

TsOH-Catalyzed Dehydroxylative Cross-Coupling of Alcohols with Phenols: Rapid Access to Propofol Derivatives

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Supporting Information

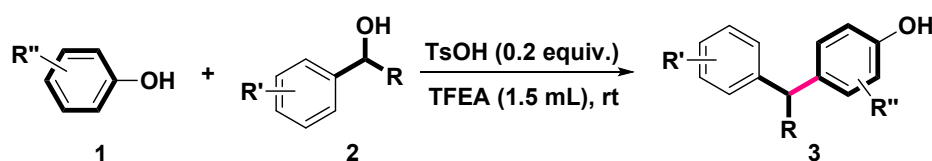
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A. General Methods

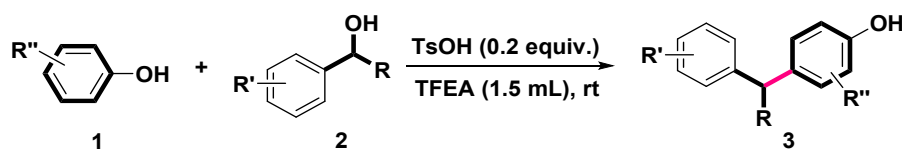
Unless otherwise stated, all reactions were magnetically stirred and conducted under air and applied dried Schlenk tubes under confined conditions. All solvents and reagents were used as received from commercial suppliers unless otherwise indicated. Column chromatography was carried out using silica gel (100-400 mesh) and detected at 254 nm. All ^1H NMR, ^{13}C NMR, ^{19}F NMR spectra for compound characterization were recorded on a Bruker AVANCE-NEO 400 WB spectrometer in a suitable deuterated solvent unless specified otherwise. Chemical shifts were given in parts per million (ppm, δ), referenced to the solvent peak of CDCl_3 , defined at $\delta = 7.26$ (^1H NMR), defined at $\delta = 77.16$ (^{13}C NMR). Coupling constants were quoted in Hz (J). ^1H NMR spectroscopy splitting patterns were designated as singlet (s), doublet (d), triplet (t), and quartet (q). HRMS was performed on a high-resolution mass spectrometer (LCMS-IT-TOF). Melt points were measured with WRR melting point apparatus.

B. Procedure for dehydroxylative coupling of alcohols with phenols



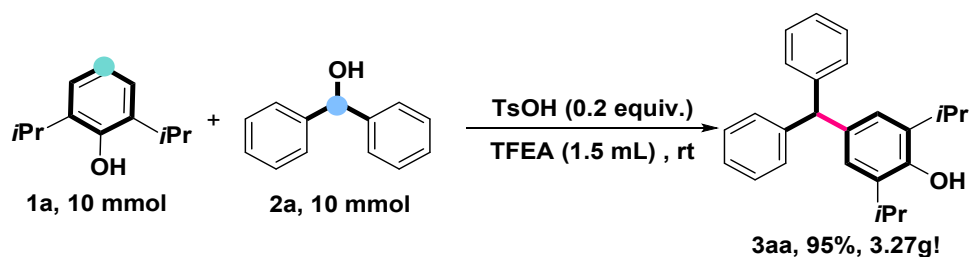
In the Schlenk tube, **1** (0.5 mmol), **2** (1.0 equiv., 0.5 mmol), TsOH (20 mol %, 0.1 mmol), TFEA (1.5 mL) were added. The mixture was stirred at room temperature for 1 h under confined conditions. After the reaction was completed, the mixture was diluted with EtOAc (5.0 mL) carefully quenched with 5.0 mL of saturated NaHCO_3 solution. To determine the separation yield of product, the mixture was extracted with EtOAc (10.0 mL \times 3 times), the organic layers were combined, washed with saturated NaCl, and dried with anhydrous MgSO_4 . After removal of the EtOAc under vacuum, the crude product was purified by column chromatography on silica gel with hexanes or petroleum ether/ethyl acetate (5:1 to 200:1) to give the desired products.

C. Procedure for dehydroxylative coupling of alcohols with aryl ethers



In the Schlenk tube, **4** (0.5 mmol), **2** (1.0 equiv., 0.5 mmol), TsOH (20 mol %, 0.1 mmol), TFEA (1.5 mL) were added. The mixture was stirred at room temperature for 1 h under confined conditions. After the reaction was completed, the mixture was diluted with EtOAc (5.0 mL) carefully quenched with 5.0 mL of saturated NaHCO₃ solution. To determine the separation yield of product, the mixture was extracted with EtOAc (10.0 mL × 3 times), the organic layers were combined, washed with saturated NaCl, and dried with anhydrous MgSO₄. After removal of the EtOAc under vacuum, the crude product was purified by column chromatography on silica gel with hexanes or petroleum ether/ethyl acetate (5:1 to 200:1) to give the desired products.

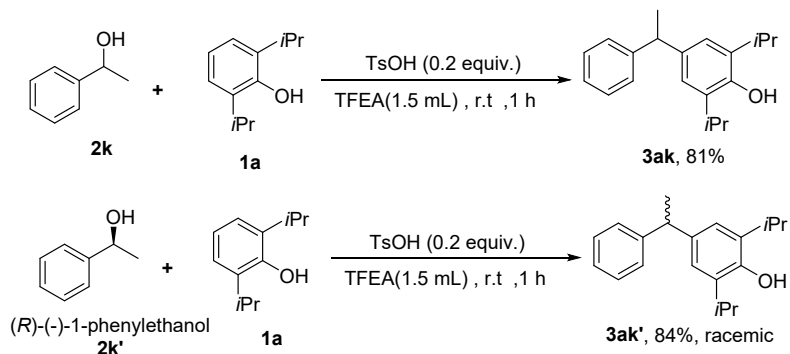
D. Procedure for gram-scale experiment



In the Schlenk tube were added **1a** (10.0 mmol), **2a** (1.0 equiv., 10 mmol), TsOH (20 mol%), TFEA (30.0 mL). The mixture was stirred at room temperature for 1 h under confined conditions. After the reaction was completed, the mixture was diluted with EtOAc (50.0 mL) carefully quenched with 50.0 mL of saturated NaHCO₃ solution. To determine the separation yield of product, the mixture was extracted with EtOAc (50.0 mL × 3 times), the organic layers were combined and washed with saturated NaCl and dried with anhydrous MgSO₄. After removal of the EtOAc under vacuum, the crude product was purified by column chromatography on silica gel with petroleum ether/ethyl acetate (50:1) to give the desired product.

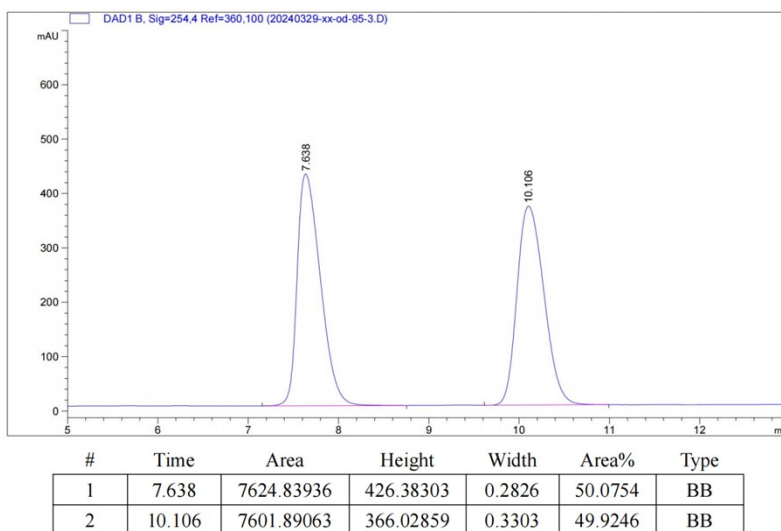
E. Control experiments.

The chiral alcohol **2k** was employed in this catalytic system to access detailed mechanistic process. As anticipated, only racemic product **3ak** was produced using (*R*)-(-)-1-phenylethanol (**2k**) to react with propofol **1a**, which evidenced the formation of benzyl carbocationic intermediate (Scheme S1).

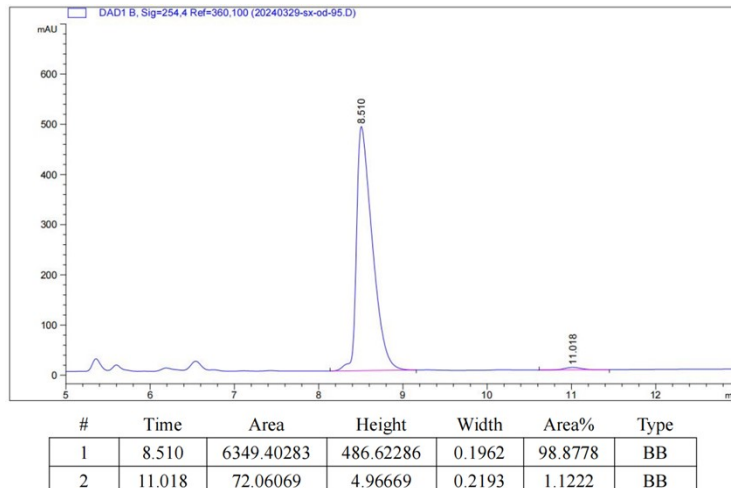


Scheme S1 Chiral alcohol employed in this deoxygenative cross-coupling.

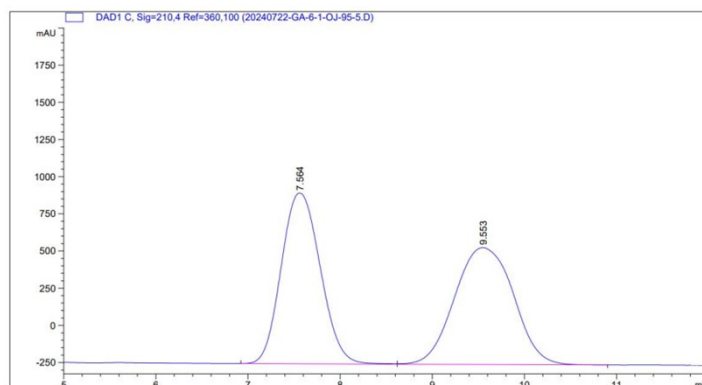
Racemic product of 1-phenylethanol (**2k**)



Chiral product of 1-phenylethanol (**2k'**)

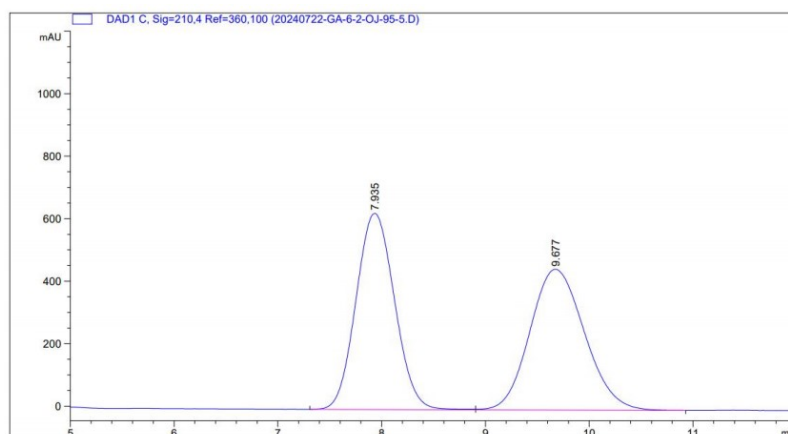


Racemic product of (3ak)



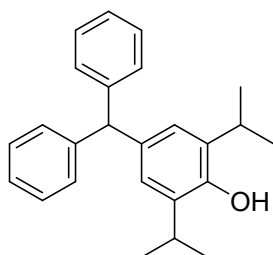
#	Time	Area	Height	Width	Area%	Type
1	7.564	3.37772e4	1147.66479	0.4654	49.1978	BV
2	9.553	3.48787e4	785.29932	0.7202	50.8022	VB

Chiral product of (3ak')



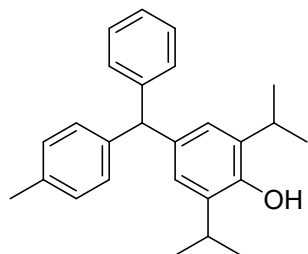
#	Time	Area	Height	Width	Area%	Type
1	7.935	1.61806e4	627.44012	0.4069	49.5944	BV
2	9.677	1.64452e4	450.49347	0.5759	50.4056	VB

F. Analytical Data

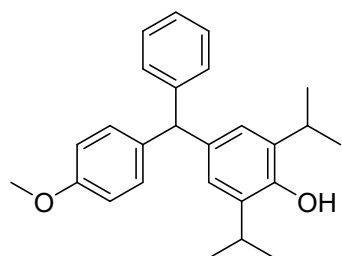


4-benzhydryl-2,6-diisopropylphenol (3aa)¹: Prepared in 98% yield (168.1 mg) as a white solid; m.p. 102-104 °C. $R_f = 0.49$ (petroleum ether/ethyl acetate = 10/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.23 (t, $J = 7.4$ Hz, 4H), 7.13 (dd, $J = 17.8, 7.2$ Hz, 6H),

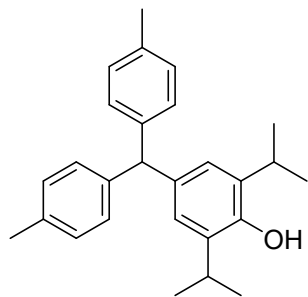
6.80 (s, 2H), 5.47 (s, 1H), 4.66 (s, 1H), 3.12-3.02 (m, 2H), 1.15 (d, $J = 7.0$ Hz, 12H).
 ^{13}C NMR (100 MHz, CDCl_3) δ 148.3, 144.6, 135.5, 133.3, 129.3, 128.1, 126.0, 124.5, 56.6, 27.2, 22.7.



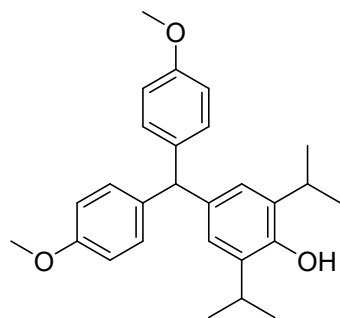
2,6-diisopropyl-4-(phenyl(*p*-tolyl)methyl)phenol (3ab): Prepared in 92% yield (164.8 mg) as a white solid; m.p. 114-117 °C. $R_f = 0.53$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.23 (t, $J = 7.4$ Hz, 2H), 7.16 (d, $J = 7.4$ Hz, 1H), 7.12-7.08 (m, 2H), 7.06 (d, $J = 7.9$ Hz, 2H), 6.99 (d, $J = 7.9$ Hz, 2H), 6.80 (s, 2H), 5.43 (s, 1H), 4.66 (s, 1H), 3.12-3.02 (m, 2H), 2.29 (s, 3H), 1.16 (dd, $J = 6.9, 1.7$ Hz, 12H). ^{13}C NMR (100 MHz, CDCl_3) δ 148.3, 144.9, 141.6, 135.7, 135.4, 133.2, 129.3, 129.2, 128.8, 128.1, 125.9, 124.5, 56.2, 27.3, 22.7, 21.0. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{26}\text{H}_{30}\text{O}$ 357.2224; Found 357.2222.



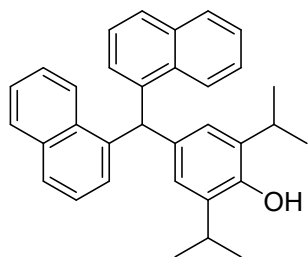
2,6-diisopropyl-4-((4-methoxyphenyl)(phenyl)methyl)phenol (3ac)²: Prepared in 86% yield (160.9 mg) as a colourless oil. $R_f = 0.49$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.25 (t, $J = 7.4$ Hz, 2H), 7.18 (d, $J = 7.3$ Hz, 1H), 7.13-7.07 (m, 2H), 7.05-6.99 (m, 2H), 6.85-6.74 (m, 4H), 5.42 (s, 1H), 4.70 (s, 1H), 3.77 (s, 3H), 3.14-3.04 (m, 2H), 1.17 (d, $J = 6.9$ Hz, 12H). ^{13}C NMR (100 MHz, CDCl_3) δ 157.8, 148.3, 145.0, 136.9, 135.8, 133.2, 130.2, 129.3, 128.1, 125.9, 124.5, 113.5, 55.8, 55.2, 27.3, 22.7 (d, $J = 1.7$ Hz).



4-benzhydryl-2,6-diisopropylphenol (3ad)³: Prepared in 96% yield (179.2 mg) as a colourless oil. $R_f = 0.55$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.32-7.23 (m, 8H), 7.06 (s, 2H), 5.64 (s, 1H), 4.92 (s, 1H), 3.37-3.27 (m, 2H), 2.52 (s, 6H), 1.41 (d, $J = 7.0$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 148.2, 141.9, 135.9, 135.3, 133.2, 129.1, 128.8, 124.5, 55.9, 27.3, 22.7, 20.9.

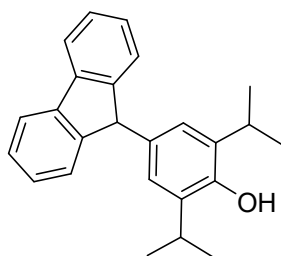


4-(di-*p*-tolylmethyl)-2,6-diisopropylphenol (3ae): Prepared in 84% yield (168.9 mg) as a white solid; m.p.107-109 °C. $R_f = 0.33$ (petroleum ether/ethyl acetate = 5/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.01 (d, $J = 8.7$ Hz, 4H), 6.83-6.76 (m, 6H), 5.37 (s, 1H), 4.72 (s, 1H), 3.76 (s, 6H), 3.14-3.04 (m, 2H), 1.17 (d, $J = 6.9$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 157.7, 148.2, 137.2, 136.1, 133.2, 130.1, 124.4, 113.4, 55.1, 27.3, 22.7. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{27}\text{H}_{32}\text{O}_3$ 403.2279; Found 403.2277.

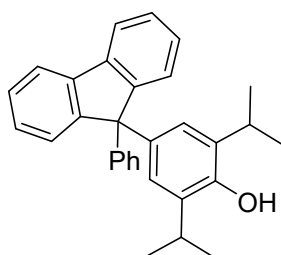


4-(di(naphthalen-1-yl)methyl)-2,6-diisopropylphenol (3af): Prepared in 82% yield (181.5 mg) as a white solid; m.p.198-200 °C. $R_f = 0.44$ (petroleum ether/ethyl acetate

= 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.98 (d, $J = 8.5$ Hz, 2H), 7.84 (d, $J = 8.1$ Hz, 2H), 7.72 (d, $J = 8.2$ Hz, 2H), 7.46-7.38 (m, 2H), 7.32 (dt, $J = 19.3, 8.1$ Hz, 4H), 6.93 (d, $J = 7.2$ Hz, 2H), 6.86 (s, 1H), 6.82 (s, 2H), 4.67 (s, 1H), 3.10-3.00 (m, 2H), 1.11 (d, $J = 6.9$ Hz, 12H). ^{13}C NMR (100 MHz, CDCl_3) δ 148.4, 140.5, 134.8, 133.9, 133.4, 131.8, 128.7, 127.5, 127.1, 126.1, 125.3, 125.3, 124.9, 124.2, 49.2, 27.3, 22.6. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{33}\text{H}_{32}\text{O}$ 443.2380; Found 443.2379.

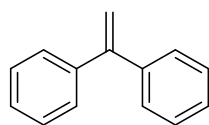


4-(9H-fluoren-9-yl)-2,6-diisopropylphenol (3ag): Prepared in 60% yield (103.4 mg) as a colourless oil. $R_f = 0.42$ (petroleum ether/ethyl acetate = 50/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.79 (dd, $J = 7.6, 1.2$ Hz, 2H), 7.39-7.32 (m, 4H), 7.27-7.23 (m, 2H), 6.78 (s, 2H), 4.99 (s, 1H), 4.68 (s, 1H), 3.14-3.04 (m, 2H), 1.19 (d, $J = 6.9$ Hz, 12H). ^{13}C NMR (100 MHz, CDCl_3) δ 148.9, 148.1, 140.8, 133.7, 133.0, 127.1, 127.0, 125.2, 123.3, 119.7, 54.3, 27.3, 22.7. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{25}\text{H}_{26}\text{O}$ 341.1911; Found 341.1909.

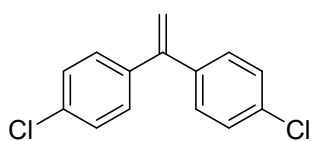


2,6-diisopropyl-4-(9-phenyl-9H-fluoren-9-yl)phenol (3ah): Prepared in 95% yield (198.1 mg) as a white solid; m.p. 157-159°C. $R_f = 0.38$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.72 (d, $J = 7.5$ Hz, 2H), 7.39 (d, $J = 7.6$ Hz, 2H), 7.28 (t, $J = 6.8$ Hz, 2H), 7.21 (t, $J = 7.5$ Hz, 2H), 7.17-7.09 (m, 5H), 6.90 (s, 2H), 3.07-2.97 (m, 2H), 1.09 (d, $J = 7.0$ Hz, 12H). ^{13}C NMR (100 MHz, CDCl_3) δ 151.8, 148.6, 146.6, 140.0, 137.2, 132.9, 128.0, 127.9, 127.5, 127.2, 126.3, 126.0,

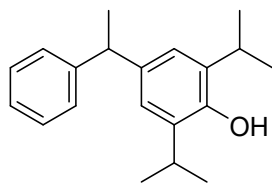
123.6, 120.0, 65.3, 27.3, 22.6. HRMS-ESI (m/z): [M+H]⁺ Calcd for C₃₁H₃₀O 417.2224; Found 417.2223.



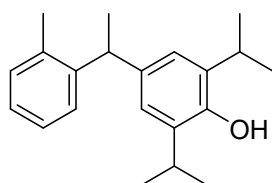
ethene-1,1-diyl dibenzene (3ai)⁴: Prepared in 47% yield (42.0 mg) as a colourless oil. R_f = 0.44 (petroleum ether/ethyl acetate = 50/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.32 (td, *J* = 5.9, 5.3, 3.0 Hz, 10H), 5.45 (s, 2H). ¹³C NMR (100 MHz, CDCl₃) δ 150.0, 141.4, 128.2, 128.1, 127.7, 114.3.



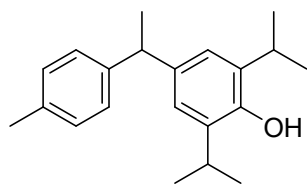
4,4'-(ethene-1,1-diyl)bis(chlorobenzene) (3aj)⁵: Prepared in 86% yield (106.4 mg) as a colourless oil. R_f = 0.44 (petroleum ether/ethyl acetate = 10/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.34-7.16 (m, 8H), 5.43 (s, 2H). ¹³C NMR (100 MHz, CDCl₃) δ 147.8, 139.4, 133.8, 129.4, 128.4, 115.1.



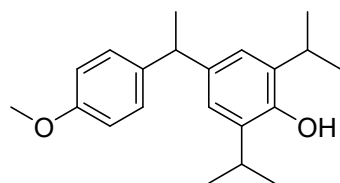
2,6-diisopropyl-4-(1-phenylethyl)phenol (3ak): Prepared in 70% yield (98.4 mg) as a colourless oil. R_f = 0.44 (petroleum ether/ethyl acetate = 10/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.29-7.19 (m, 4H), 7.18-7.10 (m, 1H), 6.90 (s, 2H), 4.65 (s, 1H), 4.08 (q, *J* = 7.2 Hz, 1H), 3.15-3.06 (m, 2H), 1.61 (d, *J* = 7.2 Hz, 3H), 1.23 (d, *J* = 7.9 Hz, 12H). ¹³C NMR (100 MHz, CDCl₃) δ 148.2, 147.0, 138.0, 133.3, 128.2, 127.5, 125.7, 122.6, 44.6, 27.3, 22.7 (d, *J* = 1.4 Hz), 22.3. HRMS-ESI (m/z): [M+H]⁺ Calcd for C₂₀H₂₆O 281.1911; Found 281.1908.



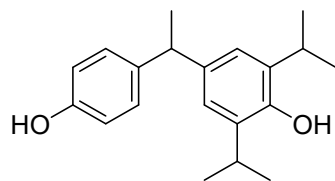
2,6-diisopropyl-4-(1-(*o*-tolyl)ethyl)phenol (3al): Prepared in 94% yield (139.6 mg) as a colourless oil. $R_f = 0.48$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.25-7.21 (m, 1H), 7.16 (td, $J = 7.6, 7.0, 2.3$ Hz, 1H), 7.13-7.06 (m, 2H), 6.84 (s, 2H), 4.62 (s, 1H), 4.25 (q, $J = 7.2$ Hz, 1H), 3.14-3.04 (m, 2H), 2.27 (s, 3H), 1.58 (d, $J = 7.2$ Hz, 3H), 1.21 (dd, $J = 6.9, 1.8$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 148.0, 144.7, 137.8, 135.8, 133.2, 130.2, 126.5, 125.9, 125.7, 122.7, 40.6, 27.3, 22.7 (d, $J = 1.4$ Hz), 22.2, 19.7. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{21}\text{H}_{28}\text{O}$ 295.2067; Found 295.2065.



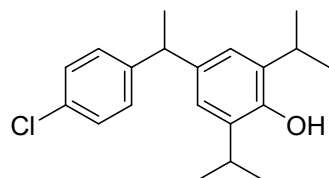
2,6-diisopropyl-4-(1-(*p*-tolyl)ethyl)phenol (3am): Prepared in 94% yield (139.3 mg) as a colourless oil. $R_f = 0.48$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.08 (q, $J = 8.2$ Hz, 4H), 6.90 (s, 2H), 4.63 (s, 1H), 4.04 (q, $J = 7.2$ Hz, 1H), 3.14-3.05 (m, 2H), 2.29 (s, 3H), 1.59 (d, $J = 7.2$ Hz, 3H), 1.23 (d, $J = 7.0$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 148.1, 144.1, 138.2, 135.1, 133.3, 128.9, 127.3, 122.6, 44.2, 27.3, 22.7, 22.4, 20.9. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{21}\text{H}_{28}\text{O}$ 295.2067; Found 295.2063.



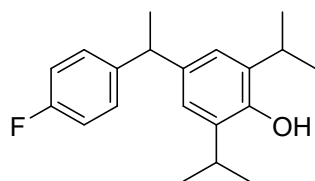
2,6-diisopropyl-4-(1-(4-methoxyphenyl)ethyl)phenol (3an)⁶: Prepared in 81% yield (125.6 mg) as a colourless oil. $R_f = 0.32$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.13 (d, $J = 8.7$ Hz, 2H), 6.89 (s, 2H), 6.81 (d, $J = 8.7$ Hz, 2H), 4.68 (s, 1H), 4.03 (q, $J = 7.2$ Hz, 1H), 3.76 (s, 3H), 3.16-3.06 (m, 2H), 1.58 (d, $J = 7.3$ Hz, 3H), 1.22 (d, $J = 6.9$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 157.6, 148.1, 139.2, 138.4, 133.3, 128.3, 122.5, 113.6, 55.2, 43.7, 27.3, 22.7 (d, $J = 1.8$ Hz), 22.5.



4-(1-(4-hydroxyphenyl)ethyl)-2,6-diisopropylphenol (3ao): Prepared in 72% yield (107.2 mg) as a white solid; m.p.89-91 °C. $R_f = 0.27$ (petroleum ether/ethyl acetate = 3/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.06 (d, $J = 8.2$ Hz, 2H), 6.88 (s, 2H), 6.72 (d, $J = 8.3$ Hz, 2H), 5.35 (s, 1H), 4.75 (s, 1H), 4.01 (q, $J = 7.2$ Hz, 1H), 3.16-3.06 (m, 2H), 1.57 (d, $J = 7.2$ Hz, 3H), 1.21 (d, $J = 6.9$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 153.4, 148.0, 139.3, 138.5, 133.4, 128.6, 122.5, 115.0, 43.7, 27.3, 22.7(d, $J = 1.6$ Hz), 22.5. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{20}\text{H}_{26}\text{O}_2$ 297.1860; Found 297.1857.

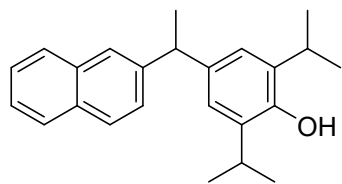


4-(1-(4-chlorophenyl)ethyl)-2,6-diisopropylphenol (3ap): Prepared in 79% yield (125.6 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.22 (d, $J = 8.5$ Hz, 2H), 7.13 (d, $J = 8.4$ Hz, 2H), 6.86 (s, 2H), 4.67 (s, 1H), 4.05 (q, $J = 7.2$ Hz, 1H), 3.16-3.06 (m, 2H), 1.58 (d, $J = 7.2$ Hz, 3H), 1.23 (d, $J = 6.9$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 148.3, 145.6, 137.5, 133.5, 131.4, 128.9, 128.3, 122.5, 44.0, 27.3, 22.7(d, $J = 2.0$ Hz), 22.2. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{20}\text{H}_{25}\text{ClO}$ 315.1521; Found 315.1522.

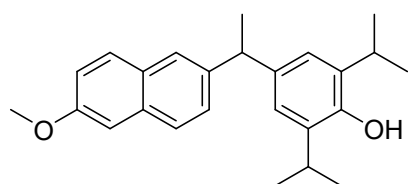


4-(1-(4-fluorophenyl)ethyl)-2,6-diisopropylphenol (3aq): Prepared in 94% yield (140.8 mg) as a colourless oil. $R_f = 0.46$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.16 (dd, $J = 8.5, 5.5$ Hz, 2H), 6.94 (t, $J = 8.7$ Hz, 2H), 6.87 (s, 2H), 4.68 (s, 1H), 4.06 (q, $J = 7.2$ Hz, 1H), 3.16-3.06 (m, 2H), 1.59 (d, $J = 7.2$ Hz, 3H), 1.23 (d, $J = 6.9$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 161.1 (d, $J = 243.4$ Hz), 148.2, 142.7 (d, $J = 3.2$ Hz), 137.9, 133.4, 128.8 (d, $J = 7.7$ Hz), 122.5, 114.9 (d,

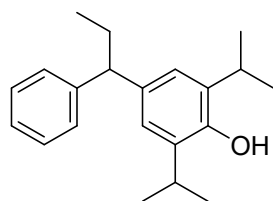
$J = 21.0$ Hz), 43.8, 27.3, 22.7 (d, $J = 1.8$ Hz), 22.4. ^{19}F NMR (377 MHz, CDCl_3) δ - 117.8. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{20}\text{H}_{25}\text{FO}$ 299.1817; Found 299.1815.



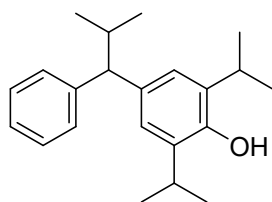
2,6-diisopropyl-4-(1-(naphthalen-2-yl)ethyl)phenol (3ar): Prepared in 95% yield (158.2 mg) as a white solid; m.p. 112-114 °C. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 8.14 (dd, $J = 7.6, 2.0$ Hz, 1H), 7.82 (dd, $J = 7.7, 1.8$ Hz, 1H), 7.69 (d, $J = 8.1$ Hz, 1H), 7.47-7.37 (m, 3H), 7.35-7.30 (m, 1H), 6.95 (s, 2H), 4.88 (q, $J = 7.1$ Hz, 1H), 4.64 (s, 1H), 3.13-3.03 (m, 2H), 1.73 (d, $J = 7.1$ Hz, 3H), 1.19 (t, $J = 7.0$ Hz, 12H). ^{13}C NMR (100 MHz, CDCl_3) δ 148.1, 142.7, 137.9, 133.9, 133.3, 131.6, 128.7, 126.6, 125.7, 125.5, 125.2, 124.2, 123.8, 122.8, 40.0, 27.3, 22.7 (d, $J = 6.2$ Hz). HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{24}\text{H}_{28}\text{O}$ 331.2067; Found 331.2068.



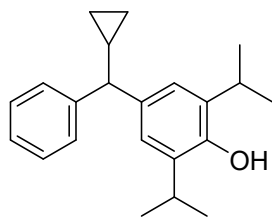
2,6-diisopropyl-4-(1-(6-methoxynaphthalen-2-yl)ethyl)phenol (3as): Prepared in 84% yield (151.7 mg) as a colourless oil. $R_f = 0.36$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.70-7.58 (m, 3H), 7.29 (dd, $J = 8.5, 1.9$ Hz, 1H), 7.14-7.06 (m, 2H), 6.94 (s, 2H), 4.67 (s, 1H), 4.20 (q, $J = 7.2$ Hz, 1H), 3.87 (s, 3H), 3.14-3.04 (m, 2H), 1.68 (d, $J = 7.2$ Hz, 3H), 1.22 (d, $J = 6.9$ Hz, 12H). ^{13}C NMR (100 MHz, CDCl_3) δ 157.2, 148.2, 142.2, 138.1, 133.3, 133.0, 129.2, 128.9, 127.3, 126.6, 125.0, 122.7, 118.5, 105.6, 55.2, 44.4, 27.3, 22.7 (d, $J = 2.7$ Hz), 22.3. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{25}\text{H}_{30}\text{O}_2$ 361.2173; Found 361.2172.



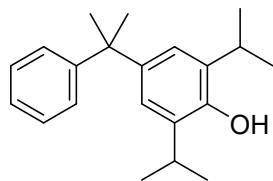
2,6-diisopropyl-4-(1-(6-methoxynaphthalen-2-yl)ethyl)phenol (3at): Prepared in 87% yield (128.1 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.28-7.21 (m, 4H), 7.18-7.11 (m, 1H), 6.91 (s, 2H), 4.63 (s, 1H), 3.71 (t, $J = 7.8$ Hz, 1H), 3.15-3.10 (m, 2H), 2.07-1.99 (m, 2H), 1.23 (dd, $J = 6.9, 1.5$ Hz, 12H), 0.88 (t, $J = 7.3$ Hz, 3H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 148.1, 145.7, 137.0, 133.2, 128.2, 127.8, 125.7, 122.8, 53.1, 29.1, 27.3, 22.7, 12.9. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{21}\text{H}_{28}\text{O}$ 295.2067; Found 295.2066.



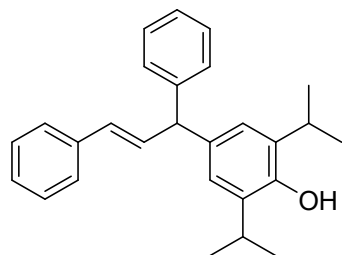
2,6-diisopropyl-4-(2-methyl-1-phenylpropyl)phenol (3au): Prepared in 83% yield (128.5 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.29-7.21 (m, 4H), 7.11 (t, $J = 7.0$ Hz, 1H), 6.94 (s, 2H), 4.59 (s, 1H), 3.31 (d, $J = 10.7$ Hz, 1H), 3.14-3.04 (m, 2H), 2.42 (dq, $J = 17.3, 6.5$ Hz, 1H), 1.23 (dd, $J = 6.9, 2.3$ Hz, 12H), 0.85 (dd, $J = 8.8, 6.5$ Hz, 6H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 148.0, 145.6, 136.7, 133.2, 128.3, 127.9, 125.6, 122.9, 60.6, 32.2, 27.2, 22.8 (d, $J = 6.9$ Hz), 21.9 (d, $J = 3.6$ Hz). HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{22}\text{H}_{30}\text{O}$ 309.2224; Found 309.2223.



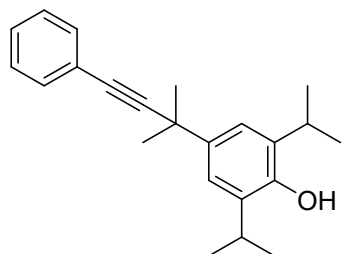
2,6-diisopropyl-4-(2-methyl-1-phenylpropyl)phenol (3av): Prepared in 87% yield (134.5 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.29-7.22 (m, 4H), 7.16 (td, $J = 6.1, 5.5, 2.7$ Hz, 1H), 6.94 (s, 2H), 4.65 (s, 1H), 3.18-3.06 (m, 3H), 1.22 (d, $J = 7.0$ Hz, 12H), 0.69-0.57 (m, 2H), 0.34-0.22 (m, 2H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 148.2, 145.7, 136.9, 133.1, 128.1, 128.1, 125.8, 123.2, 55.3, 27.3, 22.7 (d, $J = 3.1$ Hz), 17.0, 5.3 (d, $J = 14.0$ Hz). HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{22}\text{H}_{28}\text{O}$ 307.2067; Found 307.2066.



2,6-diisopropyl-4-(2-phenylpropan-2-yl)phenol (3aw): Prepared in 97% yield (143.3 mg) as a colourless oil. $R_f = 0.49$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.23 (d, $J = 1.6$ Hz, 4H), 7.16-7.10 (m, 1H), 6.91 (d, $J = 1.6$ Hz, 2H), 4.66 (s, 1H), 3.16-3.06 (m, 2H), 1.67 (s, 6H), 1.20 (d, $J = 6.9$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 151.1, 147.7, 142.3, 132.7, 127.8, 126.7, 125.3, 121.9, 42.6, 31.0, 27.4, 22.7. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{21}\text{H}_{28}\text{O}$ 295.2067; Found 295.2065.

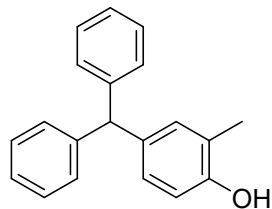


4-(1,3-diphenylallyl)-2,6-diisopropylphenol (3ax): Prepared in 68% yield (124.9 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.36 (d, $J = 7.4$ Hz, 2H), 7.32-7.16 (m, 8H), 6.92 (s, 2H), 6.66 (dd, $J = 15.8, 7.6$ Hz, 1H), 6.34 (d, $J = 15.8$ Hz, 1H), 4.82 (d, $J = 7.6$ Hz, 1H), 3.16-3.06 (m, 2H), 1.22 (d, $J = 6.9$ Hz, 12H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 148.5, 144.0, 137.5, 135.1, 133.6, 133.3, 130.8, 128.5, 128.4, 128.3, 127.1, 126.3, 126.2, 123.7, 54.0, 27.3, 22.7. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{27}\text{H}_{30}\text{O}$ 369.2224; Found 369.2223.

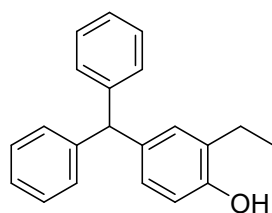


2,6-diisopropyl-4-(2-methyl-4-phenylbut-3-yn-2-yl)phenol (3ay): Prepared in 76% yield (122.1 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.47-7.42 (m, 2H), 7.35-7.26 (m, 5H), 4.72 (s,

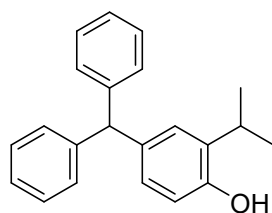
1H), 3.22-3.11 (m, 2H), 1.66 (s, 6H), 1.30 (d, $J = 6.9$ Hz, 12H). ^{13}C NMR (100 MHz, CDCl_3) δ 148.4, 138.8, 133.1, 131.5, 128.2, 127.5, 124.1, 120.7, 97.2, 36.2, 31.9, 27.5, 22.8. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{23}\text{H}_{28}\text{O}$ 319.2067; Found 319.2066.



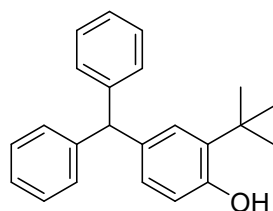
4-benzhydryl-2-methylphenol (3ba): Prepared in 80% yield (109.0 mg) as a colourless oil. $R_f = 0.32$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.28-7.22 (m, 4H), 7.20-7.14 (m, 2H), 7.11-7.07 (m, 4H), 6.87 (d, $J = 2.3$ Hz, 1H), 6.76 (dd, $J = 8.2, 2.3$ Hz, 1H), 6.60 (d, $J = 8.2$ Hz, 1H), 5.44 (s, 1H), 4.85 (s, 1H), 2.14 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 152.1, 144.2, 136.1, 132.0, 129.3, 128.2, 127.9, 126.1, 123.6, 114.6, 56.0, 15.8. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{20}\text{H}_{18}\text{O}$ 273.1285; Found 273.1284.



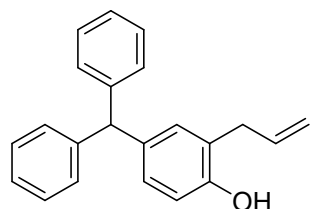
4-benzhydryl-2-ethylphenol (3ca): Prepared in 87% yield (125.9 mg) as a colourless oil. $R_f = 0.30$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.25 (dd, $J = 8.1, 6.5$ Hz, 4H), 7.19 (d, $J = 7.3$ Hz, 2H), 7.13-7.06 (m, 4H), 6.90 (d, $J = 2.3$ Hz, 1H), 6.75 (dd, $J = 8.2, 2.3$ Hz, 1H), 6.60 (d, $J = 8.2$ Hz, 1H), 5.46 (s, 1H), 4.82 (s, 1H), 2.54 (q, $J = 7.6$ Hz, 2H), 1.14 (t, $J = 7.6$ Hz, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 151.7, 144.3, 136.1, 130.4, 129.7, 129.3, 128.2, 127.7, 126.1, 114.8, 56.0, 23.0, 14.0. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{21}\text{H}_{20}\text{O}$ 287.1441; Found 287.1440.



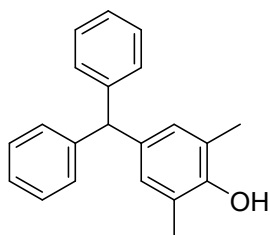
4-benzhydryl-2-isopropylphenol (3da): Prepared in 71% yield (106.8 mg) as a colourless oil. $R_f = 0.29$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.30-7.22 (m, 4H), 7.21-7.16 (m, 2H), 7.13-7.06 (m, 4H), 6.97 (d, $J = 2.3$ Hz, 1H), 6.73 (dd, $J = 8.2, 2.3$ Hz, 1H), 6.59 (d, $J = 8.2$ Hz, 1H), 5.48 (s, 1H), 4.75 (s, 1H), 3.19-3.09 (m, 1H), 1.16 (d, $J = 6.9$ Hz, 6H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 151.1, 144.4, 136.1, 134.1, 129.3, 128.2, 127.6, 127.4, 126.1, 114.9, 56.2, 27.1, 22.5. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{22}\text{H}_{22}\text{O}$ 301.1598; Found 301.1597.



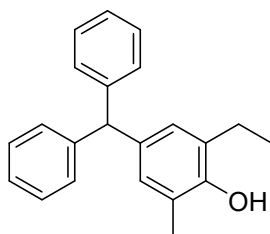
4-benzhydryl-2-(tert-butyl)phenol (3ea)⁷: Prepared in 81% yield (128.4 mg) as a colourless oil. $R_f = 0.30$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.24 (t, $J = 7.4$ Hz, 4H), 7.20-7.13 (m, 2H), 7.10 (d, $J = 7.0$ Hz, 4H), 7.04 (d, $J = 2.3$ Hz, 1H), 6.72 (dd, $J = 8.1, 2.2$ Hz, 1H), 6.46 (d, $J = 8.1$ Hz, 1H), 5.46 (s, 1H), 1.32 (s, 9H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 152.5, 144.5, 135.7, 135.5, 129.3, 128.3, 128.2, 127.6, 126.1, 116.2, 56.3, 34.5, 29.5.



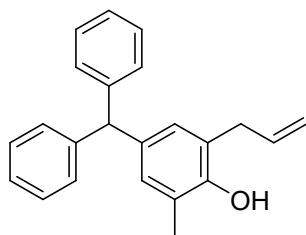
4-benzhydryl-2-methylphenol (3fa): Prepared in 73% yield (108.4 mg) as a colourless oil. $R_f = 0.29$ (petroleum ether/ethyl acetate = 10/1, v/v). $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.29-7.21 (m, 4H), 7.17 (t, $J = 7.3$ Hz, 2H), 7.09 (dd, $J = 7.2, 1.8$ Hz, 4H), 6.87 (d, $J = 2.3$ Hz, 1H), 6.81 (dd, $J = 8.2, 2.3$ Hz, 1H), 6.68 (d, $J = 8.2$ Hz, 1H), 5.95 (ddt, $J = 16.7, 10.2, 6.3$ Hz, 1H), 5.46 (s, 1H), 5.14-5.05 (m, 2H), 5.02 (s, 1H), 3.31 (d, $J = 6.4$ Hz, 2H). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 152.5, 144.2, 136.4, 136.2, 131.4, 129.3, 128.7, 128.2, 126.1, 125.0, 116.4, 115.6, 56.0. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{22}\text{H}_{20}\text{O}$ 299.1441; Found 299.1440.



4-benzhydryl-2,6-dimethylphenol (3ga)⁸: Prepared in 95% yield (136.2 mg) as a white solid; m.p.124-126 °C. $R_f = 0.48$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.23 (t, $J = 7.4$ Hz, 4H), 7.17-7.12 (m, 2H), 7.12-7.07 (m, 4H), 6.70 (s, 2H), 5.40 (s, 1H), 4.60 (s, 1H), 2.11 (s, 6H). ^{13}C NMR (100 MHz, CDCl_3) δ 150.5, 144.3, 135.4, 129.4, 129.3, 128.1, 126.0, 122.8, 56.0, 15.9.

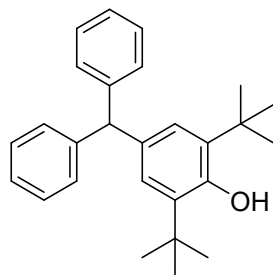


4-benzhydryl-2-ethyl-6-methylphenol (3ha): Prepared in 93% yield (141.1 mg) as a white solid; m.p.148-150 °C. $R_f = 0.52$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.26 (dd, $J = 8.1, 6.7$ Hz, 4H), 7.22-7.16 (m, 2H), 7.11 (dd, $J = 7.0, 1.8$ Hz, 4H), 6.81-6.65 (m, 2H), 5.43 (s, 1H), 4.53 (s, 1H), 2.55 (q, $J = 7.6$ Hz, 2H), 2.16 (s, 3H), 1.16 (t, $J = 7.5$ Hz, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 150.1, 144.4, 135.6, 129.3, 128.2, 128.0, 126.1, 122.7, 56.2, 23.2, 16.0, 14.1. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{22}\text{H}_{22}\text{O}$ 301.1598; Found 301.1597.

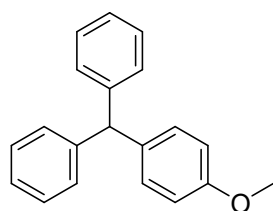


2-allyl-4-benzhydryl-6-methylphenol (3ia): Prepared in 89% yield (140.1 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.24 (t, $J = 7.5$ Hz, 4H), 7.17 (d, $J = 7.3$ Hz, 2H), 7.10 (d, $J = 6.8$ Hz, 4H), 6.73 (dd, $J = 23.1, 2.3$ Hz, 2H), 5.93 (ddt, $J = 16.6, 10.0, 6.3$ Hz, 1H), 5.42 (s, 1H), 5.18-5.06 (m, 2H), 4.91 (s, 1H), 3.29 (d, $J = 6.4$ Hz, 2H), 2.13 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 151.0, 144.3, 136.5, 135.6, 130.2, 129.3, 129.0, 128.2, 126.1,

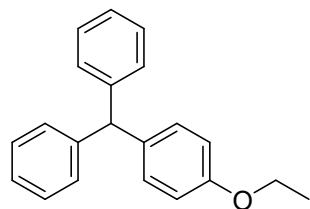
124.1, 124.0, 116.5, 56.0, 35.7, 16.0. HRMS-ESI (m/z): [M+H]⁺ Calcd for C₂₃H₂₂O 313.1598; Found 313.1599.



4-benzhydryl-2,6-di-*tert*-butylphenol (3ja)⁹: Prepared in 96% yield (178.2 mg) as a white solid; m.p.141-143 °C. R_f = 0.51 (petroleum ether/ethyl acetate = 10/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.24 (dd, *J* = 8.3, 6.8 Hz, 4H), 7.18-7.09 (m, 6H), 6.91 (s, 2H), 5.45 (s, 1H), 5.06 (s, 1H), 1.35 (s, 18H). ¹³C NMR (100 MHz, CDCl₃) δ 152.1, 144.8, 135.4, 134.1, 129.4, 128.1, 126.0, 56.8, 34.3, 30.3.

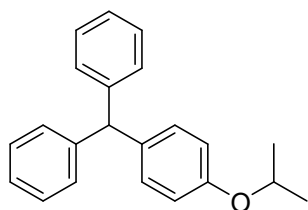


((4-methoxyphenyl)methylene)dibenzene (5aa)¹⁰: Prepared in 59% yield (80.6 mg) as a colourless oil. R_f = 0.44 (petroleum ether/ethyl acetate = 50/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.28-7.24 (m, 4H), 7.21-7.18 (m, 2H), 7.10 (dd, *J* = 7.0, 1.8 Hz, 4H), 7.04-6.99 (m, 2H), 6.84-6.77 (m, 2H), 5.49 (s, 1H), 3.75 (s, 3H). ¹³C NMR (100 MHz, CDCl₃) δ 157.9, 144.2, 136.0, 130.3, 129.3, 128.2, 126.2, 113.6, 55.9, 55.1.

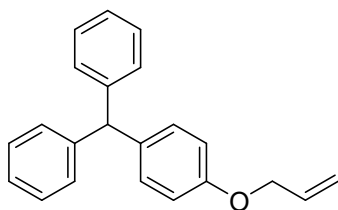


((4-ethoxyphenyl)methylene)dibenzene (5ab)¹¹: Prepared in 72% yield (103.6 mg) as a colourless oil. R_f = 0.48 (petroleum ether/ethyl acetate = 50/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.25 (dd, *J* = 8.2, 6.6 Hz, 4H), 7.20-7.15 (m, 2H), 7.13-7.04 (m, 4H), 7.04-6.96 (m, 2H), 6.84-6.76 (m, 2H), 5.48 (s, 1H), 3.97 (q, *J* = 7.0 Hz, 2H), 1.37 (t, *J*

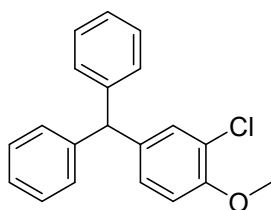
= 7.0 Hz, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 157.3, 144.2, 135.9, 130.3, 129.3, 128.2, 126.1, 114.1, 63.3, 56.0, 14.8.



((4-isopropoxyphenyl)methylene)dibenzene (5ac)¹²: Prepared in 76% yield (114.2 mg) as a colourless oil. R_f = 0.49 (petroleum ether/ethyl acetate = 50/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.26 (dd, J = 8.2, 6.7 Hz, 4H), 7.19 (d, J = 7.3 Hz, 2H), 7.13-7.06 (m, 4H), 6.99 (d, J = 8.6 Hz, 2H), 6.79 (d, J = 8.6 Hz, 2H), 5.48 (s, 1H), 4.53-4.44 (m, 1H), 1.30 (d, J = 6.1 Hz, 6H). ^{13}C NMR (100 MHz, CDCl_3) δ 156.3, 144.3, 135.8, 130.3, 129.4, 128.2, 126.1, 115.5, 69.7, 56.0, 22.1.

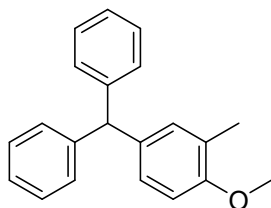


((4-allyloxy)phenyl)methylene)dibenzene (5ad): Prepared in 85% yield (127.5 mg) as a colourless oil. R_f = 0.41 (petroleum ether/ethyl acetate = 50/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.26 (dd, J = 8.1, 6.5 Hz, 4H), 7.19 (dd, J = 7.6, 1.7 Hz, 2H), 7.12-7.08 (m, 4H), 7.03-6.98 (m, 2H), 6.84-6.79 (m, 2H), 6.03 (ddd, J = 22.6, 10.6, 5.3 Hz, 1H), 5.49 (s, 1H), 5.38 (dd, J = 17.3, 1.6 Hz, 1H), 5.25 (dd, J = 10.5, 1.4 Hz, 1H), 4.48 (dt, J = 5.4, 1.6 Hz, 2H). ^{13}C NMR (100 MHz, CDCl_3) δ 157.0, 144.2, 136.2, 133.3, 130.3, 129.3, 128.2, 126.2, 117.6, 114.4, 68.7, 55.9. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{22}\text{H}_{20}\text{O}$ 299.1441; Found 299.1437.

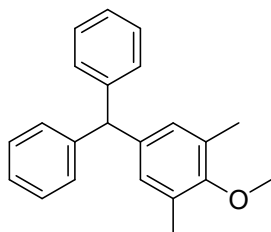


((3-chloro-4-methoxyphenyl)methylene)dibenzene (5ae)¹²: Prepared in 52% yield (80.0 mg) as a colourless oil. R_f = 0.44 (petroleum ether/ethyl acetate = 50/1, v/v). ^1H

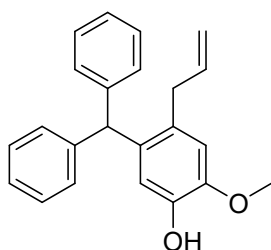
NMR (400 MHz, CDCl₃) δ 7.31-7.26 (m, 4H), 7.24-7.19 (m, 2H), 7.14-7.07 (m, 5H), 6.95 (dd, J = 8.5, 2.2 Hz, 1H), 6.83 (dd, J = 8.5, 1.0 Hz, 1H), 5.47 (s, 1H), 3.86 (d, J = 1.0 Hz, 3H). ¹³C NMR (100 MHz, CDCl₃) δ 153.4, 143.5, 137.1, 131.0, 129.3, 128.5, 128.4, 126.4, 122.1, 111.7, 56.1, 55.7.



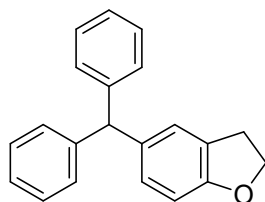
((4-methoxy-3-methylphenyl)methylene)dibenzene (5af)¹³: Prepared in 92% yield (132.0 mg) as a colourless oil. R_f = 0.44 (petroleum ether/ethyl acetate = 50/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.47 (t, J = 7.4 Hz, 4H), 7.37 (dd, J = 23.6, 7.3 Hz, 6H), 7.15 (s, 1H), 7.09 (d, J = 8.3 Hz, 1H), 6.92 (d, J = 8.3 Hz, 1H), 5.69 (s, 1H), 3.96 (s, 3H), 2.39 (s, 3H). ¹³C NMR (100 MHz, CDCl₃) δ 156.1, 144.3, 135.5, 131.7, 129.3, 128.2, 127.5, 126.3, 126.1, 109.5, 56.0, 55.1, 16.3.



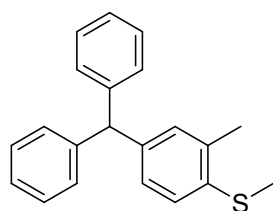
((4-methoxy-3,5-dimethylphenyl)methylene)dibenzene (5ag)¹⁴: Prepared in 86% yield (130.5 mg) as a colourless oil. R_f = 0.44 (petroleum ether/ethyl acetate = 50/1, v/v). ¹H NMR (400 MHz, CDCl₃) δ 7.24 (dd, J = 8.2, 6.7 Hz, 4H), 7.17 (d, J = 7.4 Hz, 2H), 7.13-7.08 (m, 4H), 6.74 (s, 2H), 5.42 (s, 1H), 3.66 (s, 3H), 2.19 (s, 6H). ¹³C NMR (100 MHz, CDCl₃) δ 155.3, 144.1, 138.9, 130.4, 129.7, 129.3, 128.2, 126.1, 59.5, 56.2, 16.1.



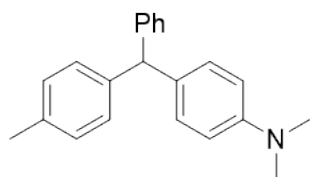
4-allyl-5-benzhydryl-2-methoxyphenol (5ah): Prepared in 90% yield (148.2 mg) as a colourless oil. $R_f = 0.32$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.23 (dd, $J = 8.2, 6.6$ Hz, 4H), 7.17 (d, $J = 7.3$ Hz, 2H), 7.08-6.98 (m, 4H), 6.66 (s, 1H), 6.47 (s, 1H), 5.90 (ddt, $J = 16.4, 10.1, 6.1$ Hz, 1H), 5.66 (s, 1H), 5.43 (s, 1H), 5.08-4.97 (m, 2H), 3.81 (s, 3H), 3.22 (d, $J = 6.1$ Hz, 2H). ^{13}C NMR (100 MHz, CDCl_3) δ 144.8, 143.7, 143.5, 137.5, 135.1, 129.4, 129.4, 128.2, 126.1, 116.4, 115.5, 112.4, 55.8, 52.0, 36.9. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{23}\text{H}_{22}\text{O}_2$ 329.1547; Found 329.1548.



5-benzhydryl-2,3-dihydrobenzofuran (5ai): Prepared in 82% yield (181.5 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.24 (dd, $J = 8.1, 6.7$ Hz, 4H), 7.19-7.14 (m, 2H), 7.10 (dd, $J = 7.1, 1.8$ Hz, 4H), 6.91 (d, $J = 1.8$ Hz, 1H), 6.82 (dd, $J = 8.3, 2.0$ Hz, 1H), 6.67 (d, $J = 8.2$ Hz, 1H), 5.46 (s, 1H), 4.47 (t, $J = 8.7$ Hz, 2H), 3.06 (t, $J = 8.7$ Hz, 2H). ^{13}C NMR (100 MHz, CDCl_3) δ 158.5, 144.3, 136.0, 129.3, 129.0, 128.2, 126.9, 126.1, 125.8, 108.8, 71.1, 56.2, 29.7. HRMS-ESI (m/z): $[\text{M}+\text{H}]^+$ Calcd for $\text{C}_{21}\text{H}_{18}\text{O}$ 286.1358; Found 286.1356.



(4-benzhydryl-2-methylphenyl)(methyl)sulfane (5aj)¹⁵: Prepared in 90% yield (130.2 mg) as a colourless oil. $R_f = 0.44$ (petroleum ether/ethyl acetate = 10/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.29-7.25 (m, 4H), 7.19 (dd, $J = 15.8, 7.9$ Hz, 4H), 7.11-7.08 (m, 4H), 7.03 (d, $J = 8.3$ Hz, 2H), 5.50 (s, 1H), 2.43 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 143.7, 140.9, 136.1, 129.9, 129.3, 128.3, 126.6, 126.3, 56.2, 15.9.



***N,N*-dimethyl-4-(phenyl(*p*-tolyl)methyl)aniline (5bk)¹⁶**: Prepared in 45% yield (67.7 mg) as a colourless oil. $R_f = 0.47$ (petroleum ether/ethyl acetate = 50/1, v/v). ^1H NMR (400 MHz, CDCl_3) δ 7.33 (t, $J = 7.2$ Hz, 2H), 7.25 (d, $J = 7.2$ Hz, 1H), 7.17 (dd, $J = 17.2, 7.5$ Hz, 4H), 7.10-7.01 (m, 4H), 6.75 (d, $J = 8.8$ Hz, 2H), 5.50 (s, 1H), 2.97 (s, 6H), 2.38 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 148.8, 144.8, 141.6, 135.5, 130.0, 129.3, 129.2, 128.9, 128.2, 128.1, 125.9, 112.6, 55.5, 40.8, 21.0.

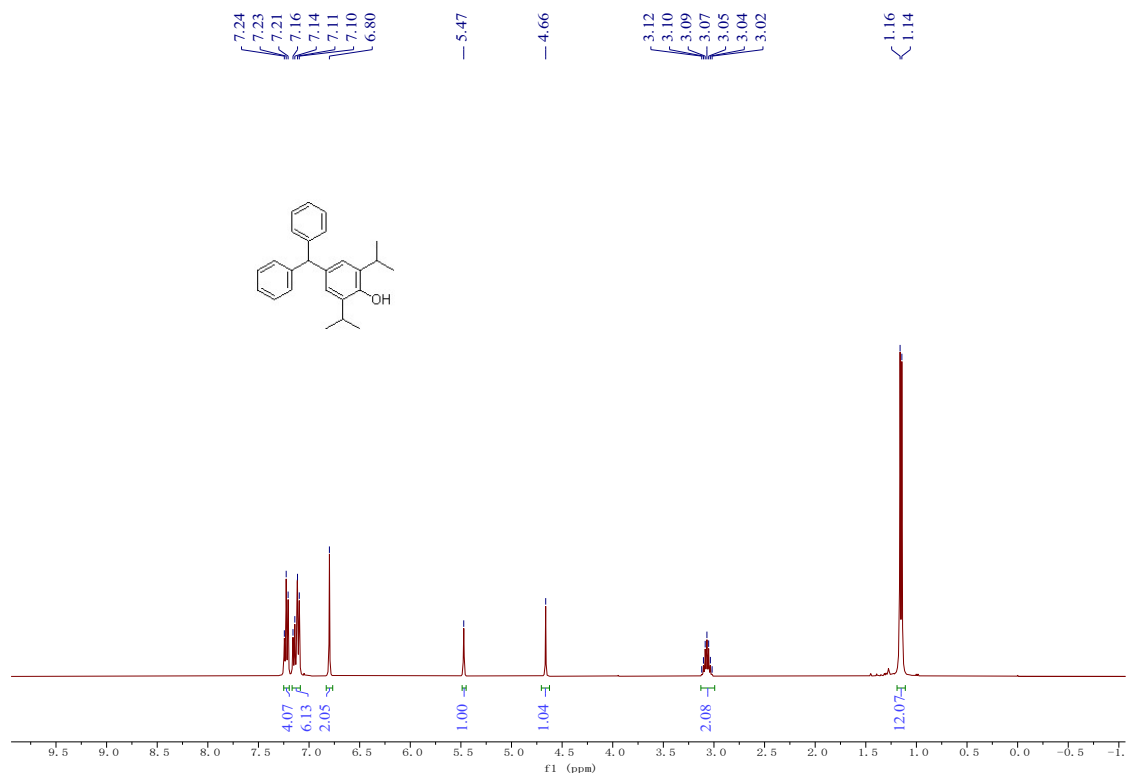
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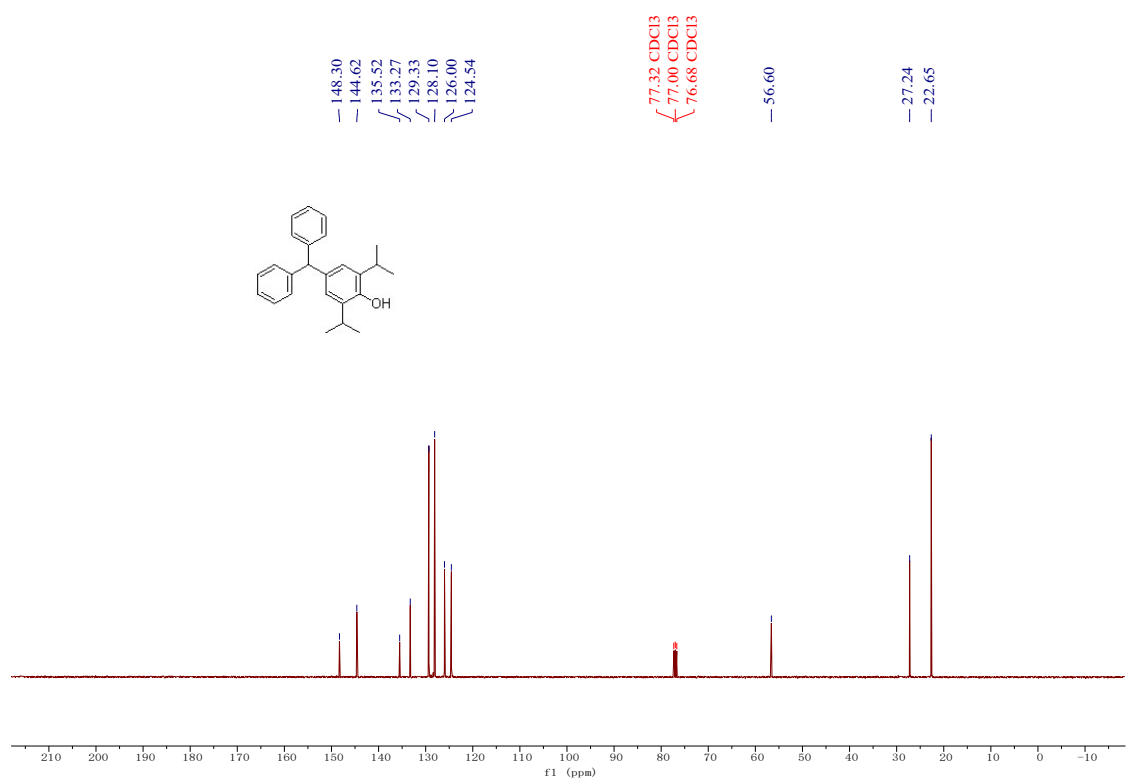
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H. NMR Spectra

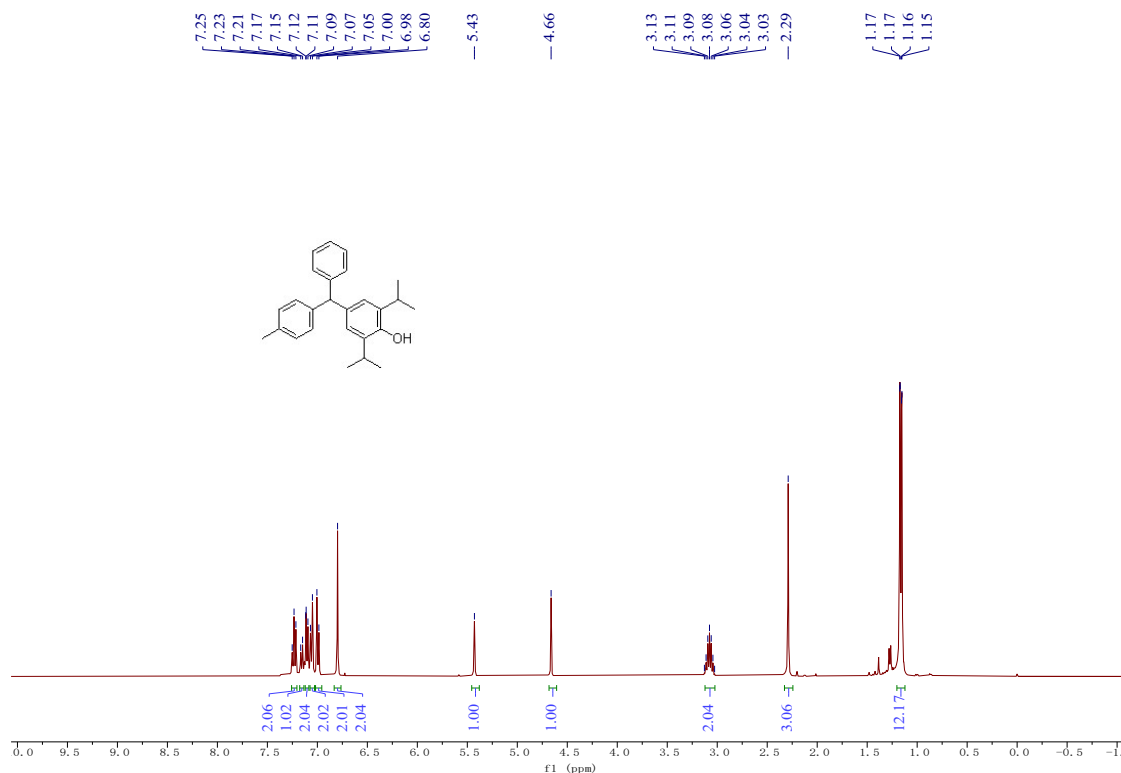
¹H NMR (400 MHz, CDCl₃) spectrum of 3aa



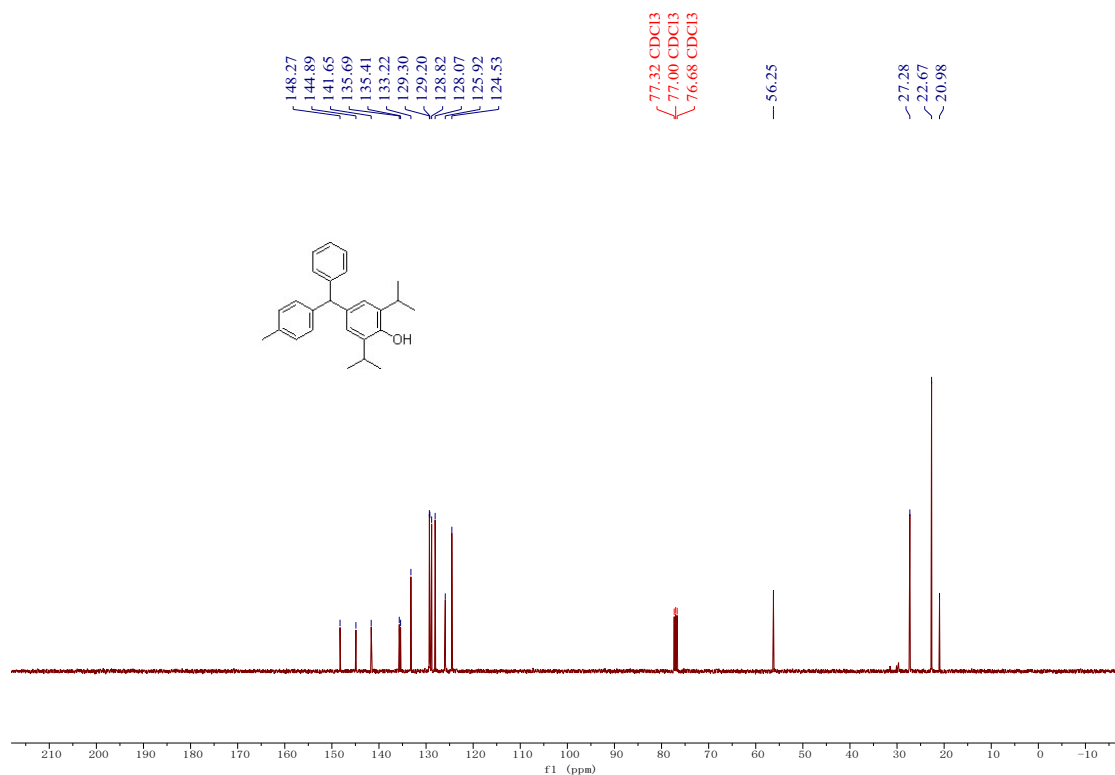
¹³C NMR (100 MHz, CDCl₃) spectrum of 3aa



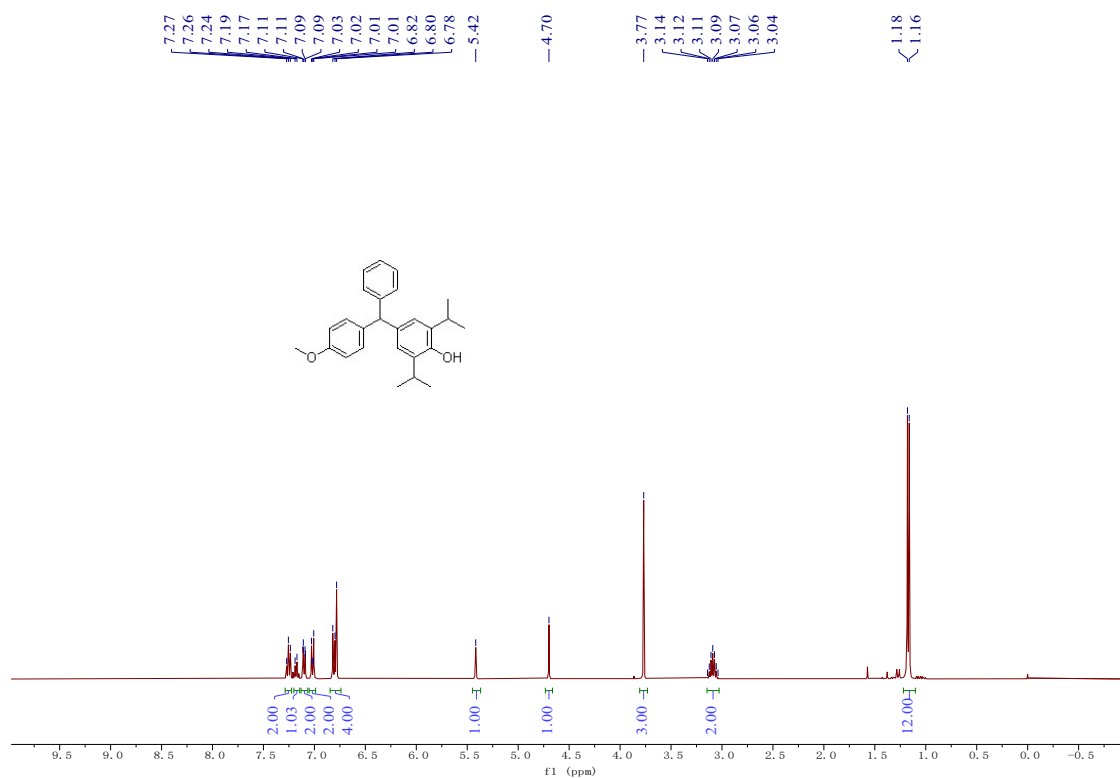
¹H NMR (400 MHz, CDCl₃) spectrum of 3ab



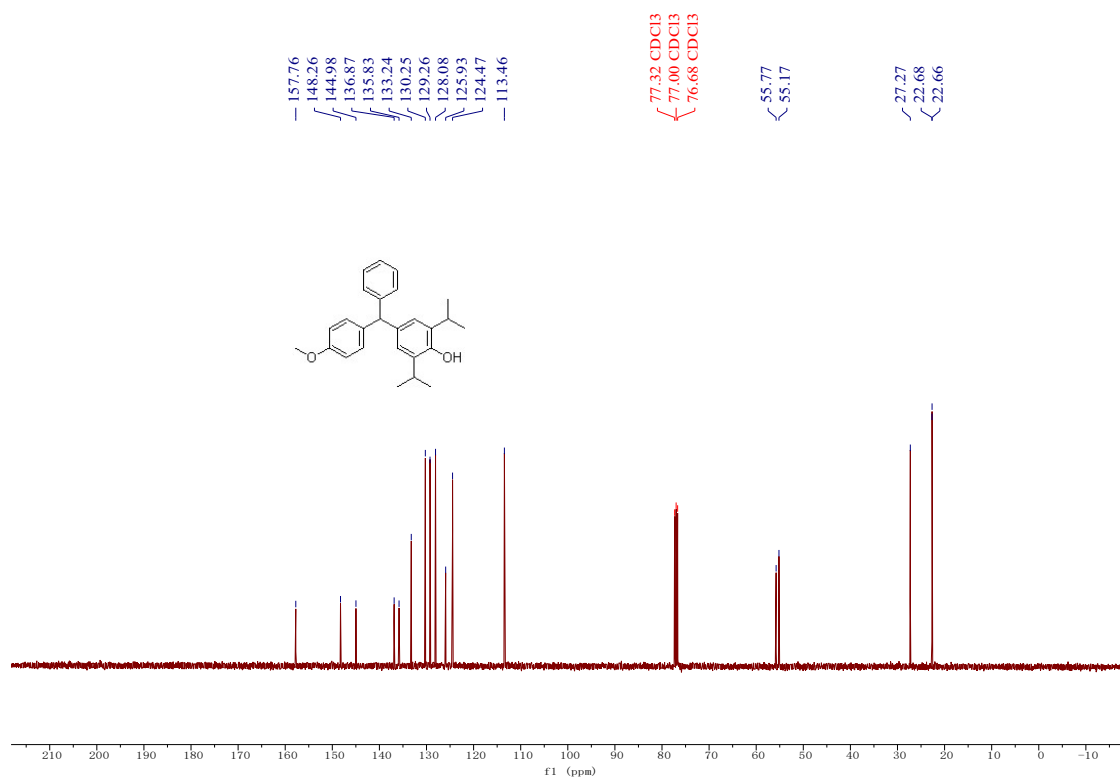
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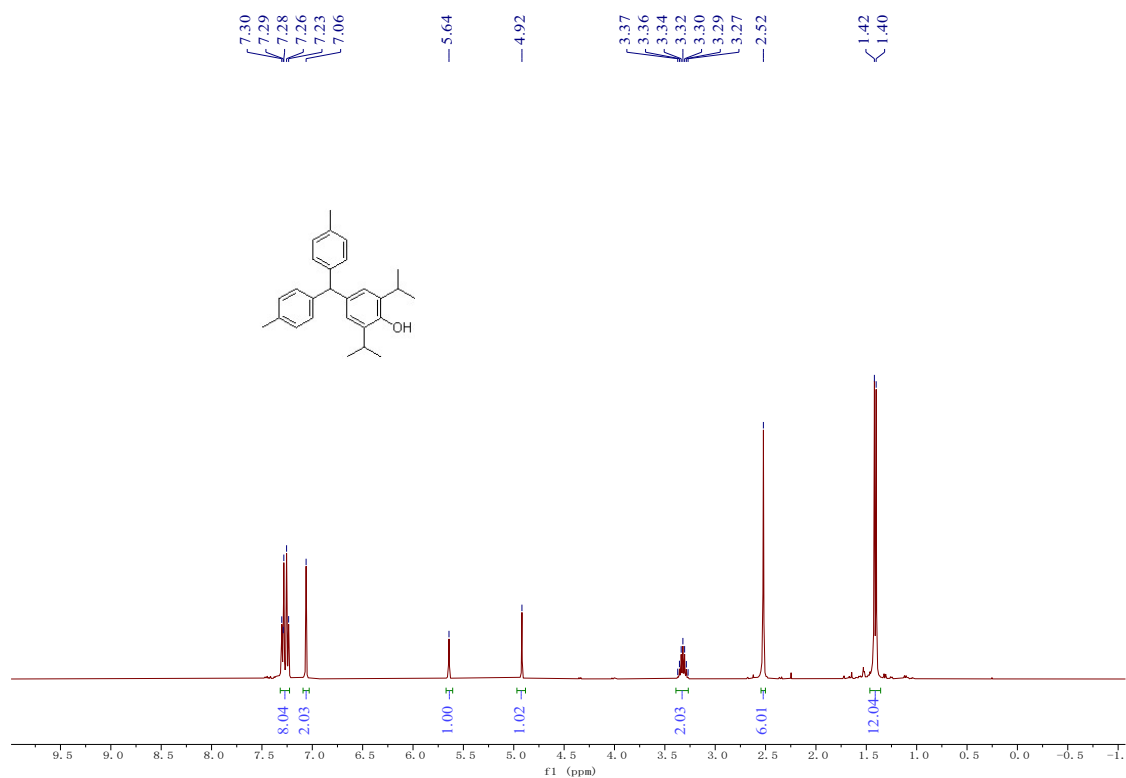
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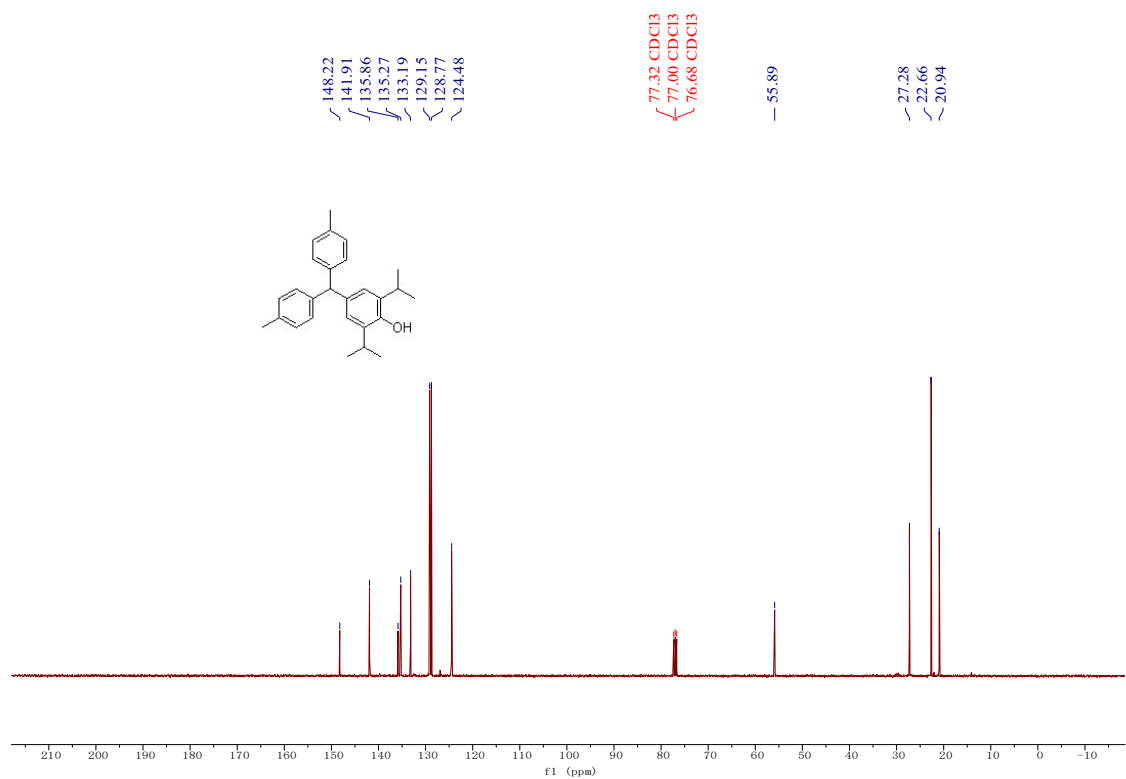
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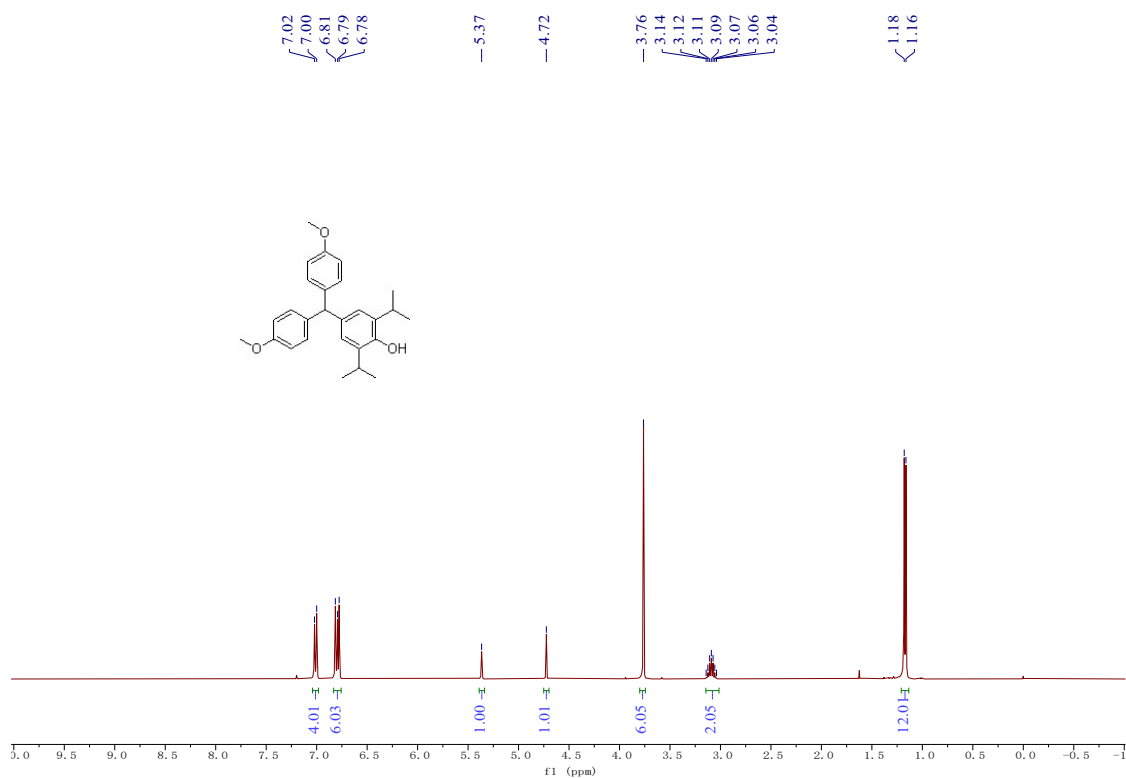
¹H NMR (400 MHz, CDCl₃) spectrum of 3ad



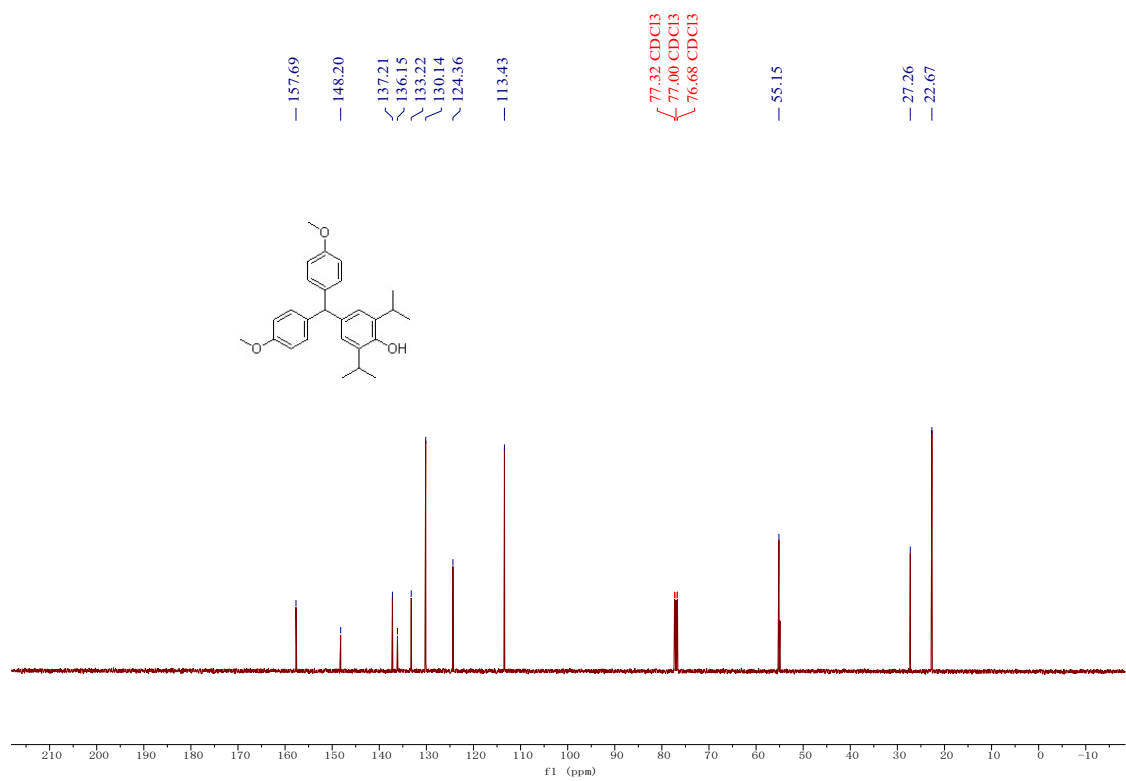
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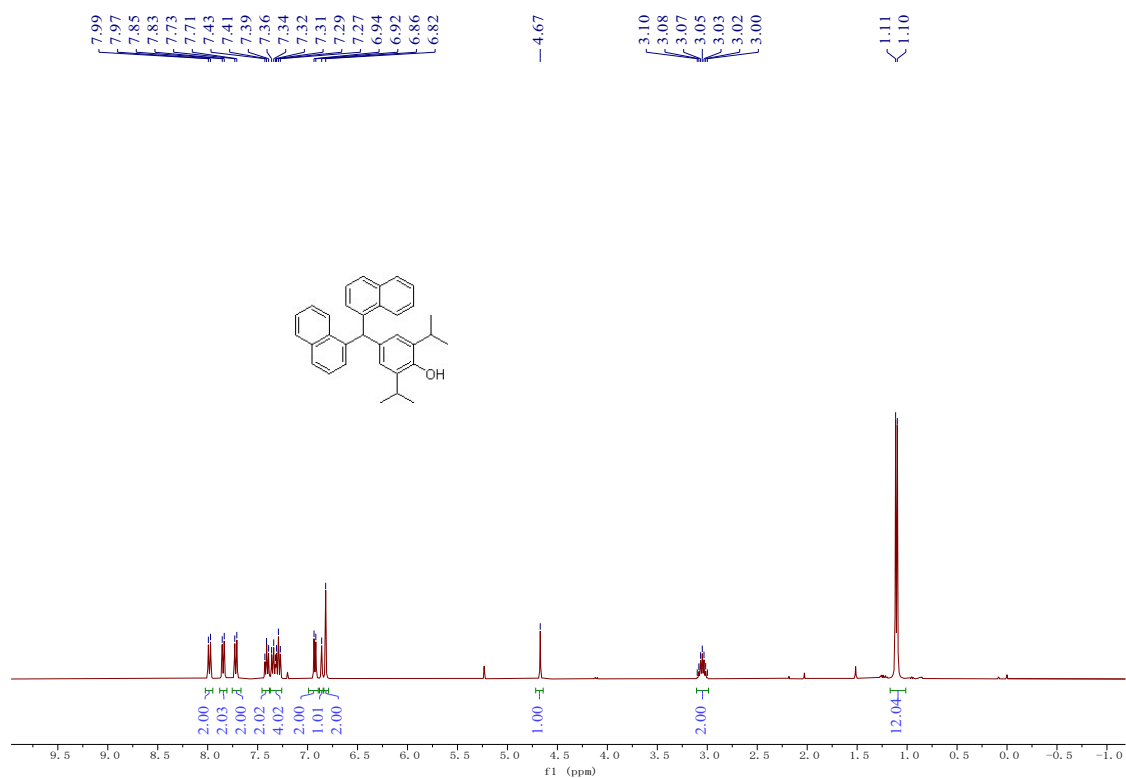
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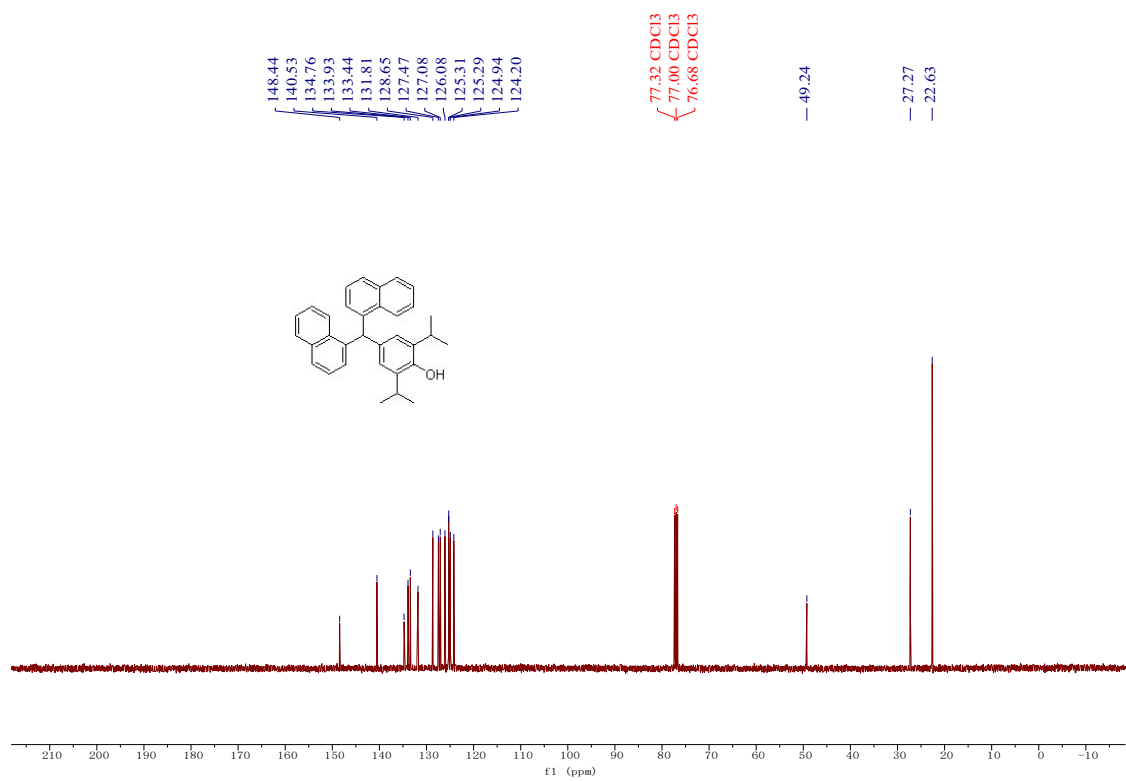
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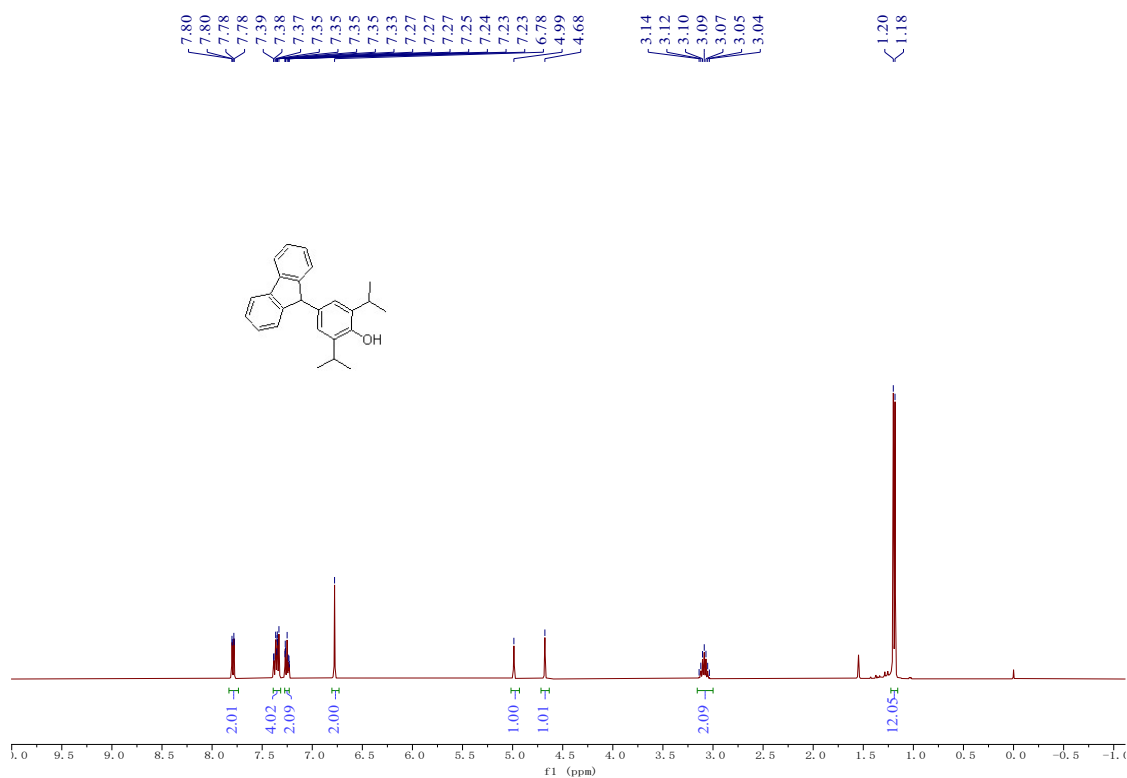
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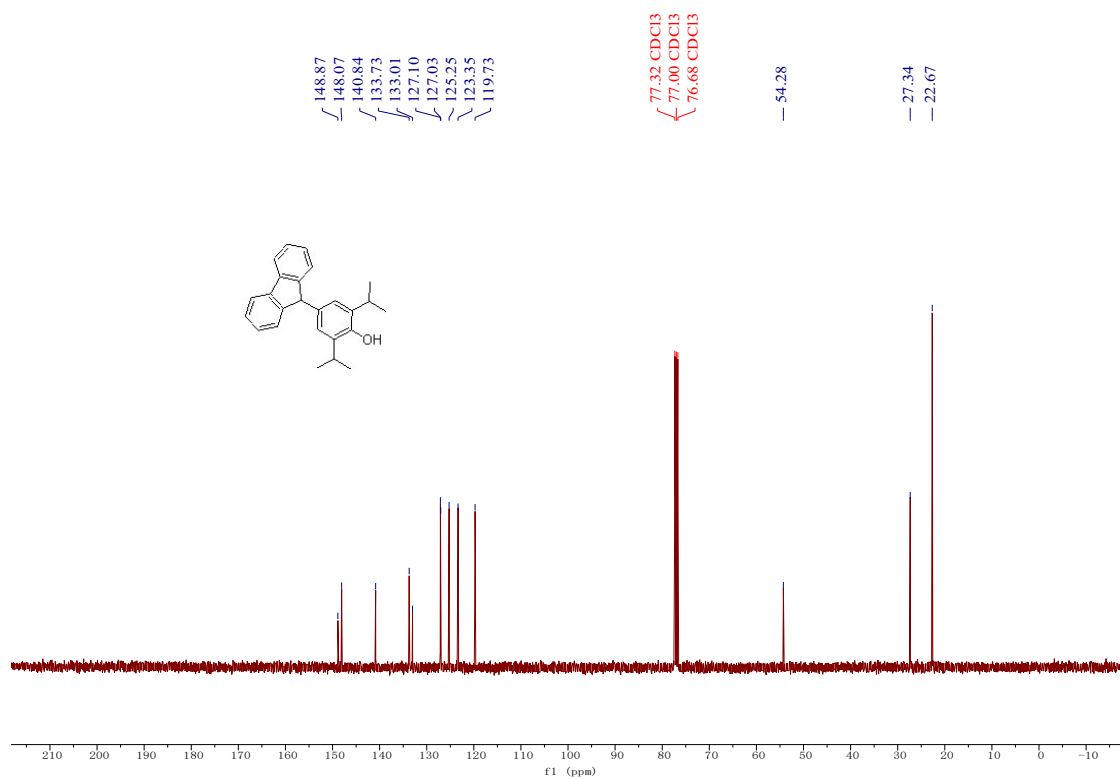
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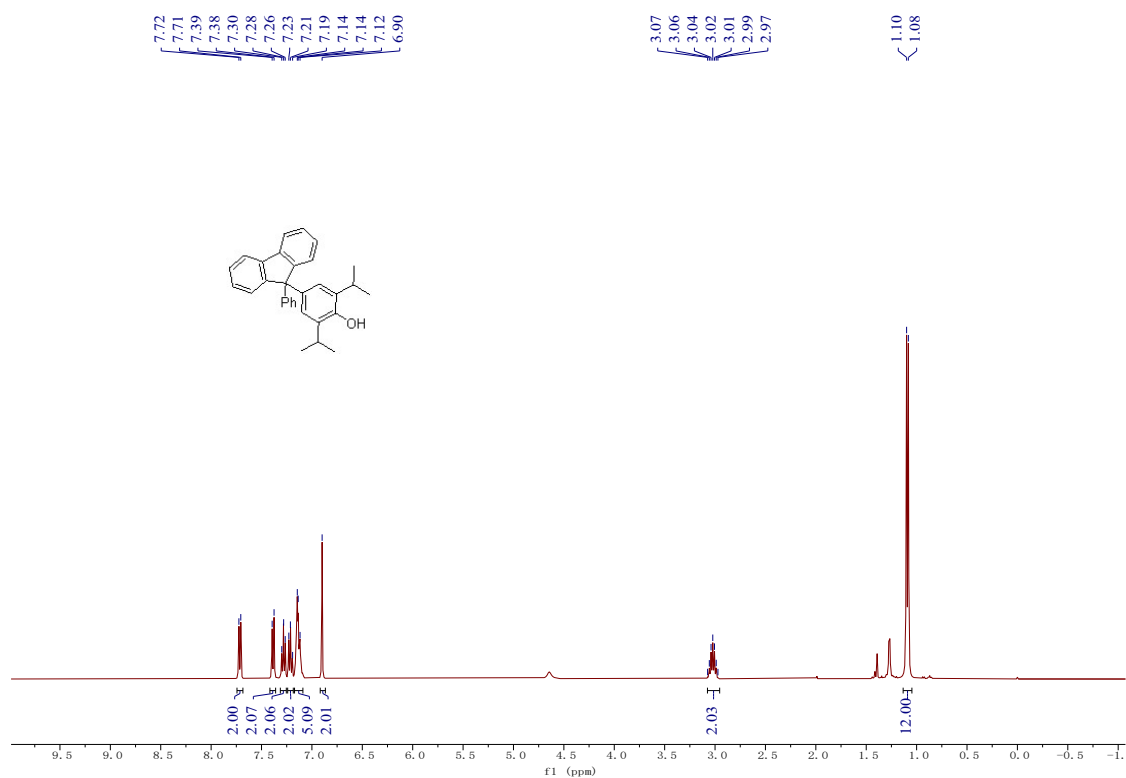
¹H NMR (400 MHz, CDCl₃) spectrum of 3ag



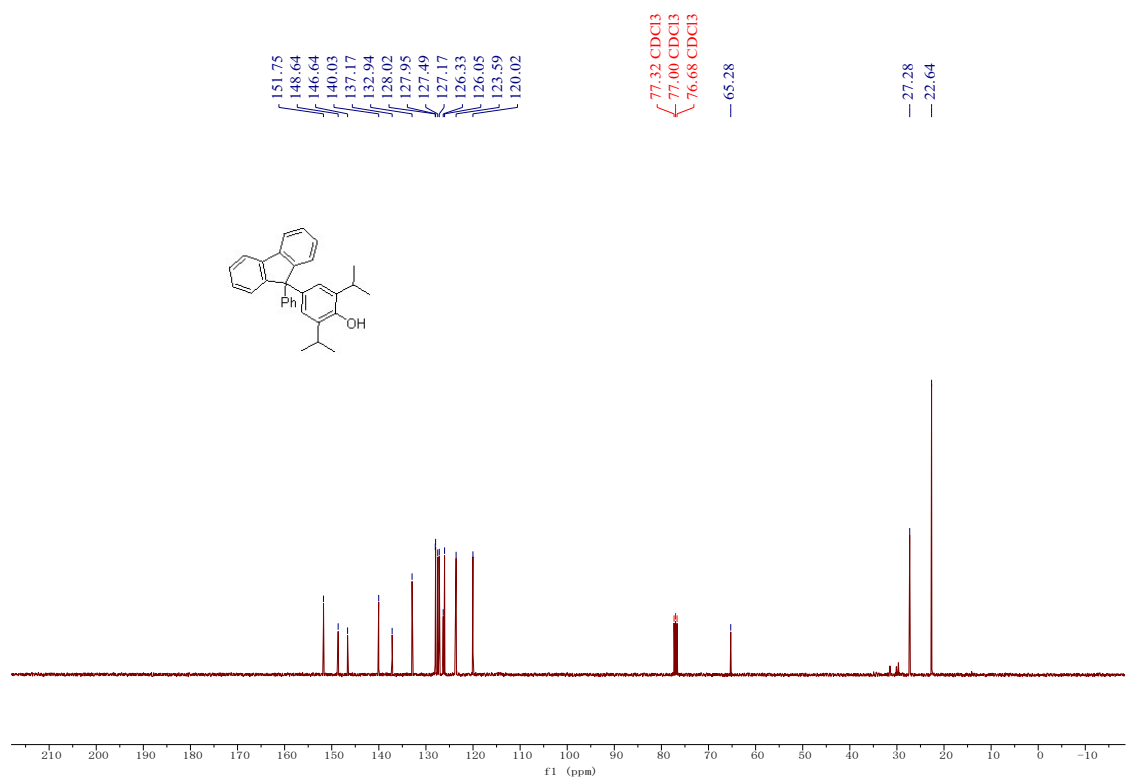
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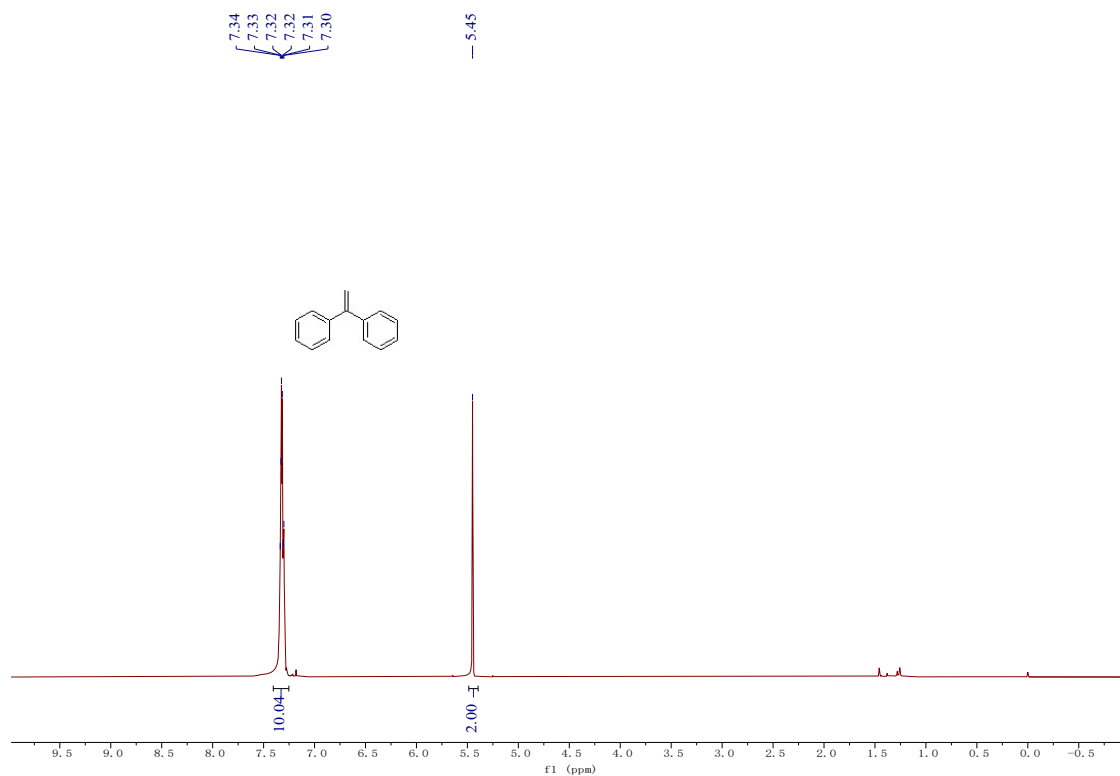
¹H NMR (400 MHz, CDCl₃) spectrum of 3ah



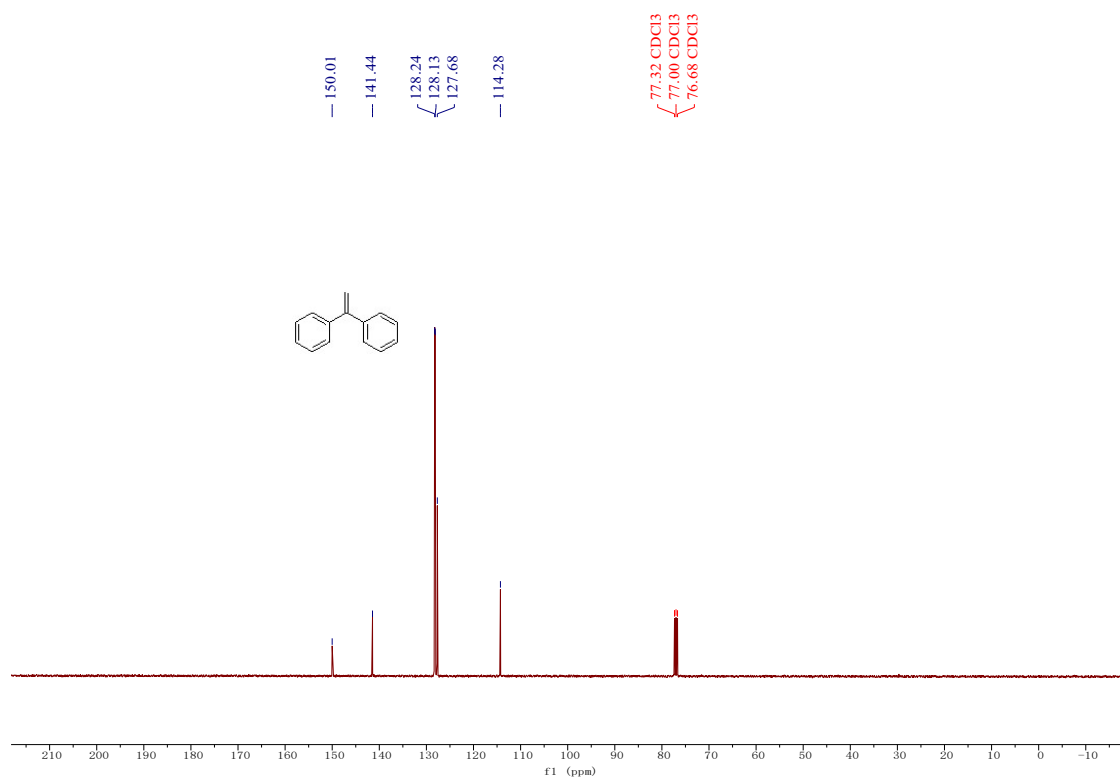
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ah



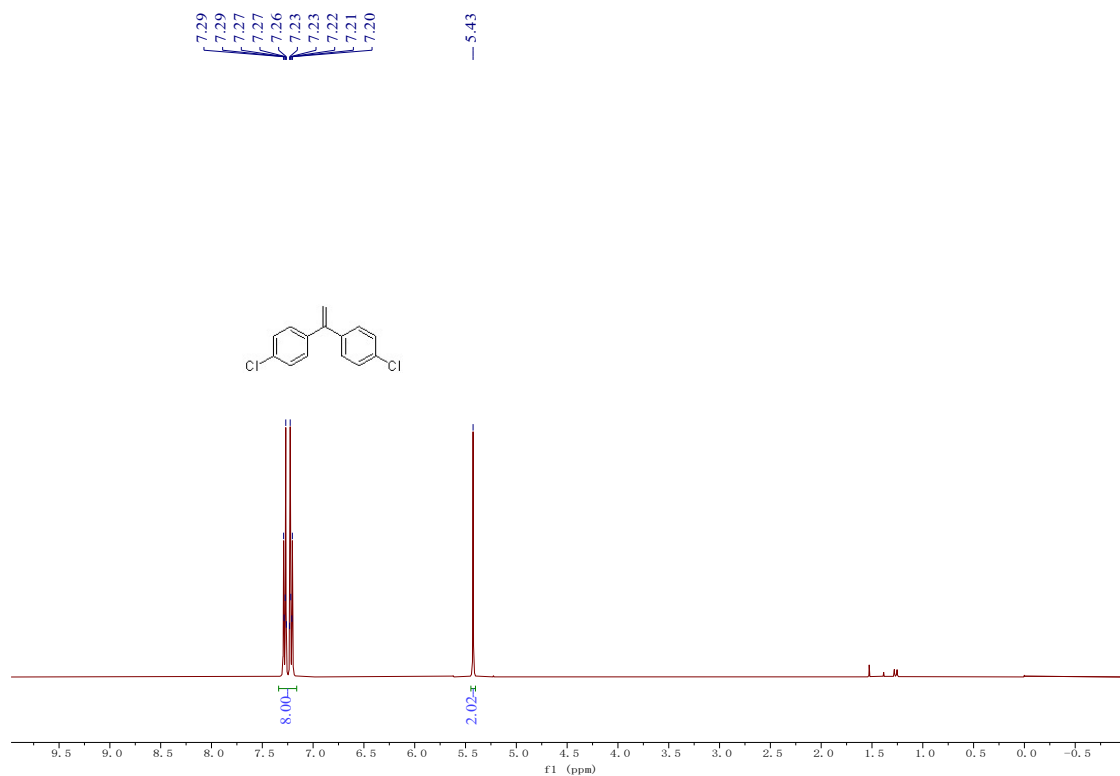
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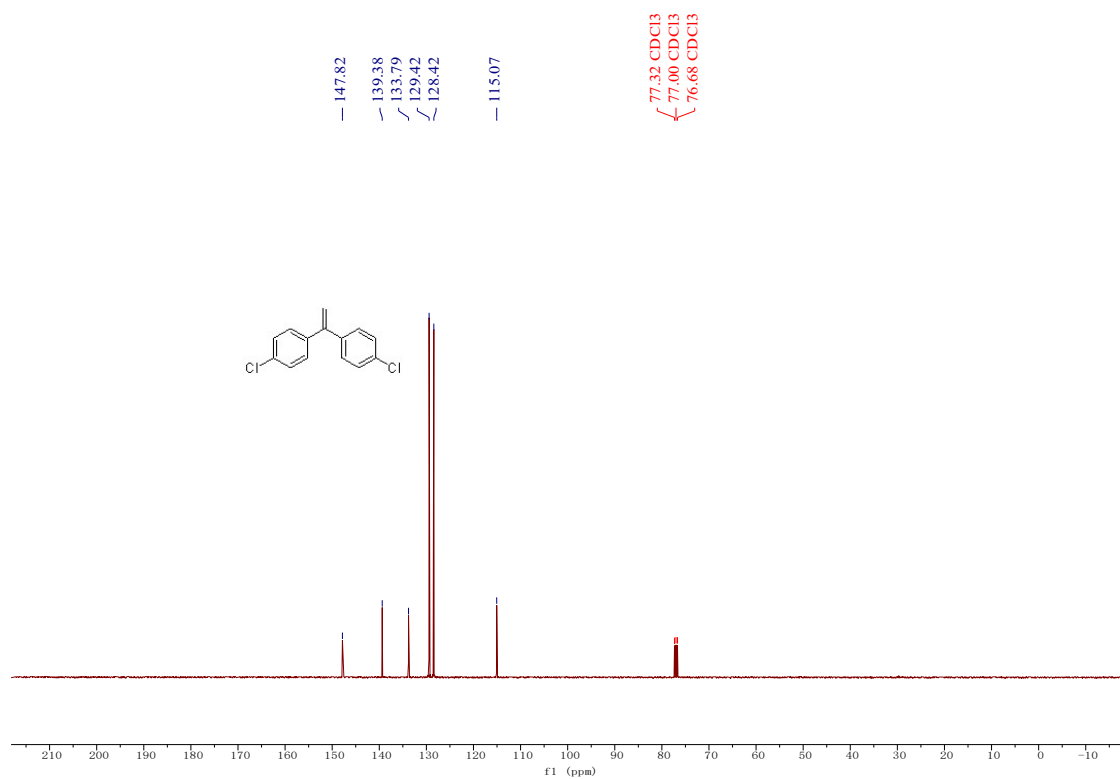
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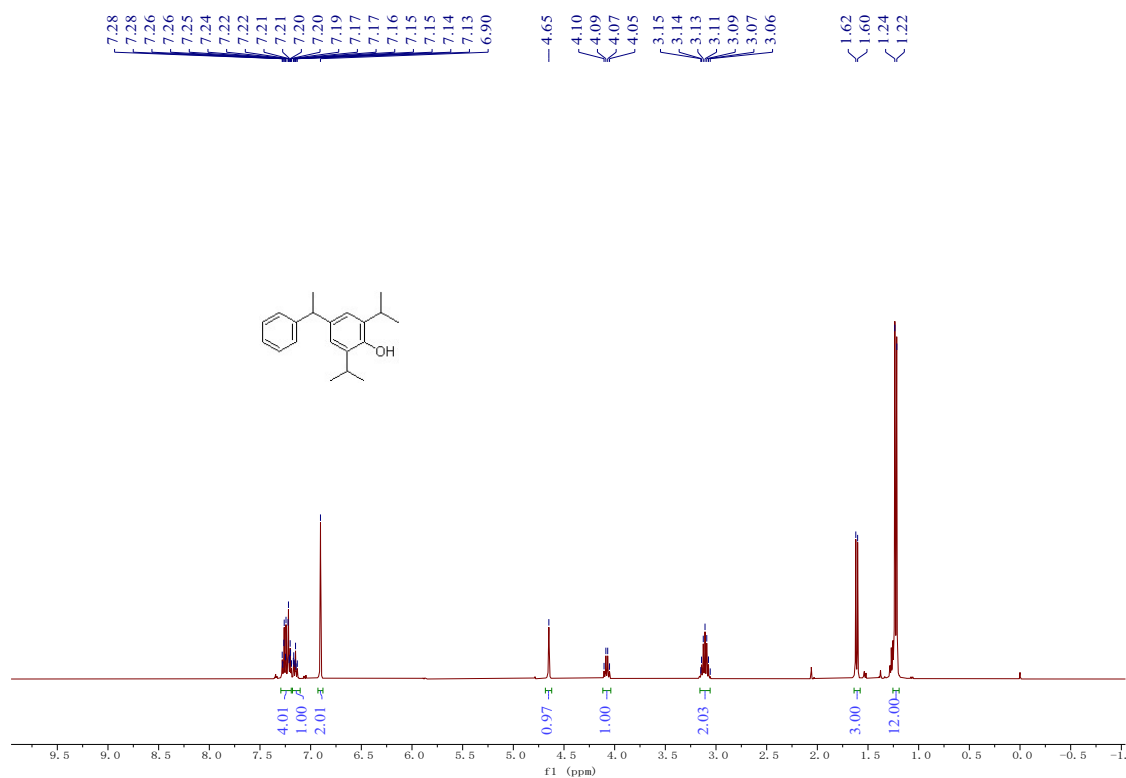
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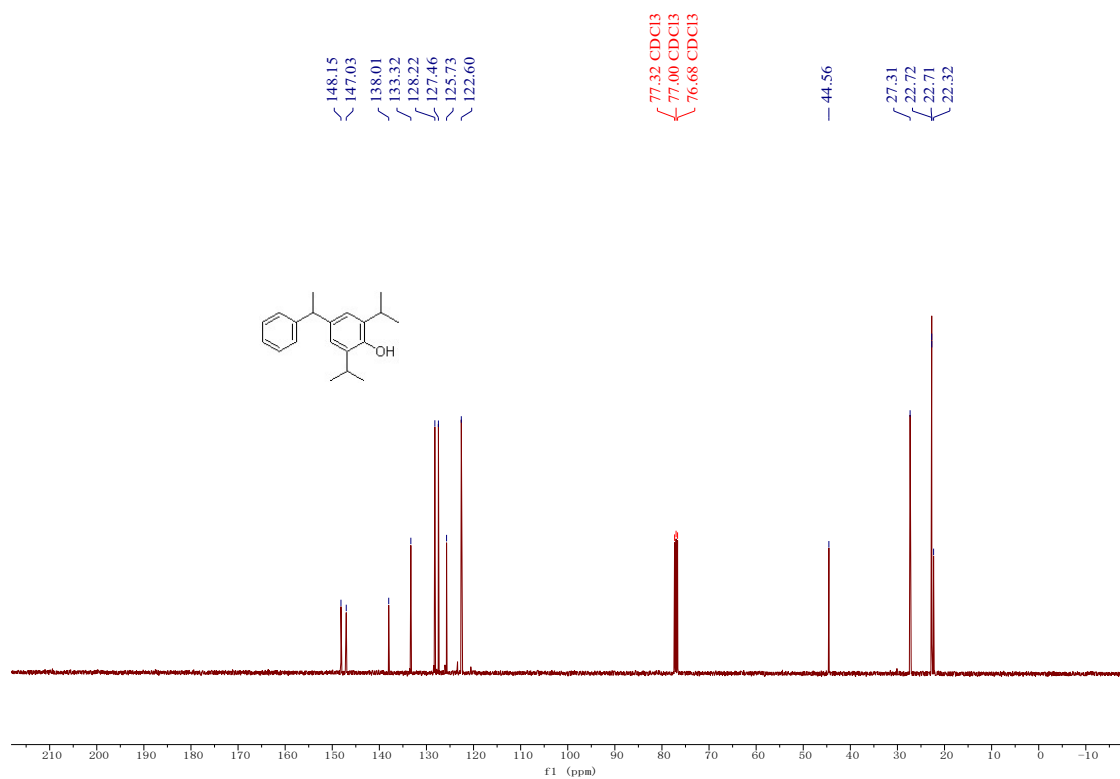
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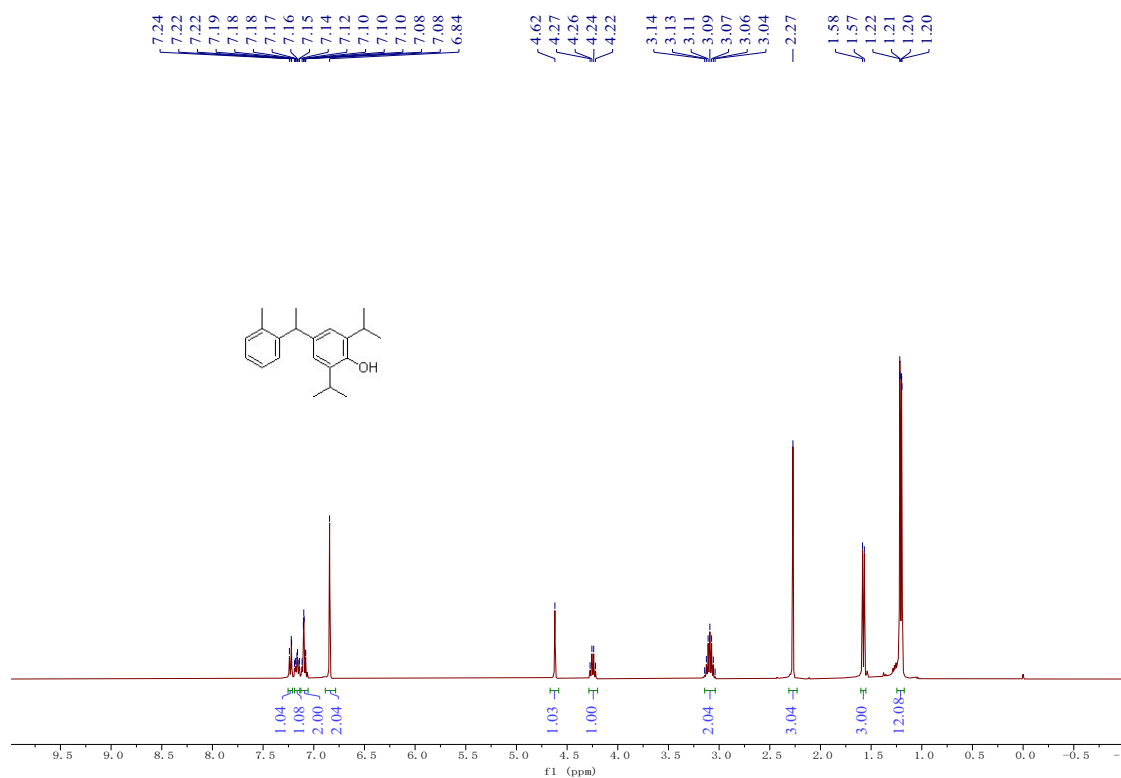
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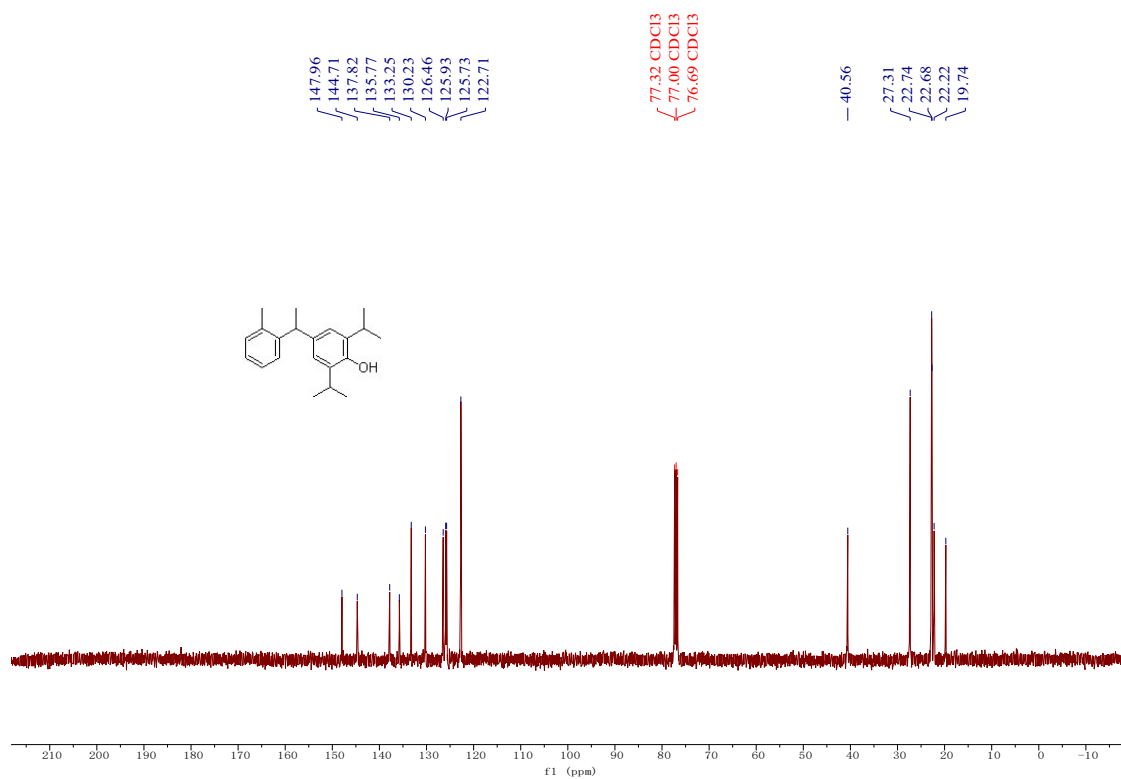
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ak



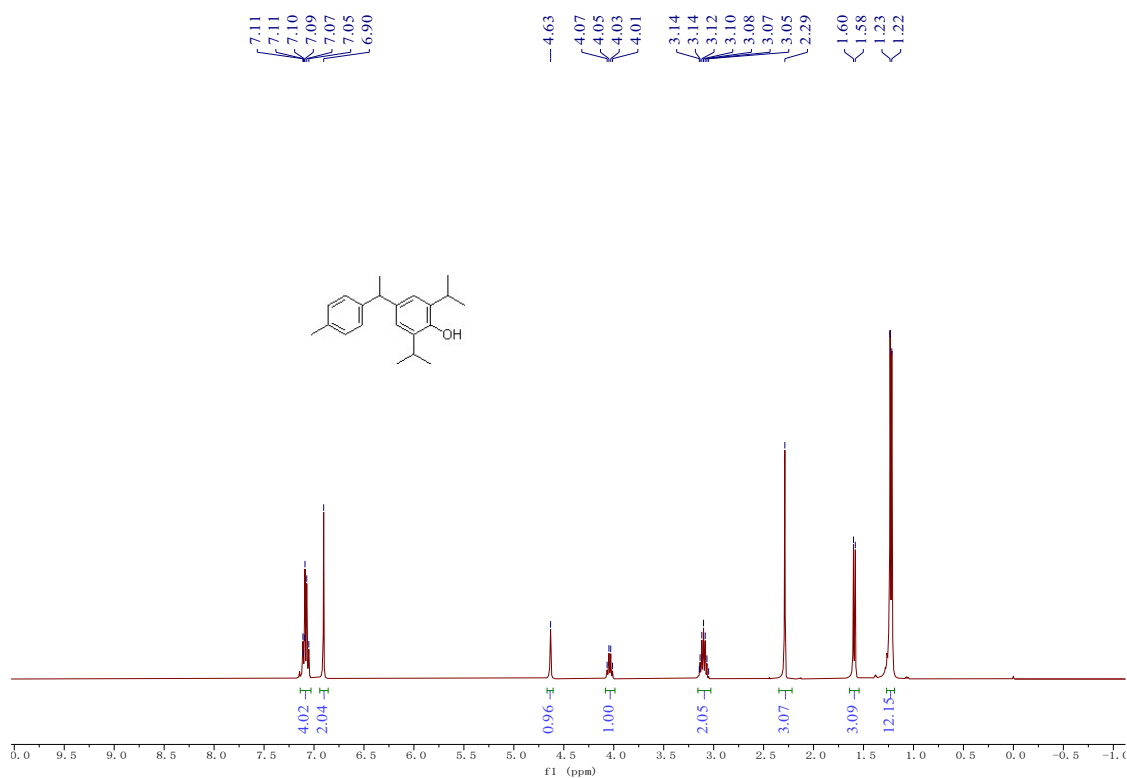
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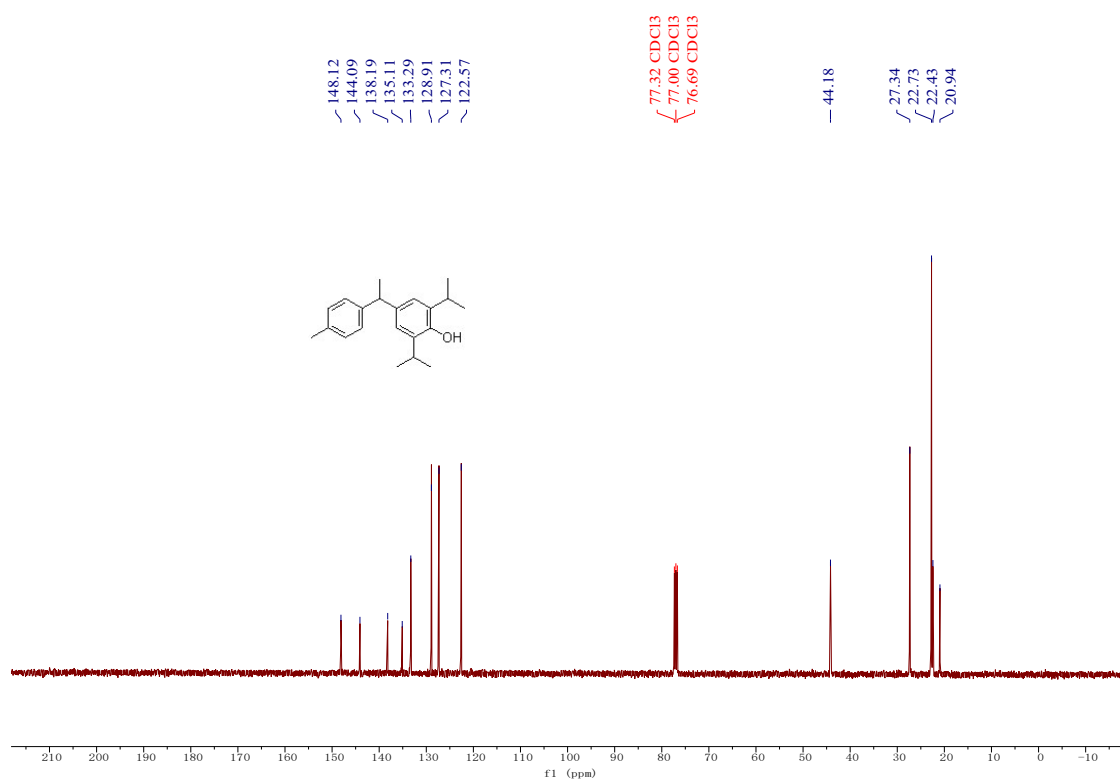
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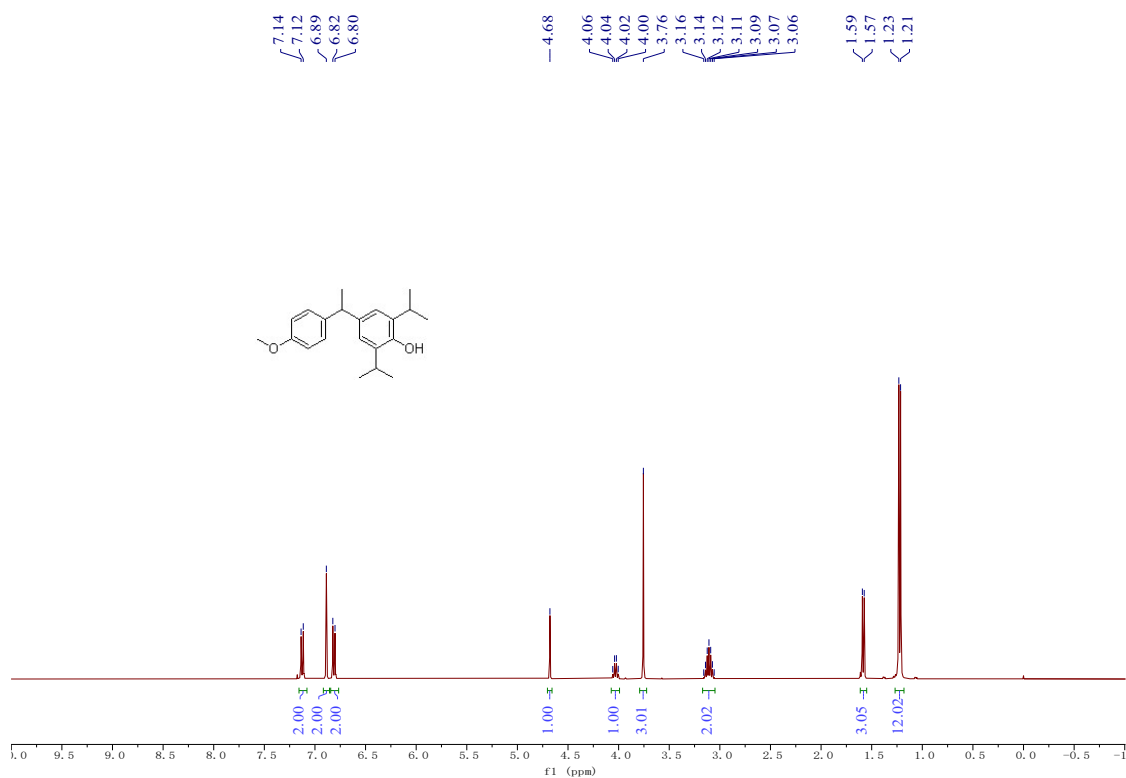
¹H NMR (400 MHz, CDCl₃) spectrum of 3am



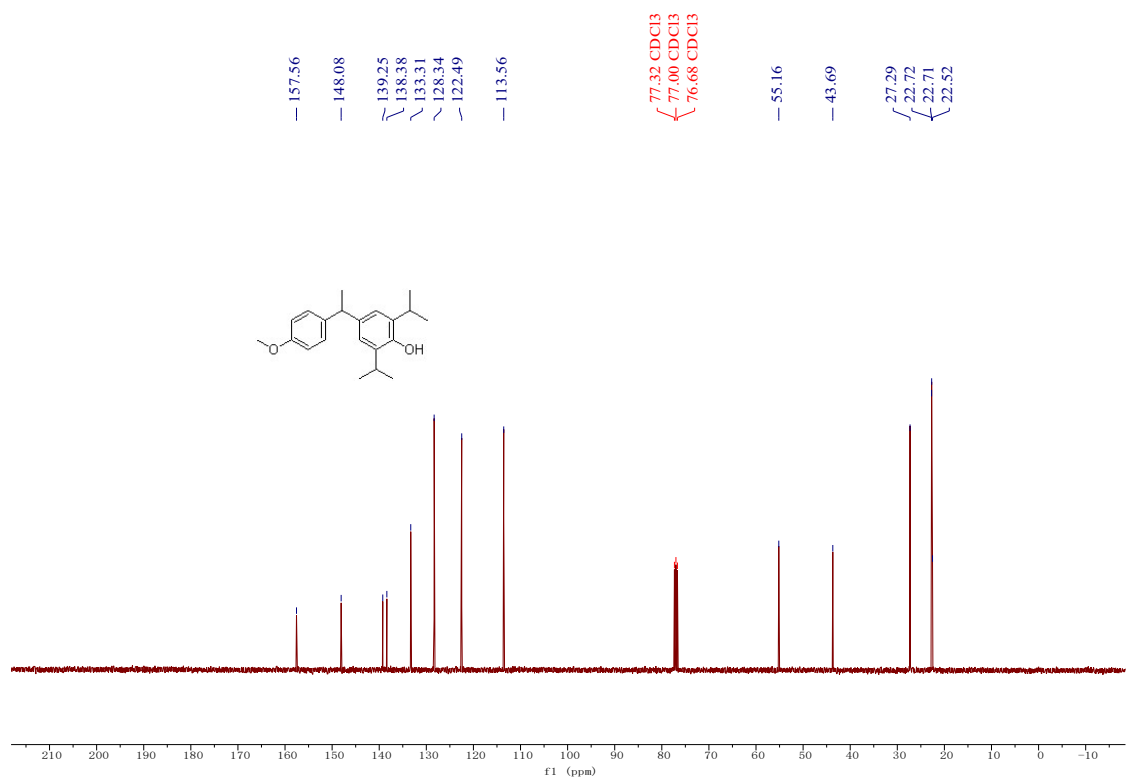
¹³C NMR (100 MHz, CDCl₃) spectrum of 3am



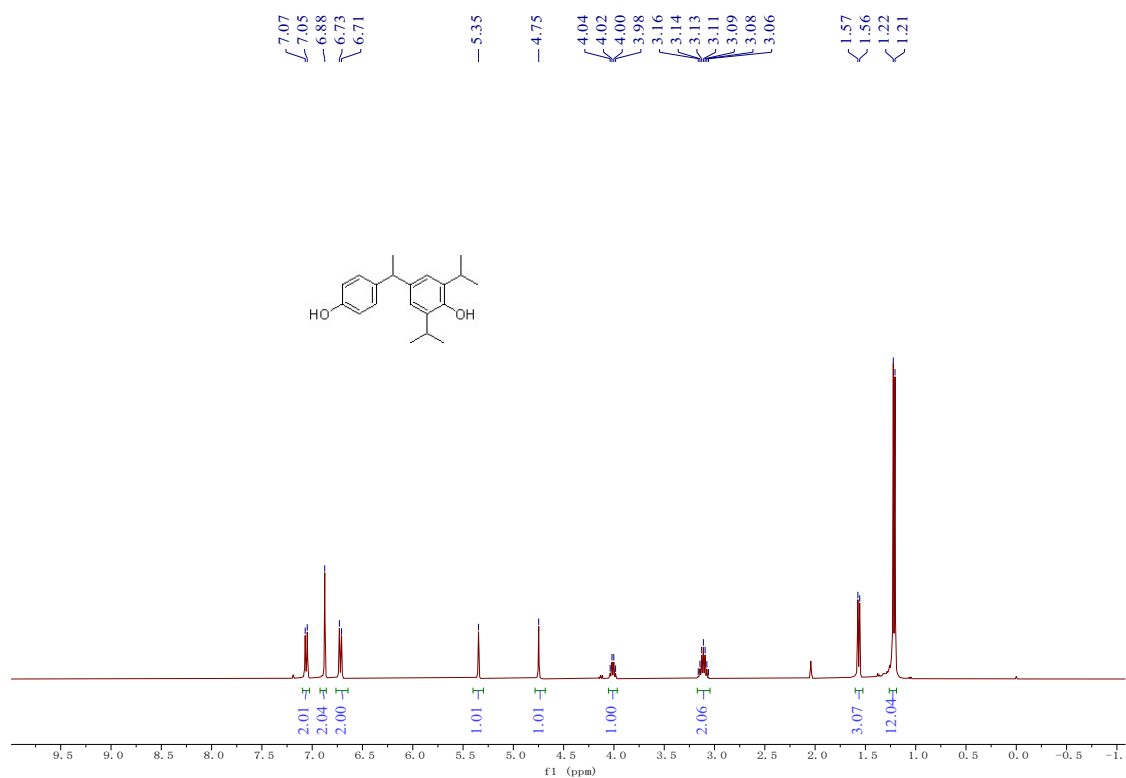
¹H NMR (400 MHz, CDCl₃) spectrum of 3an



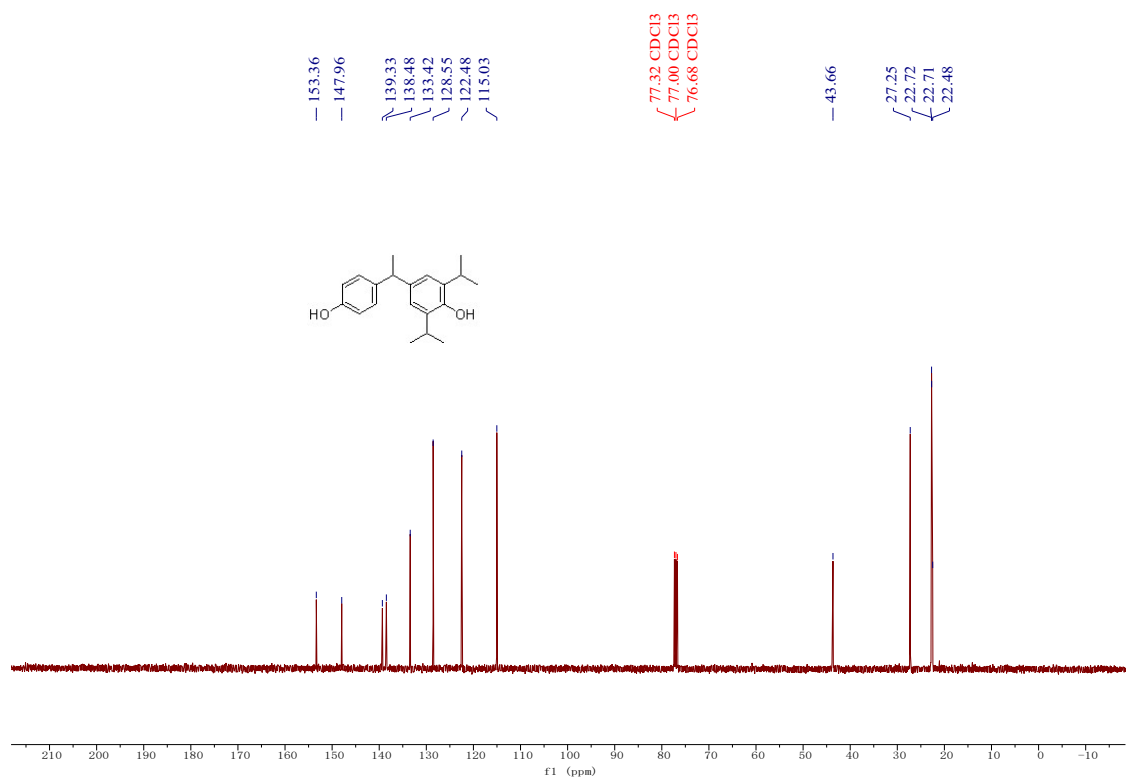
¹³C NMR (100 MHz, CDCl₃) spectrum of 3an



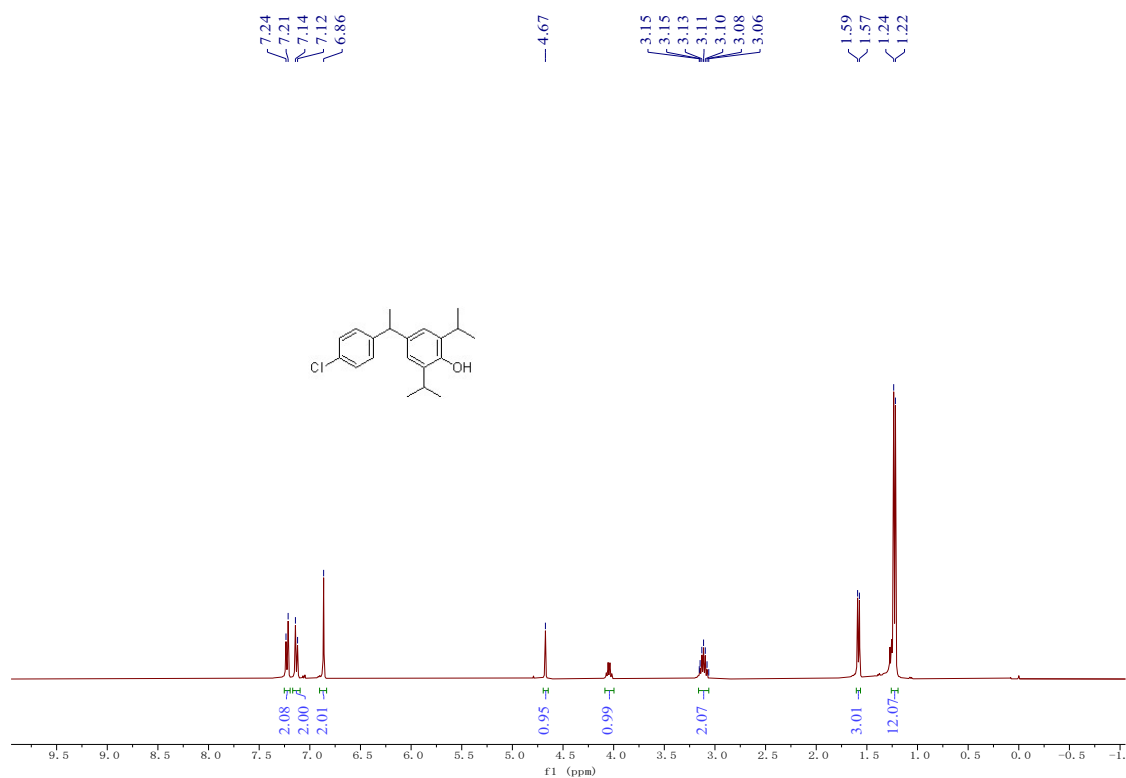
¹H NMR (400 MHz, CDCl₃) spectrum of 3ao



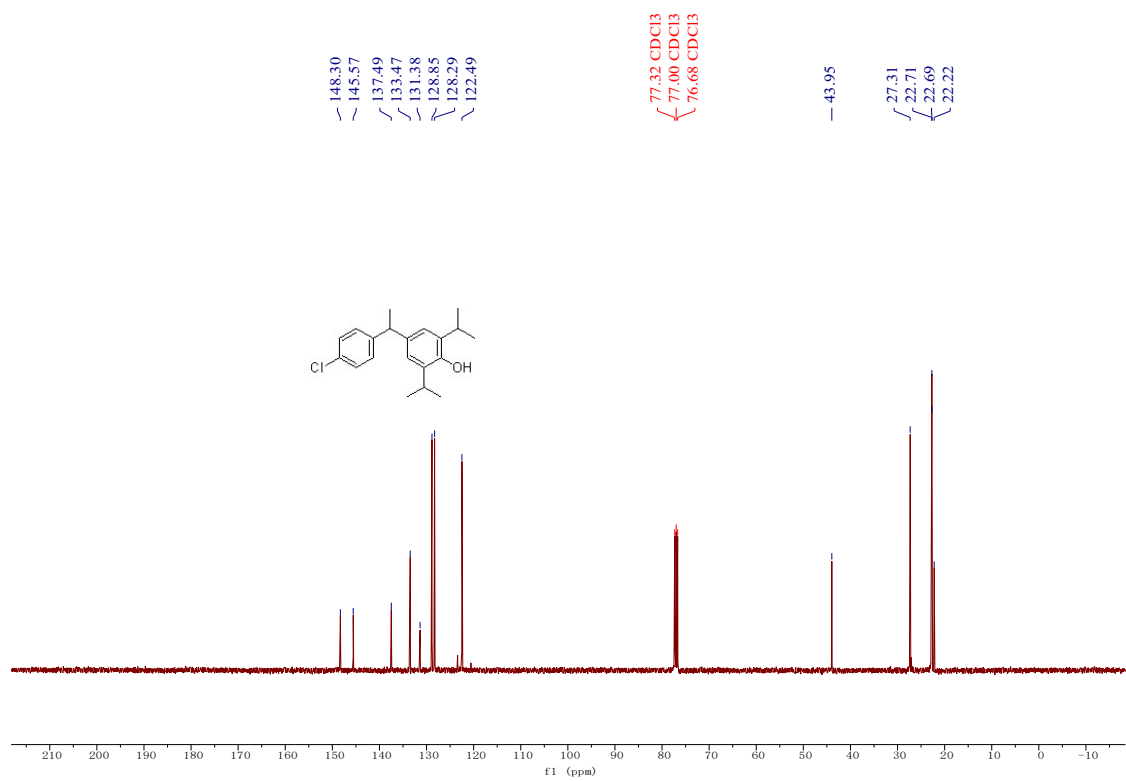
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ao



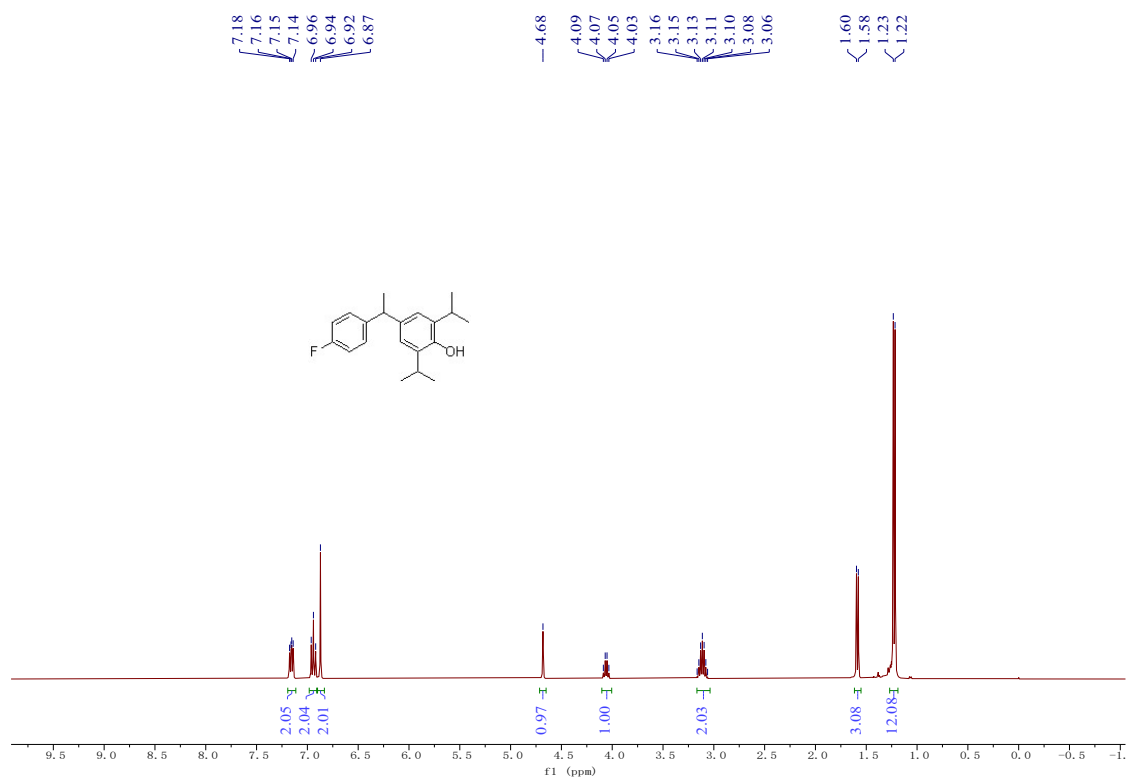
¹H NMR (400 MHz, CDCl₃) spectrum of 3ap



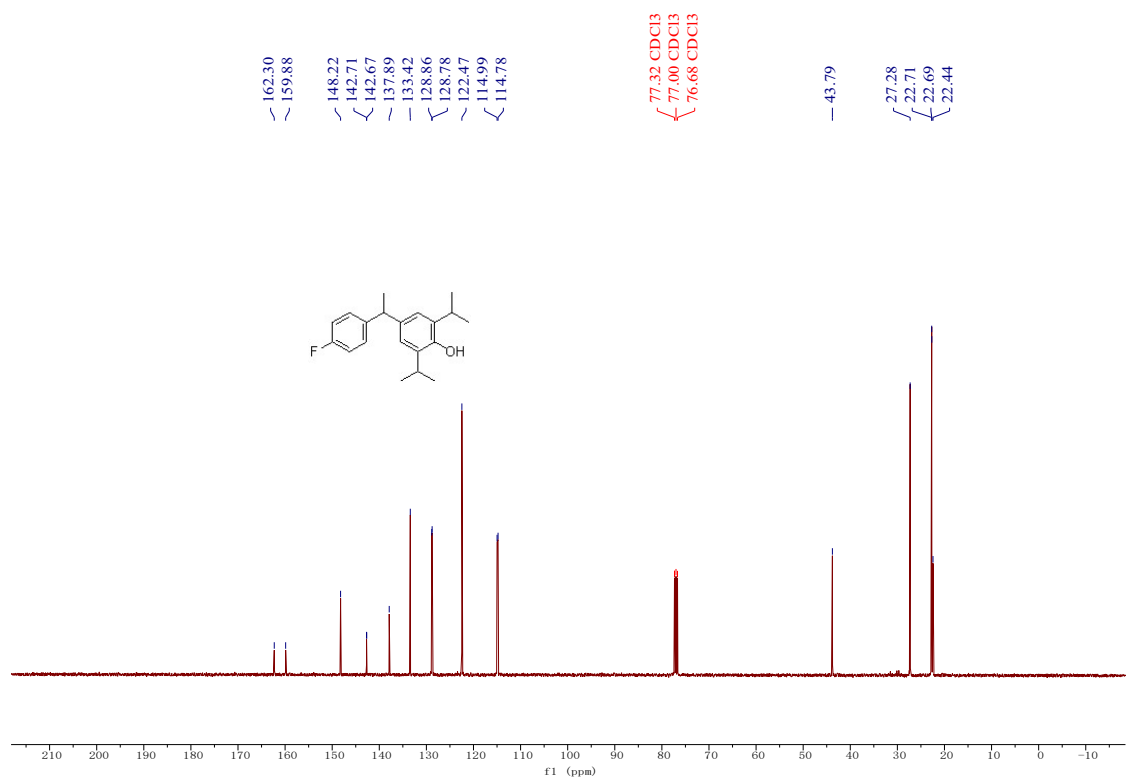
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ap



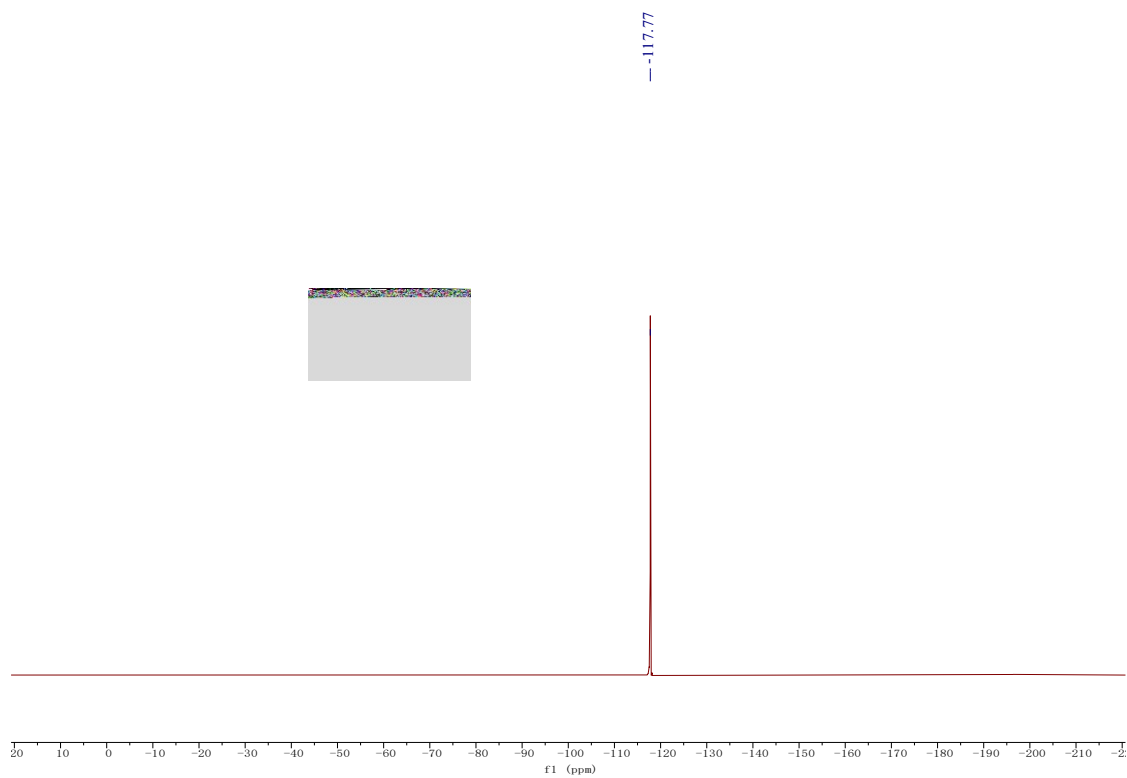
¹H NMR (400 MHz, CDCl₃) spectrum of 3a



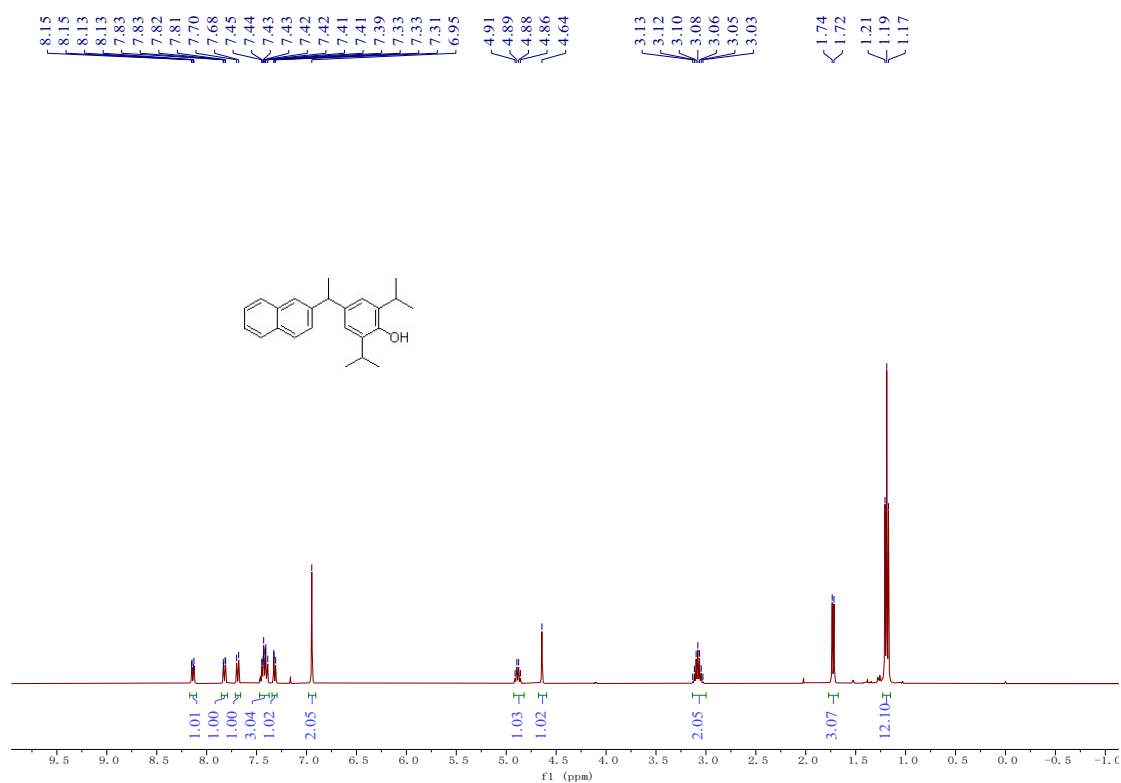
¹³C NMR (100 MHz, CDCl₃) spectrum of 3a



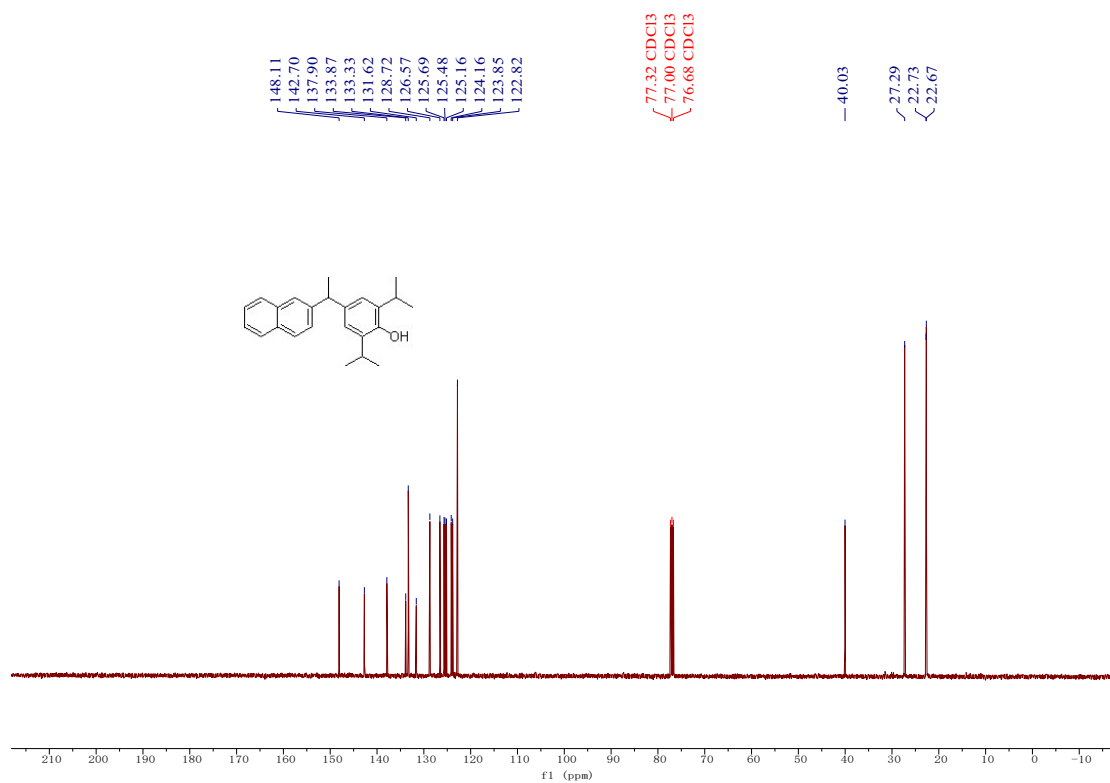
^{19}F NMR (377 MHz, CDCl_3) spectrum of 3aq



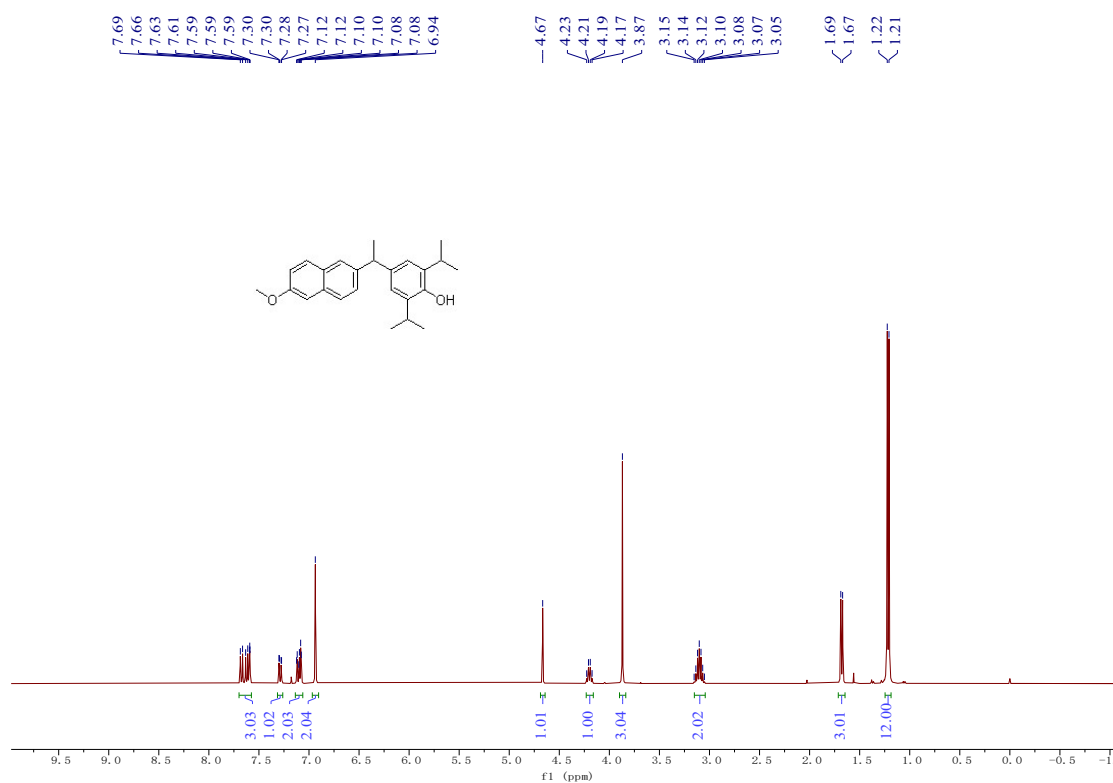
¹H NMR (400 MHz, CDCl₃) spectrum of 3ar



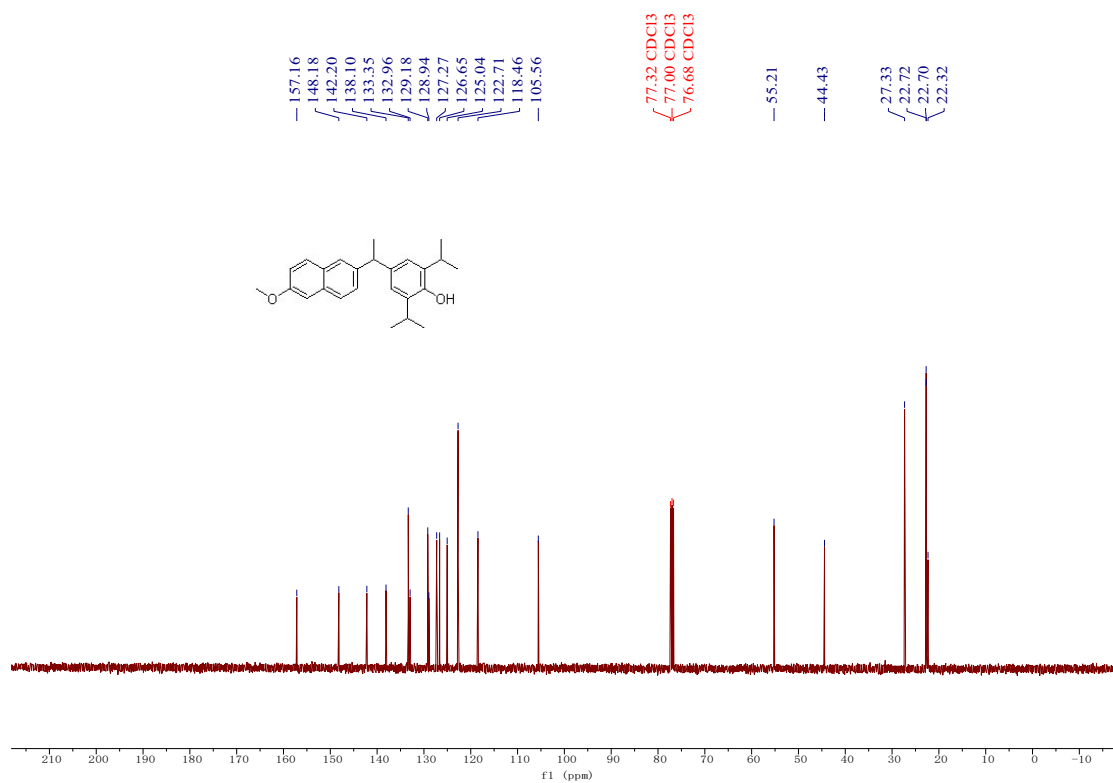
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ar



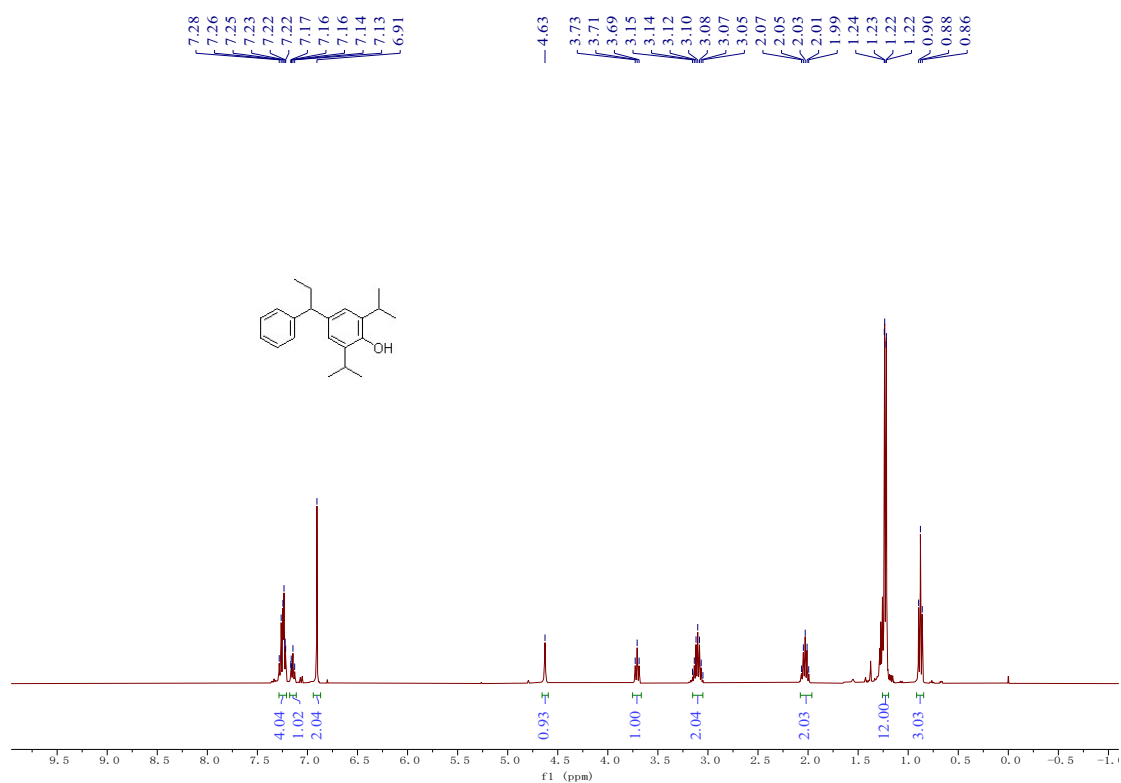
¹H NMR (400 MHz, CDCl₃) spectrum of 3as



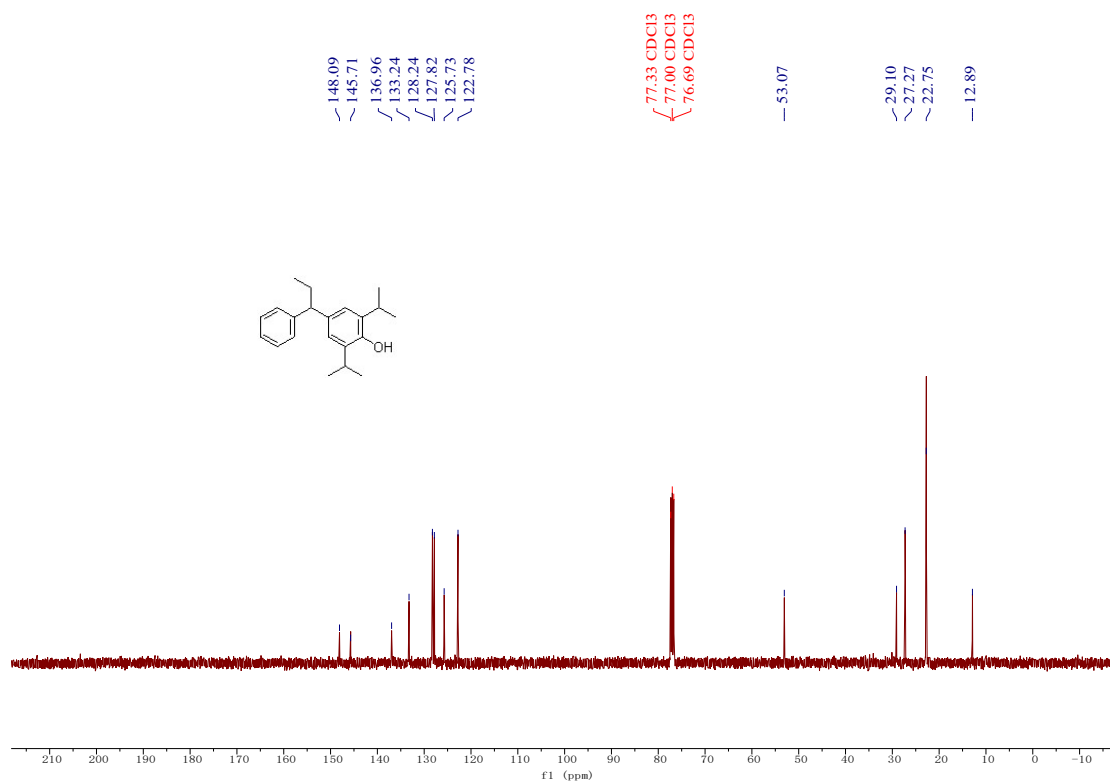
¹³C NMR (100 MHz, CDCl₃) spectrum of 3as



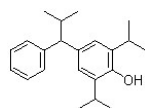
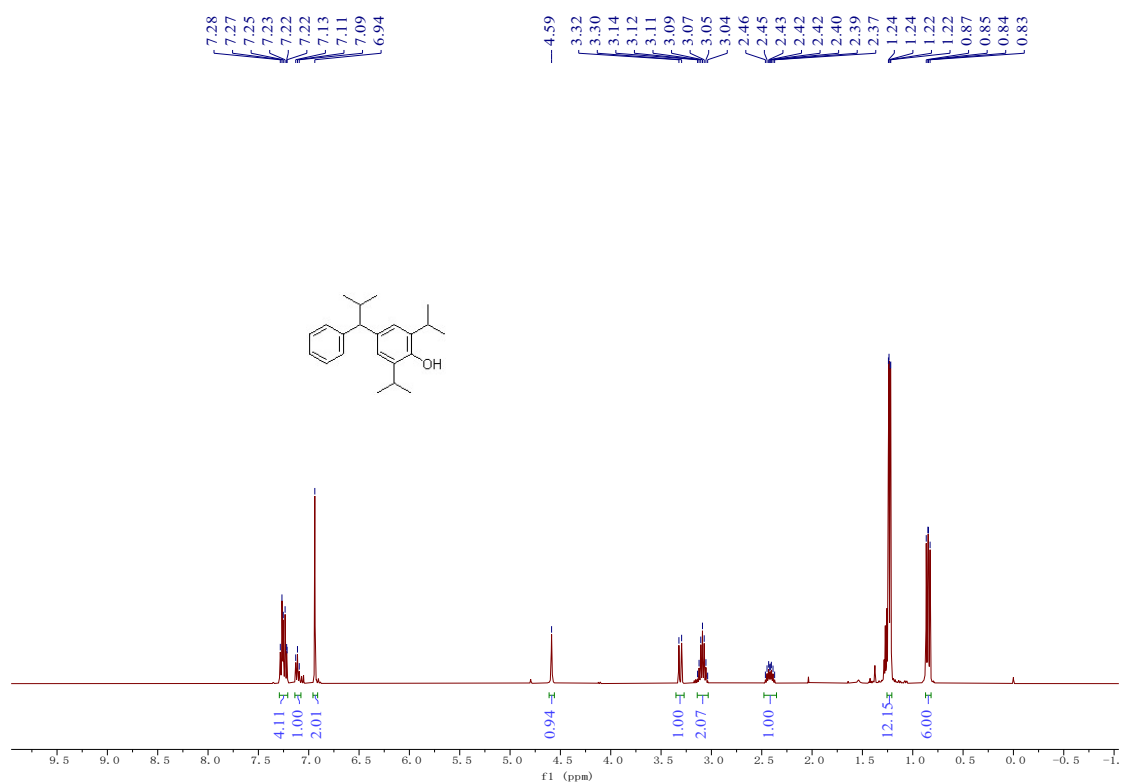
¹H NMR (400 MHz, CDCl₃) spectrum of 3at



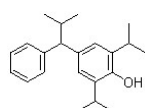
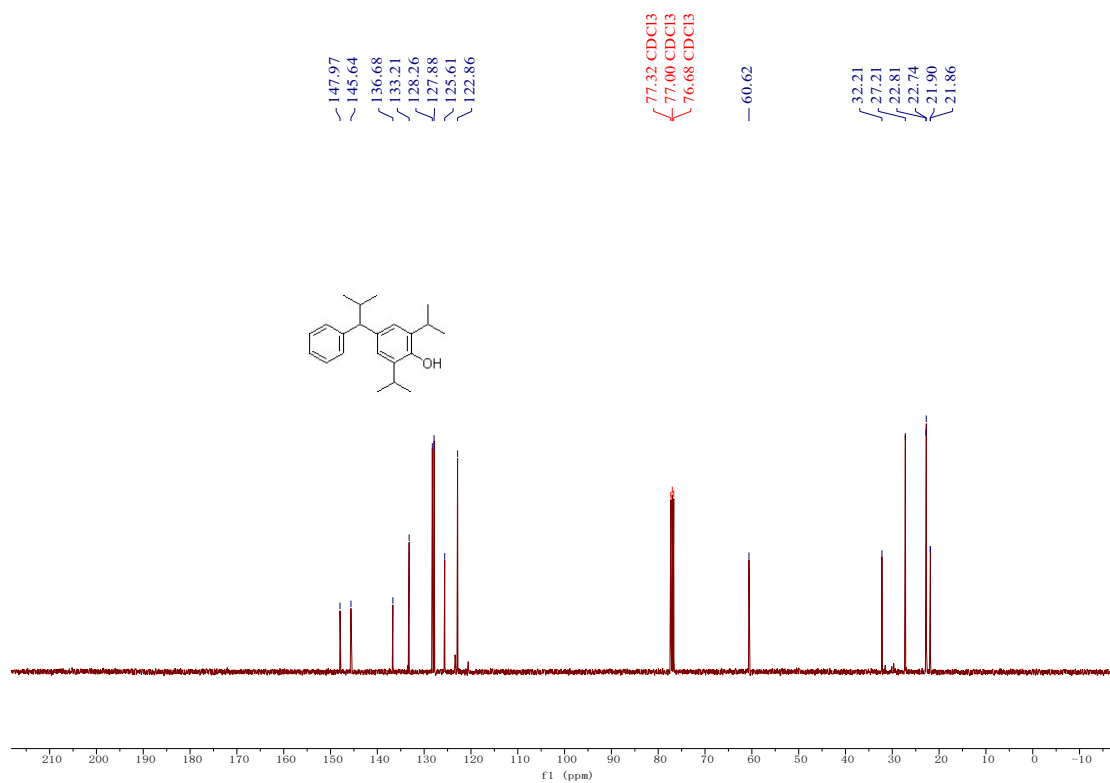
¹³C NMR (100 MHz, CDCl₃) spectrum of 3at



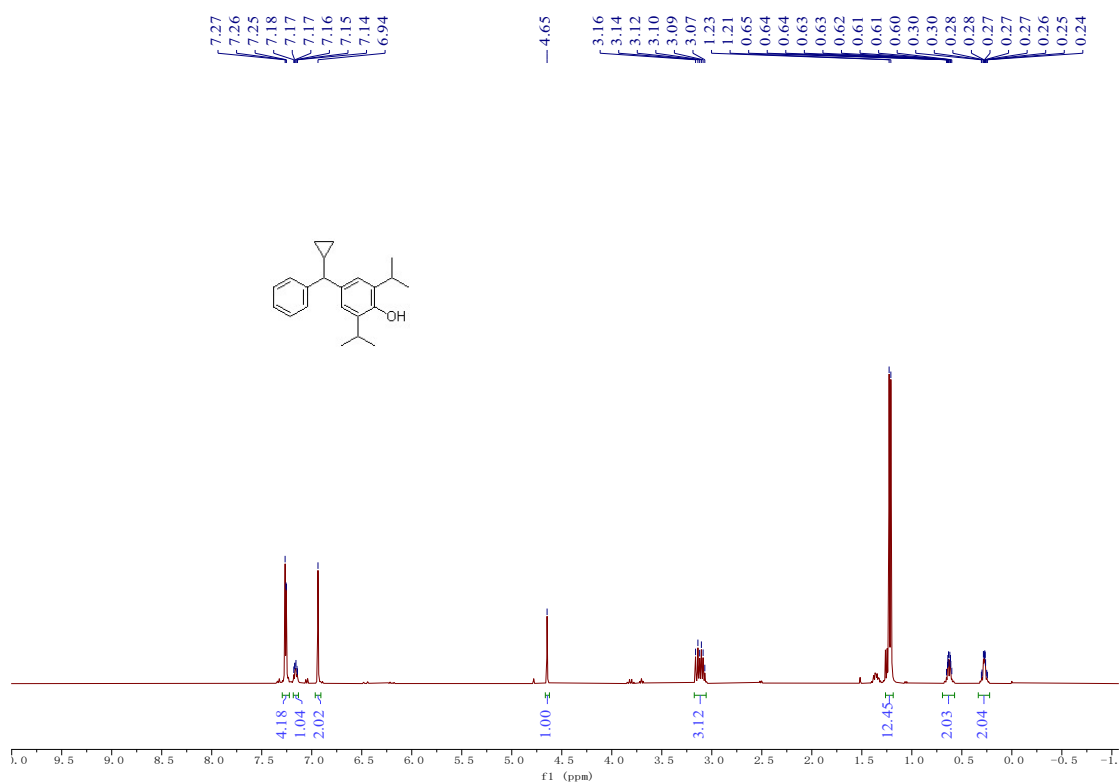
¹H NMR (400 MHz, CDCl₃) spectrum of 3au



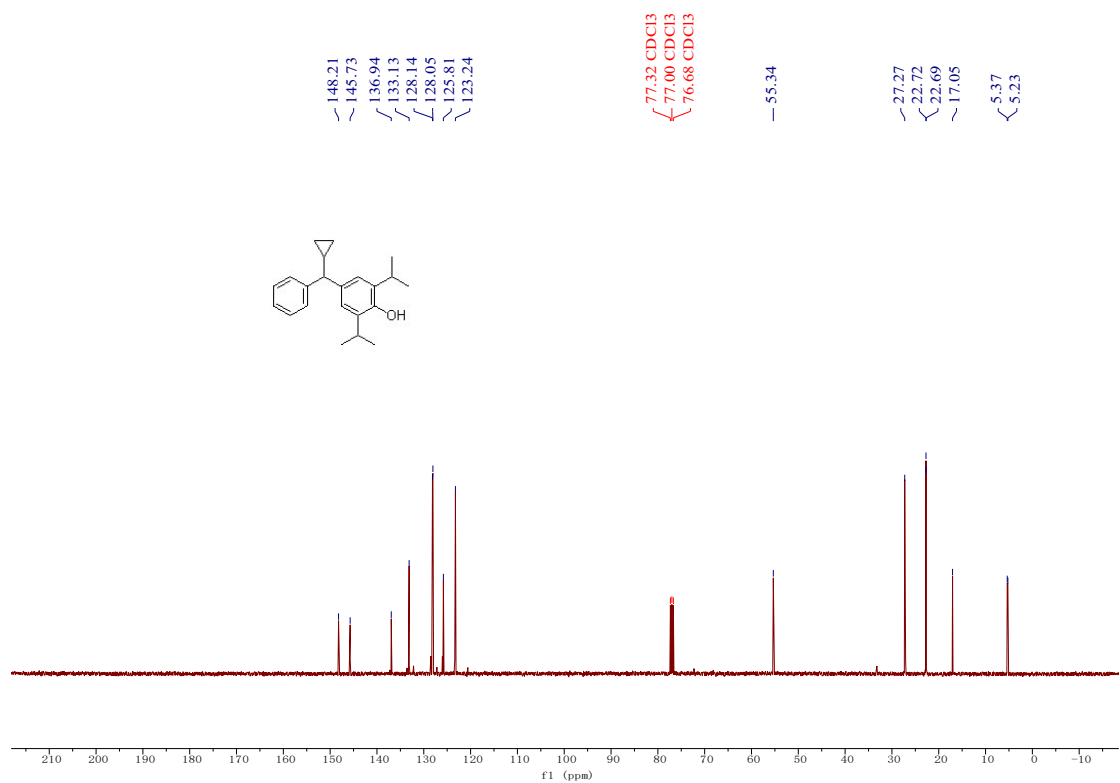
¹³C NMR (100 MHz, CDCl₃) spectrum of 3au



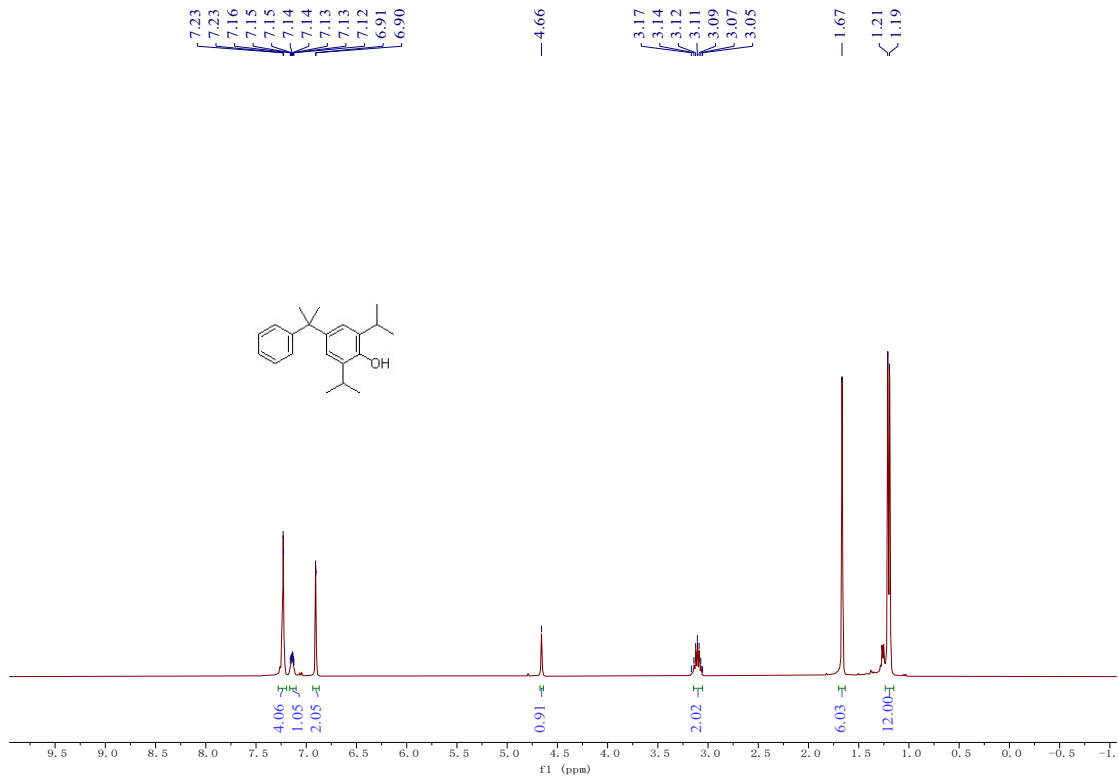
¹H NMR (400 MHz, CDCl₃) spectrum of 3av



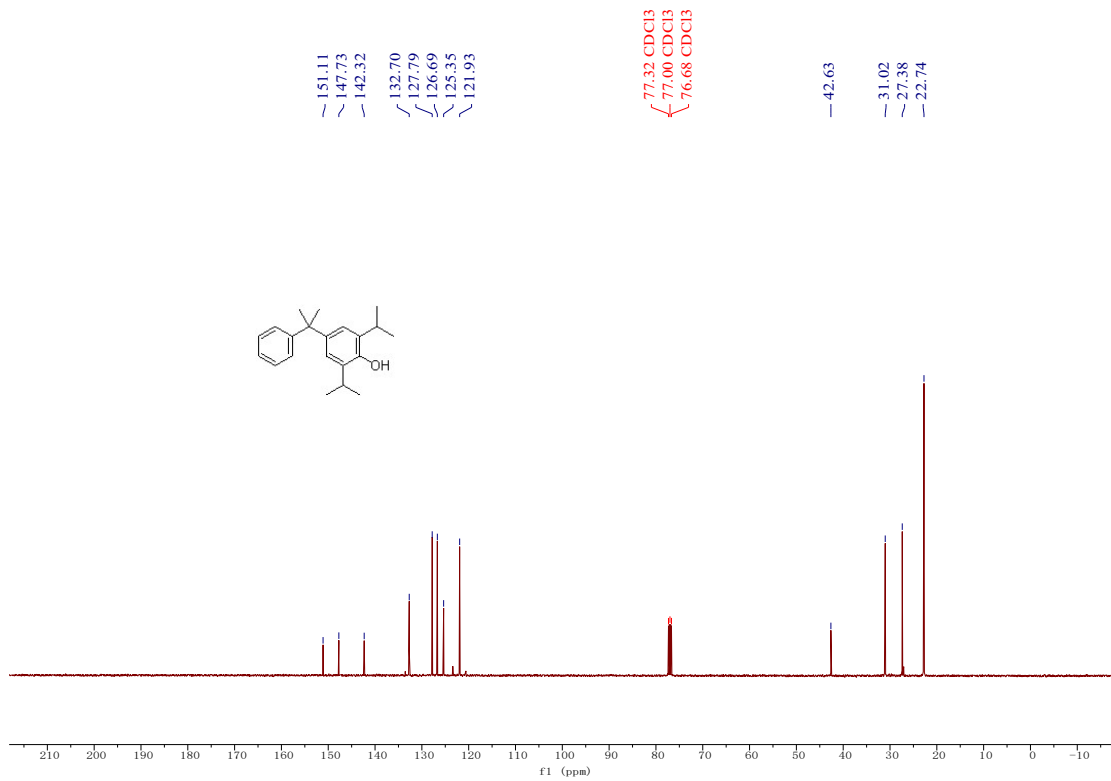
¹³C NMR (100 MHz, CDCl₃) spectrum of 3av



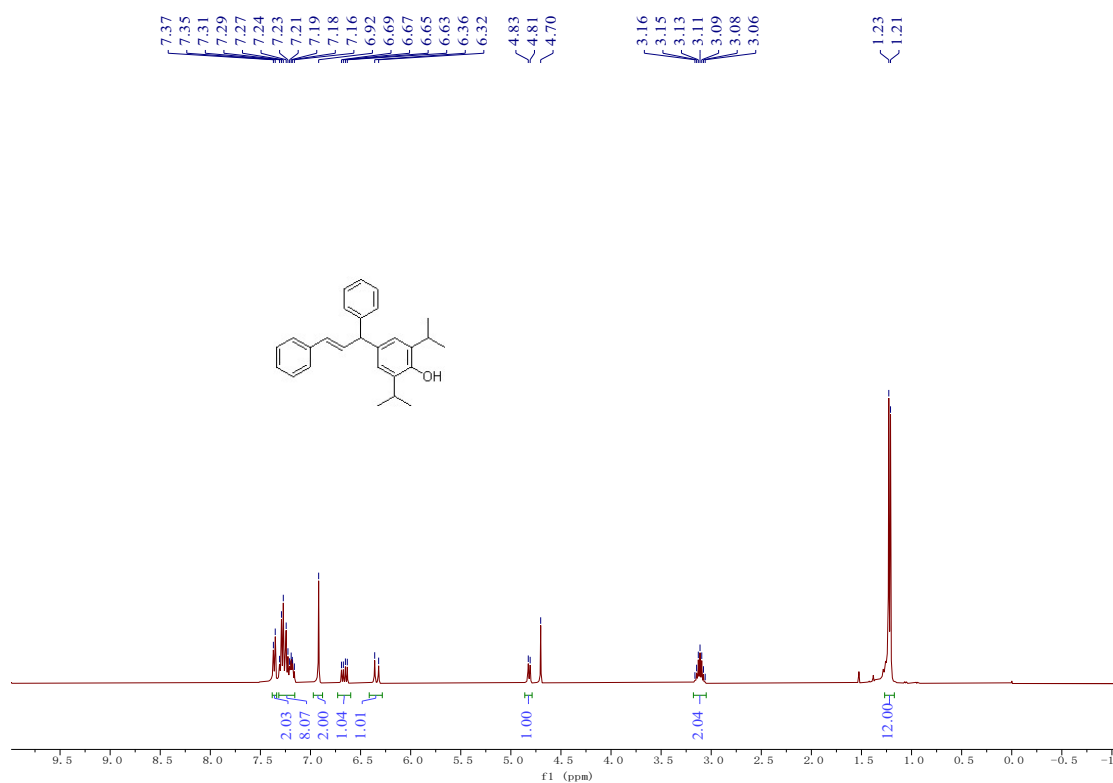
¹H NMR (400 MHz, CDCl₃) spectrum of 3aw



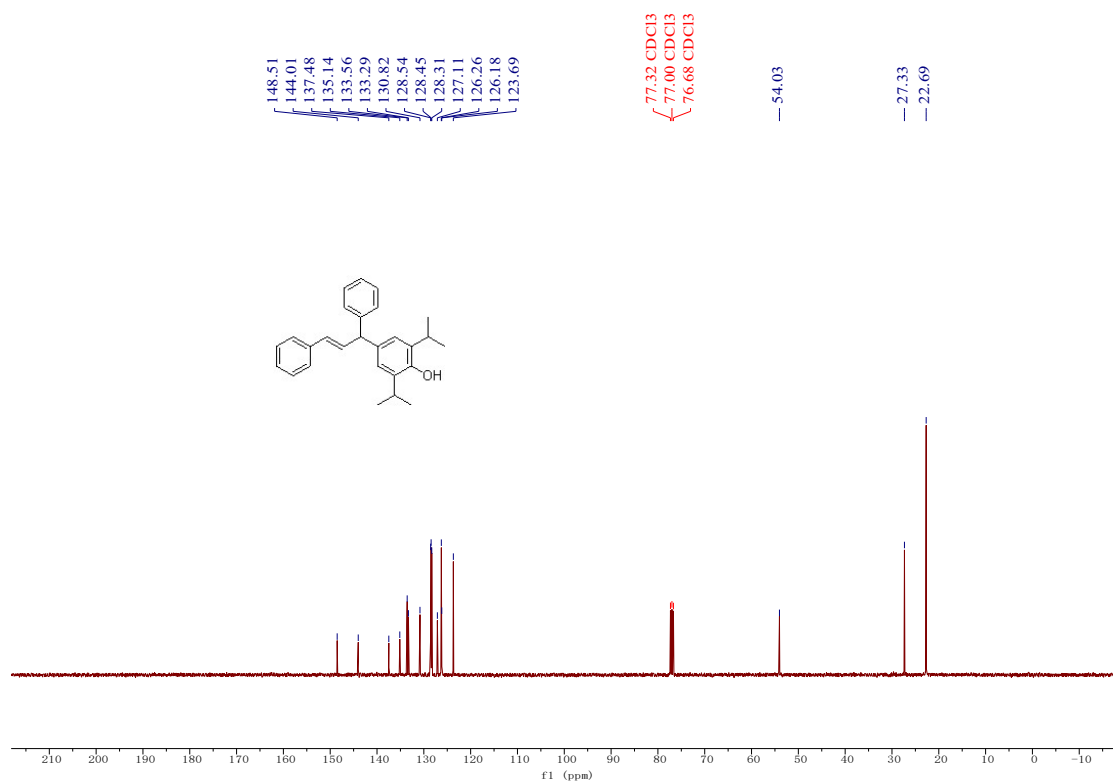
¹³C NMR (100 MHz, CDCl₃) spectrum of 3aw



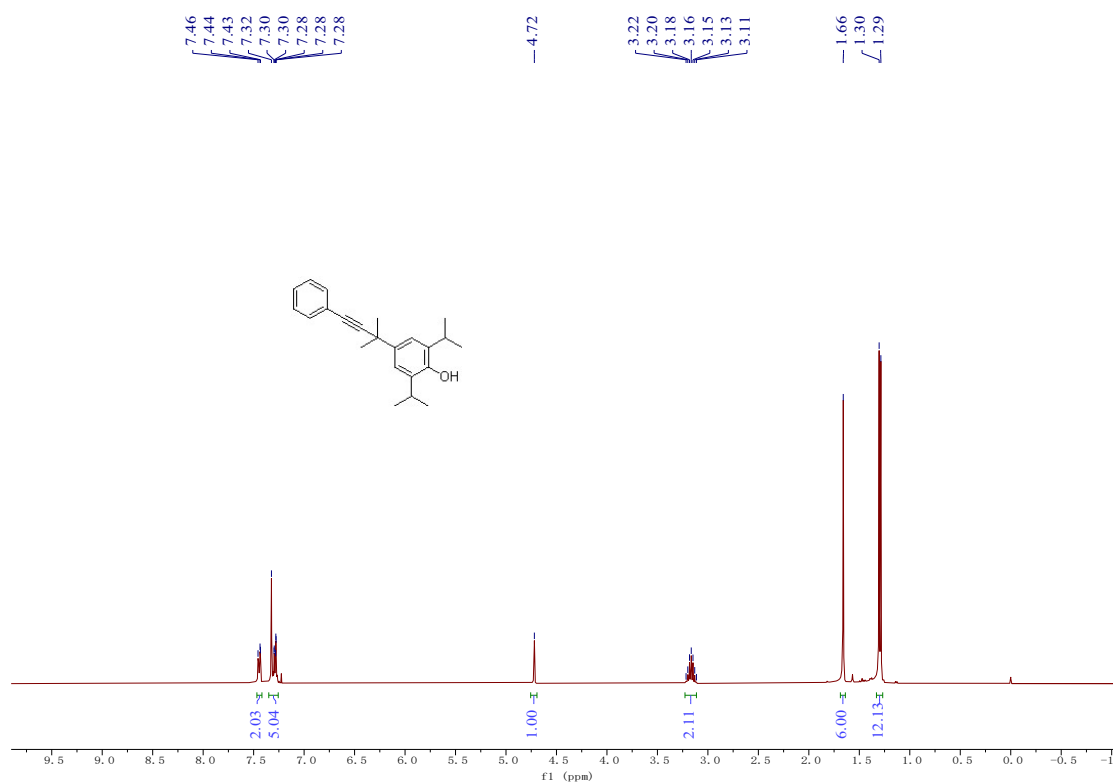
¹H NMR (400 MHz, CDCl₃) spectrum of 3ax



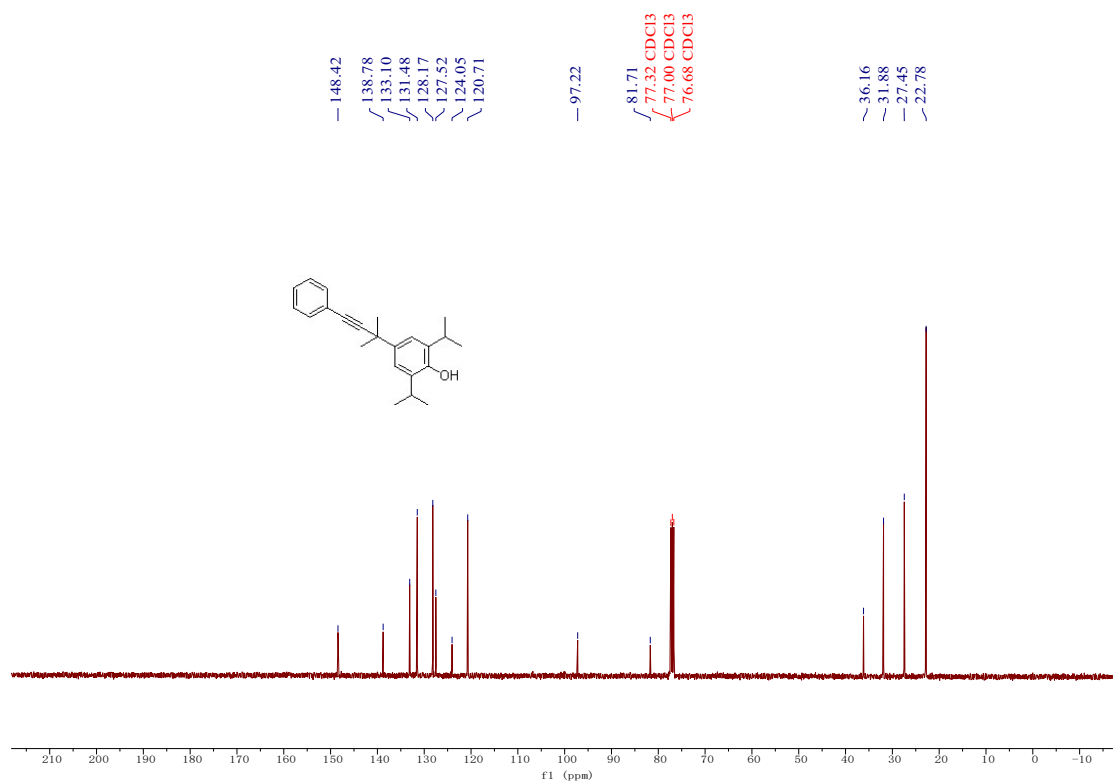
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ax



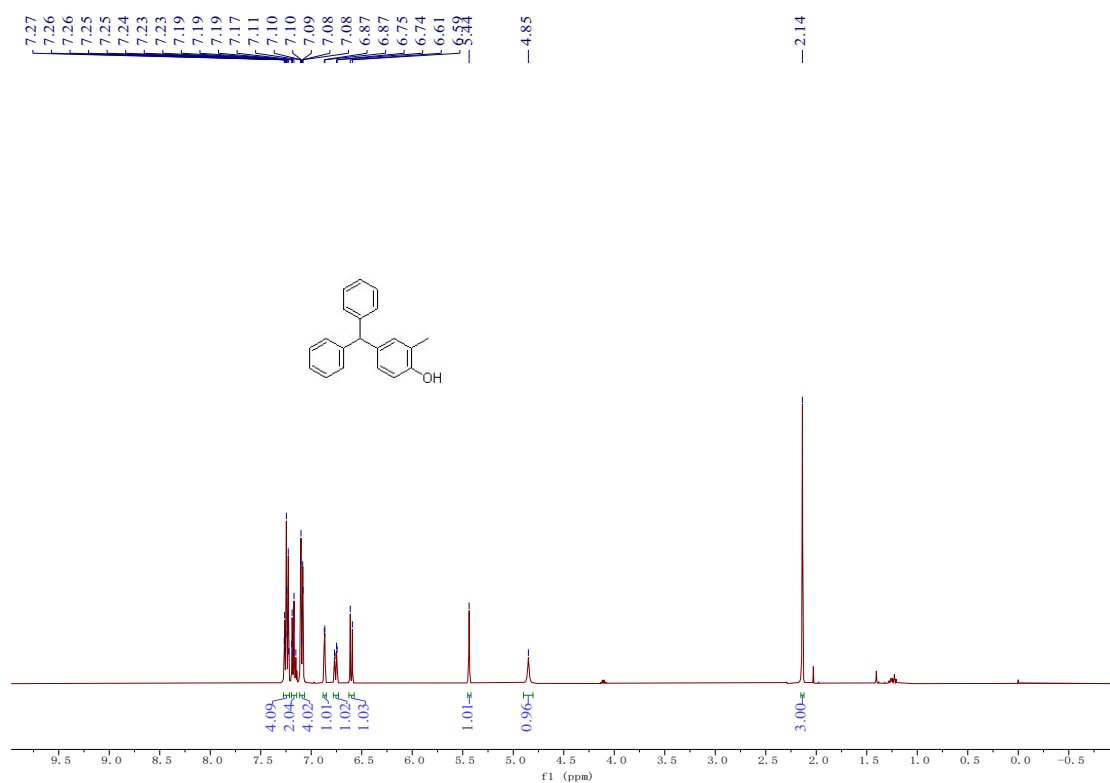
¹H NMR (400 MHz, CDCl₃) spectrum of 3ay



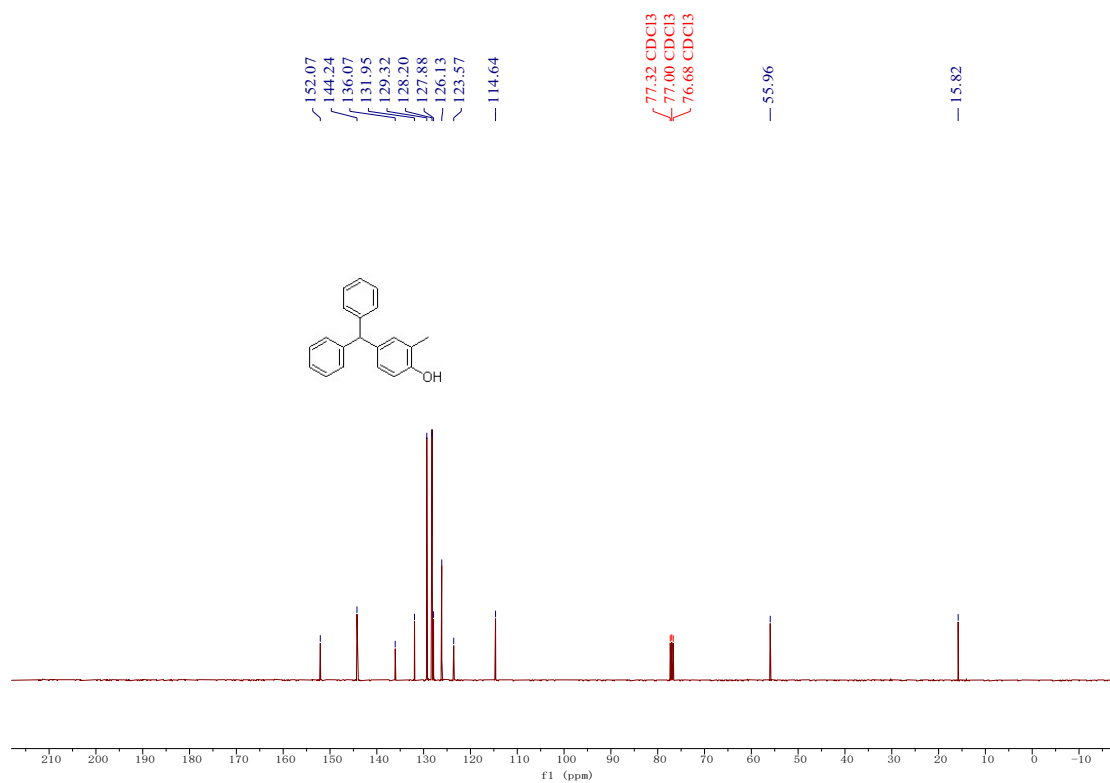
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ay



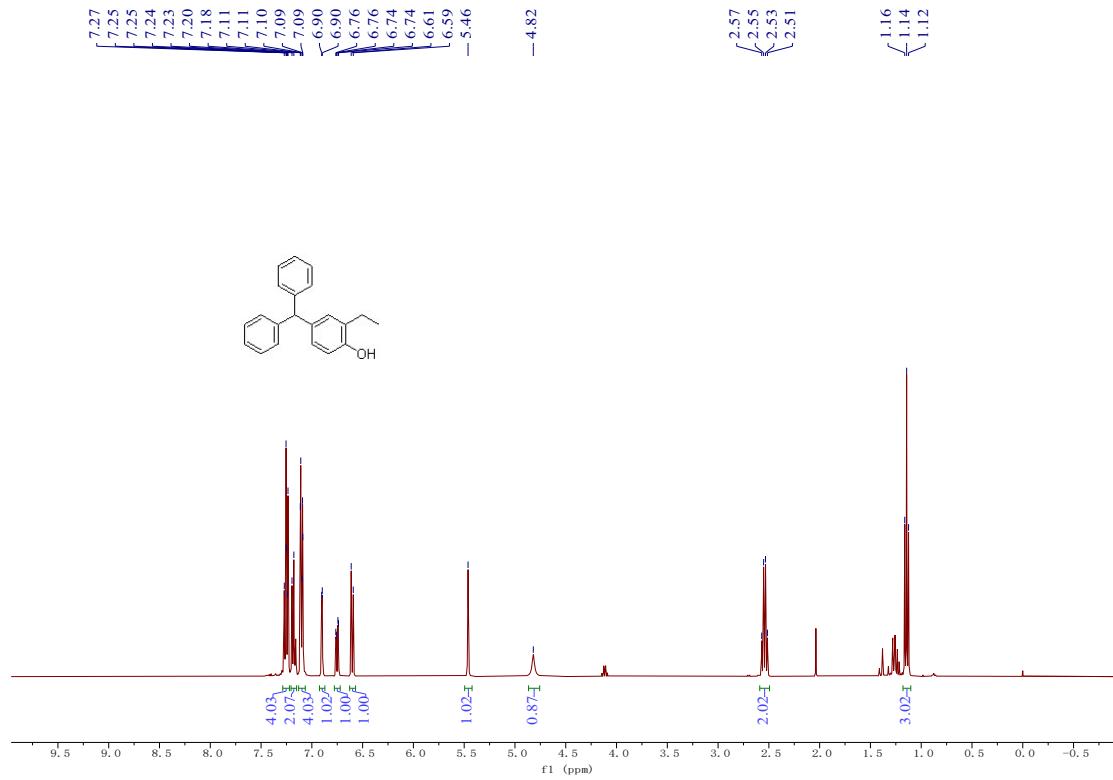
¹H NMR (400 MHz, CDCl₃) spectrum of 3ba



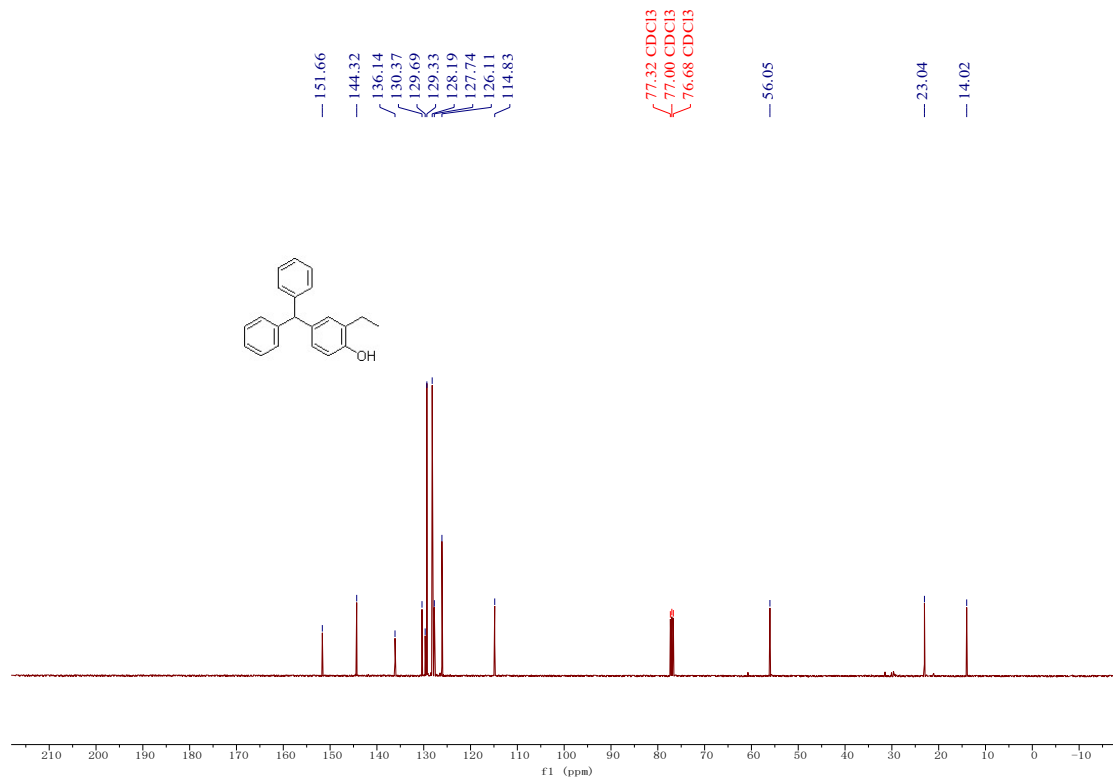
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ba



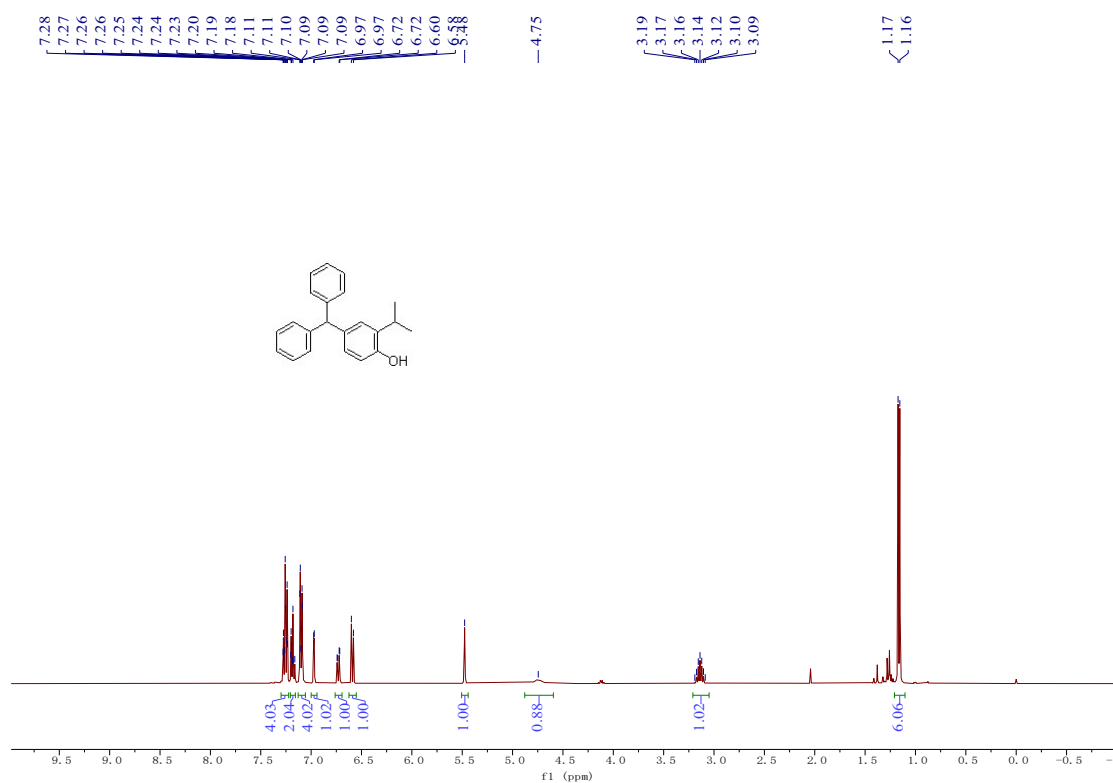
¹H NMR (400 MHz, CDCl₃) spectrum of 3ca



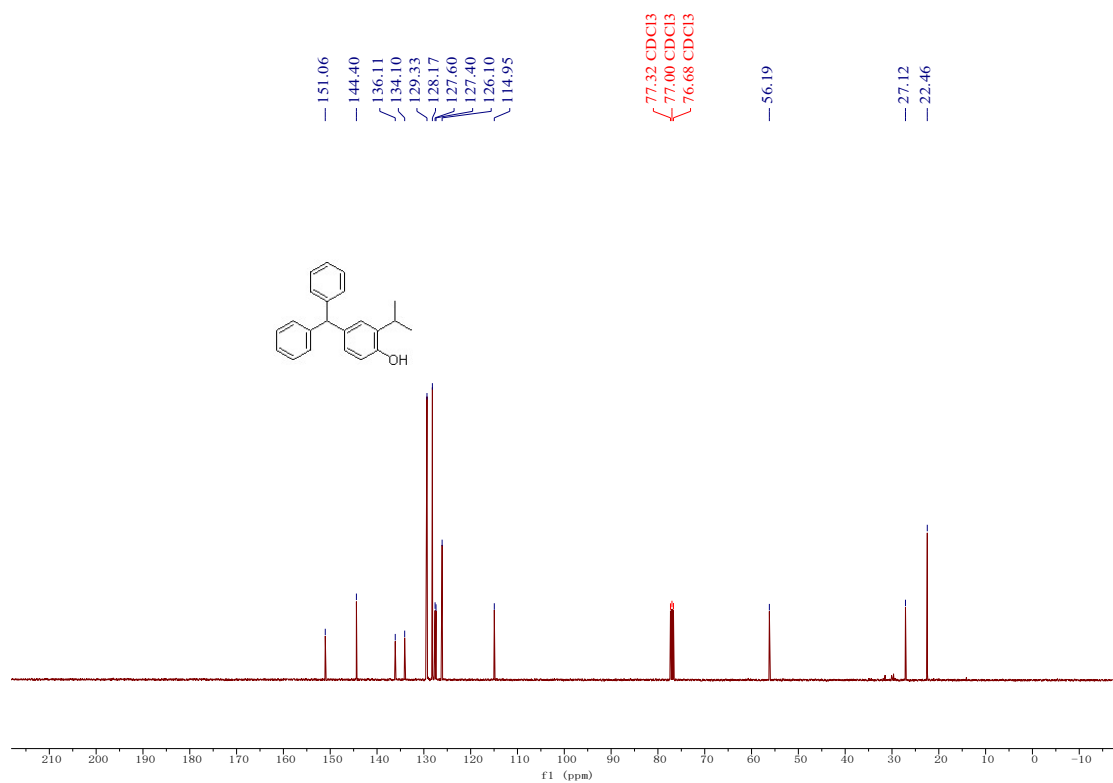
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ca



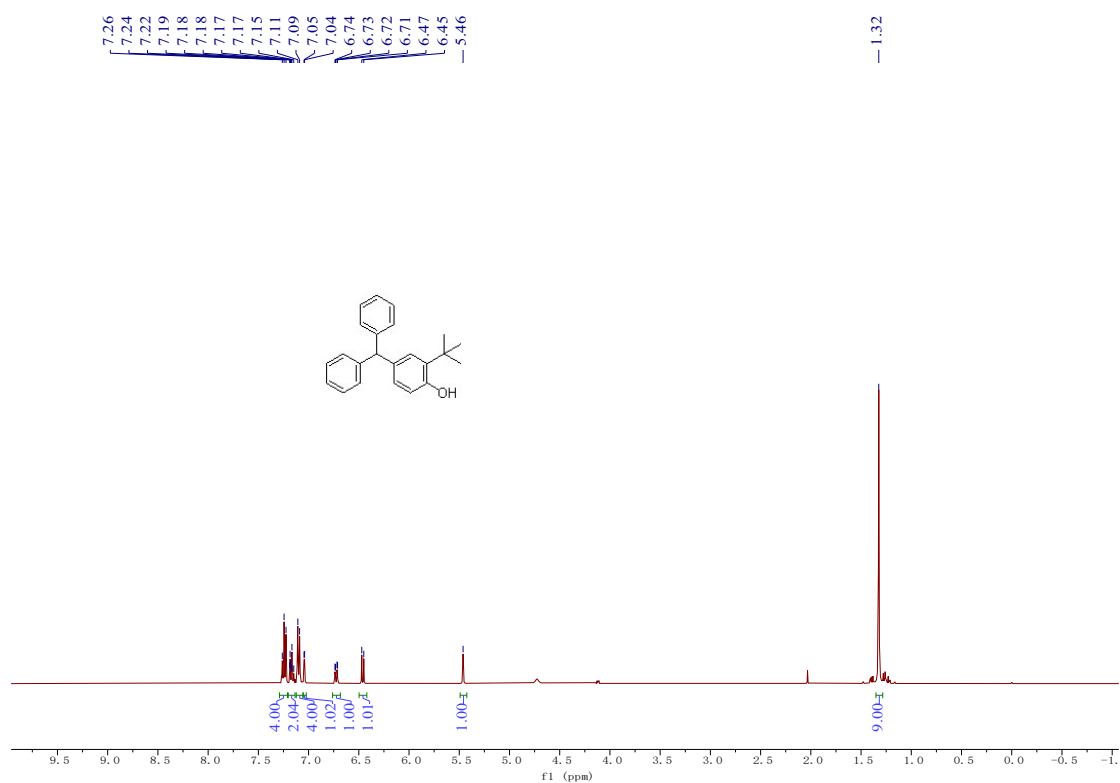
¹H NMR (400 MHz, CDCl₃) spectrum of 3da



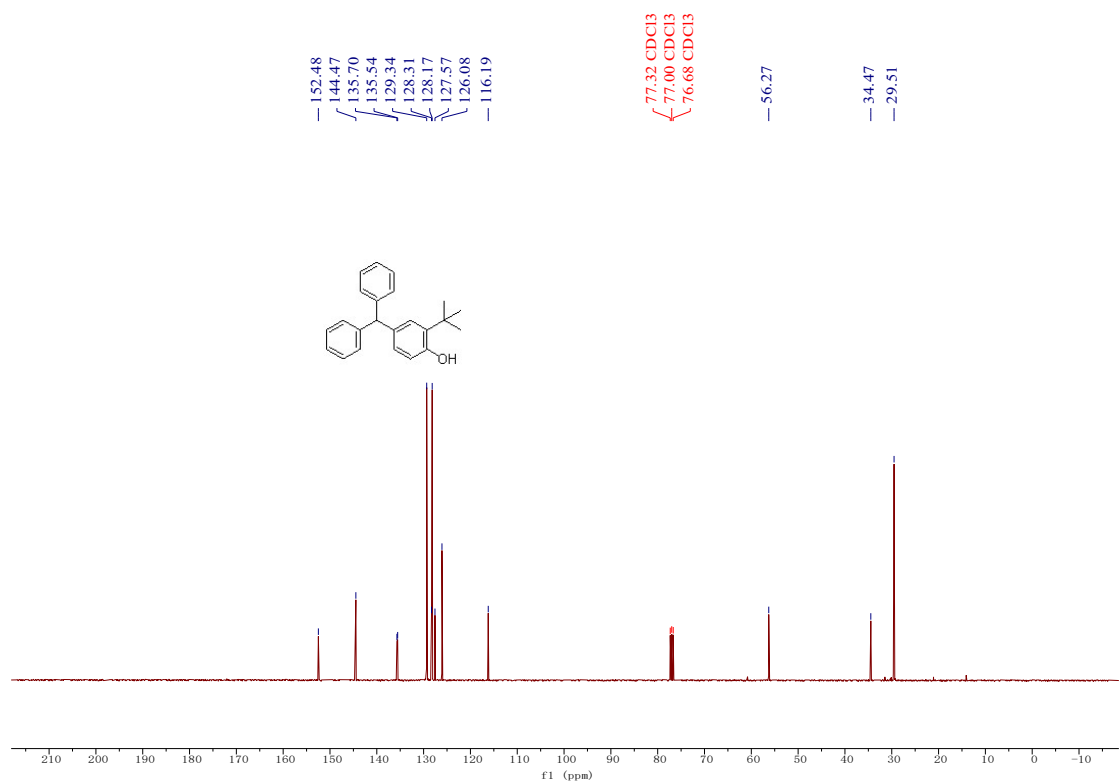
¹³C NMR (100 MHz, CDCl₃) spectrum of 3da



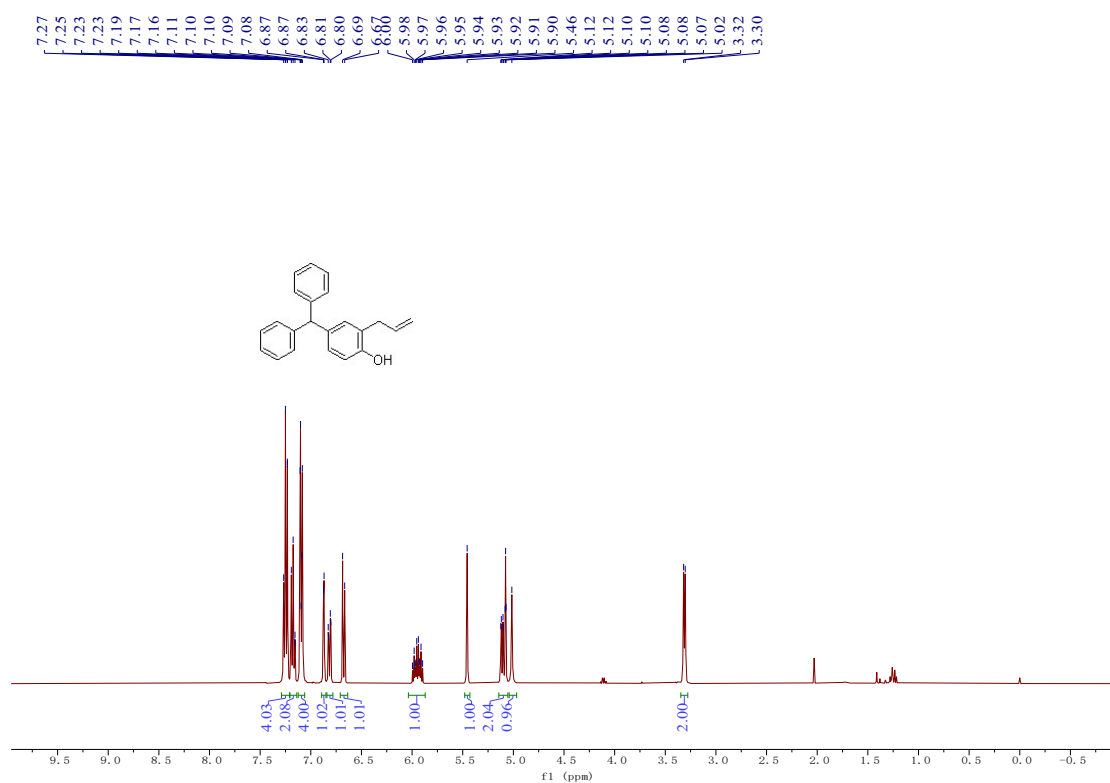
¹H NMR (400 MHz, CDCl₃) spectrum of 3ea



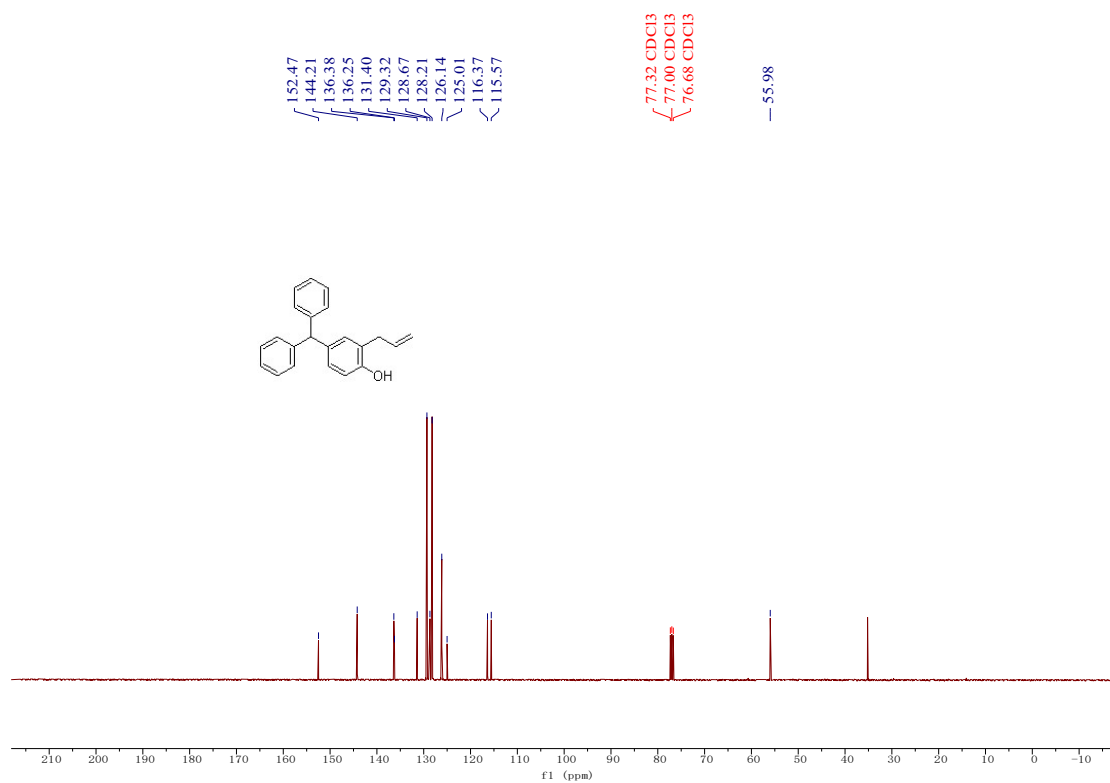
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ea



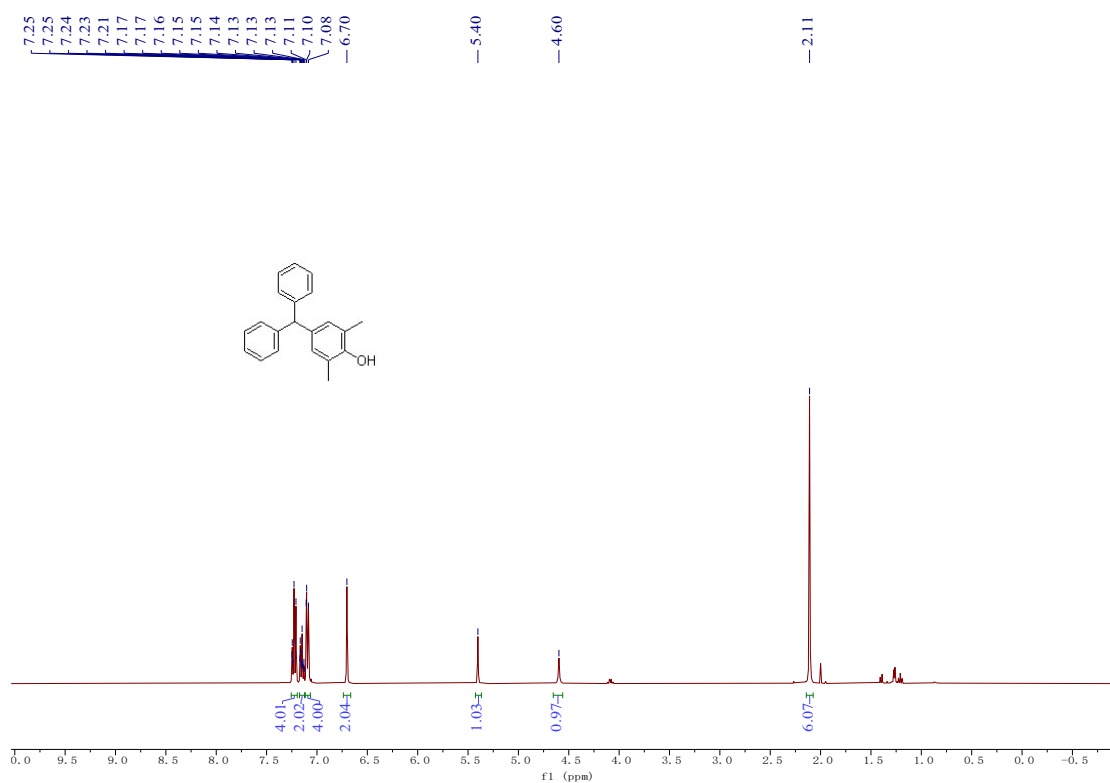
¹H NMR (400 MHz, CDCl₃) spectrum of 3fa



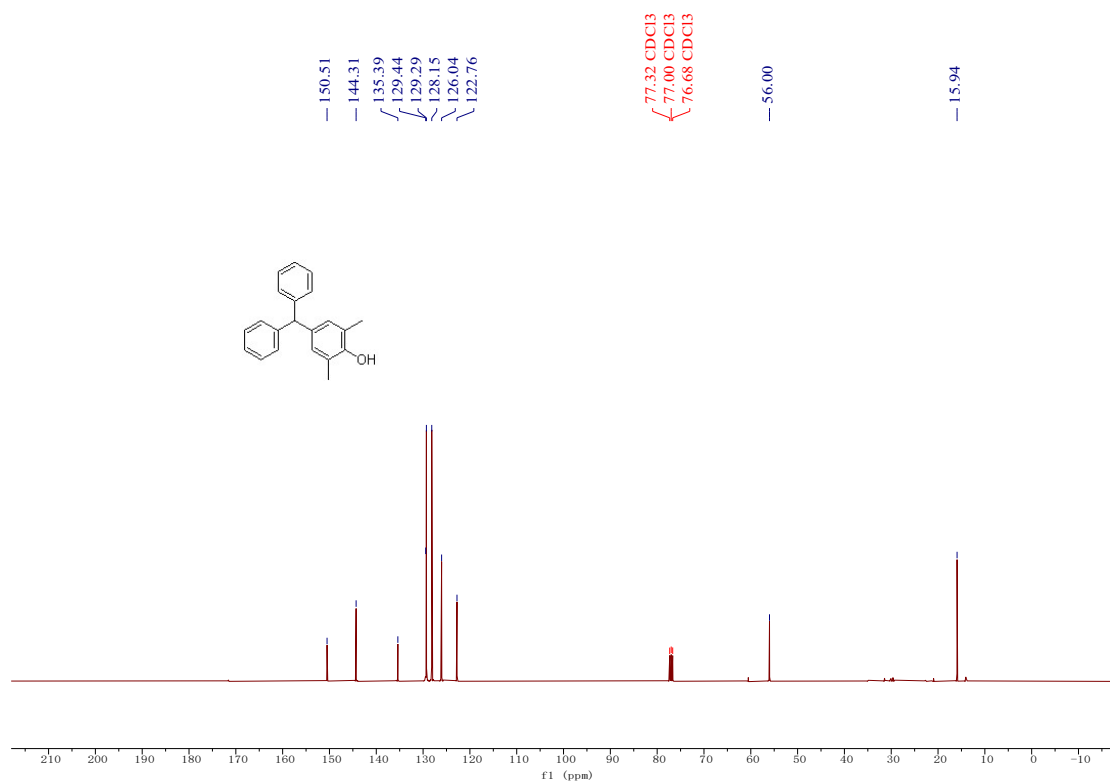
¹³C NMR (100 MHz, CDCl₃) spectrum of 3fa



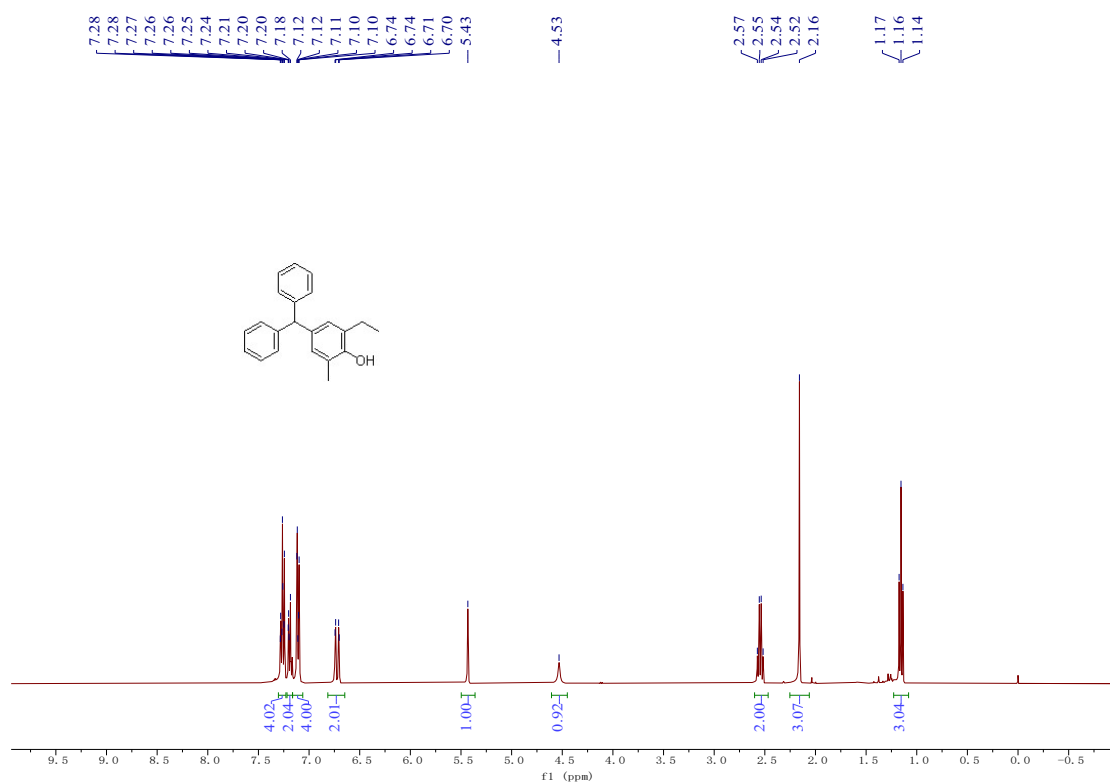
¹H NMR (400 MHz, CDCl₃) spectrum of 3ga



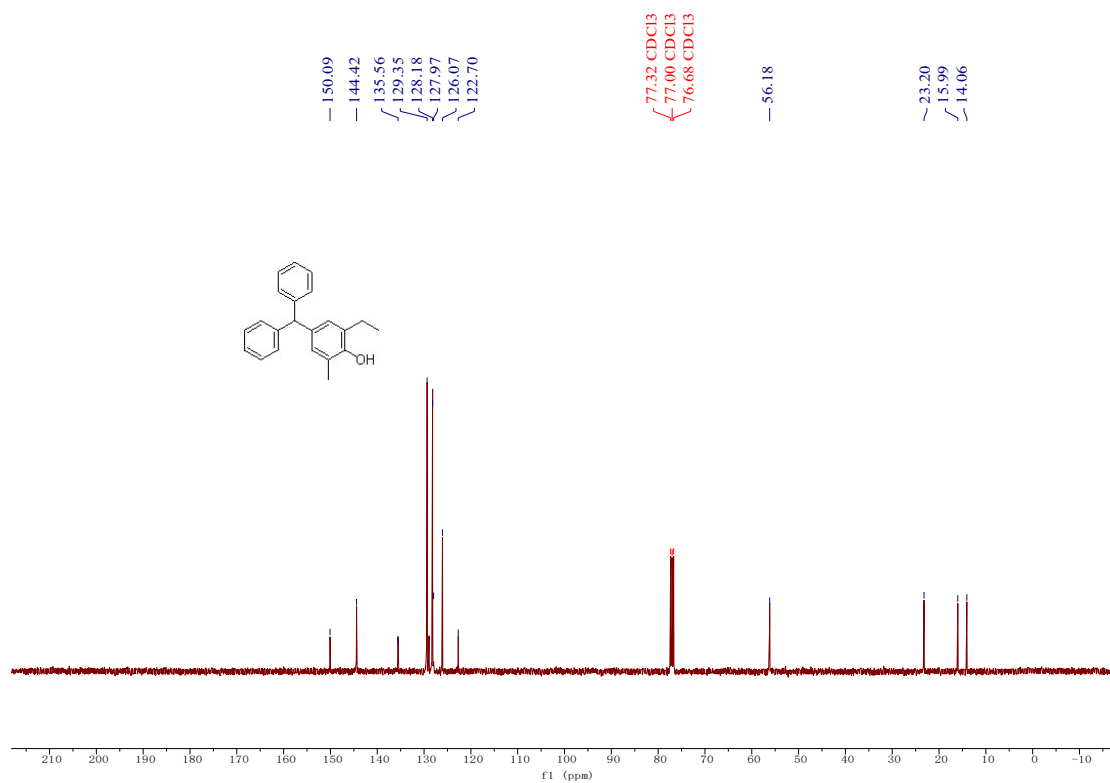
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ga



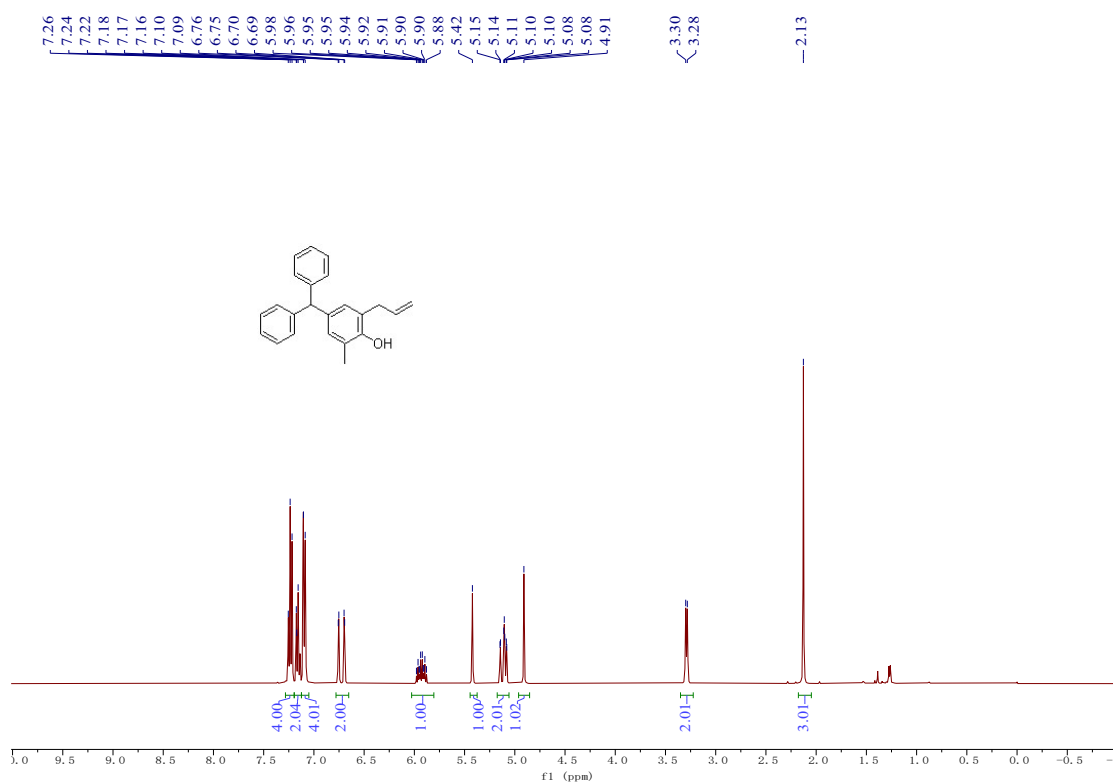
¹H NMR (400 MHz, CDCl₃) spectrum of 3ha



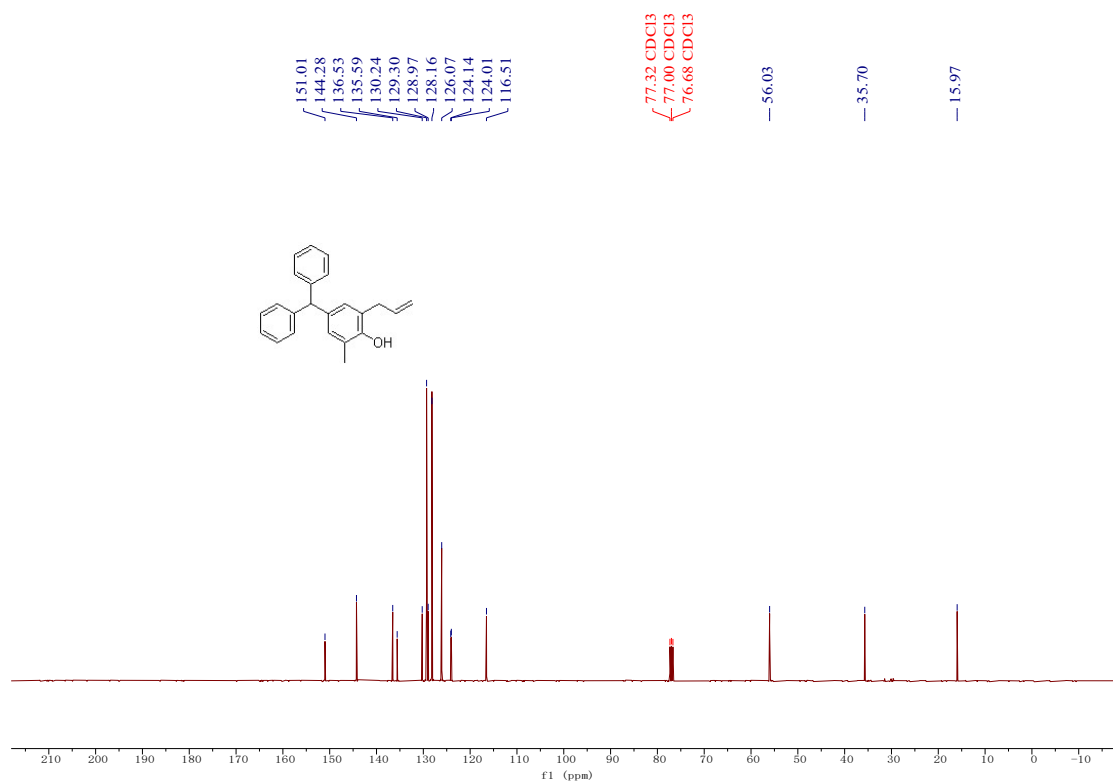
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ha



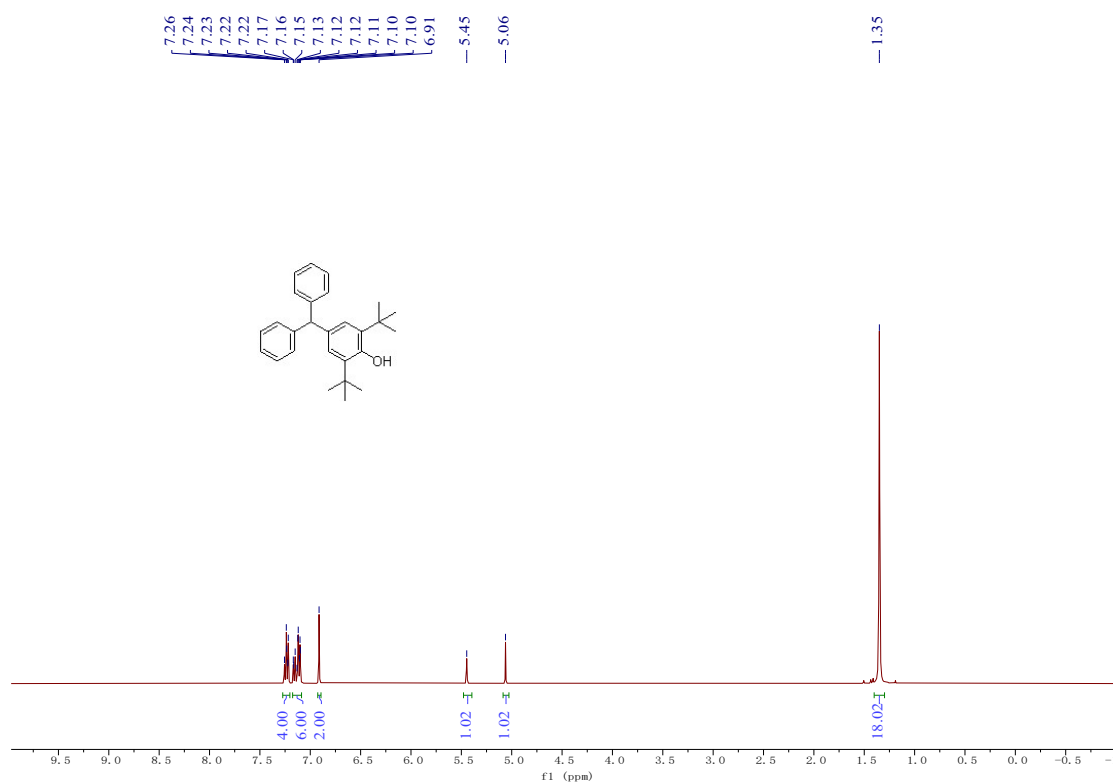
¹H NMR (400 MHz, CDCl₃) spectrum of 3ia



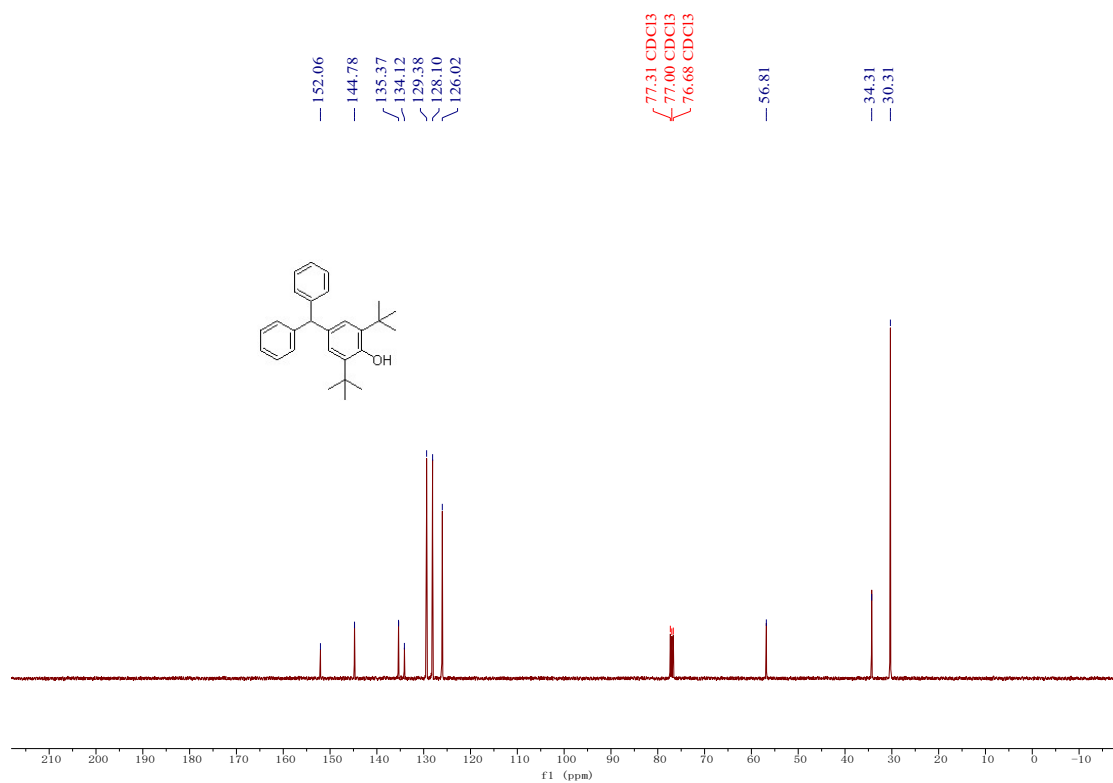
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ia



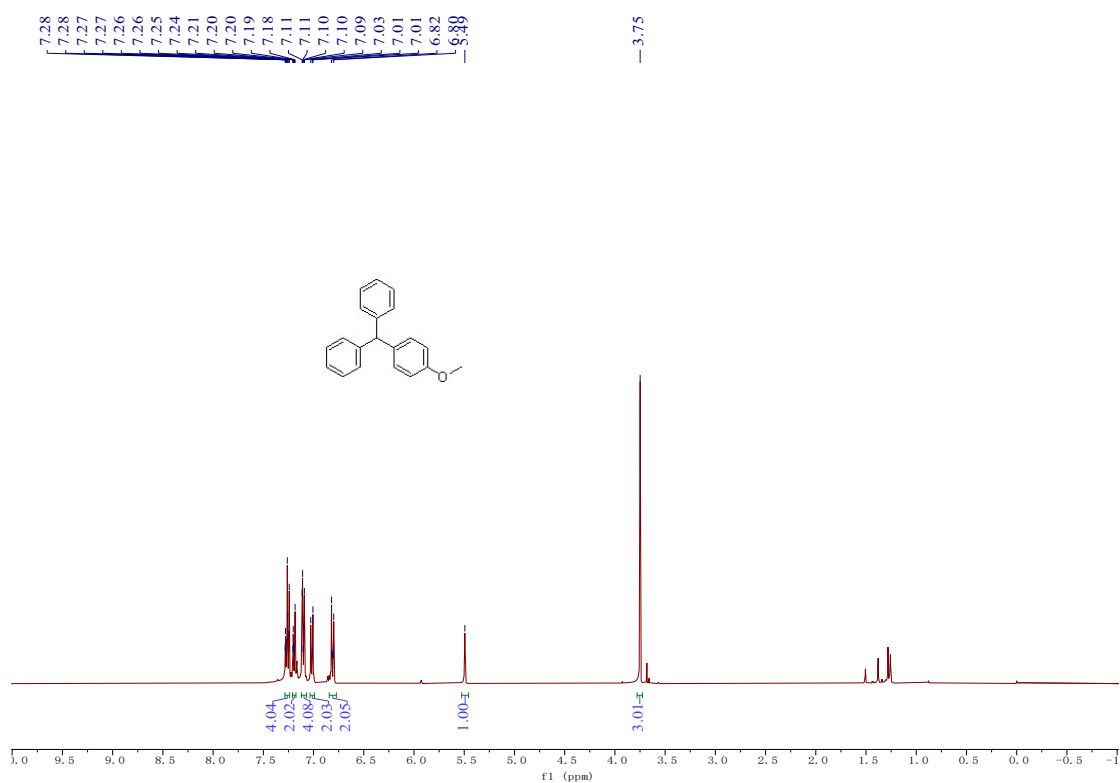
¹H NMR (400 MHz, CDCl₃) spectrum of 3ja



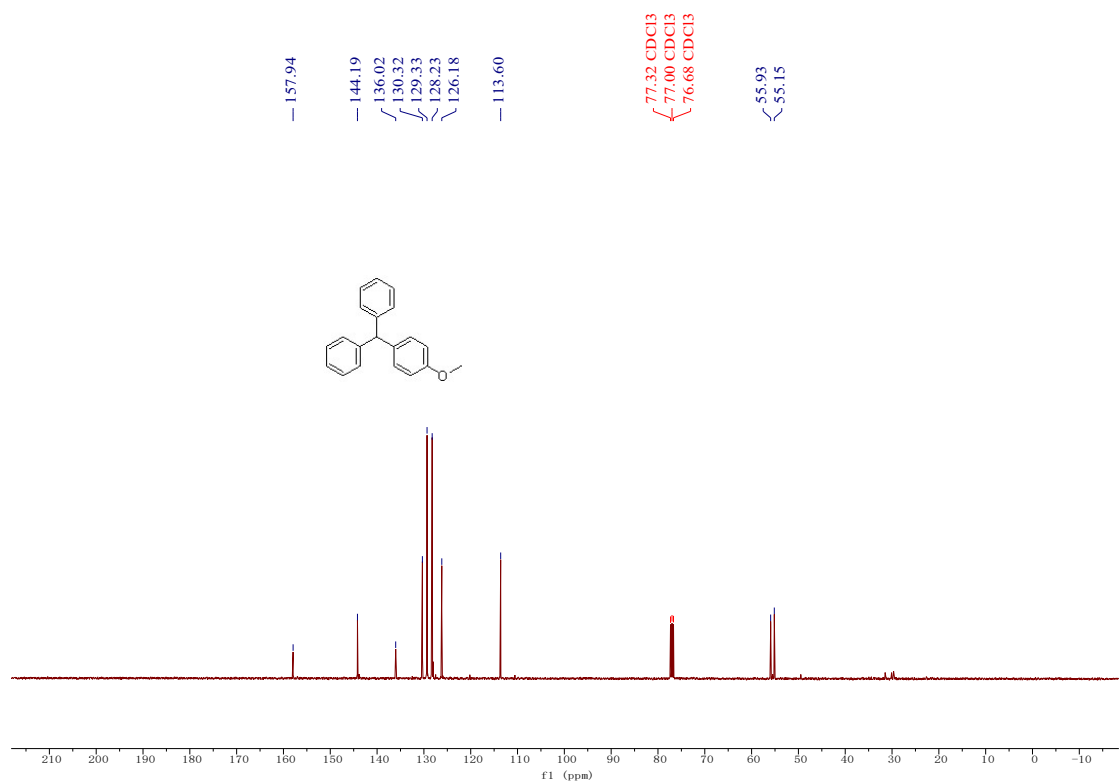
¹³C NMR (100 MHz, CDCl₃) spectrum of 3ja



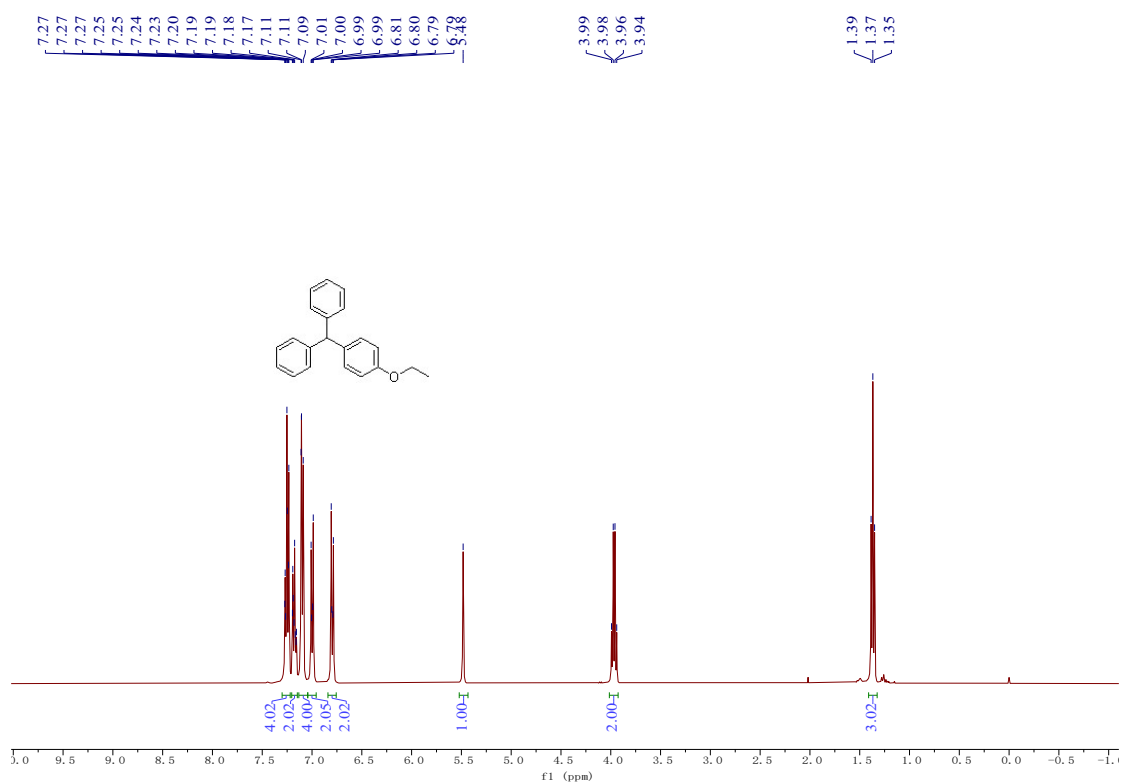
¹H NMR (400 MHz, CDCl₃) spectrum of 5aa



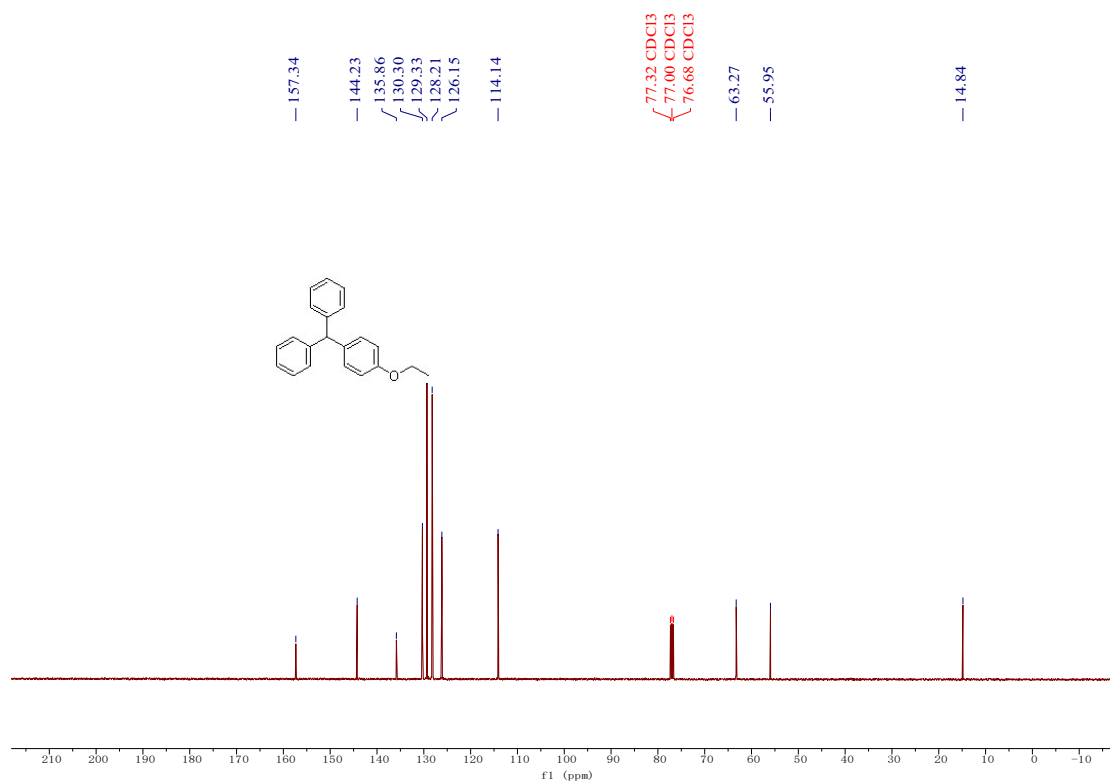
¹³C NMR (100 MHz, CDCl₃) spectrum of 5aa



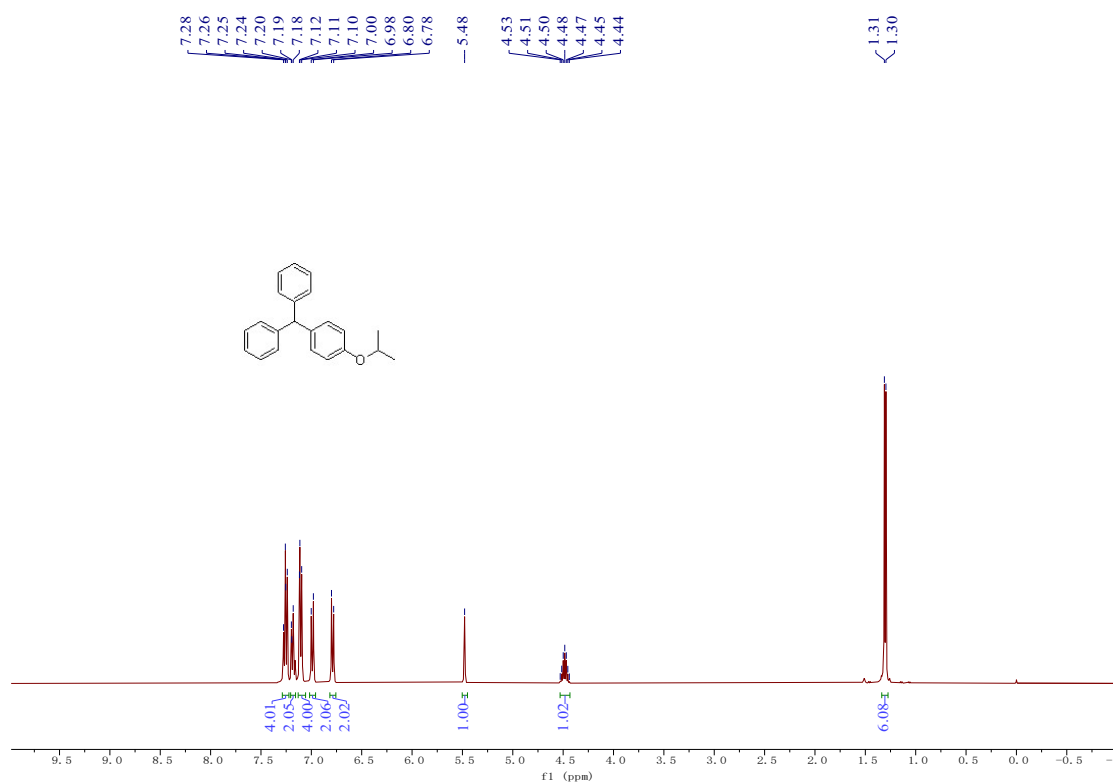
¹H NMR (400 MHz, CDCl₃) spectrum of 5ab



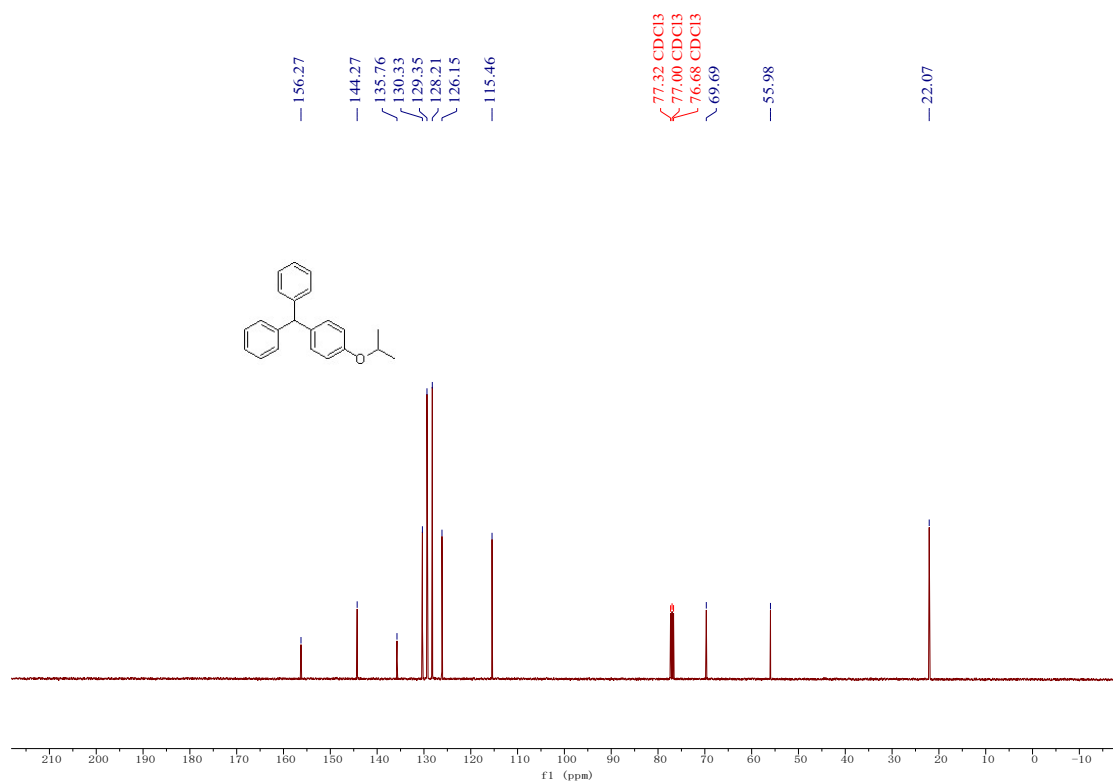
¹³C NMR (100 MHz, CDCl₃) spectrum of 5ab



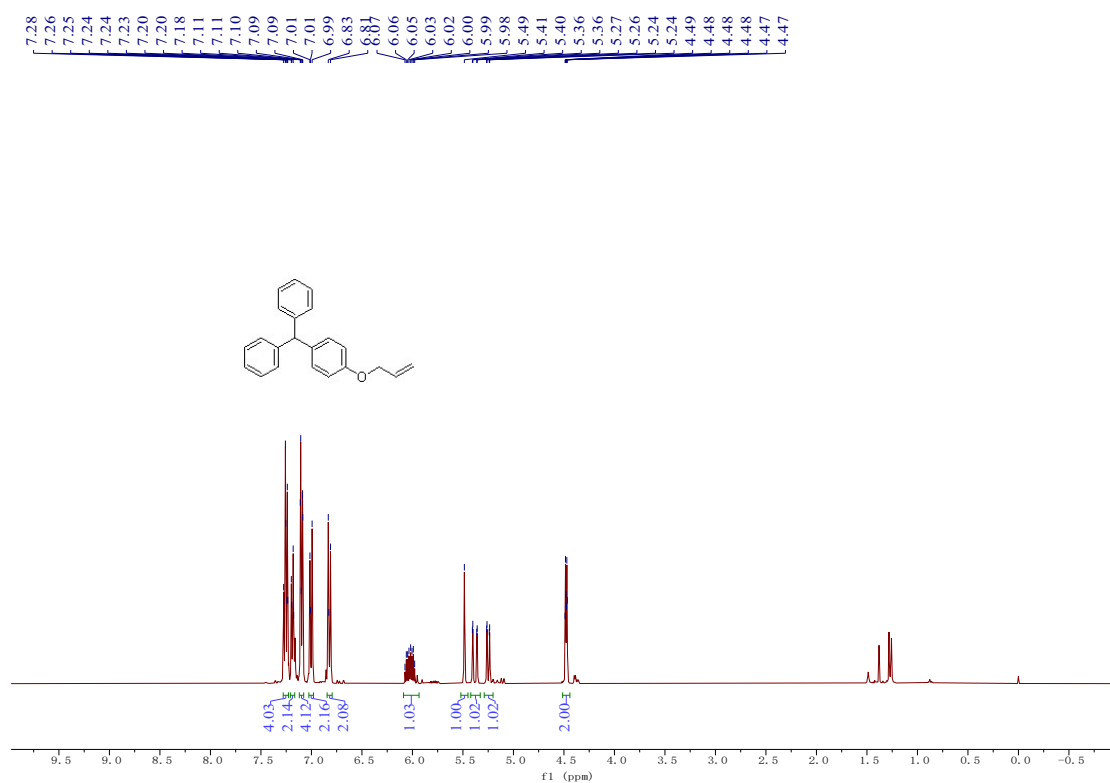
¹H NMR (400 MHz, CDCl₃) spectrum of 5ac



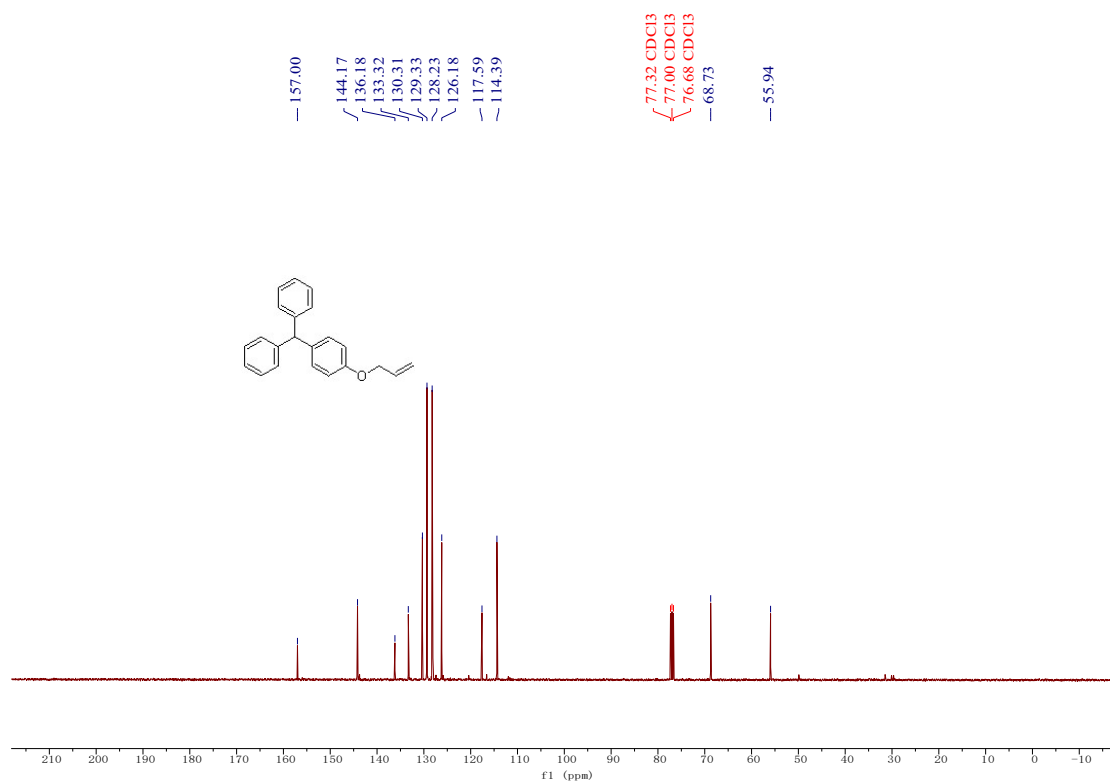
¹³C NMR (100 MHz, CDCl₃) spectrum of 5ac



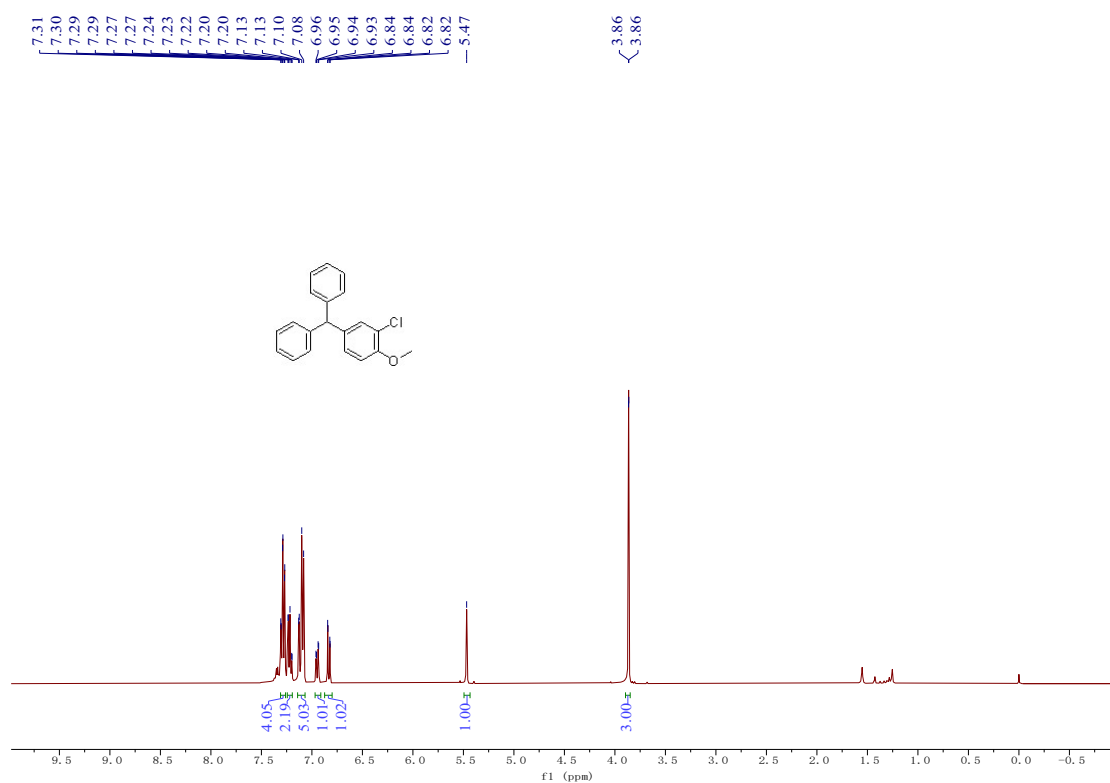
¹H NMR (400 MHz, CDCl₃) spectrum of 5ad



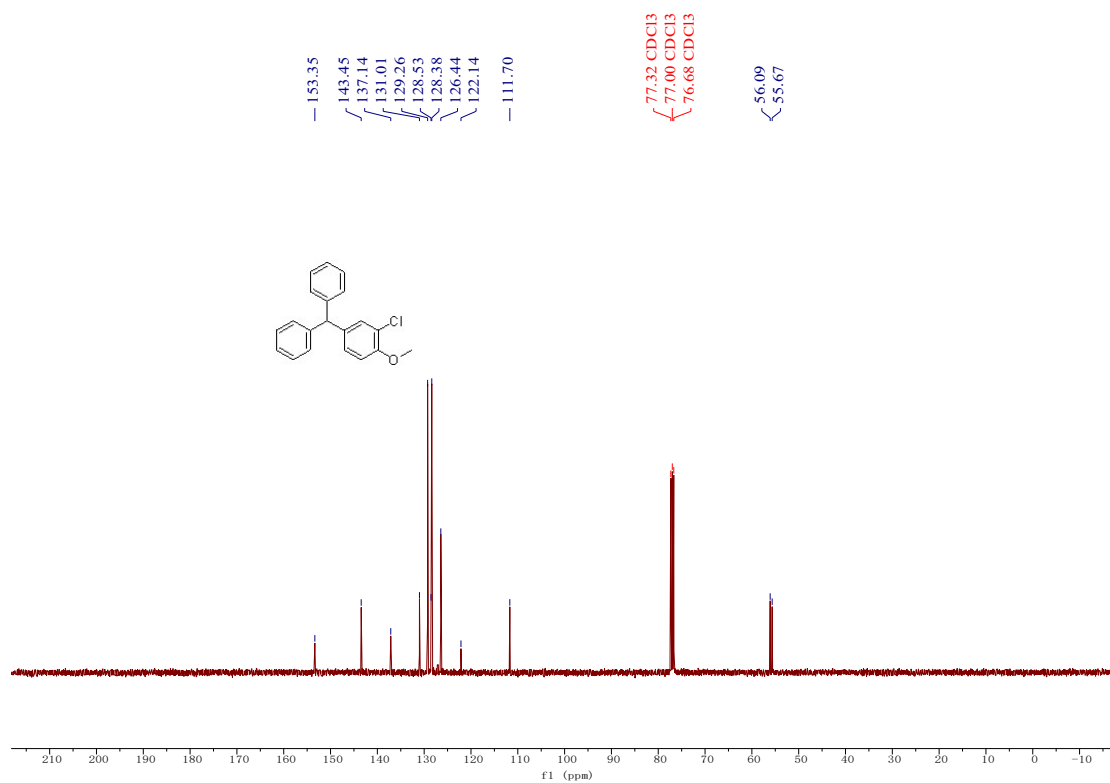
¹³C NMR (100 MHz, CDCl₃) spectrum of 5ad



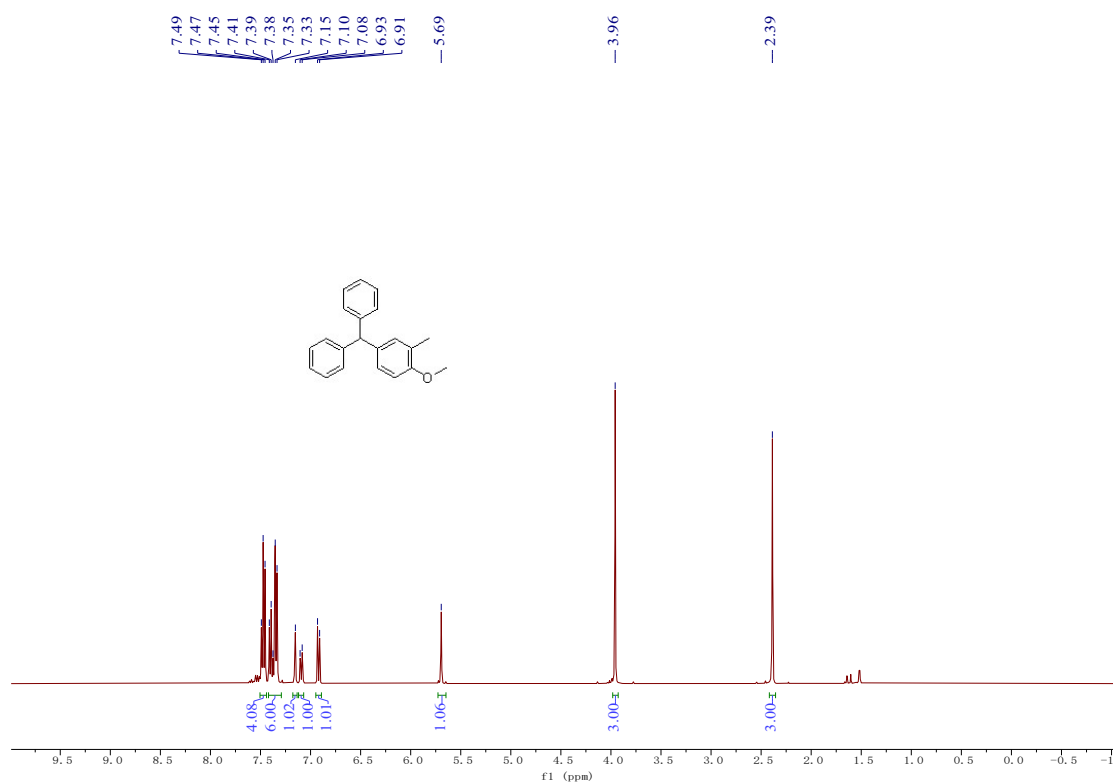
¹H NMR (400 MHz, CDCl₃) spectrum of 5ae



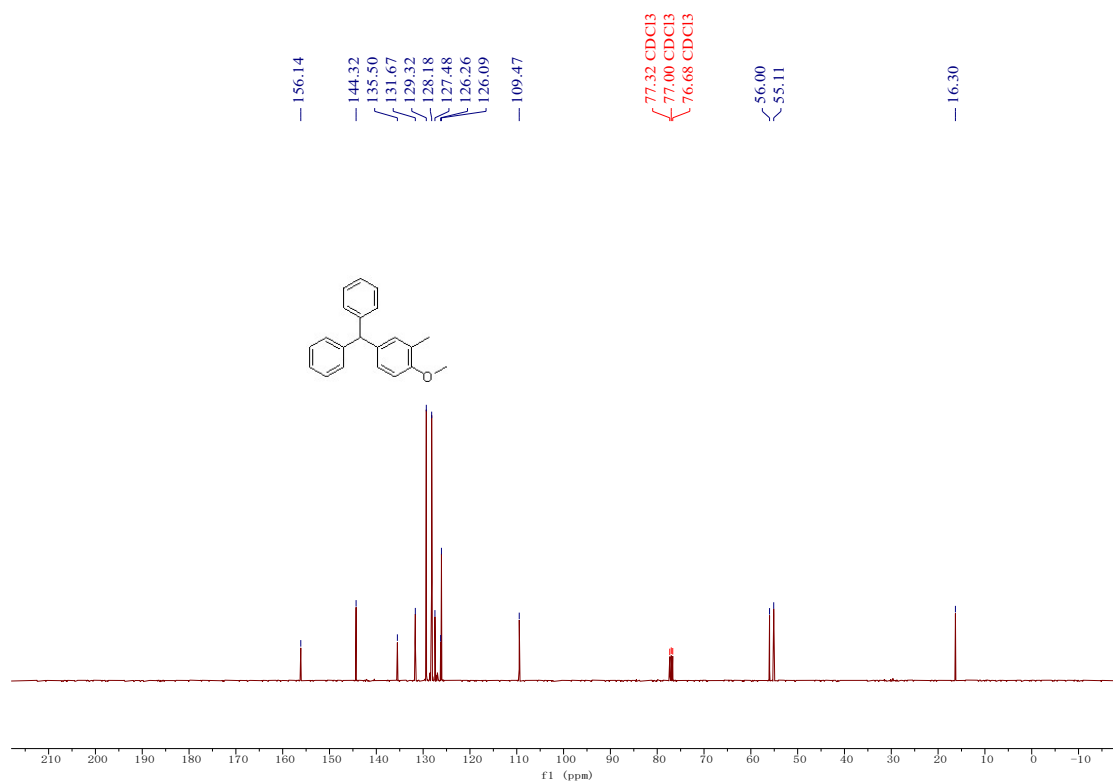
¹³C NMR (100 MHz, CDCl₃) spectrum of 5ae



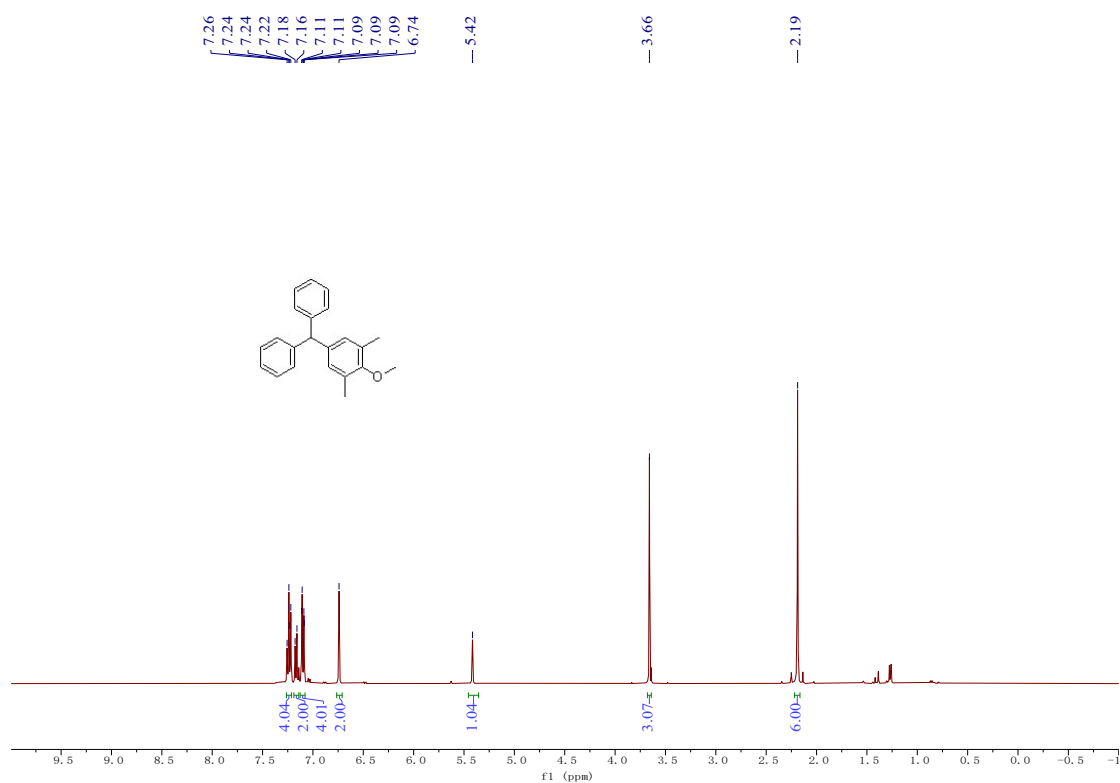
¹H NMR (400 MHz, CDCl₃) spectrum of 5af



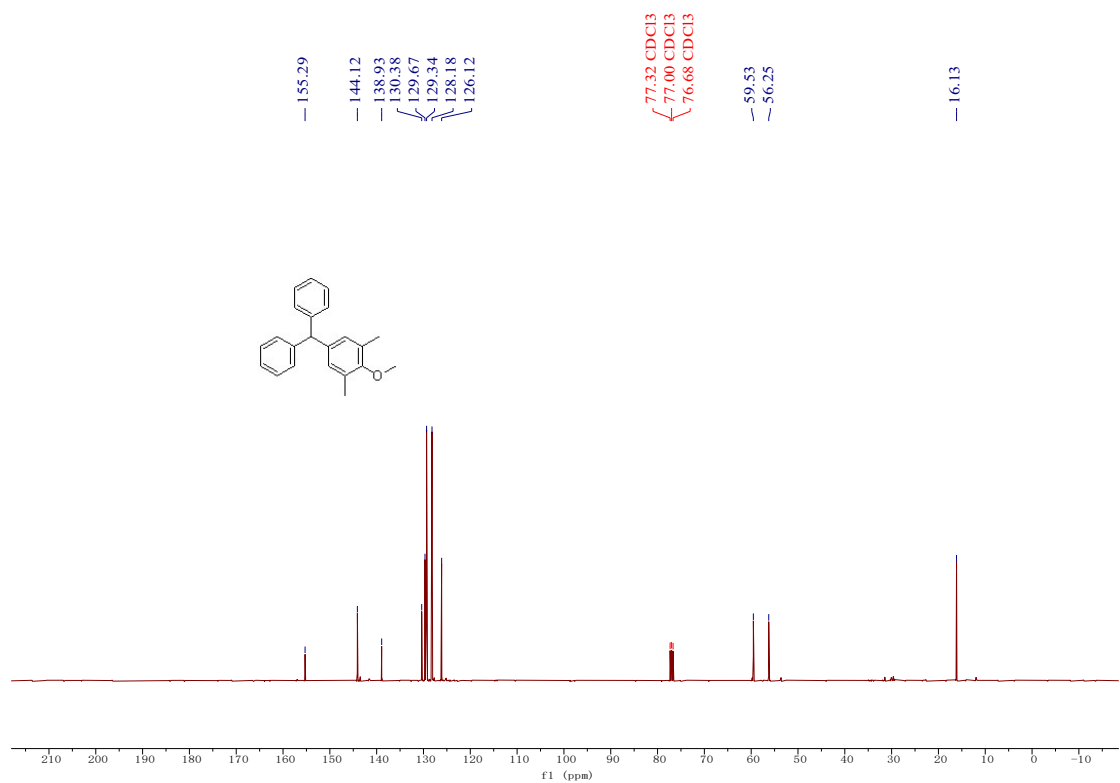
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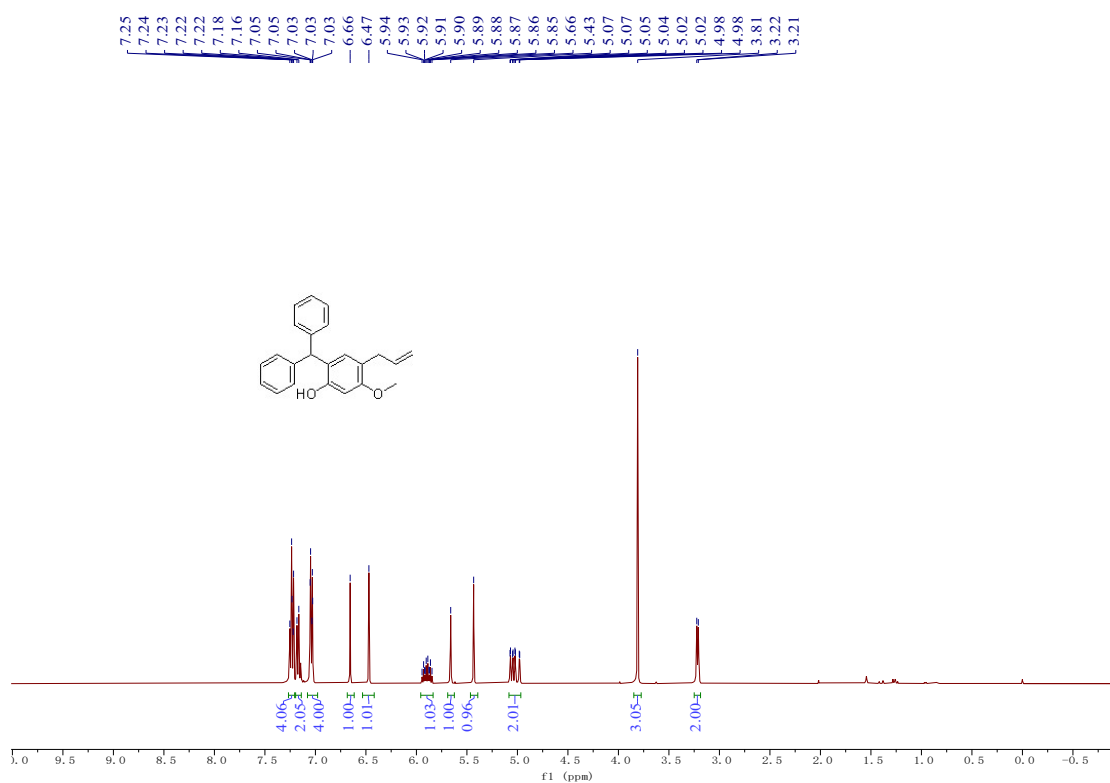
¹H NMR (400 MHz, CDCl₃) spectrum of 5ag



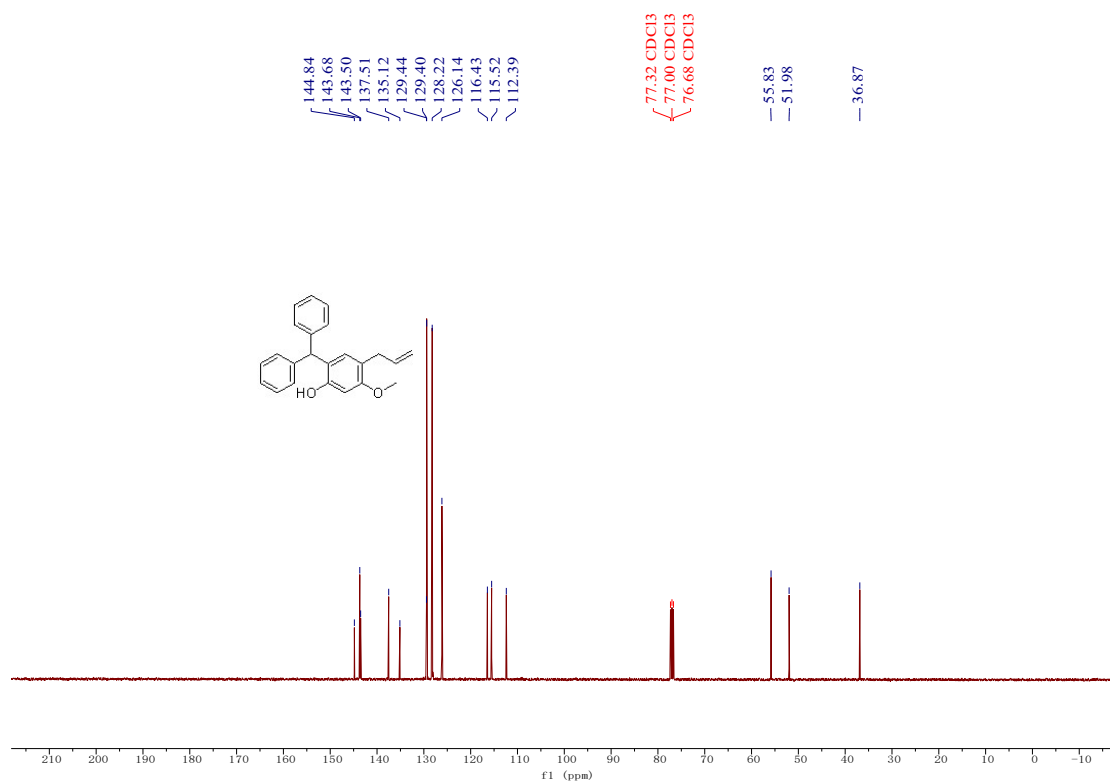
¹³C NMR (100 MHz, CDCl₃) spectrum of 5ag



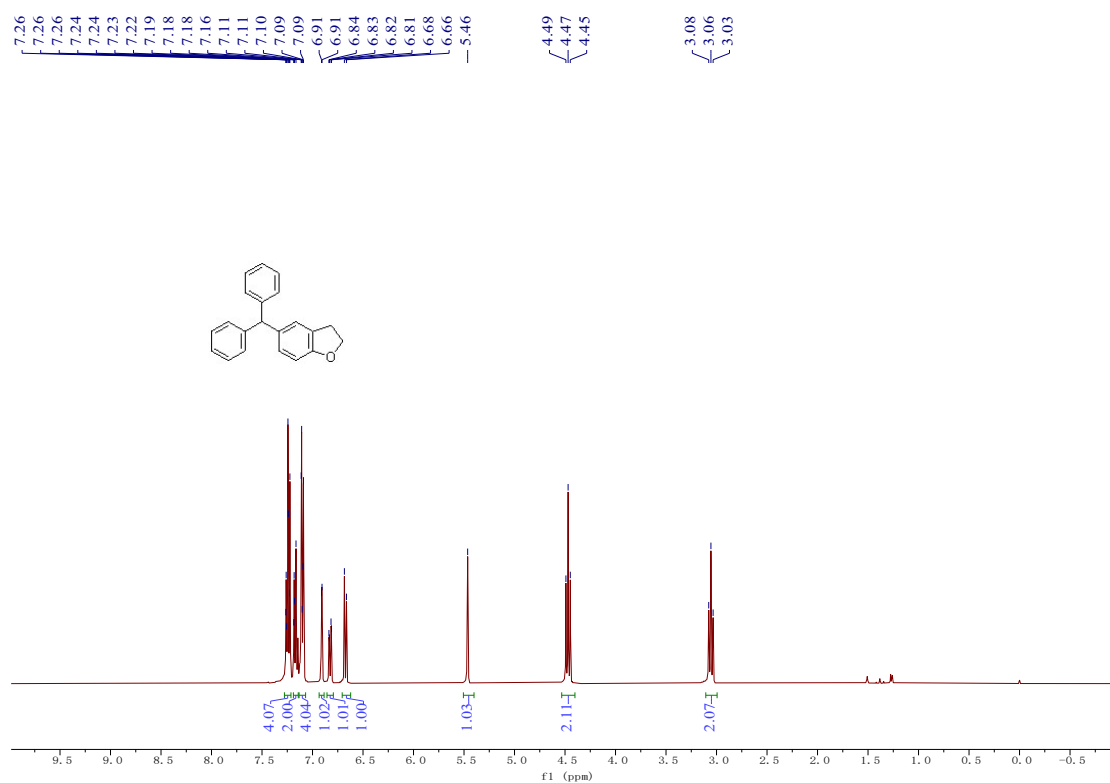
¹H NMR (400 MHz, CDCl₃) spectrum of 5ah



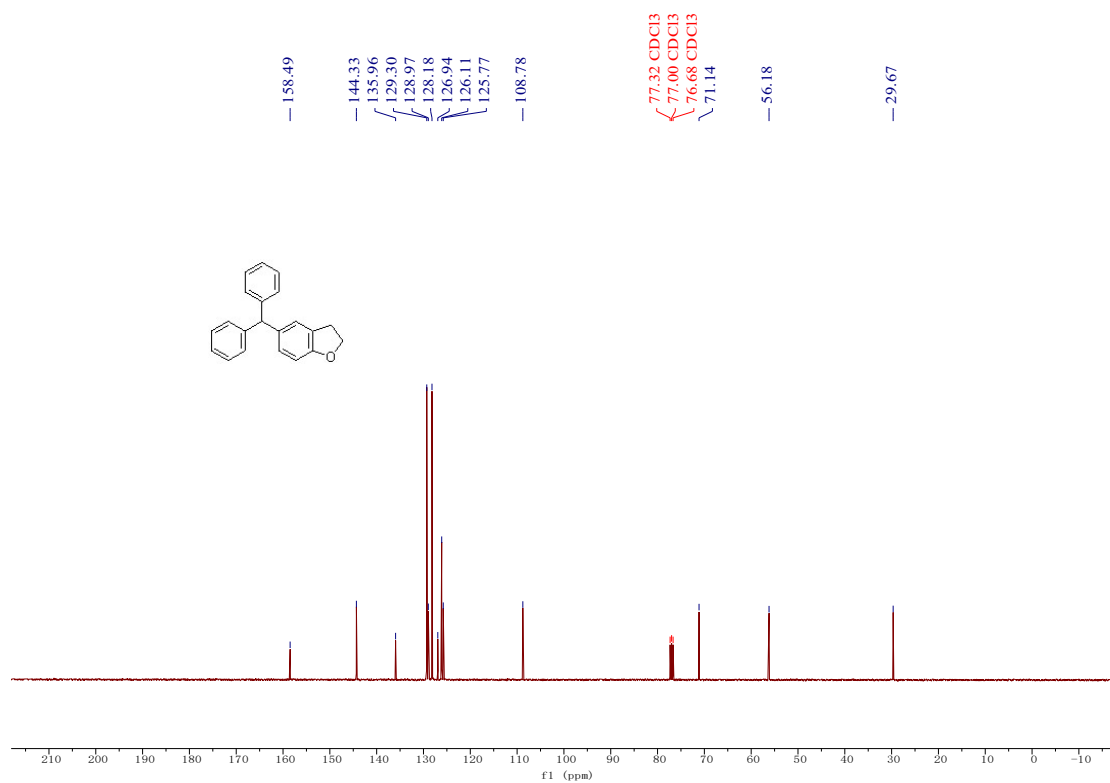
¹³C NMR (100 MHz, CDCl₃) spectrum of 5ah



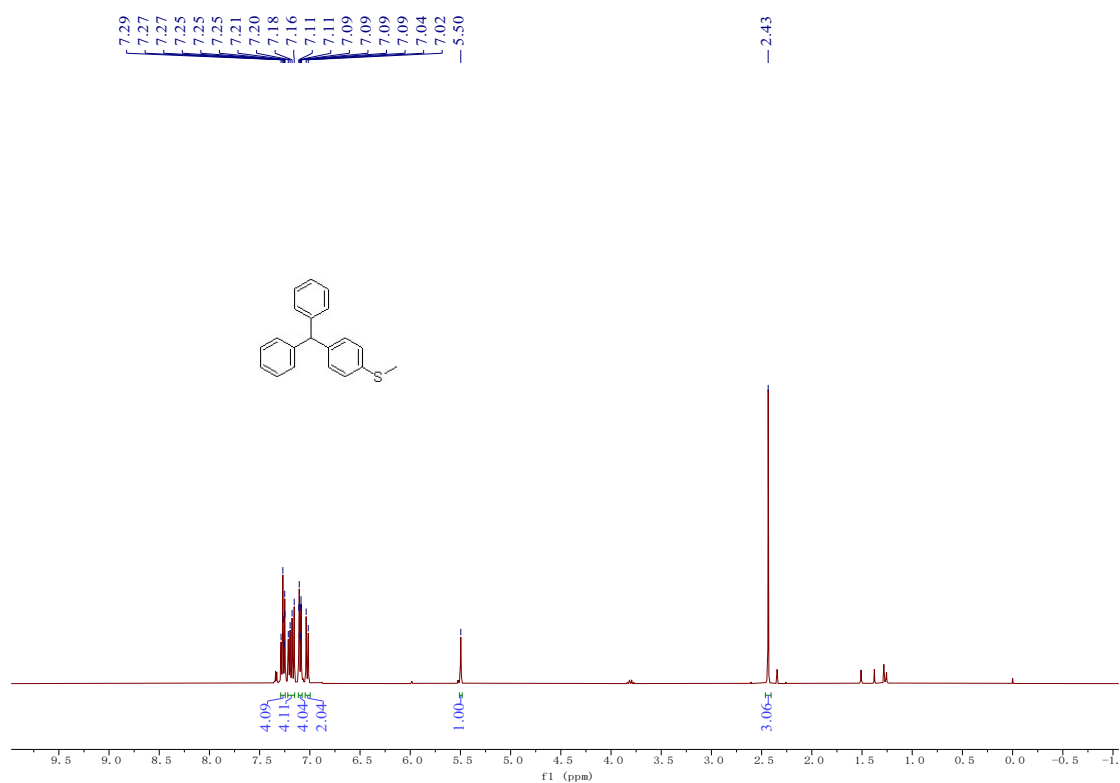
¹H NMR (400 MHz, CDCl₃) spectrum of 5ai



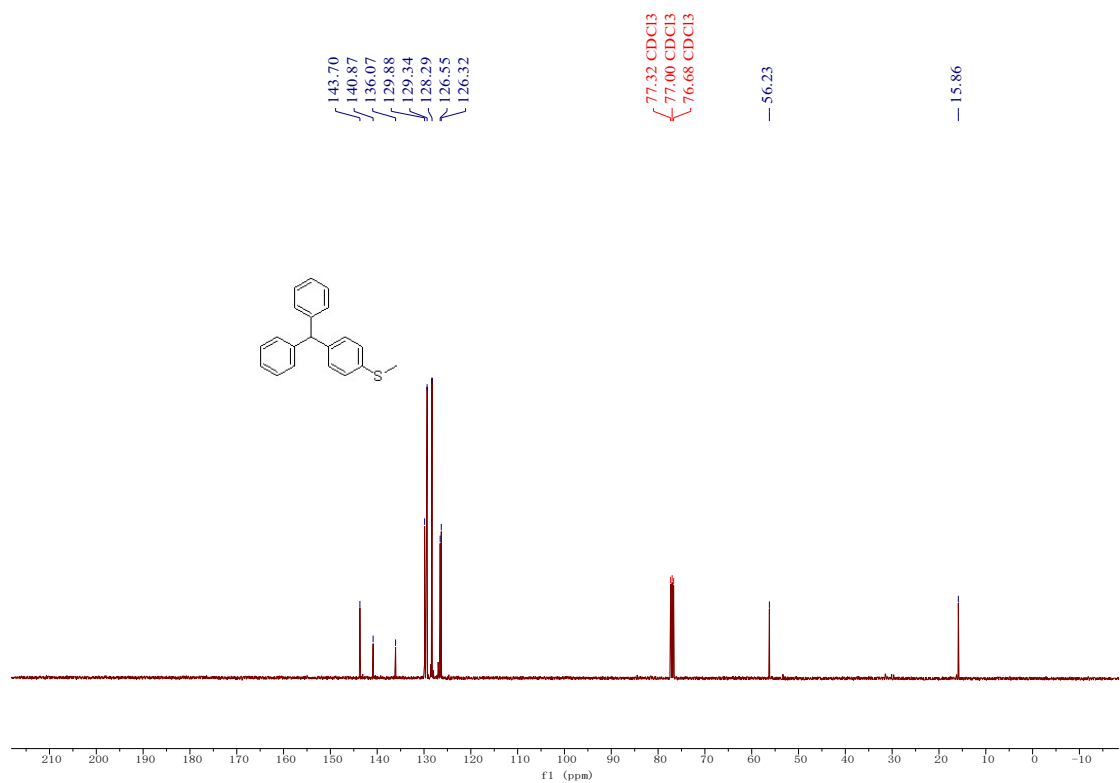
¹³C NMR (100 MHz, CDCl₃) spectrum of 5ai



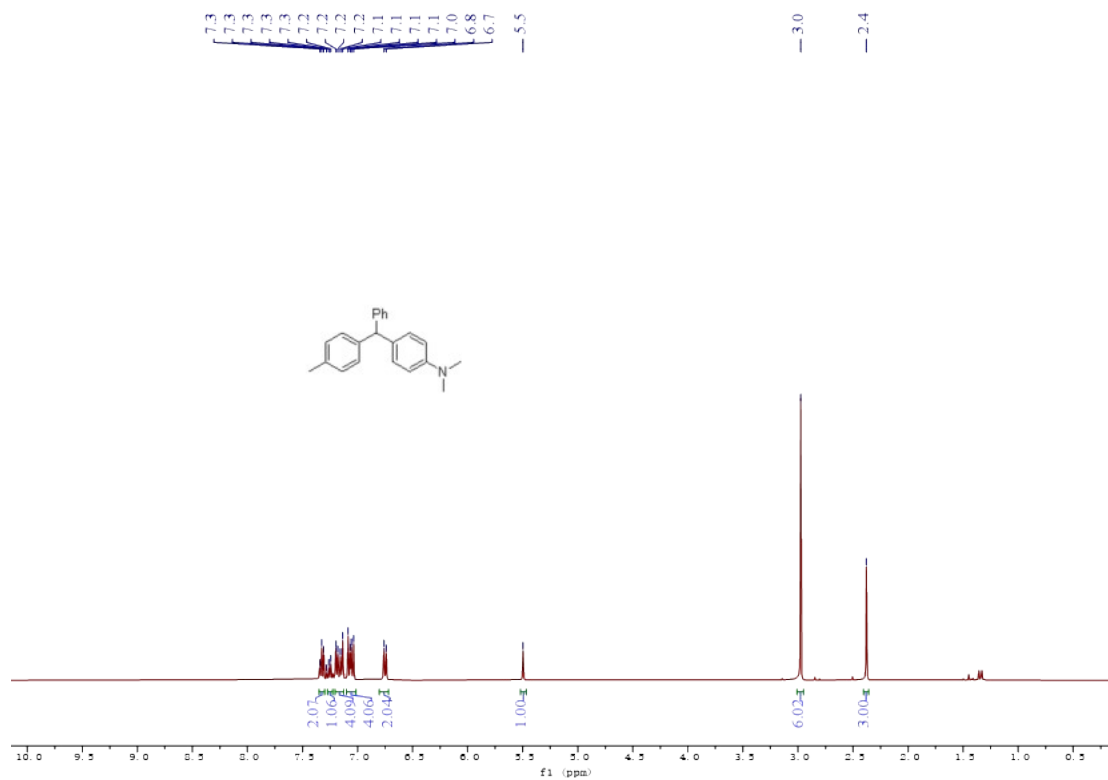
¹H NMR (400 MHz, CDCl₃) spectrum of 5aj



¹³C NMR (100 MHz, CDCl₃) spectrum of 5aj



¹H NMR (400 MHz, CDCl₃) spectrum of 5bk



¹³C NMR (100 MHz, CDCl₃) spectrum of 5bk

