (quart, *J* = 7.2 Hz, 2H, CH<sub>2</sub>), 0.96 (d, *J* = 6.6 Hz, 6H, 2xCH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 168.0, 152.5, 130.2, 125.8, 121.2, 120.7, 118.5, 44.0, 38.4, 25.7, 22.4; FTIR (net, cm<sup>-1</sup>) 3194, 2954, 1609, 1557, 1446, 1125; HRMS-EI (70 eV) *m/z* calcd for C<sub>12</sub>H<sub>17</sub>N<sub>2</sub>S [M+H]<sup>+</sup> 221.1112, found 221.1107.

### ***N*-(2-ethylhexyl)benzo[d]thiazol-2-amine (3ae)**



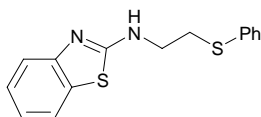
mp 80.2-81.2 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.58 (d, *J* = 7.8 Hz, 1H, ArH), 7.51 (d, *J* = 8.2 Hz, 1H, ArH), 7.29 (t, *J* = 7.3 Hz, 1H, ArH), 7.07 (t, *J* = 7.1 Hz, 1H, ArH) 5.50 (br s, 1H, NH), 3.32 (d, *J* = 6.2 Hz, 2H, CH<sub>2</sub>N), 1.61 (sept, *J* = 6.1 Hz, 1H, CH), 1.41 (quint, *J* = 7.2 Hz, 2H, CH<sub>2</sub>), 1.37-1.26 (m, 6H, 3xCH<sub>2</sub>), 0.94-0.90 (m, 6H, 2xCH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 168.3, 152.5, 130.3, 125.9, 121.2, 120.7, 118.6, 48.9, 39.5, 30.9, 28.8, 24.2, 22.9, 14.0, 10.9; FTIR (net, cm<sup>-1</sup>) 3196, 2950, 1623, 1575, 1467, 1124; HRMS-EI (70 eV) *m/z* calcd for C<sub>15</sub>H<sub>23</sub>N<sub>2</sub>S [M+H]<sup>+</sup> 263.1582, found 263.1583.

### ***N*-(2-methoxyethyl)benzo[d]thiazol-2-amine (3af)**



Oil; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.56-7.54 (m, 2H, ArH), 7.28 (t, *J* = 8.1 Hz, 1H, ArH), 7.07 (t, *J* = 7.6 Hz, 1H, ArH), 6.13 (br s, 1H, NH), 3.65-3.60 (m, 4H, CH<sub>2</sub>N, CH<sub>2</sub>O), 3.37 (d, *J* = 3.8 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>); δ 167.2, 152.4, 130.4, 125.8, 121.5, 120.7, 118.8, 70.7, 58.7, 44.7; FTIR (net, cm<sup>-1</sup>) 3218, 2921, 1681, 1597, 1443, 1119; HRMS-EI (70 eV) *m/z* calcd for C<sub>10</sub>H<sub>13</sub>N<sub>2</sub>OS [M+H]<sup>+</sup> 209.0749, found 209.0751.

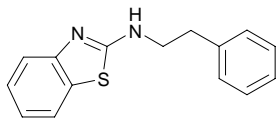
### ***N*-(2-(phenylthio)ethyl)benzo[d]thiazol-2-amine (3ag)**



mp 147.5-148.7 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.57 (d, *J* = 7.7 Hz, 1H, ArH), 7.54 (d, *J* = 8.1 Hz, 1H, ArH), 7.42 (d, *J* = 7.6 Hz, 2H, ArH), 7.32-7.28 (m, 3H, ArH), 7.23 (t, *J* = 7.4 Hz, 1H, ArH), 7.09 (t, *J* = 7.6 Hz, 1H, ArH), 5.61 (br s, 1H, NH), 3.67 (t, *J* = 6.4 Hz, 2H, CH<sub>2</sub>N), 3.24 (t, *J* = 6.4 Hz, 2H, CH<sub>2</sub>S); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 166.7, 152.3, 134.5, 130.5, 130.2, 129.1, 126.8, 126.0, 121.8,

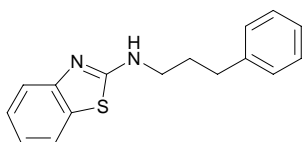
120.8, 119.0, 43.9, 33.6; FTIR (net,  $\text{cm}^{-1}$ ) 3188, 2903, 1614, 1574, 1436; HRMS-EI (70 eV)  $m/z$  calcd for  $\text{C}_{15}\text{H}_{15}\text{N}_2\text{S}_2$   $[\text{M}+\text{H}]^+$  287.0677, found 287.0679.

### ***N*-phenethylbenzo[d]thiazol-2-amine (3ah)**



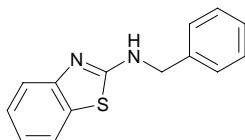
mp 143.6-144.4 °C;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  7.59 (d,  $J = 7.9$  Hz, 1H, ArH), 7.53 (d,  $J = 8.1$  Hz, 1H, ArH), 7.34-7.28 (m, 3H, ArH), 7.27-7.23 (m, 4H, ArH), 7.09 (t,  $J = 7.6$  Hz, 1H, ArH), 5.42 (br s, 1H, NH), 3.70 (t,  $J = 6.9$  Hz, 2H,  $\text{CH}_2\text{N}$ ), 3.01 (t,  $J = 6.9$  Hz, 2H,  $\text{CH}_2\text{Ph}$ );  $^{13}\text{C}$  NMR (125MHz,  $\text{CDCl}_3$ )  $\delta$  167.4, 152.4, 138.3, 130.3, 128.8, 128.7, 126.7, 126.0, 121.5, 120.8, 118.8, 46.6, 35.5; FTIR (net,  $\text{cm}^{-1}$ ) 3199, 2910, 1620, 1573, 1446, 1186; HRMS-EI (70 eV)  $m/z$  calcd for  $\text{C}_{15}\text{H}_{15}\text{N}_2\text{S}$   $[\text{M}+\text{H}]^+$  255.0956, found 255.0959.

### ***N*-(3-phenylpropyl)benzo[d]thiazol-2-amine (3ai)<sup>7</sup>**



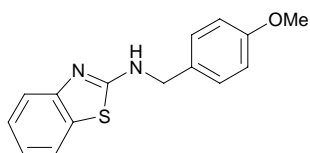
mp 101.2-102.0 °C;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  7.58 (d,  $J = 7.9$  Hz, 1H, ArH), 7.53 (d,  $J = 8.0$  Hz, 1H, ArH), 7.31-7.28 (m, 3H, ArH), 7.23-7.19 (m, 3H, ArH), 7.09 (t,  $J = 7.6$  Hz, 1H, ArH), 5.54 (br s, 1H, NH), 3.45 (t,  $J = 7.0$  Hz, 2H,  $\text{CH}_2\text{N}$ ), 2.75 (t,  $J = 7.6$  Hz, 2H,  $\text{CH}_2\text{Ph}$ ), 2.04 (quint,  $J = 7.3$  Hz, 2H,  $\text{CH}_2$ );  $^{13}\text{C}$  NMR (125MHz,  $\text{CDCl}_3$ )  $\delta$  167.9, 152.3, 141.0, 130.2, 128.5, 128.3, 126.1, 125.9, 121.3, 120.8, 118.6, 45.1, 33.0, 31.0.

### ***N*-benzylbenzo[d]thiazol-2-amine (3aj)<sup>8</sup>**



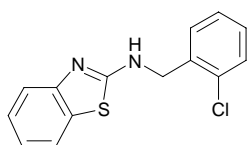
$^1\text{H}$  NMR (500 MHz,  $\text{DMSO-d}_6$ )  $\delta$  8.50 (t,  $J = 5.6$  Hz, 1H, NH), 7.67 (d,  $J = 7.8$  Hz, 1H, ArH), 7.39-7.33 (m, 5H, ArH), 7.26 (t,  $J = 7.1$  Hz, 1H, ArH), 7.22 (t,  $J = 7.7$  Hz, 1H, ArH), 7.02 (t,  $J = 7.5$  Hz, 1H, ArH), 4.60 (br s, 2H,  $\text{CH}_2\text{N}$ );  $^{13}\text{C}$  NMR (125MHz,  $\text{DMSO-d}_6$ )  $\delta$  166.2, 152.4, 138.9, 130.4, 128.3, 127.3, 127.0, 125.5, 120.95, 120.89, 118.1, 47.2.

### ***N*-(4-methoxybenzyl)benzo[d]thiazol-2-amine (3ak)<sup>8</sup>**



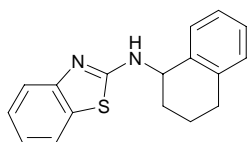
$^1\text{H}$  NMR (500 MHz, DMSO- $d_6$ )  $\delta$  8.42 (t,  $J$  = 5.6 Hz, 1H, NH), 7.66 (d,  $J$  = 7.5 Hz, 1H, ArH), 7.38 (d,  $J$  = 8.0 Hz, 1H, ArH), 7.31 (d,  $J$  = 8.5 Hz, 2H, ArH), 7.21 (t,  $J$  = 7.6 Hz, 1H, ArH), 7.01 (t,  $J$  = 7.5 Hz, 1H, ArH), 6.90 (d,  $J$  = 8.5, 2H, ArH), 4.51 (d,  $J$  = 5.7 Hz, 2H,  $\text{CH}_2\text{N}$ ), 3.73 (s, 3H,  $\text{OCH}_3$ );  $^{13}\text{C}$  NMR (125 MHz, DMSO- $d_6$ )  $\delta$  166.1, 158.4, 152.5, 130.7, 130.4, 128.8, 125.5, 120.9, 118.0, 113.7, 55.0, 46.7.

### *N*-(2-chlorobenzyl)benzo[d]thiazol-2-amine (**3al**)<sup>8</sup>



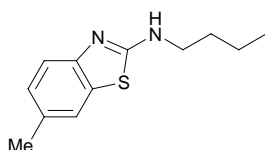
$^1\text{H}$  NMR (500 MHz, DMSO- $d_6$ )  $\delta$  8.54 (br s, 1H, NH), 7.69 (d,  $J$  = 7.8 Hz, 1H, ArH), 7.48 (d,  $J$  = 6.7 Hz, 2H, ArH), 7.40 (d,  $J$  = 8.0 Hz, 1H, ArH), 7.35-7.30 (m, 2H, ArH), 7.22 (t,  $J$  = 7.6 Hz, 1H, ArH), 7.04 (t,  $J$  = 7.6 Hz, 1H, ArH), 4.68 (br s, 2H,  $\text{CH}_2\text{N}$ );  $^{13}\text{C}$  NMR (125 MHz, DMSO- $d_6$ )  $\delta$  166.0, 152.3, 135.9, 132.3, 130.5, 129.3, 129.1, 128.9, 127.2, 125.6, 121.1, 121.0, 118.2, 45.0.

### *N*-(1,2,3,4-tetrahydronaphthalen-1-yl)benzo[d]thiazol-2-amine (**3am**)



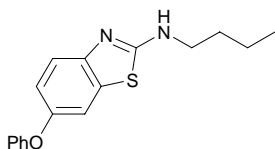
mp 131.7-132.3 °C;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  7.56 (d,  $J$  = 7.5, 1H, ArH), 7.42 (d,  $J$  = 7.8 Hz, 1H, ArH), 7.37 (d,  $J$  = 8.0 Hz, 1H, ArH), 7.24 (t,  $J$  = 7.6 Hz, 1H, ArH), 7.20-7.13 (m, 2H, ArH), 7.10 (d,  $J$  = 7.5 Hz, 1H, ArH), 7.06 (t,  $J$  = 7.6 Hz, 1H, ArH), 6.04 (br s, 1H, NH), 5.01 (t,  $J$  = 5.5 Hz, 1H, CHN), 2.85-2.73 (m, 2H,  $\text{CH}_2$ ), 2.19-2.13 (m, 1H, CH), 2.07-2.01 (m, 1H, CH), 1.94-1.81 (m, 2H,  $\text{CH}_2$ );  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  166.6, 152.4, 137.5, 136.1, 130.2, 129.2, 128.9, 127.6, 126.3, 125.9, 121.5, 120.7, 118.8, 53.9, 29.9, 29.1, 19.9; FTIR (net,  $\text{cm}^{-1}$ ) 3213, 2937, 1722, 1567, 1447, 1155; HRMS-EI (70 eV)  $m/z$  calcd for  $\text{C}_{17}\text{H}_{17}\text{N}_2\text{S}$  [ $\text{M}+\text{H}$ ]<sup>+</sup> 281.1112, found 281.1113.

### *N*-butyl-6-methylbenzo[d]thiazol-2-amine (**3ba**)<sup>9</sup>



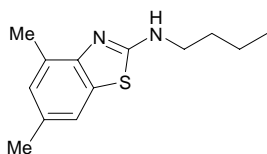
mp 90.7-91.7 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.41 (d, *J* = 8.2 Hz, 1H, ArH), 7.38 (s, 1H, ArH), 7.09 (d, *J* = 8.2 Hz, 2H, ArH), 5.47 (br s, 1H, NH), 3.39 (t, *J* = 7.0 Hz, 2H, CH<sub>2</sub>N), 2.39 (s, 3H, CH<sub>3</sub>Ar), 1.66 (quint, *J* = 7.3 Hz, 2H), 1.43 (sext, *J* = 7.5 Hz, 2H), 0.96 (t, *J* = 7.4 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 167.4, 150.2, 130.9, 130.3, 127.0, 120.8, 118.1, 45.4, 31.6, 21.1, 20.0, 13.7.

#### ***N*-butyl-6-phenoxybenzo[d]thiazol-2-amine (3ca)**



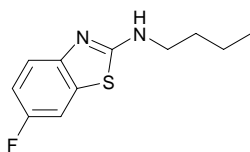
mp 116.0-116.7 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.48 (d, *J* = 8.8 Hz, 1H, ArH), 7.31 (t, *J* = 8.0 Hz, 2H, ArH), 7.25 (s, 1H, ArH), 7.06 (t, *J* = 7.4 Hz, 1H, ArH), 7.00 (dd, *J* = 8.3 Hz and 2.5 Hz, 1H, ArH), 6.98 (d, *J* = 7.9 Hz, 1H, ArH), 5.23 (br s, 1H, NH), 3.41 (t, *J* = 7.1 Hz, 2H, CH<sub>2</sub>N), 1.67 (quint, *J* = 7.4 Hz, 2H, CH<sub>2</sub>), 1.45 (sext, *J* = 7.4 Hz, 2H, CH<sub>2</sub>), 0.97 (t, *J* = 7.4 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>) δ 167.2, 158.3, 151.4, 148.9, 131.3, 129.6, 122.6, 119.2, 118.3, 117.9, 112.0, 45.3, 31.6, 20.0, 13.7; FTIR (net, cm<sup>-1</sup>) 3165, 2956, 1611, 1593, 1455, 1149. HRMS-EI (70 eV) *m/z* calcd for C<sub>17</sub>H<sub>19</sub>N<sub>2</sub>OS [M+H]<sup>+</sup> 299.1218, found 299.1223.

#### ***N*-butyl-4,6-dimethylbenzo[d]thiazol-2-amine (3da)**



mp 46.0-47.2 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.24 (s, 1H, ArH), 6.93 (s, 1H, ArH), 5.29 (br s, 1H, NH), 3.34 (quart, *J* = 5.8 Hz, 2H, CH<sub>2</sub>N), 2.51 (s, 3H, CH<sub>3</sub>Ar), 2.35 (s, 3H, CH<sub>3</sub>Ar), 1.65 (quint, *J* = 5.8 Hz, 2H, CH<sub>2</sub>), 1.44 (sext, *J* = 7.4 Hz, 2H, CH<sub>2</sub>), 0.96 (t, *J* = 7.4 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 166.7, 149.2, 130.8, 130.1, 128.0, 127.9, 118.3, 45.6, 31.6, 21.1, 19.9, 18.3, 13.7; FTIR (net, cm<sup>-1</sup>) 3242, 2959, 1606, 1557, 1447, 1145; HRMS-EI (70 eV) *m/z* calcd for C<sub>13</sub>H<sub>19</sub>N<sub>2</sub>S [M+H]<sup>+</sup> 235.1269, found 235.1271.

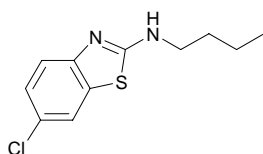
#### ***N*-butyl-6-fluorobenzo[d]thiazol-2-amine (3ea)**



mp 95.8-96.6 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.43 (dd, *J* = 8.7 Hz and 4.8 Hz, 1H, ArH), 7.29 (dd, *J* = 8.2 Hz and 2.5 Hz, 1H, ArH), 7.00 (td, *J* = 8.9 Hz and 2.6 Hz, 1H, ArH), 5.40 (br s, 1H, NH), 3.40 (t,

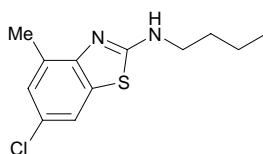
$J = 7.1$  Hz, 2H, CH<sub>2</sub>N), 1.67 (quint,  $J = 7.3$  Hz, 2H, CH<sub>2</sub>), 1.44 (sext,  $J = 7.5$  Hz, 2H, CH<sub>2</sub>), 0.96 (t,  $J = 7.4$  Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>)  $\delta$  167.4, 158.1 (d,  $J_{C-F} = 238.3$  Hz), 148.9, 131.0 (d,  $J_{C-F} = 10.7$  Hz), 118.9, 113.5 (d,  $J_{C-F} = 23.6$  Hz), 107.5 (d,  $J_{C-F} = 26.2$ ), 45.4, 31.6, 20.0, 13.7; FTIR (net, cm<sup>-1</sup>) 3214, 2972, 1621, 1569, 1461, 1137; HRMS-EI (70 eV)  $m/z$  calcd for C<sub>11</sub>H<sub>14</sub>N<sub>2</sub>FS [M+H]<sup>+</sup> 225.0862, found 225.0863

#### ***N*-butyl-6-chlorobenzo[d]thiazol-2-amine (3fa)**<sup>10</sup>



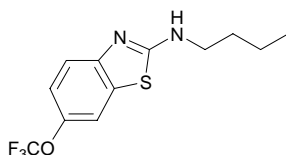
mp 109.5-110.6 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  7.54 (d,  $J = 2.1$  Hz, 1H, ArH), 7.41 (d,  $J = 8.7$  Hz, 1H, ArH), 7.24 (dd,  $J = 8.7$  Hz and 2.4 Hz, 1H, ArH), 5.44 (br s, 1H, NH), 3.41 (t,  $J = 7.1$  Hz, 2H, CH<sub>2</sub>N), 1.67 (quint,  $J = 7.3$  Hz, 2H, CH<sub>2</sub>), 1.44 (sext,  $J = 7.5$  Hz, 2H, CH<sub>2</sub>), 0.97 (t,  $J = 7.3$  Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>)  $\delta$  168.0, 151.1, 131.5, 126.4, 126.3, 120.4, 119.2, 45.4, 31.5, 20.0, 13.7.

#### ***N*-butyl-6-chloro-4-methylbenzo[d]thiazol-2-amine (3ga)**



mp 70.1-71.4 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  7.40 (s, 1H, ArH), 7.08 (s, 1H, ArH), 5.32 (br s, 1H, NH), 3.36 (quart,  $J = 6.1$  Hz, CH<sub>2</sub>N), 2.51 (s, 3H, CH<sub>3</sub>Ar), 1.66 (quint,  $J = 7.3$  Hz, 2H, CH<sub>2</sub>), 1.44 (sext,  $J = 7.4$  Hz, 2H, CH<sub>2</sub>), 0.97 (t,  $J = 7.4$  Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>)  $\delta$  167.2, 150.1, 131.0, 129.6, 126.9, 126.0, 117.8, 45.5, 31.6, 19.9, 18.2, 13.6; FTIR (net, cm<sup>-1</sup>) 3219, 2958, 1600, 1553, 1435, 1138; HRMS-EI (70 eV)  $m/z$  calcd for C<sub>12</sub>H<sub>16</sub>N<sub>2</sub>SCl [M+H]<sup>+</sup> 255.0723, found 255.0722.

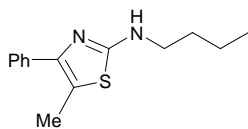
#### ***N*-butyl-6-(trifluoromethoxy)benzo[d]thiazol-2-amine (3ha)**



mp 76.4-77.4 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  7.48-7.45 (m, 2H, ArH), 7.15 (d,  $J = 8.7$  Hz, 1H, ArH), 5.47 (br s, 1H, NH), 3.42 (t,  $J = 7.0$  Hz, 2H, CH<sub>2</sub>N), 1.68 (quint,  $J = 7.3$  Hz, 2H, CH<sub>2</sub>), 1.45 (sext,  $J = 7.5$  Hz, 2H, CH<sub>2</sub>), 0.97 (t,  $J = 7.4$  Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>)  $\delta$  168.2, 151.3, 143.5, 131.0, 120.6 (q,  $J_{C-F} = 254.8$  Hz), 119.6, 118.9, 114.0, 45.4, 31.6, 20.0, 13.7; FTIR (net, cm<sup>-1</sup>) 3223,

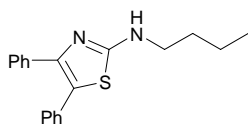
3094, 1619, 1574, 1455, 1143; HRMS-EI (70 eV)  $m/z$  calcd for  $C_{12}H_{14}N_2OF_3S$   $[M+H]^+$  291.0779, found 291.0775.

***N*-butyl-5-methyl-4-phenylthiazol-2-amine (3ia)**<sup>11</sup>



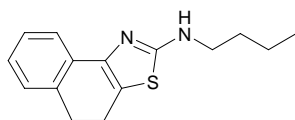
mp 55.4-56.8 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.57 (d,  $J$  = 7.8 Hz, 2H, ArH), 7.38 (t,  $J$  = 7.7 Hz, 2H, ArH), 7.28 (t,  $J$  = 7.4 Hz, 1H, ArH), 5.26 (br s, 1H, NH), 3.20 (quart,  $J$  = 6.0 Hz, 2H, CH<sub>2</sub>N), 3.40 (s, 3H, CH<sub>3</sub>), 1.59 (quint,  $J$  = 7.3 Hz, 2H, CH<sub>2</sub>), 1.39 (sext,  $J$  = 7.4 Hz, 2H, CH<sub>2</sub>), 0.94 (t,  $J$  = 7.4 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 166.2, 146.3, 135.4, 128.4, 128.2, 127.1, 115.3, 45.9, 31.6, 20.0, 13.7, 12.4.

***N*-butyl-4,5-diphenylthiazol-2-amine (3ja)**<sup>11</sup>



mp 116.2-117.0 (lit.<sup>12</sup> mp 117-118 °C); <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.47 (dd,  $J$  = 7.9 Hz and 2.2 Hz, 2H, ArH), 7.27-7.17 (m, 8H, ArH), 6.15 (br s 1H, NH), 3.14 (quart,  $J$  = 6.2 Hz, 2H, CH<sub>2</sub>N), 1.51 (quint,  $J$  = 7.4 Hz, 2H, CH<sub>2</sub>) 1.33 (sext,  $J$  = 7.4 Hz, 2H, CH<sub>2</sub>), 0.90 (t,  $J$  = 7.3 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 168.0, 146.1, 135.6, 133.0, 129.2, 129.0, 128.4, 128.1, 127.4, 126.8, 119.9, 46.0, 31.3, 20.0, 13.7.

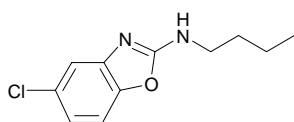
***N*-butyl-4,5-dihydronaphtho[1,2-d]thiazol-2-amine (3ka)**



mp 89.8-90.6 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.70 (d,  $J$  = 7.6 Hz, 1H, ArH), 7.23 (t,  $J$  = 7.3 Hz, 1H, ArH), 7.17-7.11 (m, 3H, ArH), 5.1 (br s, 1H, NH), 3.27 (quart,  $J$  = 6.5 Hz, 2H, CH<sub>2</sub>N), 3.02 (t,  $J$  = 7.8 Hz, 2H, CH<sub>2</sub>), 2.85 (t,  $J$  = 7.8 Hz, 2H, CH<sub>2</sub>), 1.65 (quint,  $J$  = 7.3 Hz, 2H, CH<sub>2</sub>), 1.43 (sext,  $J$  = 7.5 Hz, 2H, CH<sub>2</sub>), 0.96 (t,  $J$  = 7.3 Hz, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 168.3, 145.4, 134.4, 131.8, 127.5, 126.8, 126.5, 122.7, 117.7, 45.8, 31.5, 29.2, 21.8, 20.0, 13.7; FTIR (net, cm<sup>-1</sup>) 3201, 2958, 1600, 1553, 1435, 1138; HRMS-EI (70 eV)  $m/z$  calcd for  $C_{15}H_{19}N_2S$   $[M+H]^+$  259.1269, found 259.1274.

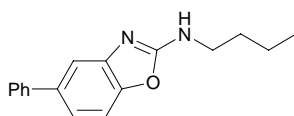
***N*-butyl-5-chlorobenzo[d]oxazol-2-amine (3la)**<sup>12</sup>





mp 109.5-110.6 °C;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  7.31 (s, 1H, ArH), 7.13 (d,  $J = 8.3$  Hz, 1H, ArH), 6.98 (d,  $J = 8.1$  Hz, 1H, ArH), 5.18 (br s, 1H, NH), 3.48 (quart,  $J = 6.4$  Hz, 2H,  $\text{CH}_2\text{N}$ ), 1.67 (quint,  $J = 7.2$  Hz, 2H,  $\text{CH}_2$ ), 1.44 (sext,  $J = 7.5$  Hz, 2H,  $\text{CH}_2$ ), 0.97 (t,  $J = 7.4$  Hz, 3H,  $\text{CH}_3$ );  $^{13}\text{C}$  NMR (125MHz,  $\text{CDCl}_3$ )  $\delta$  163.2, 147.1, 144.4, 129.2, 120.4, 116.2, 109.1, 42.8, 31.8, 19.9, 13.7.

### ***N*-butyl-5-phenylbenzo[d]oxazol-2-amine (3ma)**

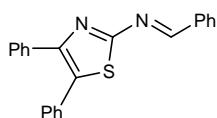


mp 132.3-133.6 °C;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  7.59-7.58 (m, 3H, ArH), 7.43 (t,  $J = 7.7$  Hz, 2H, ArH), 7.33 (t,  $J = 7.4$ , 1H, ArH), 7.29-7.26 (m, 2H, ArH), 5.10 (br s, 1H, NH), 3.51 (t,  $J = 6.6$  Hz, 2H,  $\text{CH}_2\text{N}$ ), 1.68 (quint,  $J = 7.4$  Hz, 2H,  $\text{CH}_2$ ), 1.45 (sext,  $J = 7.5$  Hz, 2H,  $\text{CH}_2$ ), 0.97 (t,  $J = 7.4$  Hz, 3H,  $\text{CH}_3$ );  $^{13}\text{C}$  NMR (125MHz,  $\text{CDCl}_3$ )  $\delta$  162.7, 148.1, 143.6, 141.6, 137.7, 128.7, 127.3, 126.9, 120.1, 114.8, 108.6, 42.9, 31.8, 19.9, 13.7; FTIR (net,  $\text{cm}^{-1}$ ) 3157, 2953, 1690, 1592, 1467, 1181; HRMS-EI (70 eV)  $m/z$  calcd for  $\text{C}_{17}\text{H}_{19}\text{N}_2\text{O}$   $[\text{M}+\text{H}]^+$  267.1497, found 267.1499.

### **Procedure for the condensation of 4,5-diphenylthiazol-2-amine with benzaldehyde**

To an oven-dried, nitrogen purged 20 ml Schlenk tube were added 4,5-diphenylthiazol-2-amine (1 mmol), base (0.2 mmol, 20 mol%) and benzaldehyde (5 mmol, 500 mol%). The resulting mixture was heated at 150 °C for 12h, followed by the mixture of the reaction was allowed to cool to ambient temperature. The mixture of the reaction was concentrated in *vacuo* and purified by flash column chromatography with hexane/ethyl acetate to afford the corresponding product.

### **(*E*)-*N*-benzylidene-4,5-diphenylthiazol-2-amine<sup>13</sup>**

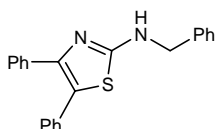


mp 109.4-110.2 °C;  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  9.09 (s, 1H,  $\text{CH}=\text{N}$ ), 8.01 (d,  $J = 7.1$  Hz, 2H, ArH), 7.58-7.56 (m, 2H, ArH), 7.54 (d,  $J = 7.1$  Hz, 1H, ArH), 7.50 (t,  $J = 7.3$  Hz, 2H, ArH), 7.39-7.37 (m, 2H, ArH), 7.34-7.32 (m, 3H, ArH), 7.30-7.29 (m, 3H, ArH);  $^{13}\text{C}$  NMR (125MHz,  $\text{CDCl}_3$ )  $\delta$  169.8, 163.1, 148.5, 135.1, 134.8, 132.6, 132.2, 132.1, 129.9, 129.6, 129.2, 128.9, 128.7, 128.24, 128.17, 127.9.

### **Procedure for the reaction of (*E*)-*N*-benzylidene-4,5-diphenylthiazol-2-amine with benzyl alcohol**

To an oven-dried, nitrogen purged 20 ml Schlenk tube were added (*E*)-*N*-benzylidene-4,5-diphenylthiazol-2-amine (1mmol), [Cp\*IrCl<sub>2</sub>]<sub>2</sub> (0.002 mmol, 0.2 mol%), NaOH (0.2 mmol, 20 mol%) and benzyl alcohol (5 mmol, 500 mol%). The resulting mixture was heated at 150 °C for 12h, followed by the mixture of the reaction was allowed to cool to ambient temperature. The mixture of the reaction was concentrated in *vacuo* and purified by flash column chromatography with hexane/ethyl acetate to afford the corresponding product. The yield of *N*-benzyl-4,5-diphenylthiazol-2-amine is isolated yield, and the yield of benzaldehyde is determined by the <sup>1</sup>H NMR integration.

### ***N*-benzyl-4,5-diphenylthiazol-2-amine<sup>11</sup>**

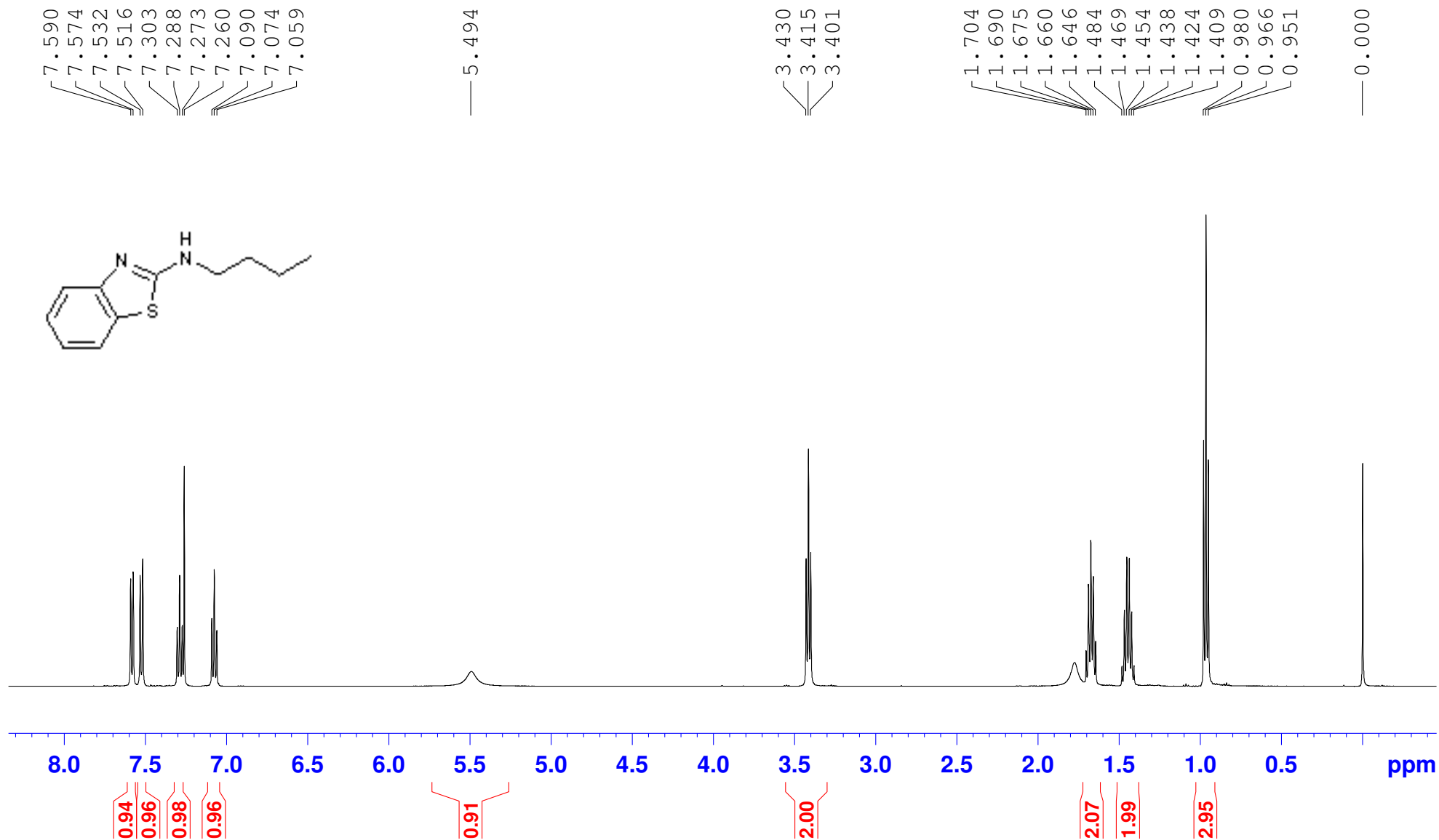
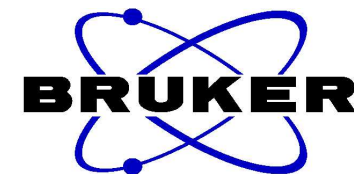


mp 142.1-143.2 °C; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 7.48-7.47 (m, 2H, ArH), 7.38-7.33 (m, 4H, ArH), 7.31-7.28 (m, 1H, ArH), 7.25-7.19 (m, 8H, ArH), 6.13 (br s, 1H, NH), 4.42 (s, 2H, CH<sub>2</sub>); <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>) δ 167.3, 146.0, 137.7, 135.5, 132.8, 129.3, 129.0, 128.7, 128.5, 128.1, 127.7, 127.6, 127.5, 127.0, 120.8, 49.8

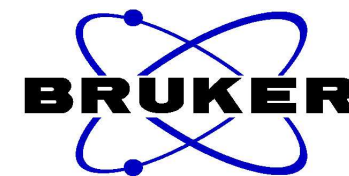
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N-butylbenzo[d]thazol-2-amine  
Proton CDCl<sub>3</sub>



N-butylbenzo[d]thiazol-2-amine  
C13CPD CDC13



— 167.990

— 152.405

— 130.218

— 125.865

— 121.228

— 120.736

— 118.533

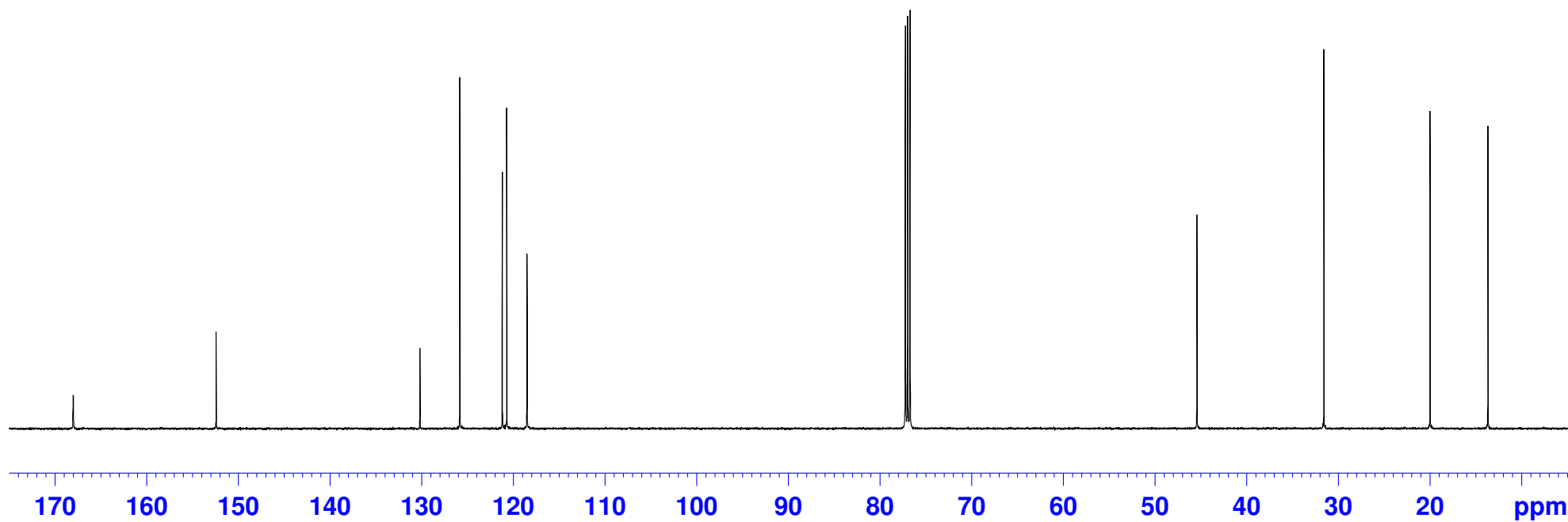
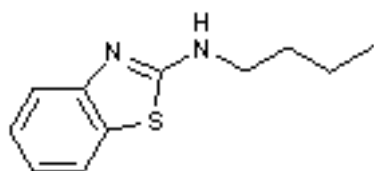
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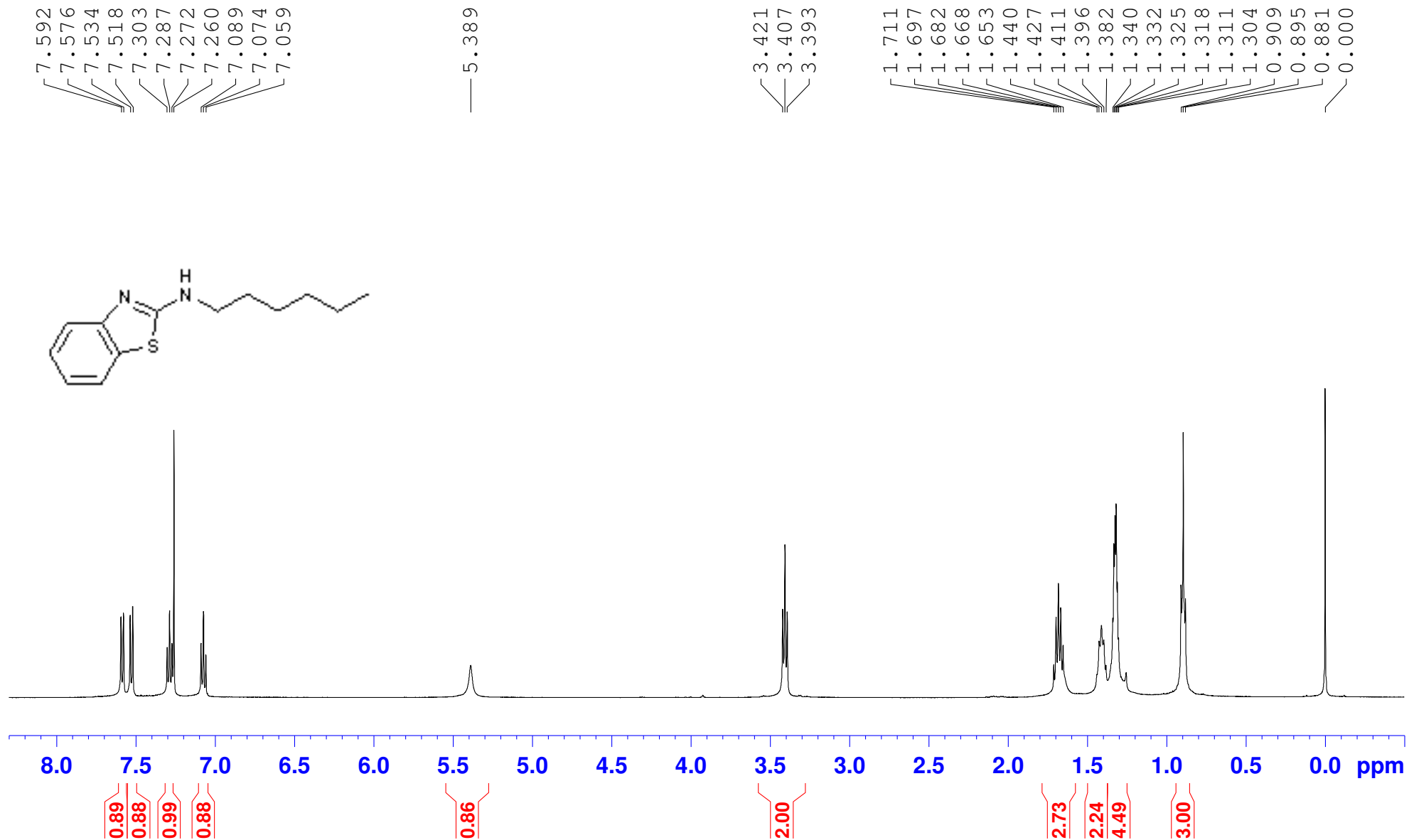
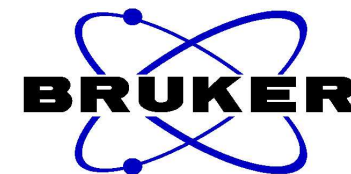
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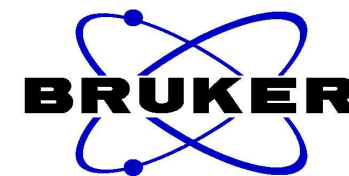
— 13.680



N-hexylbenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



N-hexylbenzo[d]thiazol-2-amine  
C13CPD CDC13

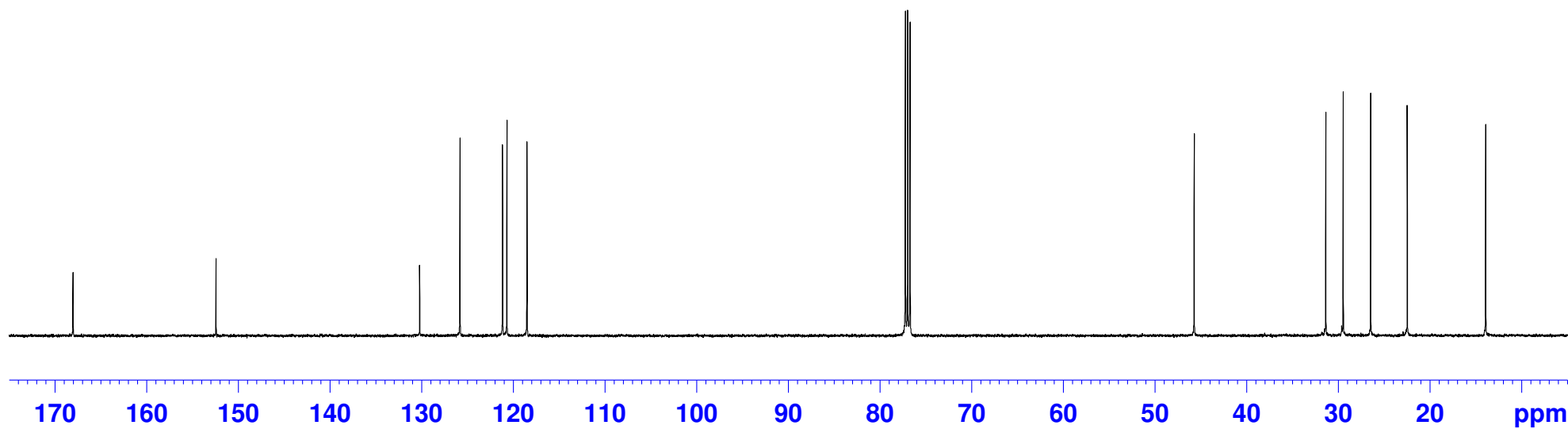
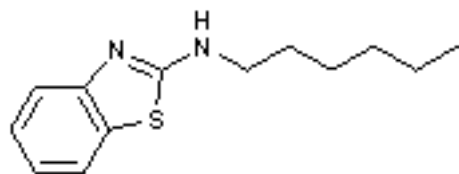


— 168.019  
— 152.459  
— 130.239  
— 125.848  
— 121.199  
— 120.733  
— 118.537

— 77.000

— 45.743

— 31.389  
— 29.482  
— 26.491  
— 22.490  
— 13.937



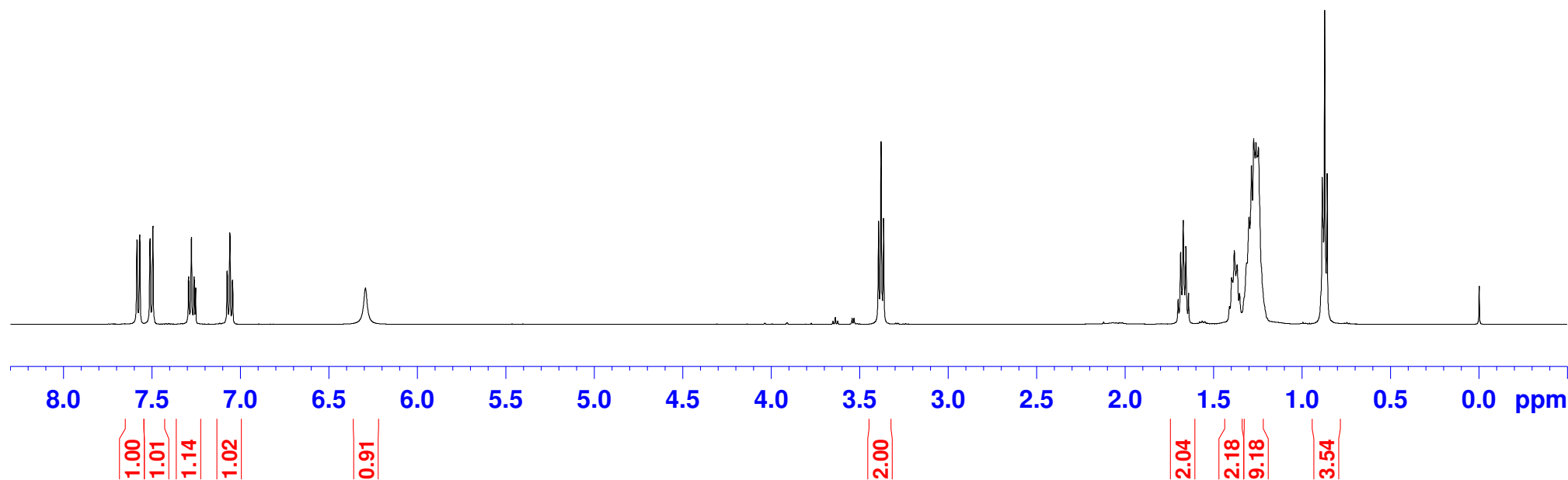
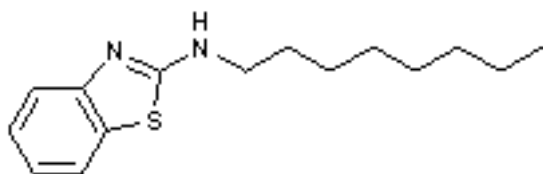
N-octylbenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



7.584  
7.568  
7.510  
7.494  
7.292  
7.276  
7.261  
7.252  
7.074  
7.059  
7.044  
— 6.293

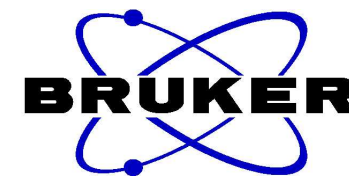
3.392  
3.378  
3.364

1.699  
1.685  
1.671  
1.656  
1.641  
1.410  
1.397  
1.382  
1.366  
1.351  
1.328  
1.313  
1.299  
1.285  
1.273  
1.260  
1.245  
1.228  
0.885  
0.871  
0.857  
0.000





N-octylbenzo[d]thiazol-2-amine  
C13CPD CDC13

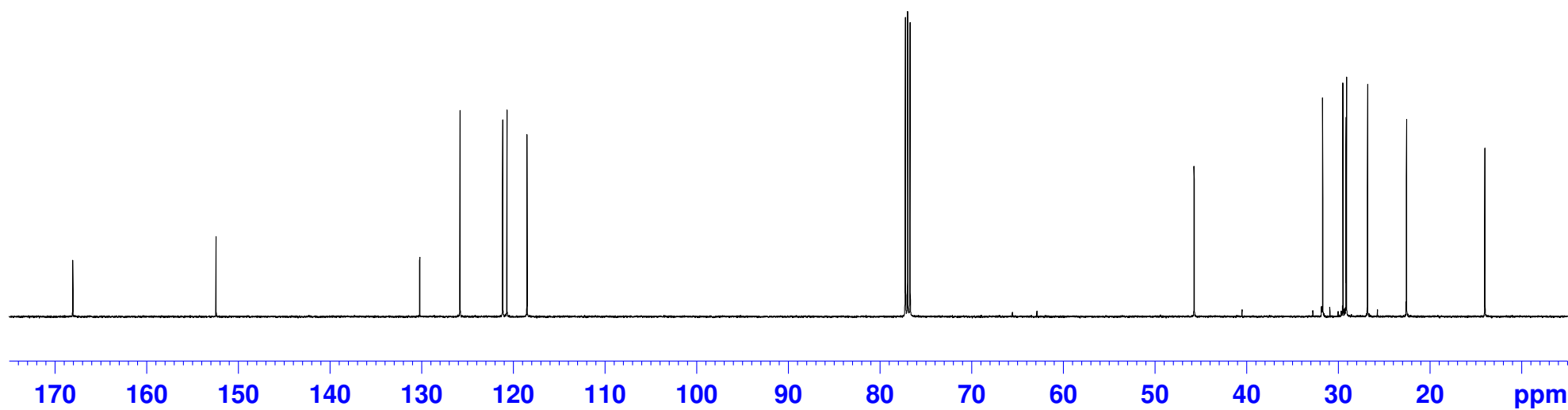
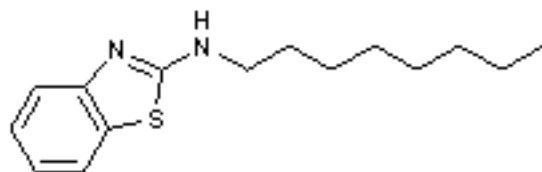


— 168.036  
— 152.459  
— 130.235  
— 125.847  
— 121.188  
— 120.725  
— 118.529

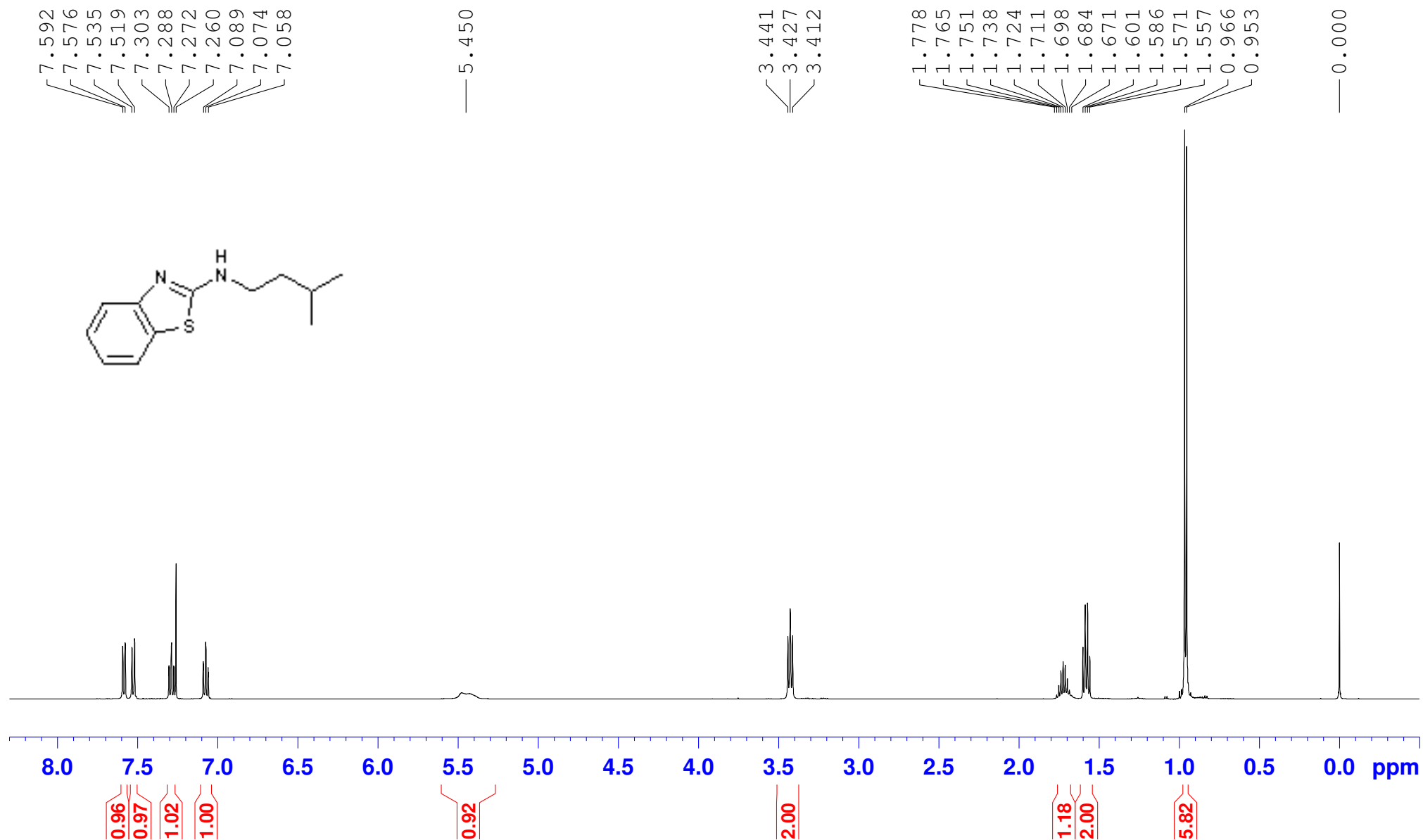
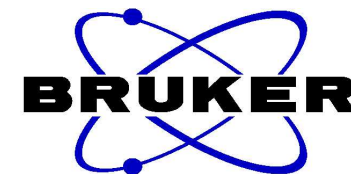
— 77.000

— 45.750

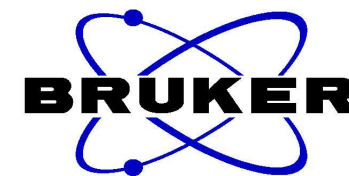
— 31.722  
— 29.518  
— 29.172  
— 29.128  
— 26.824  
— 22.576  
— 14.031



N-isopentylbenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



N-isopentylbenzo[d]thiazol-2-amine  
C13CPD CDC13



— 168.027

— 152.452

— 130.225

— 125.840

— 121.184

— 120.733

— 118.515

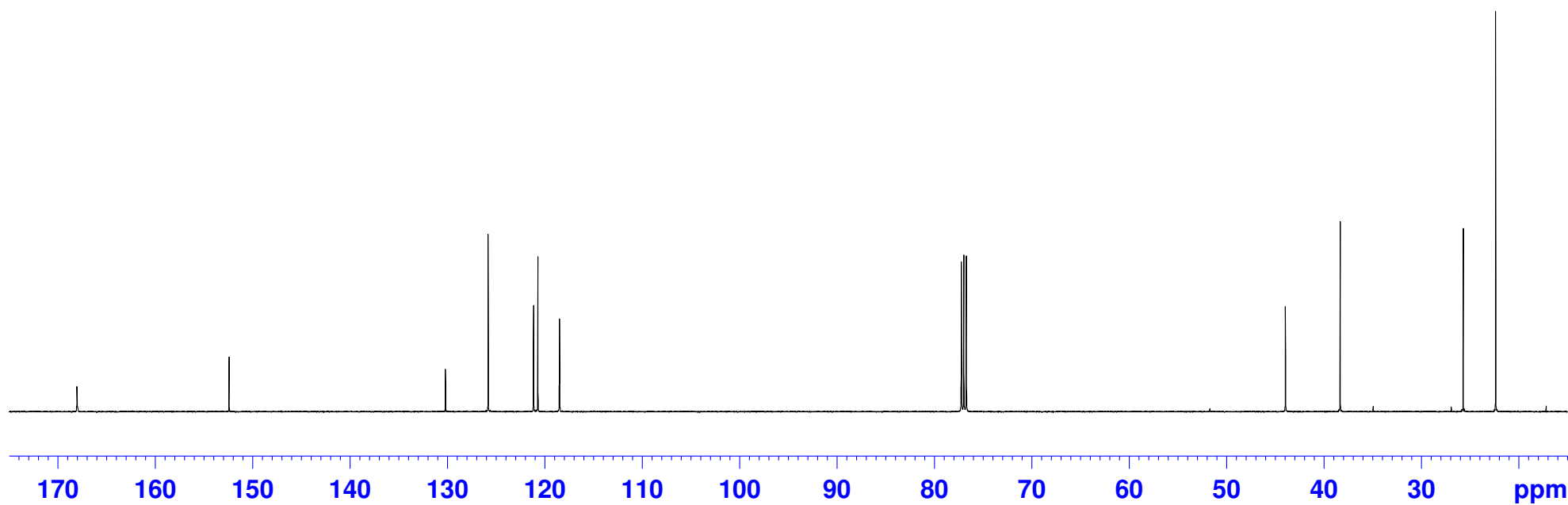
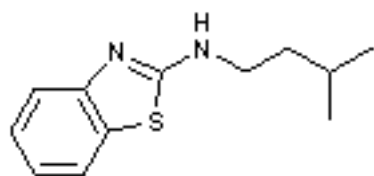
— 77.000

— 43.973

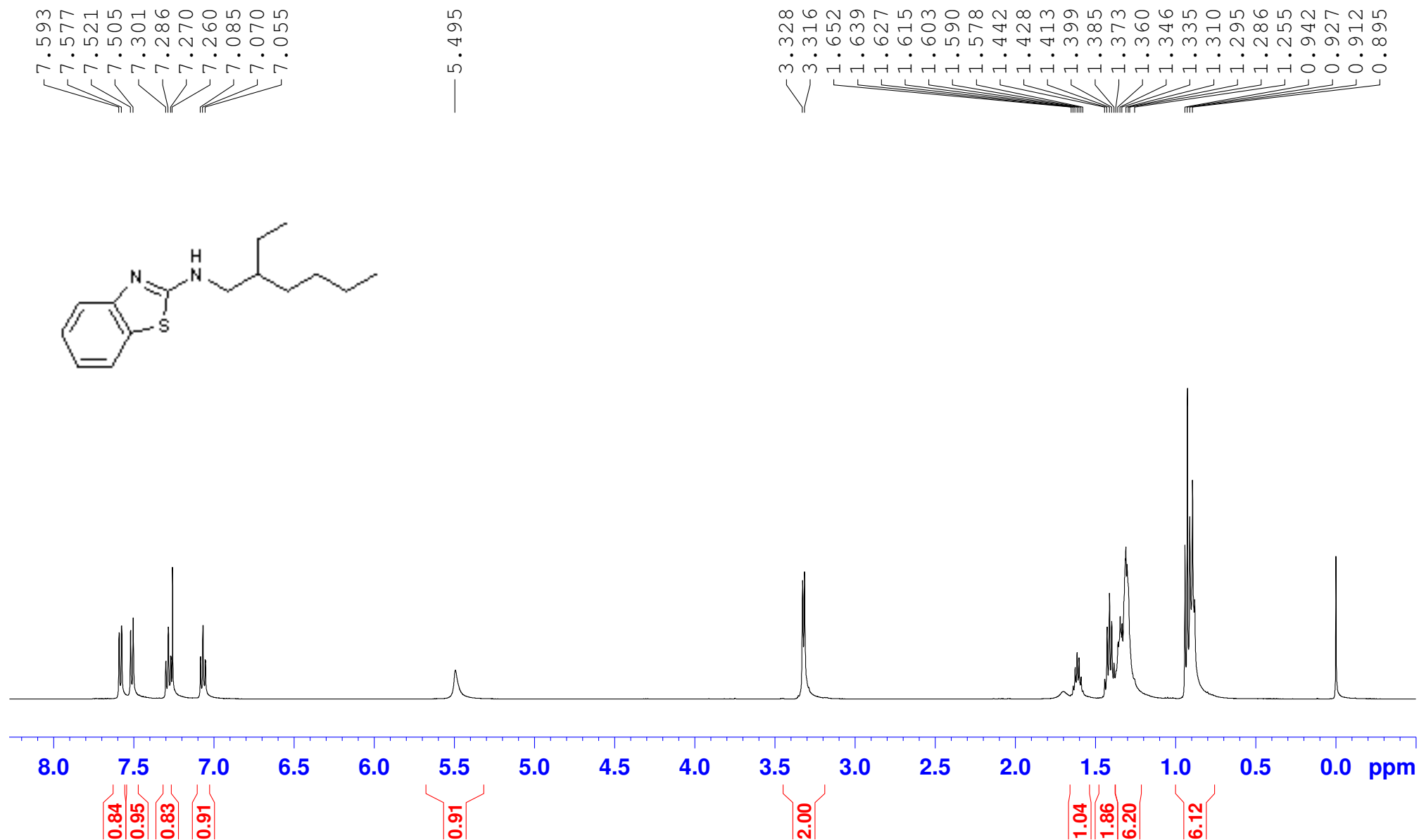
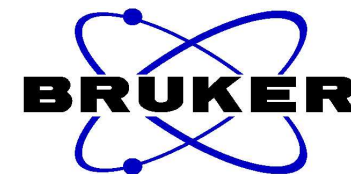
— 38.353

— 25.719

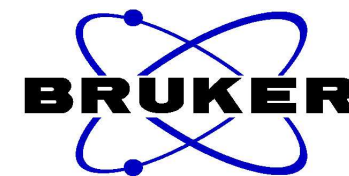
— 22.381



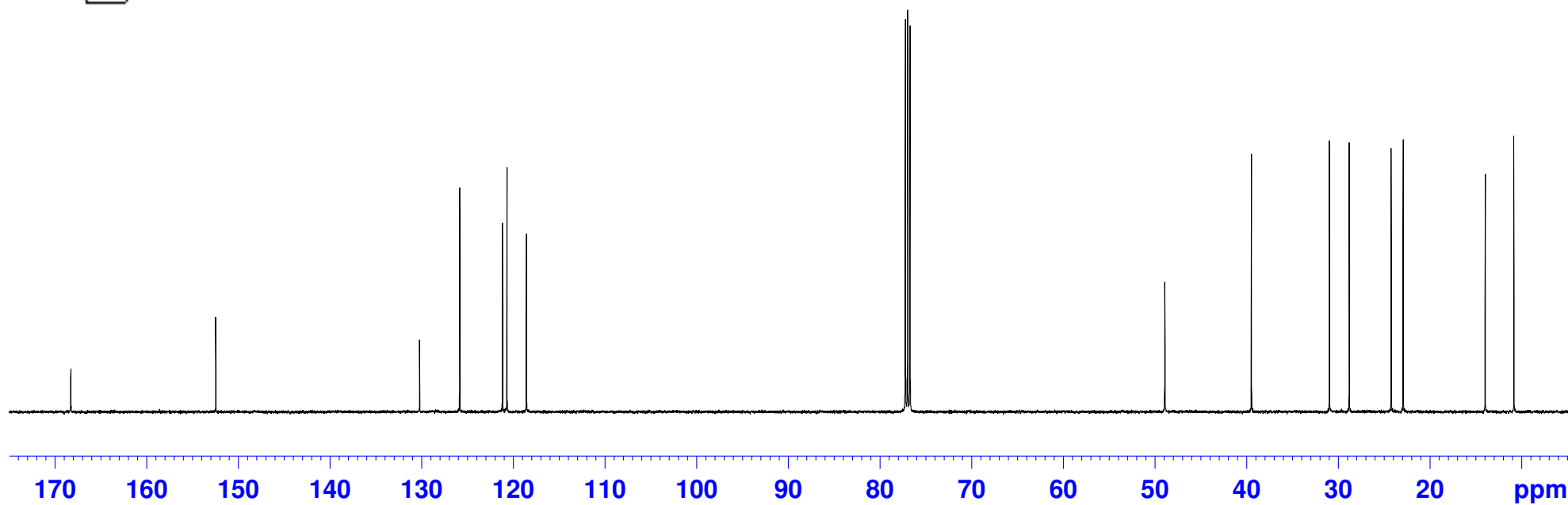
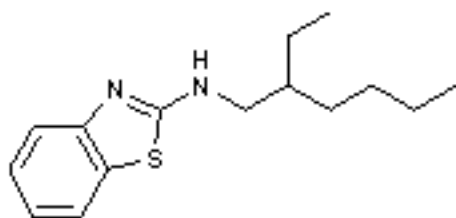
N-(2-ethylhexyl)benzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



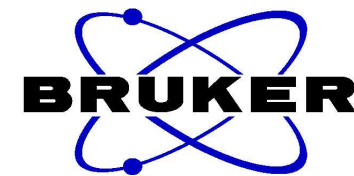
N-(2-ethylhexyl)benzo[d]thiazol-2-amine  
C13CPD CDC13



— 168.251  
— 152.488  
— 130.254  
— 125.876  
— 121.202  
— 120.718  
— 118.602  
— 77.000  
— 48.943  
— 39.494  
— 30.985  
— 28.832  
— 24.245  
— 22.945  
— 13.995  
— 10.859

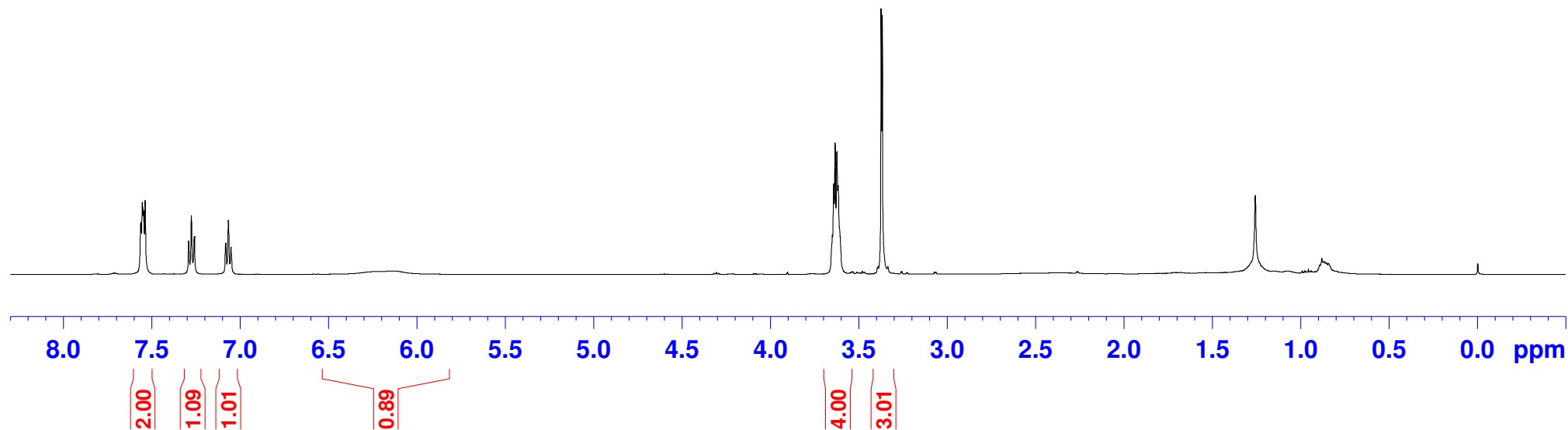
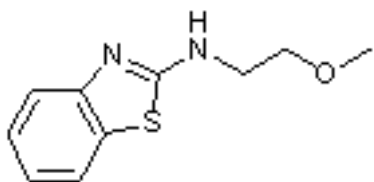


N-(2-methoxyethyl)benzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>

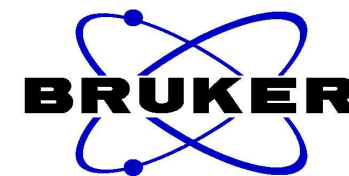


7.561  
7.553  
7.546  
7.537  
7.291  
7.276  
7.258  
7.081  
7.066  
7.051  
— 6.132

3.649  
3.641  
3.633  
3.624  
3.616  
3.608  
3.605  
3.600  
3.373  
3.366  
— 0.000



N-(2-methoxyethyl)benzo[d]thiazol-2-amine  
C13CPD CDCl<sub>3</sub>

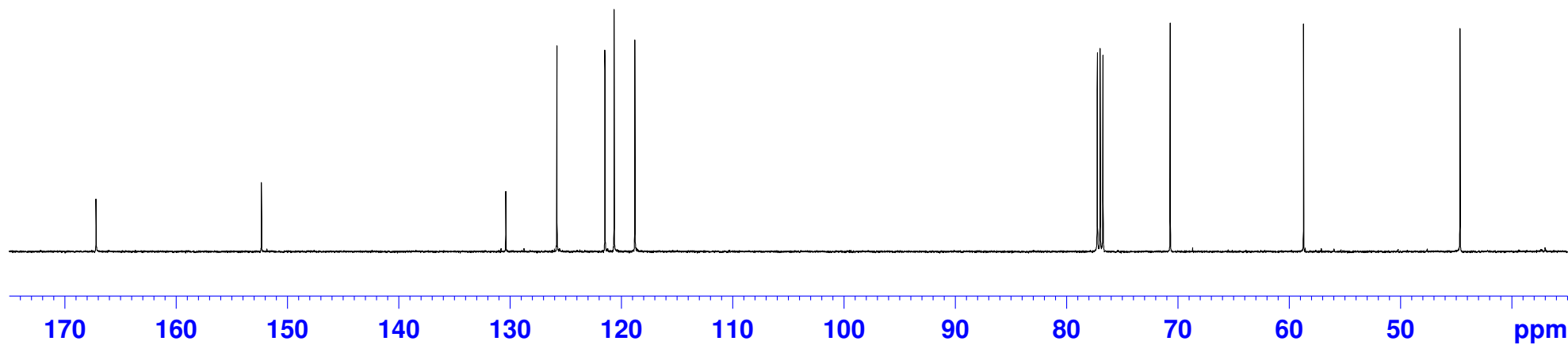
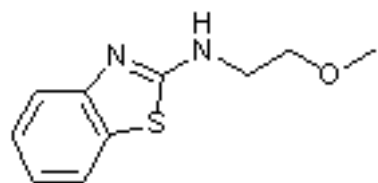


— 167.181                      — 152.358

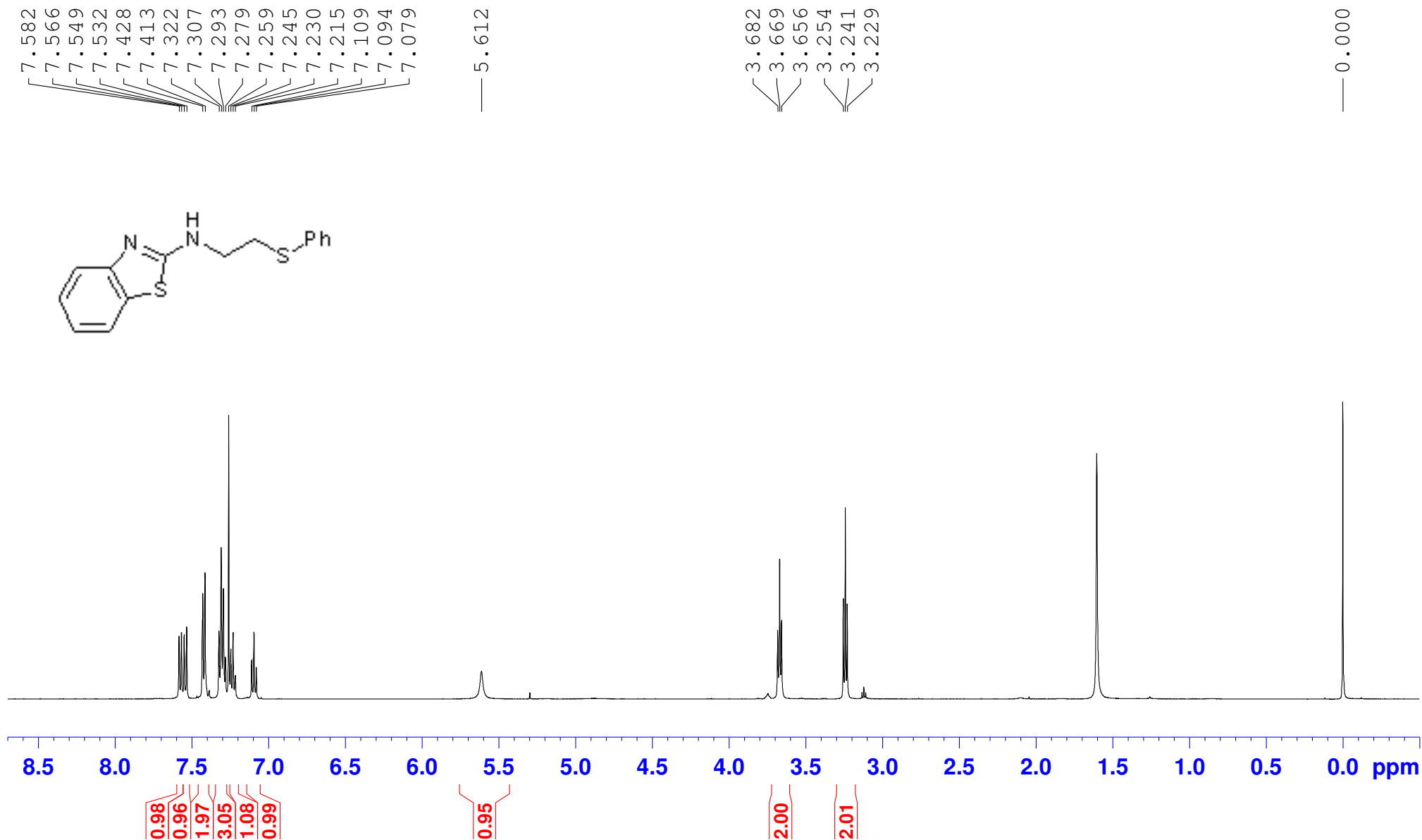
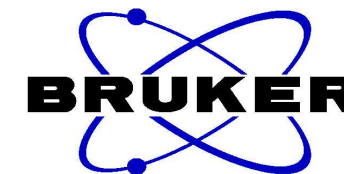
— 130.405                      — 125.811  
— 121.498  
— 120.668  
— 118.804

— 77.000                      — 70.701

— 58.724                      — 44.667

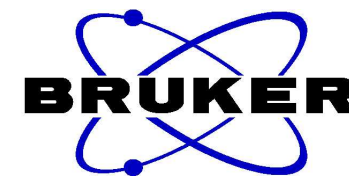


N-(2-phenylthio)ethylbenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>





N-(2-(phenylthio)ethyl)benzo[d]thiazol-2-amine  
C13CPD CDCl3

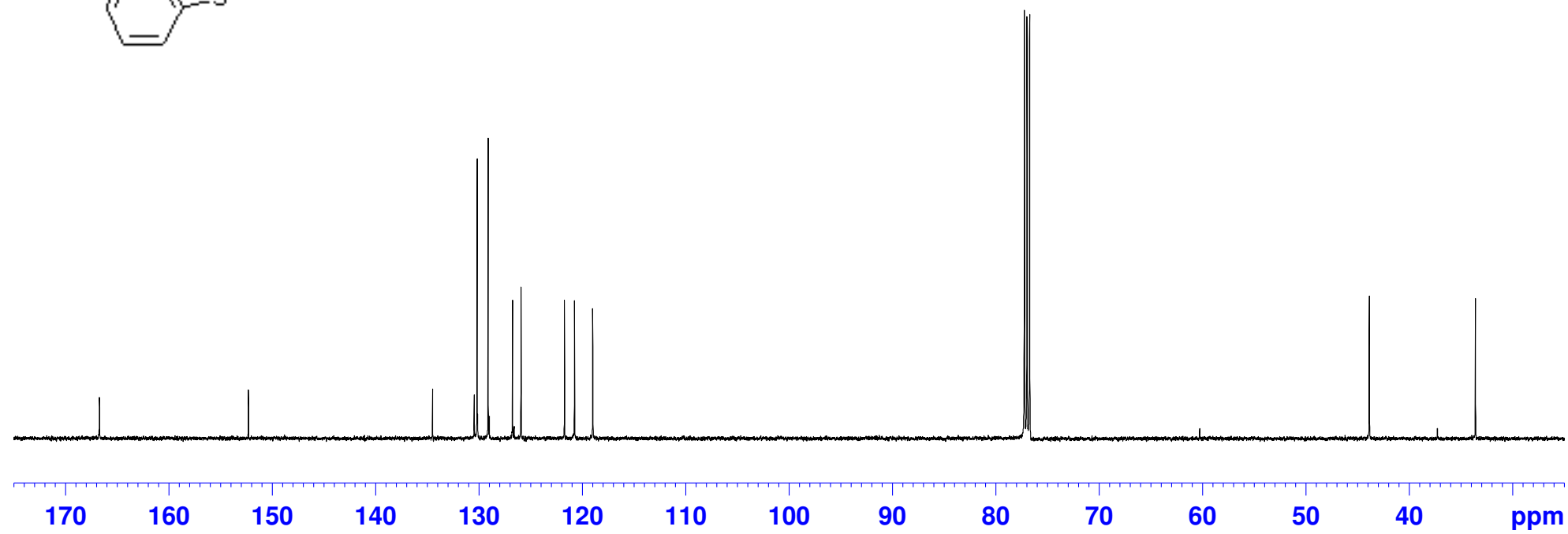
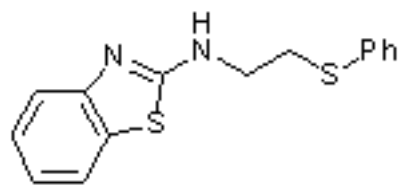


— 166.701  
— 152.289  
— 134.519  
— 130.488  
— 130.206  
— 129.137  
— 126.778  
— 125.959  
— 121.751  
— 120.779  
— 119.017

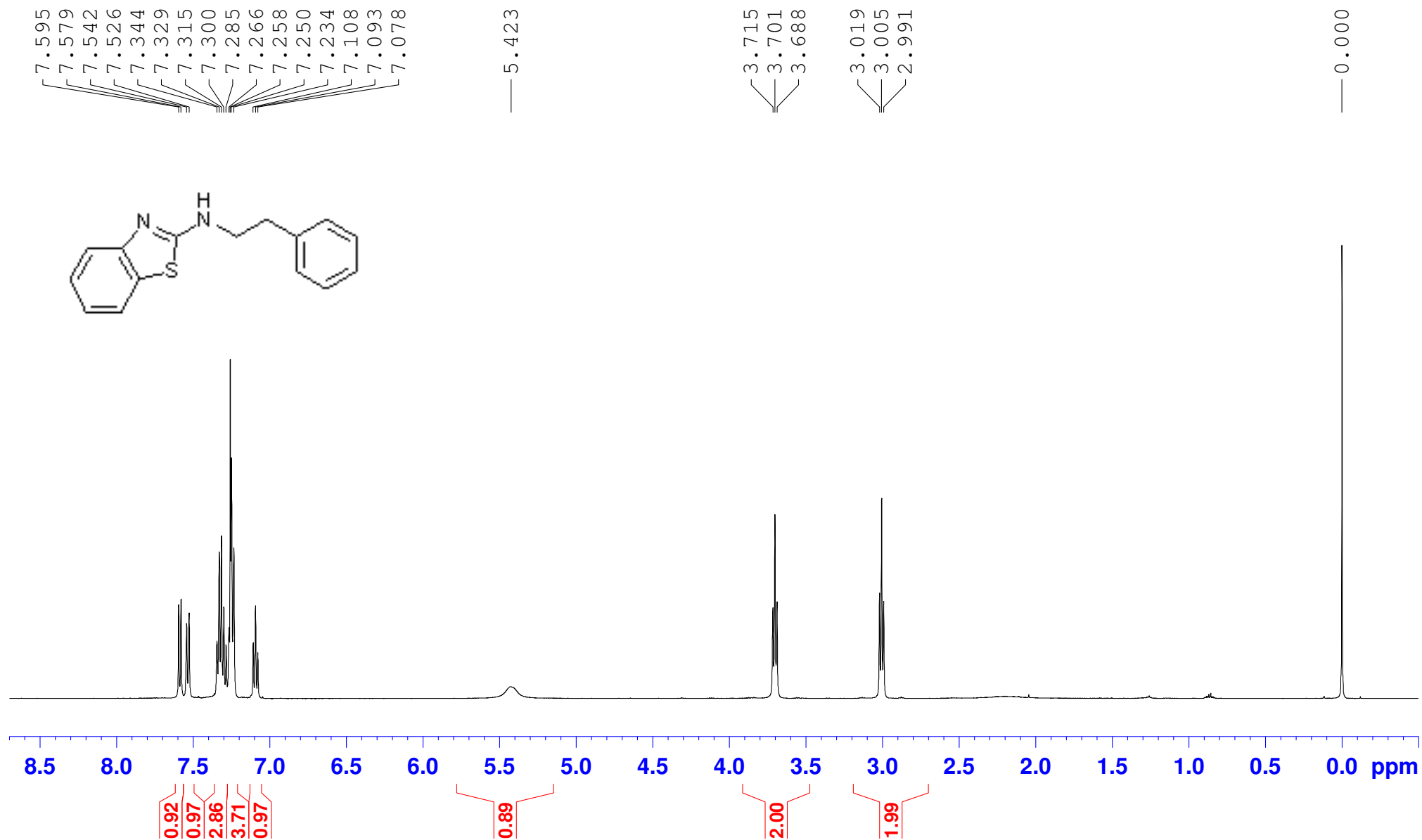
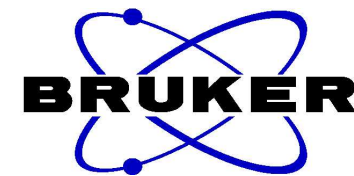
— 77.000

— 43.883

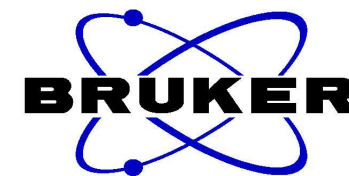
— 33.610



N-phenethylbenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



N-phenethylbenzo[d]thiazol-2-amine  
C13CPD CDC13

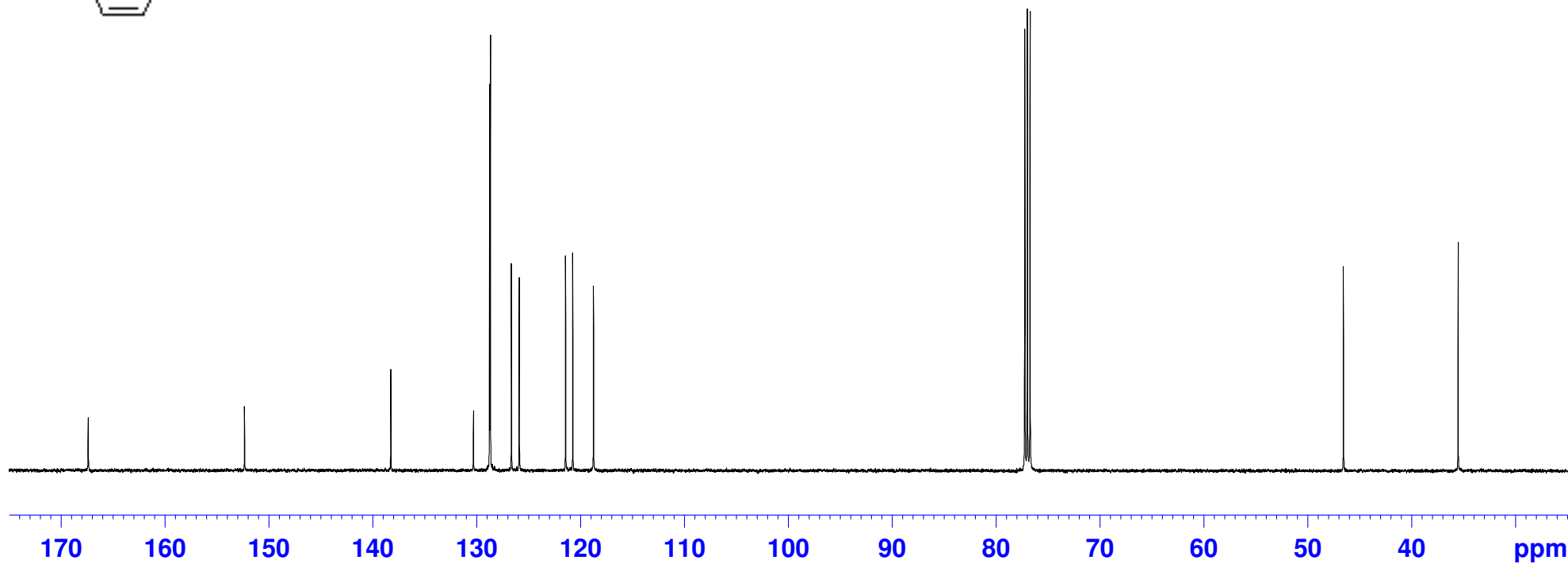
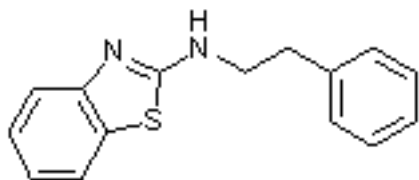


— 167.376  
— 152.372  
— 138.286  
130.333  
128.780  
128.700  
126.678  
125.923  
121.462  
120.769  
118.775

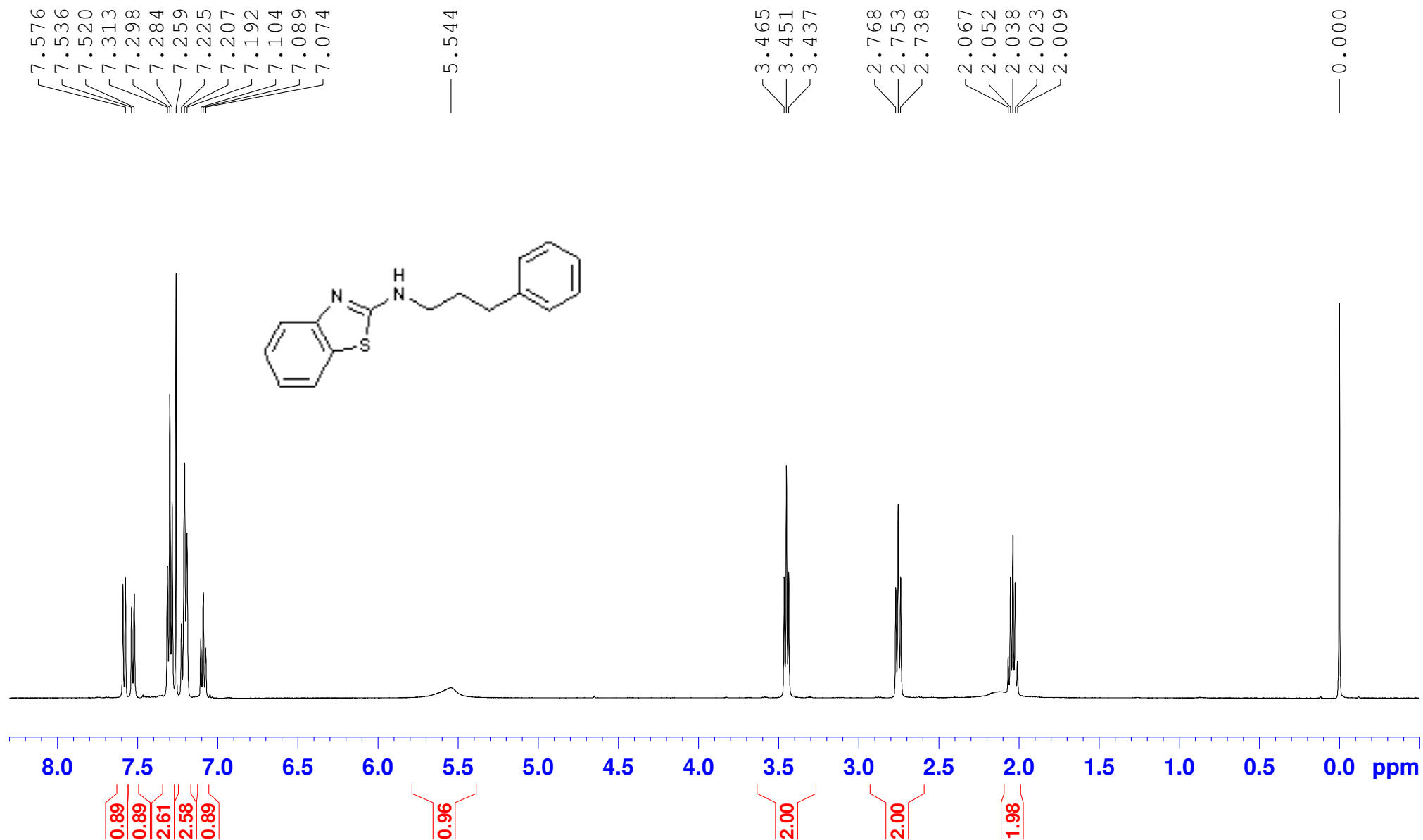
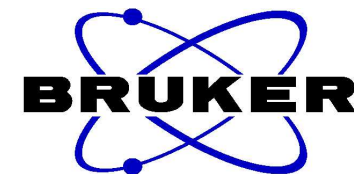
— 77.000

— 46.581

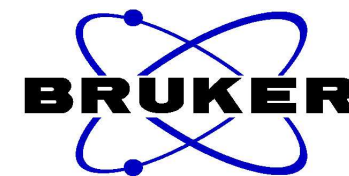
— 35.543



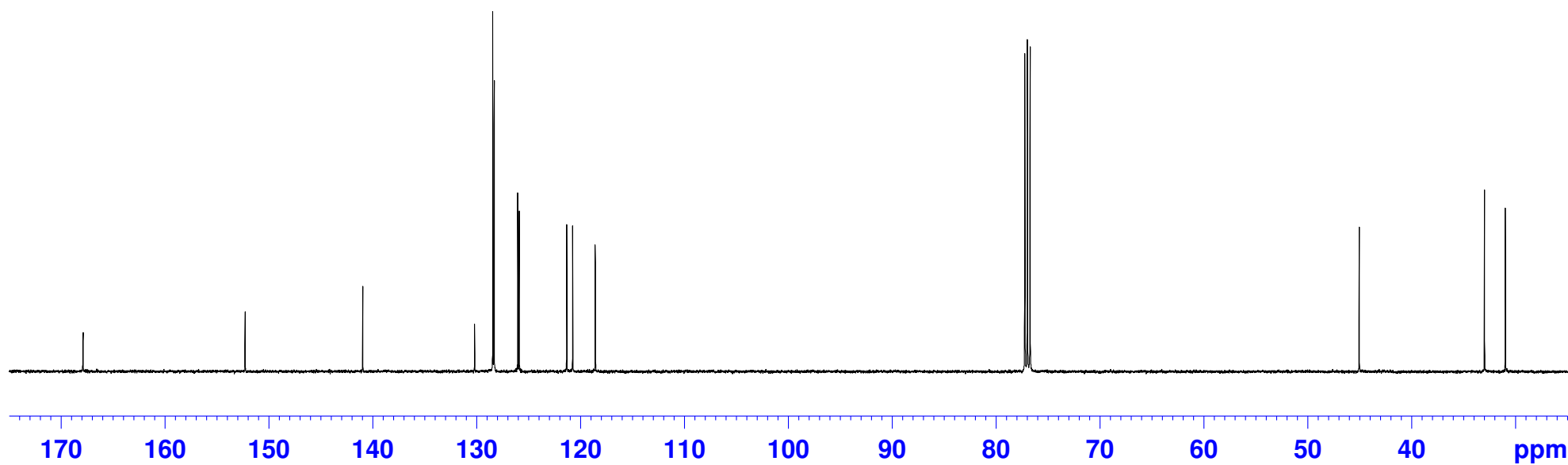
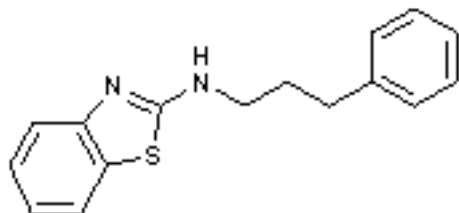
N-(3-phenylpropyl)benzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



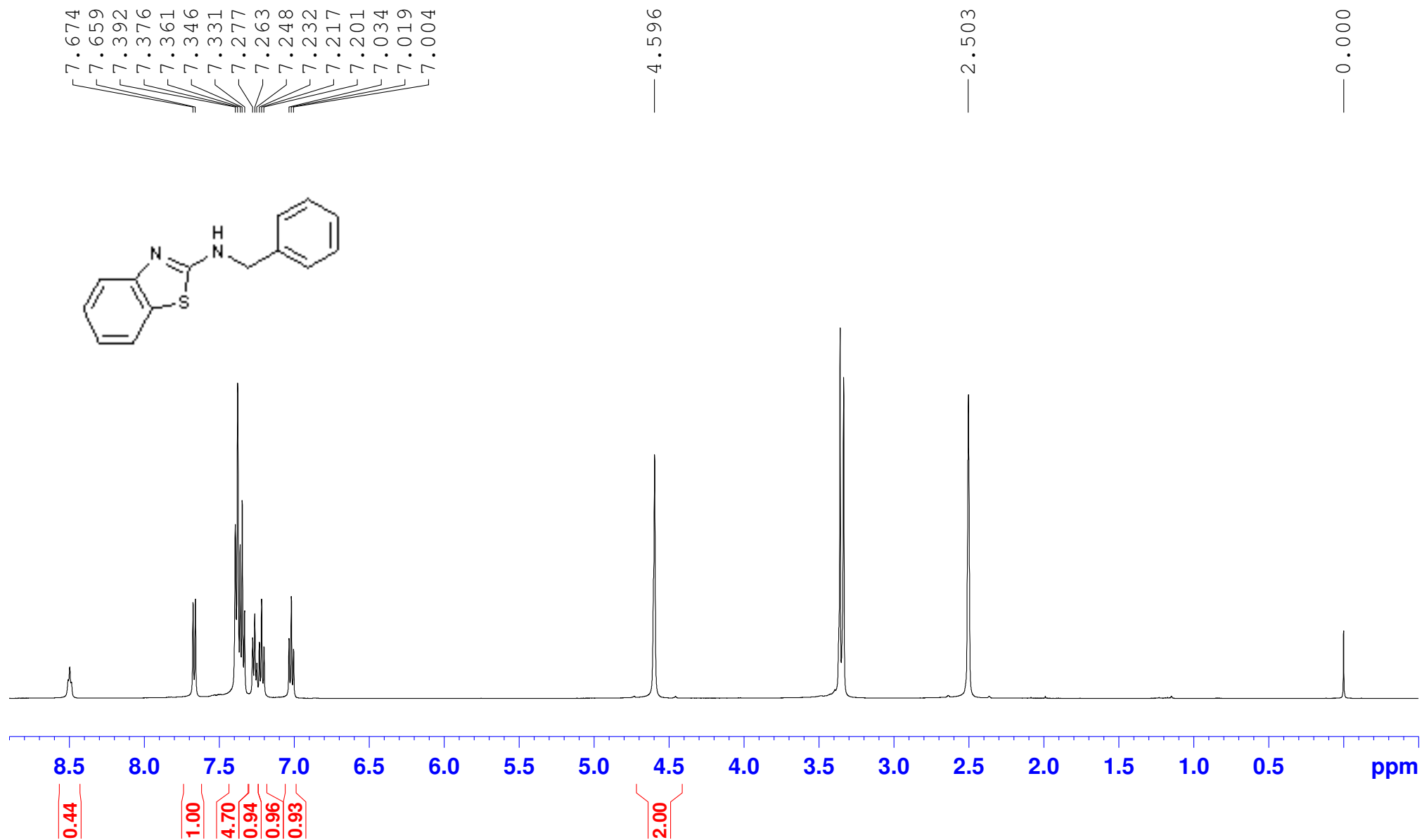
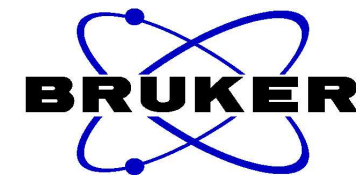
N-(3-phenylpropyl)benzo[d]thiazol-2-amine  
C13CPD CDC13



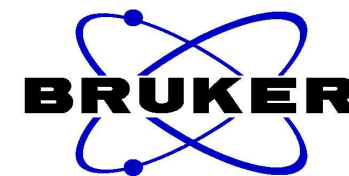
— 167.875  
— 152.315  
— 140.988  
130.224  
128.469  
128.339  
126.064  
125.934  
121.347  
120.779  
118.609  
— 77.000  
— 45.067  
— 33.000  
— 30.999



N-benzylbenzo[d]thiazol-2-amine  
Proton DMSO-d<sub>6</sub>

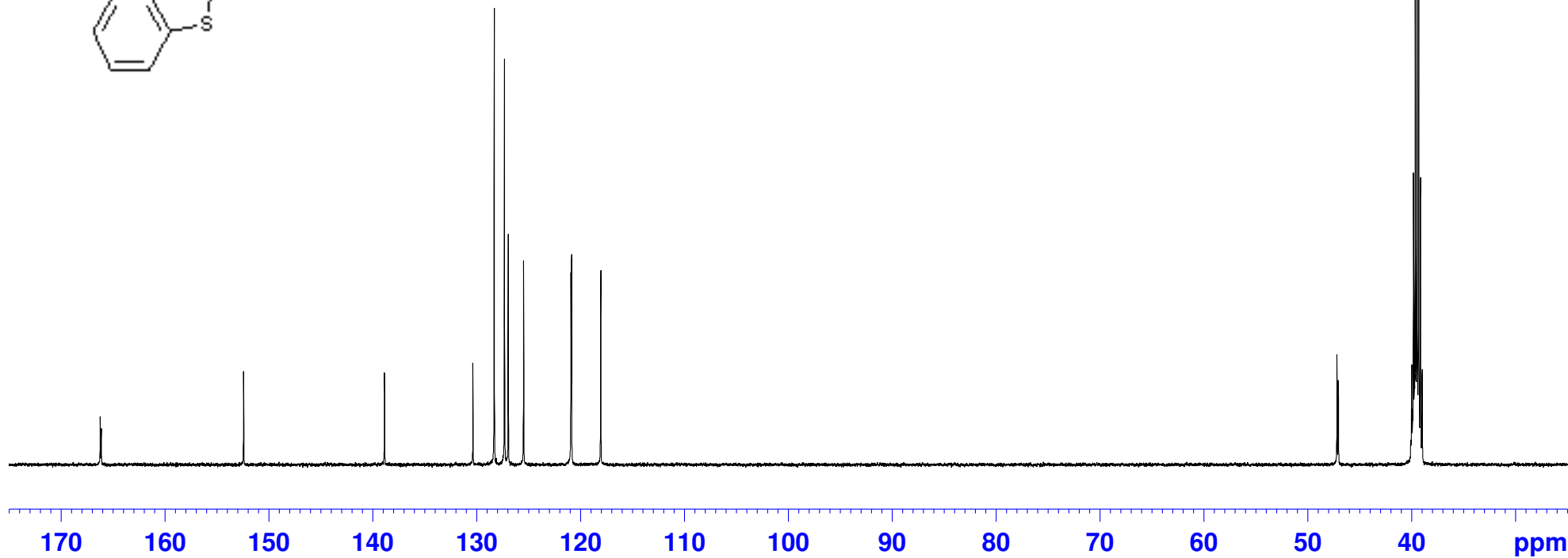
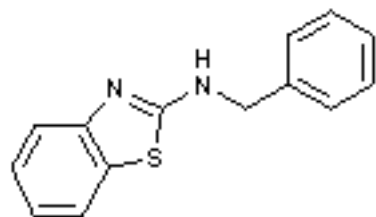


N-benzylbenzo[d]thiazol-2-amine  
Proton DMSO-d<sub>6</sub>

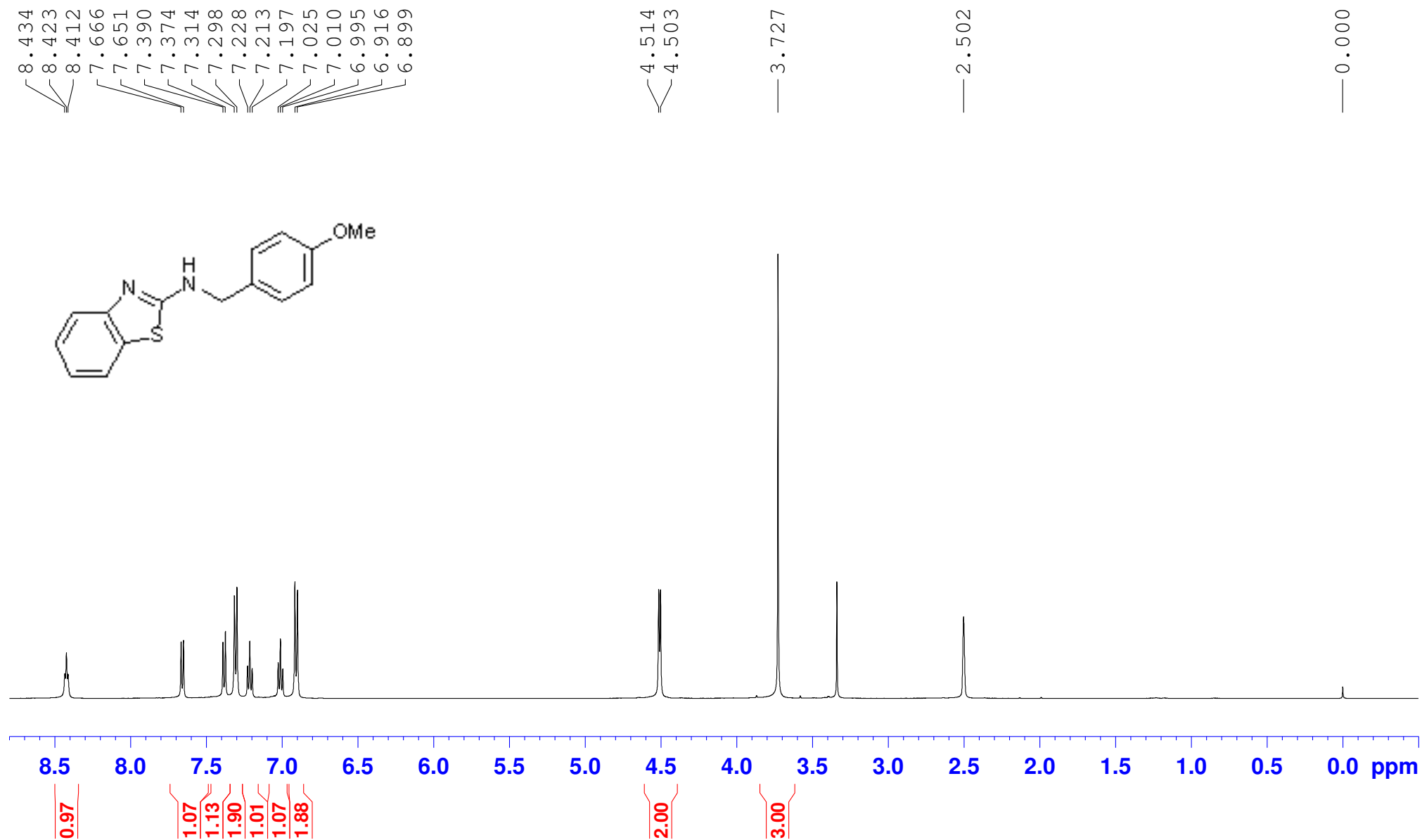
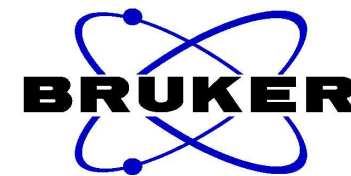


— 166.224  
— 152.420  
— 138.894  
130.387  
128.336  
127.345  
126.985  
125.504  
120.946  
120.888  
118.078

— 47.200  
— 39.501

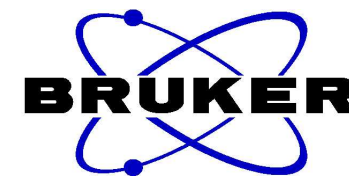


N-(4-methoxybenzyl)benzo[d]thiazol-2-amine  
Proton DMSO-d<sub>6</sub>



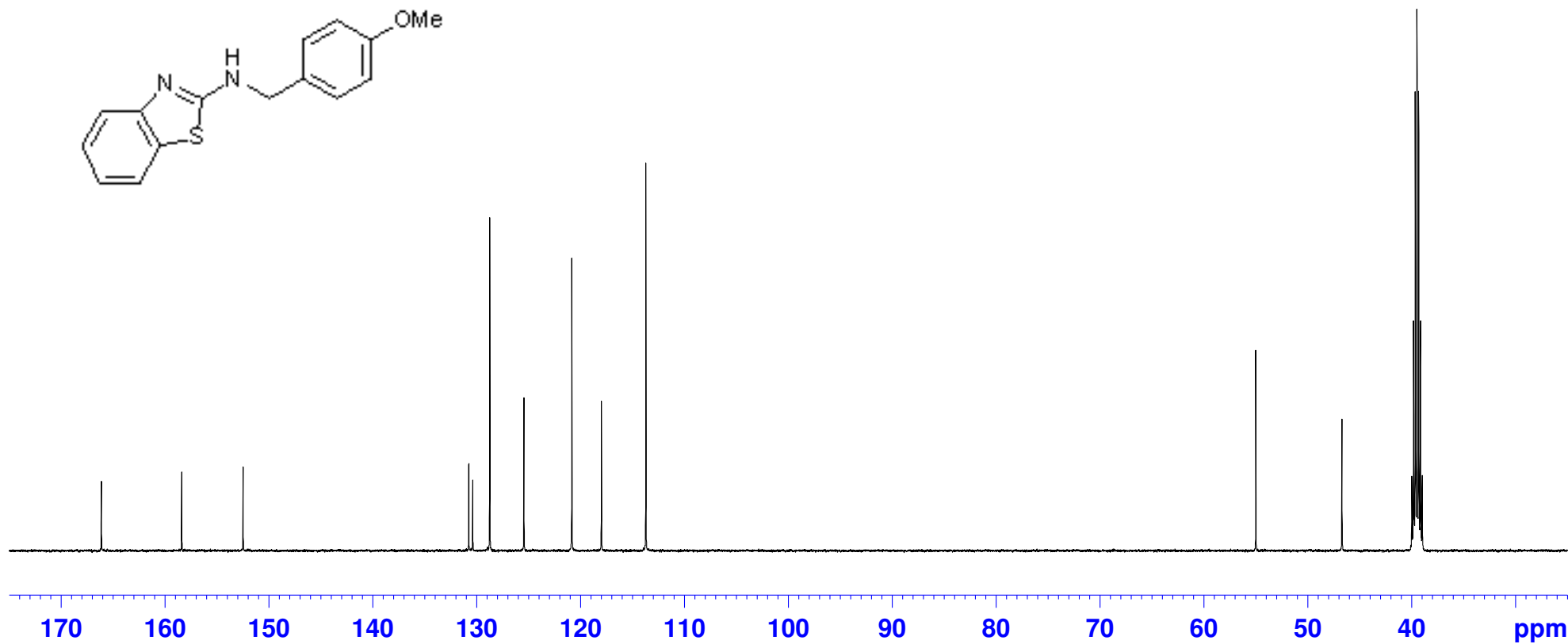
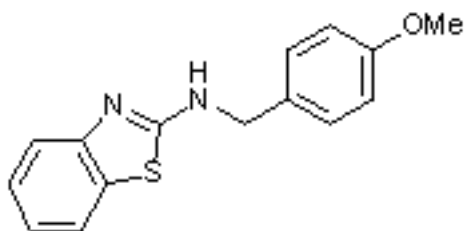


N-(4-methoxybenzyl)benzo[d]thiazol-2-amine  
C13CPD DMSO-d6

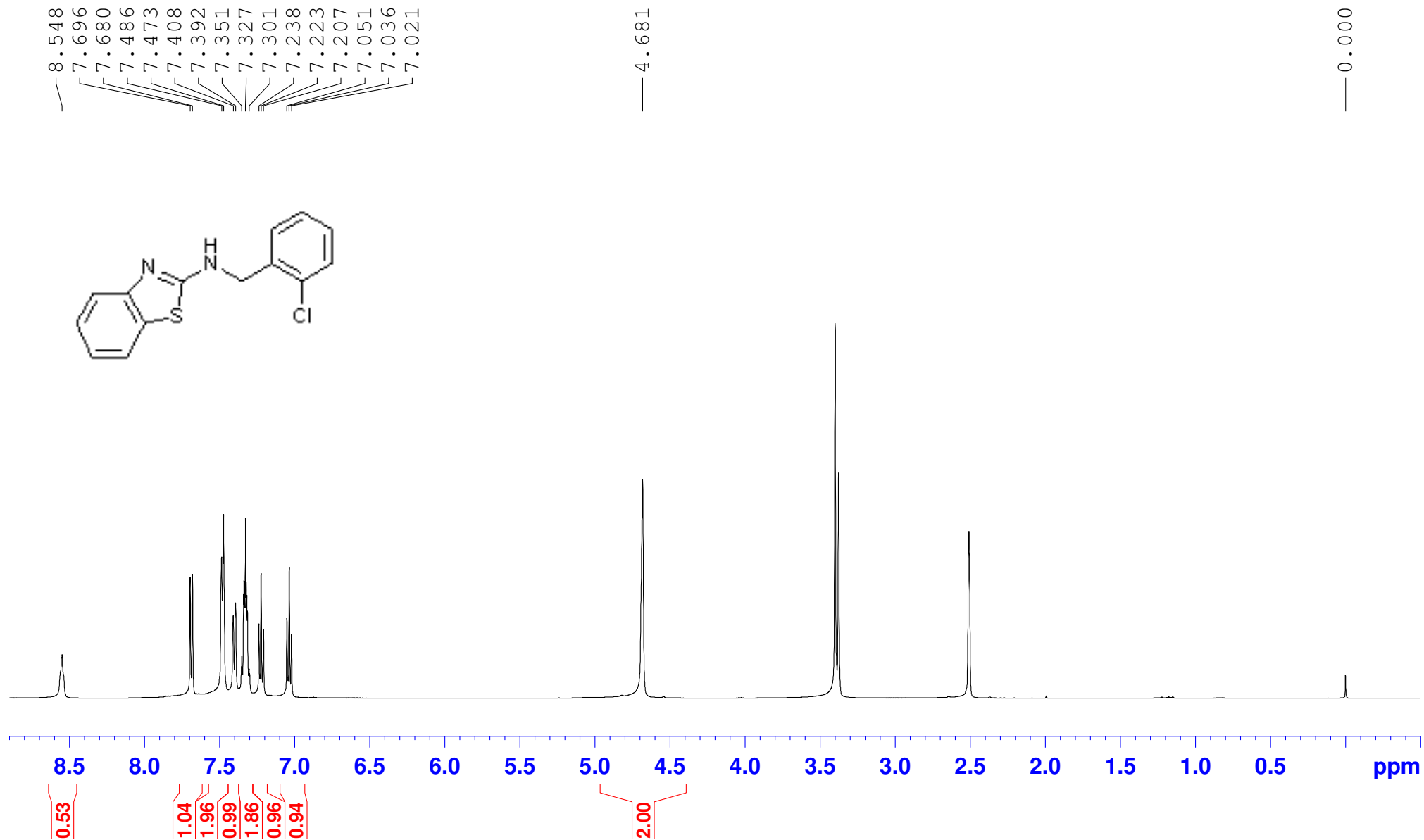
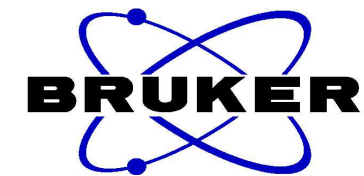


— 166.118  
— 158.381  
— 152.472  
  
130.747  
130.361  
128.768  
125.477  
— 120.868  
— 118.019  
— 113.739

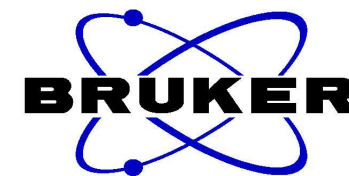
— 55.017  
— 46.724  
— 39.500



N-(2-chlorobenzyl)benzo[d]thiazol-2-amine  
Proton DMSO-d<sub>6</sub>



N-(2-chlorobenzyl)benzo[d]thiazol-2-amine  
C13CPD DMSO-d6



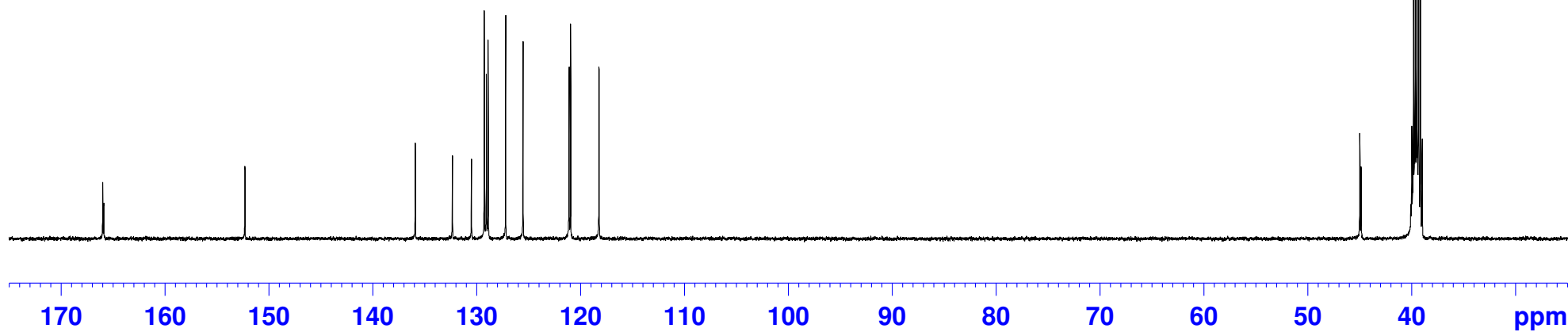
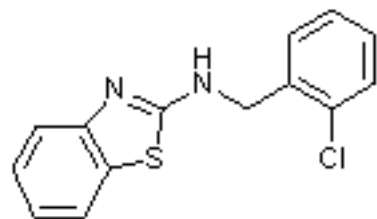
— 165.985

— 152.291

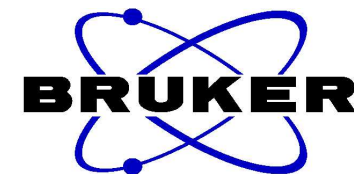
135.901  
132.318  
130.487  
129.252  
129.060  
128.879  
127.240  
125.557  
121.129  
120.977  
118.243

— 44.998

— 39.500



N-(1,2,3,4-tetrahydronaphthalen-1-yl)benzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



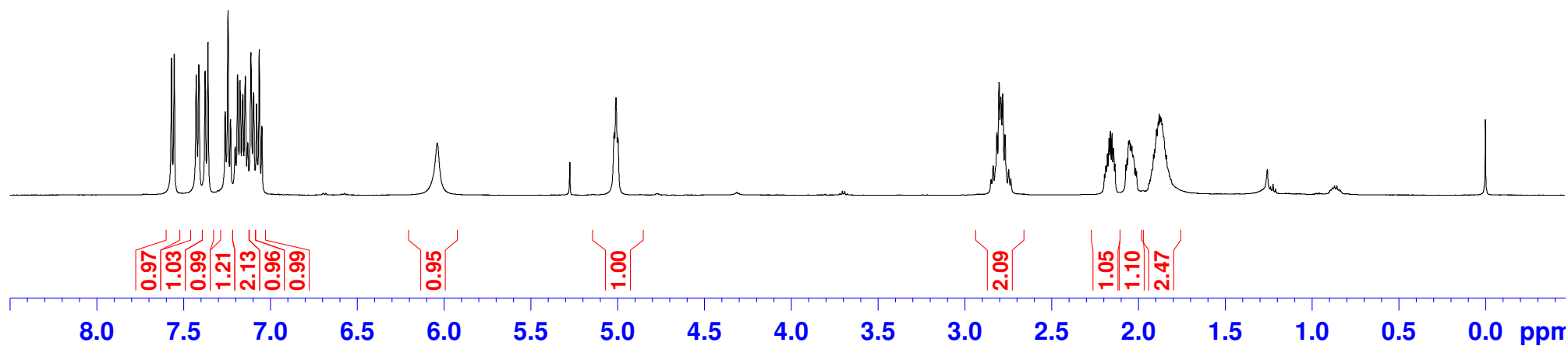
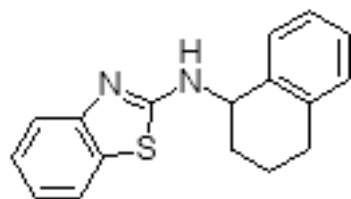
7.567  
7.551  
7.425  
7.410  
7.373  
7.357  
7.258  
7.241  
7.227  
7.200  
7.128  
7.109  
7.094  
7.077  
7.061  
7.046  
6.038

5.019  
5.009  
4.997

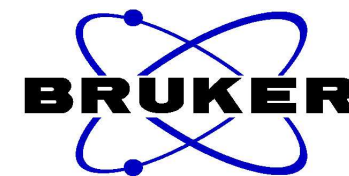
2.848  
2.733

2.195  
2.134  
2.071  
2.009  
1.939  
1.811

0.000



N-(1,2,3,4-tetrahydronaphthalen-1-yl)benzo[d]thiazol-2-amine  
C13CPD CDC13



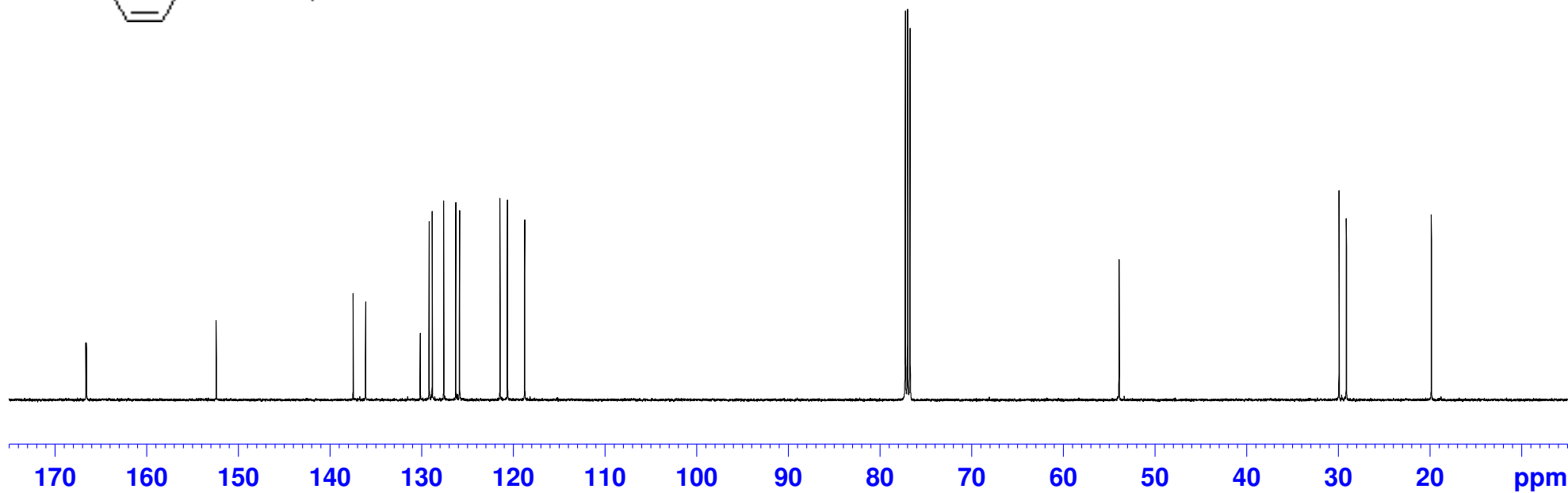
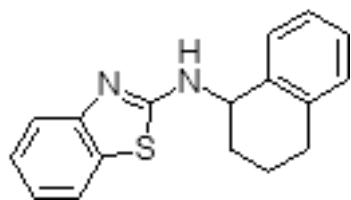
— 166.603  
— 152.438  
137.506  
136.141  
130.181  
129.213  
128.867  
127.617  
126.309  
125.897  
121.477  
120.675  
118.789

— 77.000

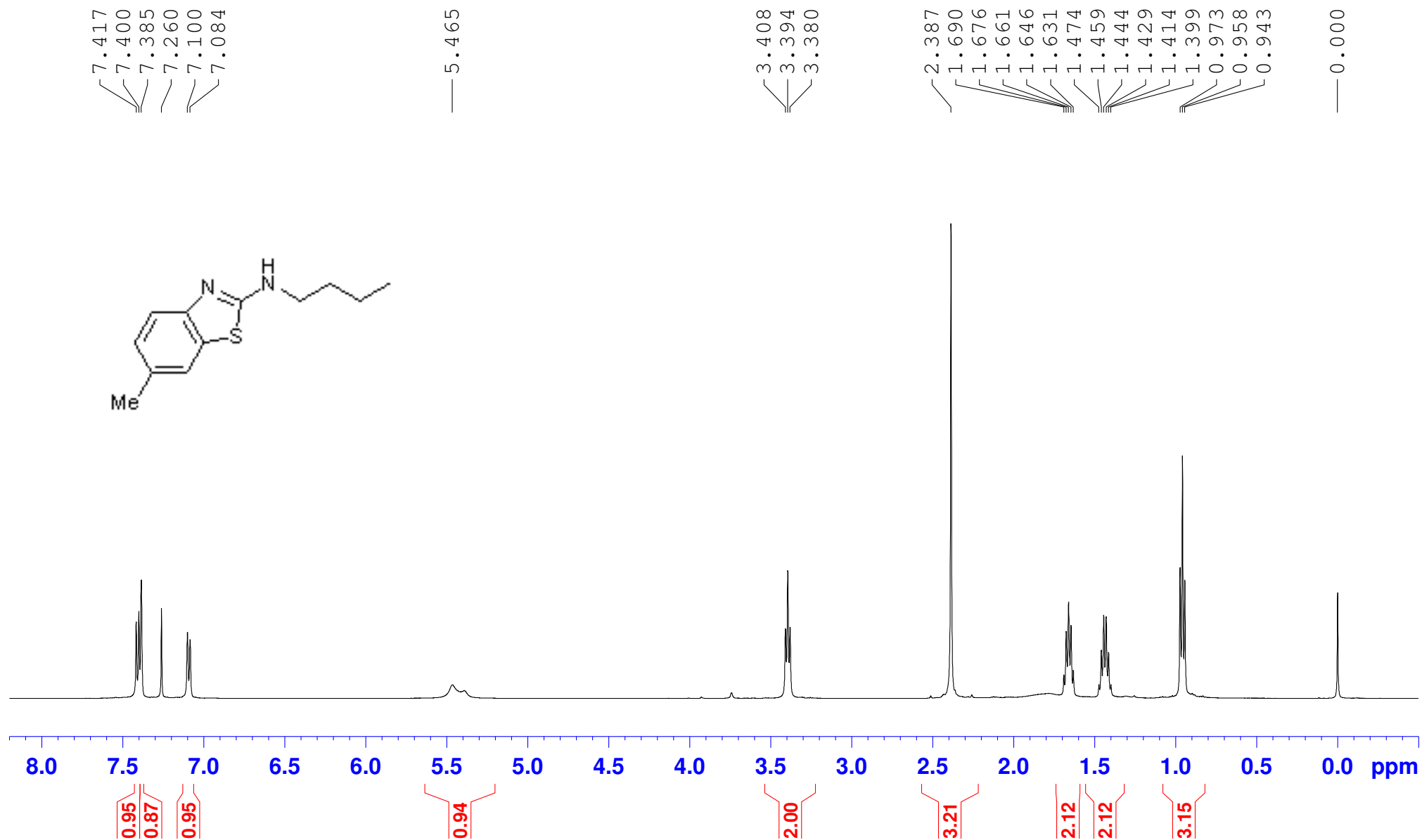
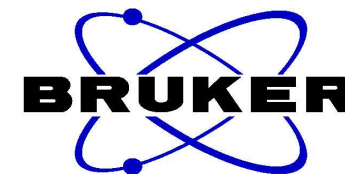
— 53.935

29.937  
29.135

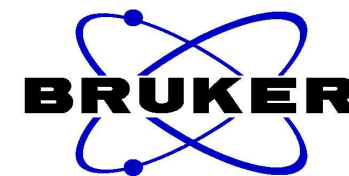
— 19.860



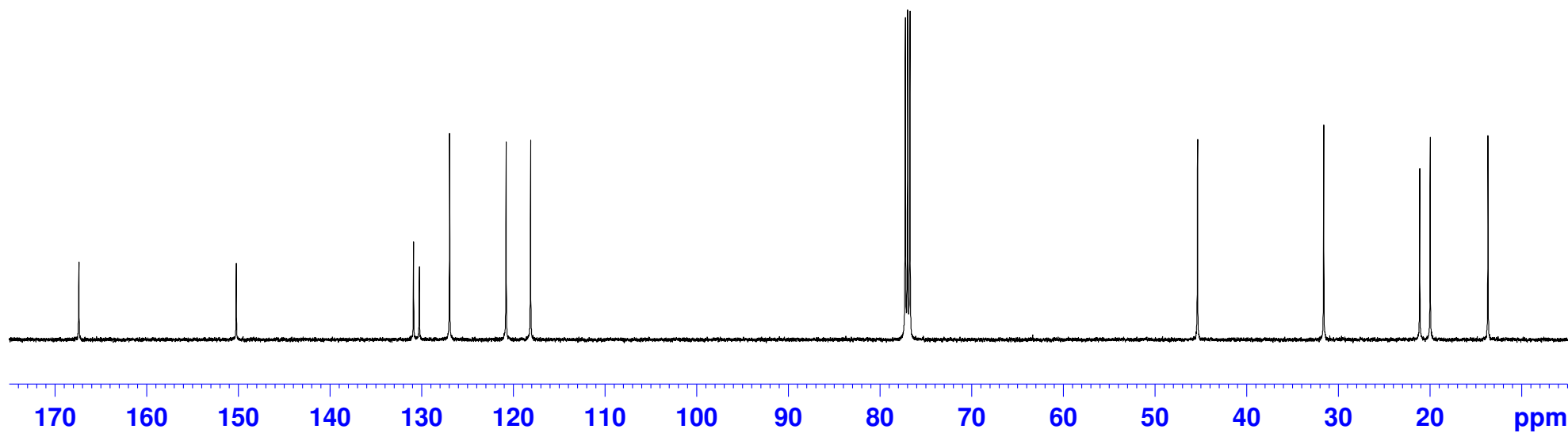
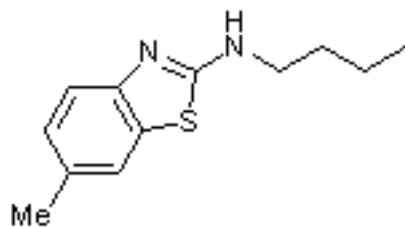
N-butyl-6-methylbenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



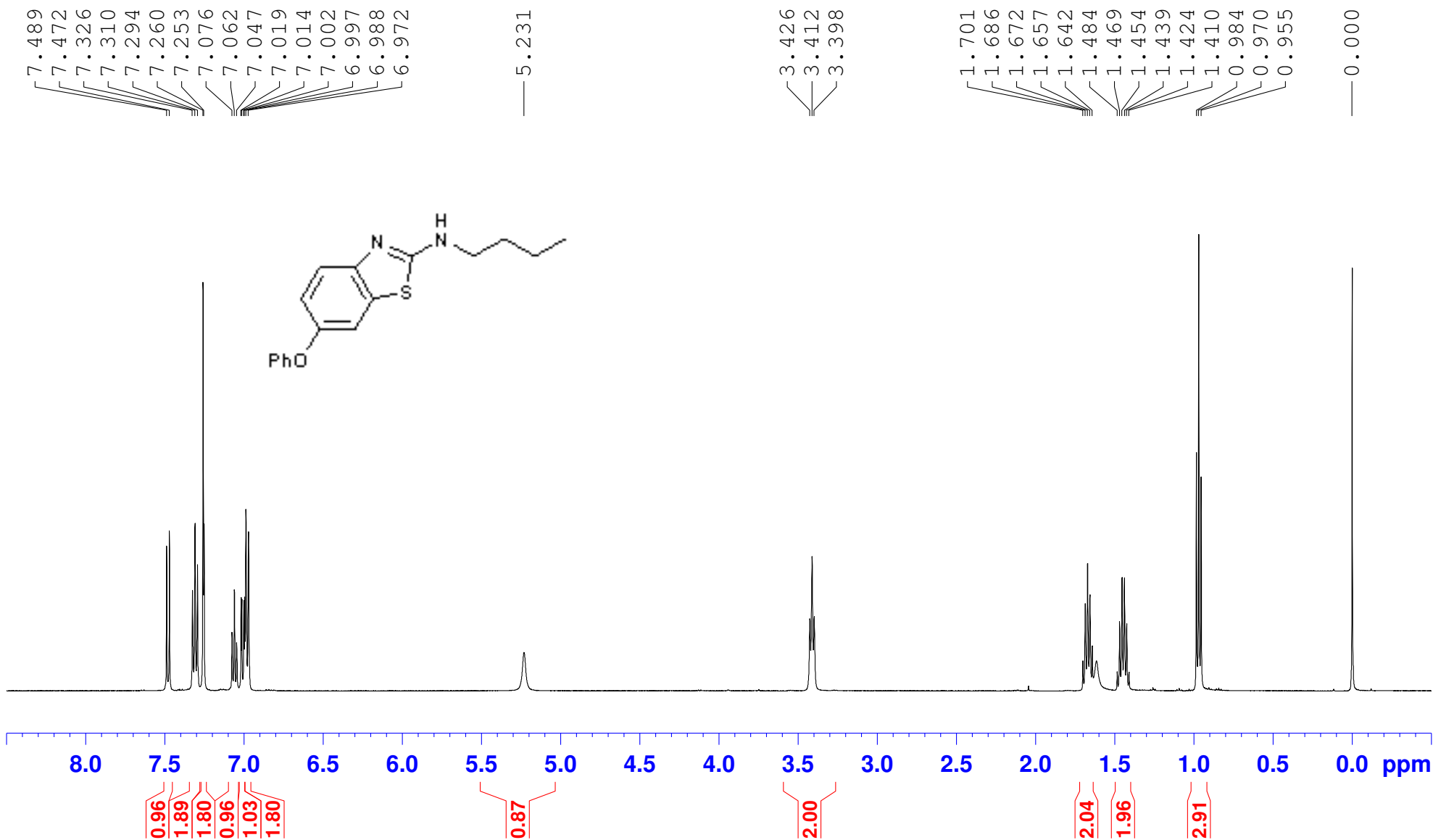
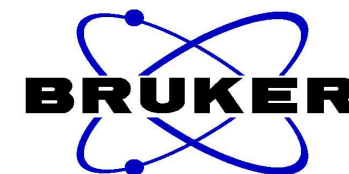
N-butyl-6-methylbenzo[d]thiazol-2-amine  
C13CPD CDC13



— 167.376  
— 150.249  
— 130.904  
— 130.275  
— 126.974  
— 120.808  
— 118.139  
— 77.000  
— 45.374  
— 31.599  
— 21.124  
— 19.986  
— 13.684

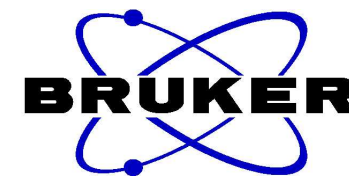


N-butyl-6-phenoxybenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>

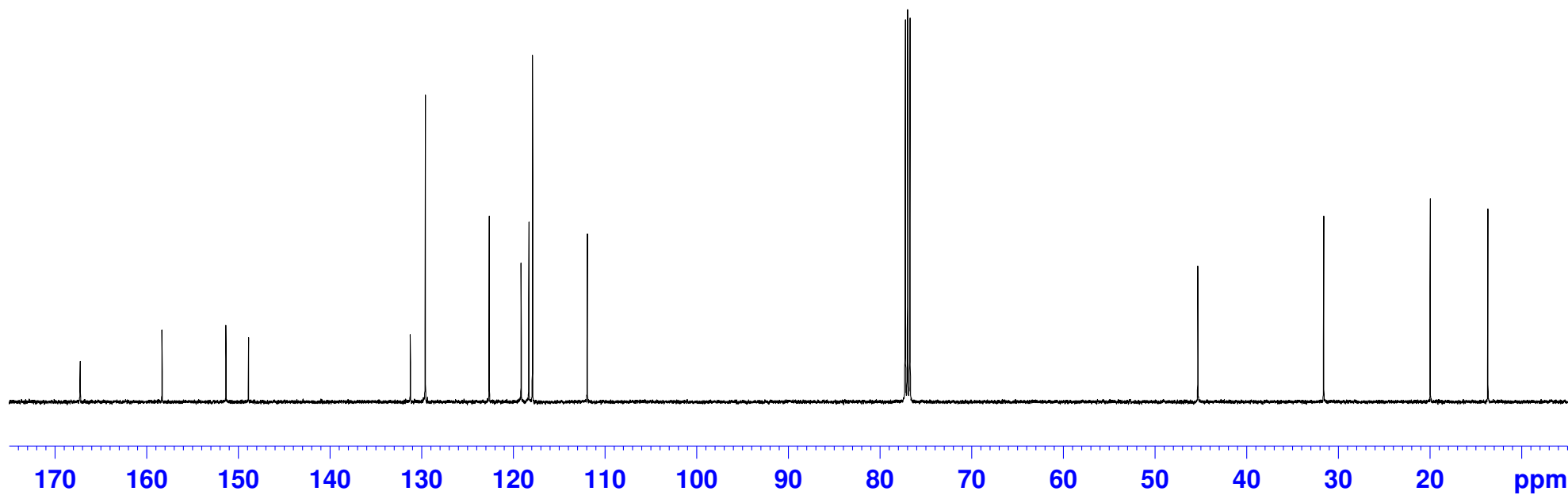
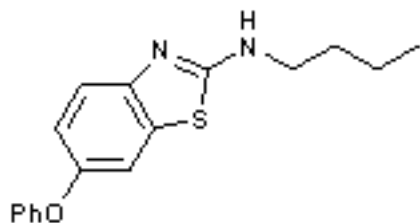




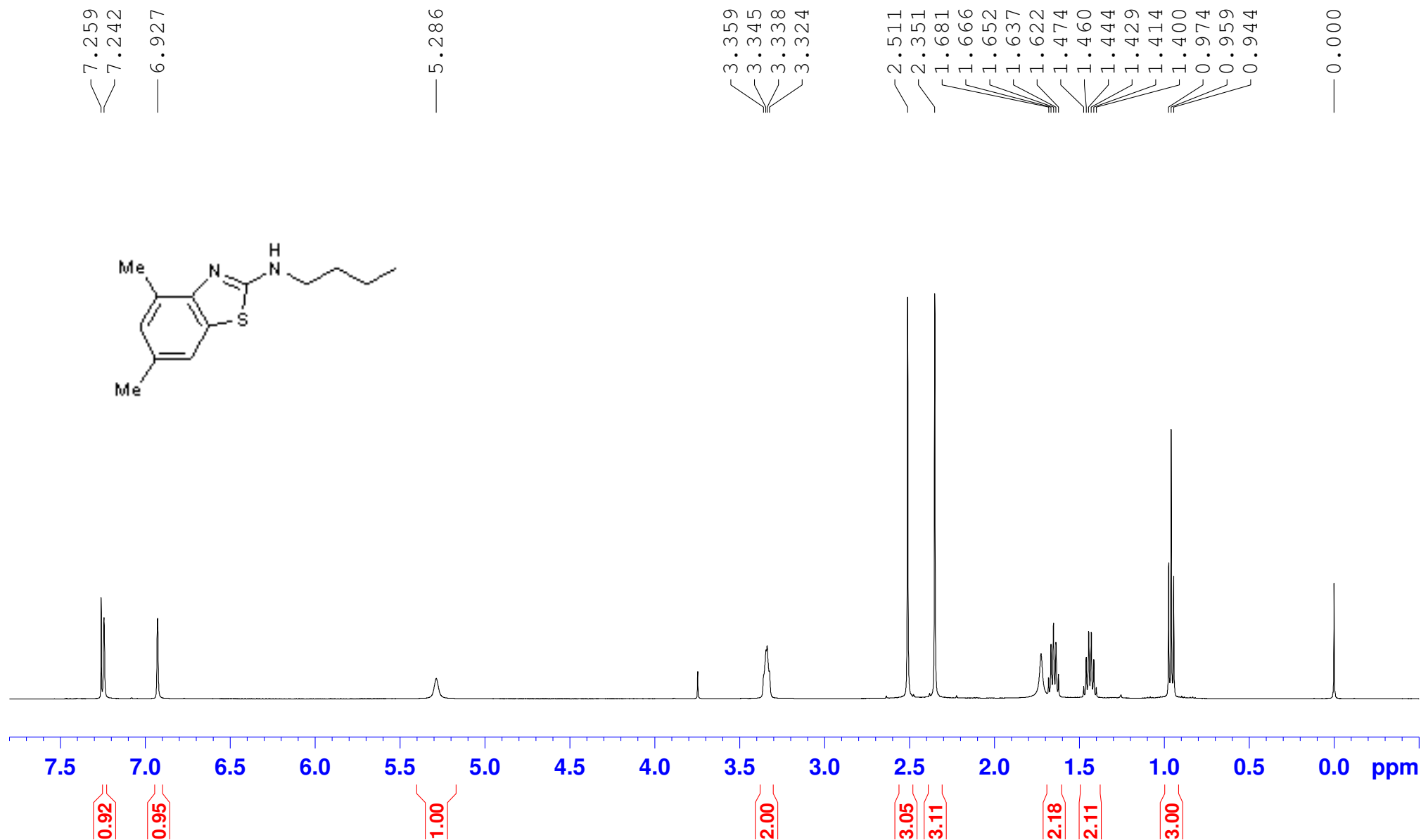
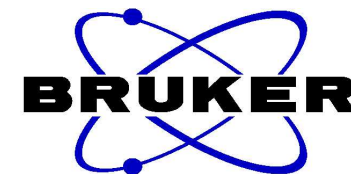
N-butyl-6-phenoxybenzo[d]thiazol-2-amine  
C13CPD CDC13



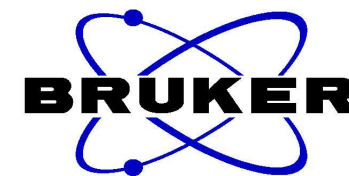
— 167.238  
— 158.346  
— 151.376  
— 148.912  
  
— 131.258  
— 129.625  
— 122.647  
— 119.172  
— 118.327  
— 117.923  
— 111.956  
  
— 77.000  
  
— 45.338  
— 31.613  
— 19.990  
— 13.698



N-butyl-4,6-dimethylbenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



N-butyl-4,6-dimethylbenzo[d]thiazol-2-amine  
C13CPD CDC13



— 166.733

— 149.194

130.781

130.080

128.029

127.942

— 118.255

— 77.000

— 45.559

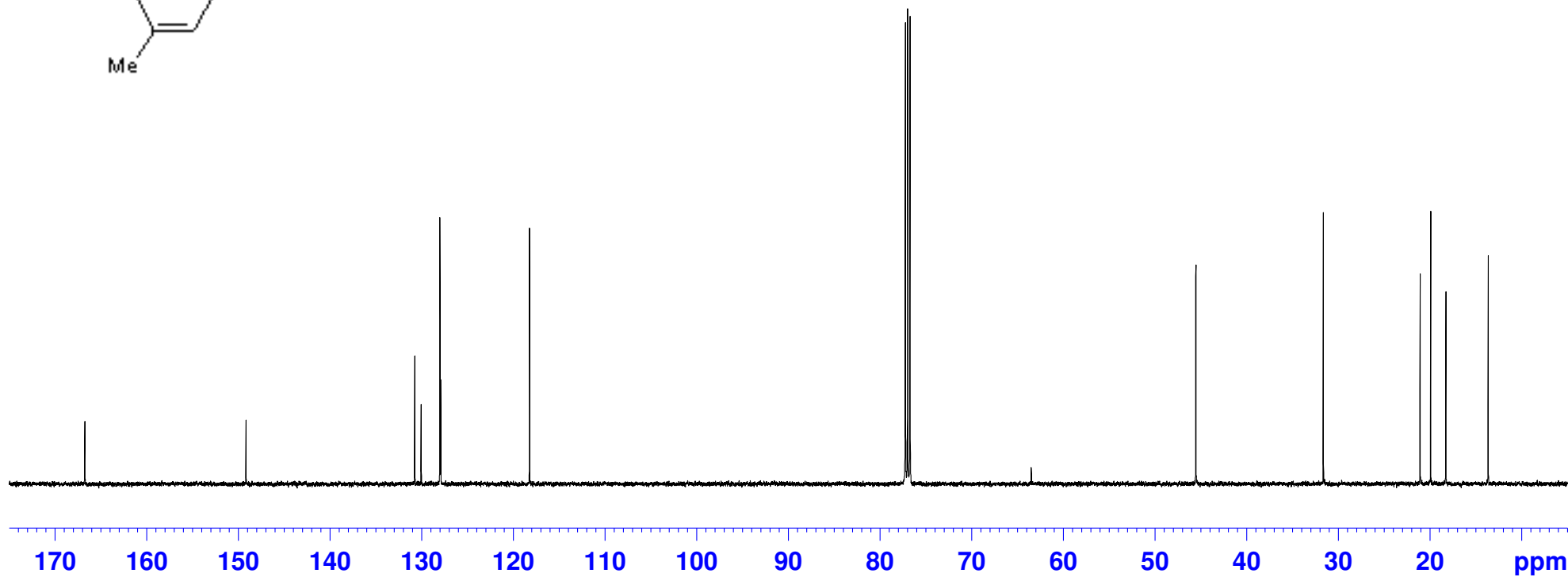
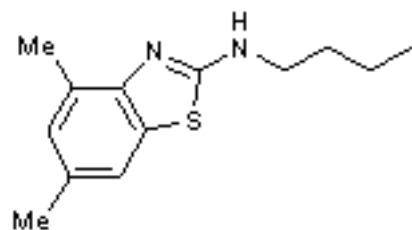
— 31.649

21.095

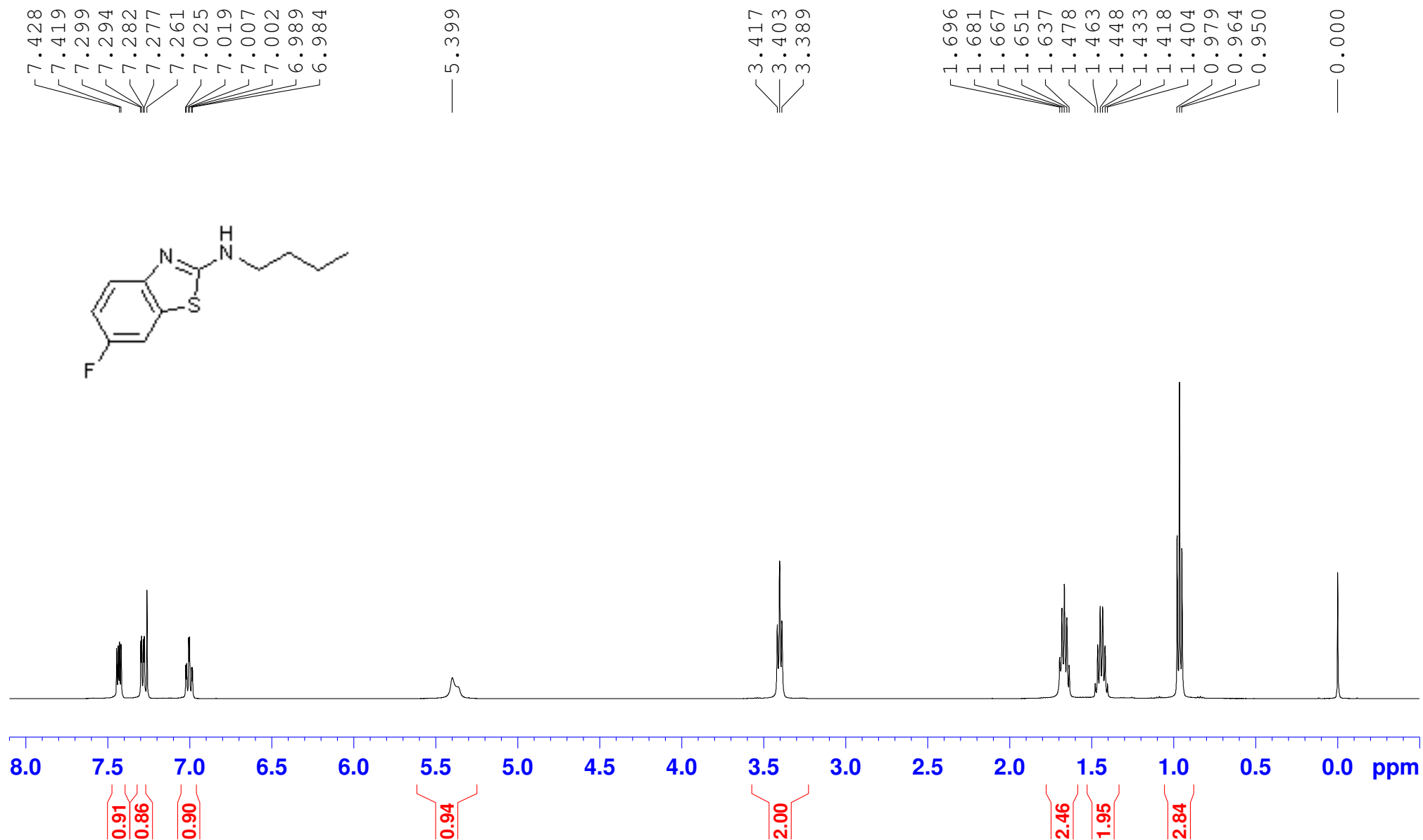
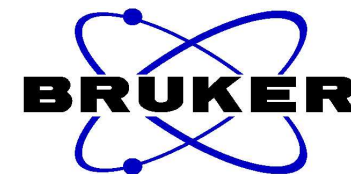
19.940

18.278

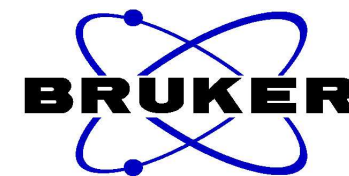
— 13.662



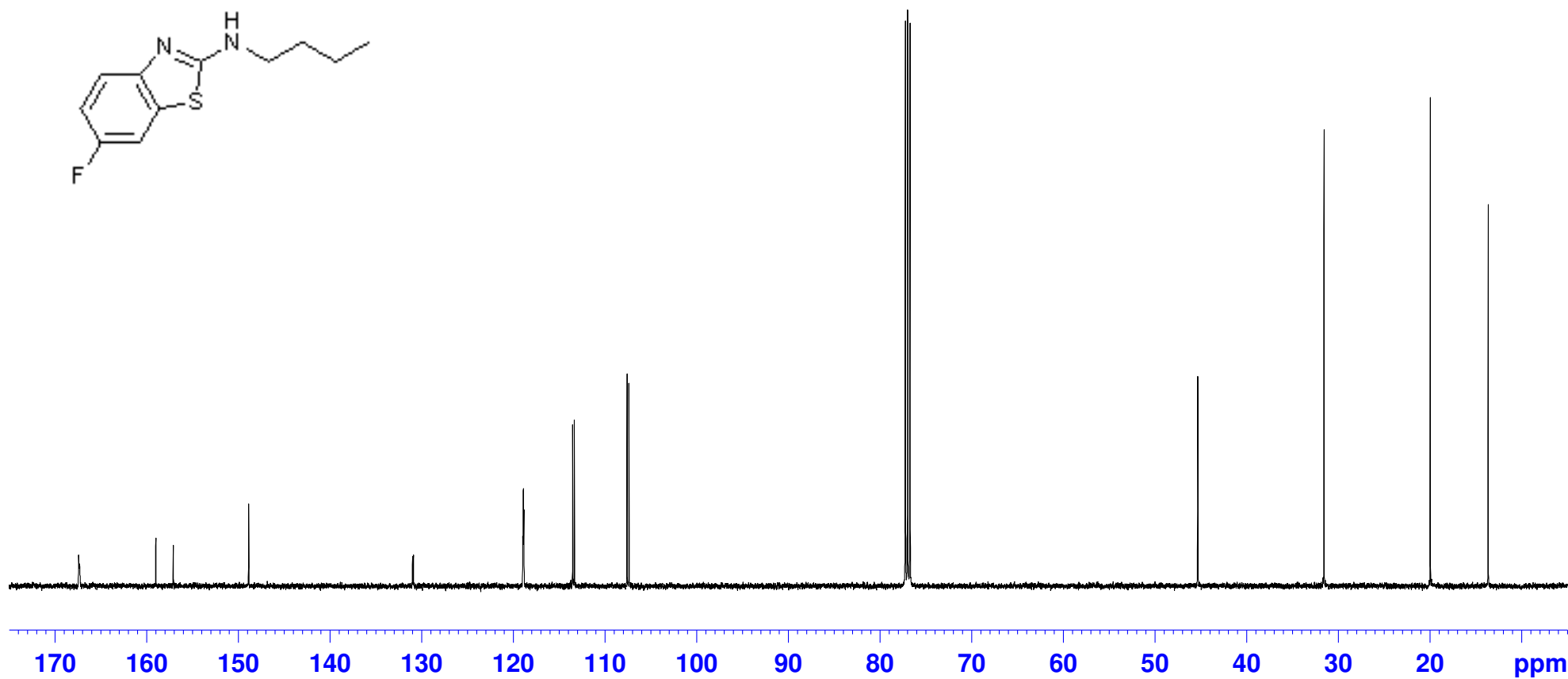
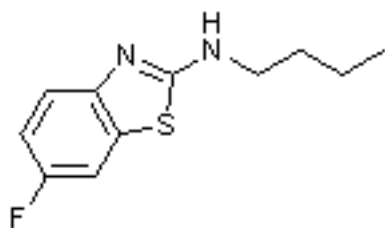
N-butyl-6-fluorobenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



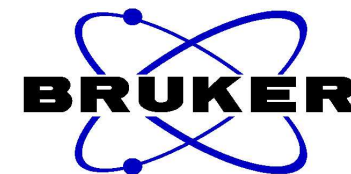
N-butyl-6-fluorobenzo[d]thiazol-2-amine  
C13CPD CDC13



— 167.411  
— 159.025  
— 157.119  
— 148.905  
  
— 130.998  
— 130.912  
  
— 118.928  
— 113.549  
— 113.361  
— 107.615  
— 107.405  
  
— 77.000  
  
— 45.360  
  
— 31.577  
— 19.983  
— 13.666



N-butyl-6-chlorobenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



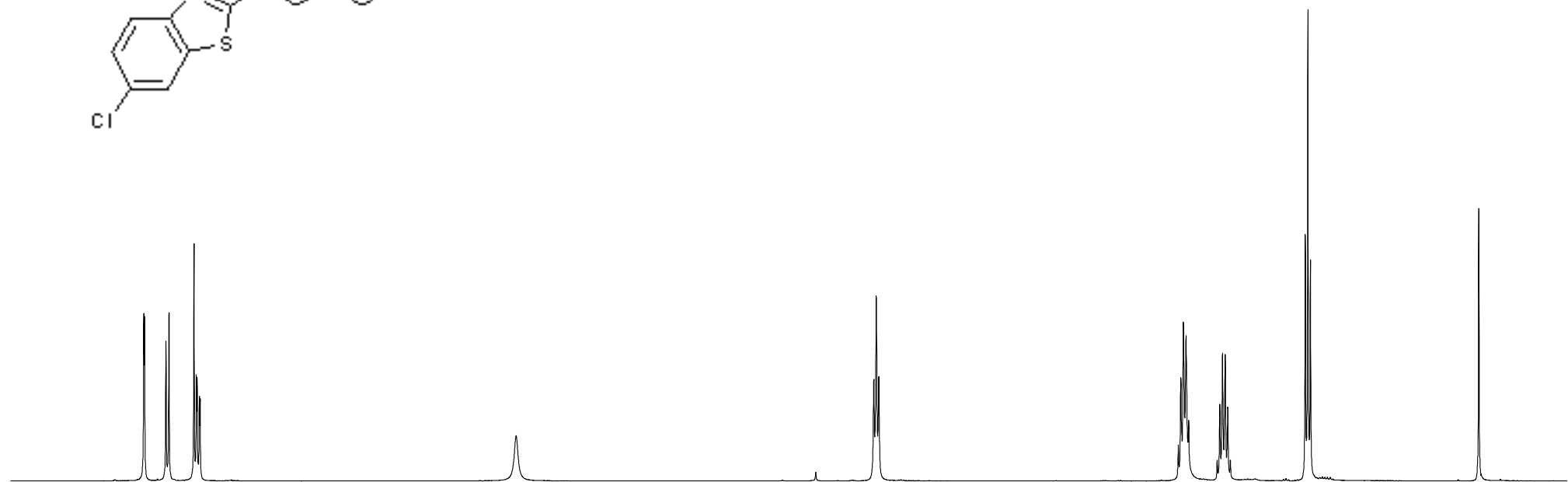
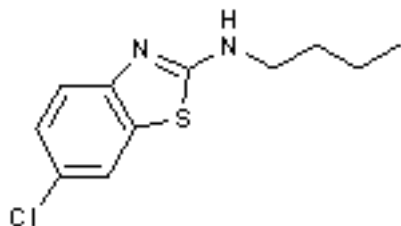
7.545  
7.541  
7.421  
7.403  
7.262  
7.248  
7.244  
7.231  
7.227

5.441

3.420  
3.406  
3.391

1.698  
1.684  
1.669  
1.655  
1.640  
1.479  
1.464  
1.449  
1.433  
1.419  
1.404  
0.981  
0.966  
0.952

0.000



8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm

0.88  
0.95  
0.95

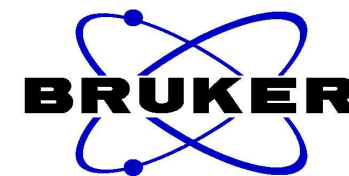
0.90

2.00

2.68  
2.05

3.07

N-butyl-6-chlorobenzo[d]thiazol-2-amine  
C13CPD CDC13



— 168.048

— 151.094

— 131.460

— 126.360

— 126.316

— 120.429

— 119.158

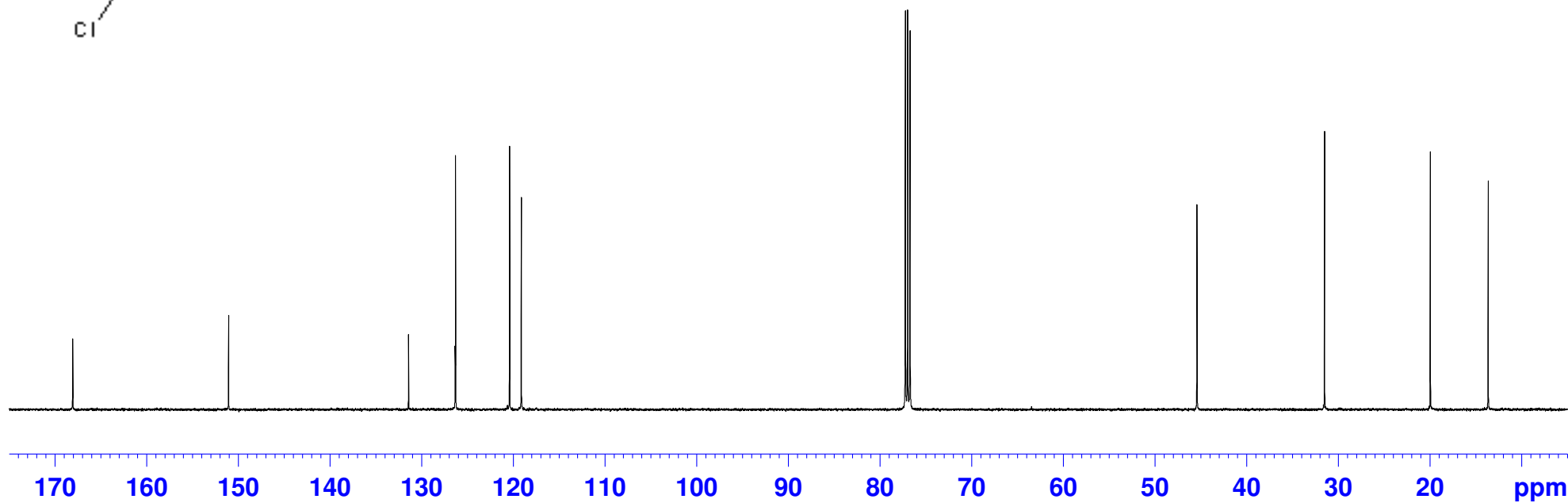
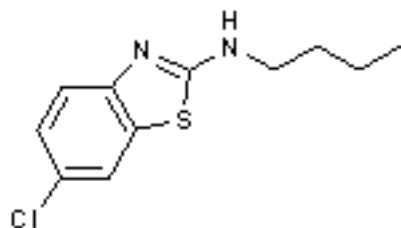
— 77.000

— 45.432

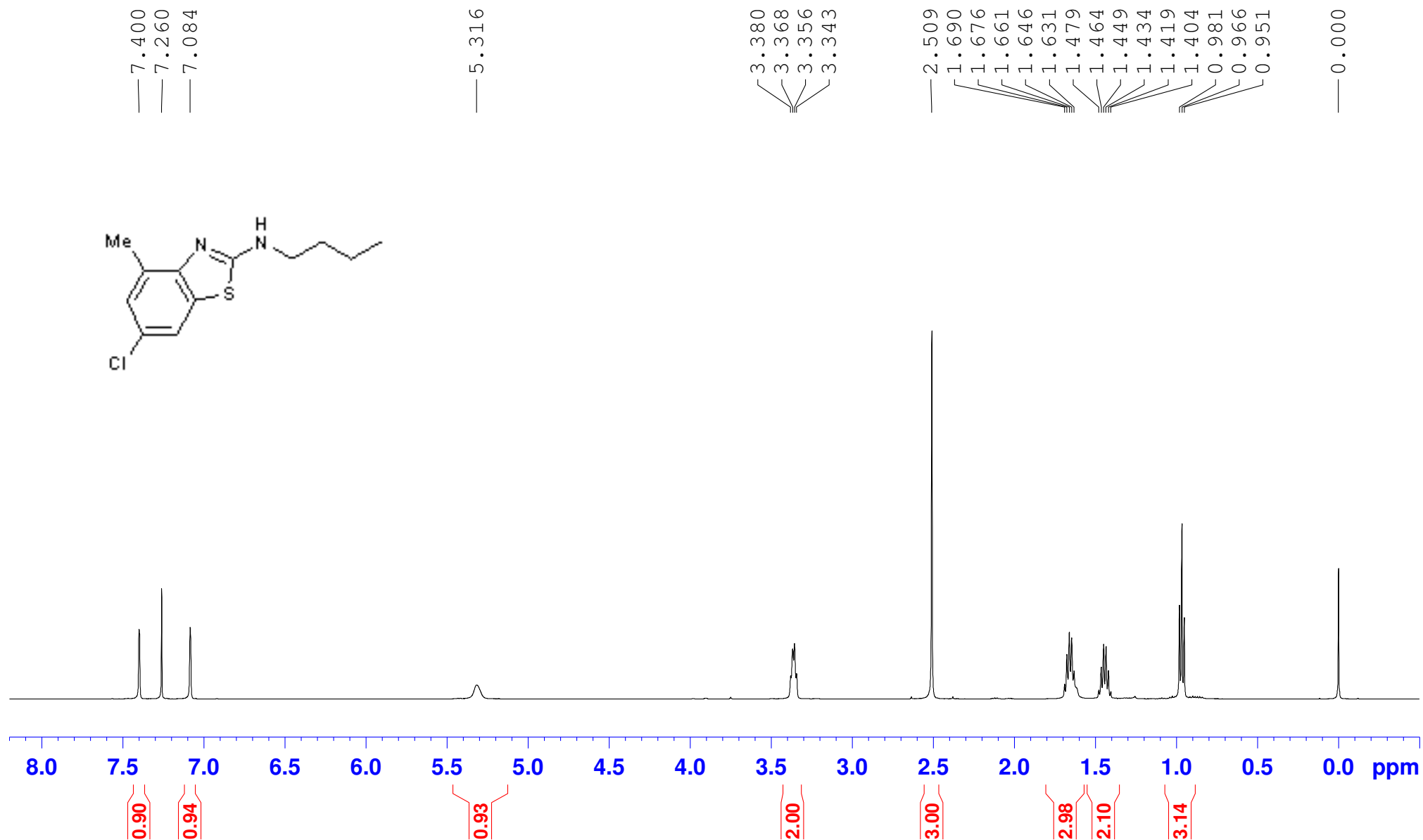
— 31.519

— 19.976

— 13.662

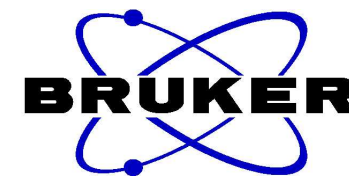


N-butyl-6-chloro-4-methylbenzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>





N-butyl-6-chloro-4-methylbenzo[d]thiazol-2-amine  
C13CPD CDC13



— 167.196

— 150.122

— 130.994

— 129.571

— 126.949

— 126.024

— 117.832

— 77.000

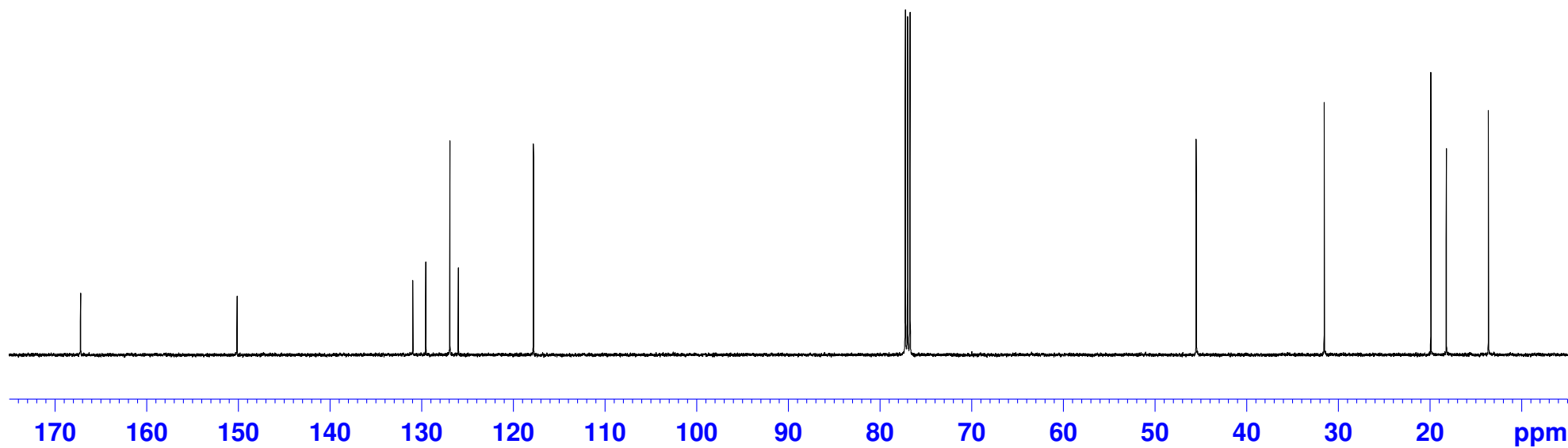
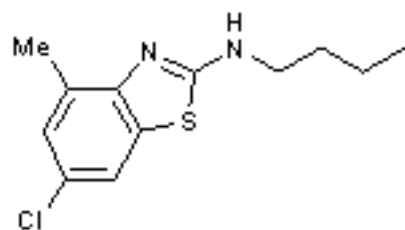
— 45.515

— 31.551

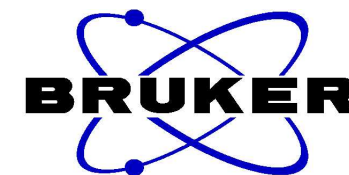
— 19.921

— 18.231

— 13.637



N-butyl-6-(trifluoromethoxy)benzo[d]thiazol-2-amine  
Proton CDCl<sub>3</sub>



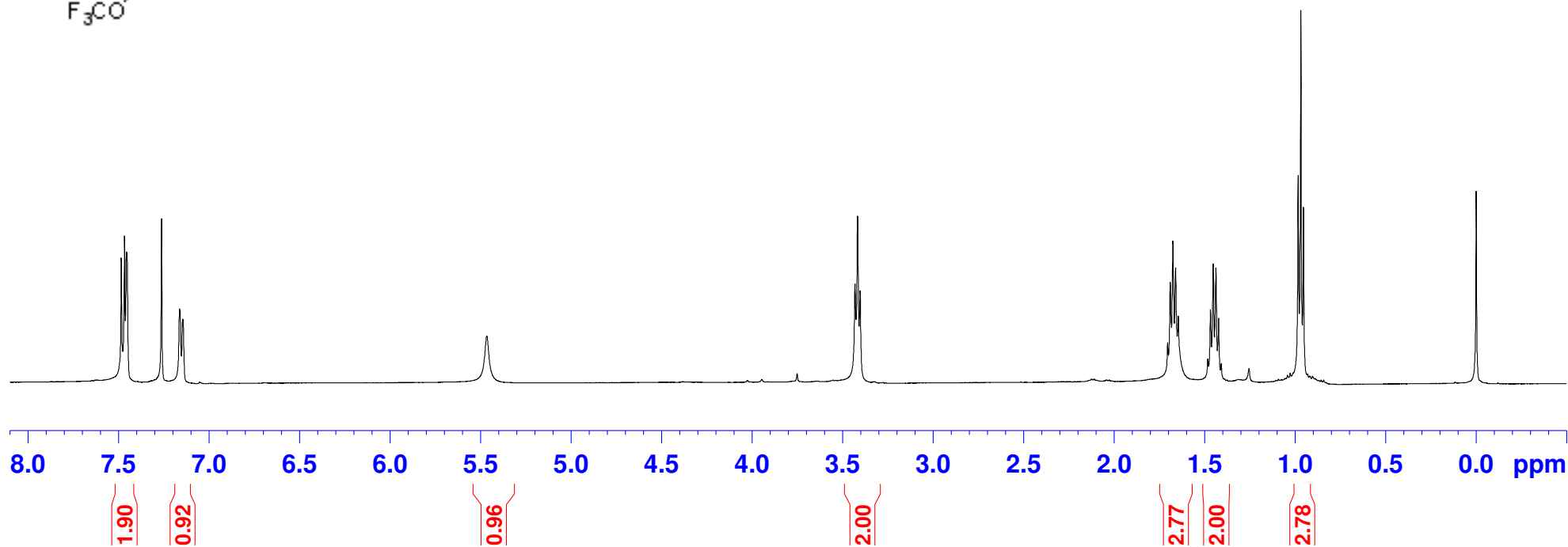
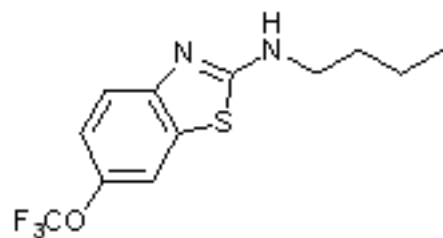
7.484  
7.466  
7.454  
7.261  
7.161  
7.144

5.467

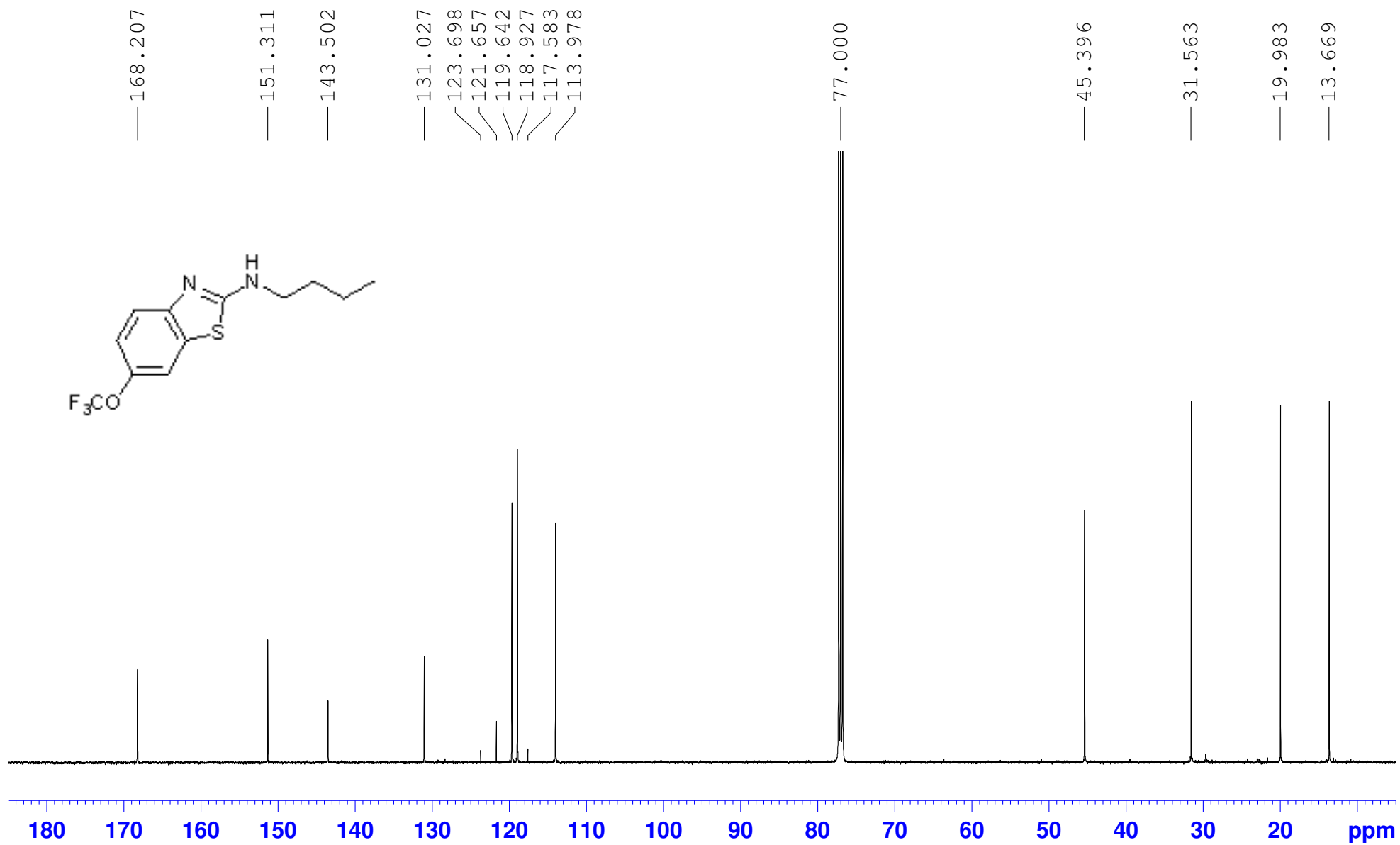
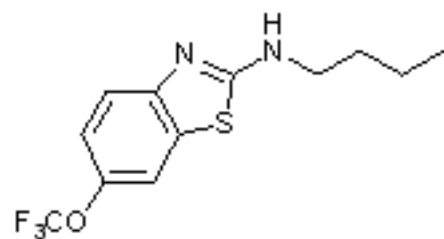
3.432  
3.418  
3.404

1.705  
1.691  
1.676  
1.661  
1.646  
1.483  
1.468  
1.453  
1.438  
1.423  
1.409  
0.984  
0.969  
0.954

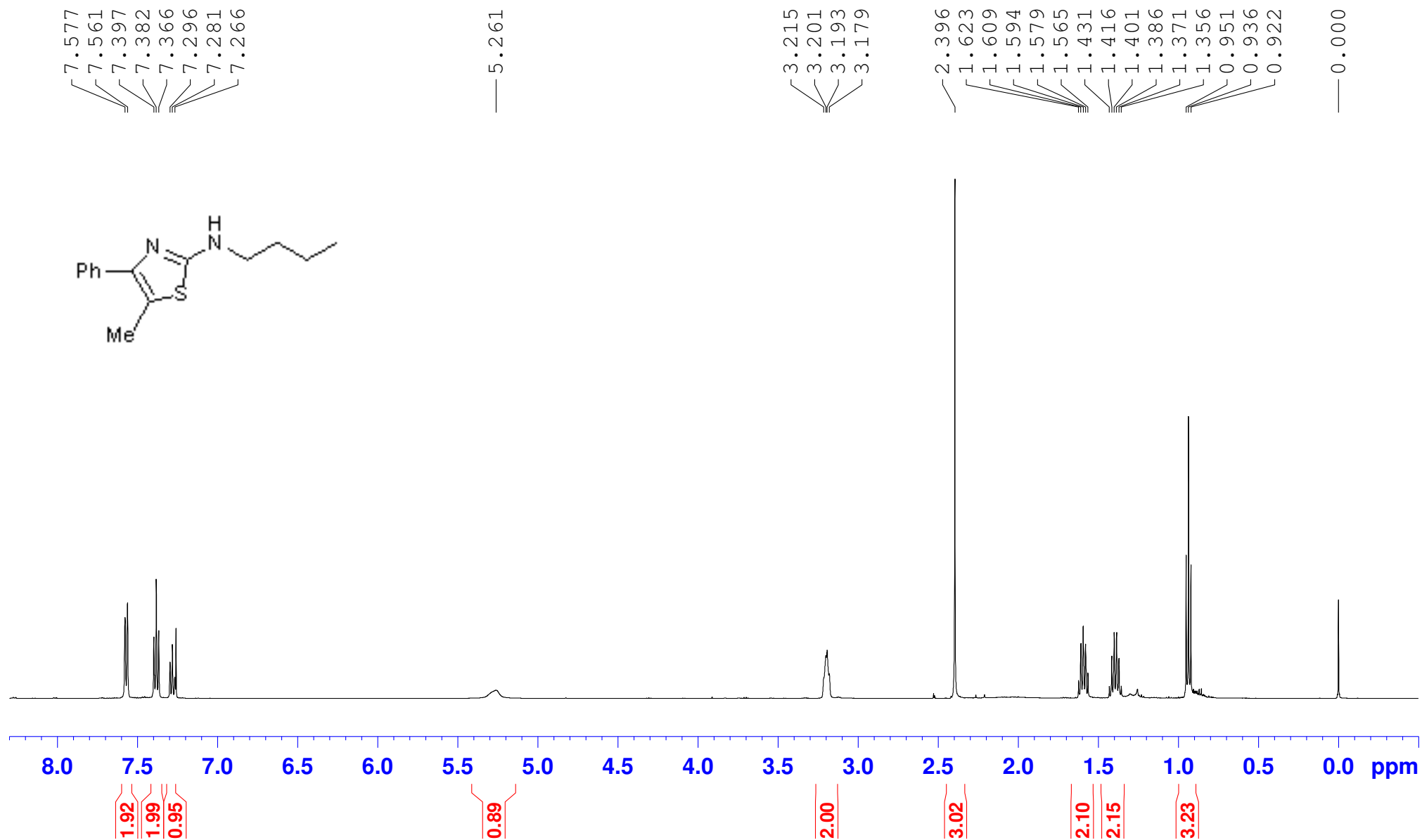
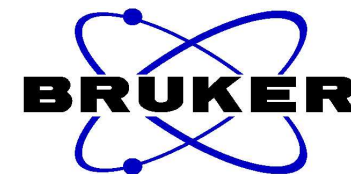
0.000



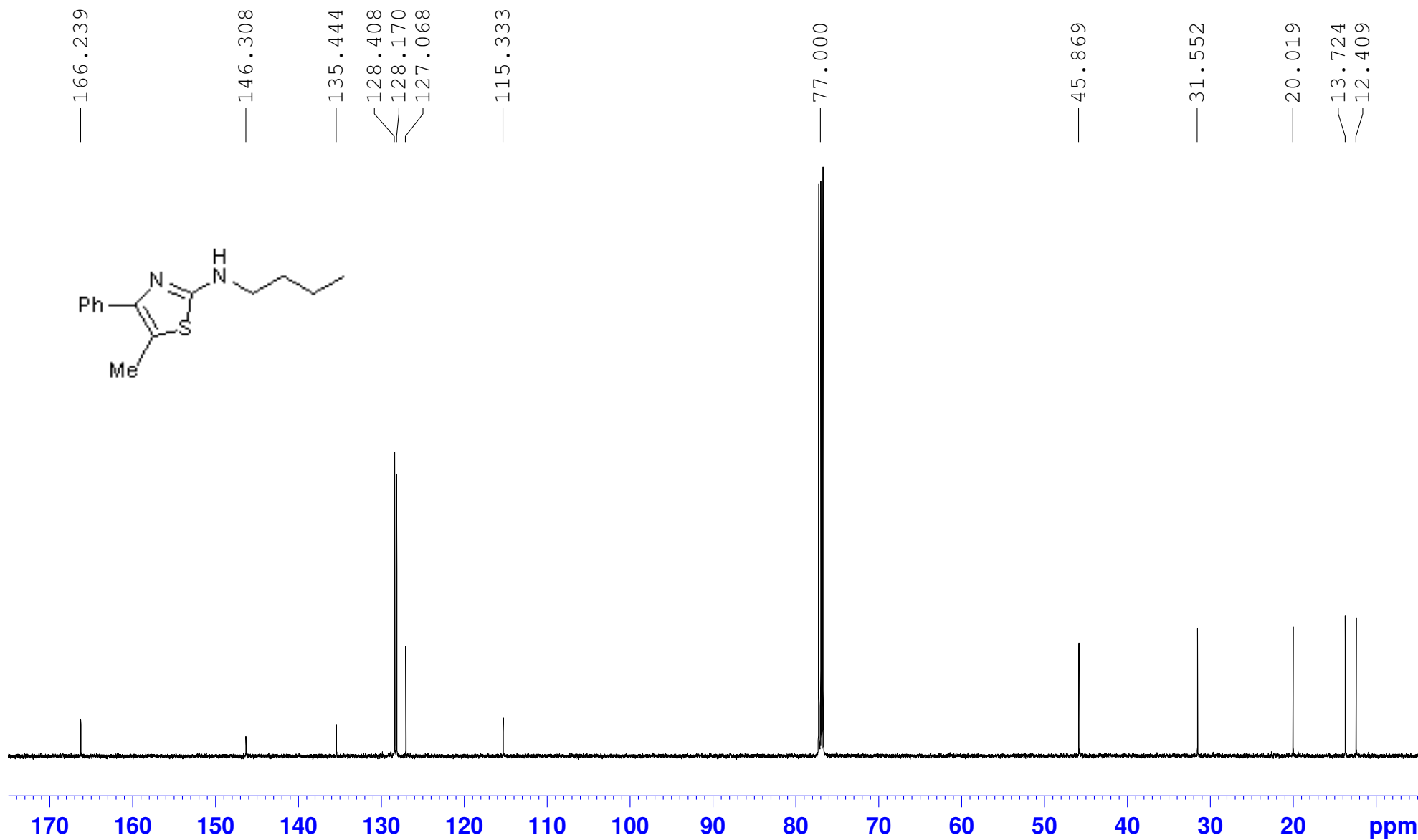
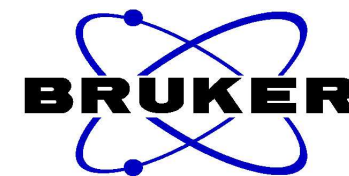
N-butyl-6-(trifluoromethoxy)benzo[d]thiazol-2-amine  
C13CPD CDC13



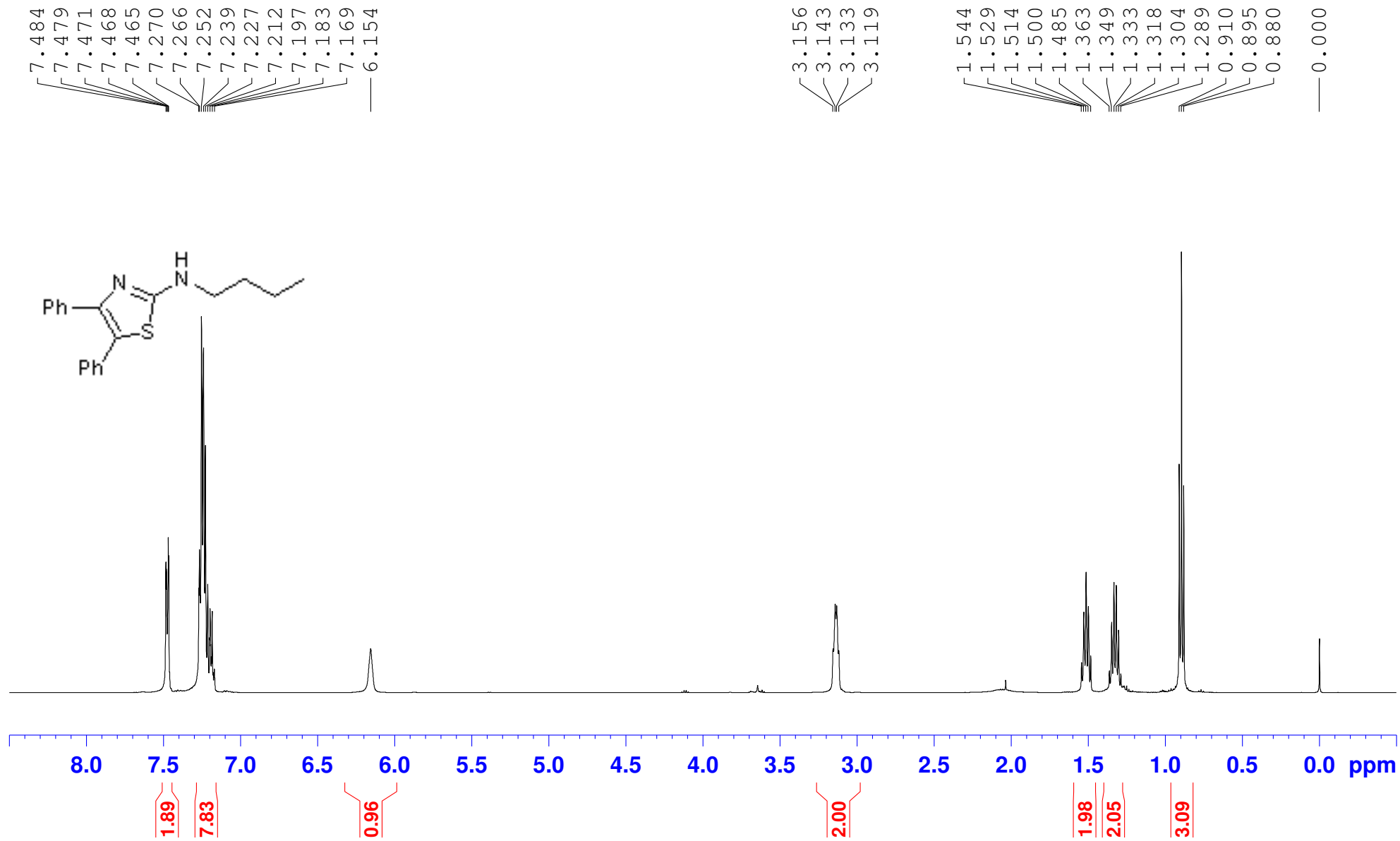
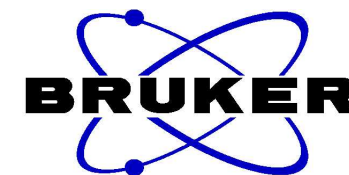
N-butyl-5-methyl-4-phenylthiazol-2-amine  
Proton CDCl<sub>3</sub>



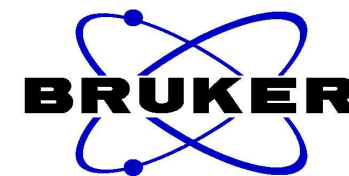
N-butyl-5-methyl-4-phenylthiazol-2-amine  
C13CPD CDC13



N-butyl-4,5-diphenylthiazol-2-amine  
Proton CDCl<sub>3</sub>



N-butyl-4,5-diphenylthiazol-2-amine  
C13CPD CDC13



— 168.019  
— 146.081  
— 135.643  
— 133.006  
— 129.163  
— 128.997  
— 128.426  
— 128.094  
— 127.422  
— 126.801  
— 119.880

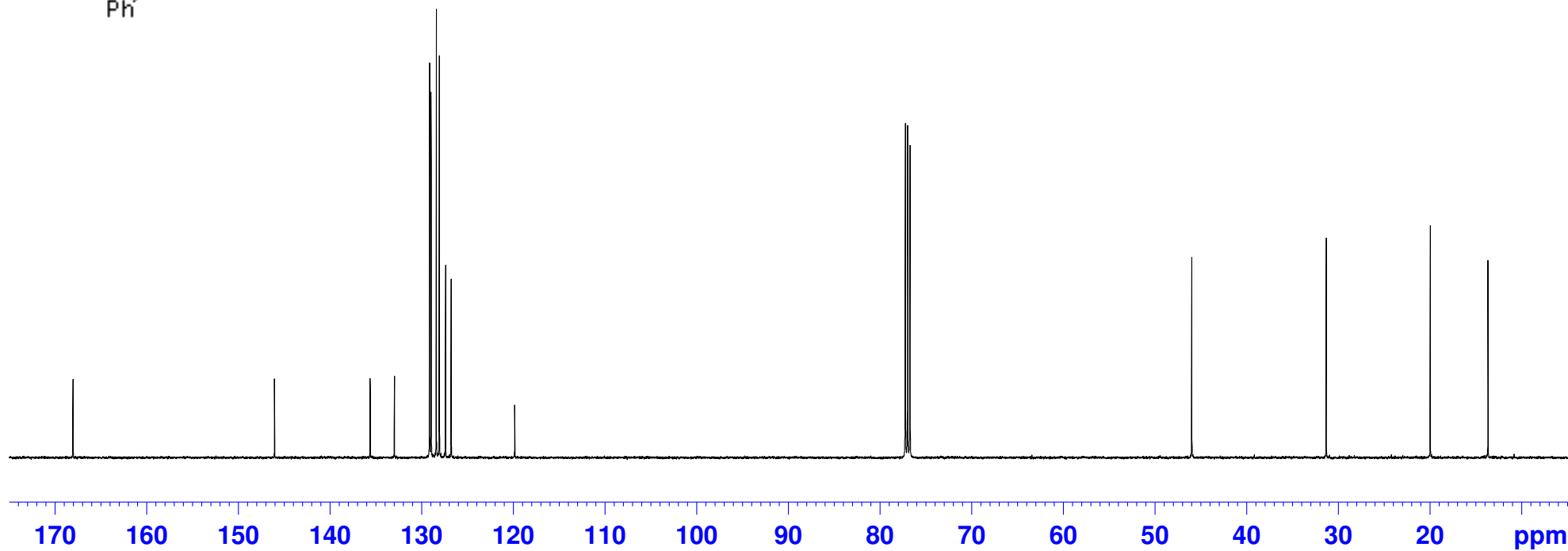
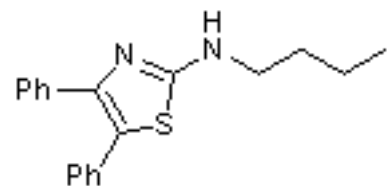
— 77.000

— 46.003

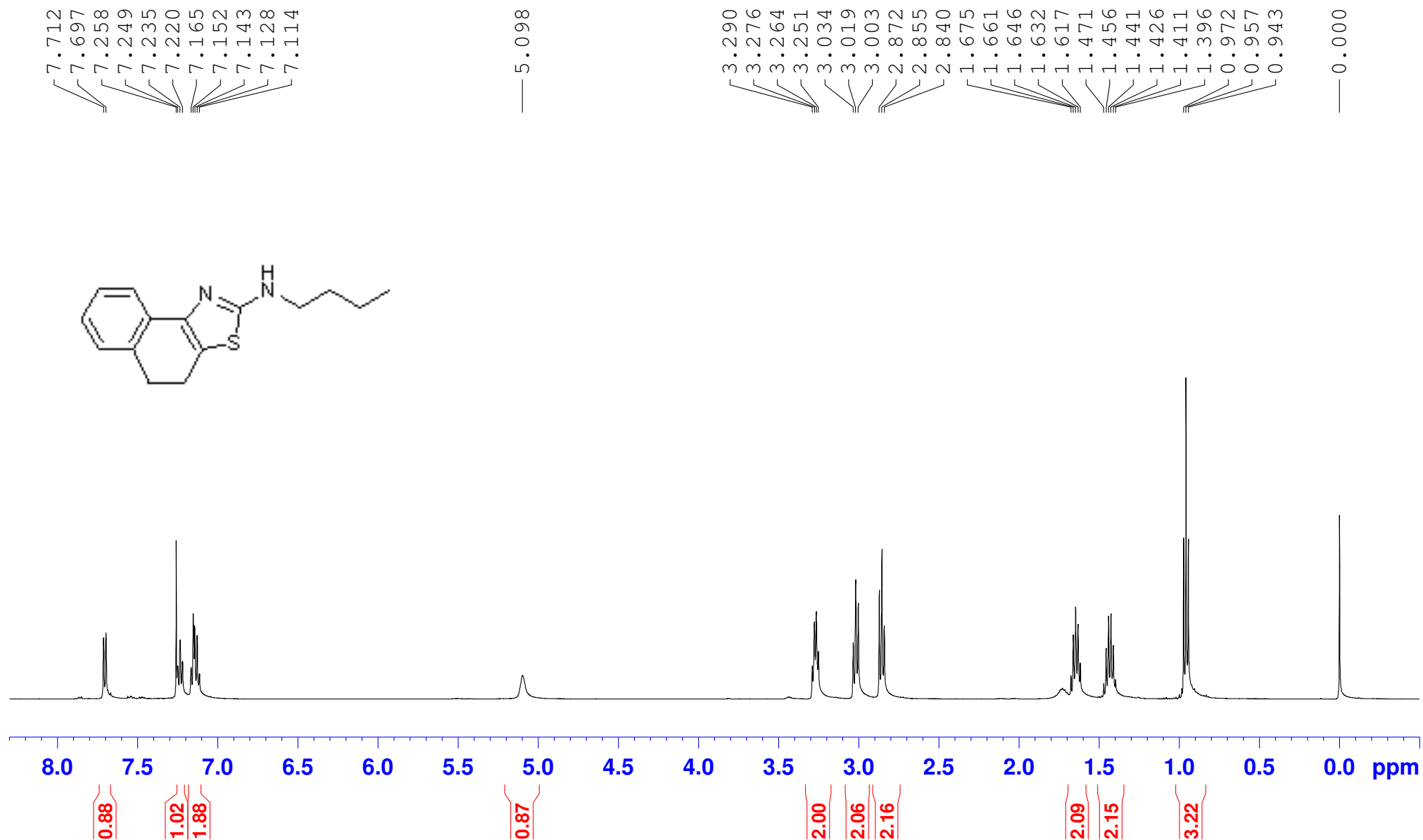
— 31.332

— 19.983

— 13.677

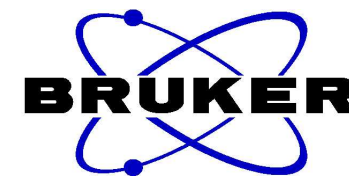


N-butyl-4,5-dihydronaphtho[1,2-d]thiazol-2-amine  
Proton CDCl<sub>3</sub>

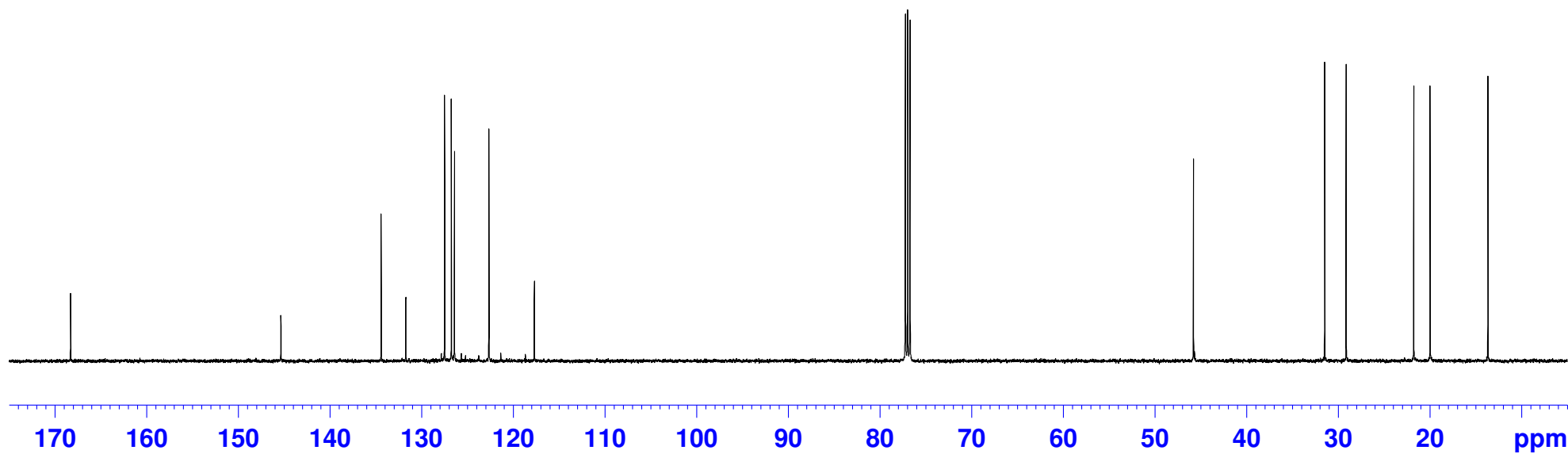
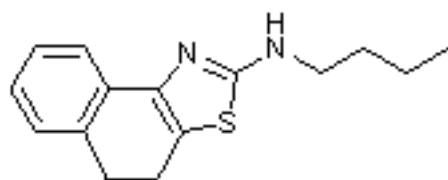




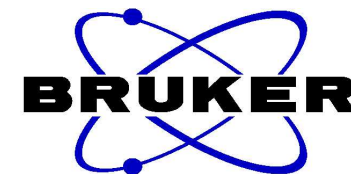
N-butyl-4,5-dihydronaphtho[1,2-d]thiazol-2-amine  
C13CPD CDC13



— 168.286  
— 145.382  
— 134.443  
— 131.756  
— 127.523  
— 126.786  
— 126.451  
— 122.690  
— 117.720  
— 77.000  
— 45.822  
— 31.505  
— 29.164  
— 21.789  
— 20.005  
— 13.691



N-butyl-5-chlorobenzo[d]oxazol-2-amine  
Proton CDCl<sub>3</sub>



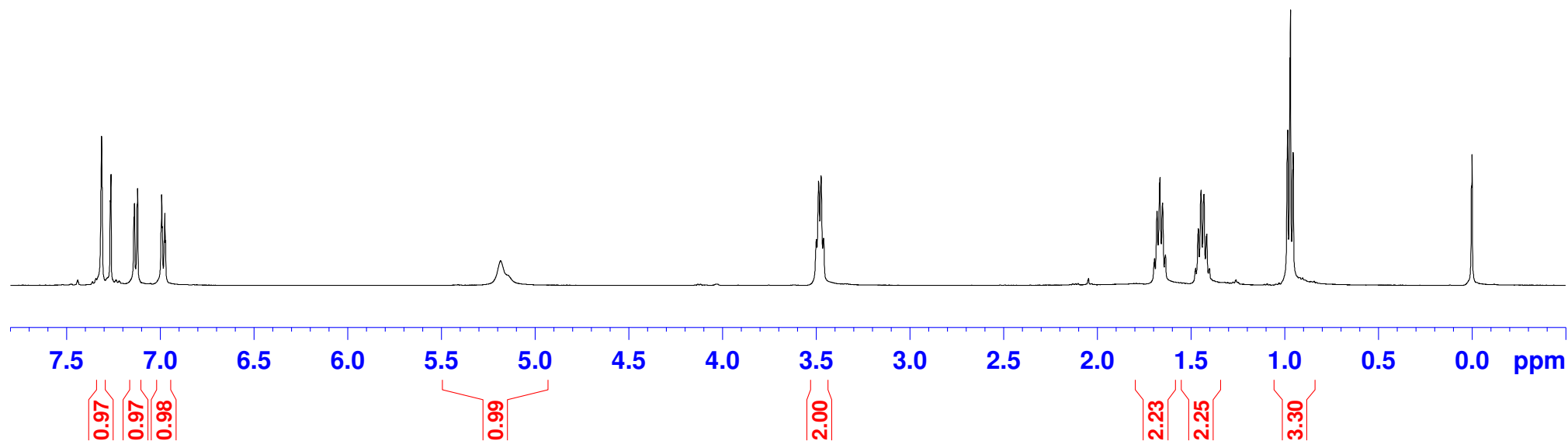
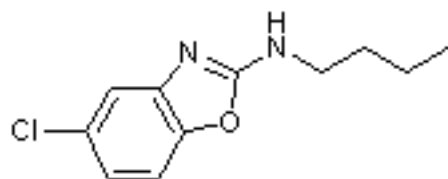
7.313  
7.263  
7.137  
7.120  
6.992  
6.975

5.184

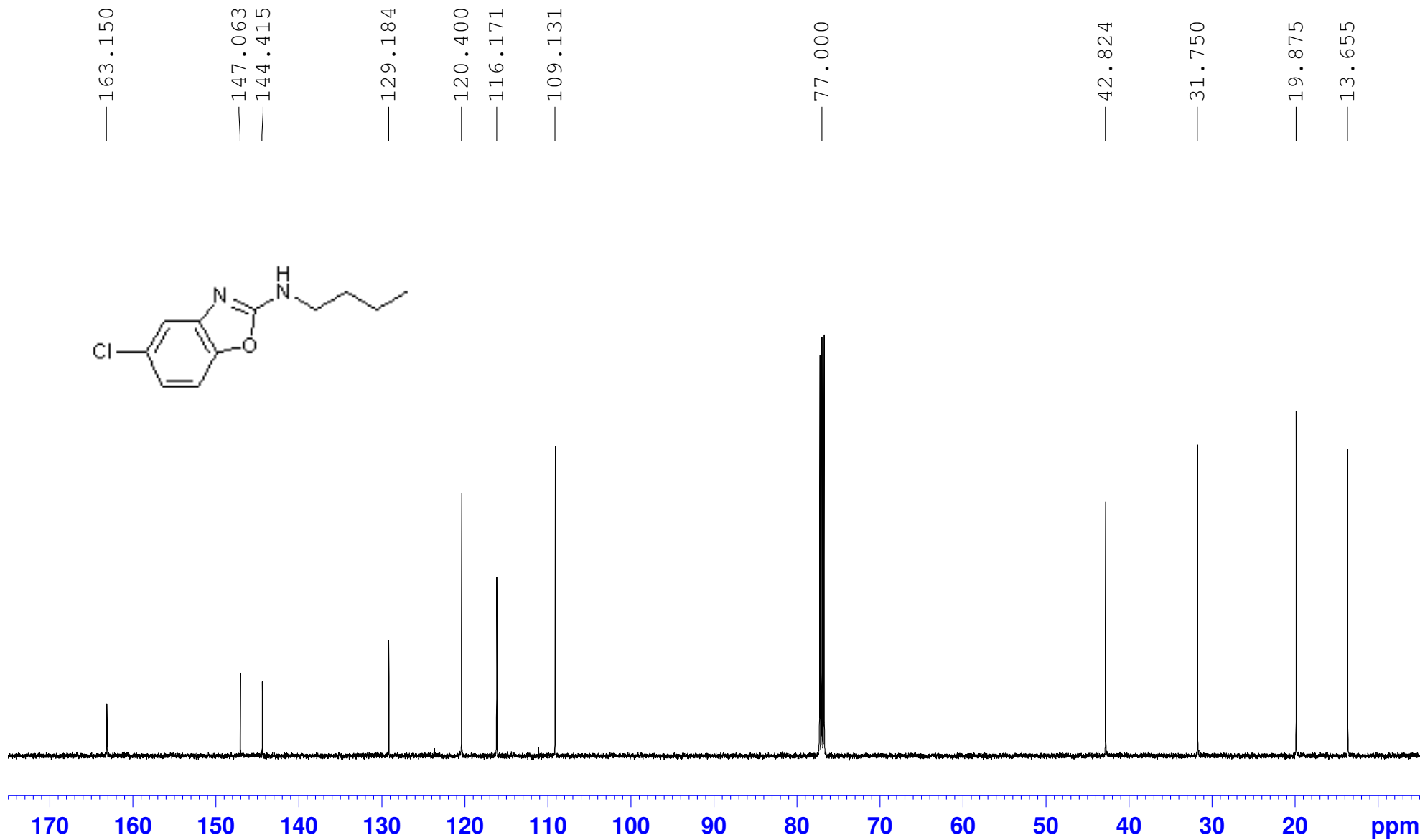
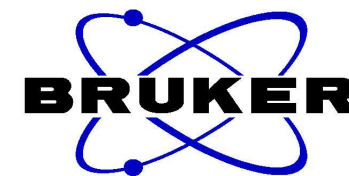
3.499  
3.487  
3.474  
3.461

1.694  
1.681  
1.665  
1.651  
1.637  
1.476  
1.460  
1.446  
1.431  
1.417  
1.402  
0.984  
0.969  
0.954

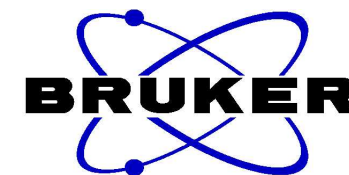
0.000



N-butyl-5-chlorobenzo[d]oxazol-2-amine  
C13CPD CDC13



N-butyl-5-phenylbenzo[d]oxazol-2-amine  
Proton CDCl<sub>3</sub>



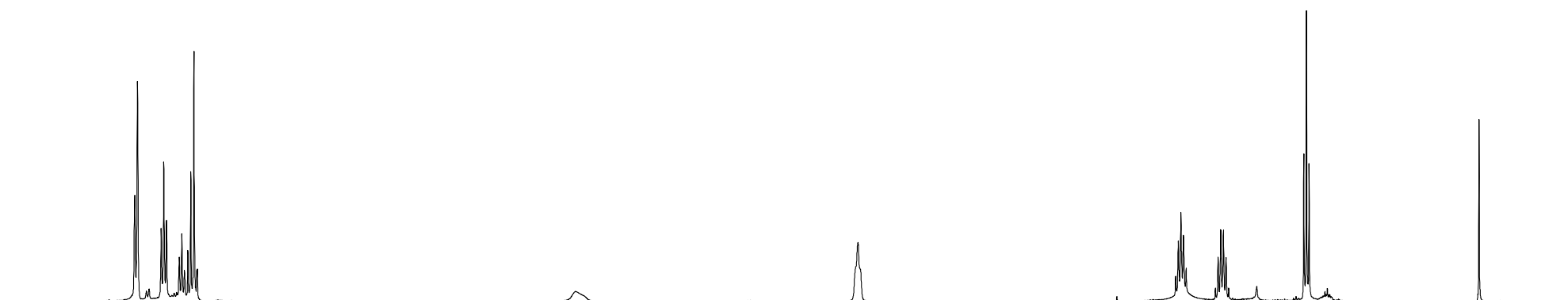
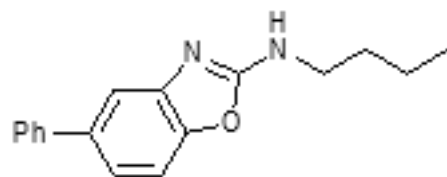
7.592  
7.577  
7.444  
7.428  
7.413  
7.341  
7.326  
7.311  
7.292  
7.276  
7.258  
7.255

5.103

3.520  
3.507  
3.494

1.713  
1.699  
1.684  
1.669  
1.654  
1.489  
1.474  
1.459  
1.444  
1.429  
1.414  
0.990  
0.975  
0.960

0.000



8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm

2.99  
2.33  
1.18  
2.82

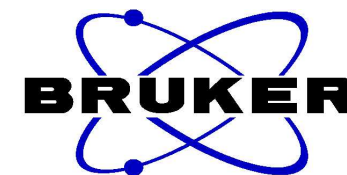
1.06

2.00

2.54  
2.26

3.12

N-butyl-5-phenylbenzo[d]oxazol-2-amine  
C13CPD CDCl3



— 162.688  
— 148.074  
— 143.567  
— 141.602  
— 137.705  
— 128.686  
— 127.284  
— 126.851  
— 120.068  
— 114.845  
— 108.604

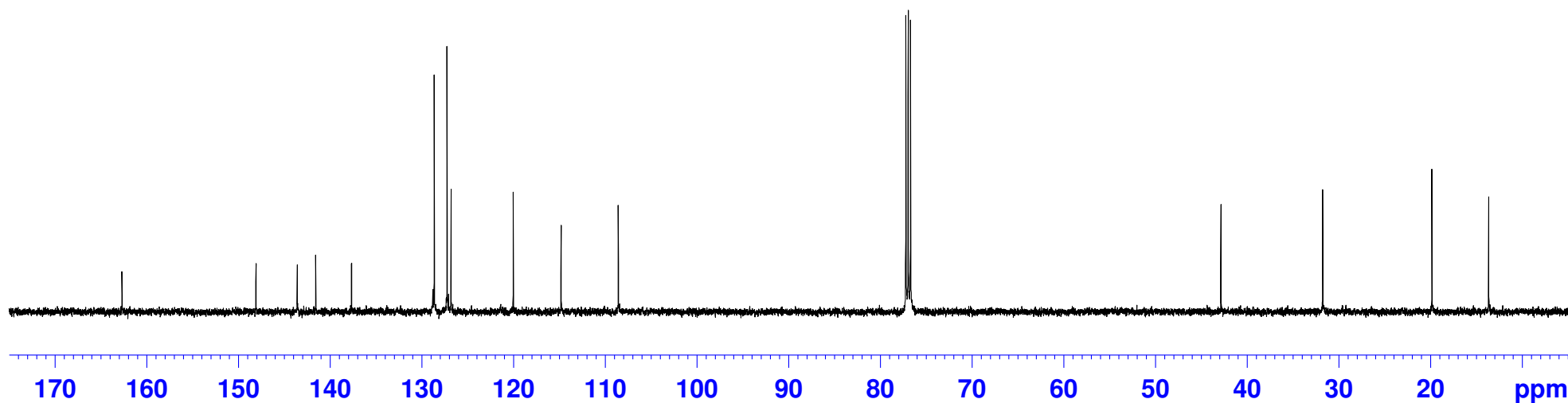
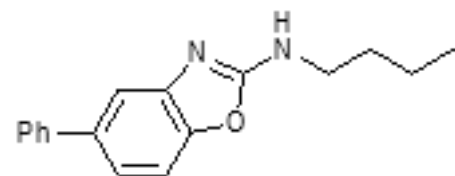
— 77.000

— 42.897

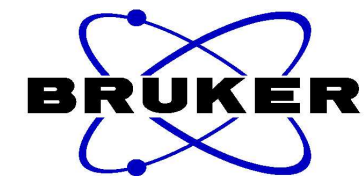
— 31.794

— 19.889

— 13.691

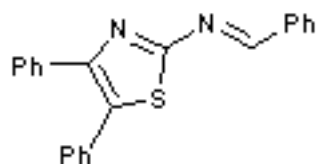


(E)-N-benzylidene-4,5-diphenylthiazol-2-amine  
Proton CDCl<sub>3</sub>



9.090  
8.016  
8.002  
7.580  
7.575  
7.564  
7.561  
7.546  
7.532  
7.512  
7.497  
7.483  
7.393  
7.384  
7.377  
7.373  
7.340  
7.333  
7.329  
7.324  
7.319  
7.300  
7.290  
7.286  
7.256

— 0.000



9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 ppm

1.00

2.05

2.09

0.96

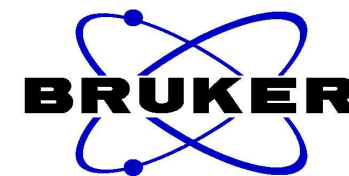
2.08

2.01

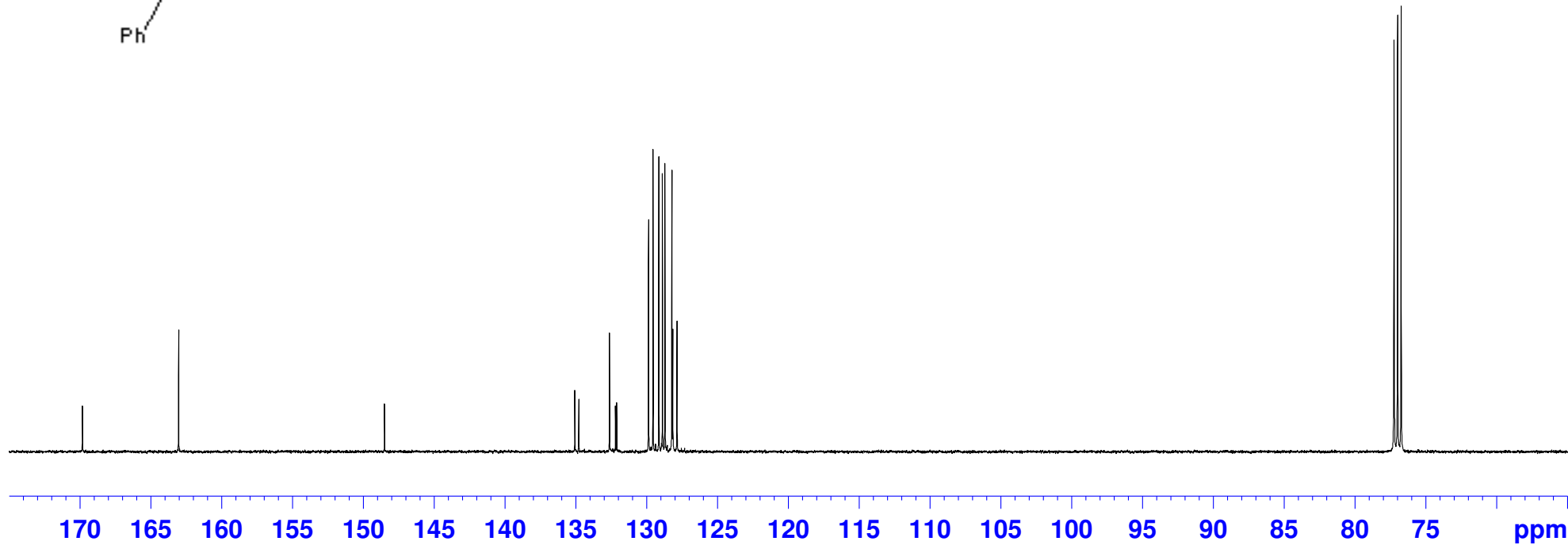
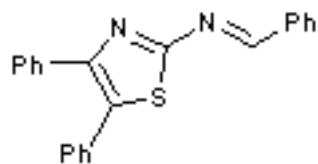
3.11

2.96

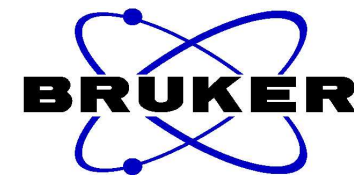
(E)-N-benzylidene-4,5-diphenylthiazol-2-amine  
C13CPD CDCl3



— 169.818  
— 163.057  
— 148.522  
135.093  
134.804  
132.637  
132.218  
132.125  
129.878  
129.567  
129.155  
128.903  
128.722  
128.238  
128.166  
127.870  
— 77.000



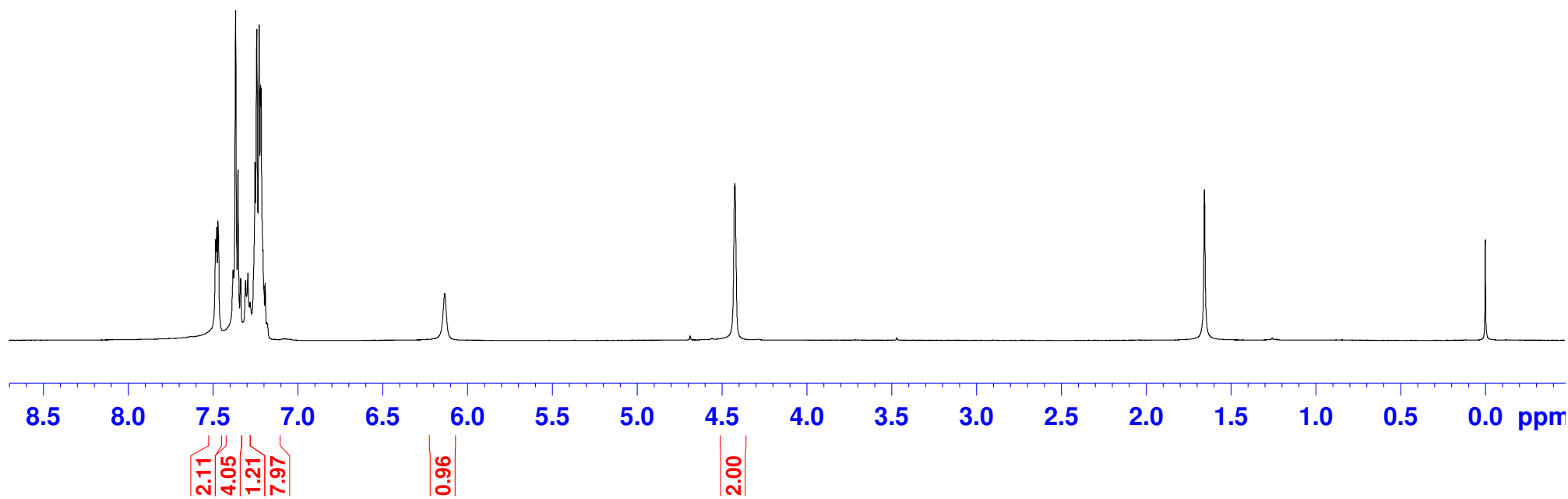
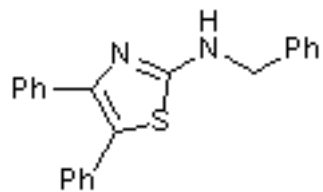
N-benzyl-4,5-diphenylthiazol-2-amine  
Proton CDCl<sub>3</sub>



7.484  
7.476  
7.468  
7.465  
7.379  
7.364  
7.350  
7.335  
7.306  
7.292  
7.279  
7.250  
7.239  
7.226  
7.218  
7.214  
7.190  
6.134

4.424

0.000





N-benzyl-4,5-diphenylthiazol-2-amine  
C13CPD CDC13

