Supporting information for

Palladium-Catalyzed Synthesis of Quinolines from Allyl alcohols and Anilines

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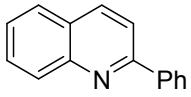
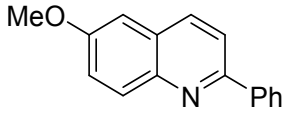
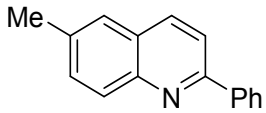
Characterization data for products



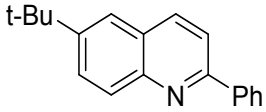
2-phenylquinoline (3aa) [1] White solid. Mp 85-86 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.26 – 8.07 (m, 4H), 7.84 (dd, *J* = 20.0, 8.3 Hz, 2H), 7.72 (t, *J* = 7.7 Hz, 1H), 7.52 (dd, *J* = 7.5, 4.9 Hz, 3H), 7.46 (t, *J* = 7.3 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.4, 148.3, 139.7, 136.8, 129.7, 129.4, 128.9, 127.6, 127.5, 127.2, 126.3, 119.0.



6-methoxy-2-phenylquinoline (3ba) [1] White solid. Mp 134-135 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.30 – 8.04 (m, 4H), 7.85 (dd, *J* = 8.7, 2.5 Hz, 1H), 7.54 (t, *J* = 7.8 Hz, 2H), 7.44 (dd, *J* = 24.9, 8.4 Hz, 2H), 7.11 (s, 1H), 3.97 (s, 3H).
^{13}C NMR (101 MHz, $CDCl_3$) δ 157.7, 155.0, 144.3, 139.7, 135.5, 131.1, 128.9, 128.8, 128.1, 127.3, 122.3, 119.2, 105.0, 55.5.

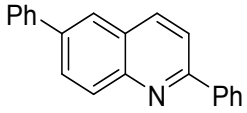


6-methyl-2-phenylquinoline (3ca) [1] White solid. Mp 89-90 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.16 – 8.09 (m, 2H), 8.05 (d, *J* = 8.5 Hz, 1H), 7.99 – 7.94 (m, 1H), 7.71 (d, *J* = 8.6 Hz, 1H), 7.54 – 7.43 (m, 4H), 7.43 – 7.33 (m, 1H), 2.45 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.5, 146.9, 139.9, 136.1, 136.1, 132.0, 129.5, 129.2, 128.9, 127.5, 127.3, 126.4, 118.9, 21.6.

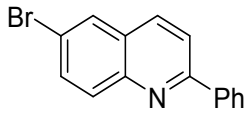


6-(*tert*-butyl)-2-phenylquinoline (3da) [1] White solid. Mp 109-110 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.24 – 8.11 (m, 4H), 7.84 (td, *J* = 6.7, 3.2 Hz, 2H), 7.75 (s, 1H), 7.52 (td, *J* = 6.6, 3.4 Hz, 2H), 7.46 (dd,

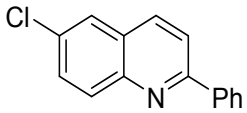
J = 8.4, 6.4 Hz, 1H), 1.44 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.7, 149.3, 137.1, 129.3, 129.0, 128.9, 127.6, 126.9, 122.5, 119.0, 35.0, 31.2.



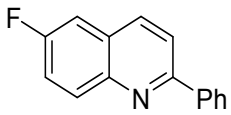
2,6-diphenylquinoline (3ea) [1] White solid. Mp 203-204 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.30 – 8.15 (m, 4H), 8.06 – 7.97 (m, 2H), 7.90 (dd, *J* = 8.8, 2.3 Hz, 1H), 7.74 (d, *J* = 7.6 Hz, 2H), 7.59 – 7.45 (m, 5H), 7.44 – 7.35 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.3, 147.7, 140.4, 139.6, 139.1, 137.0, 130.1, 129.4, 129.4, 129.0, 128.9, 127.7, 127.6, 127.4, 127.4, 125.2, 119.4.



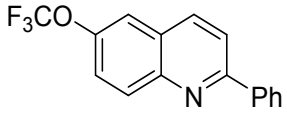
6-bromo-2-phenylquinoline (3fa) [1] Light yellow solid. Mp 129-130 °C;^{1}H NMR (400 MHz, $CDCl_3$) δ 8.14 (t, *J* = 9.0 Hz, 3H), 8.05 (d, *J* = 9.0 Hz, 1H), 7.99 (s, 1H), 7.89 (d, *J* = 8.6 Hz, 1H), 7.79 (d, *J* = 9.0 Hz, 1H), 7.60 – 7.41 (m, 3H).
^{13}C NMR (101 MHz, $CDCl_3$) δ 157.6, 146.7, 139.1, 135.8, 133.1, 131.4, 129.6, 129.5, 128.9, 128.2, 127.5, 120.1, 119.8.



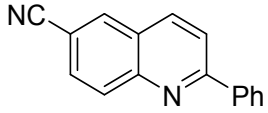
6-chloro-2-phenylquinoline (3ga) [1] White solid. Mp 109-110 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 – 8.04 (m, 2H), 8.01 (dt, *J* = 9.0, 0.6 Hz, 1H), 7.88 (dd, *J* = 8.7, 0.8 Hz, 1H), 7.69 (d, *J* = 8.6 Hz, 1H), 7.62 (d, *J* = 2.4 Hz, 1H), 7.55 (dd, *J* = 9.0, 2.4 Hz, 1H), 7.49 – 7.37 (m, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.4, 146.6, 139.2, 135.7, 131.9, 131.3, 130.5, 129.6, 128.9, 127.7, 127.5, 126.2, 119.6.



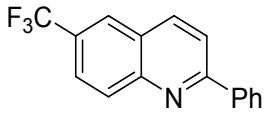
6-fluoro-2-phenylquinoline (3ha) [1] White solid. Mp 100-101 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.26 – 8.06 (m, 4H), 7.88 (d, *J* = 8.5 Hz, 1H), 7.63 – 7.34 (m, 5H). . ^{13}C NMR (101 MHz, $CDCl_3$) δ 161.6, 159.2, 145.4, 139.4, 136.2, 132.3, 132.2, 129.5, 128.9, 127.8, 127.7, 127.5, 120.0, 119.8, 110.6, 110.4.



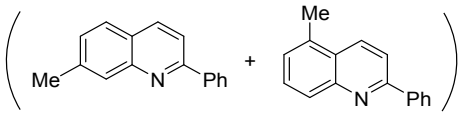
2-phenyl-6-(trifluoromethoxy)quinoline (3ia) [1] White solid. Mp 126-127 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18 (dd, *J* = 21.0, 8.2 Hz, 4H), 7.93 (d, *J* = 8.7 Hz, 1H), 7.65 (s, 1H), 7.60 – 7.45 (m, 4H).
^{13}C NMR (101 MHz, $CDCl_3$) δ 157.9, 146.8, 146.5, 139.1, 136.6, 131.9, 129.7, 128.9, 127.6 127.2, 123.7, 119.9, 117.5.



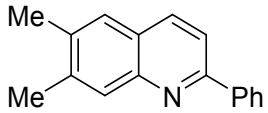
2-phenylquinoline-6-carbonitrile (3ja) [1] White solid; mp 140-141 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.38 – 8.13 (m, 5), 7.99 (d, *J* = 8.7 Hz, 1), 7.84 (dd, *J* = 8.8, 2.0 Hz, 1), 7.64 – 7.46 (m, 3). ^{13}C NMR (101 MHz, $CDCl_3$) δ 160.0, 149.1, 138.4, 137.1, 133.7, 131.1, 130.4, 130.3, 129.0, 127.8, 126.4, 120.5, 118.7, 109.8.



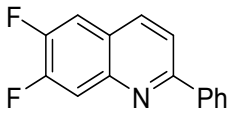
2-phenyl-6-(trifluoromethyl)quinoline (3ka) [1] White solid. Mp 135 -136 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.22 (dd, *J* = 36.5, 7.8 Hz, 4H), 8.11 (s, 1H), 7.91 (dd, *J* = 27.9, 8.8 Hz, 2H), 7.52 (dt, *J* = 12.1, 6.8 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 159.3, 149.2, 138.8, 137.6, 130.8, 130.0, 129.0, 128.2, 127.9, 127.7, 126.1, 125.5, 125.4, 125.4, 125.4, 122.8, 120.1.



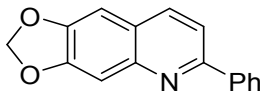
7-methyl-2-phenylquinoline and 5-methyl-2-phenylquinoline mixtrue (3la / 3la' = 6:1) [1] White solid. Mp 89-92 °C;^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (d, *J* = 8.6 Hz, 0.2H), 8.14 (d, *J* = 8.1 Hz, 3.3H), 8.02 (d, *J* = 8.5 Hz, 0.2H), 7.95 (s, 1.0H), 7.87 (d, *J* = 8.9 Hz, 0.2H), 7.79 (d, *J* = 8.4 Hz, 1.0H), 7.69 (d, *J* = 8.1 Hz, 1.0H), 7.62 – 7.56 (m, 0.3H), 7.55 – 7.48 (m, 2.5H), 7.47 – 7.41 (m, 1.3H), 7.34 (d, *J* = 8.3 Hz, 1.2H), 2.69 (s, 0.5H), 2.56 (s, 3.0H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.2, 156.8, 148.5, 139.8, 139.8, 139.6, 136.3, 134.3, 133.2, 129.3, 129.2, 129.1, 128.8, 128.7, 128.5, 128.0, 127.5, 127.0, 126.7, 126.4, 125.2, 118.5, 118.1, 21.8, 18.5.



6,7-dimethyl-2-phenylquinoline (3ma) [1] White solid. Mp 121-122 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (d, *J* = 7.2 Hz, 2H), 8.11 (d, *J* = 2.2 Hz, 1H), 7.98 (s, 1H), 7.80 (d, *J* = 8.6 Hz, 1H), 7.66 – 7.50 (m, 3H), 7.51 – 7.39 (m, 1H), 2.52 (s, 3H), 2.48 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.3, 147.3, 139.8, 136.1, 135.6, 128.9, 128.7, 127.4, 126.6, 125.7, 118.1, 20.4, 19.9.

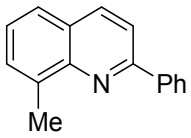


6,7-difluoro-2-phenylquinoline (3na) [1] White solid. Mp 106-107 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.15 (d, *J* = 7.6 Hz, 3H), 7.94 – 7.87 (m, 2H), 7.57 – 7.49 (m, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.6, 153.8, 151.3, 151.1, 148.8, 148.6, 145.4, 145.3, 138.9, 135.9, 135.8, 129. 6, 128.8, 127.4, 123.9, 123.8, 119.0, 115.9, 115.7, 112.6, 112.5.

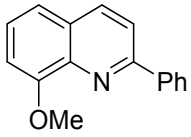


6-phenyl-[1,3]dioxolo[4,5-g]quinoline (3oa) [1] Light yellow solid. Mp 111-112 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 (d, *J* = 7.6 Hz, 2H), 8.02 (d, *J* = 8.3 Hz, 1H), 7.71 (d, *J* = 8.4 Hz, 1H), 7.55 – 7.36 (m, 4H), 7.06 (s, 1H), 6.11 (s, 2H).

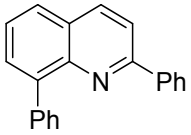
^{13}C NMR (101 MHz, $CDCl_3$) δ 155.1, 150.8, 147.6, 146.3, 139.5, 135.5, 128.8, 128.6, 127.2, 124.0, 117.1, 106.0, 102.4, 101.6.



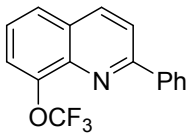
8-methyl-2-phenylquinoline (3pa) [1] Light yellow solid. Mp 46-47 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25 (d, *J* = 7.2 Hz, 2H), 8.17 (d, *J* = 8.5 Hz, 1H), 7.89 (d, *J* = 8.6 Hz, 1H), 7.65 (d, *J* = 8.2 Hz, 1H), 7.60 – 7.48 (m, 3H), 7.48 – 7.36 (m, 2H), 2.90 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.5, 147.1, 139.8, 137.7, 136.9, 129.7, 129.2, 128.8, 127.5, 127.1, 126.0, 125.4, 118.2, 17.9.



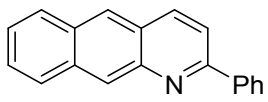
8-methoxy-2-phenylquinoline (3qa) [1] Light yellow solid. Mp 55-56 °C.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.24 – 8.14 (m, 3H), 7.91 (d, *J* = 8.7 Hz, 1H), 7.52 (t, *J* = 7.8 Hz, 2H), 7.47 – 7.39 (m, 3H), 7.08 (d, *J* = 7.4 Hz, 1H), 4.12 (s, 3H).
^{13}C NMR (101 MHz, $CDCl_3$) δ 156.2, 155.5, 140.1, 139.7, 136.8, 129.2, 128.7, 128.3, 127.7, 126.5, 119.5, 119.3, 108.1, 56.1.



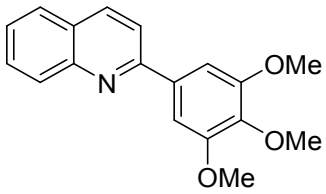
2,8-diphenylquinoline (3ra) [1] yellow oil,^{1}H NMR (400 MHz, $CDCl_3$) δ 8.23 (d, *J* = 8.5 Hz, 1H), 8.16 (d, *J* = 7.5 Hz, 2H), 7.94 (dd, *J* = 8.7, 2.3 Hz, 1H), 7.86 (d, *J* = 7.7 Hz, 2H), 7.79 (t, *J* = 7.7 Hz, 2H), 7.65 – 7.34 (m, 7H).^{13}C NMR (101 MHz, $CDCl_3$) δ 155.9, 145.5, 140.7, 139.5, 139.4, 137.0, 131.1, 130.4, 129.3, 128.7, 127.6, 127.4, 127.1, 126.1, 118.0.



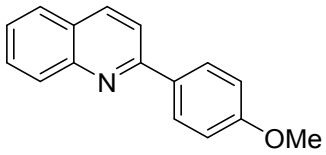
2-phenyl-8-(trifluoromethoxy)quinoline (3sa) [1] White solid. Mp 72-73 °C.,^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25 (t, *J* = 7.4 Hz, 3H), 7.99 (d, *J* = 8.7 Hz, 1H), 7.77 (d, *J* = 8.2 Hz, 1H), 7.63 (d, *J* = 7.7 Hz, 1H), 7.52 (dt, *J* = 15.9, 6.9 Hz, 4H).^{13}C NMR (101 MHz, $CDCl_3$) δ 157.5, 145.4, 141.4, 138.9, 136.6, 129.8, 128.8, 128.6, 127.6, 126.4, 125.5, 121.3, 119.5.



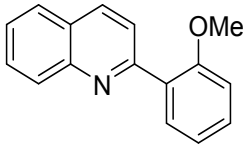
2-phenylbenzo[g]quinoline (3ta) [1] Light yellow solid. Mp 203-204 °C.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.99 (d, *J* = 8.6 Hz, 1H), 8.62 (d, *J* = 8.1 Hz, 1H), 8.21 (d, *J* = 7.7 Hz, 2H), 8.09 (d, *J* = 9.1 Hz, 1H), 8.01 (t, *J* = 8.3 Hz, 2H), 7.94 (d, *J* = 7.8 Hz, 1H), 7.67 (dt, *J* = 22.4, 7.3 Hz, 2H), 7.54 (t, *J* = 7.5 Hz, 2H), 7.46 (t, *J* = 7.3 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.9, 148.2, 139.4, 131.7, 131.6, 131.0, 129.6, 129.3, 128.9, 128.7, 128.6, 127.5, 127.1, 127.1, 124.2, 122.6, 118.8.



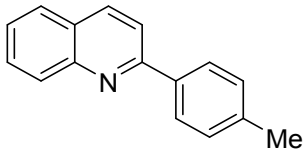
2-(3,4,5-trimethoxyphenyl)quinoline (3ab) [1] Light yellow solid. Mp 150-151 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25 – 8.13 (m, 2H), 7.90 – 7.80 (m, 2H), 7.77 – 7.68 (m, 1H), 7.60 – 7.47 (m, 1H), 7.40 (d, *J* = 2.4 Hz, 2H), 4.00 (s, 6H), 3.92 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.0, 153.6, 148.1, 139.5, 136.8, 135.3, 129.8, 129.6, 127.5, 127.1, 126.3, 118.9, 105.0, 61.0, 56.3.



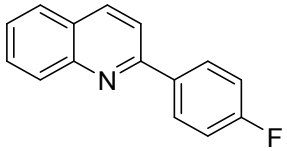
2-(4-methoxyphenyl)quinoline (3ac) [2] White solid. Mp 119-120°C;^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 – 7.94 (m, 4H), 7.71 – 7.60 (m, 2H), 7.56 (ddd, *J* = 8.4, 6.9, 1.5 Hz, 1H), 7.34 (ddd, *J* = 8.1, 6.9, 1.2 Hz, 1H), 6.97 – 6.85 (m, 2H), 3.71 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 160.9, 156.9, 148.3, 136.6, 132.3, 129.6, 129.5, 128.9, 127.5, 126.9, 125.9, 118.5, 114.3, 55.4.



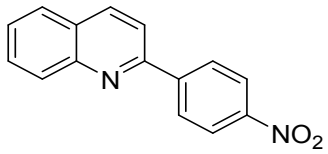
2-(2-methoxyphenyl)quinoline (3ad) [2] Yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.15 (dd, *J* = 16.8, 8.5 Hz, 2H), 7.94 – 7.78 (m, 3H), 7.70 (td, *J* = 7.5, 6.9, 1.5 Hz, 1H), 7.59 – 7.48 (m, 1H), 7.45 – 7.37 (m, 1H), 7.12 (t, *J* = 7.5 Hz, 1H), 7.03 (d, *J* = 8.3 Hz, 1H), 3.85 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.2, 157.1, 148.3, 135.1, 131.5, 130.3, 129.7, 129.6, 129.2, 127.3, 127.0, 126.1, 123.4, 121.3, 111.5, 55.6.



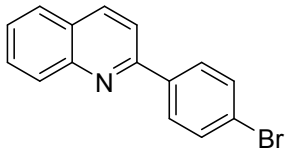
2-(p-tolyl)quinoline (3ae) [2] White solid. mp 80-81 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 (dd, *J* = 8.5, 1.1 Hz, 1H), 8.02 – 7.90 (m, 3H), 7.72 – 7.60 (m, 2H), 7.57 (ddd, *J* = 8.4, 6.8, 1.5 Hz, 1H), 7.35 (ddd, *J* = 8.1, 6.9, 1.2 Hz, 1H), 7.19 (d, *J* = 7.9 Hz, 2H), 2.29 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.3, 148.4, 139.4, 136.9, 136.7, 129.7, 129.6, 127.5, 127.2, 126.1, 118.8, 21.4.



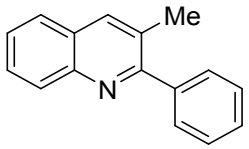
2-(4-fluorophenyl)quinoline (3af) [2] White solid. Mp 95-96 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.23 – 8.07 (m, 4H), 7.77 (td, *J* = 5.5, 2.8 Hz, 2H), 7.70 (ddd, *J* = 8.4, 6.8, 1.5 Hz, 1H), 7.49 (ddd, *J* = 8.0, 6.7, 1.1 Hz, 1H), 7.22 – 7.00 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.1, 162.6, 156.2, 148.2, 136.9, 135.8, 135.8, 129.8, 129.6, 129.5, 129.4, 127.5, 127.1, 126.4, 118.6, 115.9, 115.7, 77.4, 77.1, 76.8



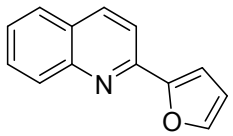
2-(4-nitrophenyl)quinoline (3ag) [1] Yellow solid. Mp 141-142 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.31 (d, *J* = 1.8 Hz, 4H), 8.25 (d, *J* = 8.7 Hz, 1H), 8.17 (d, *J* = 8.6 Hz, 1H), 7.92 – 7.81 (m, 2H), 7.76 (t, *J* = 7.8 Hz, 1H), 7.57 (t, *J* = 7.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.4, 148.3, 148.2, 145.4, 137.3, 130.2, 129.9, 128.2, 127.5, 127.3, 124.0, 118.7.



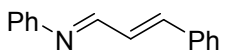
2-(4-bromophenyl)quinoline (3ah) [2] White solid. Mp 120-121 °C ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (dd, *J* = 14.6, 8.6 Hz, 2H), 8.07 – 7.97 (m, 2H), 7.80 (d, *J* = 8.5 Hz, 2H), 7.72 (ddd, *J* = 8.4, 6.8, 1.5 Hz, 1H), 7.68 – 7.61 (m, 2H), 7.52 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H).
^{13}C NMR (101 MHz, $CDCl_3$) δ 156.0, 148.2, 138.4, 137.0, 132.0, 129.9, 129.7, 129.1, 127.5, 127.3, 126.5, 124.0, 118.5.



3-methyl-2-phenylquinoline (3ai) [2] Yellow oil;^{1}H NMR (400 MHz, $CDCl_3$) δ 8.13 (d, *J* = 8.5 Hz, 1H), 7.99 (s, 1H), 7.76 (d, *J* = 8.3 Hz, 1H), 7.69 – 7.61 (m, 1H), 7.59 (d, *J* = 7.8 Hz, 2H), 7.54 – 7.41 (m, 4H), 2.45 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 160.6, 146.7, 141.0, 136.8, 129.4, 129.3, 128.9, 128.8, 128.4, 128.3, 128.2, 127.7, 126.8, 126.5, 20.7.



2-(furan-2-yl)quinoline (3aj) [3] White solid. Mp 90-91 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.15 (d, *J* = 8.6 Hz, 2H), 7.81 (d, *J* = 8.6 Hz, 1H), 7.77 (d, *J* = 8.2 Hz, 1H), 7.70 (ddd, *J* = 8.4, 6.9, 1.5 Hz, 1H), 7.65 – 7.60 (m, 1H), 7.49 (ddd, *J* = 8.0, 6.9, 1.1 Hz, 1H), 7.26 (s, 1H), 6.59 (dd, *J* = 3.4, 1.7 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 153.5, 148.9, 147.9, 144.2, 136.8, 123.0, 129.2, 127.6, 127.1, 126.3, 117.5, 112.3, 110.4.



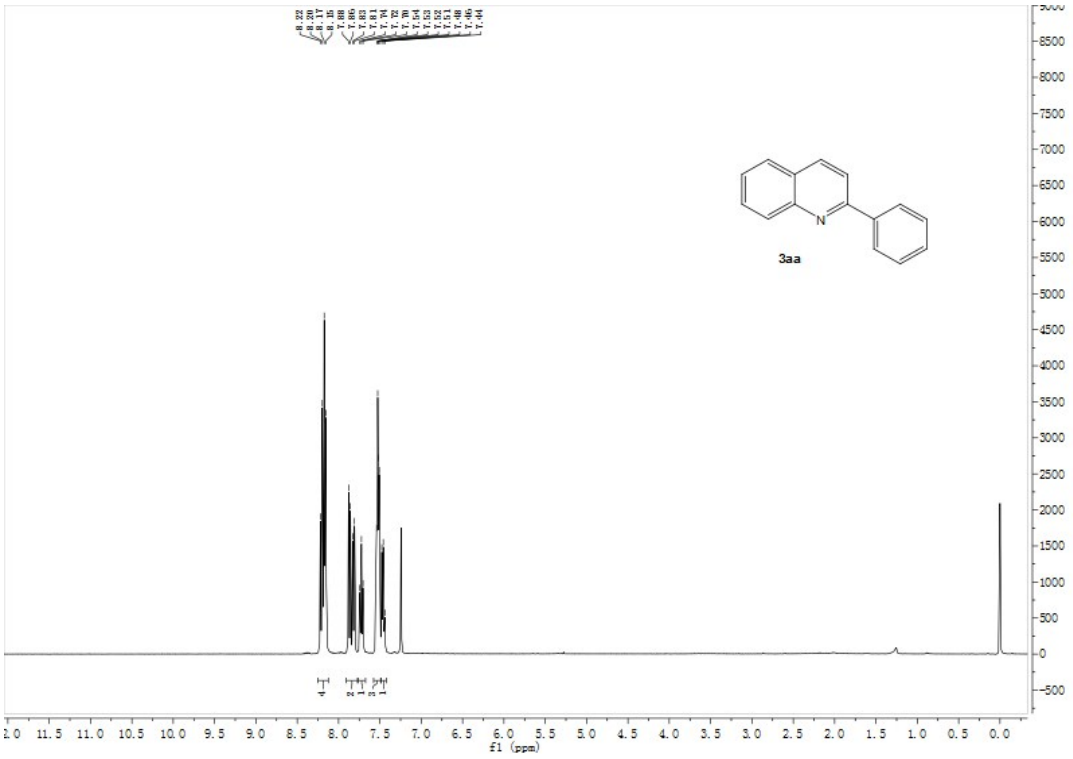
N-cinnamylideneaniline ^{1}H NMR (400 MHz, $CDCl_3$) δ8.30 (dd, *J* = 5.2, 3.1 Hz, 1H), 7.66 – 7.48 (m, 2H), 7.48 – 7.34 (m, 5H), 7.32 – 7.22 (m, 3H), 7.20 – 7.12 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 161.6, 151.8, 144.0, 135.7, 129.6, 129.2, 129.0, 128.6, 127.6, 126.2, 121.0.

References

(1) C. Li, J. Li, Y. An, J. Peng, W. Wu and H. Jiang, *J. Org. Chem*., **2016**, 81, 12189-12196.

(2) R. Wang, H. Fan, W. Zhao and F. Li, *Org. Lett.* **2016**, *18*, 3558-3561.

(3) R. Martínez, D. J. Ramón and M. Yus, *J. Org. Chem.* **2008**, *73*, 9778-9780.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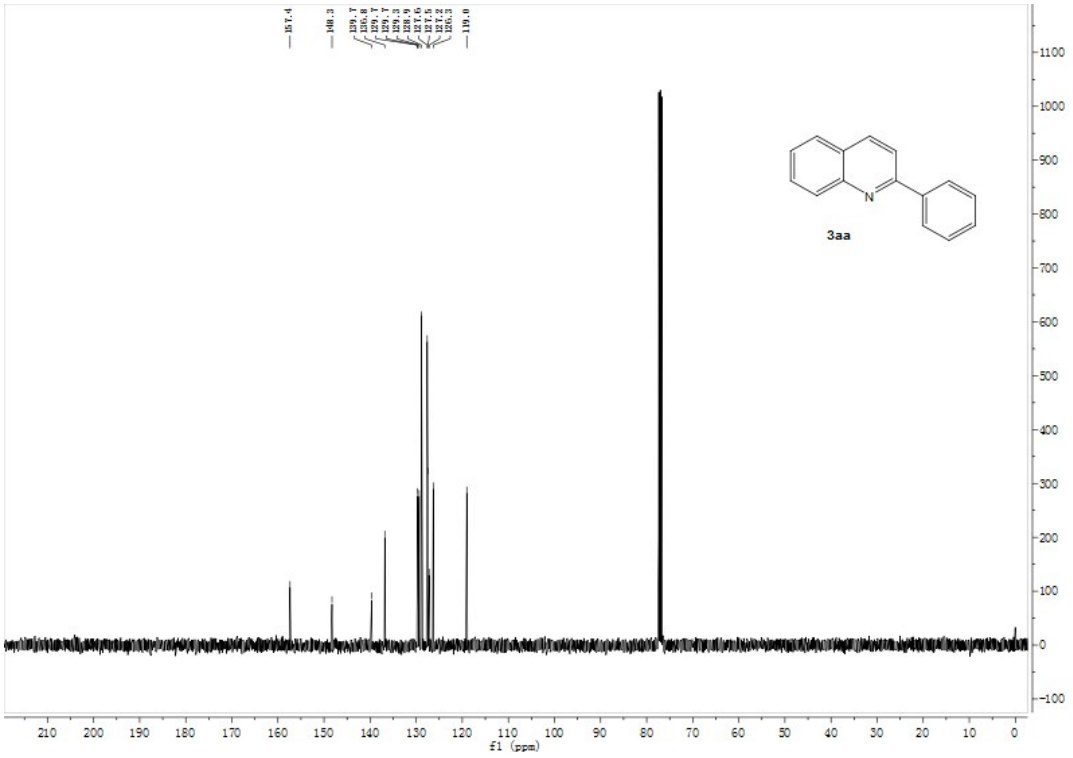
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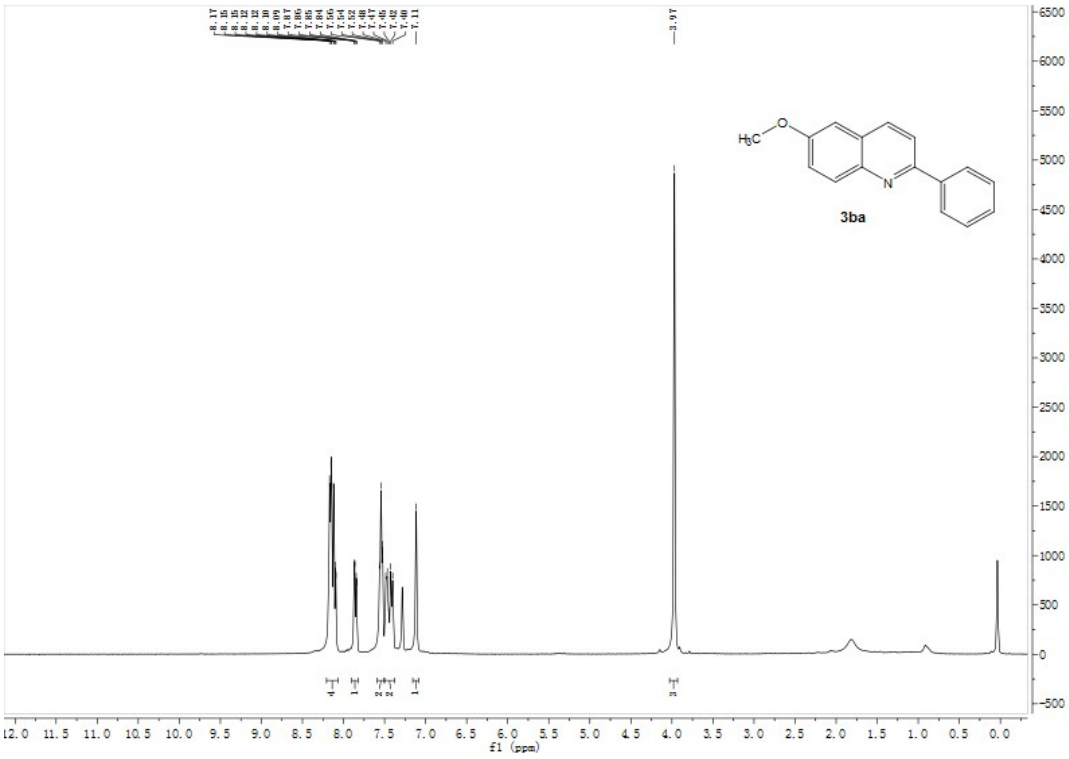
3aa
f1 (ppm)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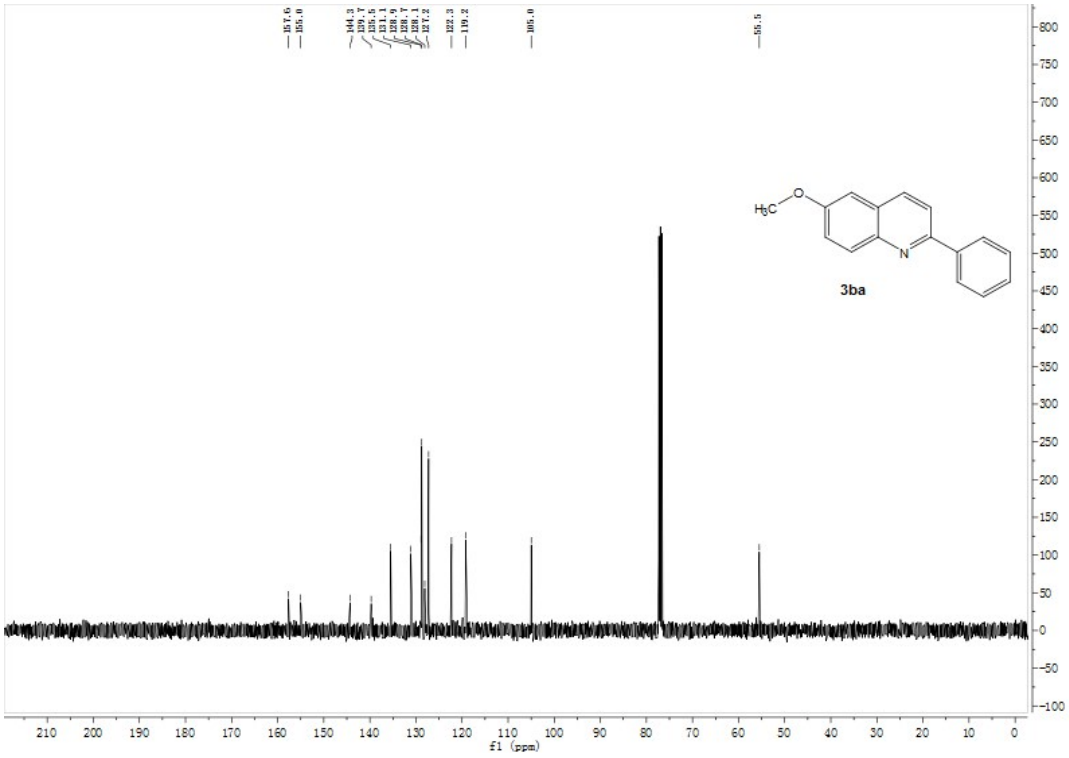
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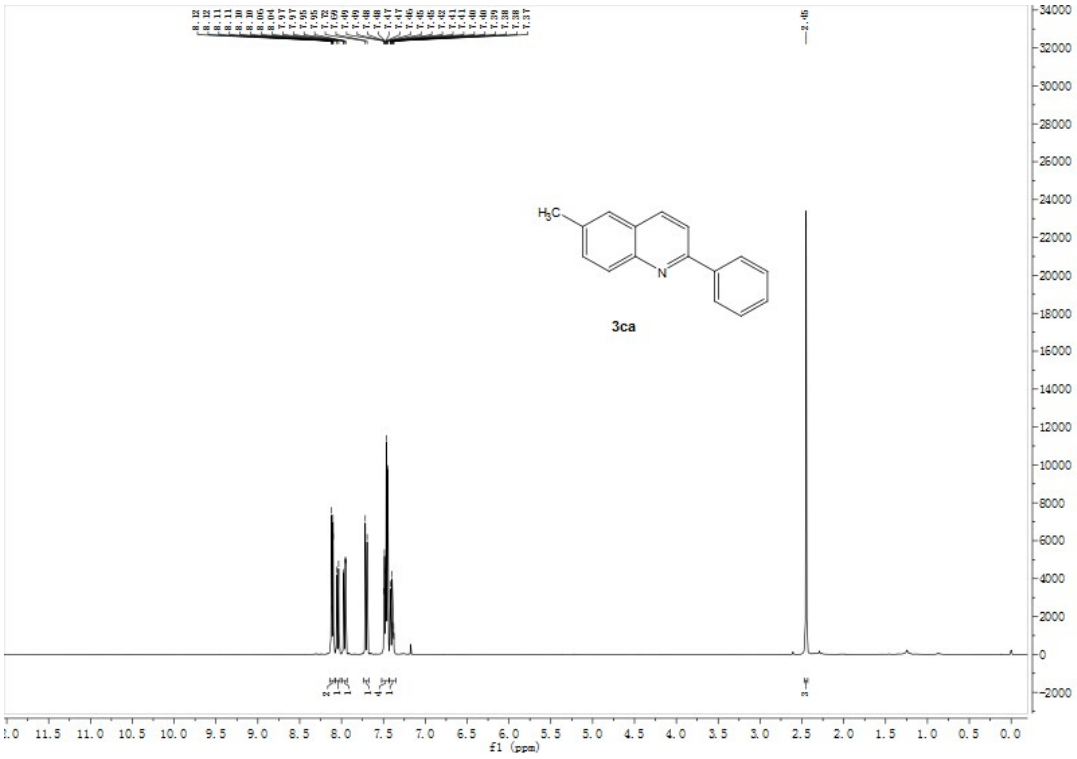
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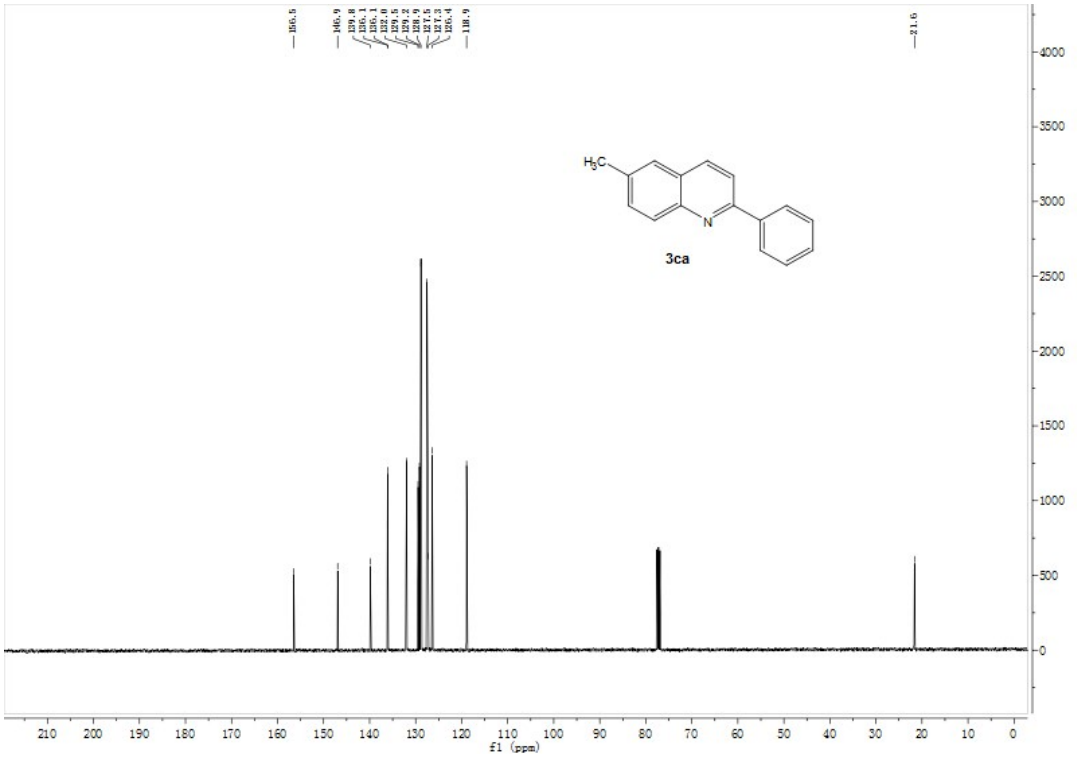
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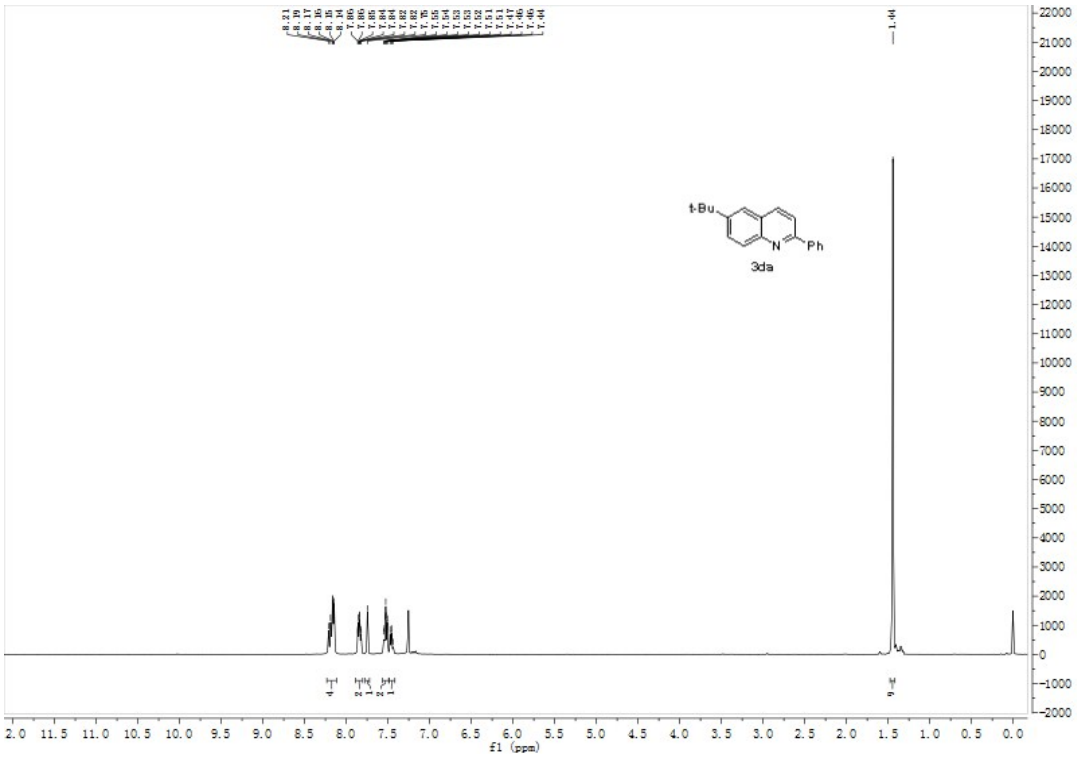
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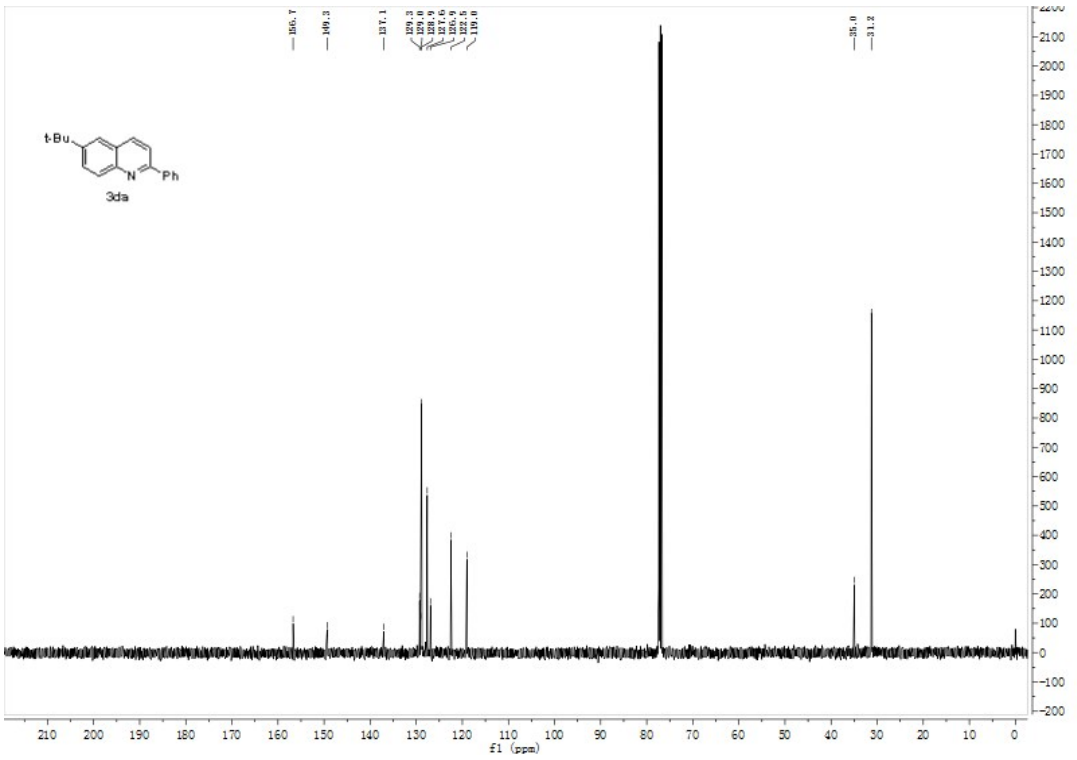
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Ph
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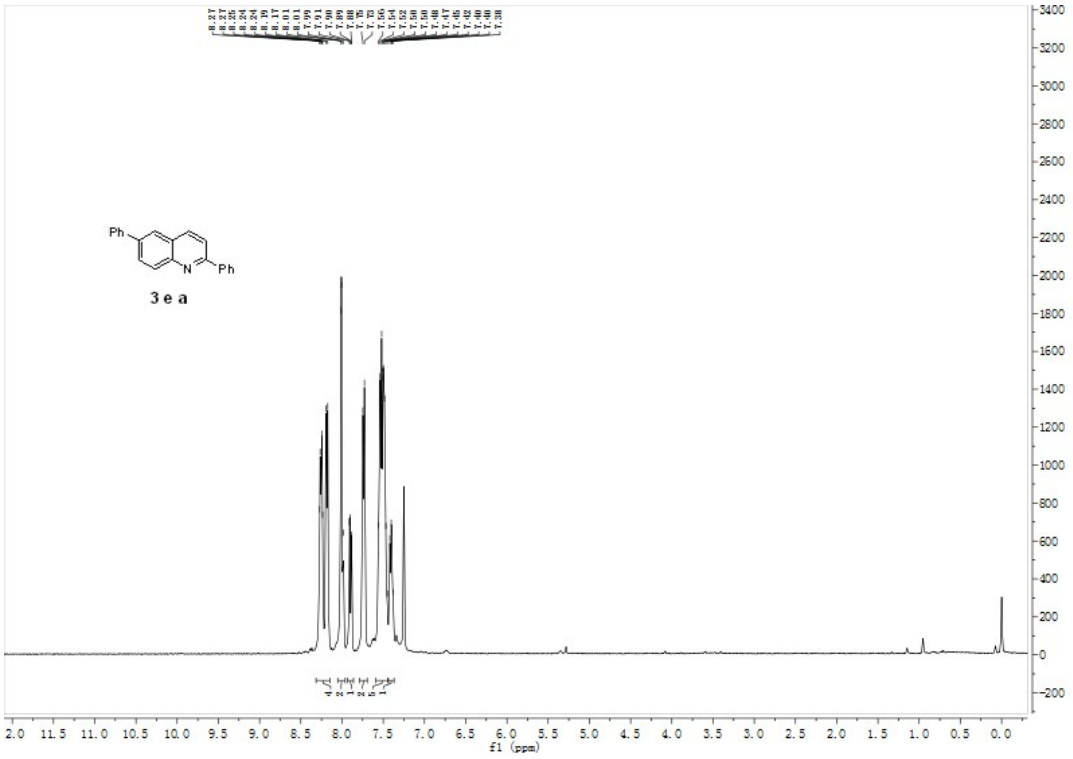
f1 (ppm)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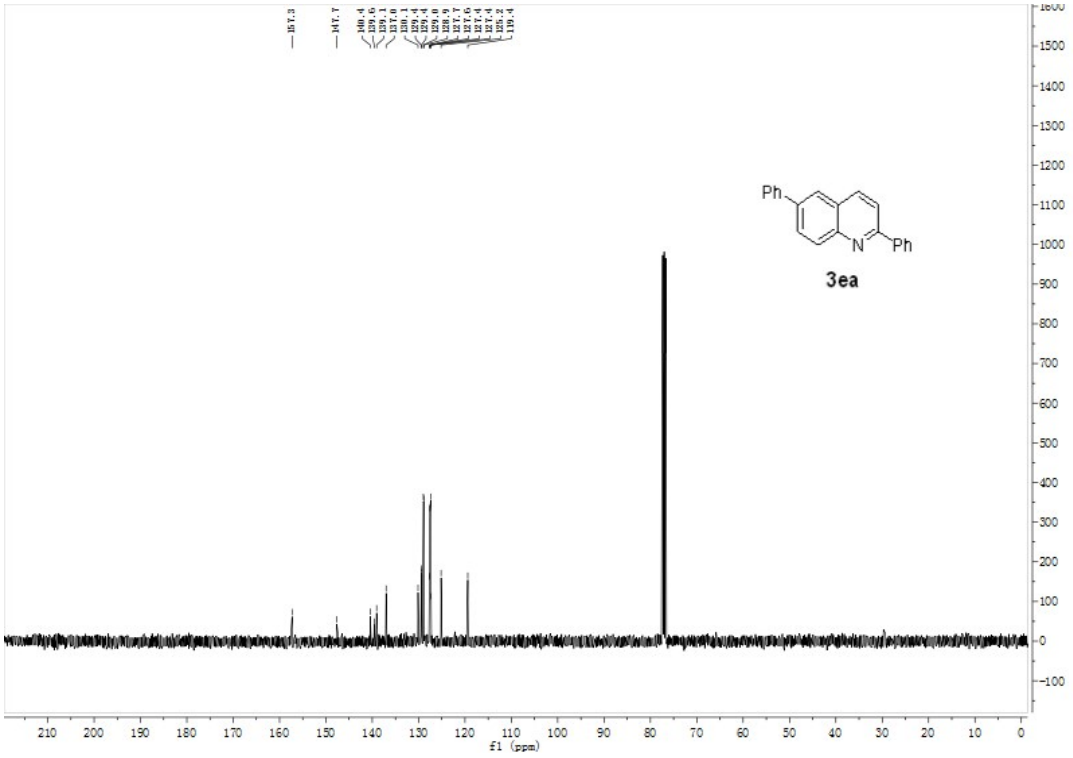
3 e a
f1 (ppm)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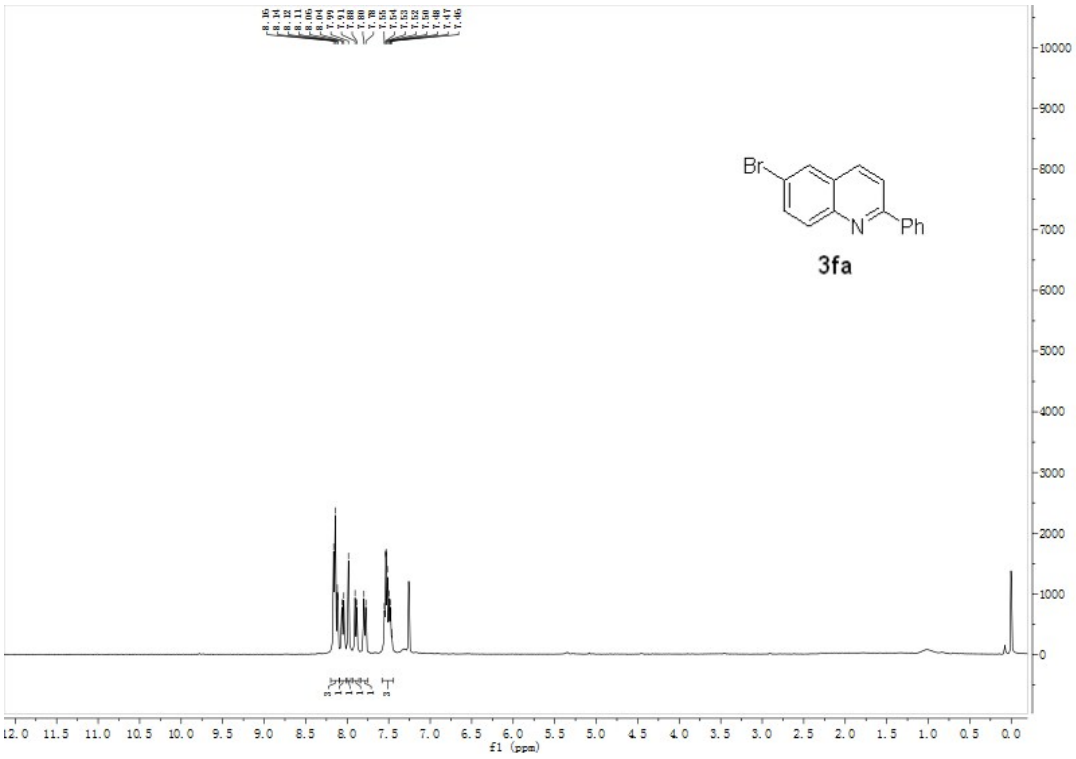
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Ph
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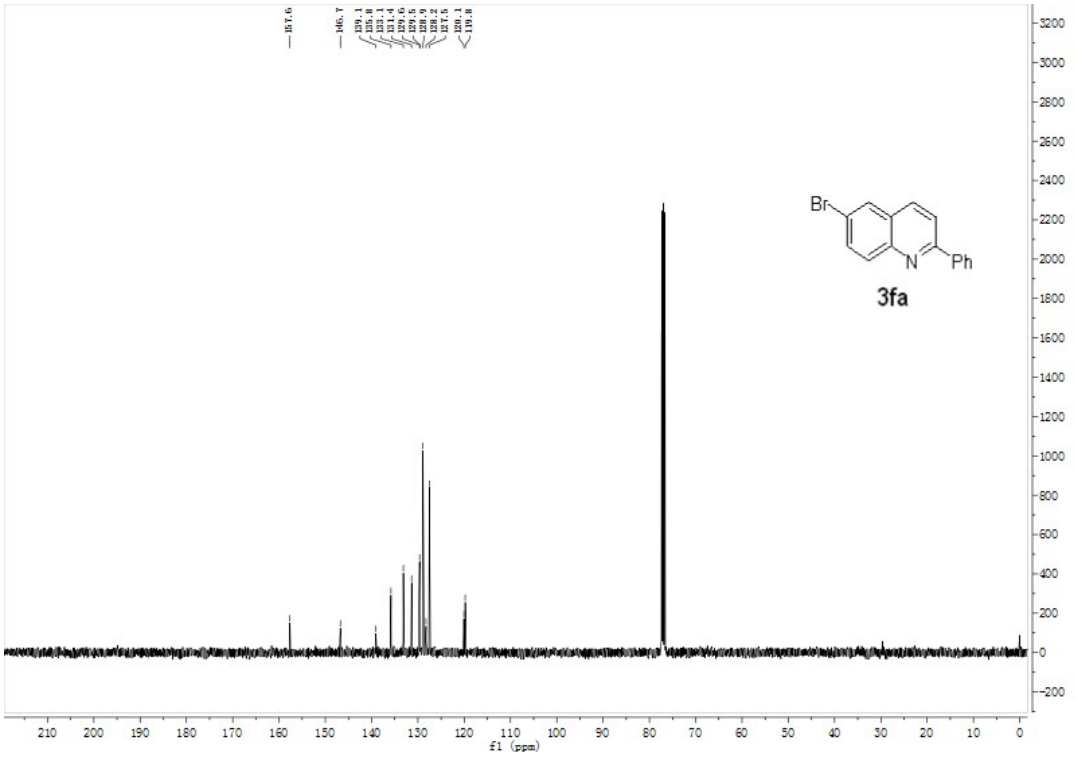
f1 (ppm)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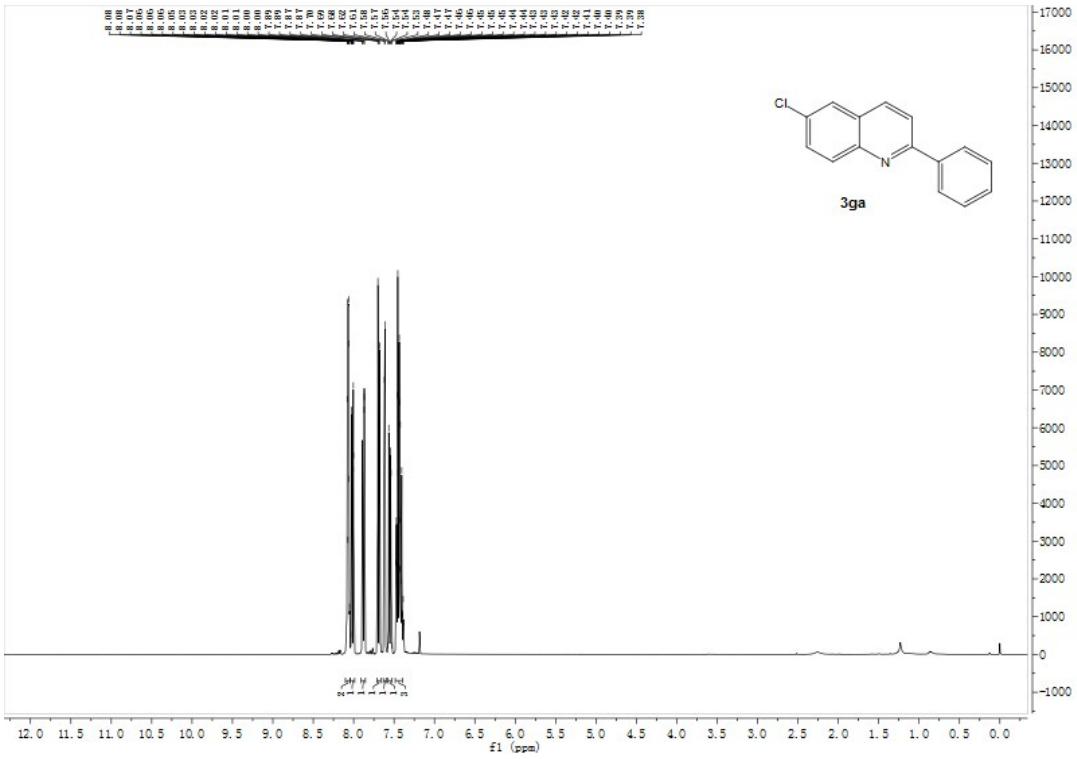
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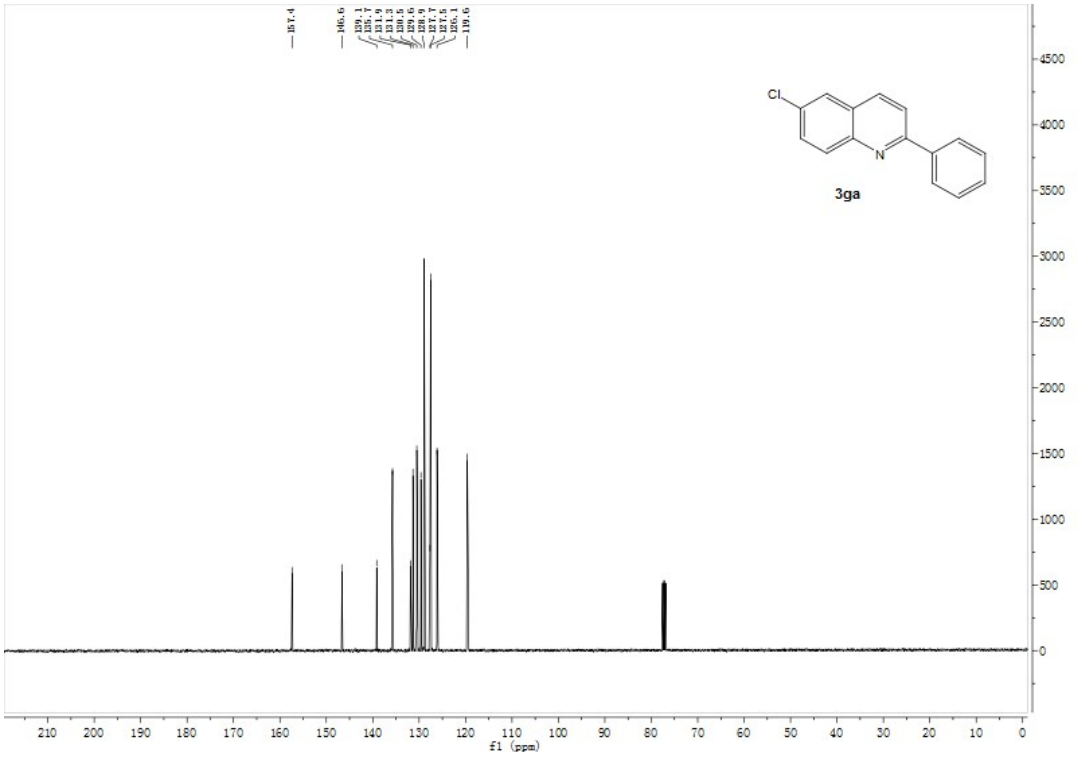
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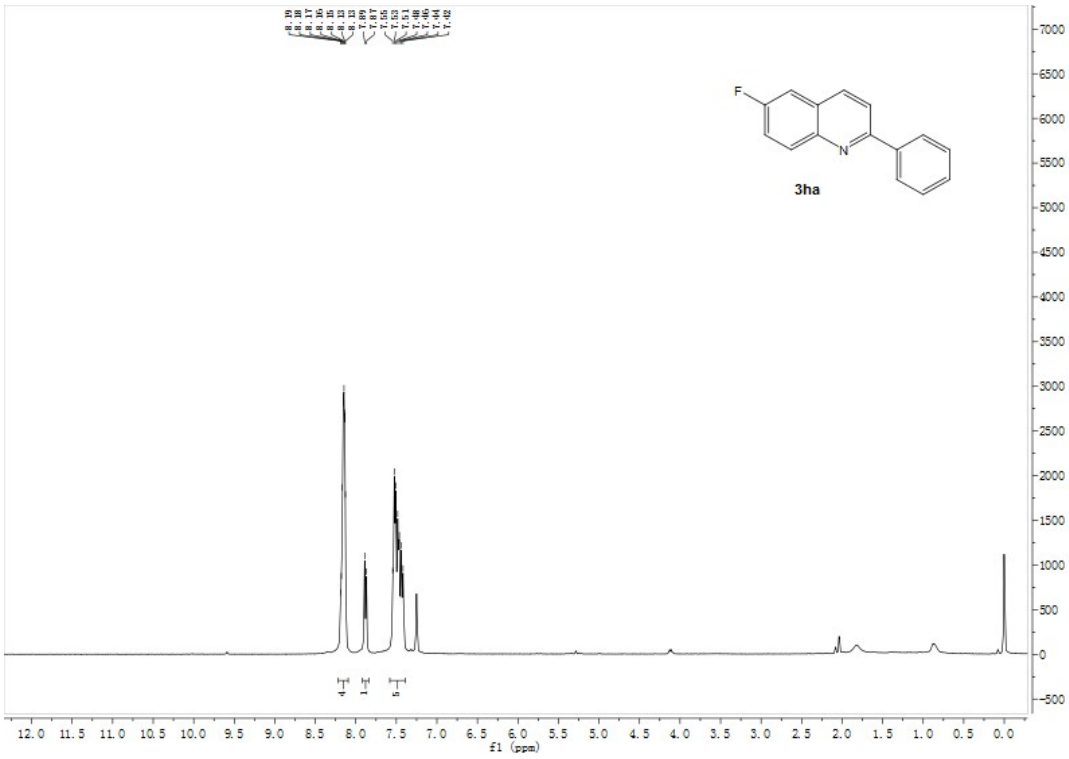
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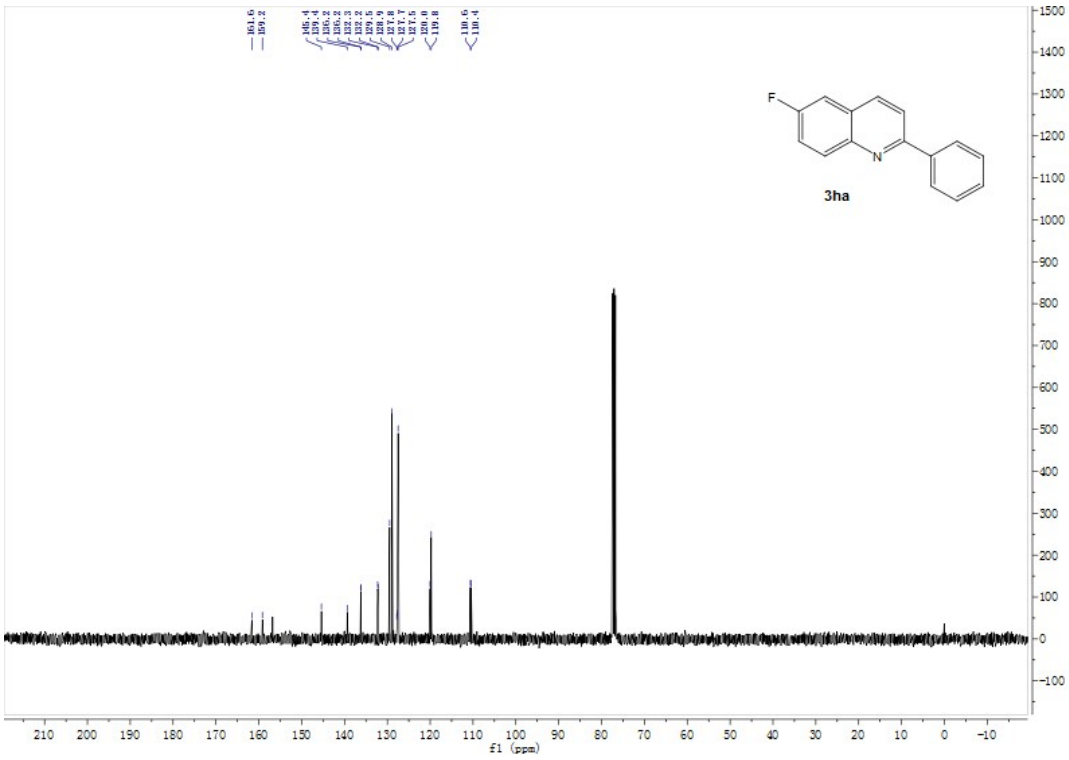
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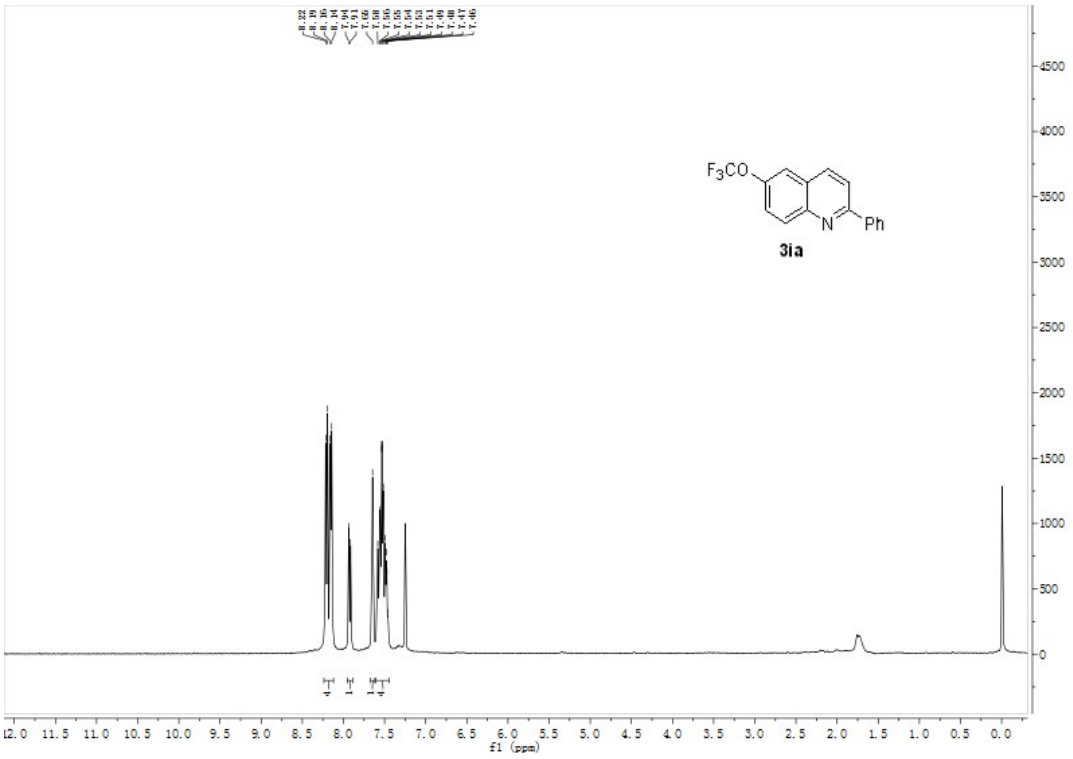
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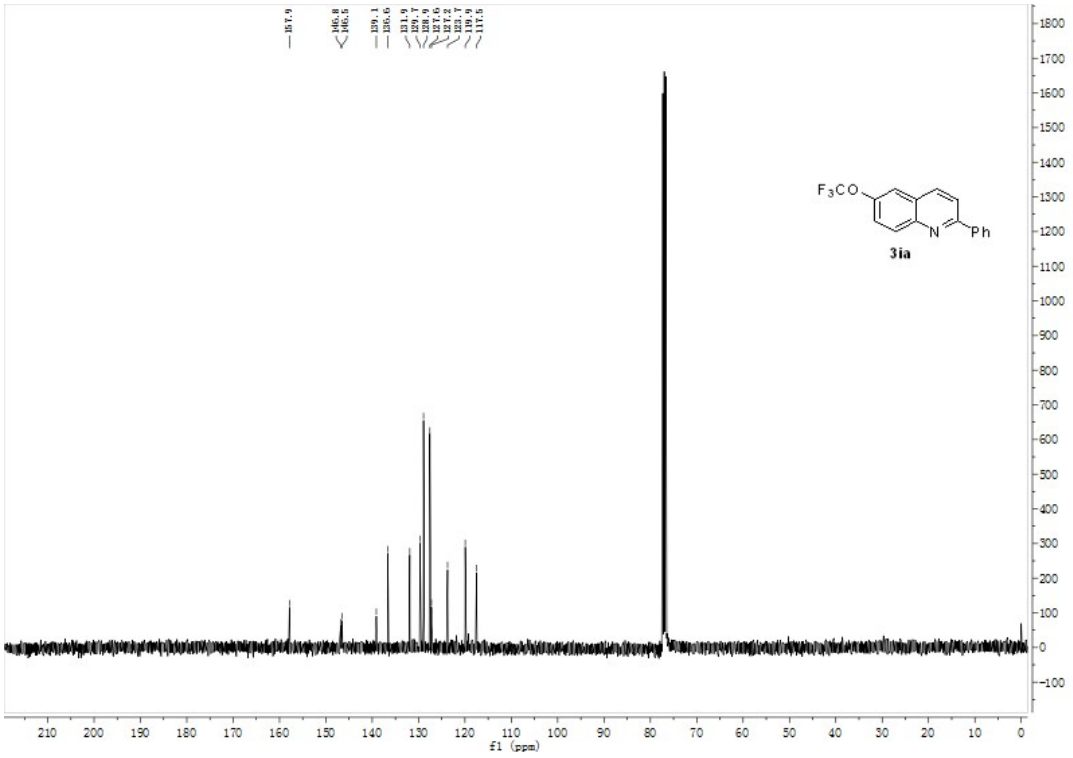
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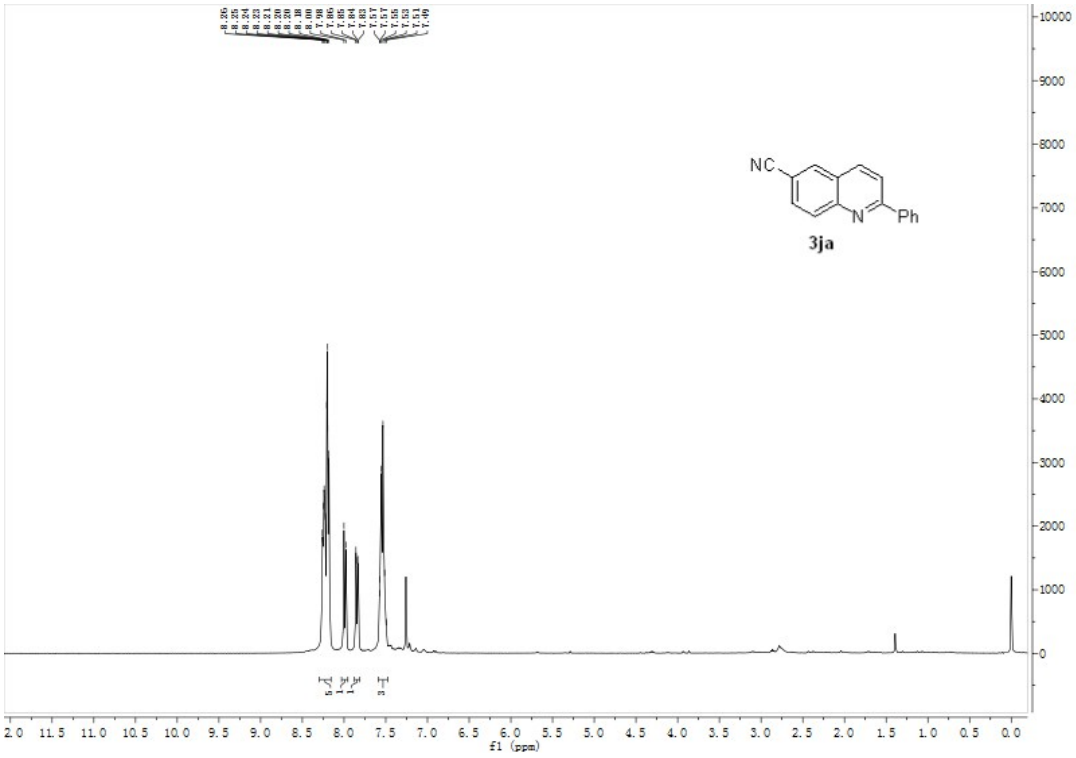
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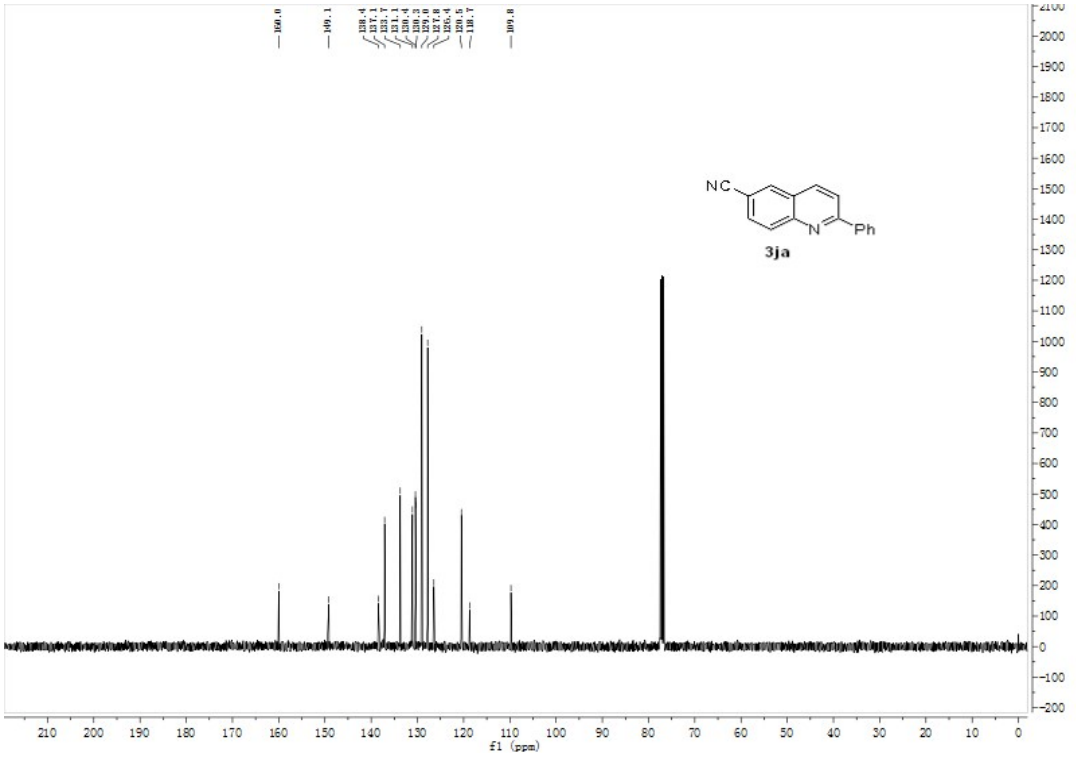
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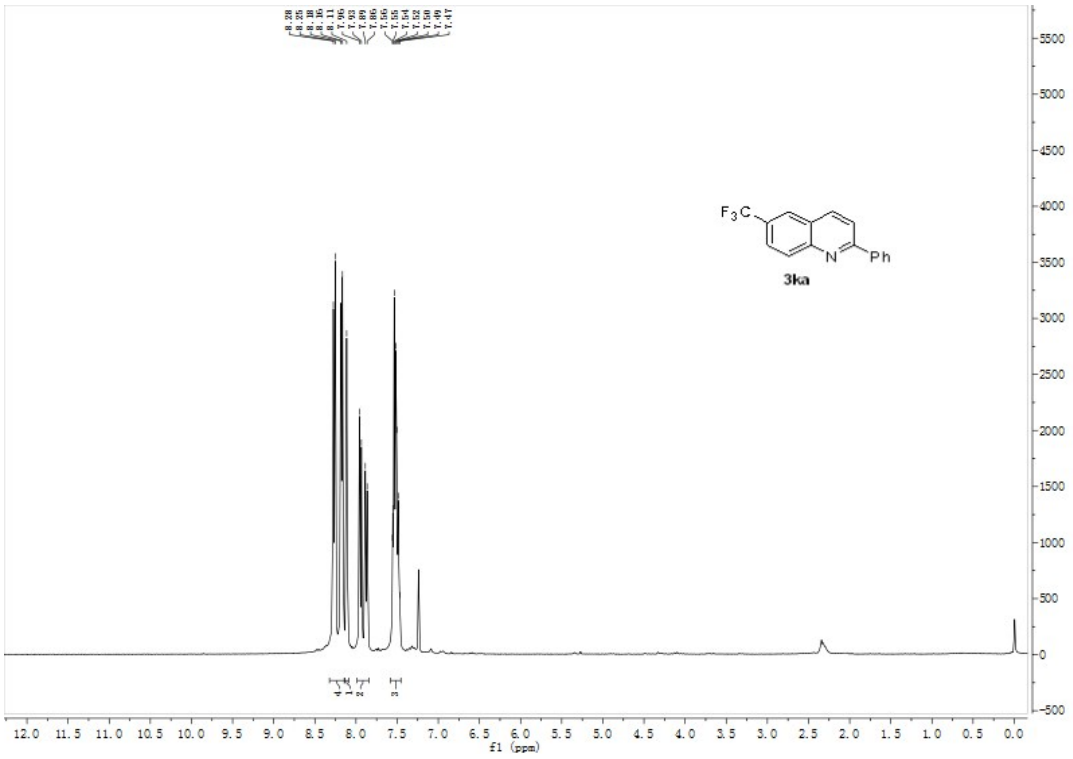
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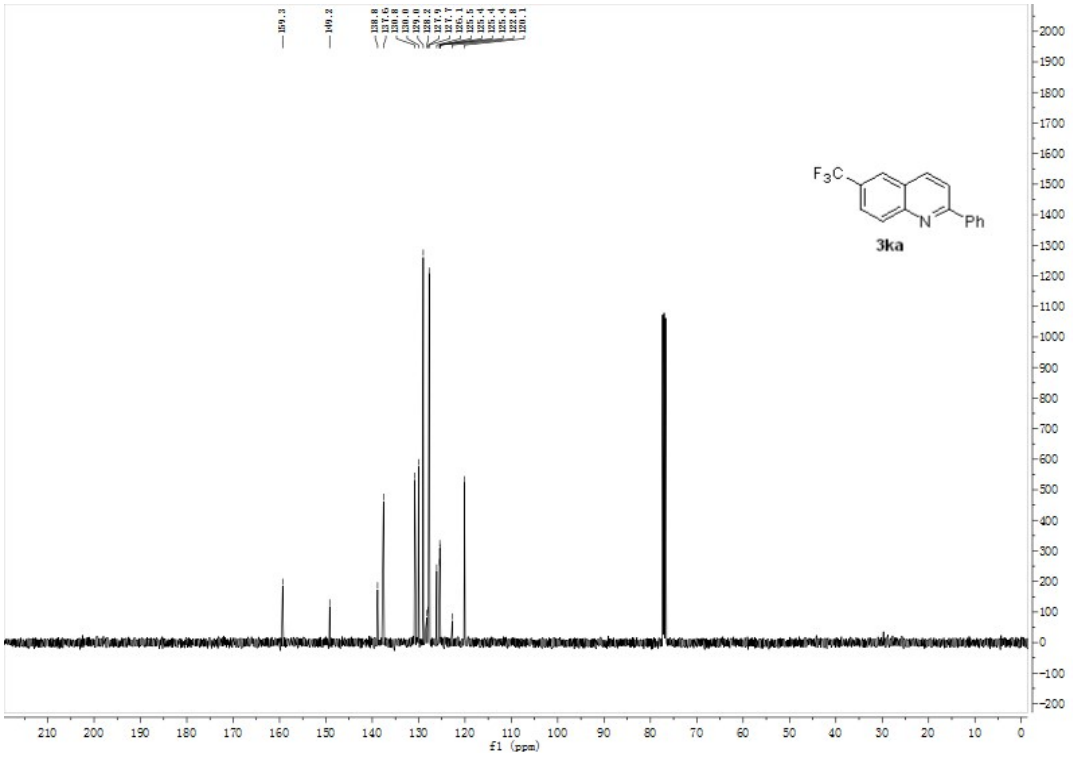
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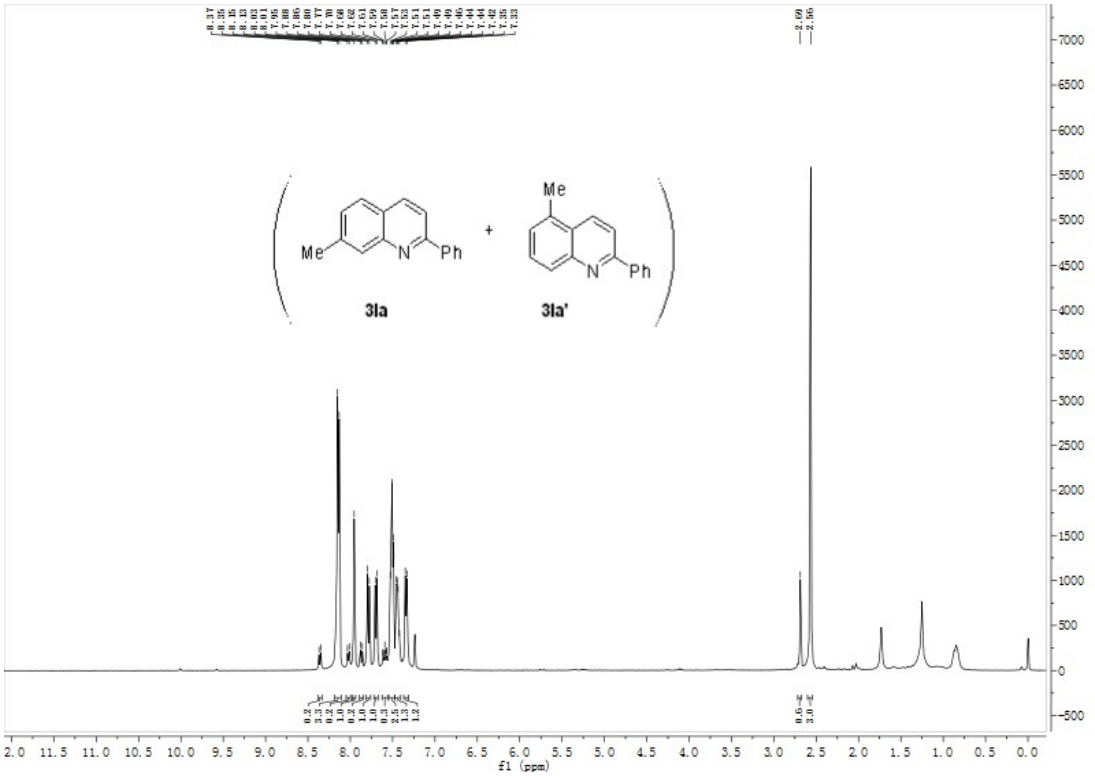
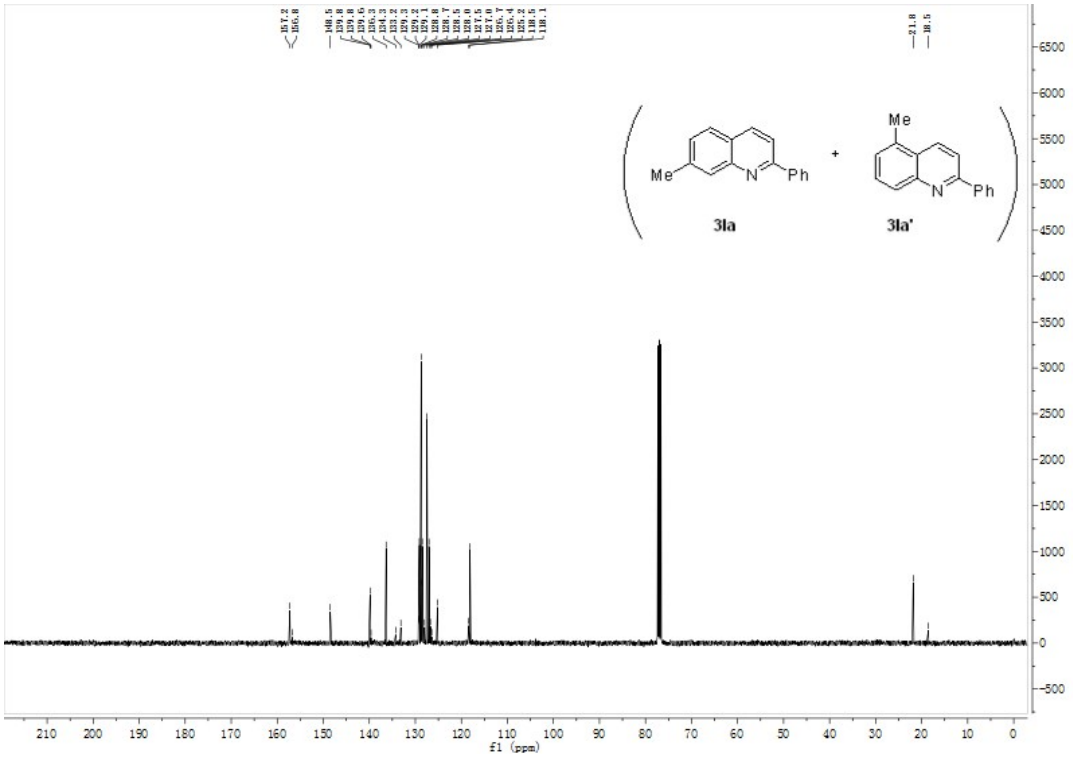
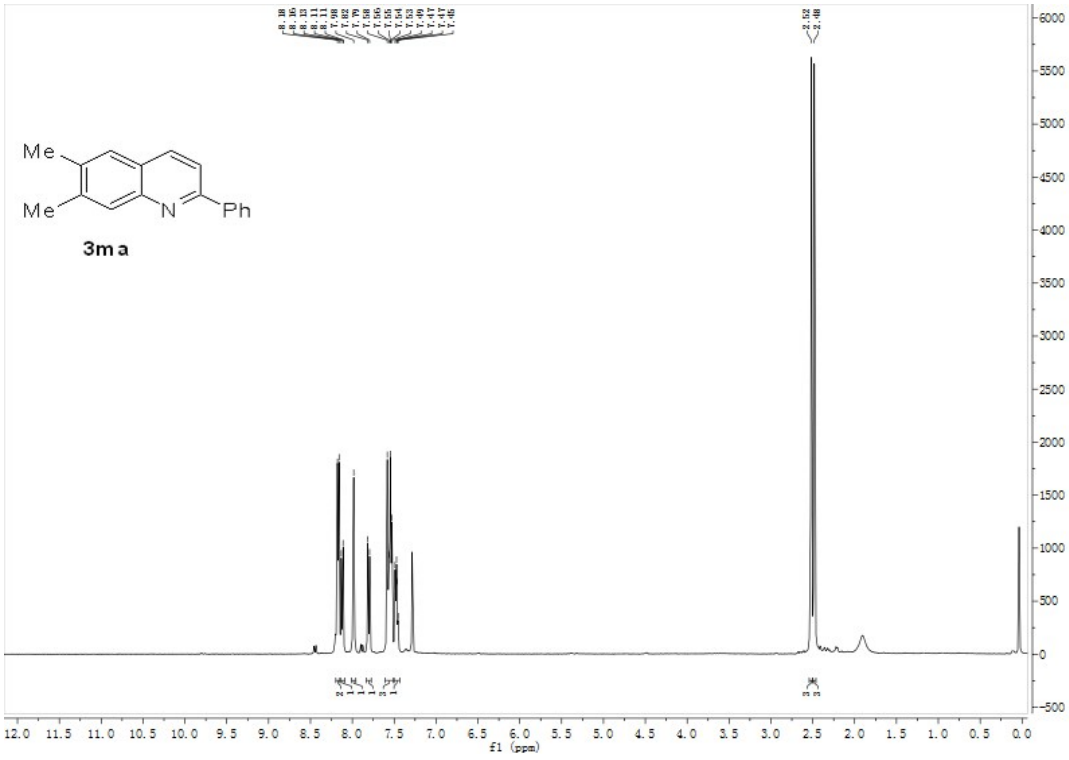
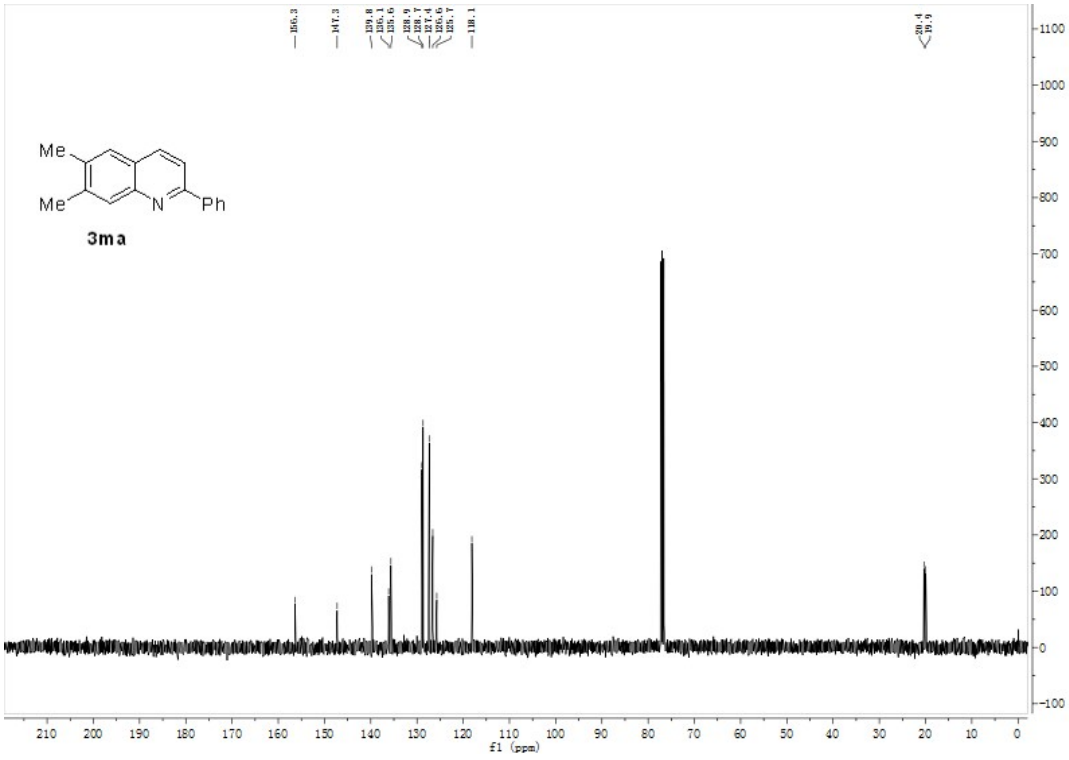
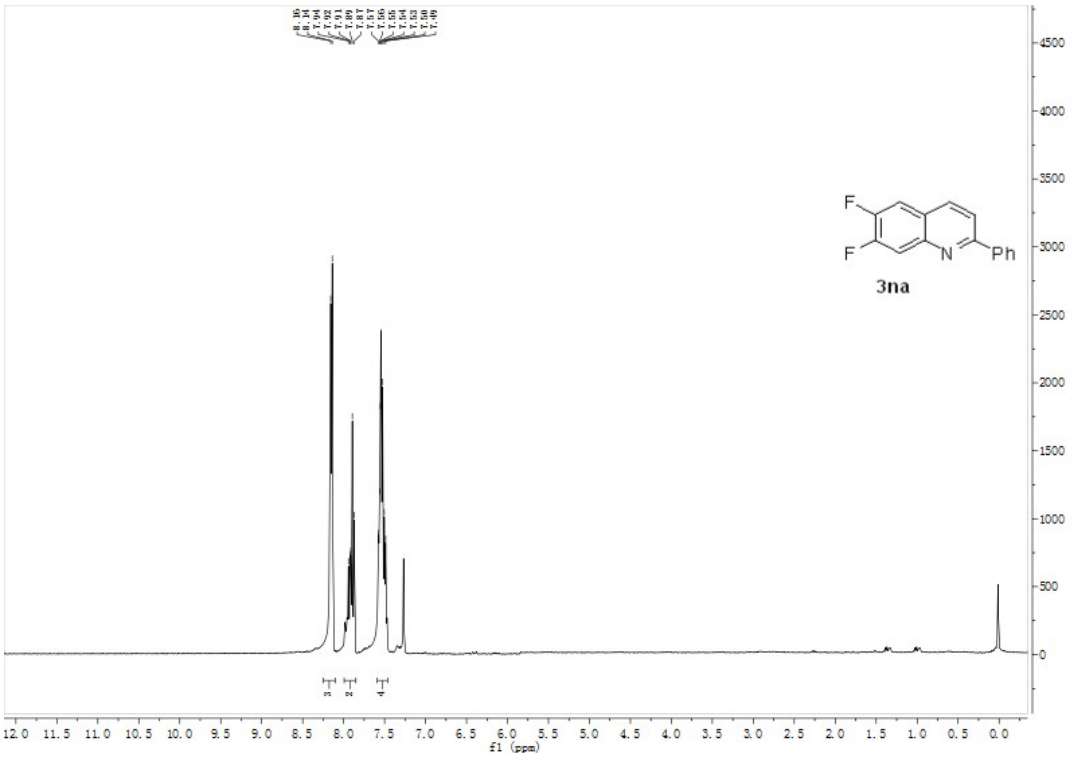
f1 (ppm)

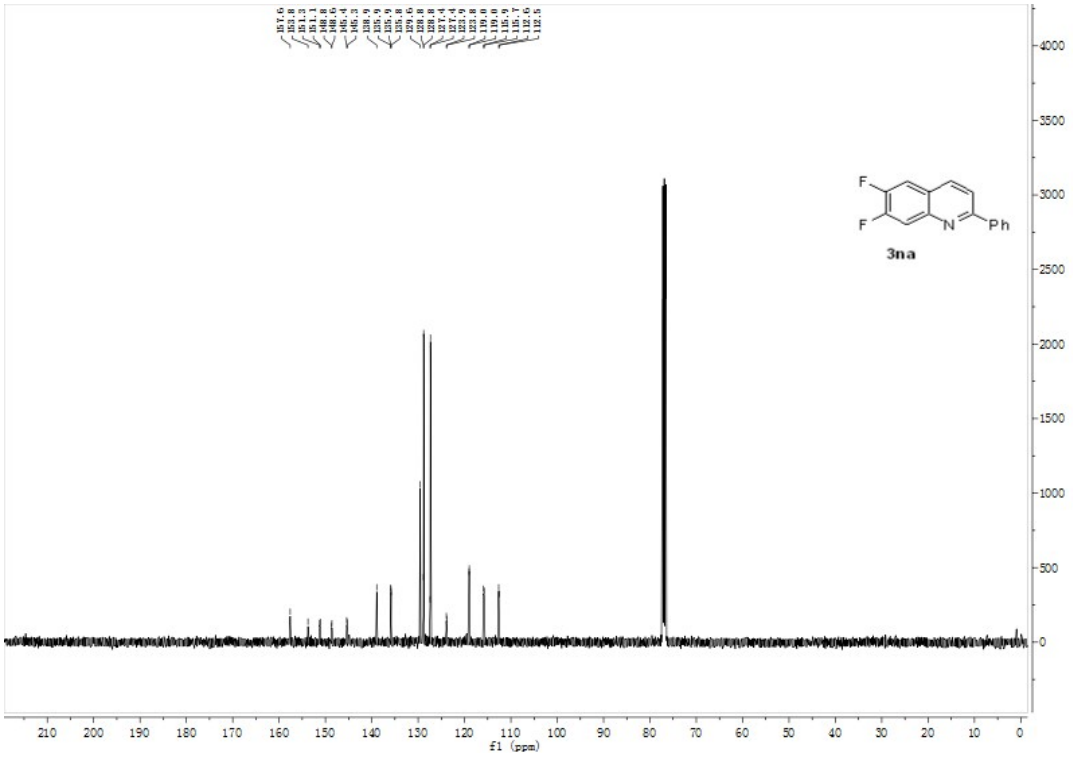

Me
N
Ph
+
Me
N
Ph
3la
3la'
f1 (ppm)

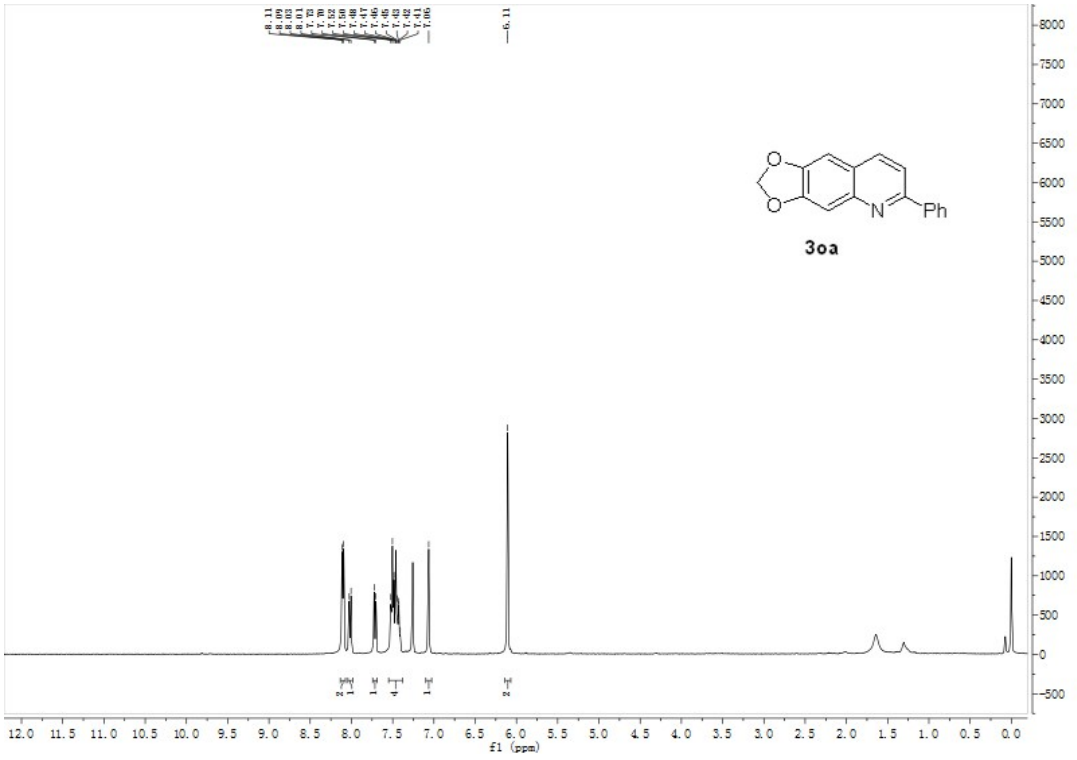

Me
N
Ph
+
Me
N
Ph
3la
3la'
f1 (ppm)

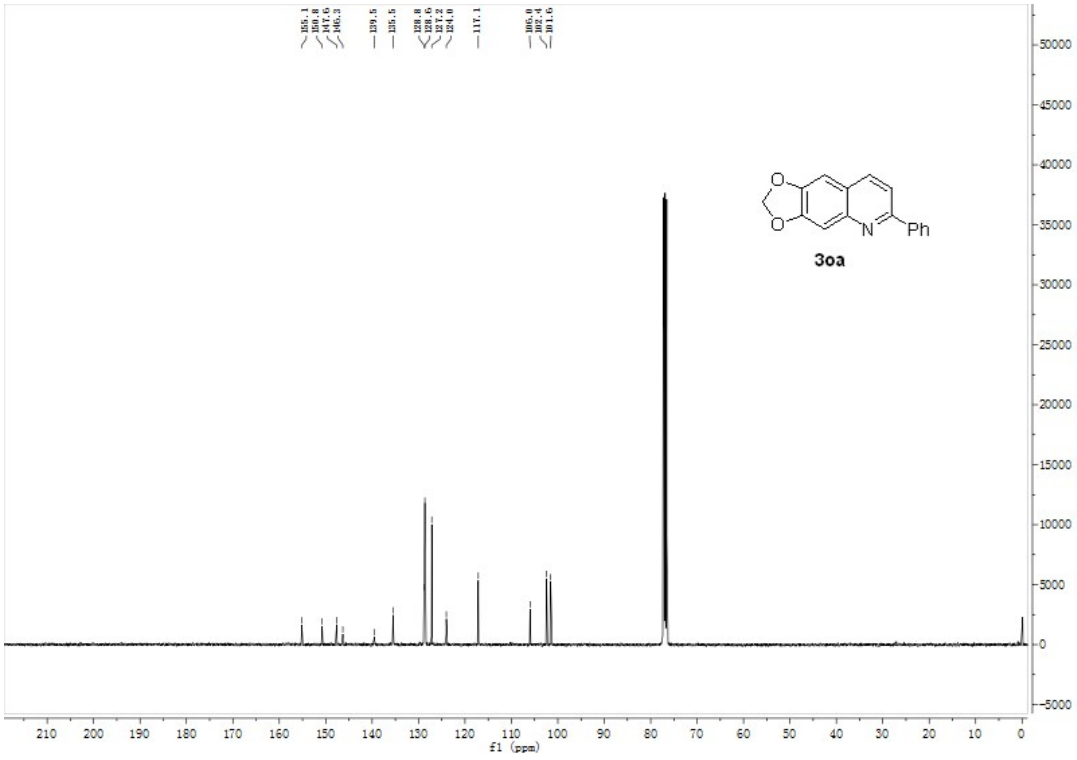

Me
Me
N
Ph
3ma
f1 (ppm)

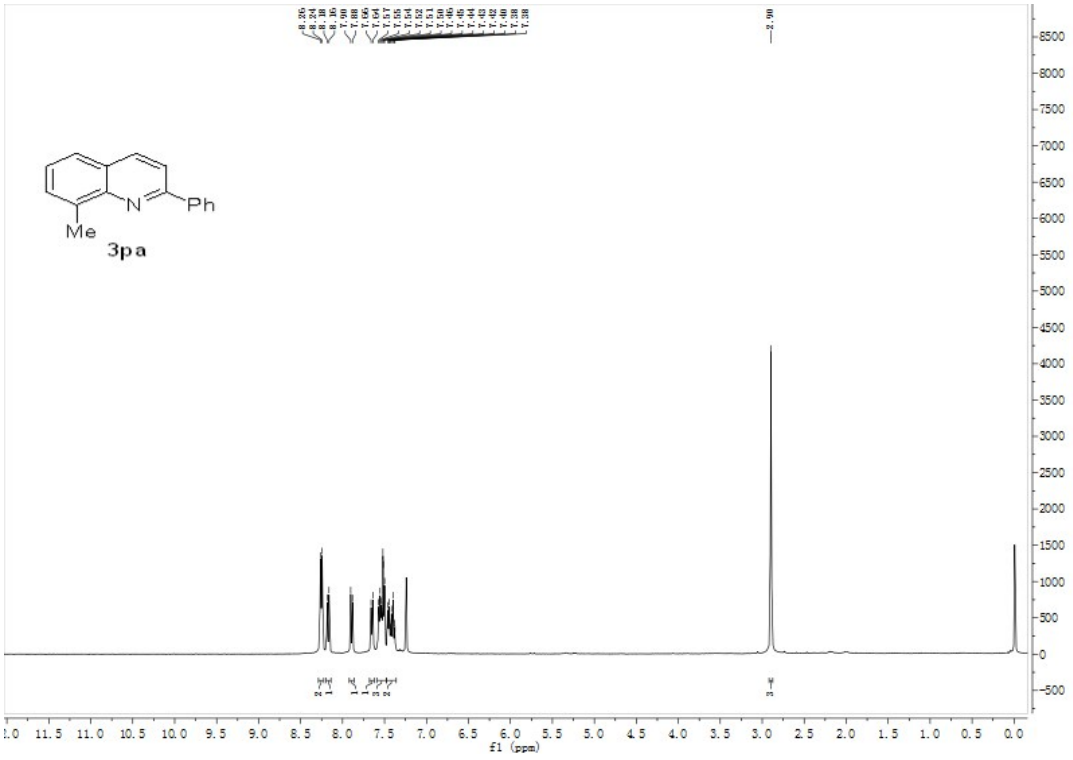

Me
Me
N
Ph
3ma
f1 (ppm)

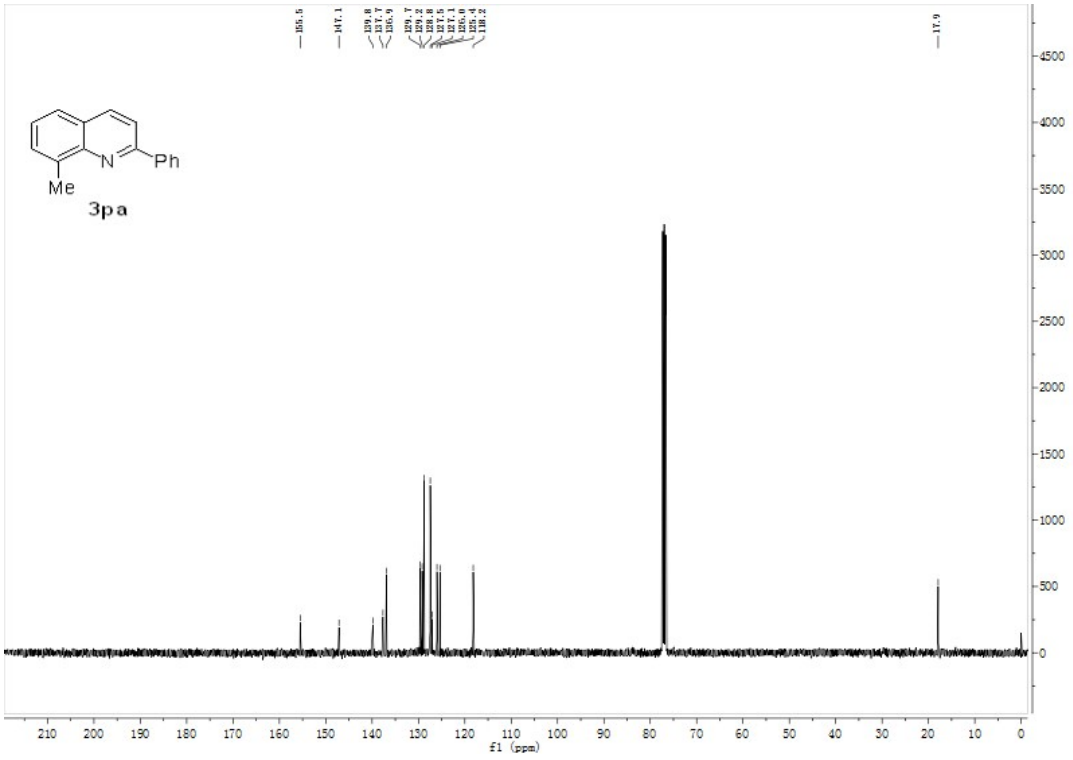

F
F
N
Ph
3na
f1 (ppm)

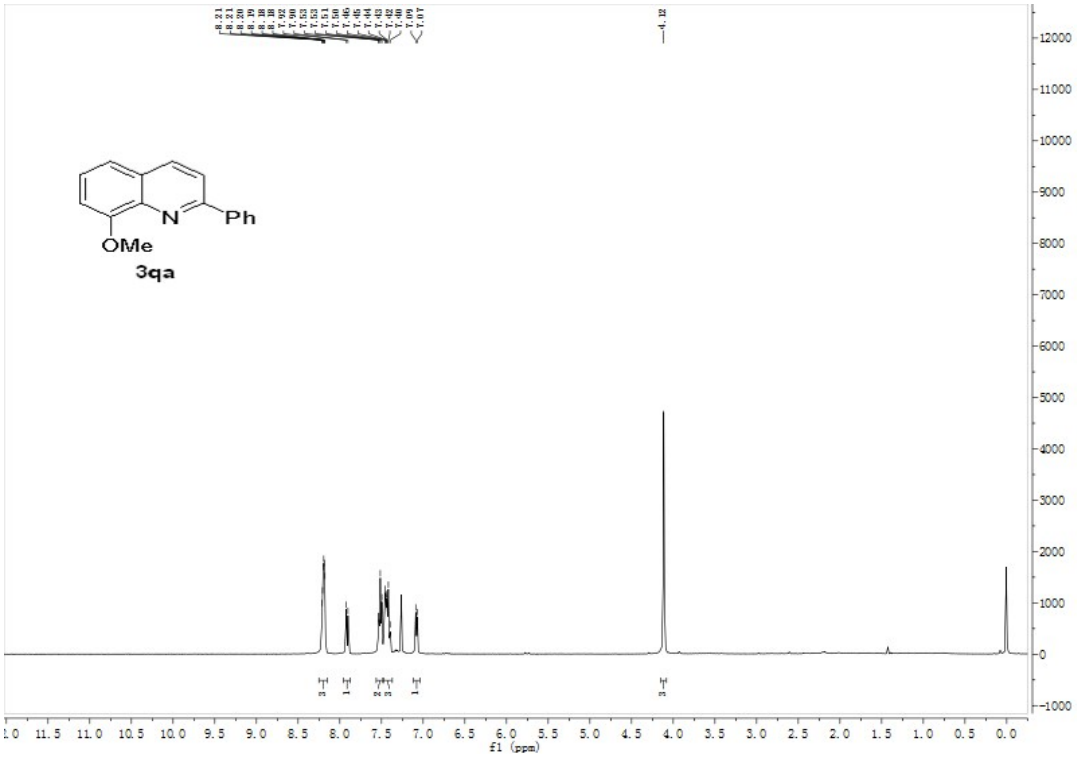

F
F
N
Ph
3na
f1 (ppm)

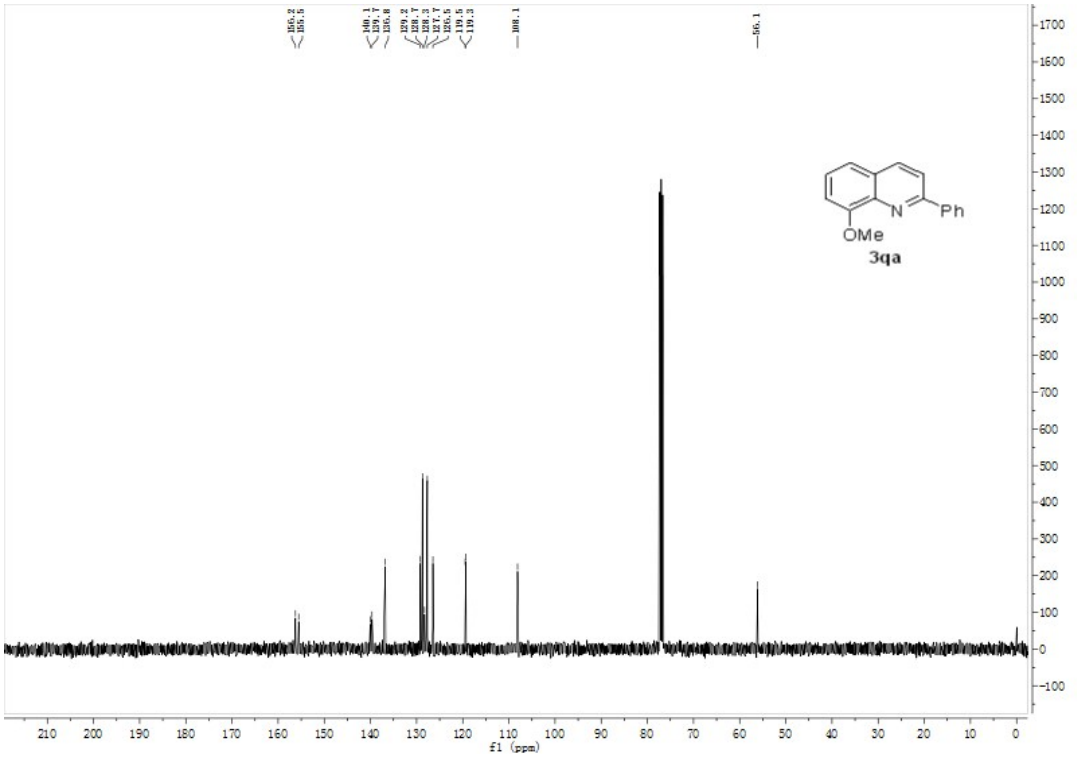

8.11
8.09
8.03
8.01
7.73
7.70
7.52
7.50
7.48
7.47
7.46
7.45
7.43
7.42
7.41
7.06
6.11
O
O
N
Ph
3oa
f1 (ppm)

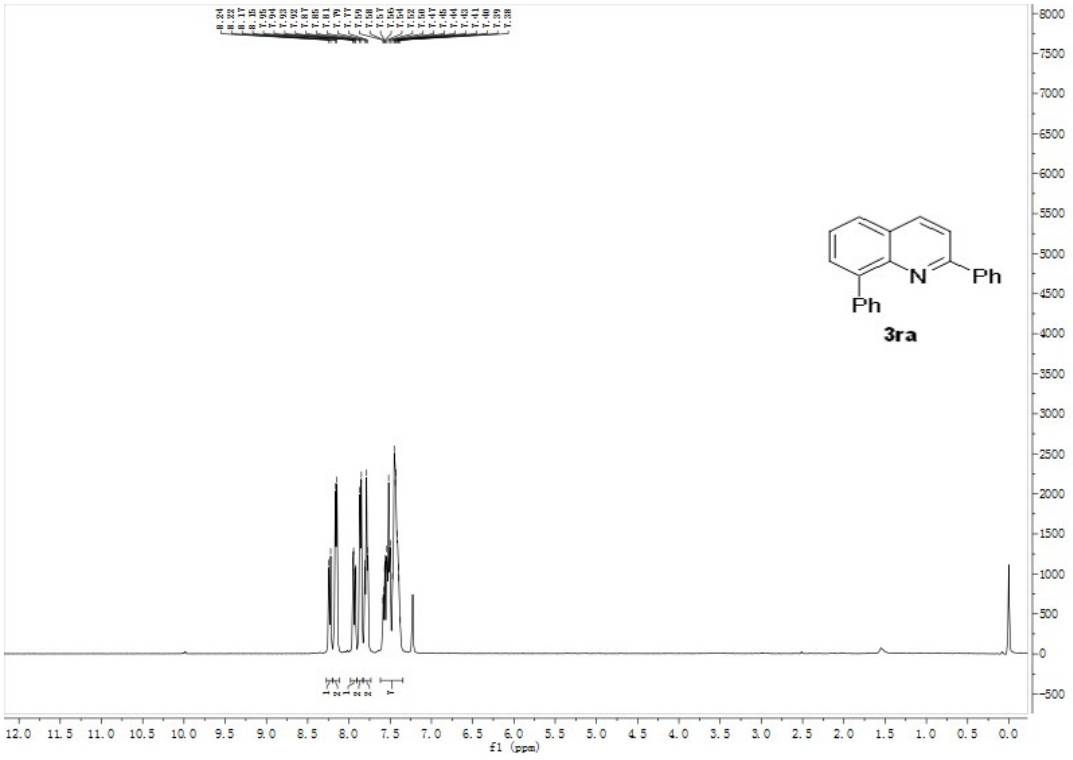

155.1
150.8
147.6
146.3
139.5
135.5
128.8
128.6
127.2
124.0
117.1
105.0
102.4
101.6
O
O
N
Ph
3oa
f1 (ppm)

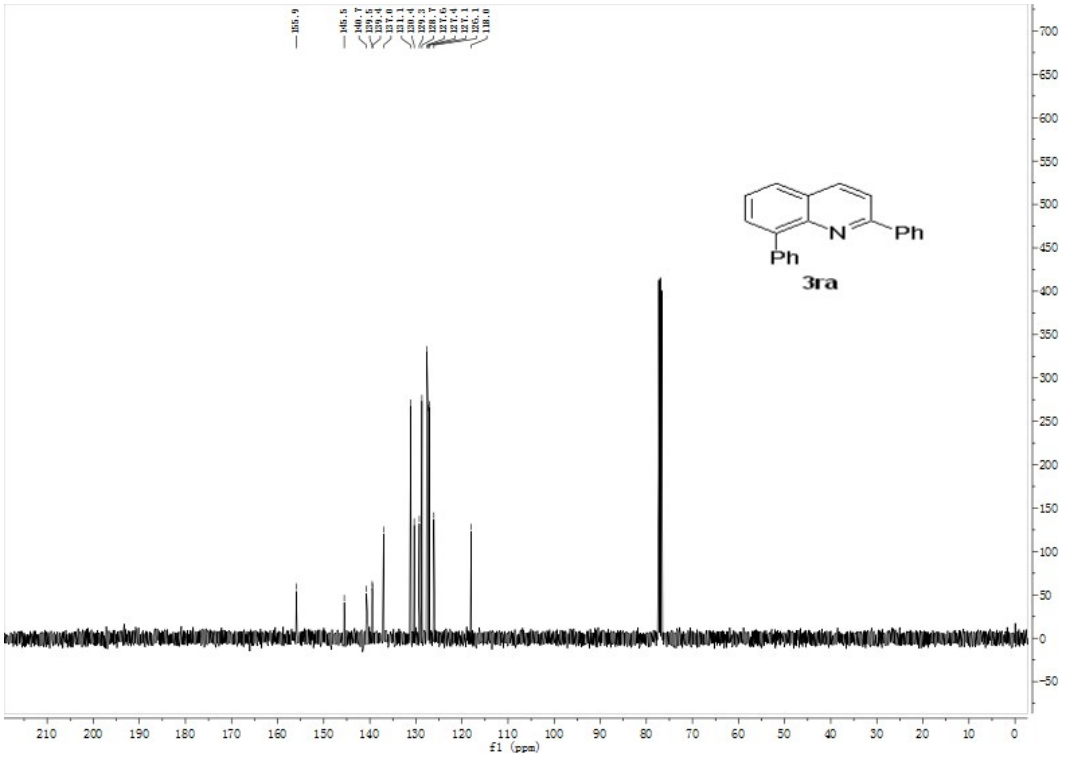

Me
Ph
N
3pa
f1 (ppm)

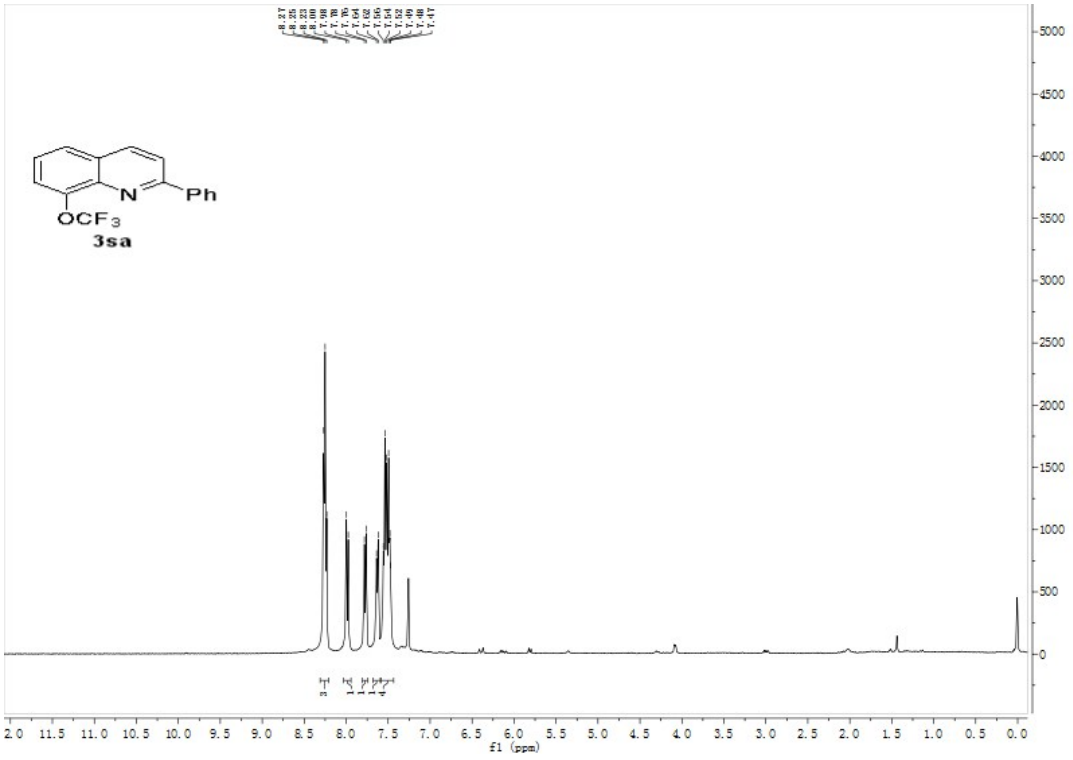

Me
Ph
N
3pa
f1 (ppm)

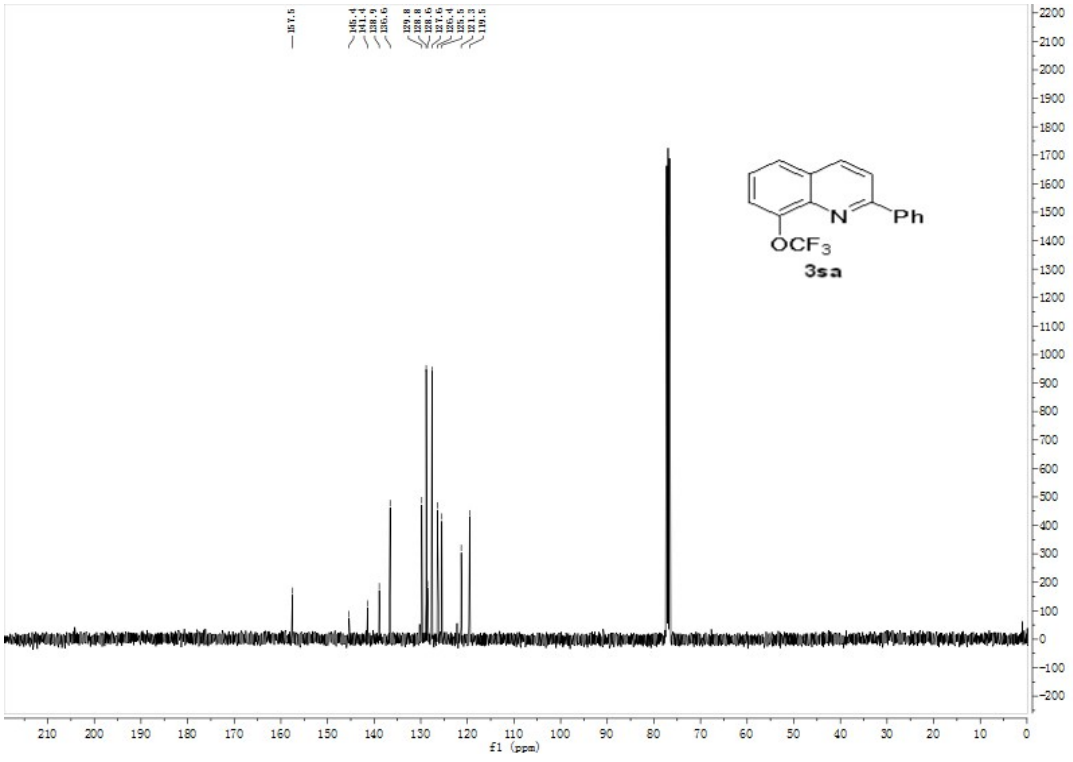

N
Ph
OMe
3qa
f1 (ppm)

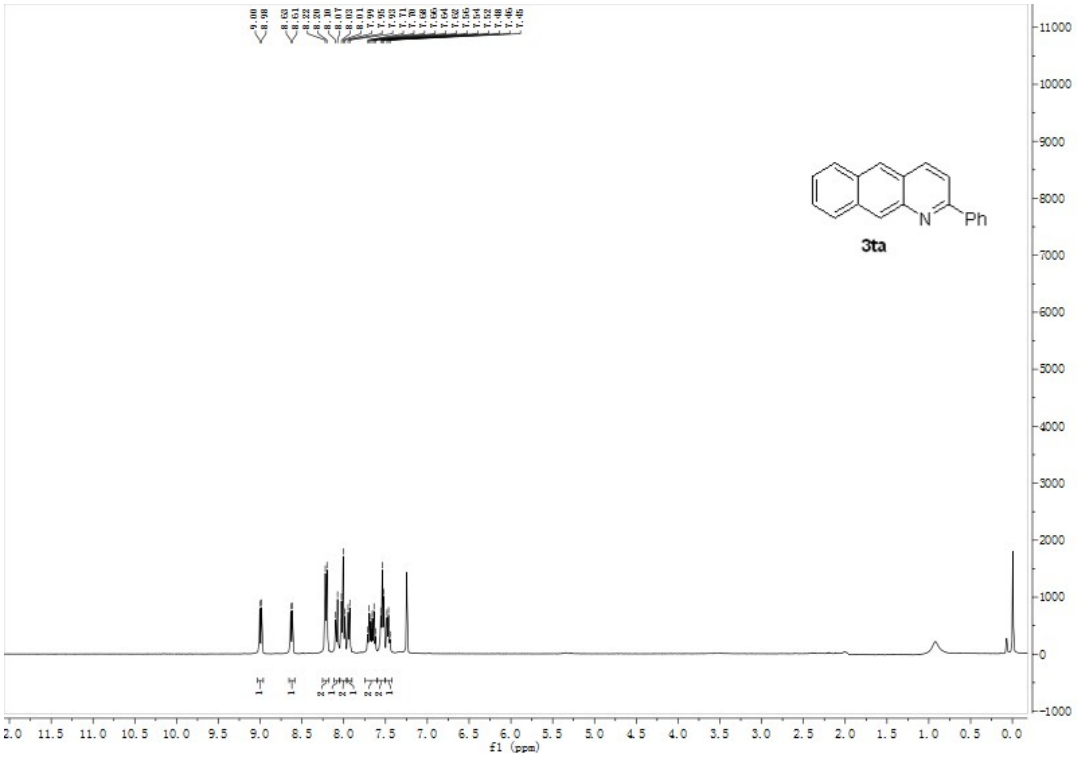

N
Ph
OMe
3qa
f1 (ppm)

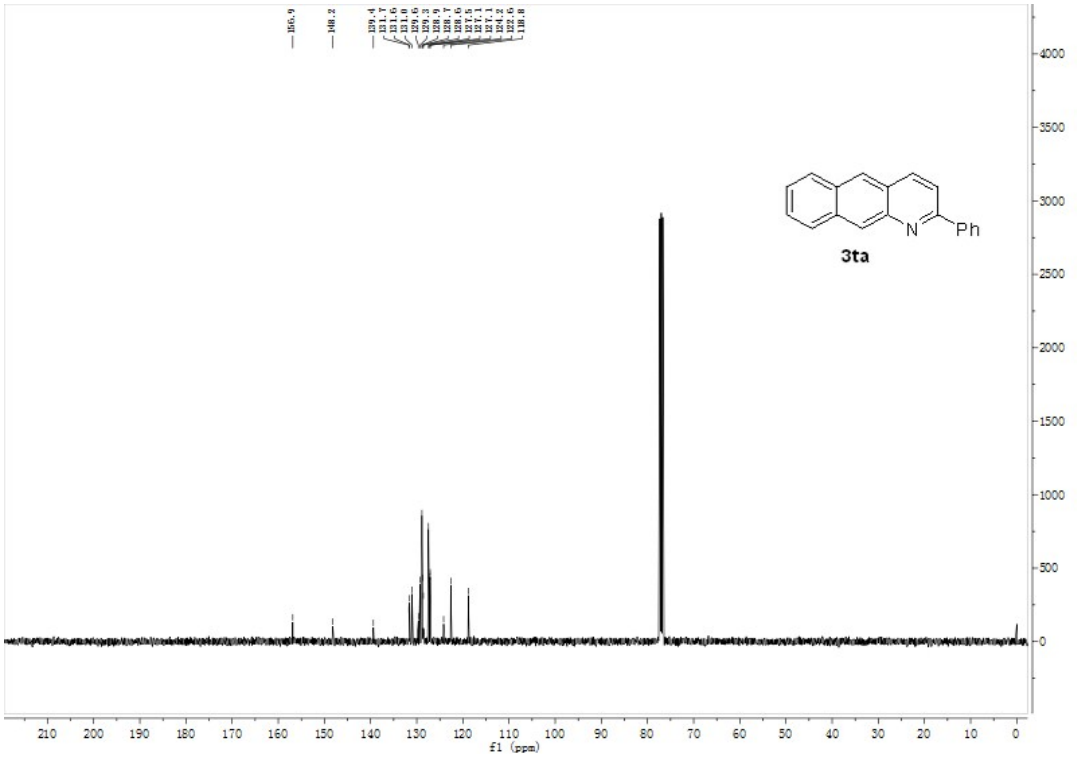

8.24
8.22
8.17
8.15
7.95
7.94
7.93
7.92
7.87
7.85
7.81
7.80
7.77
7.59
7.58
7.57
7.55
7.54
7.52
7.50
7.47
7.45
7.44
7.43
7.41
7.40
7.39
7.38
N
Ph
Ph
3ra
f1 (ppm)

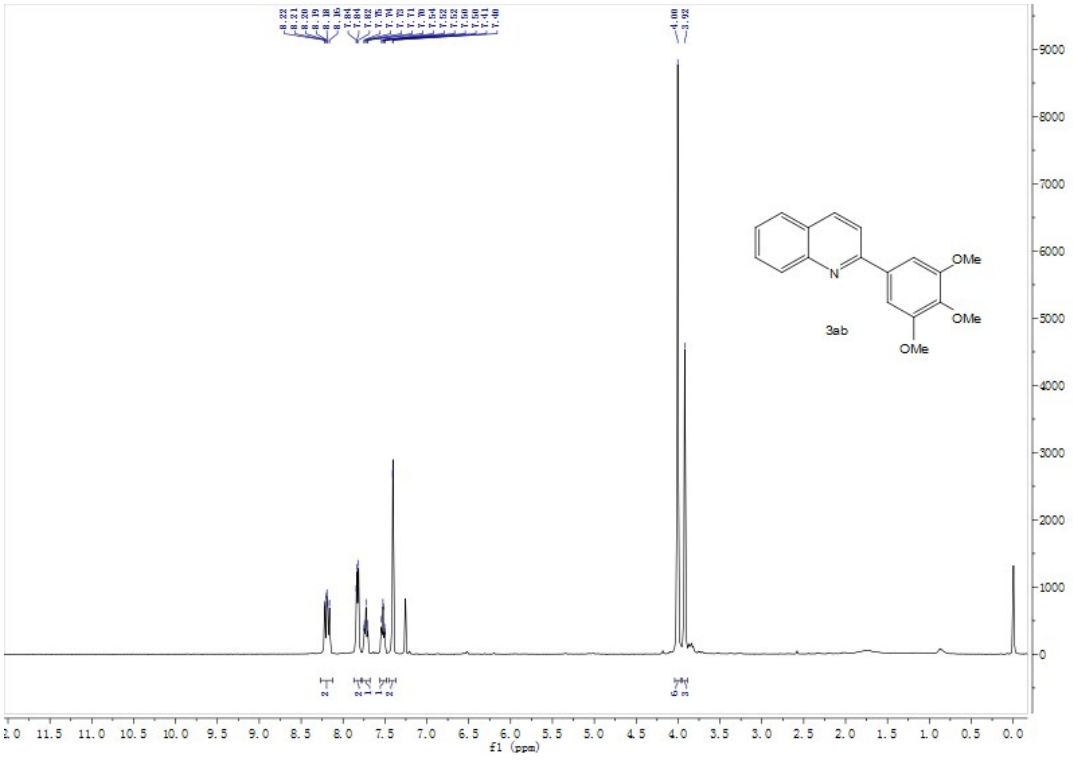

155.9
145.5
140.7
139.5
139.4
137.0
131.1
130.4
129.3
128.7
127.6
127.4
127.1
125.1
118.0
N
Ph
Ph
3ra
f1 (ppm)

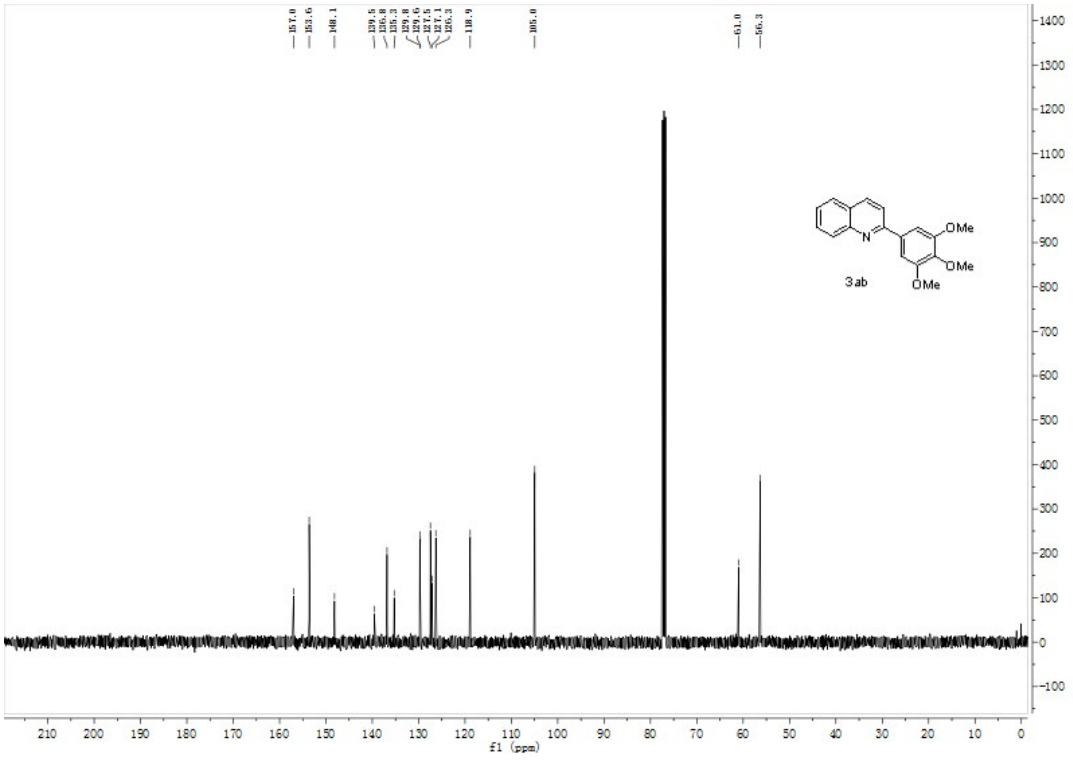

8.27
8.25
8.23
8.09
8.08
7.78
7.76
7.64
7.62
7.55
7.54
7.52
7.49
7.48
7.47
N
Ph
OCF3
3sa
f1 (ppm)

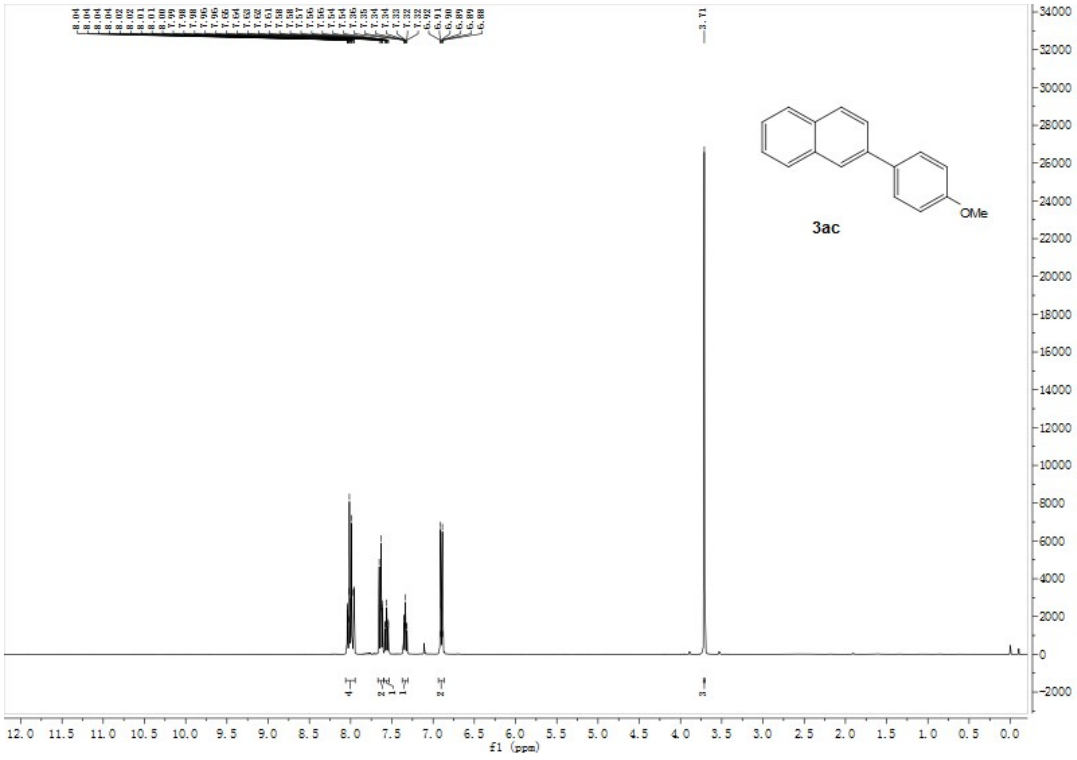

157.5
145.4
141.4
138.9
136.6
129.8
128.8
128.6
127.6
125.4
125.5
121.3
119.5
N
Ph
OCF3
3sa
f1 (ppm)

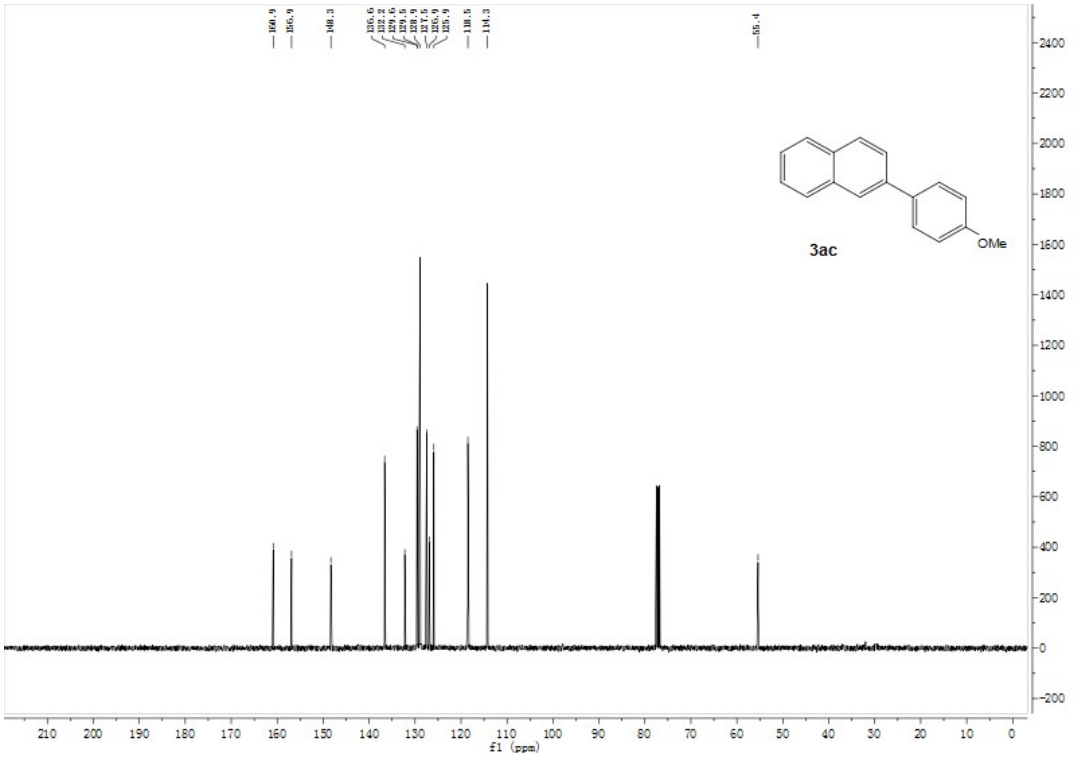

N
Ph
3ta
f1 (ppm)

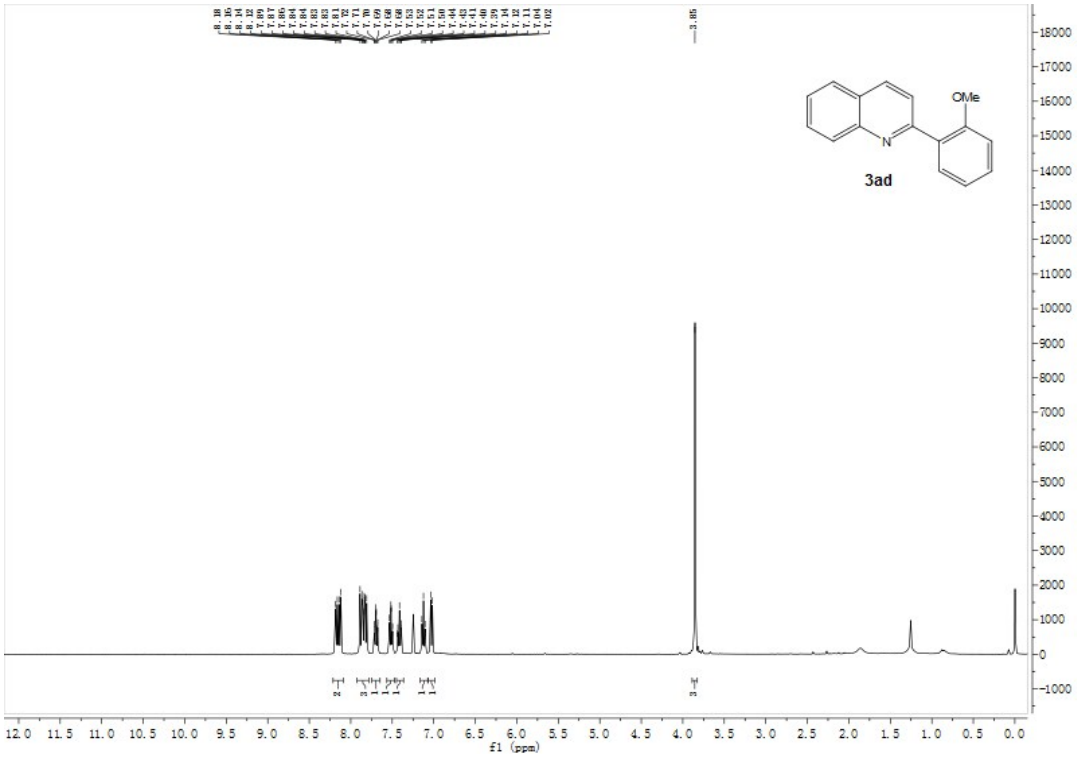

N
Ph
3ta
f1 (ppm)

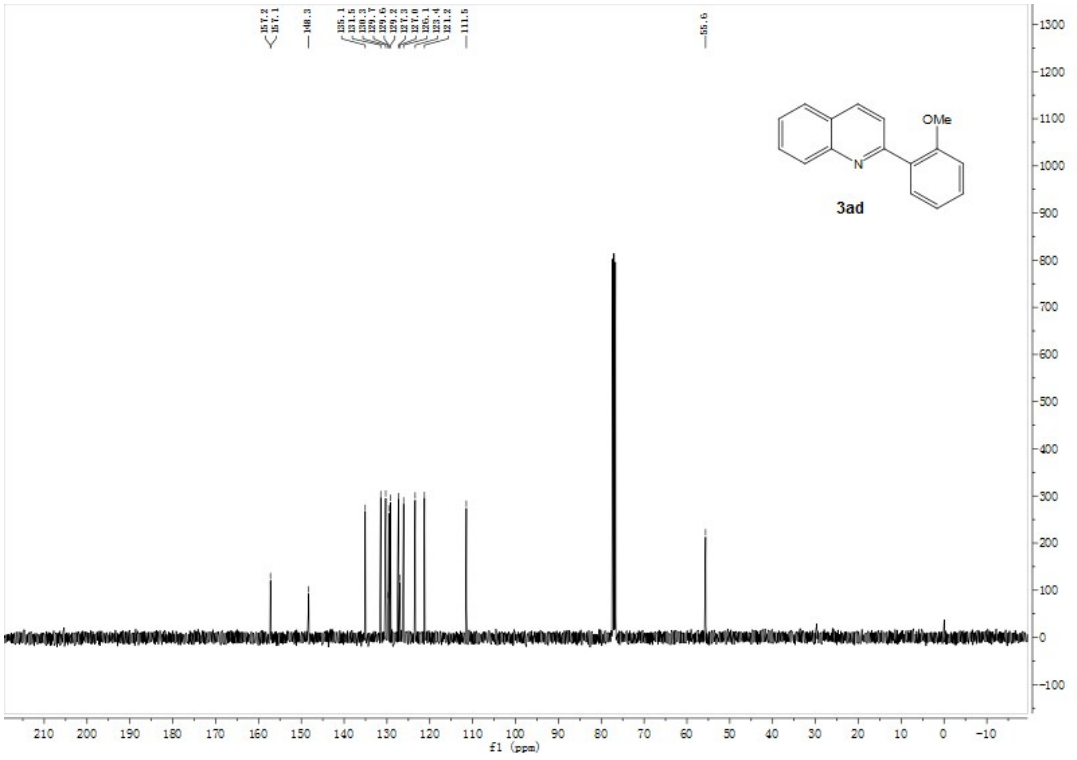

OMe
OMe
OMe
3ab
f1 (ppm)

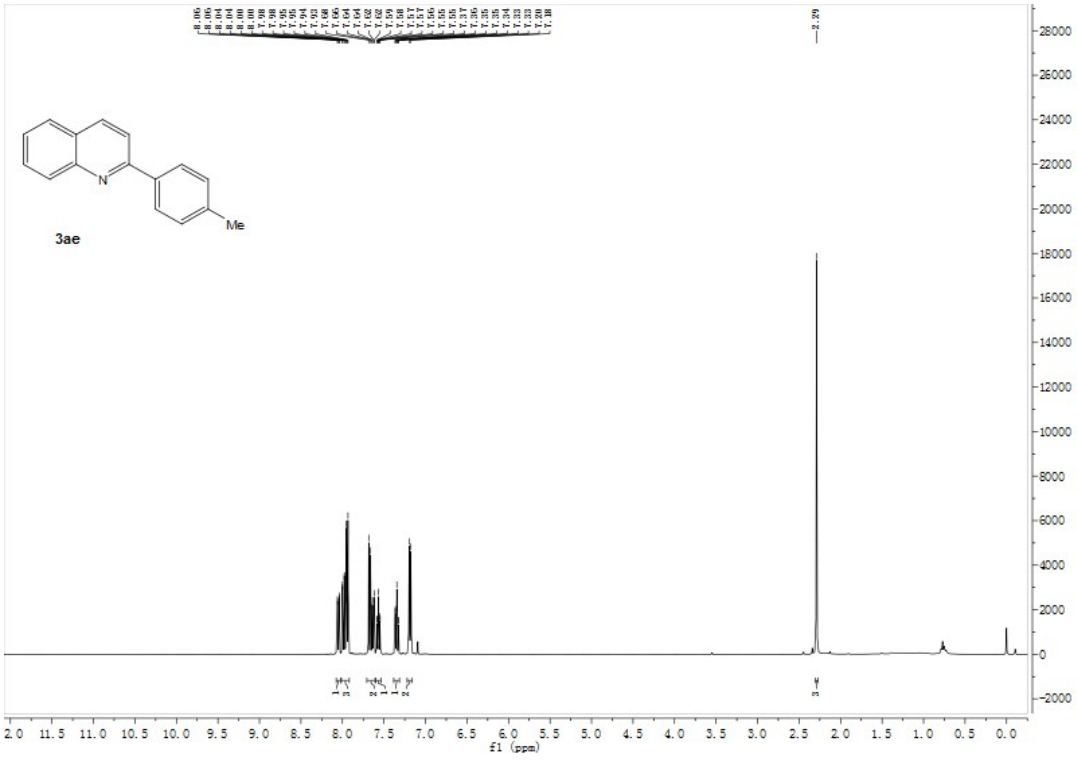

OMe
OMe
OMe
3ab
f1 (ppm)

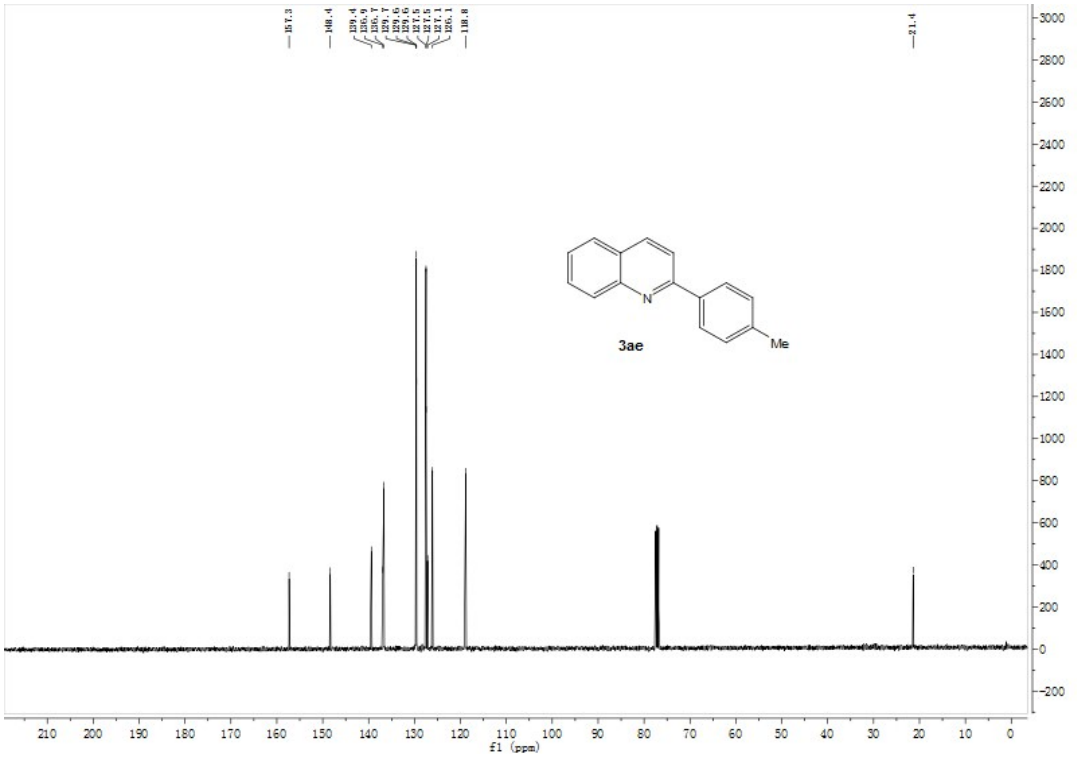

3ac
OMe
f1 (ppm)

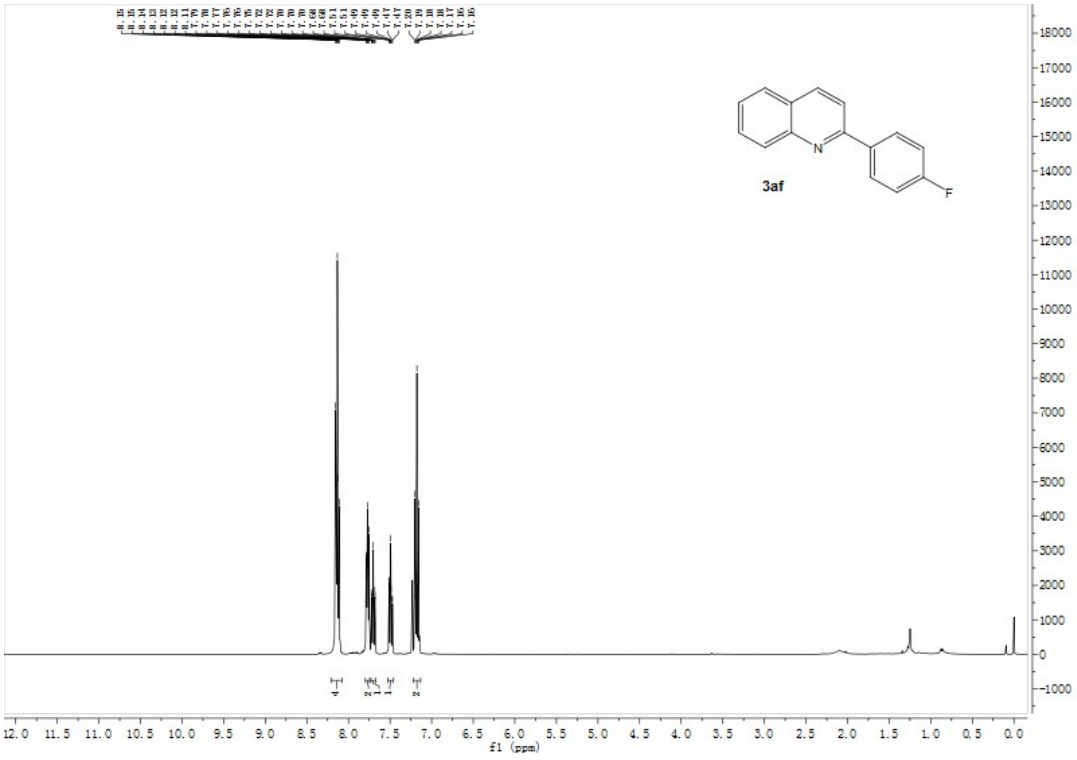

3ac
OMe
f1 (ppm)

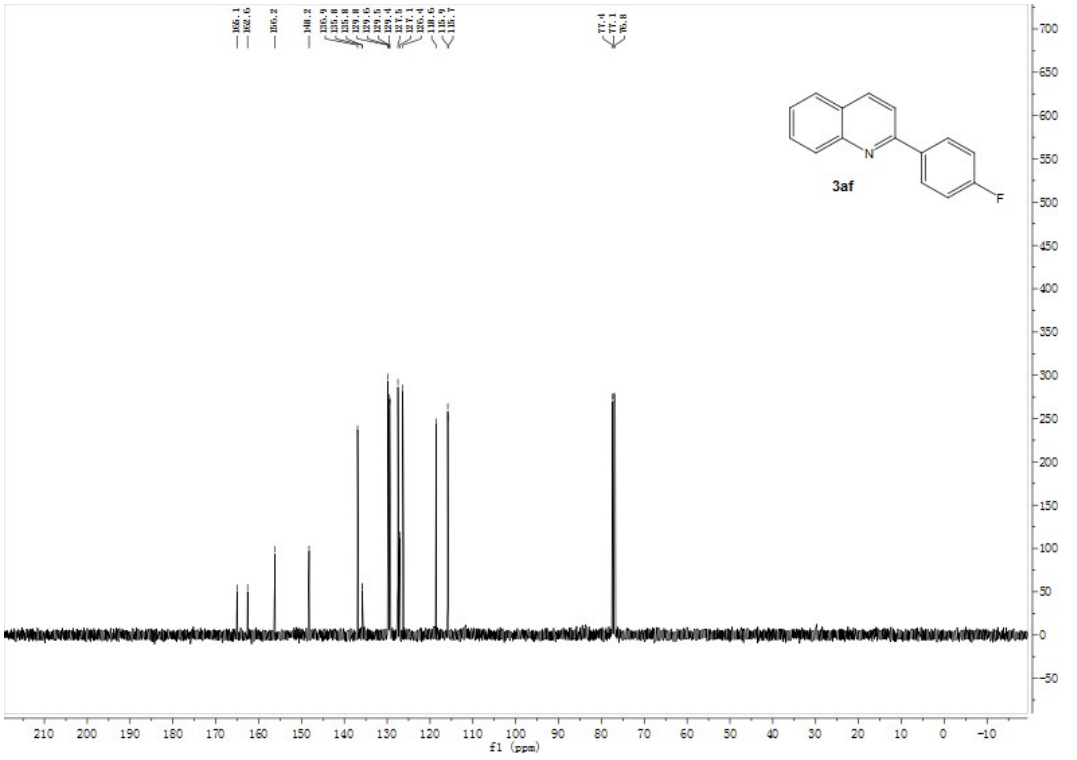

OMe
N
3ad
f1 (ppm)

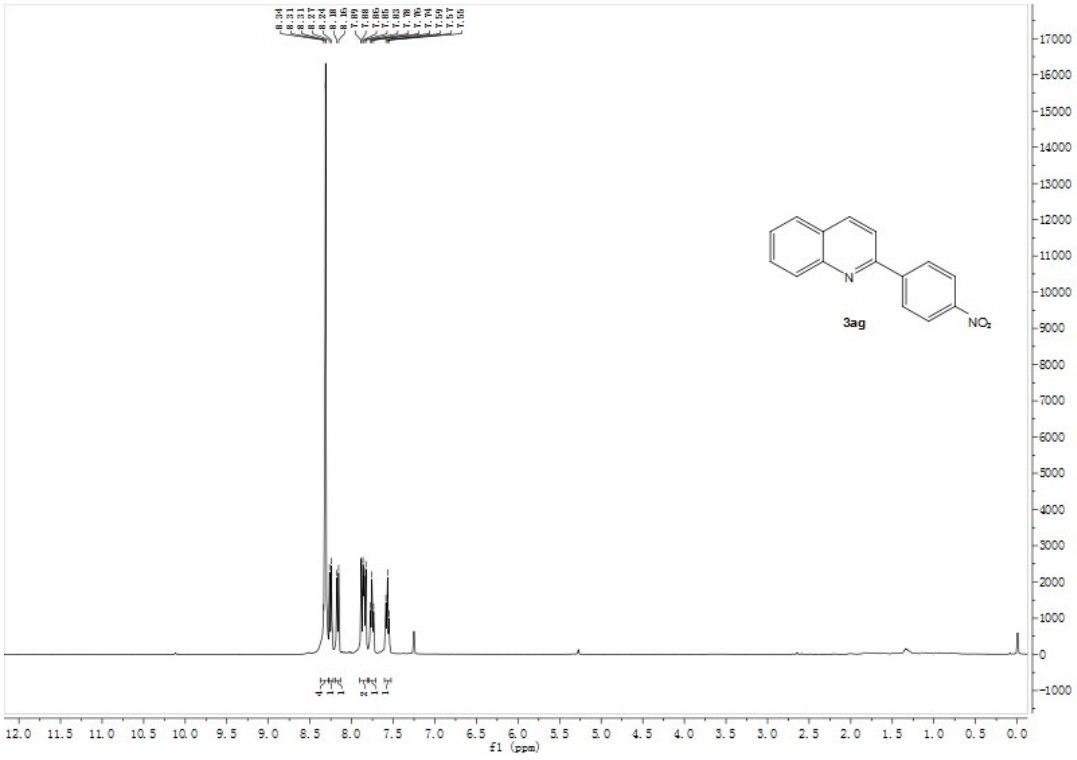

OMe
N
3ad
f1 (ppm)


3ae
N
Me
f1 (ppm)


3ae
N
Me
f1 (ppm)


3af
F
f1 (ppm)


3af
F
f1 (ppm)


8.34
8.31
8.27
8.24
8.18
8.16
7.89
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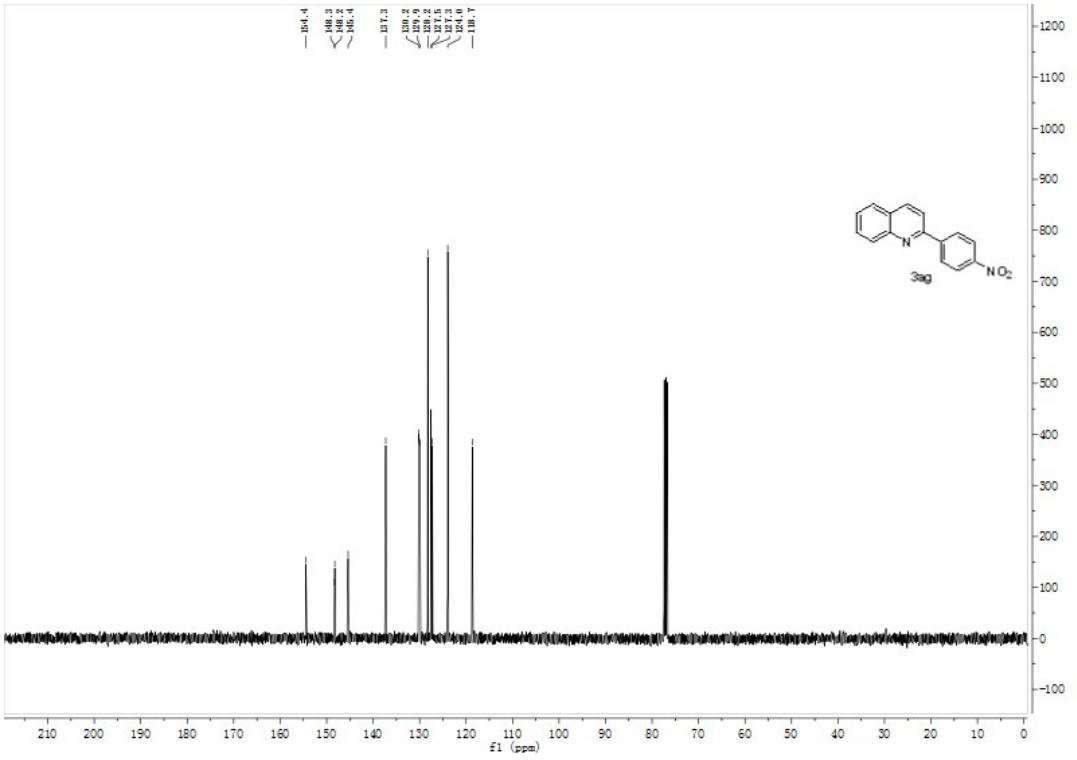
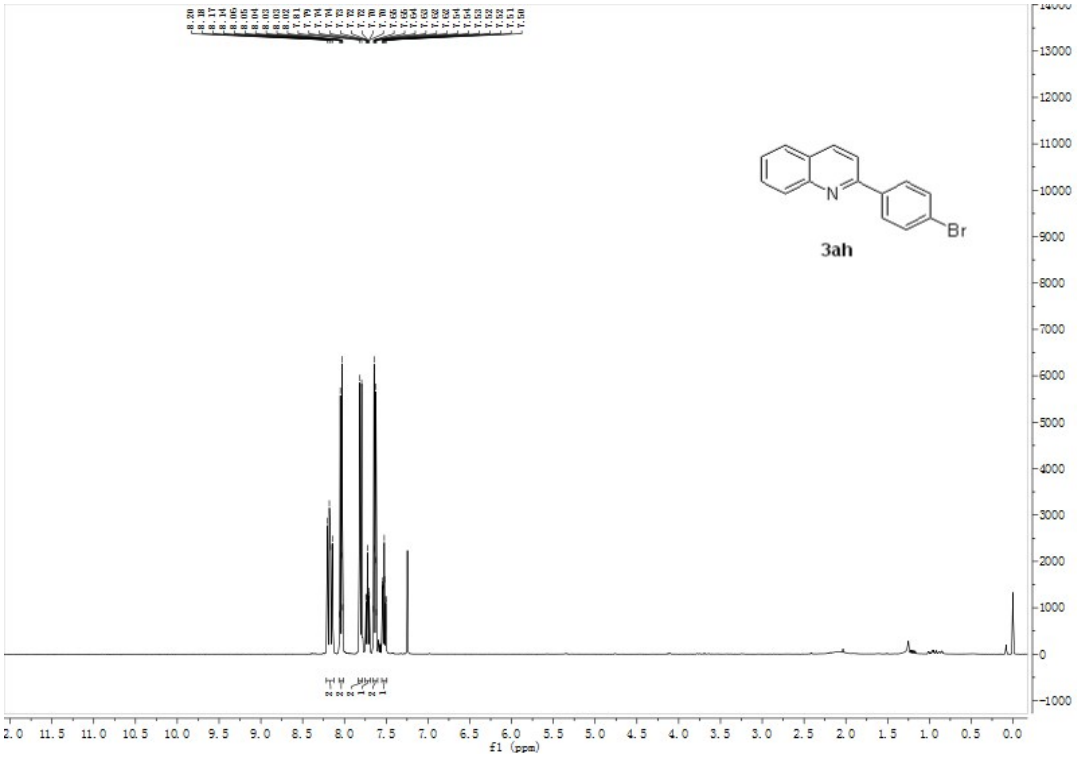
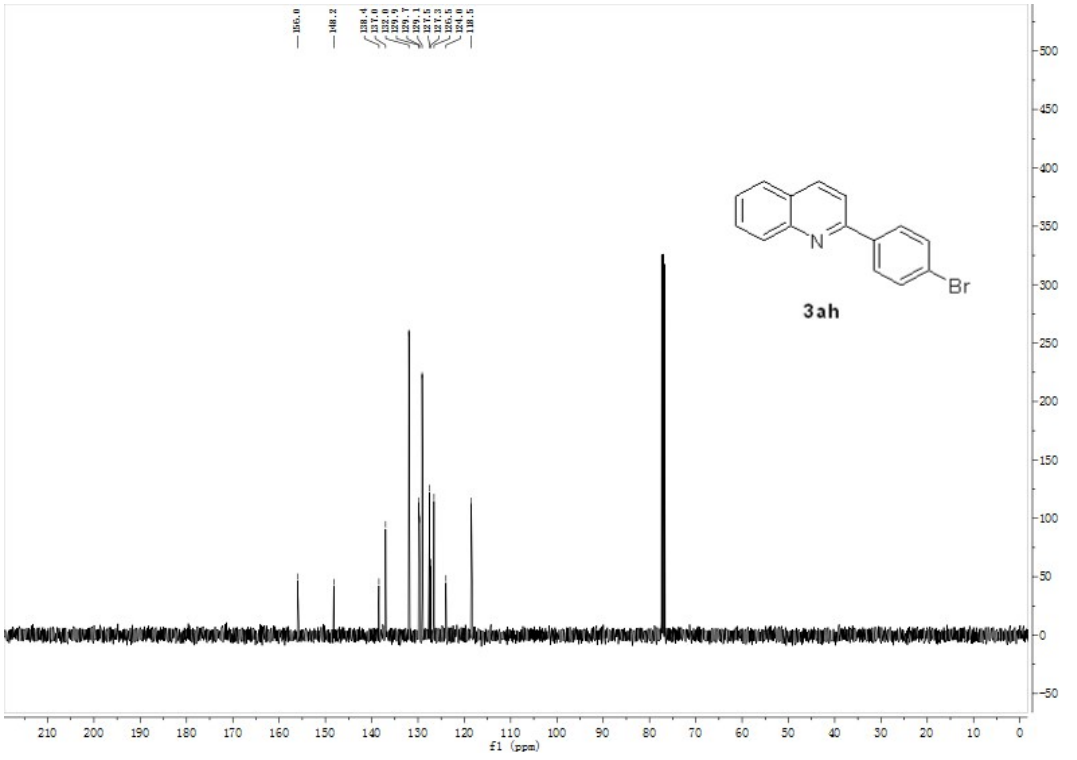
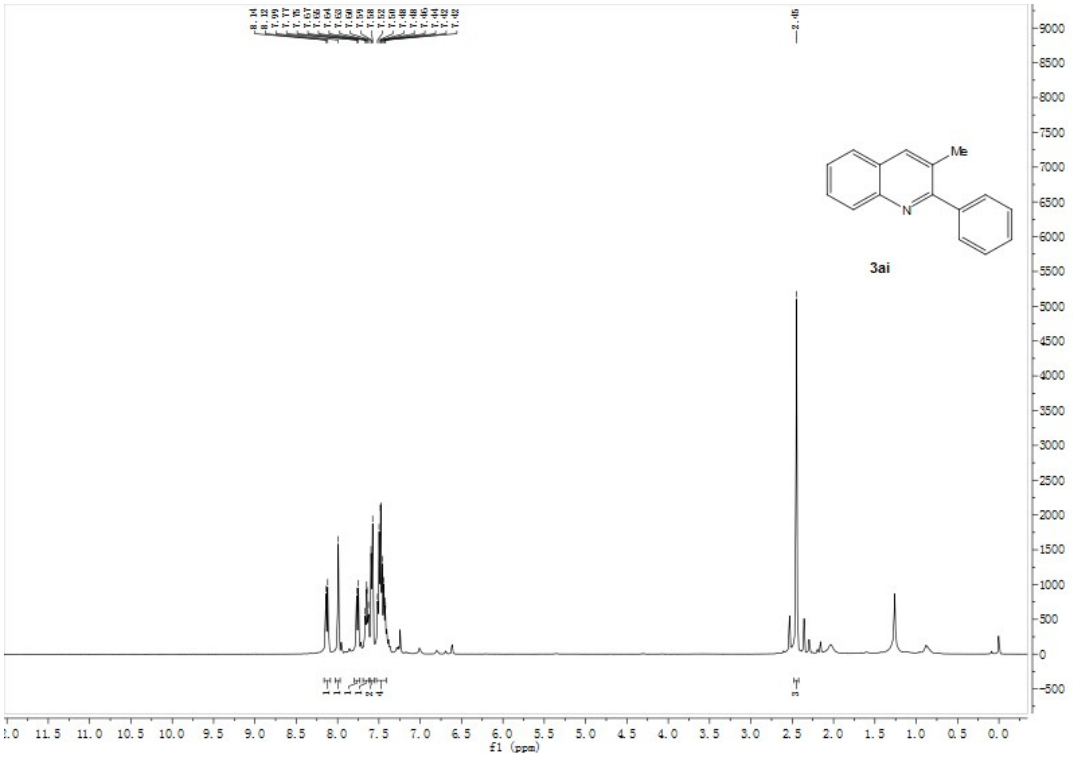
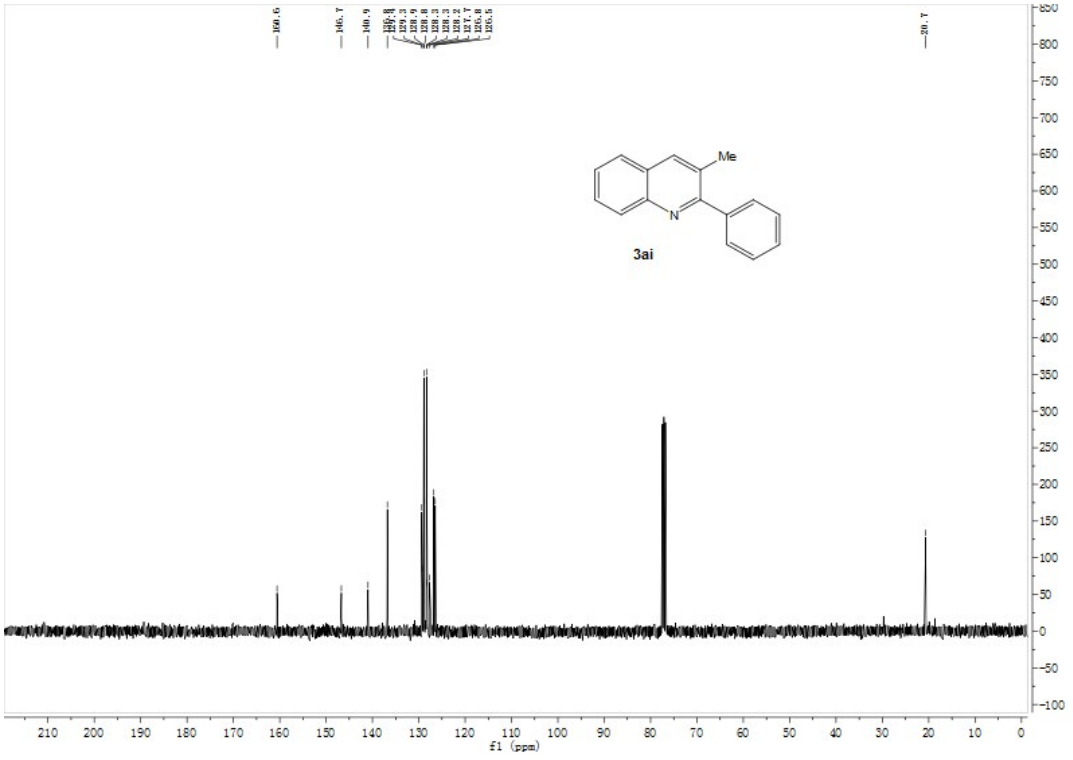
7.83
7.78
7.76
7.74
7.59
7.57
7.55
3ag
NO2
f1 (ppm)

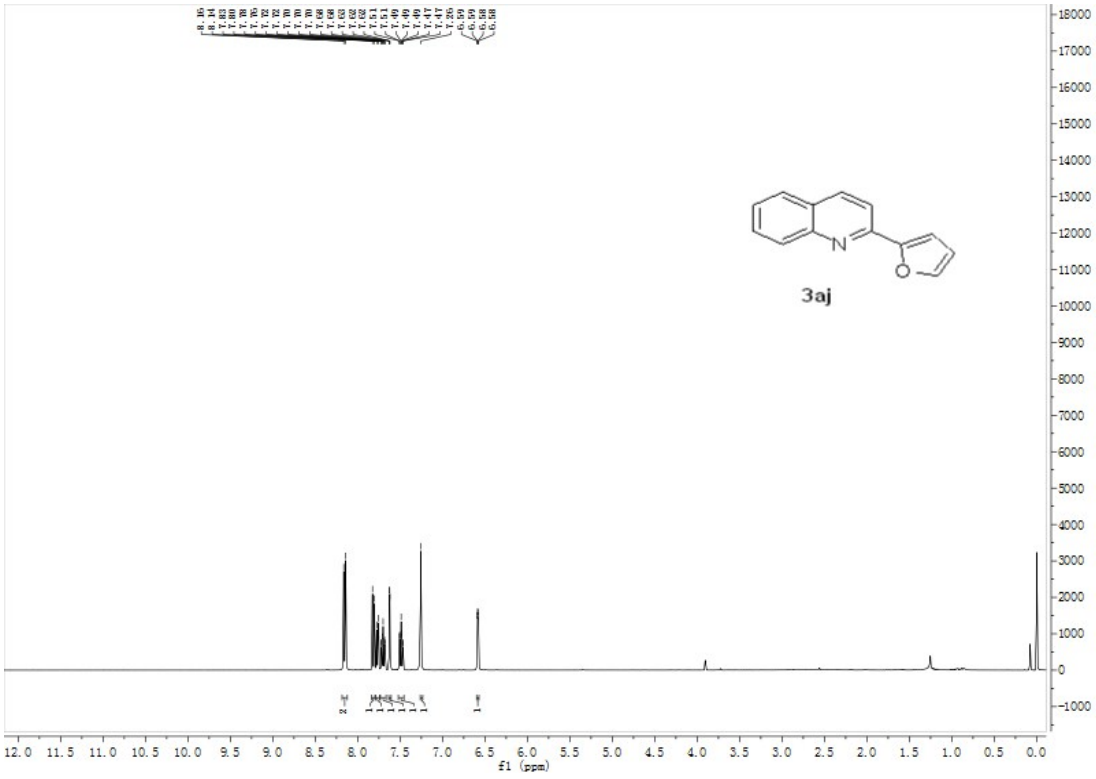

154.4
148.3
148.2
146.4
137.3
130.2
129.9
128.2
127.5
127.3
124.0
118.7
3ag
NO2
f1 (ppm)


3ah
f1 (ppm)


3ah
f1 (ppm)


Me
N
3ai
f1 (ppm)


Me
N
3ai
f1 (ppm)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7.70
7.68
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7.63
7.62
7.62
7.51
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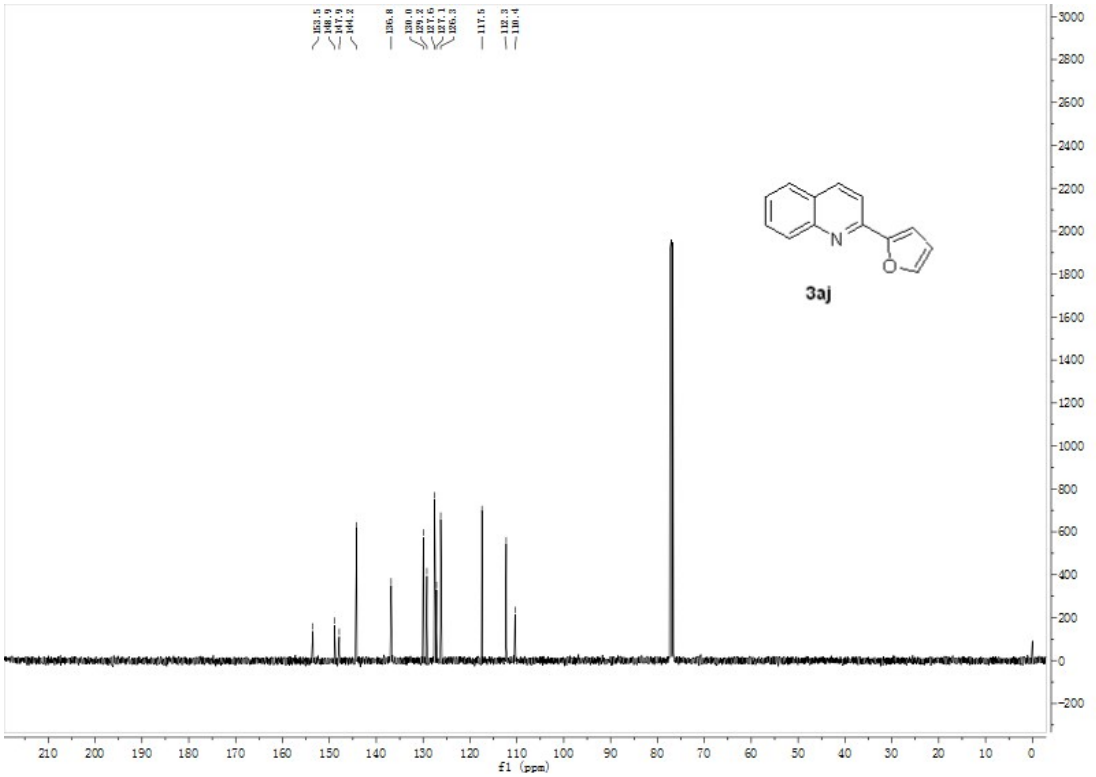
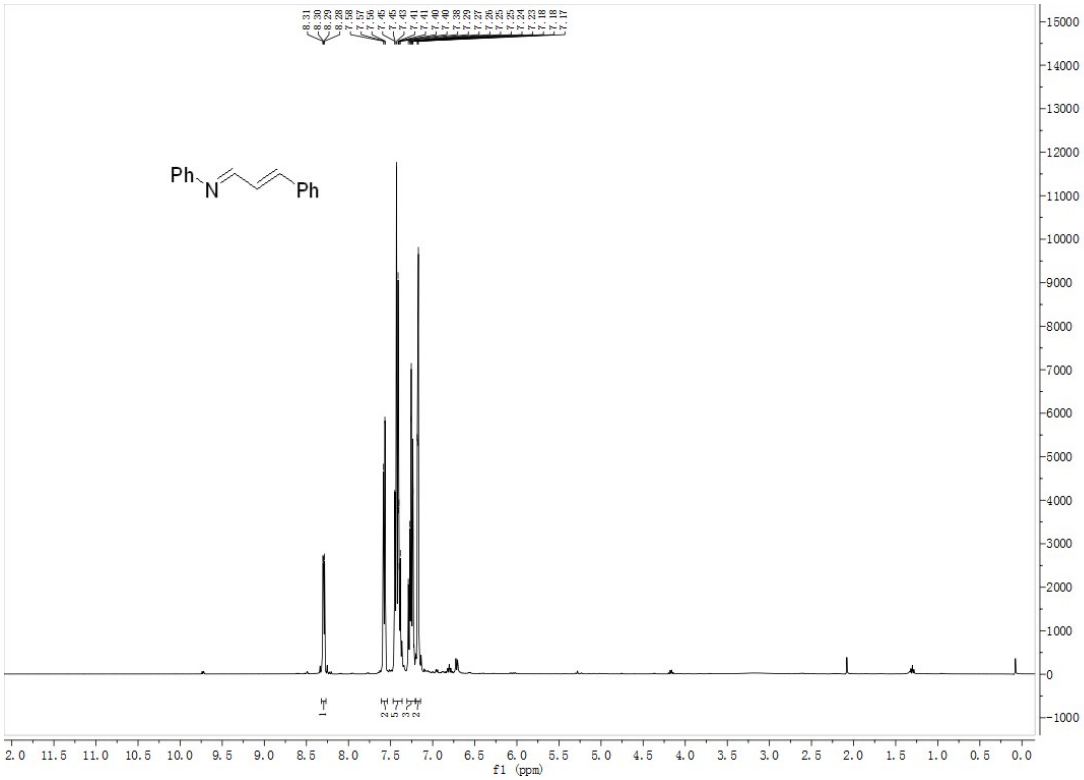
6.59
6.58
6.58
3aj
f1 (ppm)


153.5
148.9
141.9
141.2
136.8
130.0
129.2
127.6
127.1
126.3
117.5
112.3
110.4
3aj
f1 (ppm)


8.31
8.30
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7.58
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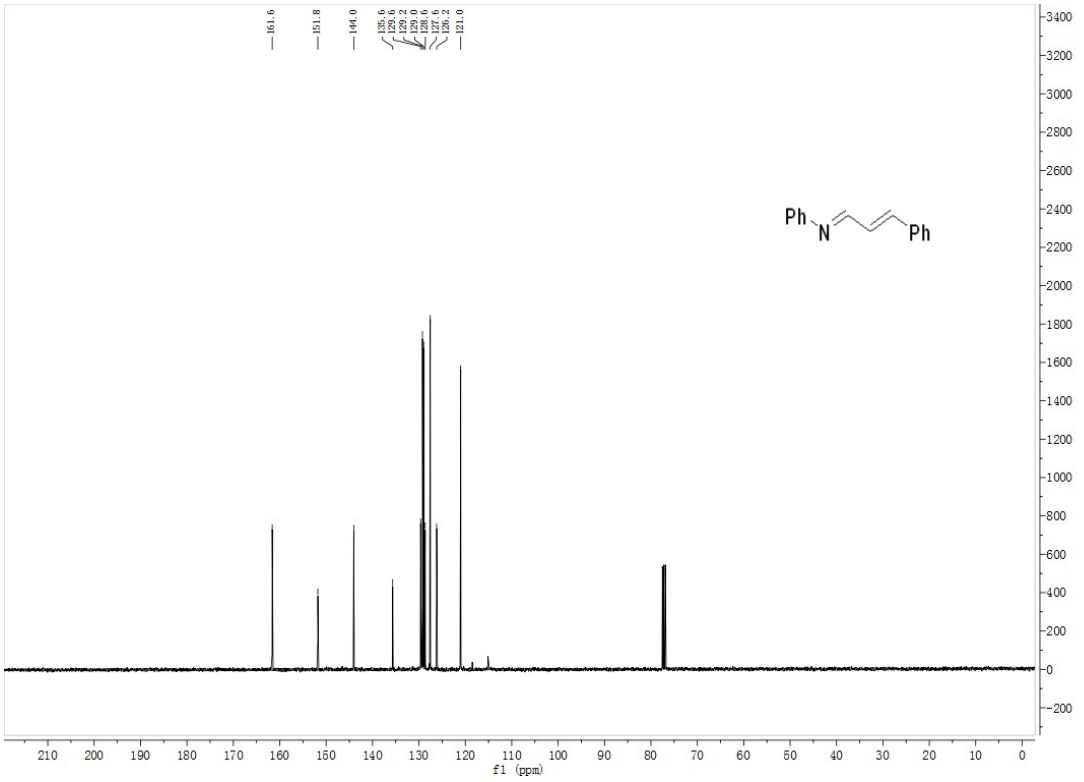
7.56
7.45
7.44
7.43
7.41
7.41
7.40
7.40
7.38
7.29
7.27
7.26
7.25
7.25
7.24
7.23
7.18
7.17
Ph
N
Ph
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
1.00
2.45
1.77
2.24
2.24
2.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)


161.6
151.8
144.0
135.6
129.5
129.2
129.0
128.6
127.6
126.2
121.0
Ph
N
Ph
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)