Electronic Supplementary Information

Tetranuclear Zn_2Ln_2 Coordination Clusters as catalysts in Petasis Borono-Mannich Multicomponent Reaction

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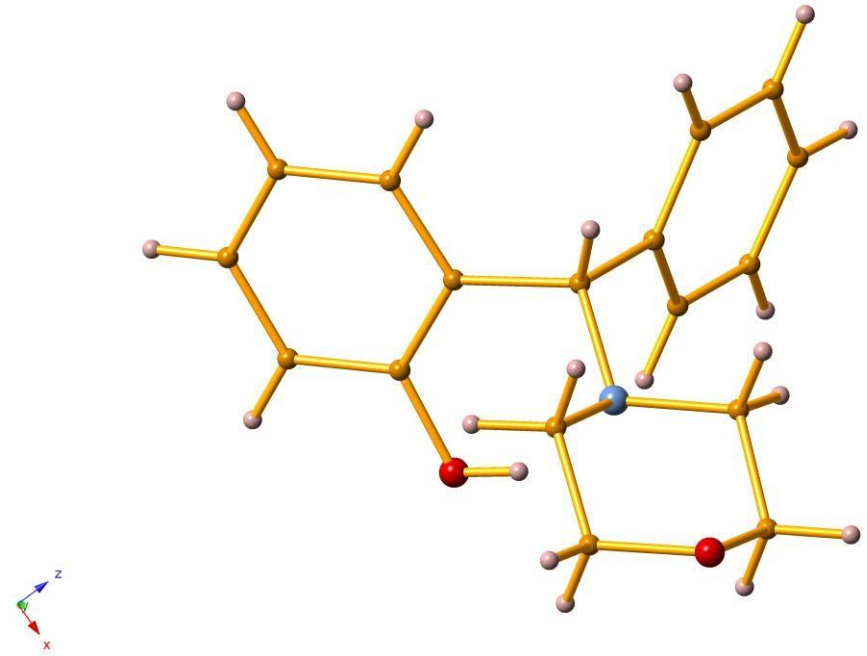
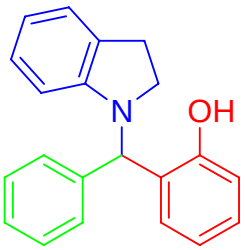


Figure S1. The crystal structure of compound 4**aba**

Products

Synthesis of Compound **4aa**

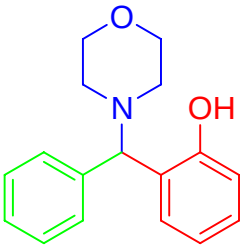


Salicylaldehyde (61 mg, 0.5 mmol), indoline (59 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4aaa** (289 mg, 0.96 mmol, 96%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 11.03 (s, 1H), 7.54 – 7.48 (m, 1H), 7.46 – 7.39 (m, 2H), 7.32 – 7.26 (m, 3H), 7.19 – 7.15 (m, 1H), 7.14 – 7.11 (m, 1H), 6.99 – 6.92 (m ,3H), 6.90 (dd, J = 5.2 Hz, 3.8 Hz, 1H), 6.83 – 6.78 (m, 2H), 6.49 (d, *J*=6.0 Hz, 1H), 5.34 (s, 1H), 3.21 (m, 1H), 3.01 (m,1H), 2.93 (m,1H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 156.22, 151.08, 139.54, 132.12, 128.50, 128.02, 127.37, 124.60, 121.08, 119.79, 117.02, 111.76, 69.98, 53.00, 28.51.

Synthesis of Compound **4aba**

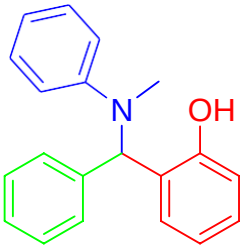


Salicylaldehyde (61 mg, 0.5 mmol), morpholine (43 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4aba** (255 mg, 0.95 mmol, 95%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 10.36 (s, 1H), 7.43 – 7.38 (m, 2H), 7.46 – 7.39 (m, 2H), 7.28 – 7.24 (m, 3H), 7.19 – 7.16 (m, 1H), 7.01 – 6.96 (m, 1H), 6.74 – 6.69 (m ,2H), 4.64 (s, 1H), 3.60 (t, *J* = 5.2, 4H), 2.34 – 2.26 (m, 4H).

^{13}C NMR (DMSO-d_6, 126 MHz): δ = 155.74, 147.70, 128.90, 128.88, 128.82, 128.58, 128.47, 128.14, 127.53, 127.36, 119.65, 116.31, 66.69, 52.50.

Synthesis of Compound **4aca**

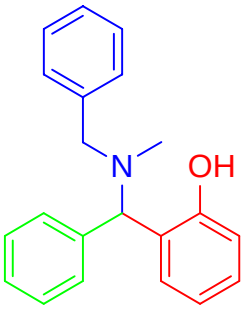


Salicylaldehyde (61 mg, 0.5 mmol), N-methylaniline (53 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4aca** (271 mg, 0.94 mmol, 94%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 9.79 (s, 1H), 7.24 – 7.12 (m, 8H), 7.03 – 6.94 (m, 2H), 6.96 – 6.89 (m, 3H), 6.79 – 6.74 (m, 1H), 5.86 (s, 1H), 2.83 (s, 3H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 157.63, 149.45, 142.71, 131.90, 128.14, 26.88, 123.99, 121.72, 119.60, 117.33, 114.66, 68.55, 37.50.

Synthesis of Compound **4ada**

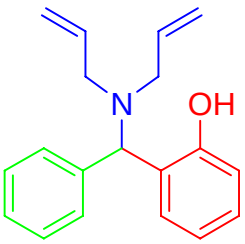


Salicylaldehyde (61 mg, 0.5 mmol), N-benzylmethylamine (60 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4ada** (282 mg, 0.93 mmol, 93%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 12.31 (s, 1H), 7.50 – 7.54 (m, 2H), 7.33 – 7.23 (m, 8H), 7.16 – 7.10 (m, 1H), 6.93 – 6.84 (m, 2H), 6.73 – 6.68 (m, 1H), 4.72 (s, 1H), 3.58 (s, 2H), 2.19 (s, 3H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 156.94, 138.79, 136.90, 129.25, 129.10, 128.94, 128.76, 128.63, 128.55, 128.02, 127.51, 125.24, 122.58, 118.83, 117.21, 75.53, 59.65, 38.92.

Synthesis of Compound **4aea**

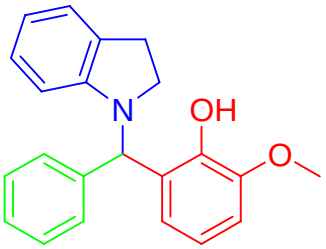


Salicylaldehyde (61 mg, 0.5 mmol), diallylamine (48 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4aae** (251 mg, 0.90 mmol, 90%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 12.08 (s, 1H), 7.43 – 7.37 (m, 2H), 7.37 – 7.32 (m, 2H), 7.31 – 7.27 (m, 1H), 7.13 – 7.09 (m, 1H), 6.86 – 6. 78 (m, 2H), 6.69 (t, *J* = 6.2, 1H), 5.91 – 5.83 (m, 2H), 5.25 – 5.18 (m, 2H), 5.16 – 5.08 (m, 2H), 5.06 (s, 1H), 3.38 – 3.32 (m, 2H), 3.07 – 3.02 (m, 2H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 143.32, 133.50, 130.18, 129.53, 128.36, 127.83, 126.76, 121.28, 119.48, 118.41, 116.12, 71.39, 56.22.

Synthesis of Compound **4baa**

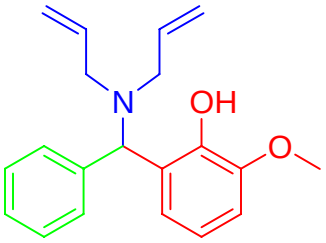


2-methoxybenzaldehyde (68 mg, 0.5 mmol), indoline (59 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4baa** (314 mg, 0.95 mmol, 95%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 7.56 (s, 1H), 7.44 – 7.36 (m, 2H), 7.31 – 7.24 (m, 3H), 7.10 (dd, *J* = 4.5, *J* = 3.6, 1H), 6.95 – 6.90 (m, 1H), 6.82 – 6.75 (m, 3H), 6.72 – 6.68 (m, 1H), 6.33 (d, *J* = 4.8 Hz), 5.72 (s, 1H), 3.90 (s, 3H), 3.21- 3.14 (m, 2H), 2.95 (t, *J* = 6.2 Hz, 2H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 151.78, 147.15, 144.31, 140.67, 130.87, 128.55, 128.41, 127.32, 127.19, 124.22, 121.14, 120.65, 119.42, 118.70, 109.88, 109.53, 63.54, 55.98, 52.32, 28.43.

Synthesis of Compound **4bea**

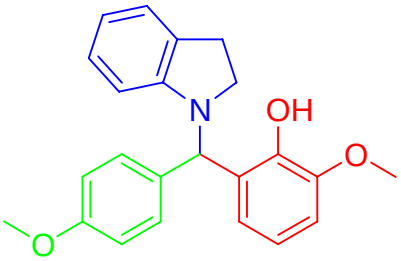


2-methoxybenzaldehyde (68 mg, 0.5 mmol), indoline (59 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4bea**(287 mg, 0.93 mmol, 93%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 12.32 (s, 1H), 7.48 – 7.37 (m, 4H), 6.58 – 6.52 (m, 1H), 6. 51 – 6. 44 (m, 3H), 5.86 – 6.77 (m, 2H), 5.24 – 5. 12 (m, 5H), 3.78 (s, 3H), 3.44 – 3. 38 (m, 2H), 3.24 – 2.17 (m, 2H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 148.68, 144.39, 142.91□□134.23, 129.35, 128.49, 127.98, 126.99, 123.60, 121.15, 118.47, 110.72, 73.03, 58.13, 52.28.

Synthesis of Compound **4bab**

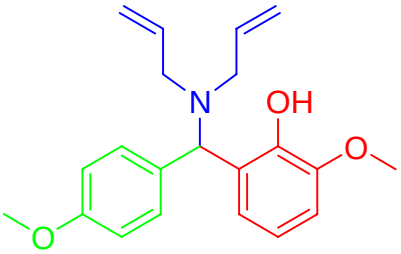


2-methoxybenzaldehyde (68 mg, 0.5 mmol), indoline (59 mg, 0.5 mmol), 4-Methoxyphenylboronic acid (76 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4bab** (354 mg, 0.98 mmol, 98%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 7.36 – 7.28 (m, 2H), 7.13 – 7.08 (m, 1H), 7.05 – 6.99 (m, 1H), 6.96 - 6.88 (m, 3H), 6.87 – 6. 82 (m, 2H), 6.80 – 6. 74 (m, 1H), 6.36 (d, J = 4.8 Hz, 1H), 5.64 (s, 1H), 3.90 (s, 3H), 3.81 (s, 3H), 3.21 – 3.14 (m, 2H), 2.95 (t, *J* = 5.2 Hz, 2H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 158.61, 151.92, 147.43, 144.20, 132.39, 130.89, 129.80, 126.81, 124.21, 120.76, 119.26, 118.39, 113.27, 109.69, 109.46, 63.58, 55.96, 55.20.

Synthesis of Compound **4beb**

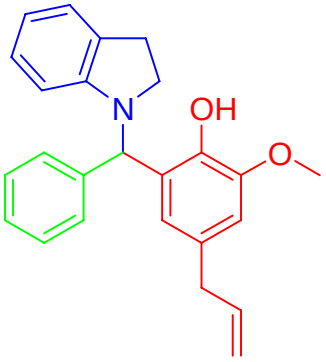


2-methoxybenzaldehyde (68 mg, 0.5 mmol), diallylamine (48 mg, 0.5 mmol), 4-Methoxyphenylboronic acid (76 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4beb** (315 mg, 0.93 mmol, 93%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 12.45 (s, 1H), 7.34 –7. 27 (m, 2H), 6.88 – 6.80 (m, 2H), 6.77 – 6.72 (m, 1H), 6.65 (t, 1H), 6.46 – 6.39 (m, 1H), 5.91 – 5. 84 (m, 2H), 5.22 -5.15 (m, 3H), 5.02 (s, 1H), 3.89 (s, 3H), 3.81 (s, 3H), 3.37 – 3.31 (m, 2H), 3.06 – 2.99 (m, 2H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 159.30, 148.30, 146.97, 135.50, 130.61, 130.18, 125.51, 121.20, 119.35, 118.41, 113.93, 113.56, 110.68, 69.24, 55.20, 52.27.

Synthesis of Compound **4caa**

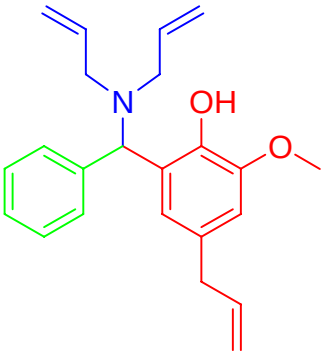


5-Allyl-2-hydroxy-3-methoxybenzaldehyde (96 mg, 0.5 mmol), indoline (59 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4caa** (322 mg, 0.87 mmol, 87%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 7.45 (dd, *J* = 6.4 Hz, 4.5 Hz, 2H), 7.31 – 7.24 (m, 3H), 7.20 – 7.15 (m, 1H), 7.13 – 7.06 (m, 3H), 6.95 – 6.88 (m, 1H), 6.55 – 6.48 (m, 2H), 5.91 – 5. 86 (m, 1H), 5.65 (s, 1H), 5.02 – 4.94 (m, 2H), 3.88 (s, 3H), 3.29 – 3.23 (m, 2H), 3.20 – 3.08 (m, 3H), 2.94 – 2.87 (m, 2H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 151.87, 147.13, 142.58, 140.72, 137.81, 131.06, 128.54, 128.40, 128.16, 127.30, 127.19, 124.19, 120.88, 119.56, 118.82, 115.47, 110.34, 109.75, 64.13, 56.04, 52.45, 39.95, 28.45.

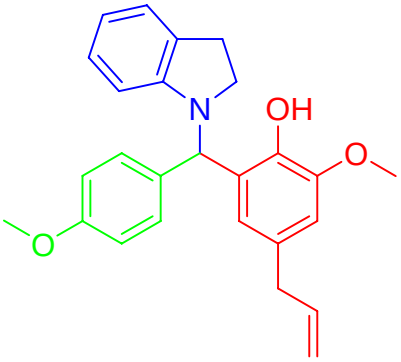
Synthesis of Compound **4cea**



5-Allyl-2-hydroxy-3-methoxybenzaldehyde (96 mg, 0.5 mmol), diallylamine (48 mg, 0.5 mmol), benzene boronic acid (61 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4cea** (293 mg, 0.84 mmol, 84%).

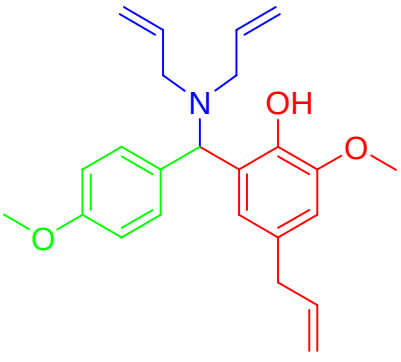
^{1}H NMR ($CDCl_3$, 500 MHz): δ = 12.08 (s, 1H), 7.44 – 7.38 (m, 2H), 7.32 – 7.24 (m, 3H), 6.59 (d, 1H), 6.31 (d, 1H), 5.89 – 5.81 (m, 3H), 5.22 – 5.17 (m, 2H), 5.13 – 5.09 (m, 2H), 5.00 – 4.94 (m, 3H), 3.88 (s, 3H), 3.44 – 3.39 (m, 2H), 3.19 – 3.14 (m, 2H), 3.10 – 3.05 (m, 2H).
^{13}C NMR ($CDCl_3$, 126 MHz): δ = 148.19, 144.87, 137.80, 133.29, 129.24, 127.91, 123.71, 122.48, 120.92, 119.38, 110.09, 70.39, 55.91, 52.28.

Synthesis of Compound **4cab**



5-Allyl-2-hydroxy-3-methoxybenzaldehyde (96 mg, 0.5 mmol), indoline (59 mg, 0.5 mmol), 4-Methoxyphenylboronic acid (76 mg, 0.5 mmol),1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4cab** (357 mg, 0.89 mmol, 89%).
^{1}H NMR ($CDCl_3$, 500 MHz): δ = 7.90 (s, 1H), 7.34 – 7.28 (m, 2H), 7.10 – 7.04 (m, 2H), 6.95 – 6.91 (m, 1H), 6.88 – 6.82 (m, 2H), 6.66 – 6.56 (m, 4H), 6.35 – 6.30 (m, 1H), 5.94 – 5.90 (m, 1H), 5.54 (s, 1H), 5.05 – 4.94 (m, 2H), 3.87 (m, 3H), 3.80 (m, 3H) 3.28 – 3.24 (m, 2H), 3.11 – 3. 05 (m, 3H), 2.98 (t, *J* = 4.6 Hz, 2H).
^{13}C NMR ($CDCl_3$, 126 MHz): δ = 158.86, 151.68, 146.99, 142.72, 137.83, 132.72, 131.14, 129.75, 129.46, 127.20, 124.20, 121.37, 120.63, 119.03, 115.54, 113.94, 113.81, 110.33, 110.03, 64.11, 55.11, 52.70, 40.32, 28.53.

Synthesis of Compound **4ceb**

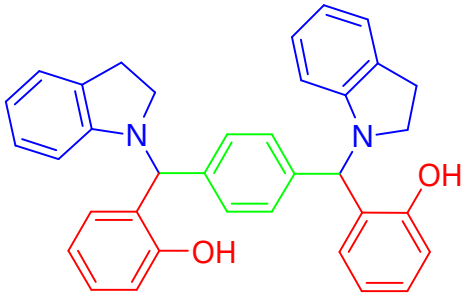


5-Allyl-2-hydroxy-3-methoxybenzaldehyde (96 mg, 0.5 mmol), diallylamine (48 mg, 0.5 mmol), 4-Methoxyphenylboronic acid (76 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4ceb** (326 mg, 0.86 mmol, 86%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 9.98 (s, 1H), 7.33 (dd, *J* = 6.2 Hz, 4.5Hz, 2H), 6.85 – 6.79 (m, 2H), 6.64 (t, J = 4.8 Hz, 1H), 6.59 – 6.54 (m, 1H), 5.85 – 5. 79 (m, 3H), 5.14 – 5.08 (m, 2H), 5.04 – 4.94 (m, 5H), 3.71 (s, 3H), 3.69 (s, 3H), 3.32 (s, 2H), 3.20 – 3.14 (m, 2H), 3.09 – 3.02 (m, 3H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 158.76, 148.08, 143.29, 138.45, 134.66, 133.60, 130.29, 129.64, 127.87, 127.63, 120.13, 118.59, 115.93, 114.40, 111.32, 65.70, 56.01, 55.36, 52.23.

Synthesis of Compound **4aac**

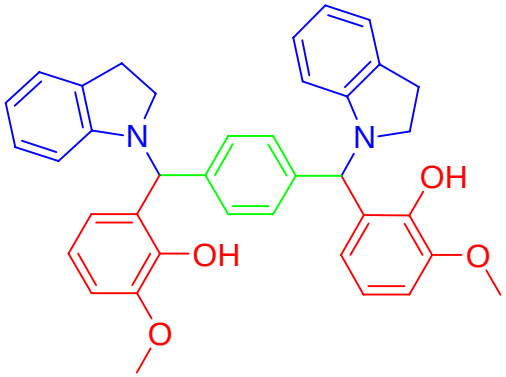


Salicylaldehyde (122 mg, 1.0 mmol), indoline (118 mg, 1.0 mmol), benzene 1, 4-diboronic acid (83 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4aac** (482 mg, 0.92 mmol, 92%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 9.99 (s, 2H), 7.43 (s, 3H), 7.21 – 7.17 (m, 2H), 7.15 – 7.10 (m, 2H), 6.98 – 6.93 (m , 3H), 6.91 – 6.87 (m, 2H), 6.85 – 6.80 (m, 3H), 6.44 – 6.40 (m, 2H), 5.31 (s, 2H), 3.17 – 3.13 (m, 2H), 3.07 – 3.02 (m, 2H), 2.93 – 2.86 (m, 4H) .

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 156.24, 151.01, 150.99, 139.38, 139.37, 132.10, 129.30, 129.26, 128.92, 128.47, 127.36, 126.19, 126.13, 124.63, 121.30, 120.06, 117.73, 117.10, 112.06, 69.84, 69.81, 53.57, 53.52, 28.51.

Synthesis of Compound **4bac**

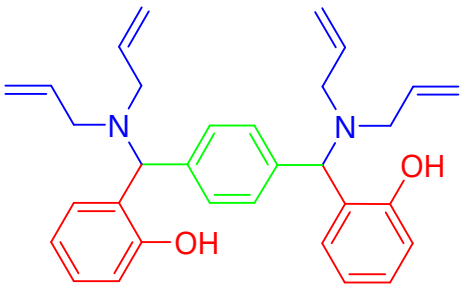


2-methoxybenzaldehyde (136 mg, 1.0 mmol), indoline (118 mg, 1.0 mmol), benzene 1, 4-diboronic acid (83 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4bac** (555 mg, 0.95 mmol, 95%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 7.35 (s, 4H), 7.08 (d, 2H), 6.92 (t, 2H), 6.79 – 6. 72 (m, 6H), 6.69 (t, 2H), 6.30 (d, 2H), 5.69 (d, 2H), 3.89 (s, 6H), 3.18 – 3.12 (m, 4H), 2.92 (t, 4H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 151.78, 147.15, 144.31, 140.67, 130.87, 128.55, 128.41, 127.32, 127.19, 124.22, 121.14, 120.65, 119.42, 118.70, 109.88, 109.53, 63.54, 55.98, 52.32, 28.43.

Synthesis of Compound **4aec**

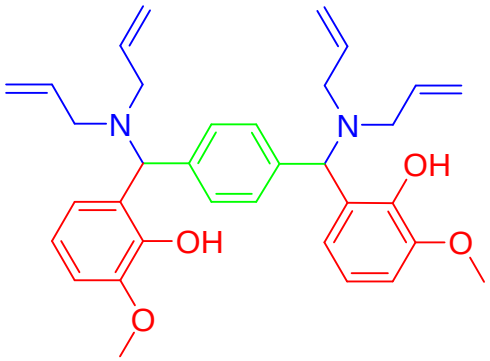


Salicylaldehyde (122 mg, 1.0 mmol), diallylamine (96 mg, 1.0 mmol), benzene 1, 4-diboronic acid (83 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4aec** (413 mg, 0.86 mmol, 86%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 11.97 (s, 2H), 7.40 (s, 4H), 7.14 – 7.10 (m, 2H), 6.84 – 6. 79 (m, 4H), 6.70 – 6.65 (m, 2H), 5.88 – 5. 81 (m, 4H), 5.22 – 5. 16 (m, 4H), 5.13 – 5.08 (m, 4H), 5.00 (m, 2H), 3.34 – 3.29 (m, 4H), 3.07 – 2.97 (m, 4H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 157.43, 137.73, 133.28, 129.64, 129.20, 128.64, 124.80, 119.46, 119.04, 116.92, 69.99, 51.91.

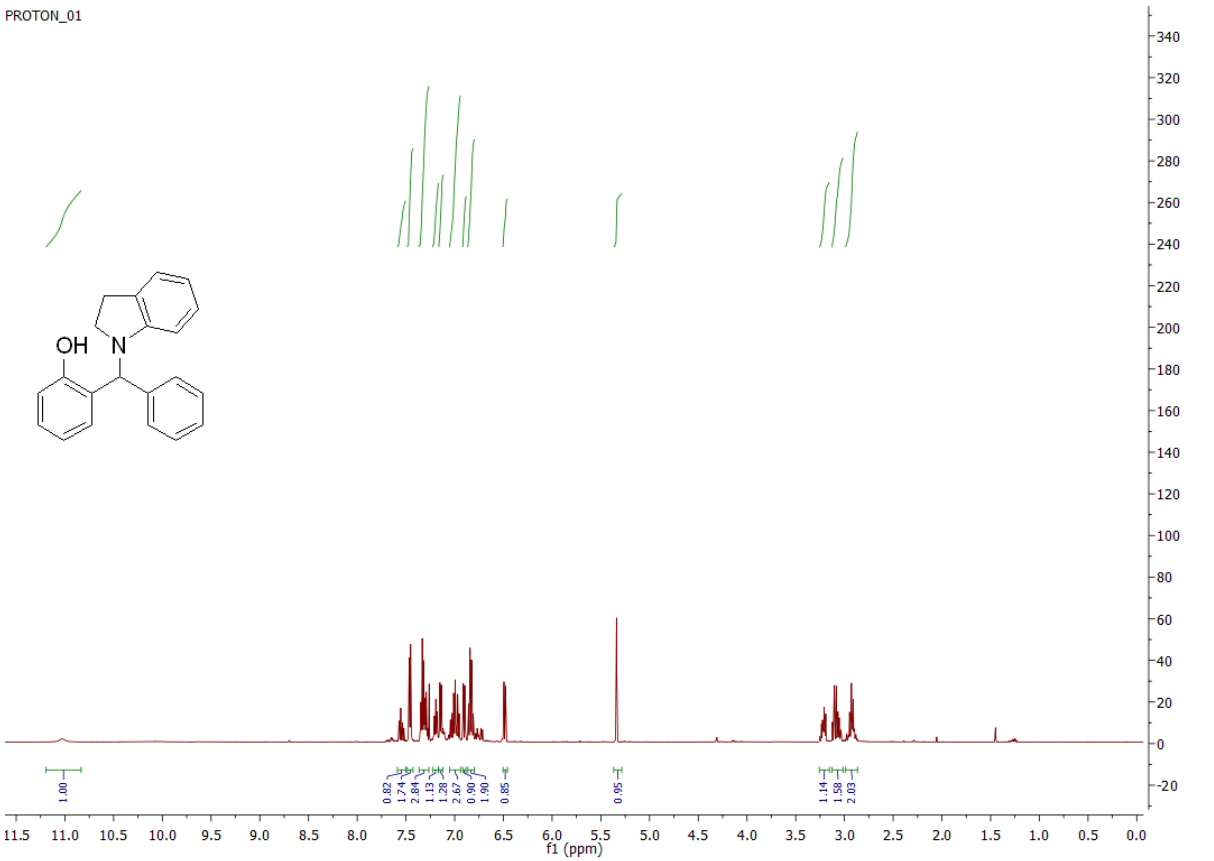
Synthesis of Compound **4bec**

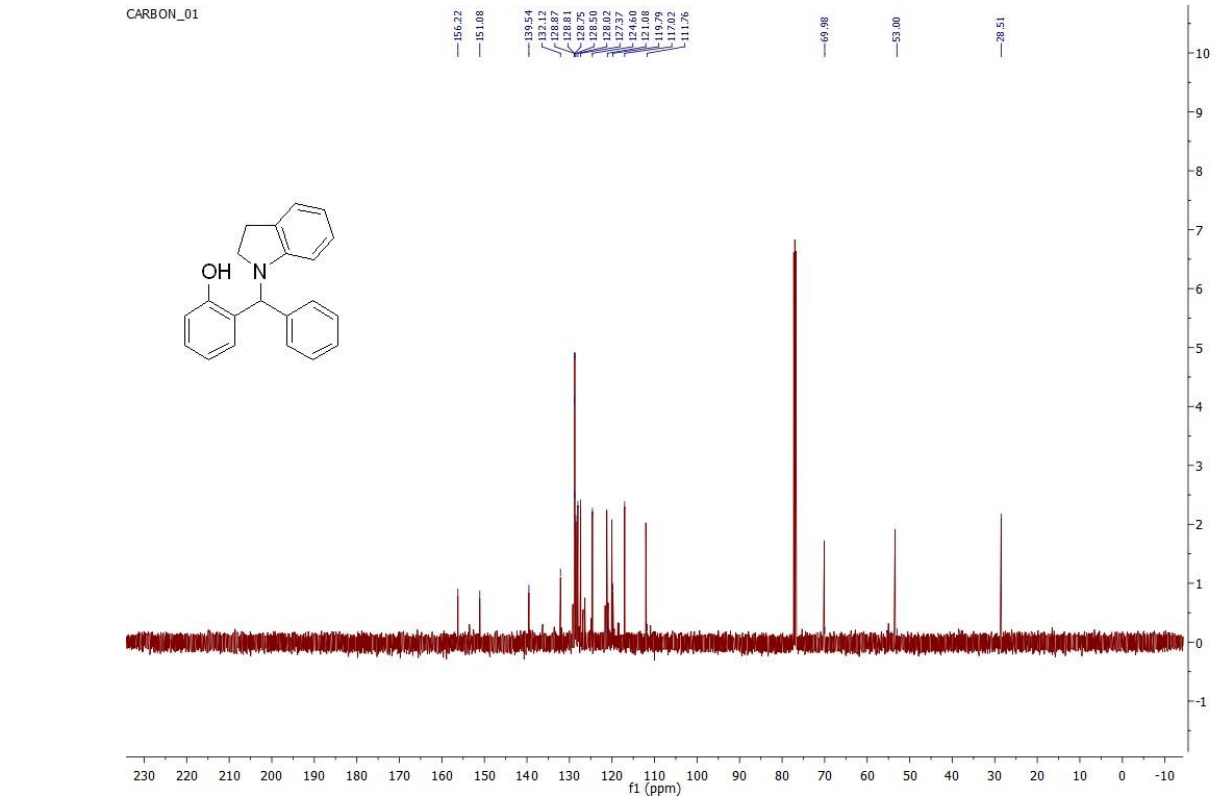


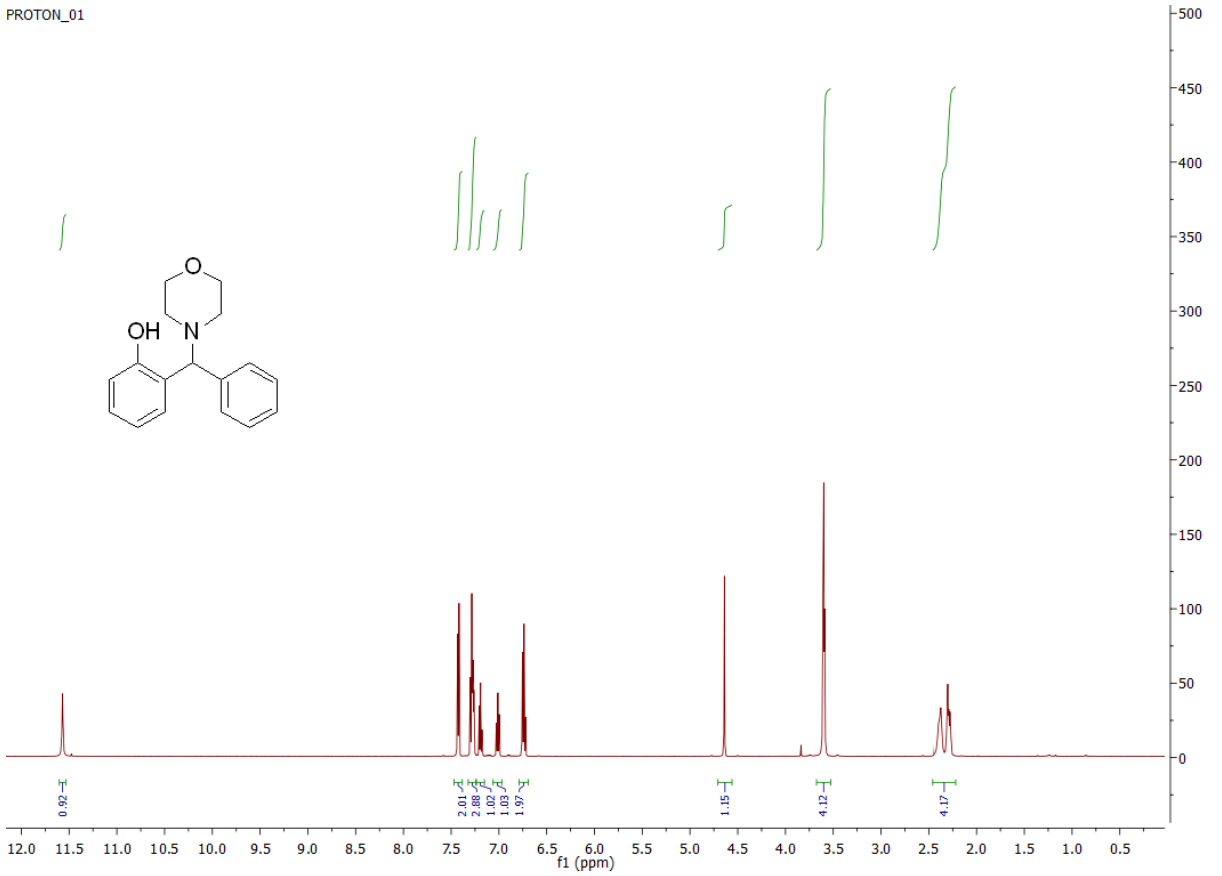
2-methoxybenzaldehyde (136 mg, 1.0 mmol), diallylamine (96 mg, 1.0 mmol), benzene 1, 4-diboronic acid (83 mg, 0.5 mmol), 1.0 mol% **5Dy**, 5 mL DME, rt, 16 h. The crude product was purified by column chromatography with silica (10% ethyl acetate in hexanes) to afford the title compound **4bec** (475 mg, 0.88 mmol, 88%).

^{1}H NMR ($CDCl_3$, 500 MHz): δ = 12.15 (s, 2H), 7.40 (s, 4H), 6.78 – 6.73 (m, 2H), 6.66 – 6.60 (m, 2H), 6.47 – 6.42 (m, 2H), 5.88 – 5.79 (m, 4H), 5.16 – 5. 05 (m, 8H), 4.98 (d, 2H), 3.89 (s, 6H), 3.33 – 3.27 (m, 4H), 3.09 – 3.04 (m, 4H).

^{13}C NMR ($CDCl_3$, 126 MHz): δ = 148.21, 146.94, 141.78, 133.24, 129.74, 123.78, 121.16, 119.43, 110.64, 69.79, 55.92, 52.23.


PROTON_01
OH
N
1.00
0.82
1.74
2.84
1.13
1.28
2.67
0.90
1.90
0.85
0.95
1.14
1.58
2.03
f1 (ppm)


CARBON_01
OH
N
156.22
151.08
139.54
132.12
129.87
129.81
128.75
128.50
128.02
127.37
124.60
121.08
119.79
117.02
111.76
69.98
53.00
28.51
f1 (ppm)


PROTON_01
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O
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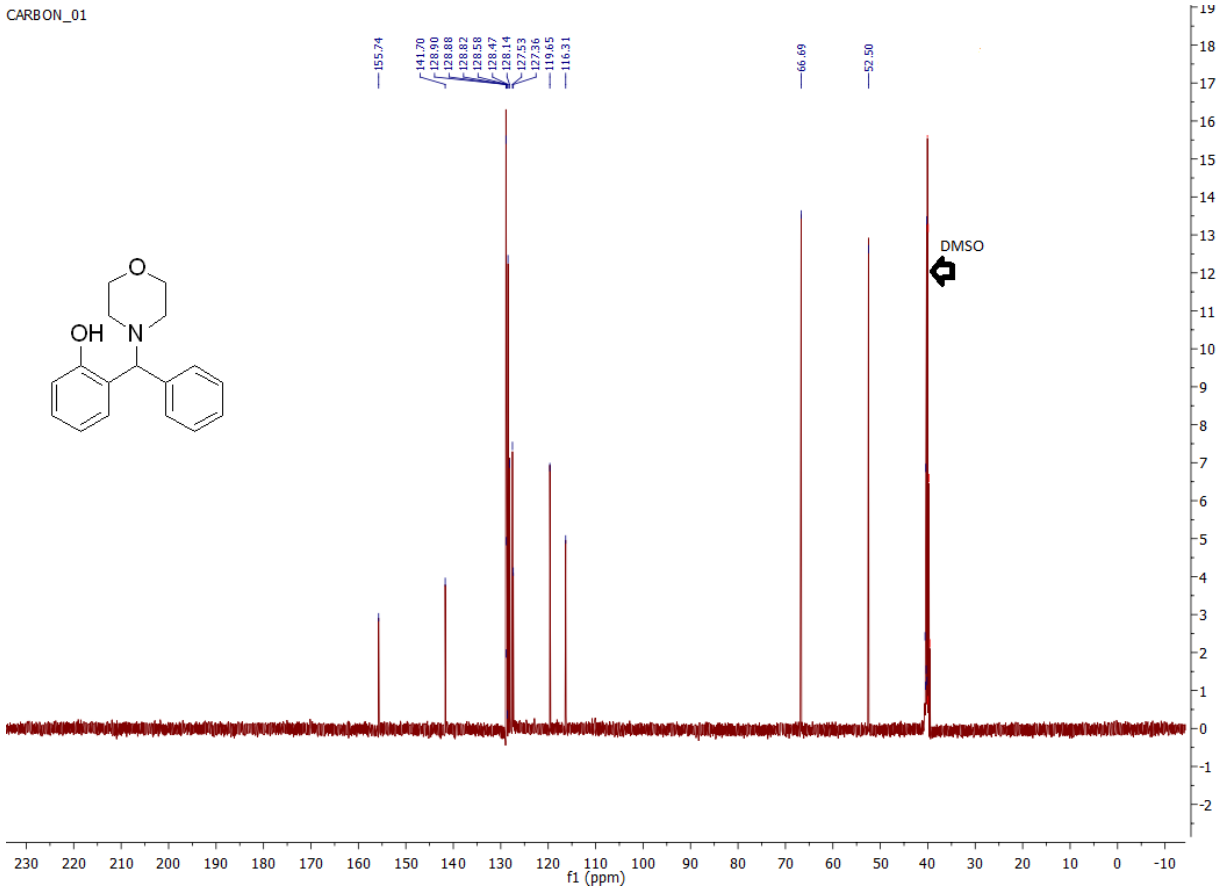
2.88
1.02
1.03
1.97
1.15
4.12
4.17
f1 (ppm)


CARBON_01
OH
N
O
155.74
141.70
128.90
128.88
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128.14
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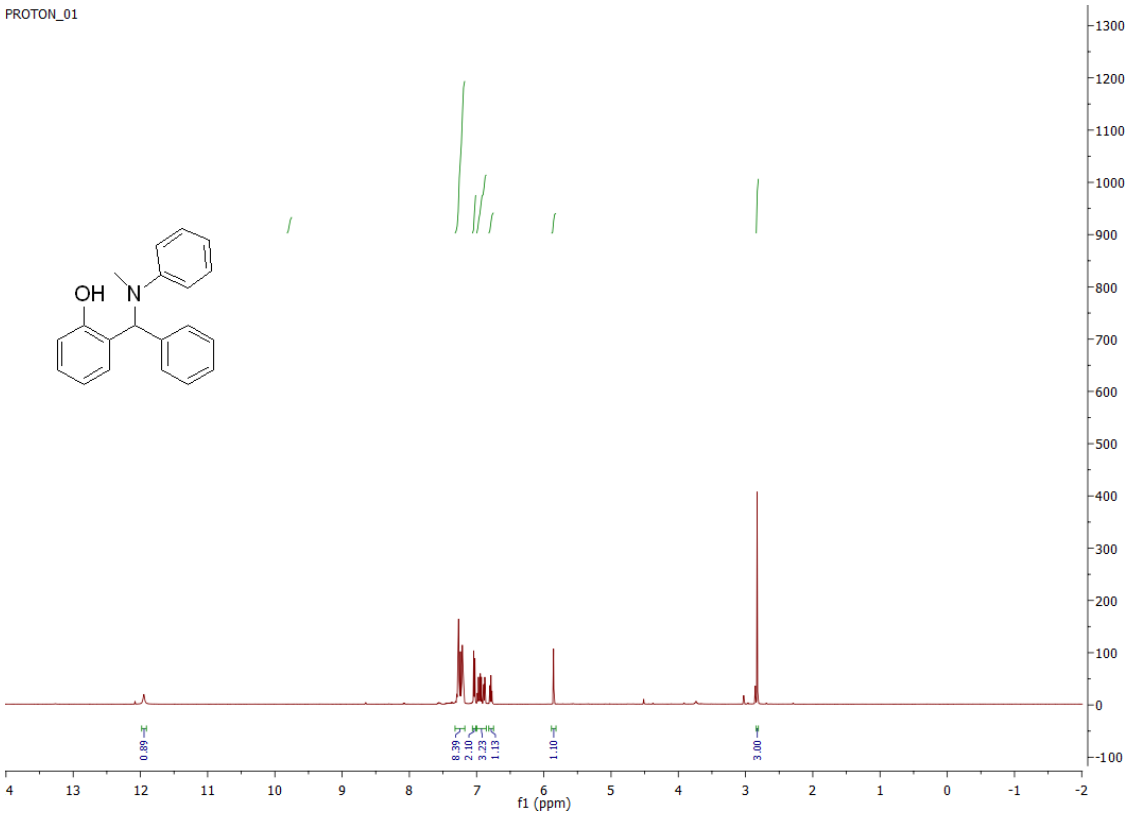
116.31
66.69
52.50
DMSO
f1 (ppm)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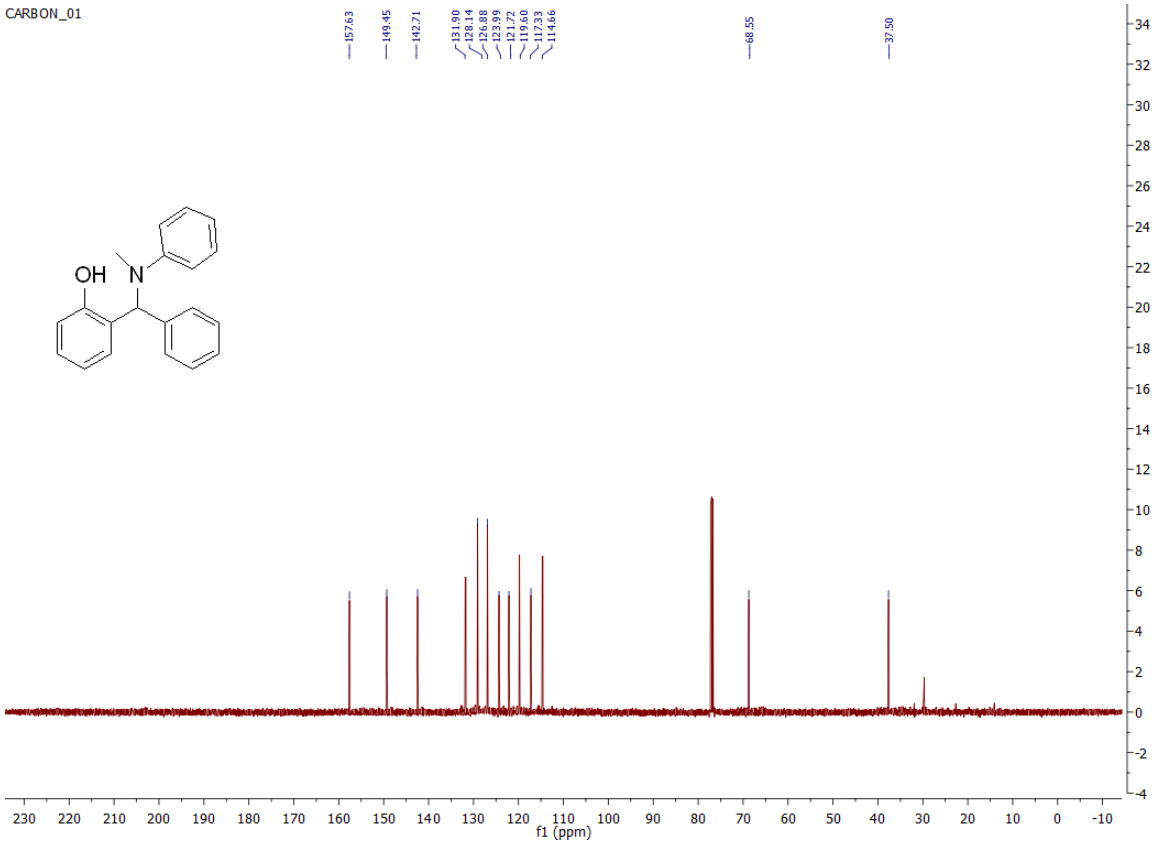
3.00
f1 (ppm)


CARBON_01
OH
N
157.63
149.45
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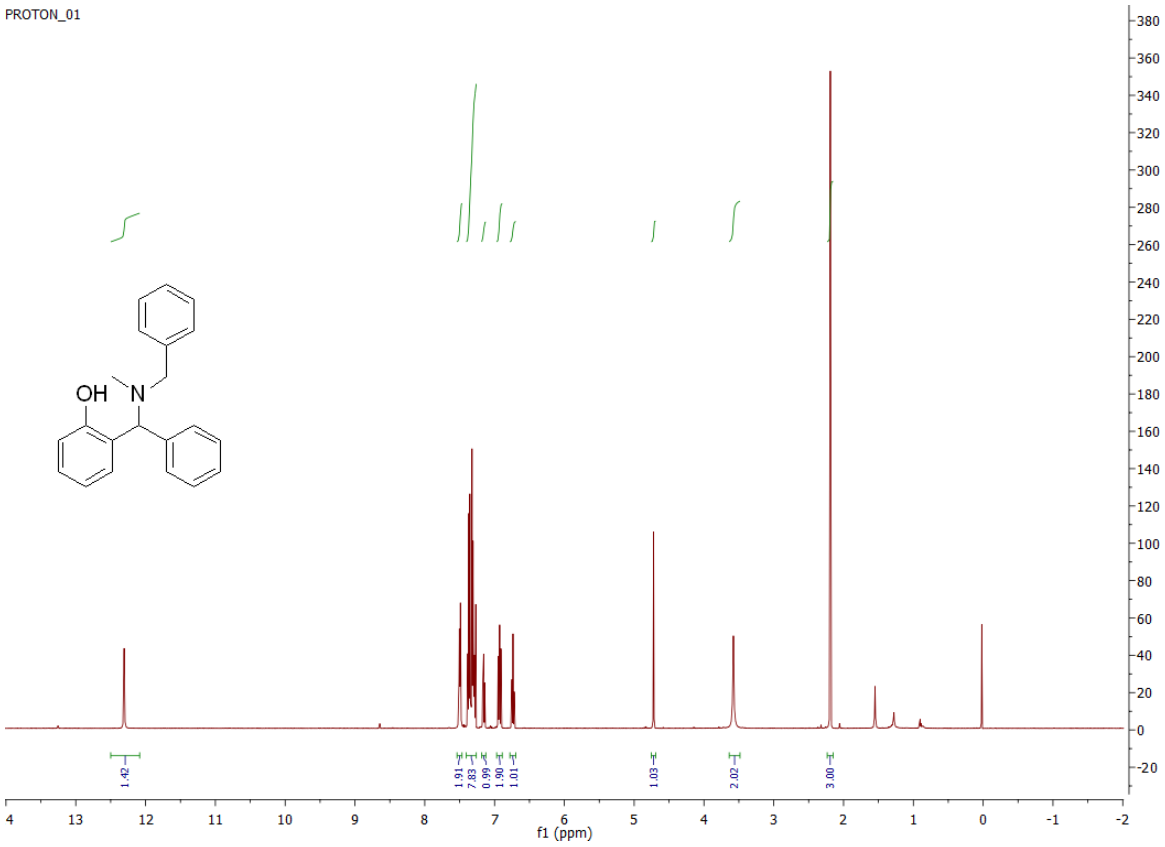
123.99
121.72
119.60
117.33
114.66
68.55
37.50
f1 (ppm)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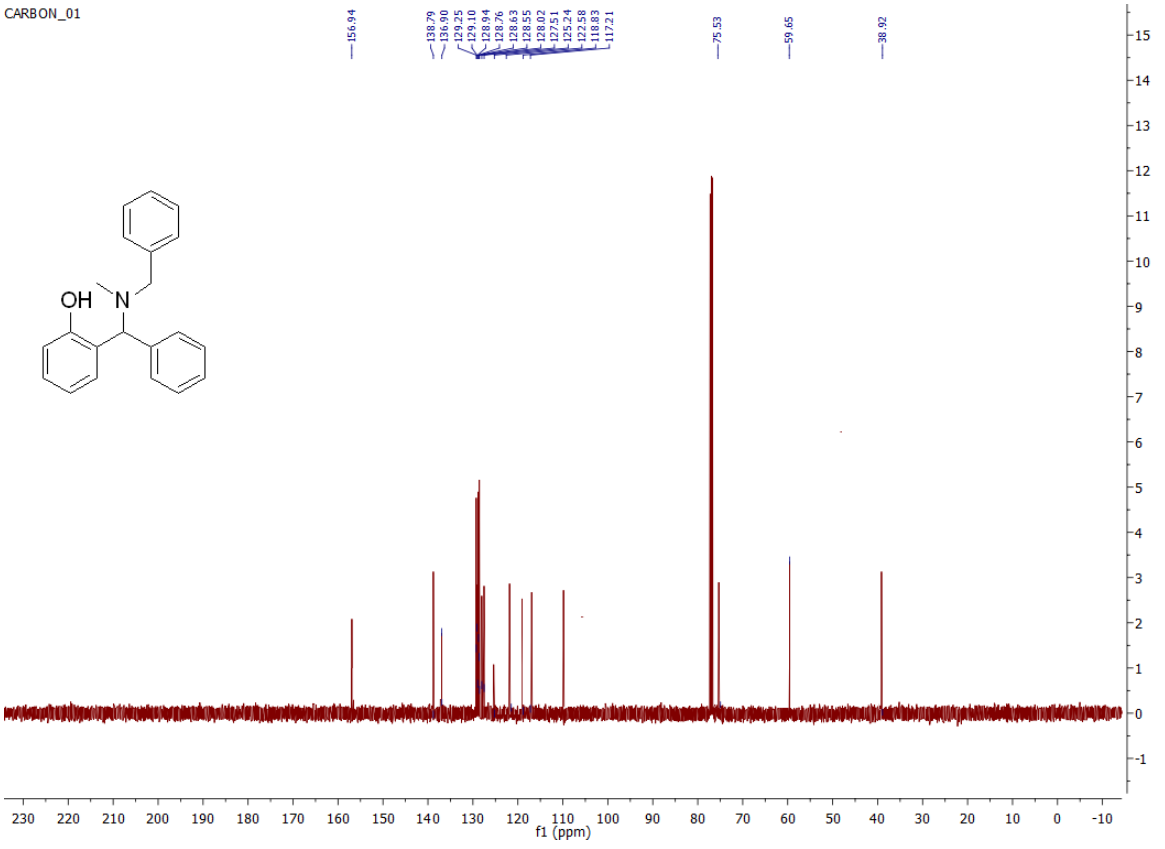
7.83
0.99
1.90
1.01
1.03
2.02
3.00
f1 (ppm)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128.76
128.63
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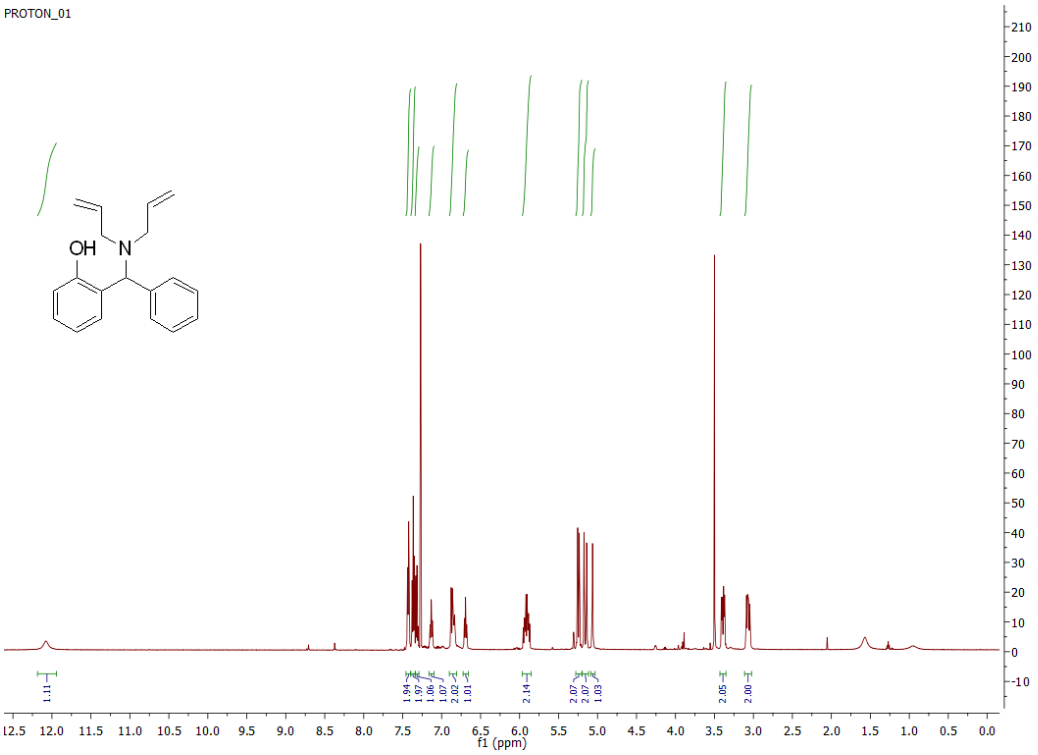
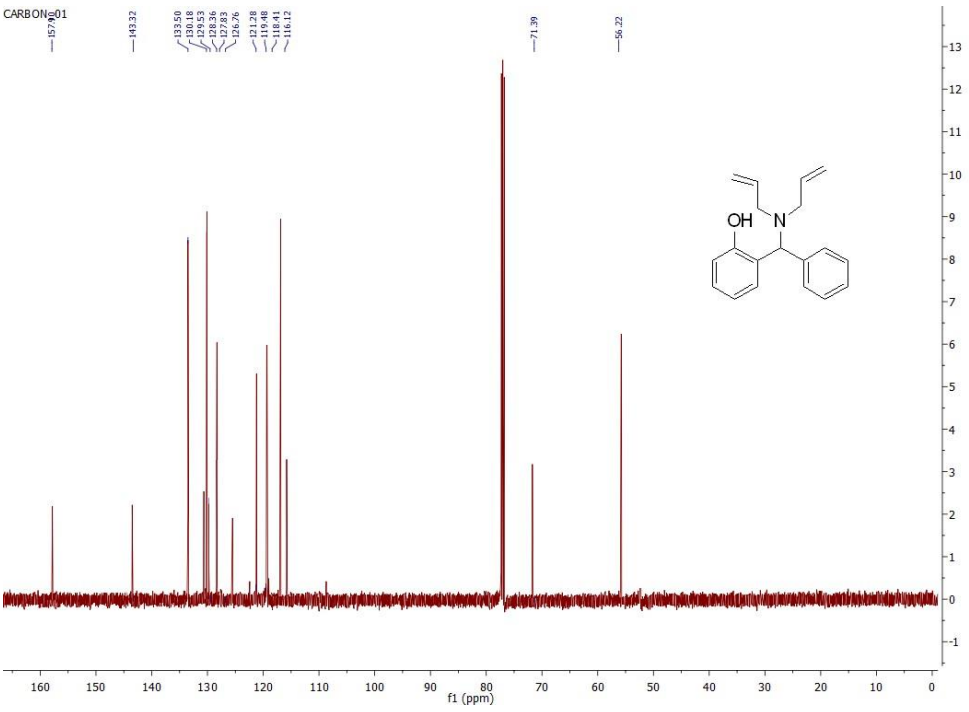
125.24
122.58
118.83
117.21
75.53
59.65
38.92
OH
N
f1 (ppm)


PROTON_01
OH
N
f1 (ppm)


CARBON_01
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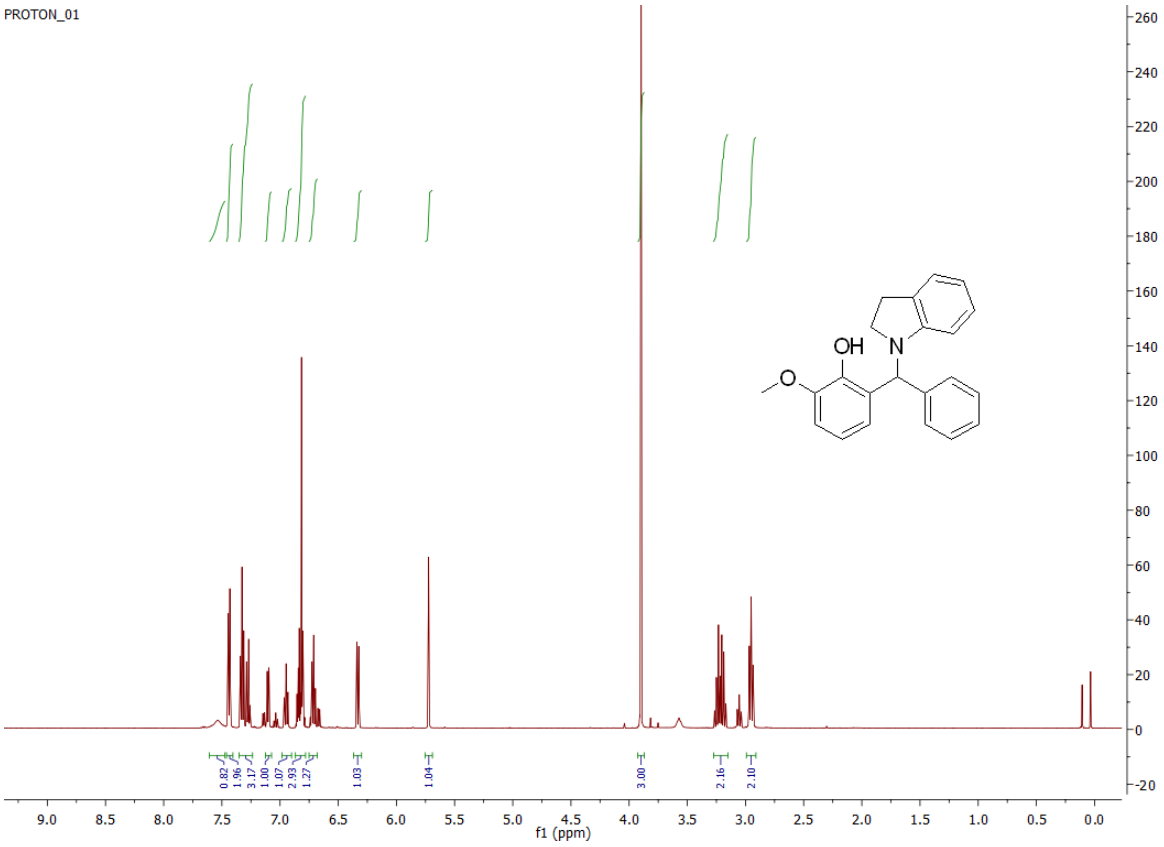
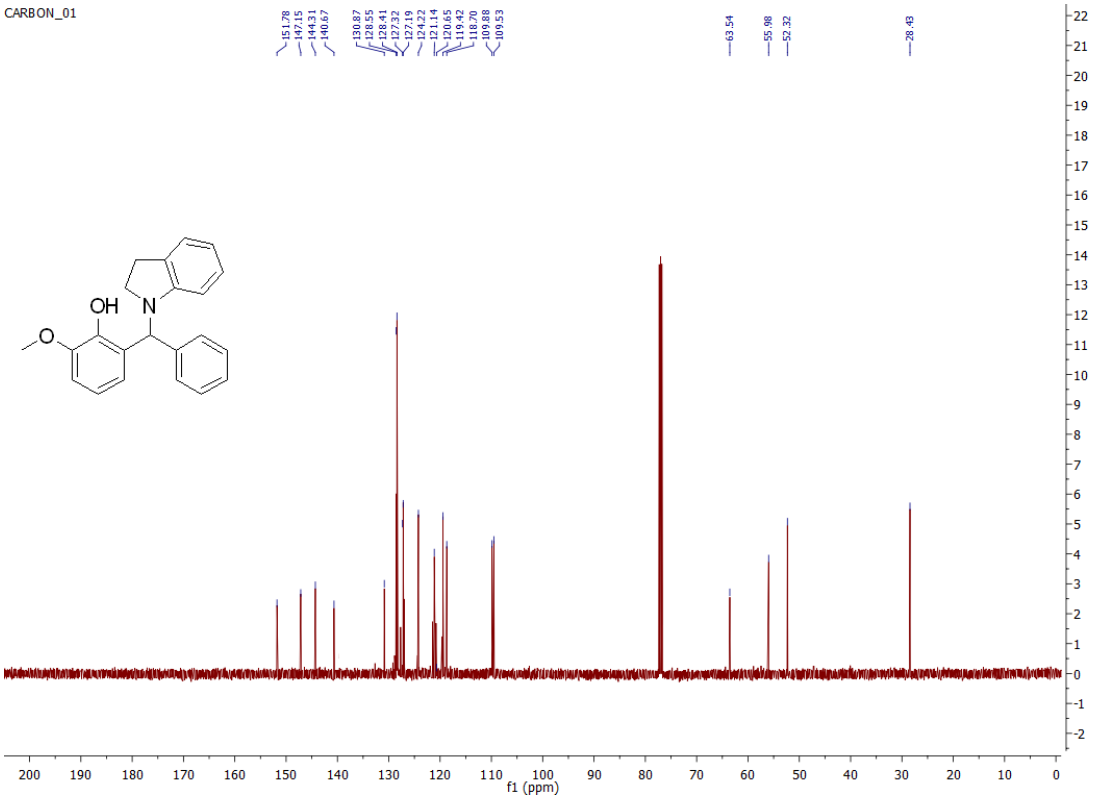
133.50
130.18
129.53
128.36
127.83
126.76
121.28
119.48
118.41
116.12
71.39
56.22
OH
N
f1 (ppm)


PROTON_01
OH
N
O
0.82
1.96
3.17
1.00
1.07
2.93
1.27
1.03
1.04
3.00
2.16
2.10
f1 (ppm)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144.31
140.67
130.87
128.55
128.41
127.32
127.19
124.22
121.14
120.65
119.42
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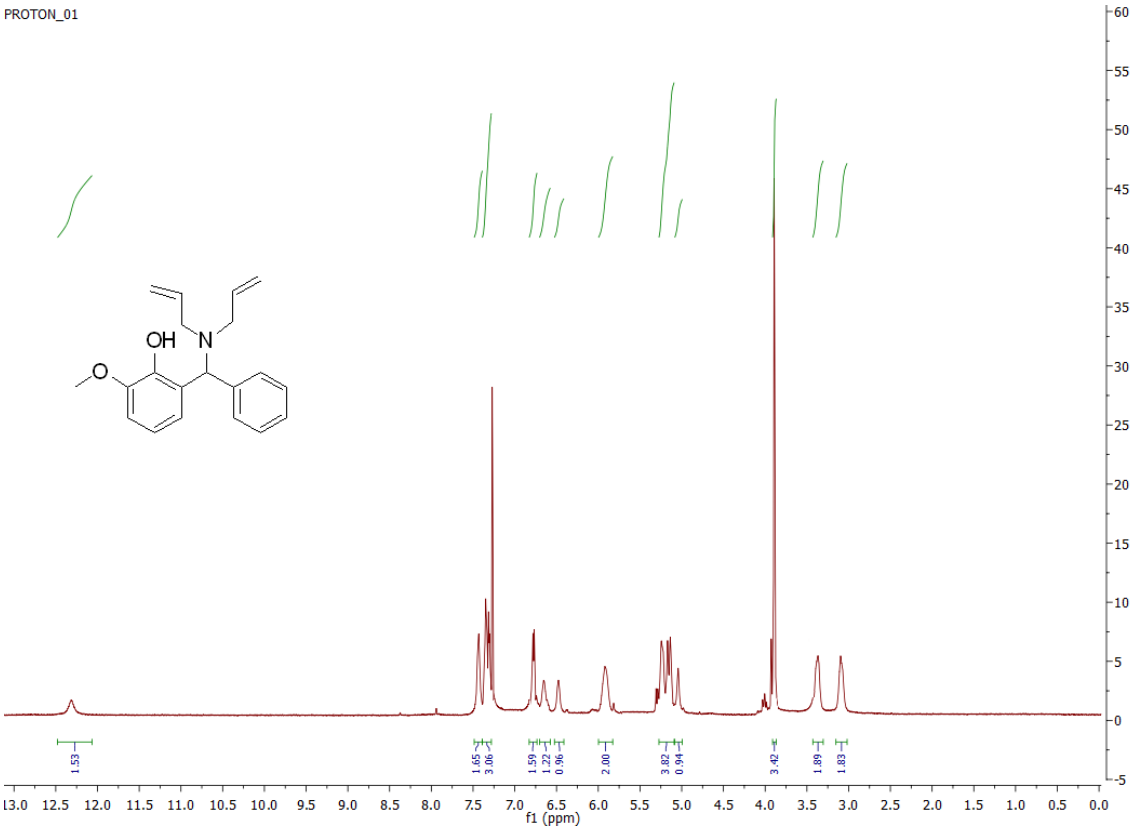
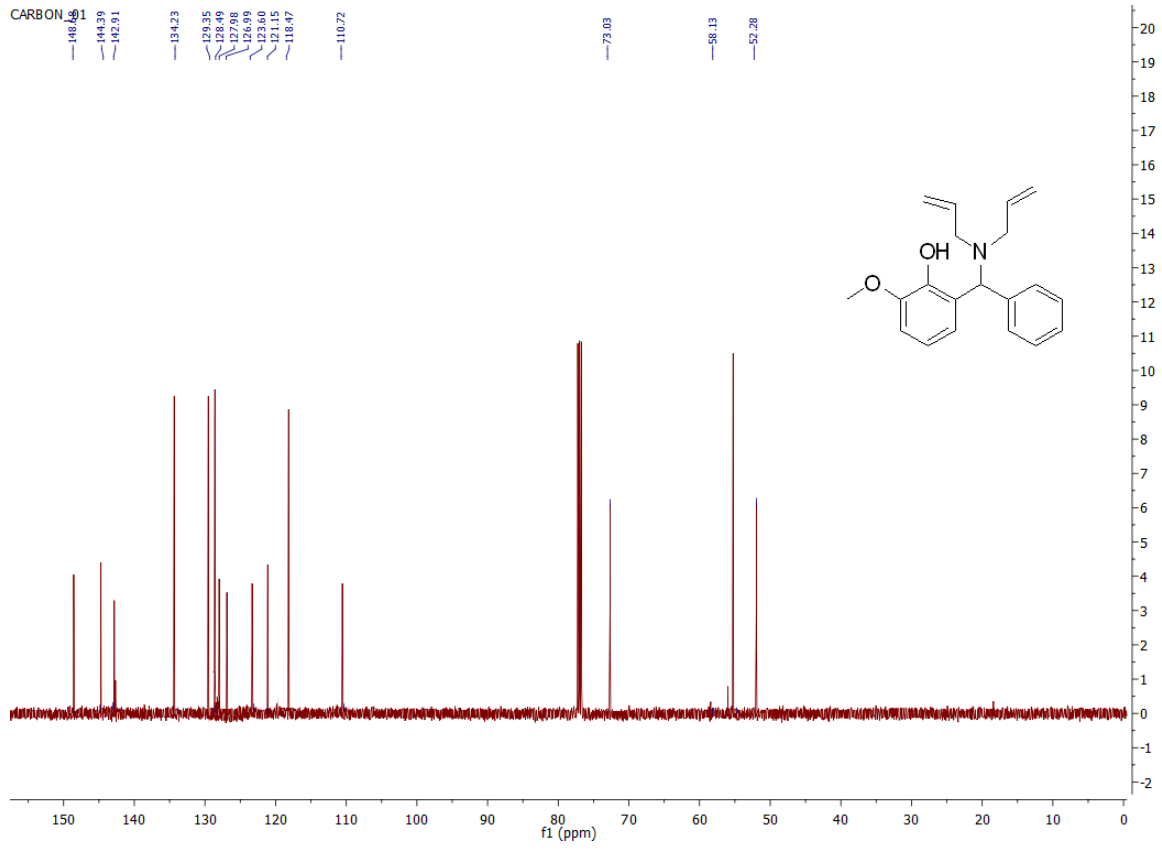
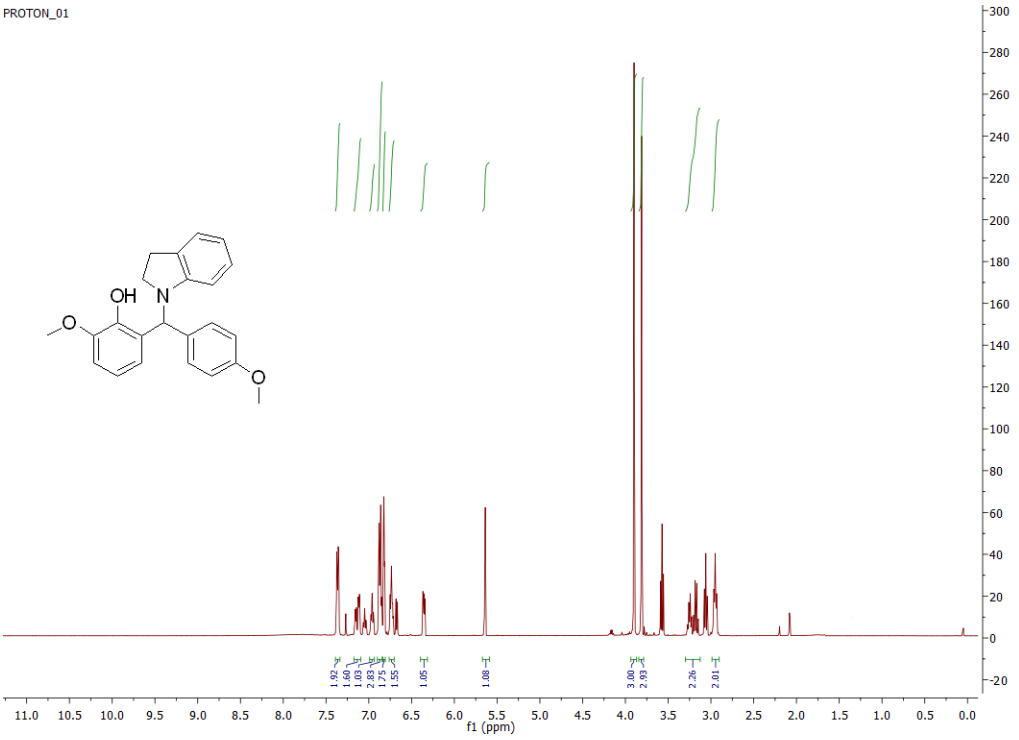
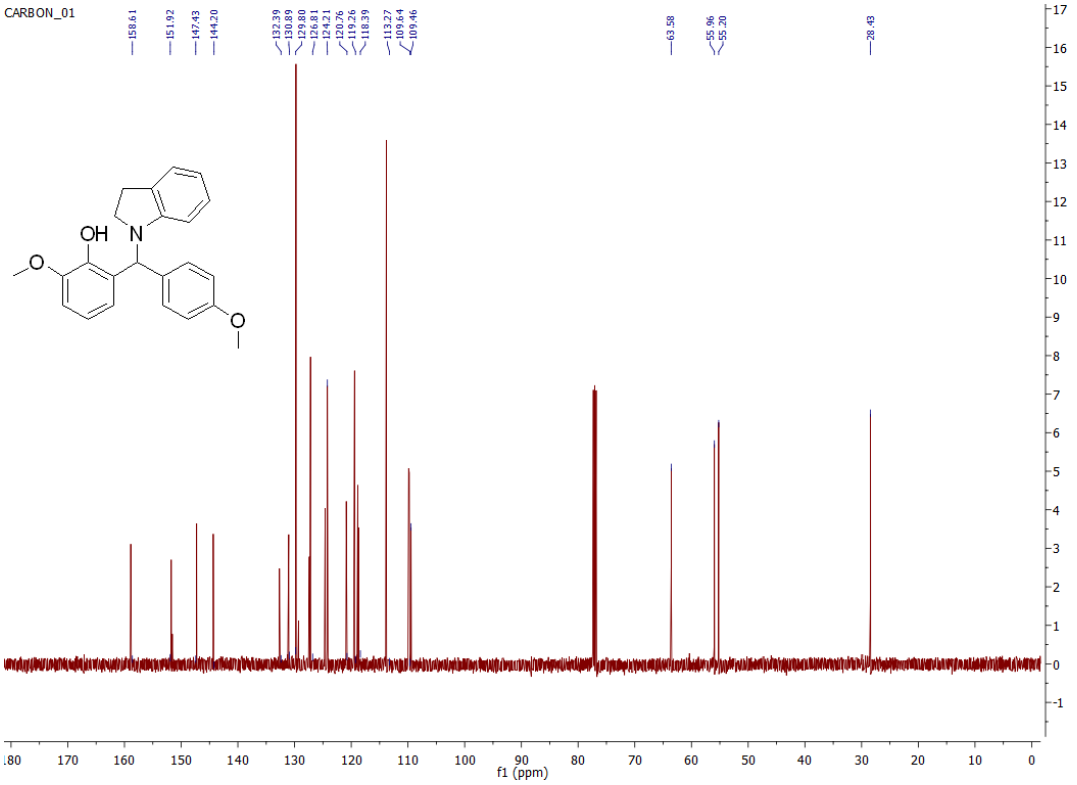
109.88
109.53
63.54
55.98
52.32
28.43
OH
N
O
f1 (ppm)


PROTON_01
OH
N
O
1.53
1.65
3.06
1.59
1.22
0.96
2.00
3.82
0.94
3.42
1.89
1.83
f1 (ppm)


CARBON_01
148.15
144.39
142.91
134.23
129.35
128.49
127.98
126.99
123.60
121.15
118.47
110.72
73.03
58.13
52.28
OH
N
O
f1 (ppm)


PROTON_01
OH
N
O
O
1.92
1.60
1.03
2.83
1.75
1.55
1.05
1.08
3.00
2.93
2.26
2.01
f1 (ppm)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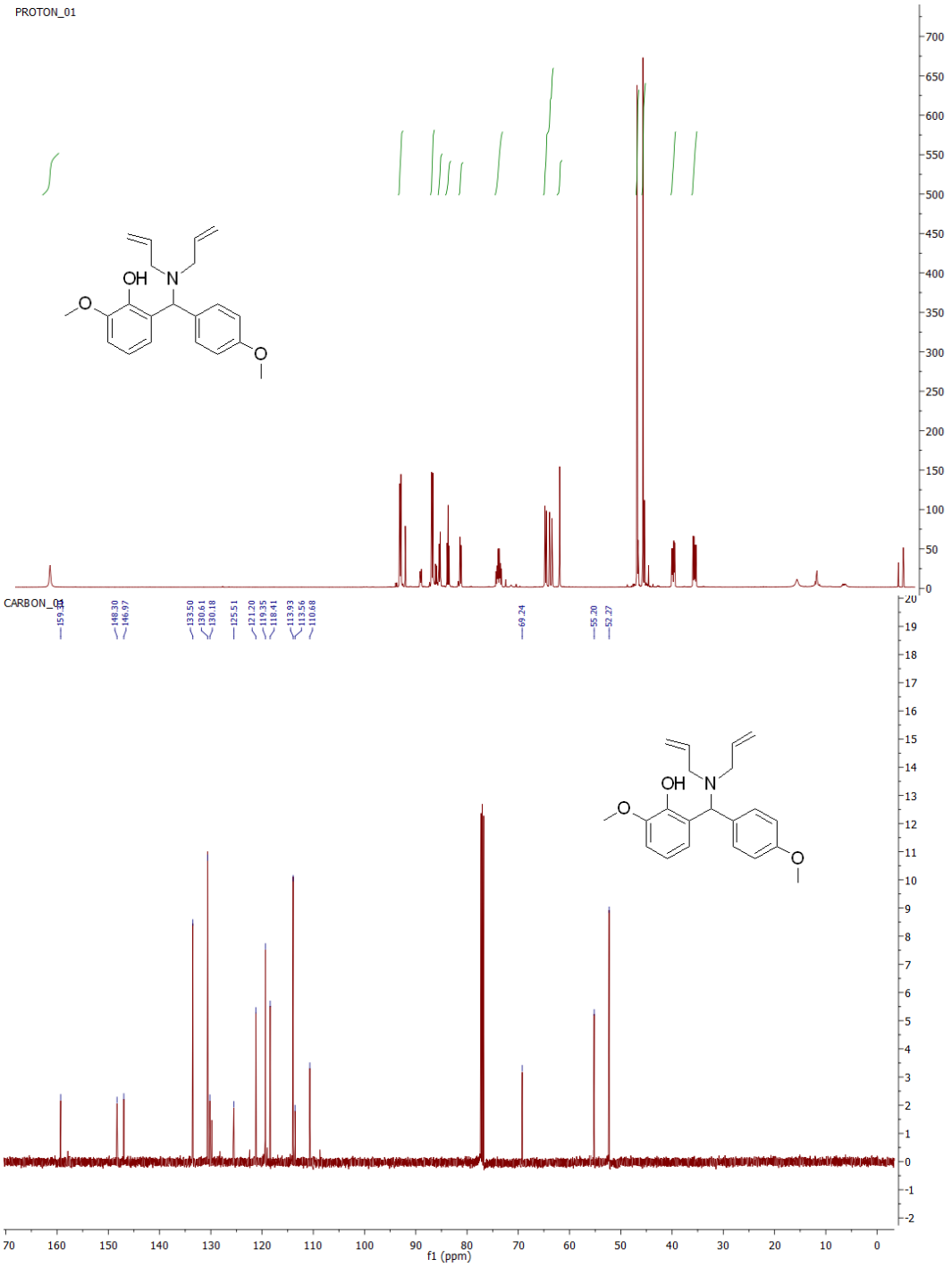
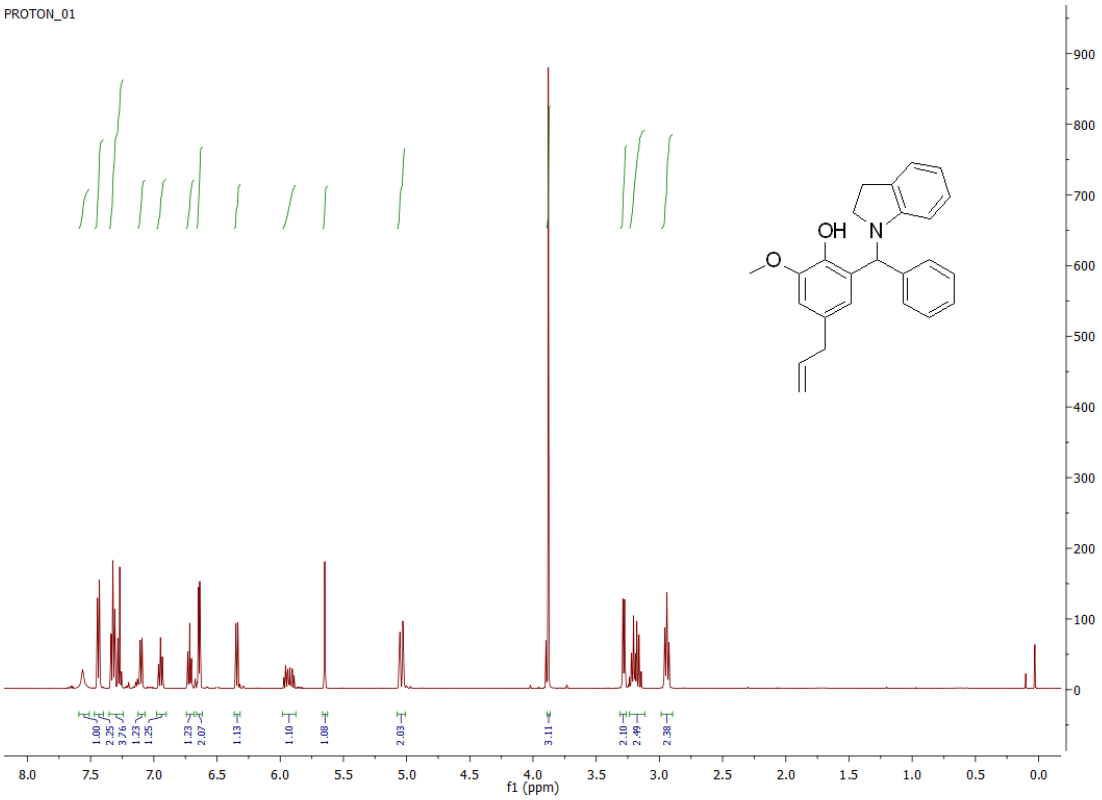
132.39
130.89
129.80
126.81
124.21
120.76
119.26
118.39
113.27
109.64
109.46
63.58
55.96
55.20
28.43
OH
N
O
O
f1 (ppm)


PROTON_01
OH
N
O
O
CARBON_01
159.33
148.30
146.97
133.50
130.61
130.18
125.51
121.20
119.35
118.41
113.93
113.56
110.68
69.24
55.20
52.27
OH
N
O
O
f1 (ppm)


PROTON_01
OH
N
O
1.00
2.25
3.76
1.23
1.25
1.23
2.07
1.13
1.10
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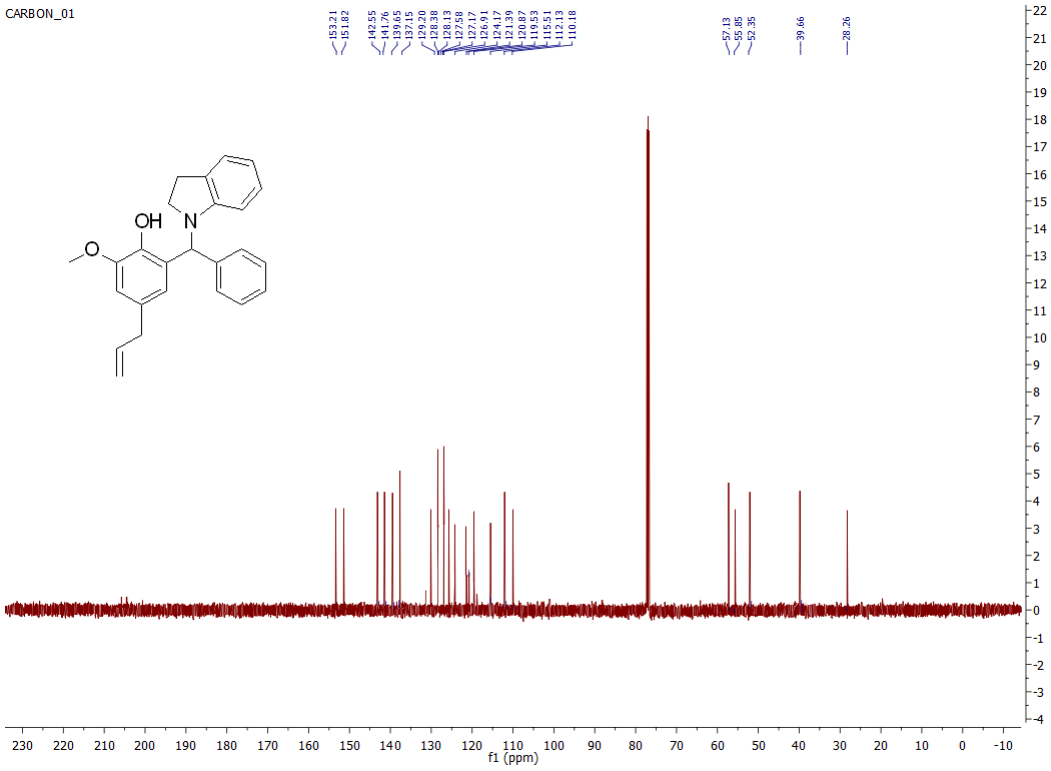
3.11
2.10
2.49
2.38
f1 (ppm)


CARBON_01
153.21
151.82
142.55
141.76
139.65
137.15
129.20
128.38
128.13
127.58
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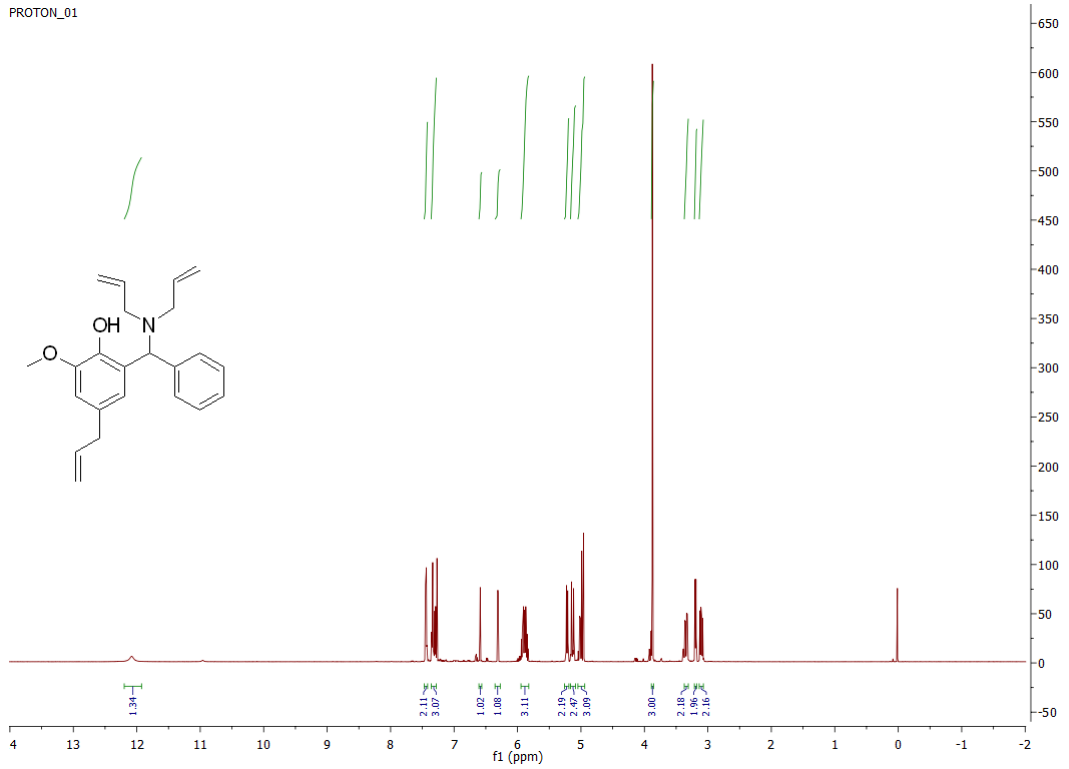
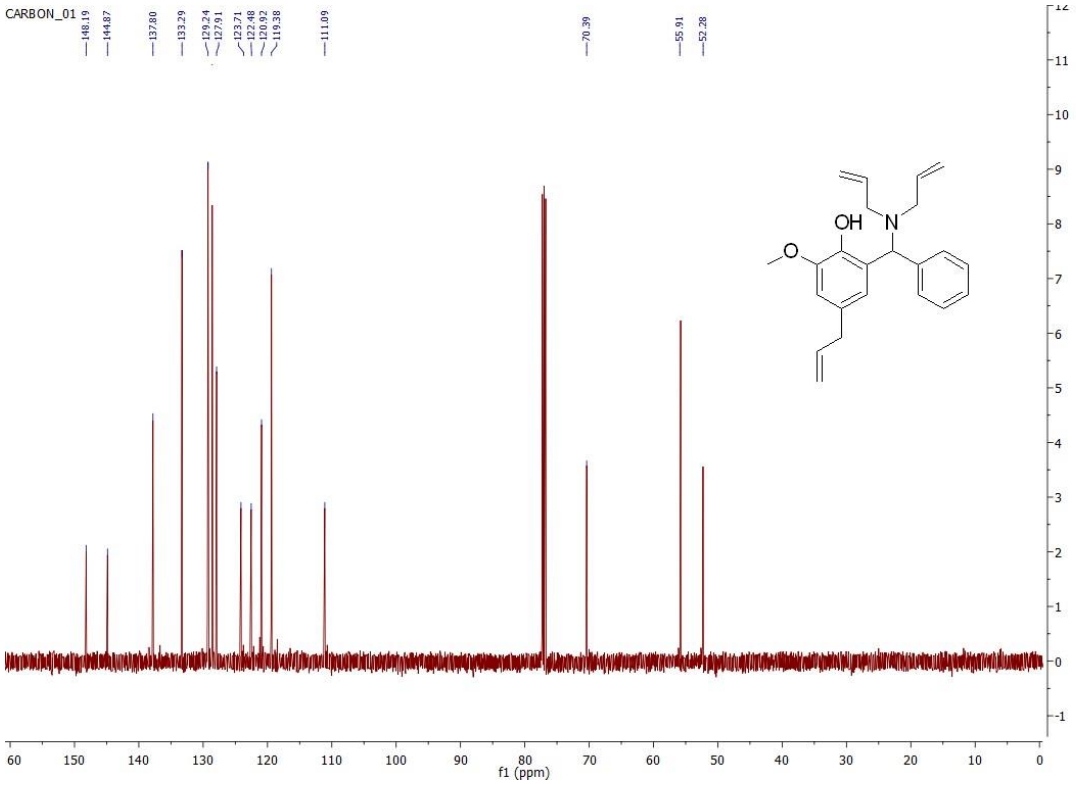
126.91
124.17
121.39
120.87
119.53
115.51
112.13
110.18
57.13
55.85
52.35
39.66
28.26
OH
N
O
f1 (ppm)


PROTON_01
OH
N
O
1.34
2.11
3.07
1.02
1.08
3.11
2.19
2.47
3.09
3.00
2.18
1.96
2.16
f1 (ppm)


CARBON_01
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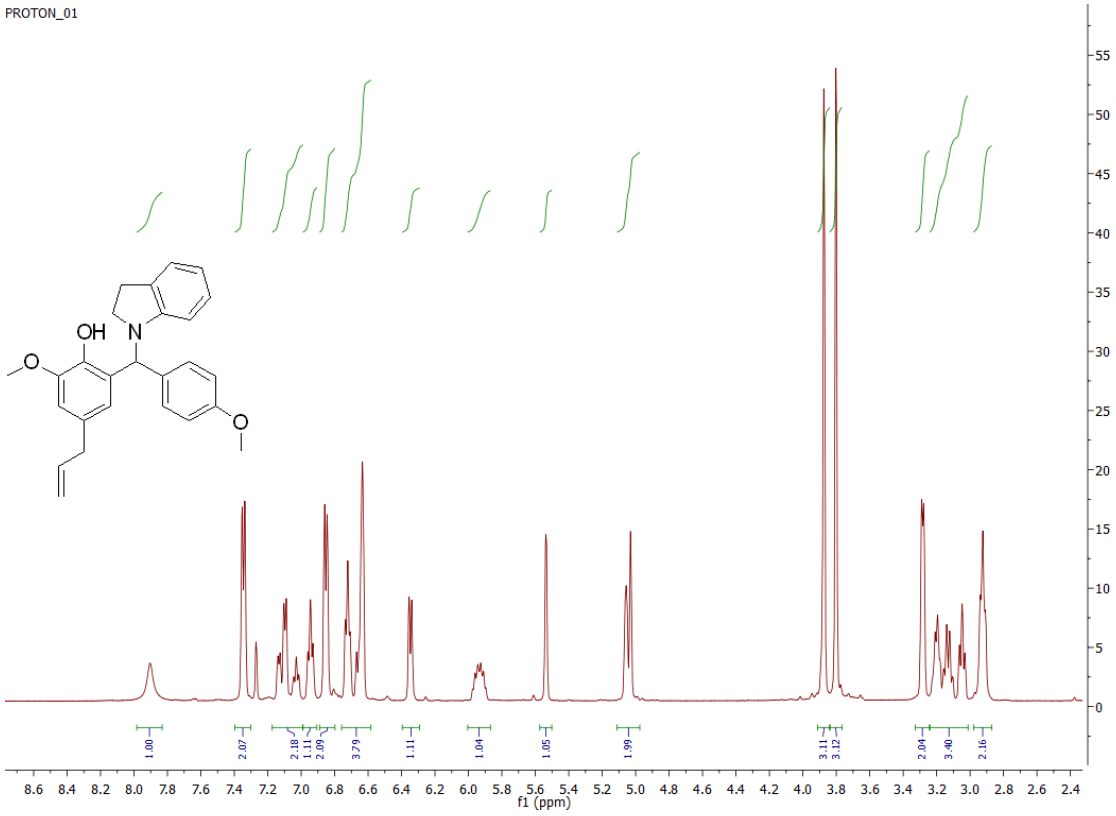
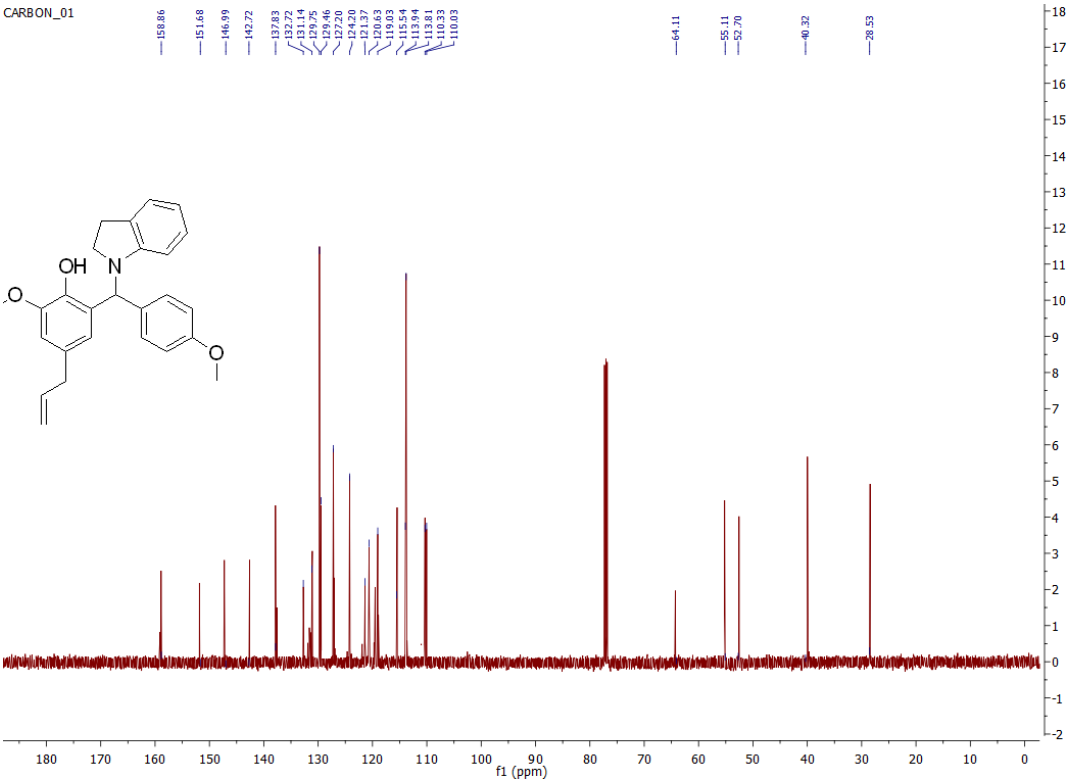
144.87
137.80
133.29
129.24
127.91
123.71
122.48
120.92
119.38
111.09
70.39
55.91
52.28
OH
N
O
f1 (ppm)


PROTON_01
OH
N
O
O
1.00
2.07
2.18
1.11
2.09
3.79
1.11
1.04
1.05
1.99
3.11
3.12
2.04
3.40
2.16
f1 (ppm)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129.46
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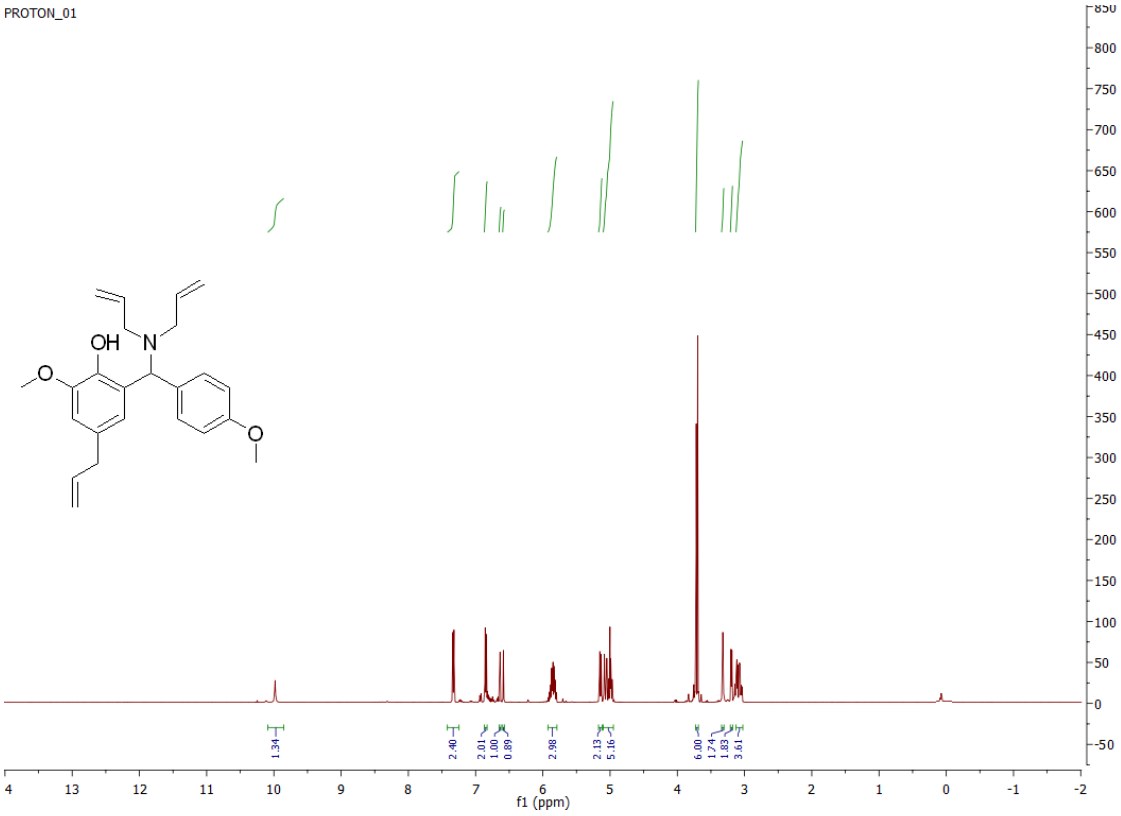
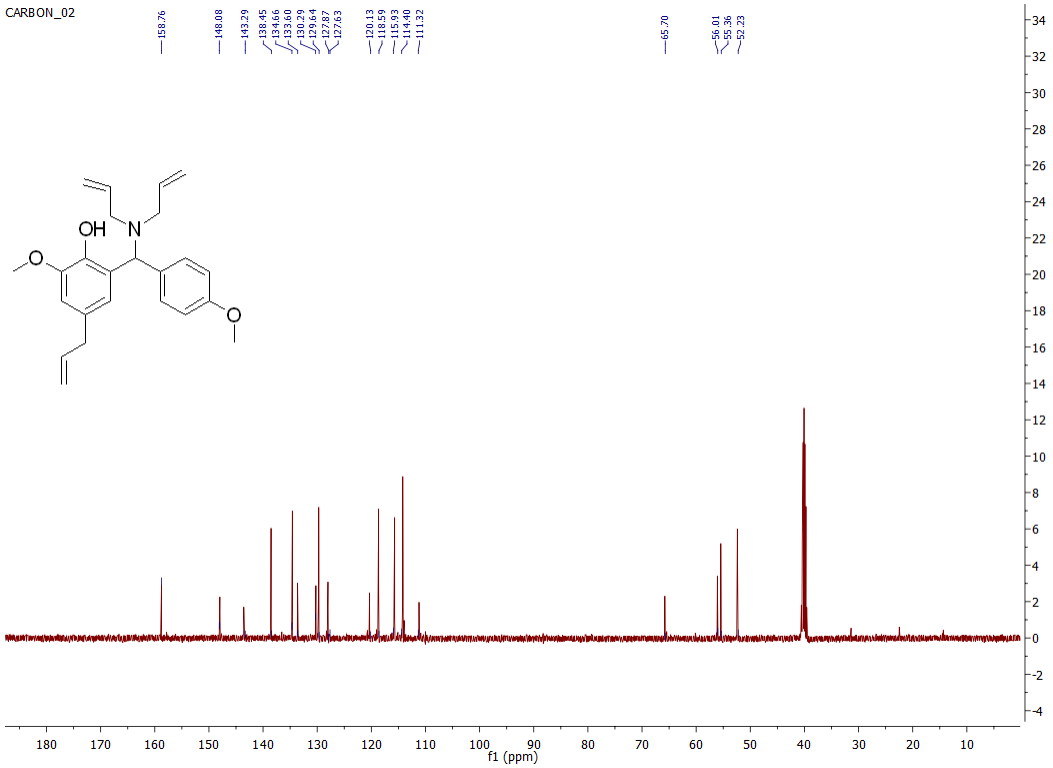
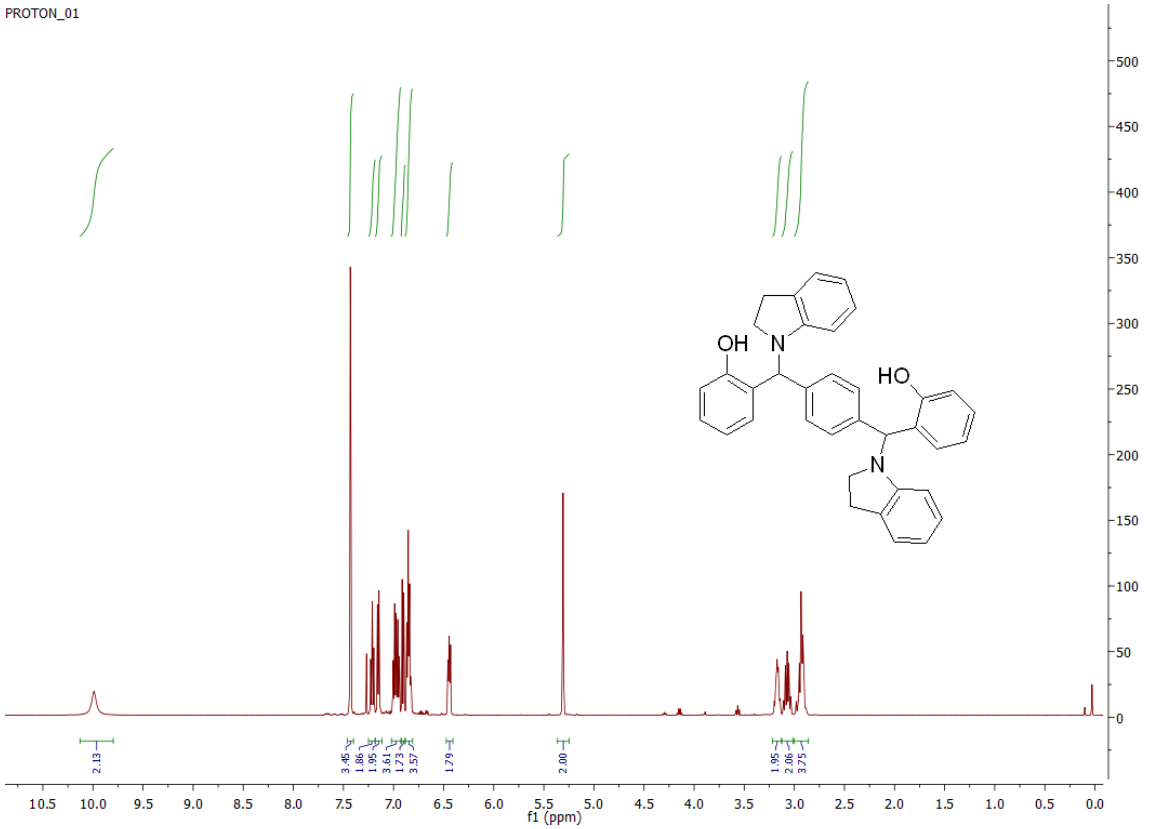
121.37
120.63
119.03
115.54
113.94
113.81
110.33
110.03
64.11
55.11
52.70
40.32
28.53
OH
N
O
O
f1 (ppm)

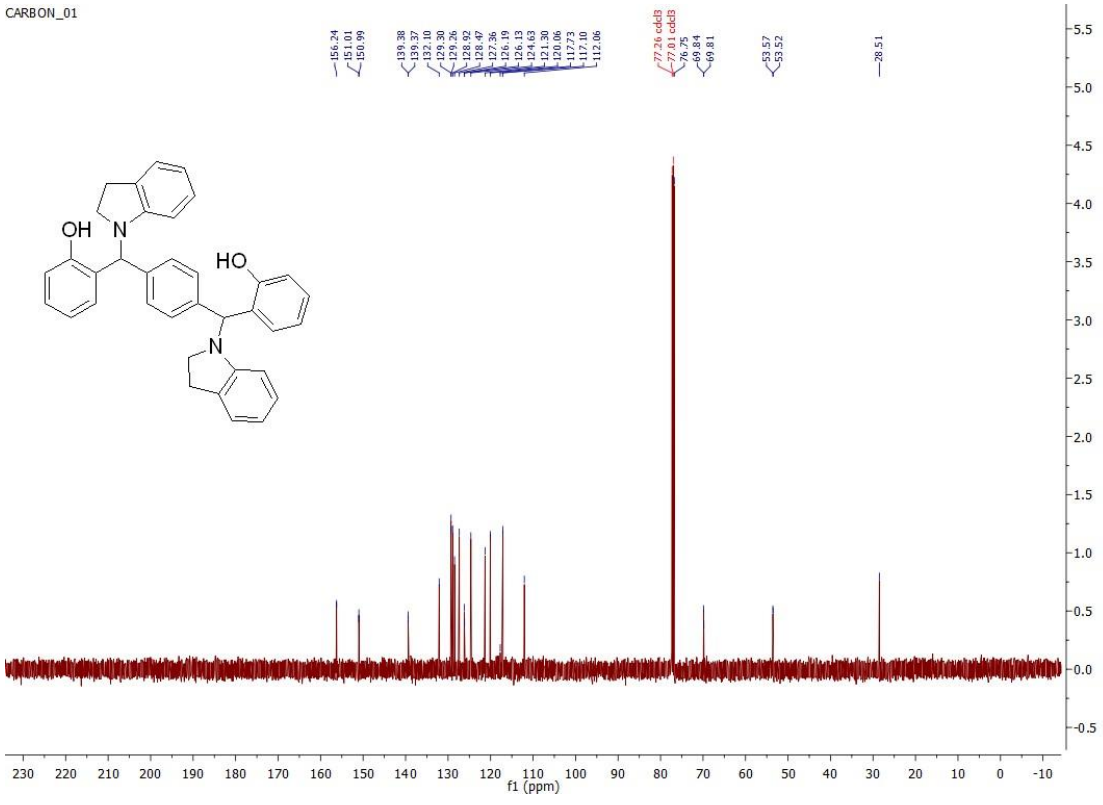
PROTON_01

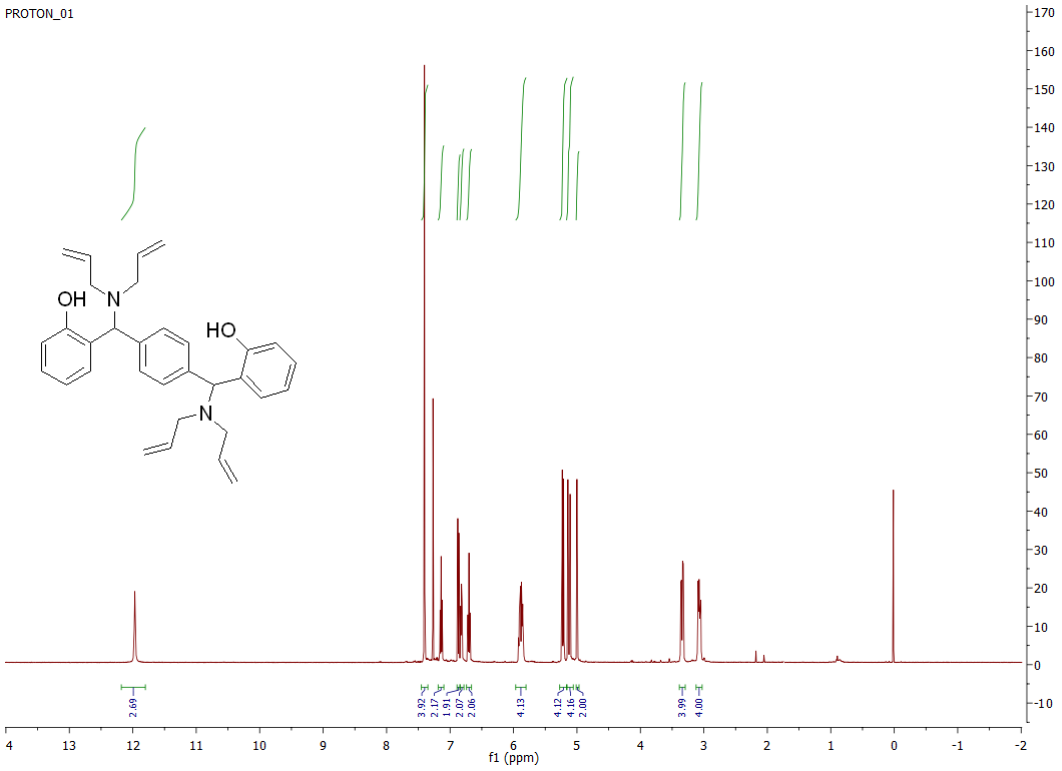


CARBON_02




PROTON_01
OH
N
HO
N
2.13
3.46
1.86
1.95
3.61
1.73
3.57
1.79
2.00
1.95
2.06
3.75
f1 (ppm)


CARBON_01
156.24
151.01
150.99
139.38
139.37
132.10
129.30
129.26
128.92
128.47
127.36
126.19
126.13
124.63
121.30
120.06
117.73
117.10
112.06
77.26 cdcl3
77.01 cdcl3
76.75
69.84
69.81
53.57
53.52
28.51
OH
N
HO
N
f1 (ppm)


PROTON_01
OH
N
HO
N
2.69
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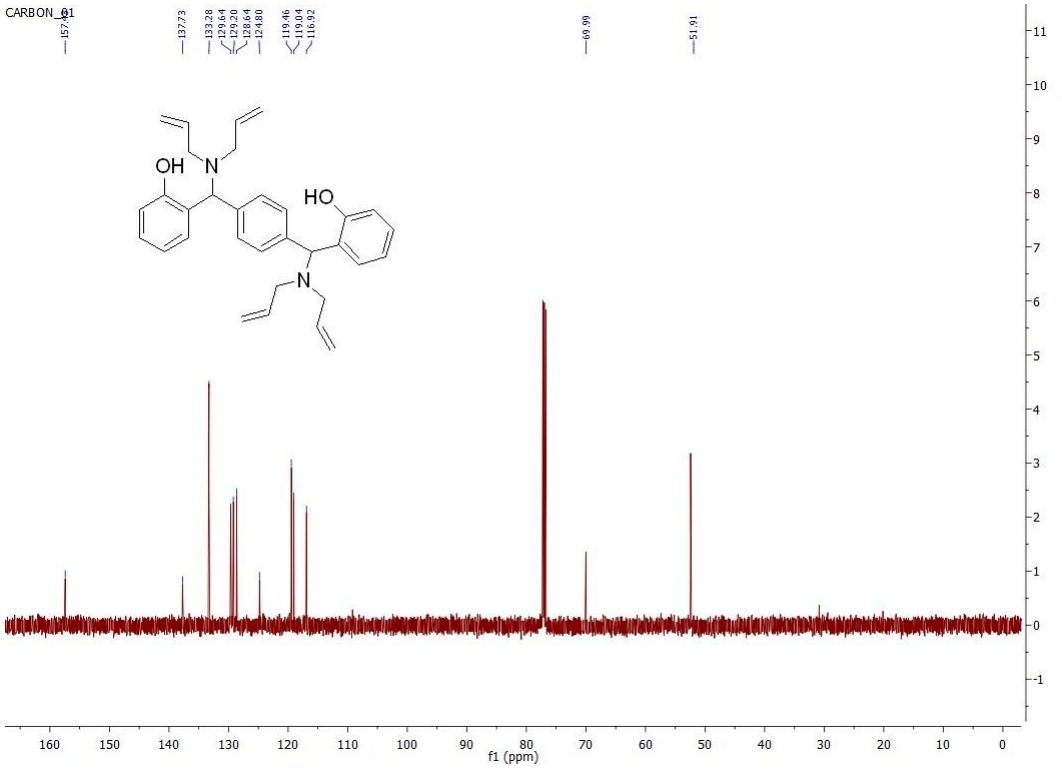
2.00
3.99
4.00
f1 (ppm)


CARBON_01
157.71
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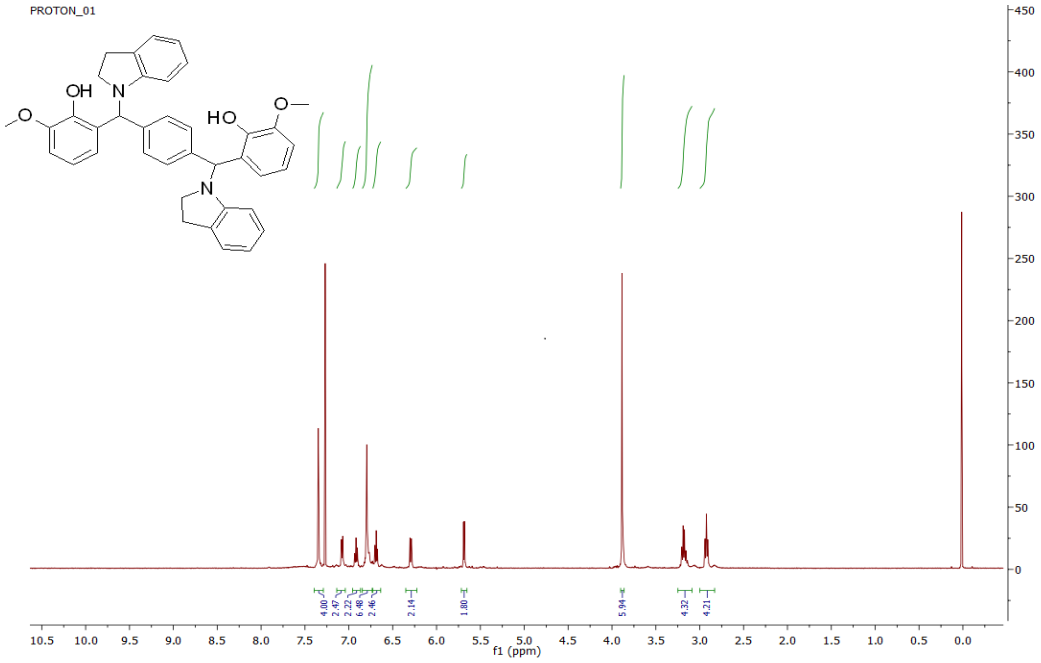
128.64
124.80
119.46
119.04
116.92
69.99
51.91
OH
N
HO
N
f1 (ppm)


PROTON_01
OH
N
O
HO
O
N
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2.22
6.68
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5.94
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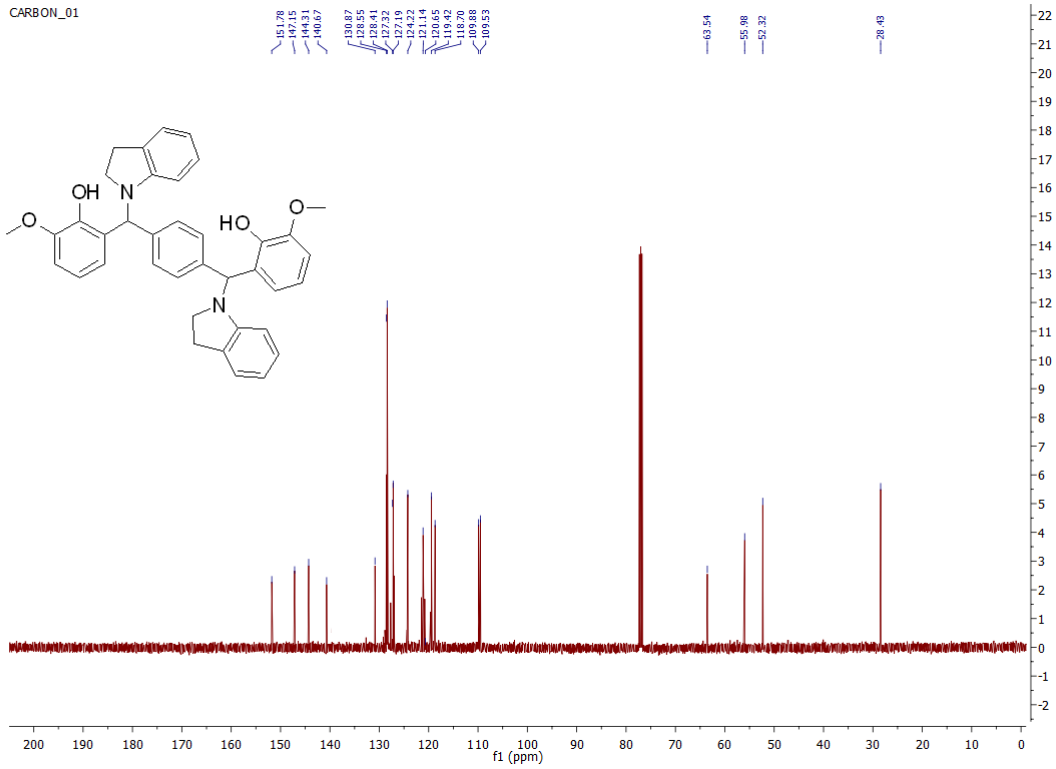
4.21
f1 (ppm)


CARBON_01
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127.19
124.22
121.14
120.65
119.42
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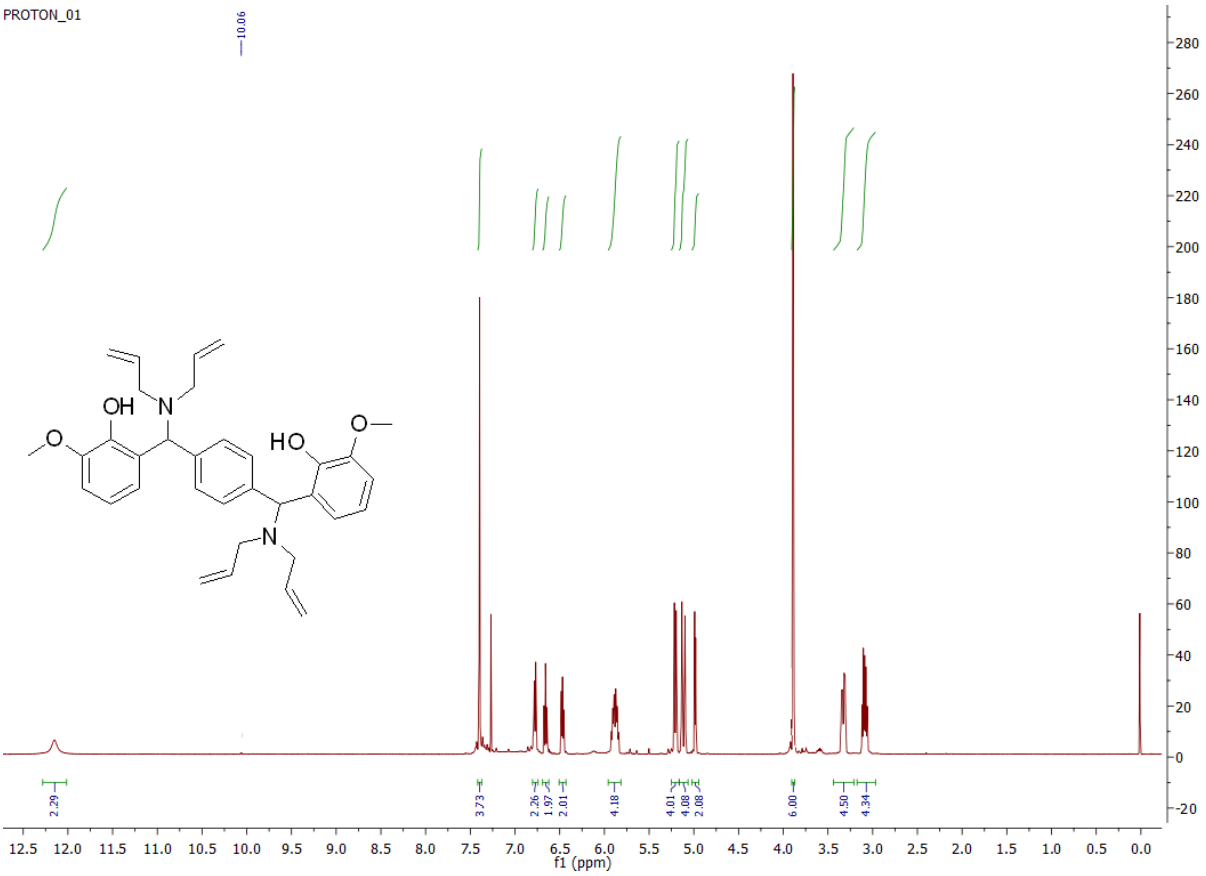
63.54
55.98
52.32
28.43
OH
N
O
HO
O
N
f1 (ppm)


PROTON_01
10.06
OH
N
O
HO
O
N
2.29
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2.01
4.18
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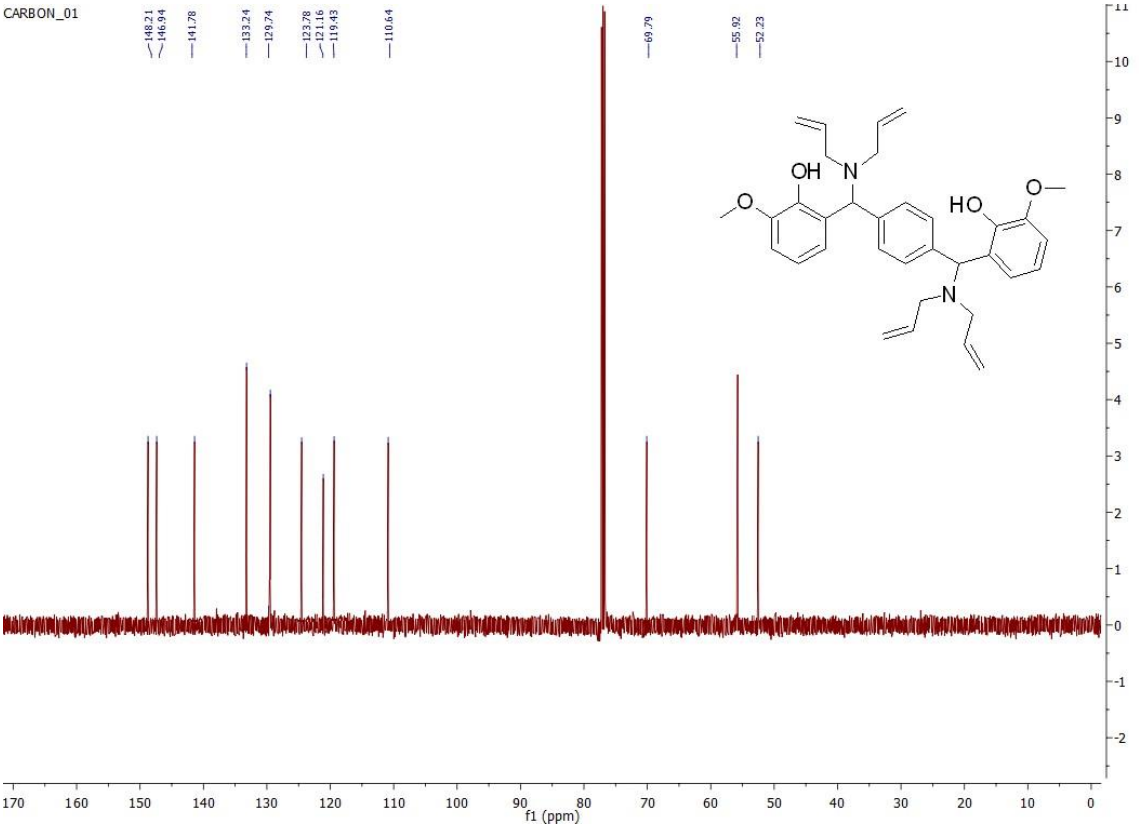
2.08
6.00
4.50
4.34
f1 (ppm)


CARBON_01
148.21
146.94
141.78
133.24
129.74
123.78
121.16
119.43
110.64
69.79
55.92
52.23
OH
N
O
HO
O
N
f1 (ppm)