Electronic Supplementary Material (ESI) for Chemical Communications

Palladium-Catalyzed Insertion of *N*-Tosylhydrazones for the Synthesis of Isoindolines

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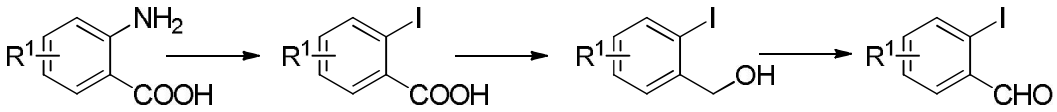
1. General remarks.

For product purification by flash column chromatography, silica gel (200~300 mesh). ^{1}H NMR spectra and ^{13}C NMR spectra were recorded on 400 MHz in $CDCl_3$ or C3D6O solutions and TMS as internal standard. All products were further characterized by HRMS (high resolution mass spectra). Copies of their ^{1}H NMR and ^{13}C NMR spectra were provided. THF, and toluene, 1,4-dioxane were dried over Na with benzophenone-ketyl intermediate as indicator. MeCN was distilled over P_2O_5. Commercially available reagents and solvents were used without further purification.

2. General procedure for the preparation of 1 and 2.

(1) Preparation of 2-iodobenzaldehyde derivatives

General procedure A :



A solution of $NaNO_2$ (1.2 eq) in 20 mL of H_2O was added slowly to a solution of 2-aminobenzoic acid derivatives (50 mmol, 1.0 eq) in concentrated HCl (10.0 eq) and 80 ml H_2O at 0℃ over a period of 30 min. After the resulting solution was stirred at this temperature for 30min, an ice cold solution of potassium iodide (1.5 eq) in 20 mL of H_2O was then added dropwise over a period of 20 min and stirred for addition 1h at 0℃. The resulting red mixture was heated to 90 °C for 30min. After cooling to room temperature, $Na_2S_2O_3$ was added and extracted with EtOAc (2×100 mL) and the combined organic layers were washed by H_2O, brine and dried over $NaSO_4$. Solvent was removed under reduced pressure and 2-iodobenzoic acid derivatives were obtained by flash chromatography.

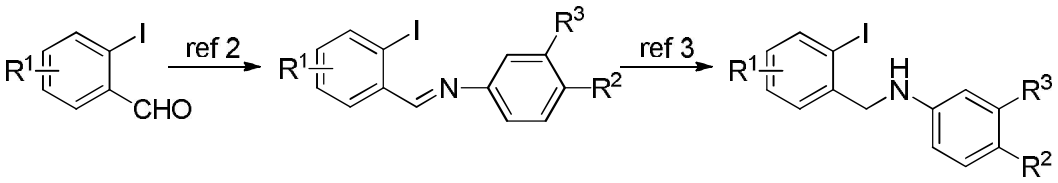
To a solution of the 2-iodobenzoic acid derivatives (20 mmol, 1.0 eq) and $NaBH_4$ in (2.0 eq) in THF (30 mL) at 0 °C was slowly added $(C_2H_5)_2O{\cdot}BF_3$ (2.0 equiv) over a period of 30 min and then the mixture was vigorously stirred at room temperature. When the reaction was considered complete, as determined by TLC analysis, the reaction mixture was cooled to 0℃, H_2O was slowly added and then extracted with CH_2Cl_2 (2×50 mL). The combined organic layers were dried (Na_2SO_4), and evaporated in vacuum and the (2-iodophenyl)methanol was used without further purification.

To a solution of (2-iodophenyl)methanol (15 mmol, 1.0 eq) and SiO_2 (5.0g) in CH_2Cl_2 was slowly added PCC (2.0 eq) at 0 °C. The solution was stirred at room temperature for 2h.The reaction mixture was filtrated, evaporated and 2-iodobenzaldehyde derivatives were obtained by flash chromatography.

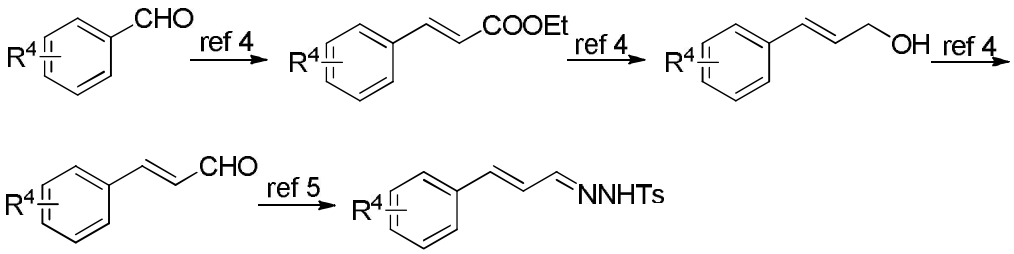
General procedure B:

2-iodo-4,5-dimethoxybenzaldehyde and 2-iodo-5-methoxybenzaldehyde were synthesized according to the literature procedure.[1]

(2) Compounds **1** were synthesized according to the literature procedure.[2-3]

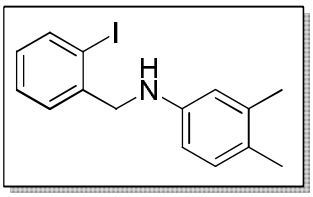


(3) Compounds **2** were synthesized according to the literature procedure.[4-5]

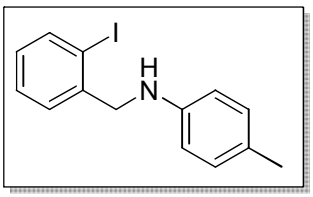


Propenal tosylhydrazone and (E)-2-Butenal tosylhydrazone were synthesized according to the literature procedure.[6]

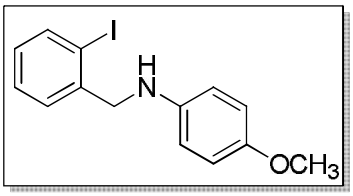
3. Spectral data of compound 1 and 2.



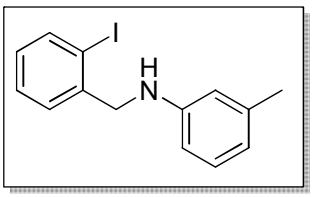
***N*-(2-iodobenzyl)-3,4-dimethylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.80-7.77(m, 1H), 7.31(d, *J* =7.2Hz, 1H), 7.23-7.19(m, 1H), 6.87(d, *J* =6.8Hz, 2H), 6.38(s, 1H), 6.29(d, *J* =7.6Hz, 1H), 4.20(s, 2H), 3.9(s, 1H), 2.14(s, 3H), 2.11(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.7, 141.2, 139.2, 137.2, 130.2, 128.7, 128.6, 128.2, 125.5, 114.7, 110.1, 98.5, 53.3, 20.0, 18.6.



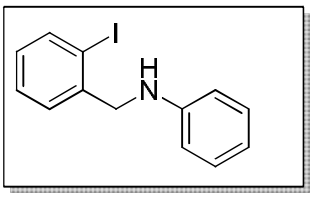
***N*-(2-iodobenzyl)-4-methylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.82(d, *J* =8.0Hz, 1H), 7.35(d, *J* =7.2Hz, 1H), 7.28-7.24(m, 1H), 6.98-6.92(m, 3H), 6.50(d, *J* =8.4Hz, 2H), 4.27(d, *J* =7.2Hz, 2H), 4.04(s, 1H), 2.22(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.3, 141.1, 139.4, 129.7, 128.8, 128.7, 128.3, 126.9, 113.0, 98.5, 53.4, 20.4.



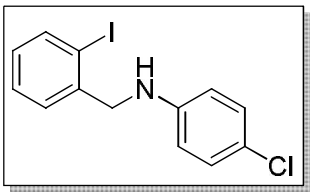
***N*-(2-iodobenzyl)-4-methoxyaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.85-7.83(m, 1H), 7.37(d, *J* =7.6Hz, 1H), 7.31-7.27(m, 1H), 6.98-6.94(m, 1H), 6.77(dd, *J* =6.8Hz, *J* =2.0Hz, 2H), 6.56(dd, *J* =6.8Hz, *J* =2.4Hz, 2H), 4.27(s, 2H), 3.94(s, 1H), 3.73(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 152.3, 141.8, 141.2, 139.4, 128.9, 128.8, 128.4, 114.9, 114.2, 98.6, 55.7, 54.1.



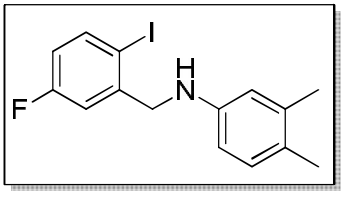
***N*-(2-iodobenzyl)-3-methylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.83(d, *J* =7.6Hz, 1H), 7.35(d, *J* =8.0Hz, 1H), 7.29-7.25(m, 1H), 7.07-7.03(m, 1H), 6.97-6.93(m, 1H), 6.54(d, *J* =7.6Hz, 1H), 6.42(s, 1H), 6.39(d, *J* =8.0Hz, 1H), 4.28(d, *J* =5.6Hz, 2H), 4.09(s, 1H), 2.25(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 147.6, 141.0, 139.4, 139.0, 129.1, 128.9, 128.7, 128.4, 118.7, 113.7, 109.9, 98.5, 53.2, 21.6.



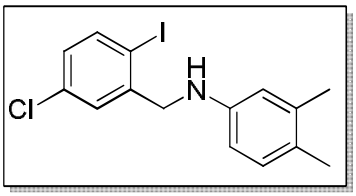
***N*-(2-iodobenzyl)aniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.84(d, *J* =8.0Hz, 1H), 7.36(d, *J* =7.6Hz, 1H), 7.30-7.26(m, 1H), 7.18-7.15(m, 2H), 6.98-6.94(m, 1H), 6.74-6.70(m, 1H), 6.59(d, *J* =8.4Hz, 2H), 4.31(d, *J* =4.8Hz, 2H), 4.17(s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 147.6, 140.9, 139.4, 129.3, 128.9, 128.7, 128.4, 117.8, 112.9, 98.5, 53.2.



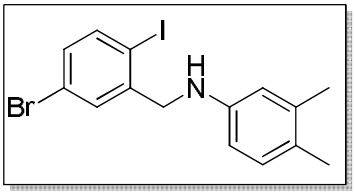
4-chloro-*N*-(2-iodobenzyl)aniline: ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.85(dd, *J* =7.6Hz, *J* =0.8Hz, 1H), 7.35-7.27(m, 2H), 7.12-7.08(m, 2H), 6.99-6.95(m, 1H), 6.50(dd, *J* =6.8Hz, *J* =2.0Hz, 2H) 4.27(d, *J* =2.4Hz, 2H), 4.21(s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 146.1, 140.4, 139.5, 129.1, 128.6, 128.4, 127.4, 122.3, 114.0, 98.5, 53.2.



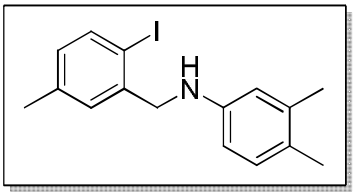
***N*-(5-fluoro-2-iodobenzyl)-3,4-dimethylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.79-7.76(m, 1H), 7.15(dd, *J* =9.6Hz, *J* =3.2Hz, 1H), 6.92(d, *J* =8.0Hz, 1H), 6.76-6.71(m, 1H), 6.42(d, *J* =2.4Hz, 1H), 6.32(dd, *J* =8.0Hz, *J* =2.4Hz, 1H), 4.25(d, *J* =5.6Hz, 2H), 4.08(s, 1H), 2.18(s, 3H), 2.15(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 164.5, 162.1, 145.3, 143.9, 143.8, 140.2, 140.1, 137.3, 130.3, 125.9, 116.1, 115.9, 115.8, 115.7, 114.7, 110.1, 90.5, 90.4, 53.3, 20.0, 18.6.



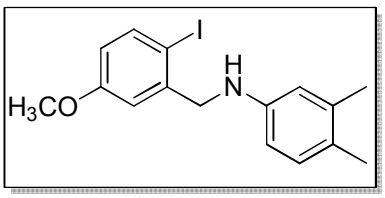
***N*-(5-chloro-2-iodobenzyl)-3,4-dimethylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.69(d, *J* =8.0Hz, 1H), 7.35(s, 1H), 6.90(d, *J* =6.8Hz, 2H), 6.39(s, 1H), 6.29(d, *J* =7.2 Hz, 1H), 4.18(s, 2H), 3.96(s, 1H), 2.16(s, 3H), 2.13(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.4, 143.3, 140.2, 137.4, 134.9, 130.3, 128.9, 128.6, 126.0, 114.7, 110.2, 95.1, 53.4, 20.0, 18.7.



***N*-(5-bromo-2-iodobenzyl)-3,4-dimethylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.65(d, *J* =8.4Hz, 1H), 7.51(d, *J* =2.4Hz, 1H), 7.09-7.06(m, 1H), 6.92(d, *J* =8.0Hz, 1H), 6.41(d, *J* =2.4Hz, 1H), 6.31(dd, *J* =8.0Hz, *J* =2.4Hz, 1H), 4.21(s, 2H), 3.98(s, 1H), 2.18(s, 3H), 2.14(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.5, 143.6, 140.5, 137.4, 131.9, 131.5, 130.3, 126.1, 123.0, 114.8, 110.2, 96.1, 53.4, 20.0, 18.7.

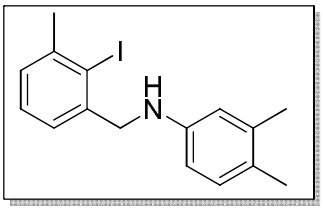


***N*-(2-iodo-5-methylbenzyl)-3,4-dimethylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.69(d, *J* =7.6Hz, 1H), 7.22-7.21(m, 1H), 6.92(d, *J* =8.4Hz, 1H), 6.78(dd, *J* =8.0Hz, *J* =1.6Hz, 1H), 6.45(d, *J* =2.4Hz, 1H), 6.36(dd, *J* =8.0Hz, *J* =2.4Hz, 1H), 4.23(d, *J* =5.6Hz, 2H), 3.94(s, 1H), 2.25(s, 3H), 2.18(s, 3H), 2.15(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 146.0, 141.0, 139.1, 138.4, 137.3, 130.3, 129.9, 129.8, 125.7, 114.8, 110.3, 94.5, 53.5, 21.0, 20.0, 18.7.

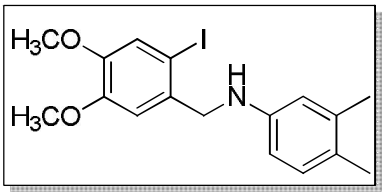


***N*-(2-iodo-5-methoxybenzyl)-3,4-dimethylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.68(d, *J* =8.4Hz, 1H), 7.01(d, *J* =2.8Hz, 1H), 6.92(d, *J* =8.0Hz, 1H), 6.58-6.55(m,

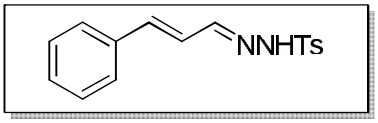
1H), 6.45(d, *J* =2.4Hz, 1H), 6.38-6.35(m, 1H), 4.23(s, 2H), 3.99(s, 1H), 3.72(s, 3H), 2.18(s, 3H), 2.14(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 160.2, 145.8, 142.5, 139.8, 137.3, 130.3, 125.9, 115.1, 114.9, 114.7, 110.4, 86.7, 55.3, 53.6, 20.0, 18.7.



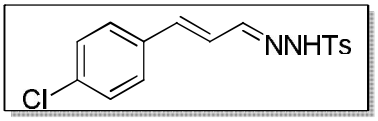
***N*-(2-iodo-3-methylbenzyl)-3,4-dimethylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.13-7.08(m, 3H), 6.87(d, *J* =8.0Hz, 1H), 6.39(d, *J* =2.4Hz, 1H), 6.30(dd, *J* =8.0Hz, *J* =2.4Hz, 1H), 4.24(d, *J* =4.4Hz, 2H), 3.94(s, 1H), 2.45(s, 3H), 2.14(s, 3H), 2.11(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.8, 142.1, 141.7, 137.2, 130.2, 128.4, 127.8, 125.9, 125.4, 114.7, 110.1, 105.7, 54.5, 29.3, 20.0, 18.6.



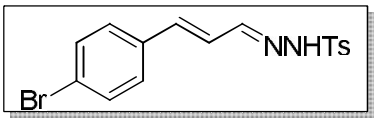
***N*-(2-iodo-4,5-dimethoxybenzyl)-3,4-dimethylaniline:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.23(s, 1H), 6.94(s, 1H), 6.91(d, *J* =8.0Hz, 1H), 6.45(s, 1H), 6.36(dd, *J* =8.0Hz, *J* =2.0Hz, 1H), 4.18(s, 2H), 3.90(s, 1H), 3.83(s, 3H), 3.76(s, 3H), 2.17(s, 3H), 2.14(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 149.3, 148.5, 145.9, 137.1, 133.8, 130.1, 125.7, 121.5, 114.9, 111.9, 110.4, 86.2, 56.1, 55.8, 53.3, 19.9, 18.6.



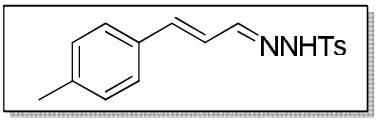
4-methyl-*N*'-((E)-3-phenylallylidene)benzenesulfonohydrazide: ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.22(d, *J* =5.2Hz, 1H), 7.86(d, *J* =8.0Hz, 2H), 7.58(d, *J* =8.0Hz, 1H), 7.39-7.38(m, 2H), 7.34-7.28(m, 5H), 6.86-6.74(m, 2H), 2.41(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 149.8, 144.3, 140.0, 135.6, 135.3, 129.8, 129.1, 128.8, 127.9, 127.0, 124.3, 21.6.



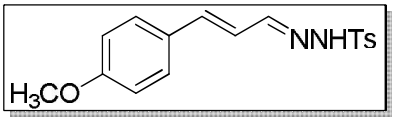
***N*'-((E)-3-(4-chlorophenyl)allylidene)-4-methylbenzenesulfonohydrazide:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.62(d, *J* =16.4Hz, 1H), 7.86(d, *J* =8.0Hz, 2H), 7.60(d, *J* =8.4Hz, 1H), 7.31(d, *J* =8.0Hz, 2H), 7.27(s, 4H), 6.79-6.66(m, 2H), 2.40(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 149.5, 144.4, 138.4, 135.1, 134.8, 134.0, 129.8, 129.0, 128.1, 127.8, 124.9, 21.6.



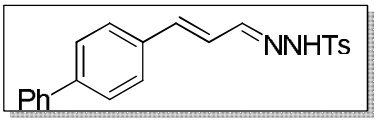
***N*'-((E)-3-(4-bromophenyl)allylidene)-4-methylbenzenesulfonohydrazide:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.82(s, 1H), 7.87(d, *J* =8.0Hz, 2H), 7.61(d, *J* =8.4Hz, 1H), 7.40(d, *J* =8.0Hz, 2H), 7.30(d, *J* =8.0Hz, 2H), 7.18(d, *J* =8.4Hz, 2H), 6.81-6.72(m, 1H), 6.64(d, *J* =16.4Hz, 1H), 2.39(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 149.5, 144.3, 138.4, 135.1, 134.4, 131.9, 129.7, 128.3, 127.8, 124.9, 123.0, 21.6.



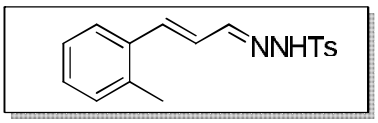
4-methyl-*N*'-((E)-3-(p-tolyl)allylidene)benzenesulfonohydrazide: ^{1}H NMR (400 MHz, C_3D_6O) δ: 10.04(s, 1H), 7.82-7.76(m, 3H), 7.41-7.37(m, 4H), 7.16(d, *J* =7.6Hz, 2H), 6.86(d, *J* =16.0Hz, 1H), 6.76(dd, *J* =16.0Hz, *J* =8.8Hz, 1H), 2.38(s, 3H), 2.30(s, 3H); ^{13}C NMR (100 MHz, C_3D_6O) δ: 149.9, 144.3, 139.8, 139.5, 137.3, 133.9, 130.1, 130.0, 128.2, 127.6, 124.5, 21.2, 21.0.



***N*'-((E)-3-(4-methoxyphenyl)allylidene)-4-methylbenzenesulfonohydrazide:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.13(s, 1H), 7.85(d, *J* =8.4Hz, 2H), 7.55(dd, *J* =6.8Hz, *J* =1.6Hz, 1H), 7.34-7.30(m, 4H), 6.85(d, *J* =8.8Hz, 2H), 6.70(d, *J* =6.8Hz, 2H), 3.81(s, 3H), 2.41(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 160.4, 150.5, 144.2, 139.8, 135.3, 129.7, 128.5, 128.4, 127.9, 122.1, 114.3, 55.3, 21.6.

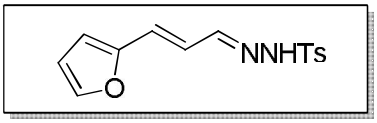


***N*'-((E)-3-([1,1'-biphenyl]-4-yl)allylidene)-4-methylbenzenesulfonohydrazide:** ^{1}H NMR (400 MHz, C_3D_6O) δ: 10.1(s, 1H), 7.81(d, *J* =8.4Hz, 3H), 7.68-7.62(m, 6H), 7.48-7.44(m, 2H), 7.41-7.35(m, 3H), 6.96(d, *J* =16.0Hz, 1H), 6.87(dd, *J* =16.0Hz, *J* =8.8Hz, 1H), 2.40(s, 3H); ^{13}C NMR (100 MHz, C_3D_6O) δ: 149.8, 144.4, 141.9, 140.8, 139.3, 137.4, 135.9, 130.2, 129.6, 128.4, 128.3, 127.9, 127.4, 125.6, 21.2.

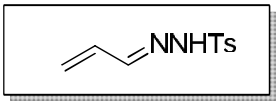


4-methyl-*N*'-((E)-3-(o-tolyl)allylidene)benzenesulfonohydrazide: ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.54(s, 1H), 7.87(d, *J* =8.4Hz, 2H), 7.64(d, *J* =9.2Hz, 1H), 7.45-7.43(m, 1H), 7.31(d, *J* =8.0Hz, 2H), 7.20-7.13(m, 3H), 7.02(d, *J* =16.0Hz, 1H), 6.77-6.70(m, 1H), 2.40(s, 3H), 2.32(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 150.2,

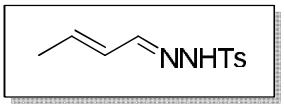
144.3, 137.6, 136.3, 135.2, 134.3, 130.6, 129.7, 128.9, 127.8, 126.3, 125.5, 125.3, 21.6, 19.7.



***N'*-((E)-3-(furan-2-yl)allylidene)-4-methylbenzenesulfonohydrazide:** ^{1}H NMR (400 MHz, C_3D_6O) δ: 10.03(s, 1H), 7.79(d, *J* =8.4Hz, 2H), 7.73(d, *J* =9.2Hz, 1H), 7.59(d, *J* =1.2Hz, 1H), 7.39(d, *J* =8.0Hz, 2H), 6.75(d, *J* =16.0Hz, 1H), 6.63-6.56(m, 2H), 6.51-6.49(m, 1H), 2.39(s, 3H); ^{13}C NMR (100 MHz, C_3D_6O) δ: 152.6, 149.2, 144.5, 144.3, 137.2, 130.1, 128.2, 126.5, 123.4, 112.7, 112.1, 21.2.

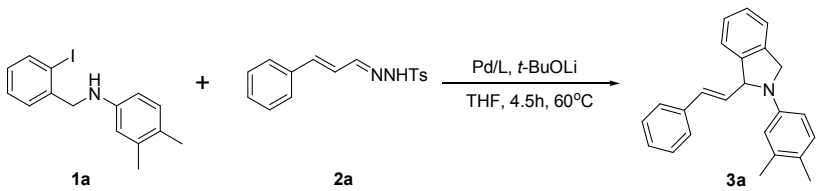


***N'*-allylidene-4-methylbenzenesulfonohydrazide:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.79(s, 1H), 7.81(d, *J* =8.0Hz, 2H), 7.46(d, *J* =9.2Hz, 1H), 7.29(d, *J* =8.0Hz, 2H), 6.40-6.30(m, 1H), 5.54(d, *J* =10.8Hz, 1H), 5.47(d, *J* =17.6Hz, 1H), 2.40(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 149.8, 144.1, 135.1, 133.0, 129.6, 127.7, 125.1, 21.5.



***N'*-((E)-but-2-en-1-ylidene)-4-methylbenzenesulfonohydrazide:** ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.55(s, 1H), 7.82(d, *J* =8.0Hz, 2H), 7.43(d, *J* =8.8Hz, 1H), 7.28(d, *J* =8.4Hz, 2H), 6.12-5.94(m, 2H), 2.39(s, 3H), 1.77(m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 150.5, 144.0, 139.0, 135.2, 129.5, 127.7, 21.4, 18.3.

4. The tables for optimizing reaction conditions.[a]

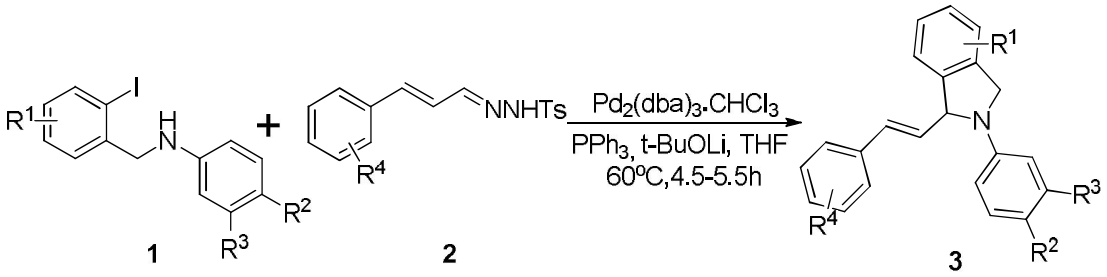


1a **2a** **3a**

Entry	Catalyst (mol%)	Yield[b]
1	$PdCl_2(MeCN)_2$ (2.5)/PPh_3 (15)	28
2	$Pd(OAc)_2$ (5)/PPh_3 (15)	87
3	$Pd_2(dba)_3$ (2.5)/PPh_3 (15)	76
4	$Pd(PPh_3)_4$ (5)/PPh_3 (15)	86
5	**$Pd_2(dba)_3$·$CHCl_3$ (2.5)/ PPh_3 (15)**	**88**
6	$Pd_2(dba)_3$·$CHCl_3$ (2.5)/Xphos (15)	Trace
7	$Pd_2(dba)_3$·$CHCl_3$ (2.5)/TFP (15)	72
8	$Pd_2(dba)_3$·$CHCl_3$ (2.5)	0
9	$Pd_2(dba)_3$·$CHCl_3$(2.5)/$[HPCy_3]BF_4$ (15)	16

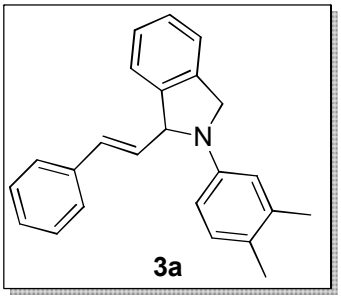
[a]: Reaction conditions: **1a** (0.3 mmol), **2a** (0.675 mmol, 2.25 equiv), *t*-BuOLi (1.575 mmol, 5.25 equiv), THF (4ml). [b] Yield of isolated product.

5. General procedure for the preparation of the products 3.

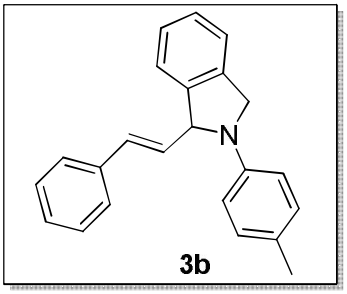


Under a nitrogen atmosphere, to an oven-dried Schlenk tube were added *N-(2-iodobenzyl) anilines* **1** (0.30 mmol, 1.0 eq), *N*-tosylhydrazones **2** (0.675 mmol, 2.25 eq), t-BuOLi (1.575 mmol, 5.25eq), $Pd_2(dba)_3{\cdot}CHCl_3$ (2.5 mmol%), PPh_3 (15 mmol%), THF (4 ml) was introduced by syringe. The mixture was stirred at 60°C. When the reaction was considered complete, as determined by TLC analysis, the reaction mixture was cooled to room temperature and filtered through celite with EtOAc as eluents. The solvents were evaporated under reduced pressure and the residue was purified by flash chromatography on silica gel to afford pure **3**.

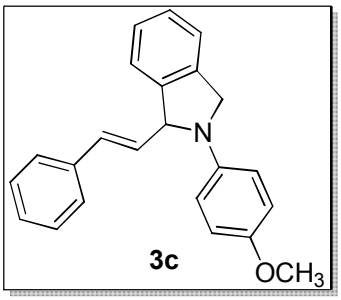
6. Spectral data of compound 3.



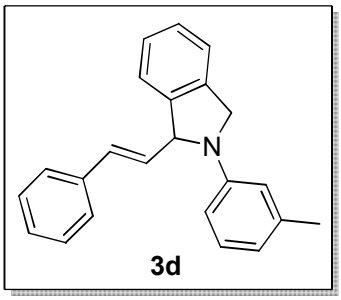
(E)-2-(3,4-dimethylphenyl)-1-styrylisoindoline 3a: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.37-7.32(m, 3H), 7.27(d, *J* =7.6Hz, 5H), 7.21-7.17(m, 1H), 7.01-6.99(m, 1H), 6.82(d, *J* =16.0Hz, 1H), 6.66(s, 1H), 6.62(d, *J* =8.0Hz, 1H), 6.26-6.19(m, 1H), 5.46(d, *J* =7.2 Hz, 1H), 4.86(d, *J* =13.2Hz, 1H), 4.58(d, *J* =13.2Hz, 1H), 2.24(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.5, 140.9,137.1, 136.7, 132.3, 130.6, 130.2, 128.5, 127.5, 127.4, 127.2, 126.5, 124.4, 123.4, 122.5, 114.3, 110.2, 67.3, 54.7, 20.4, 18.6; HRMS (ESI) m/z: calcd for $C_{24}H_{23}N$: M+H=326.1903; found: 326.1899.



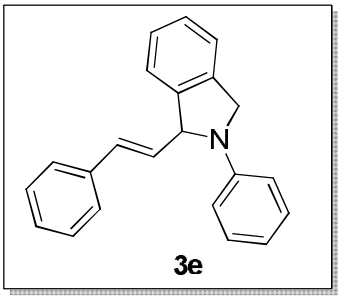
(E)-1-styryl-2-(p-tolyl)isoindoline 3b: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.36-7.31(m, 3H), 7.27-7.25(m, 5H), 7.20-7.18(m, 1H), 7.05(d, *J* =6.0Hz, 2H), 6.83-6.74(m, 3H), 6.25-6.18(m, 1H), 5.46(s, 1H), 4.85(d, *J* =13.2Hz, 1H), 4.56(d, *J* =12.8Hz, 1H), 2.24(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.0, 140.9, 137.1, 136.6, 132.1, 130.7, 129.7, 128.5, 127.5, 127.2, 126.5, 125.6, 123.4, 122.5, 112.7, 67.4, 54.6, 20.3; HRMS (ESI) m/z: calcd for $C_{23}H_{21}N$: M+H=312.1747; found: 312.1743.



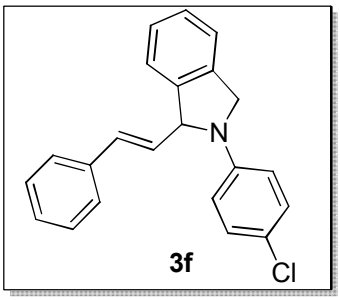
(E)-2-(4-methoxyphenyl)-1-styrylisoindoline 3c: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.37(d, *J* =5.6Hz, 2H), 7.31-7.26(m, 6H), 7.22-7.20(m, 1H), 6.88-6.78(m, 5H), 6.27-6.20(m, 1H), 5.42(s, 1H), 4.84(d, *J* =13.2Hz, 1H), 4.54(d, *J* =13.2Hz, 1H), 3.72(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 151.4, 141.9, 140.9, 137.2, 136.6, 132.2, 130.7, 128.5, 127.5, 127.2, 126.5, 123.3, 122.4, 114.9, 113.5, 67.7, 55.8, 55.0; HRMS (ESI) m/z: calcd for $C_{23}H_{21}NO$: M+H=328.1696; found: 328.1692.



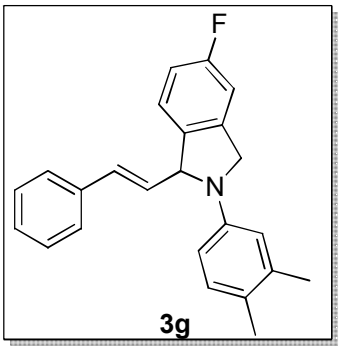
(E)-1-styryl-2-(m-tolyl)isoindoline 3d: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.37-7.25(m, 8H), 7.21-7.13(m, 2H), 6.83-6.78(m, 1H), 6.66(d, *J* =6.8Hz, 2H), 6.57(s, 1H), 6.25-6.17(m, 1H), 5.48(s, 1H), 4.87-4.84(m, 1H), 4.60-4.57(m, 1H), 2.32(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 147.1, 140.7, 138.8, 136.9, 136.6, 132.0, 130.6, 129.0, 128.5, 127.6, 127,5, 127.3, 126.5, 123.3, 122.5, 117.5, 113.4, 110.0, 67.2, 54.4, 21.9; HRMS (ESI) m/z: calcd for $C_{23}H_{21}N$: M+H=312.1747; found: 312.1751.



(E)-2-phenyl-1-styrylisoindoline 3e: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.38-7.31(m, 3H), 7.29-7.26(m, 7H), 7.24-7.19(m, 1H), 6.85-6.81(m, 3H), 6.76-6.71(m, 1H), 6.26-6.19(m, 1H), 5.52-5.50(m, 1H), 4.87(d, *J* =13.2Hz, 1H), 4.62(d, *J* =13.2Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 147.1, 140.7, 136.9, 136.6, 131.9, 130.8, 129.2, 128.5, 127.6, 127.5, 127.3, 126.5, 123.4, 122.5, 116.5, 112.7, 67.3, 54.4; HRMS (ESI) m/z: calcd for $C_{22}H_{19}N$: M+H=298.1590; found: 298.1593.

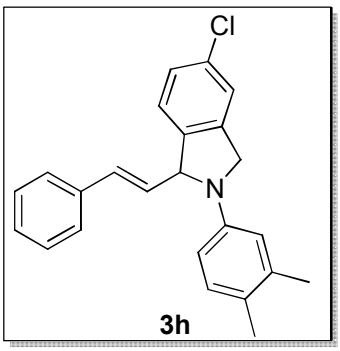


(E)-2-(4-chlorophenyl)-1-styrylisoindoline 3f: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.37-7.34(m, 2H), 7.32(d, *J* =2.8Hz, 1H), 7.30-7.28(m, 3H), 7.26-7.22(m, 2H), 7.21-7.16(m, 3H), 6.79(d, *J* =15.6Hz, 1H), 6.72(d, *J* =9.2Hz, 2H), 6.20-6.14(m, 1H), 5.45-5.43(m, 1H), 4.82(dd, *J* =13.2Hz, *J* =3.2Hz, 1H), 4.56(d, *J* =13.2Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.6, 140.5, 136.5, 136.3, 131.2, 131.1, 128.9, 128.5, 127.8, 127.7, 127.5, 126.5, 123.4, 122.5, 121.4, 113.7, 67.4, 54.5; HRMS (ESI) m/z: calcd for $C_{22}H_{18}NCl$: M+H=332.1201; found: 332.1206.

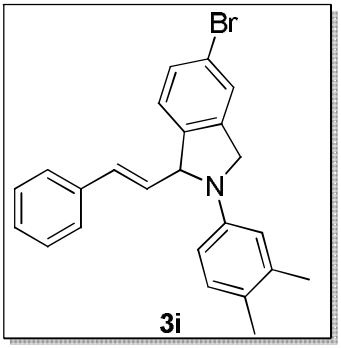


(E)-2-(3,4-dimethylphenyl)-5-fluoro-1-styrylisoindoline 3g: yellow liquid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.36(d, *J* =7.2Hz, 2H), 7.29-7.25(m, 2H), 7.21-7.15(m, 2H), 7.01-6.93(m, 3H), 6.79(d, *J* =15.6Hz, 1H), 6.63(s, 1H), 6.59(d, *J* =8.4Hz, 1H), 6.21-6.14(m, 1H), 5.39(d, *J* =7.2Hz, 1H), 4.82(d, *J* =13.6Hz, 1H), 4.52(d, *J* =13.6Hz, 1H), 2.23(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 163.9, 161.5, 145.3,

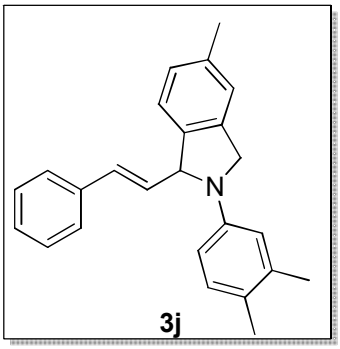
139.1, 139.0, 137.2, 136.6, 136.4, 132.0, 130.8, 130.3, 128.5, 127.6, 126.5, 124.7, 124.6, 124.5, 114.6, 114.3, 114.2, 110.2, 109.7, 109.4, 66.7, 54.5, 54.4, 20.3, 18.6; HRMS (ESI) m/z: calcd for $C_{24}H_{22}NF$: M+H=344.1809; found: 344.1804.



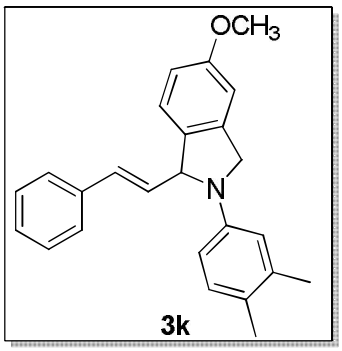
(E)-5-chloro-2-(3,4-dimethylphenyl)-1-styrylisoindoline 3h: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ:7.34(d, *J* =8.0Hz, 2H), 7.28-7.24(m, 3H), 7.23-7.19(m, 2H), 7.13(d, *J* =8.4 Hz, 1H), 6.99(d, *J* =8.4Hz, 1H), 6.78(d, *J* =16.0Hz, 1H), 6.62 (s, 1H), 6.59-6.56(m, 1H), 6.19-6.13(m, 1H), 5.38(d, *J* =6.0Hz, 1H), 4.80(dd, *J* =13.6Hz, *J* =3.2Hz, 1H), 4.50(d, *J* =13.6Hz, 1H), 2.23(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.2, 139.5, 139.0, 137.2, 136.5, 133.4, 131.7, 131.0, 130.3, 128.5, 127.6, 127.5, 126.5, 124.8, 124.5, 122.7 114.3, 110.3, 66.8, 54.3, 20.3, 18.6; HRMS (ESI) m/z: calcd for $C_{24}H_{22}NCl$: M+H=360.1514; found: 360.1519.



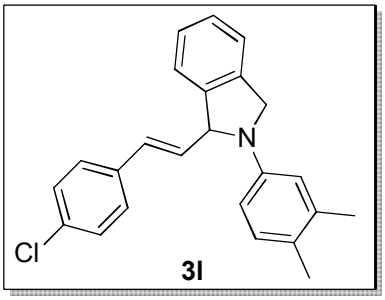
(E)-5-bromo-2-(3,4-dimethylphenyl)-1-styrylisoindoline 3i: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.45(s, 1H), 7.39-7.34(m, 3H), 7.29-7.25(m, 2H), 7.22-7.18(m, 1H), 7.09(d, *J* =8.0Hz, 1H), 6.99(d, *J* =8.4Hz, 1H), 6.79(d, *J* =16.0Hz, 1H), 6.62(s, 1H), 6.58(d, *J* =8.4Hz, 1H), 6.19-6.13(m, 1H), 5.37(dd, *J* =7.6Hz, *J* =2.0Hz, 1H), 4.83-4.79(m, 1H), 4.52(d, *J* =13.6Hz, 1H), 2.23(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.1, 140.0, 139.4, 137.2, 136.5, 131.6, 131.0, 130.4, 130.3, 128.5, 127.7, 126.5, 125.7, 124.9, 124.8, 121.4, 114.3, 110.3, 66.9, 54.2, 20.3, 18.6; HRMS (ESI) m/z: calcd for $C_{24}H_{22}NBr$: M+H=404.1008; found: 404.1014.



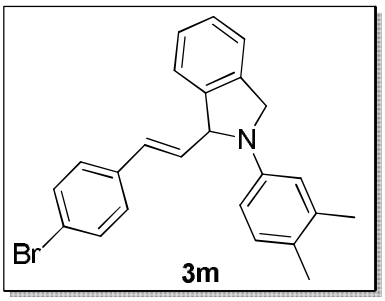
(E)-2-(3,4-dimethylphenyl)-5-methyl-1-styrylisoindoline 3j: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.34(d, *J* =7.6Hz, 2H), 7.24(t, *J* =7.6Hz, 2H), 7.17(d, *J* =6.8Hz, 1H), 7.11(d, *J* =5.2Hz, 2H), 7.05(d, *J* =7.6Hz, 1H), 6.98(d, *J* =8.0Hz, 1H), 6.78(d, *J* =16.0Hz, 1H), 6.64(s, 1H), 6.60(d, *J* =8.0Hz, 1H), 6.22-6.16(m, 1H), 5.39(d, *J* =7.6Hz, 1H), 4.80(d, *J* =13.2Hz, 1H), 4.51(d, *J* =13.2Hz, 1H), 2.35(s, 3H), 2.23(s, 3H), 2.15(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.5, 138.0, 137.3, 137.2, 137.1, 136.8, 132.5, 130.4, 130.2, 128.4, 128.1, 127.4, 126.5, 124.3, 123.1, 123.0, 114.2, 110.2, 67.0, 54.5, 21.3, 20.4, 18.6; HRMS (ESI) m/z: calcd for $C_{25}H_{25}N$: M+H=340.2060; found: 340.2055.



(E)-2-(3,4-dimethylphenyl)-5-methoxy-1-styrylisoindoline 3k: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.34(d, *J* =7.6Hz, 2H), 7.27-7.23(m, 2H), 7.18(d, *J* =6.8Hz, 1H), 7.12(d, *J* =8.4Hz, 1H), 6.98(d, *J* =8.4Hz, 1H), 6.84(d, *J* =1.6Hz, 1H), 6.82-6.76(m, 2H), 6.63(d, *J* =2.4Hz, 1H), 6.61-6.58(m, 1H), 6.21-6.15(m, 1H), 5.37(dd, *J* =7.6Hz, *J* =2.4Hz, 1H), 4.83-4.79(m, 1H), 4.52(d, *J* =13.2Hz, 1H), 3.78(s, 3H), 2.23(s, 3H), 2.15(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 159.6, 145.5, 138.5, 137.1, 136.8, 133.0, 132.6, 130.3, 130.2, 128.4, 127.4, 126.5, 124.3, 124.1, 114.2, 113.5, 110.2, 107.6, 66.8, 55.4, 54.7, 20.3, 18.5; HRMS (ESI) m/z: calcd for $C_{25}H_{25}NO$: M+H=356.2009; found: 356.2004.

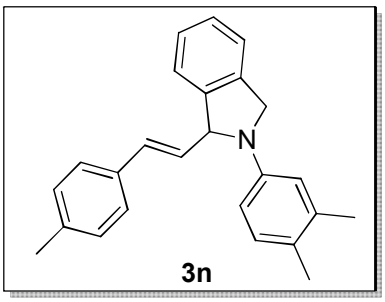


(E)-1-(4-chlorostyryl)-2-(3,4-dimethylphenyl)isoindoline 3l: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.32-7.20(m, 8H), 7.01(d, *J* =6.0Hz, 1H), 6.74(d, *J* =16.0Hz, 1H), 6.63(s, 1H), 6.58(d, *J* =8.0Hz, 1H), 6.22-6.16(m, 1H), 5.44(d, *J* =7.2Hz, 1H), 4.85(d, *J* =13.2Hz, 1H), 4.57(d, *J* =12.8Hz, 1H), 2.24(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.4, 140.7, 137.2, 137.1, 135.2, 133.1, 132.8, 130.3, 129.3, 128.6, 127.7, 127.6, 127.3, 124.5, 123.2, 122.5, 114.3, 110.2, 67.1, 54.6, 20.4, 18.6; HRMS (ESI) m/z: calcd for $C_{24}H_{22}NCl$: M+H=360.1514; found: 360.1509.



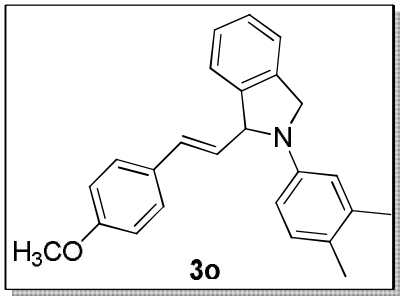
3m

(E)-1-(4-bromostyryl)-2-(3,4-dimethylphenyl)isoindoline 3m: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.36(d, *J* =8.4Hz, 2H), 7.33-7.25(m, 3H), 7.24-7.18(m, 3H), 7.00(d, *J* =8.4 Hz, 1H), 6.72(d, *J* =16.0Hz, 1H), 6.63(d, *J* =2.4Hz, 1H), 6.59-6.56(m, 1H), 6.20(dd, *J* =16.0Hz, *J* =7.6Hz, 1H), 5.43(dd, *J* =7.2Hz, *J* =2.4Hz, 1H), 4.84(dd, *J* =13.2Hz, *J* =3.2Hz, 1H), 4.56(d, *J* =13.2Hz, 1H), 2.23(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.3, 140.6, 137.2, 137.1, 135.6, 133.0, 131.5, 130.2, 129.4, 128.0, 127.6, 127.2, 124.5, 123.2, 122.5, 121.2, 114.2, 110,2, 67.0, 54.6, 20.3, 18.6; HRMS (ESI) m/z: calcd for $C_{24}H_{22}NBr$: M+H=404.1008; found: 404.1013.

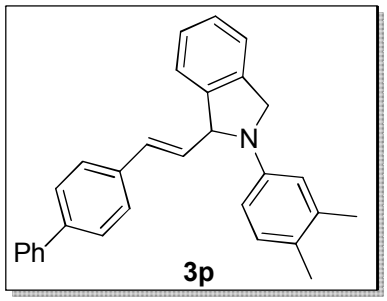


3n

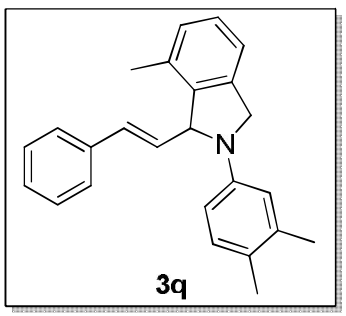
(E)-2-(3,4-dimethylphenyl)-1-(4-methylstyryl)isoindoline 3n: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.30-7.24(m, 6H), 7.07(d, *J* =2.0Hz, 2H), 7.01-6.98(m, 1H), 6.78(dd, *J* =16.0Hz, *J* =3.2Hz, 1H), 6.66(s, 1H), 6.62(s, 1H), 6.19-6.12(m, 1H), 5.43(s, 1H), 4.84(d, *J* =13.2Hz, 1H), 4.55(d, *J* =12.8Hz, 1H), 2.28(s, 3H), 2.22(s, 3H), 2.15(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.5, 141.0, 137.2, 137.1, 137.0, 133.9, 131.2, 130.5, 130.2, 129.1, 127.4, 127.2, 126.4, 124.3, 123.3, 122.4, 114.3, 110.2, 67.3, 54.6, 21.1, 20.3, 18.5; HRMS (ESI) m/z: calcd for $C_{25}H_{25}N$: M+H=340.2060; found: 340.2055.



(E)-2-(3,4-dimethylphenyl)-1-(4-methoxystyryl)isoindoline 3o: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.33-7.24(m, 6H), 6.99(d, *J* =8.4Hz, 1H), 6.80(d, *J* =8.8Hz, 2H), 6.74(d, *J* =15.6Hz, 1H), 6.65(s, 1H), 6.61(dd, *J* =8.4Hz, *J* =2.4Hz, 1H), 6.09-6.03(m, 1H), 5.43(dd, *J* =7.6Hz, *J* =2.4Hz, 1H), 4.84(dd, *J* =13.2Hz, *J* =3.2Hz, 1H), 4.55(d, *J* =13.2Hz, 1H), 3.74(s, 3H), 2.23(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 159.1, 145.5, 141.2, 137.1, 137.0, 130.2, 130.1, 130.0, 129.5, 127.6, 127.4, 127.2, 124.3, 123.4, 122.4, 114.3, 113.9, 110.3, 67.4, 55.2, 54.6, 20.3, 18.6; HRMS (ESI) m/z: calcd for $C_{25}H_{25}NO$: M+H=356.2009; found: 356.2004.

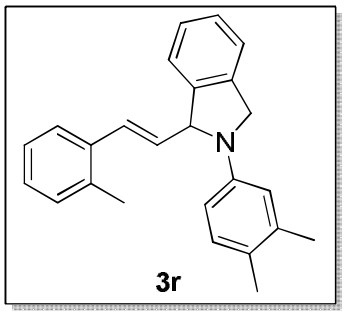


(E)-1-(2-([1,1'-biphenyl]-4-yl)vinyl)-2-(3,4-dimethylphenyl)isoindoline 3p: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.55(d, *J* =7.6Hz, 2H), 7.51(d, *J* =8.0Hz, 2H), 7.44-7.38(m, 4H), 7.34-7.27(m, 5H), 7.01(d, *J* =8.0Hz, 1H), 6.85(d, *J* =16.0Hz, 1H), 6.67(s, 1H), 6.63(d, *J* =8.4Hz, 1H), 6.26(dd, *J* =16.0Hz, *J* =7.6Hz, 1H), 5.48(d, *J* =6.0Hz, 1H), 4.87(dd, *J* =13.2Hz, *J* =2.8Hz, 1H), 4.58(d, *J* =12.8Hz, 1H), 2.24(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.5, 140.9, 140.7, 140.3, 137.2, 135.8, 132.4, 130.3, 130.1, 128.8, 128.7, 127.5, 127.2, 127.1, 126.9, 126.8, 124.5, 123.4, 122.5, 114.3, 110.2, 67.3, 54.7, 20.4, 18.6; HRMS (ESI) m/z: calcd for $C_{30}H_{27}N$: M+H=402.2216; found: 402.2221.

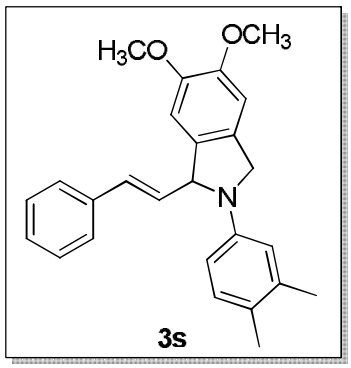


(E)-2-(3,4-dimethylphenyl)-7-methyl-1-styrylisoindoline 3q: yellow liquid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.31(d, *J* =8.0Hz, 2H), 7.26-7.15(m, 5H), 7.04(d, *J* =6.8Hz, 1H), 7.00(d, *J* =8.0Hz, 1H), 6.74(d, *J*=16.0Hz, 1H), 6.61(s, 1H), 6.57(d, *J*

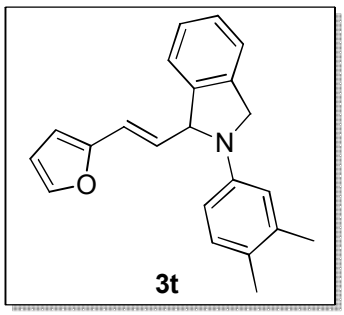
=8.4Hz, 1H), 6.06-6.00(m, 1H), 5.58-5.55(m, 1H), 4.83-4.79(m, 1H), 4.62(d, *J* =13.2Hz, 1H), 2.34(s, 3H), 2.24(s, 3H), 2.15(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 144.5, 139.2, 137.4, 137.1, 136.6, 133.3, 132.3, 130.2, 128.8, 128.7, 128.4, 127.8, 127.5, 126.5, 124.0, 120.0, 114.0, 109.9, 65.9, 53.8, 20.4, 18.9, 18.6; HRMS (ESI) m/z: calcd for $C_{25}H_{25}N$: M+H=340.2060; found: 340.2055.



(E)-2-(3,4-dimethylphenyl)-1-(2-methylstyryl)isoindoline 3r: yellow liquid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.34-7.30(m, 2H), 7.29-7.23(m, 3H), 7.12-7.10(m, 2H), 7.08-7.07(m, 2H), 7.03-7.00(m, 1H), 6.69(d, *J* =2.4Hz, 1H), 6.62(dd, *J* =8.0Hz, *J* =2.4Hz, 1H), 6.01(dd, *J* =15.6Hz, *J* =8.0Hz, 1H), 5.49-5.46(m, 1H), 4.84(dd, *J* =13.2Hz, *J* =3.2Hz, 1H), 4.55(d, *J* =12.8Hz, 1H), 2.40(s, 3H), 2.24(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.4, 140.9, 137.2, 137.0, 136.0, 135.2, 133.7, 130.2, 130.1, 128.9, 127.5, 127.4, 127.2, 126.0, 124.3, 123.3, 122.5, 114.3, 110.3, 67.6, 54.5, 20.3, 19.9, 18.6; HRMS (ESI) m/z: calcd for $C_{25}H_{25}N$: M+H=340.2060; found: 340.2055.

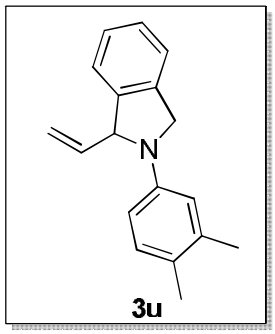


(E)-2-(3,4-dimethylphenyl)-5,6-dimethoxy-1-styrylisoindoline 3s: yellow solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.37(d, *J* =7.6Hz, 2H), 7.27(t, *J* =7.6Hz, 2H), 7.21-7.17(m, 1H), 6.99(d, *J* =8.4Hz, 1H), 6.80(d, *J* =15.6Hz, 2H), 6.71(s, 1H), 6.63(s, 1H), 6.59(d, *J* =8.4Hz, 1H), 6.18(dd, *J* =16.0Hz, *J* =8.0Hz, 1H), 5.38(d, *J* =5.6Hz, 1H), 4.79(dd, *J* =12.4Hz, *J* =3.2Hz, 1H), 4.50(d, *J* =12.8Hz, 1H), 3.88(s, 3H), 3.83(s, 3H), 2.23(s, 3H), 2.16(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 149.2, 148.9, 145.5, 137.0, 136.7, 132.5, 132.3, 130.6, 130.1, 128.7, 128.4, 127.4, 126.5, 124.2, 114.1, 110.0, 106.1, 105.4, 67.5, 56.1, 56.0, 54.6, 20.3, 18.5; HRMS (ESI) m/z: calcd for $C_{26}H_{27}NO_2$: M+H=386.2115; found: 386.2121.



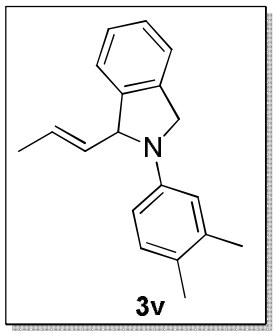
3t

(E)-2-(3,4-dimethylphenyl)-1-(2-(furan-2-yl)vinyl)-7-methylisoindoline 3t: yellow liquid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.36-7.26(m, 5H), 7.01(d, *J* =8.0Hz, 1H), 6.62(s, 1H), 6.59-6.55(m, 2H), 6.31(d, *J* =1.6Hz, 1H), 6.25-6.20(m, 2H), 5.42(d, *J* =6.4Hz, 1H), 4.84(d, *J* =13.2Hz, 1H), 4.57(d, *J* =12.8Hz, 1H), 2.24(s, 3H), 2.17(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 152.4, 145.3, 141.7, 140.9, 137.1, 137.0, 130.3, 130.2, 127.5, 127.2, 124.4, 123.2, 122.5, 118.8, 114.2, 111.2, 110.2, 107.8, 66.6, 54.6, 20.3, 18.6; HRMS (ESI) m/z: calcd for $C_{22}H_{21}NO$: M+H=316.1696; found: 316.1701.



3u

2-(3,4-dimethylphenyl)-1-vinylisoindoline 3u: colorless liquid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.32-7.26(m, 3H), 7.23-7.20(m, 1H), 7.01(d, *J* =8.4Hz, 1H), 6.61(d, *J* =2.4 Hz, 1H), 6.57-6.55(m, 1H), 5.88-5.79(m, 1H), 5.46(d, *J* =17.2Hz, 1H), 5.30(dd, *J* =7.2Hz, *J* =2.8Hz, 1H), 5.23(d, *J* =10.0Hz, 1H), 4.80(dd, *J* =13.2Hz, *J* =3.2Hz, 1H), 4.54(d, *J* =12.8Hz, 1H), 2.25(s, 3H), 2.18(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.4, 140.9, 140.2, 137.1, 137.0, 130.2, 127.4, 127.2, 124.4, 123.1, 122.4, 115.6, 114.3, 110.2, 67.7, 54.6, 20.3, 18.6; HRMS (ESI) m/z: calcd for $C_{18}H_{19}N$: M+H=250.1590; found: 250.1587.



3v

(E)-2-(3,4-dimethylphenyl)-1-(prop-1-en-1-yl)isoindoline: yellow liquid; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.30-7.25(m, 3H), 7.21-7.18(m, 1H), 7.01(d, *J* =8.0Hz, 1H), 6.61(s, 1H), 6.57-6.55(m, 1H), 5.94-5.85(m, 1H), 5.48-5.42(m, 1H), 5.27-5.25(m, 1H),

4.80-4.76(m, 1H), 4.51(d, J =13.2Hz, 1H), 2.25(s, 3H), 2.18(s, 3H), 1.70(dd, J =6.4 Hz, J =1.2Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.4, 141.6, 140.0, 133.1, 130.1, 127.2, 127.0, 126.7, 124.1, 123.1, 122.3, 114.2, 110.2, 66.8, 54.4, 20.3, 18.5, 17.6; HRMS (ESI) m/z: calcd for $C_{19}H_{21}N$: M+H=264.1747; found: 264.1744.

7. References.

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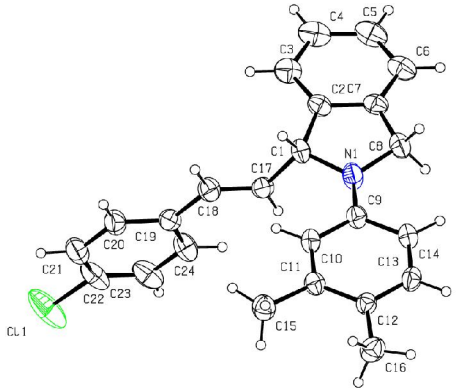
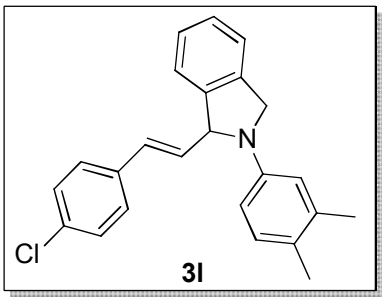
8. The crystal structure of product 3l.





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Bond precision: C-C = 0.0060 A Wavelength=0.71070

Cell: a=30.0639(18) b=6.1724(3) c=21.5055(16)
alpha=90 beta=104.784(6) gamma=90

Temperature: 290 K

	Calculated	Reported
Volume	3858.6(4)	3858.6(4)
Space group	I 2	I 1 2 1
Hall group	I 2y	I 2y
Moiety formula	C24 H22 Cl N	2(C24 H22 Cl N)
Sum formula	C24 H22 Cl N	C48 H44 Cl2 N2
Mr	359.88	719.75
Dx,g cm-3	1.239	1.239
Z	8	4
Mu (mm-1)	0.205	0.205
F000	1520.0	1520.0
F000'	1521.67	
h,k,lmax	40,8,28	37,8,28
Nref	5339[9793]	6911
Tmin,Tmax	0.943,0.970	0.979,1.000
Tmin'	0.919	

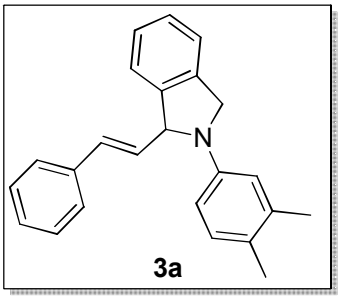
Correction method= MULTI-SCAN

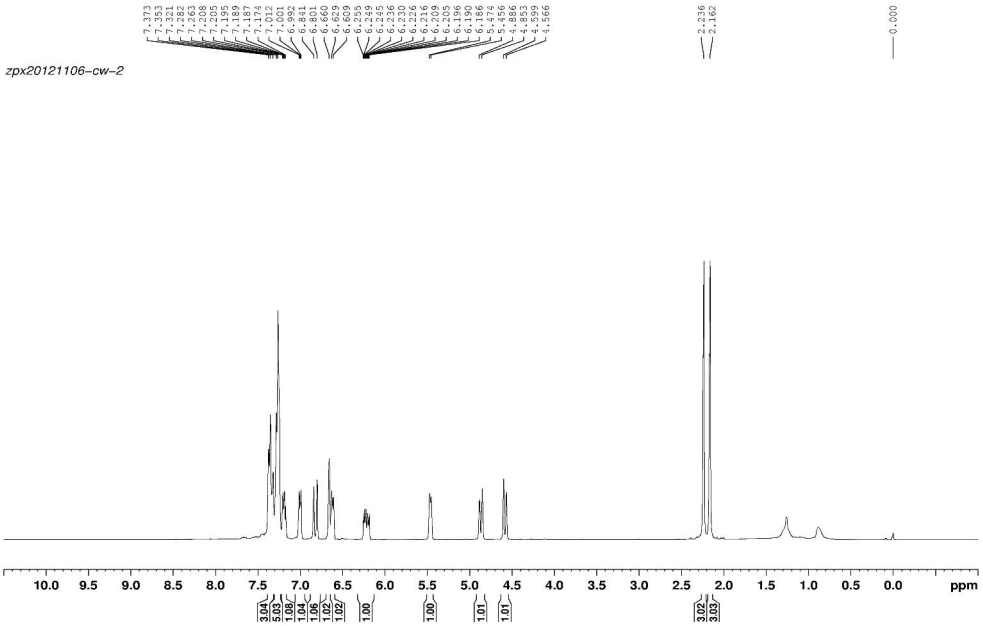
Data completeness= 1.29/0.71 Theta(max)= 28.520

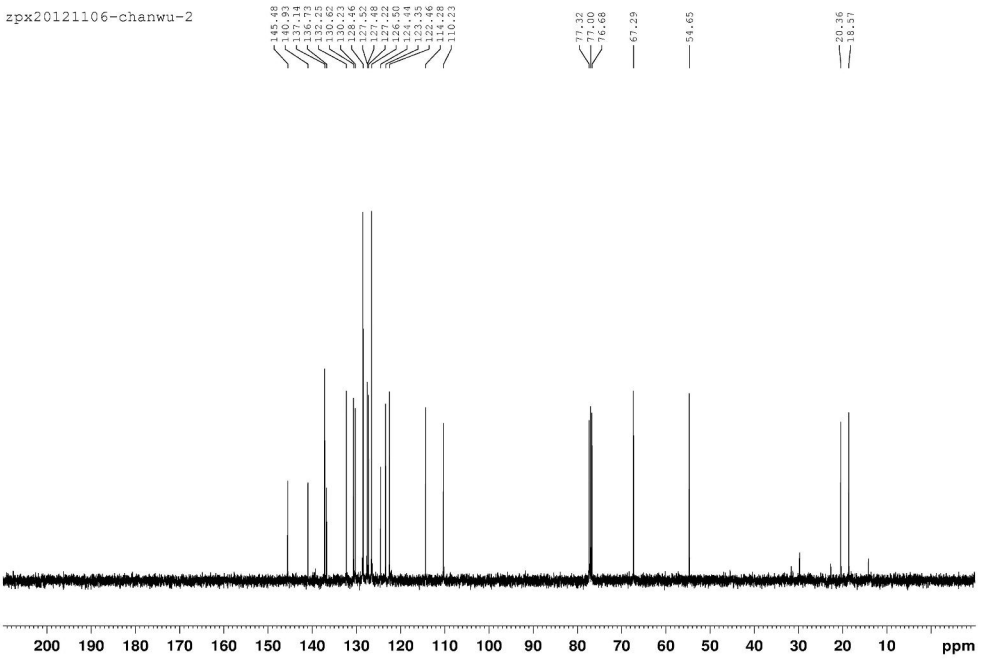
R(reflections)= 0.0587(4460) wR2(reflections)= 0.1294(6911)

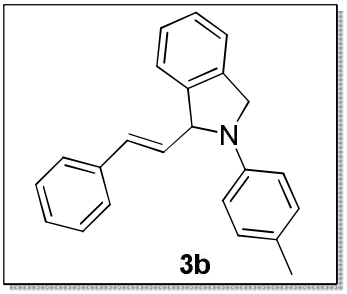
S = 1.070 Npar= 473

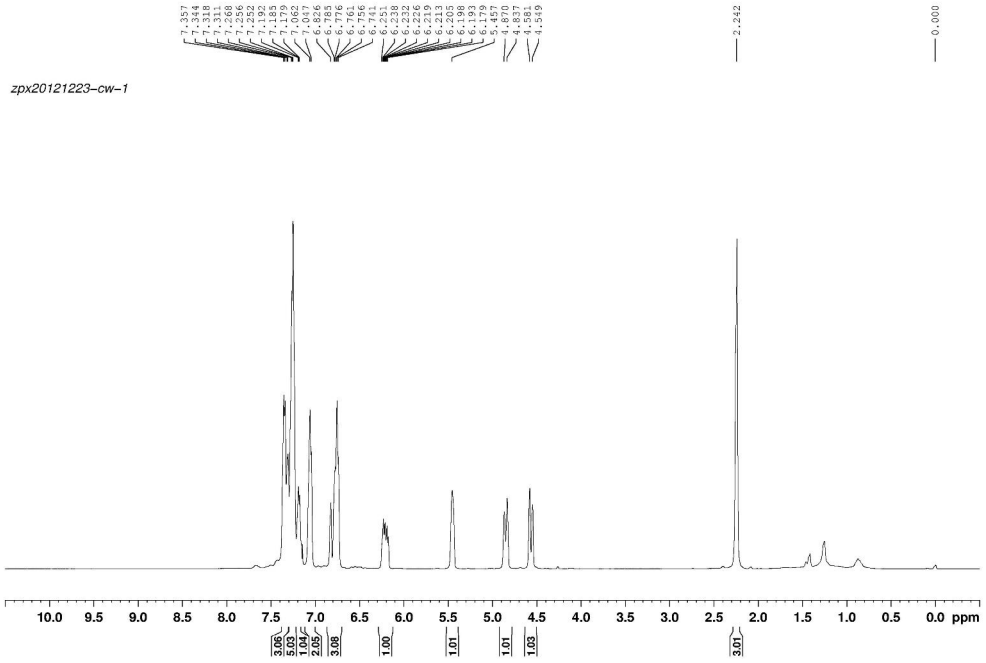
9. ^{1}H and ^{13}C NMR spectra for compound 3


N
3a


zpx20121106-cw-2
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 ppm


zpx20121106-chanwu-2
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm


N
3b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7.344
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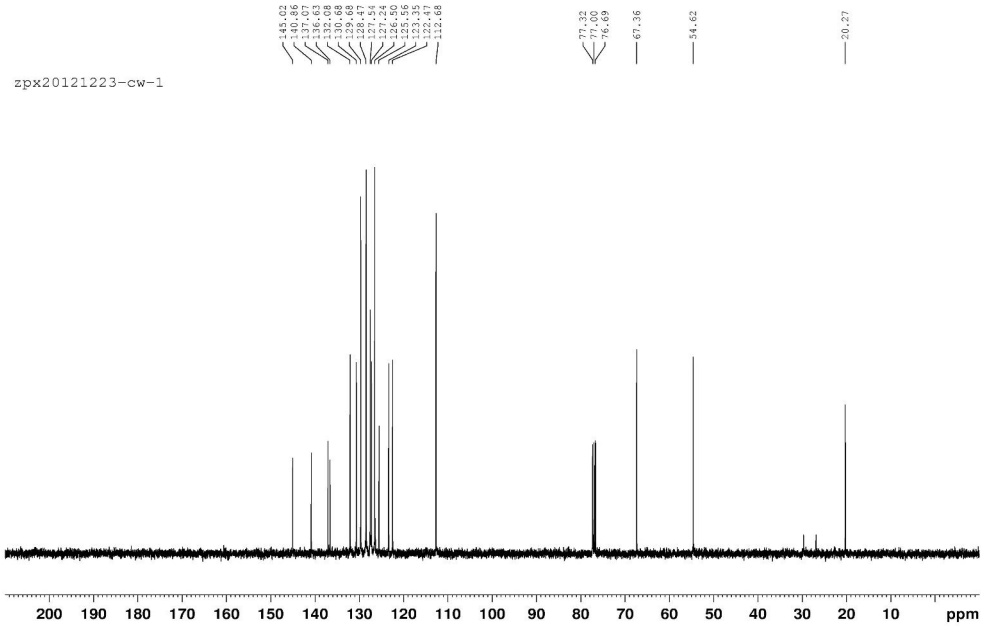
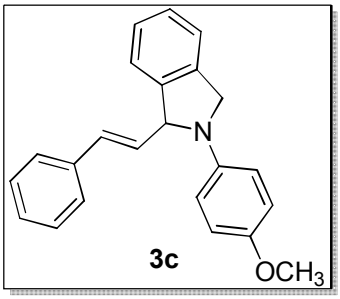
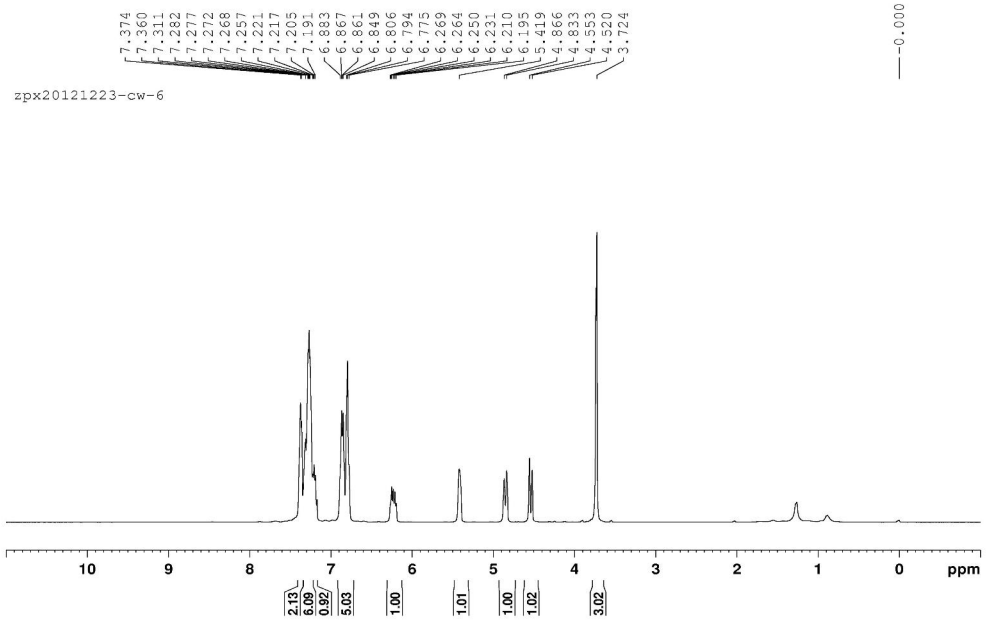
7.311
7.268
7.256
7.252
7.192
7.185
7.139
7.062
7.047
6.826
6.785
6.776
6.761
6.756
6.741
6.231
6.228
6.232
6.226
6.219
6.213
6.205
6.198
6.193
6.179
6.167
4.870
4.837
4.581
4.549
2.242
0.000
zpx20121223-cw-1
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm
3.06
5.03
1.04
2.05
3.08
1.00
1.01
1.01
1.03
3.01


145.02
140.86
137.67
136.63
135.68
130.68
129.68
128.47
127.54
127.24
126.50
125.56
123.35
122.77
112.68
77.32
77.00
76.69
67.36
54.62
20.27
zpx20121223-cw-1
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm


N
3c
OCH3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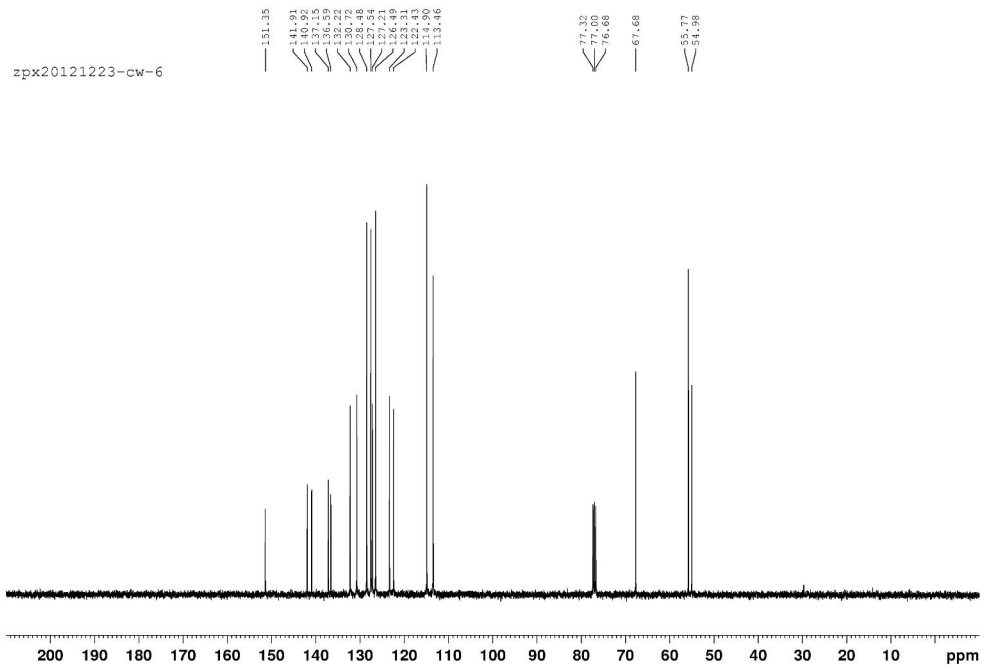
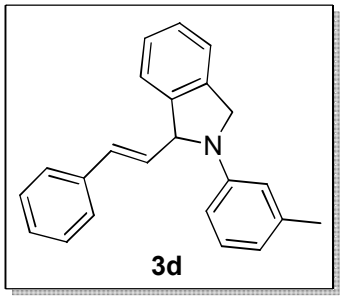
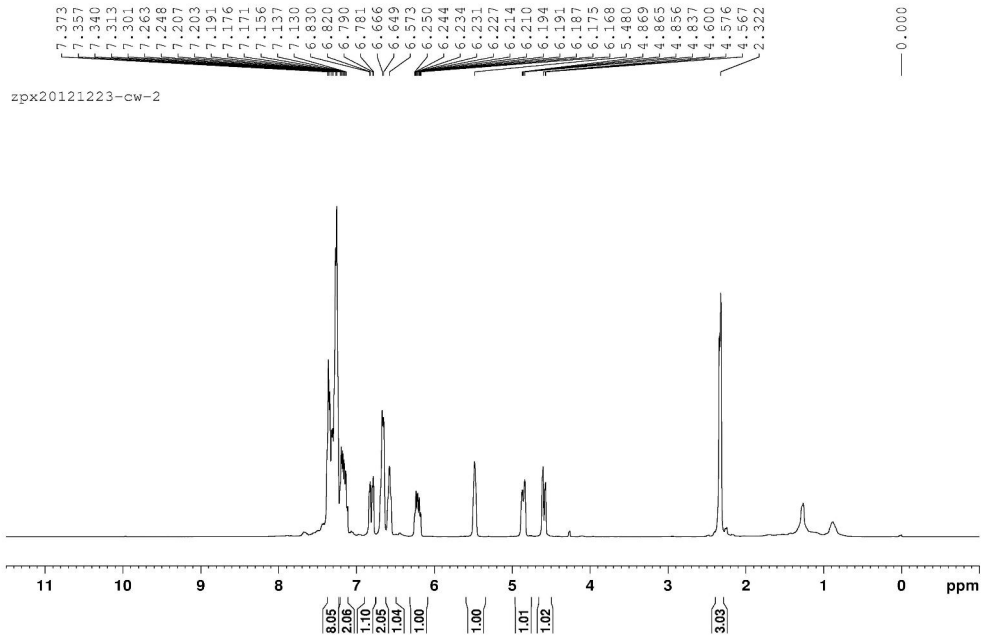
7.360
7.311
7.282
7.277
7.272
7.268
7.257
7.221
7.217
7.205
7.191
6.883
6.867
6.861
6.849
6.806
6.794
6.775
6.269
6.264
6.250
6.231
6.210
6.195
5.419
4.866
4.833
4.553
4.520
3.724
-0.000
zpx20121223-cw-6
10
9
8
7
6
5
4
3
2
1
0
ppm
2.13
6.09
0.92
5.03
1.00
1.01
1.00
1.02
3.02


151.35
141.91
140.92
137.15
136.59
132.22
130.72
128.48
127.54
127.21
126.49
123.31
122.43
114.90
113.46
77.32
77.00
76.68
67.68
55.77
54.98
zpx20121223-cw-6
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm


N
3d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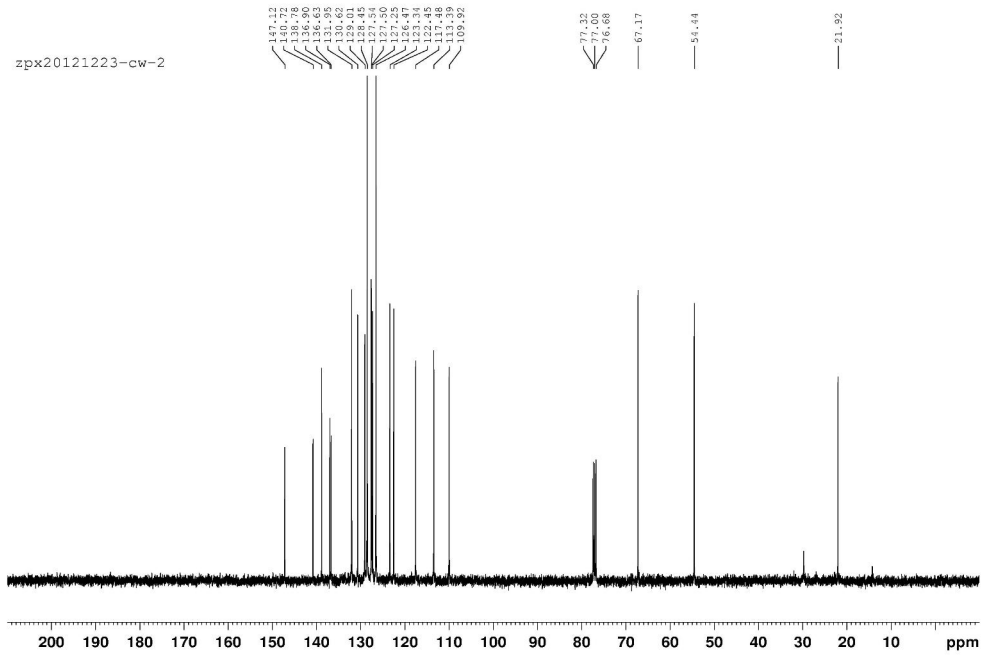
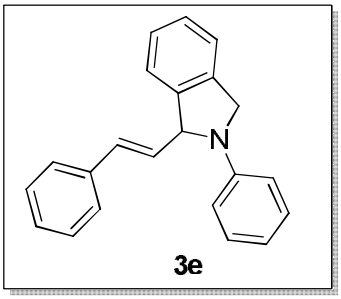
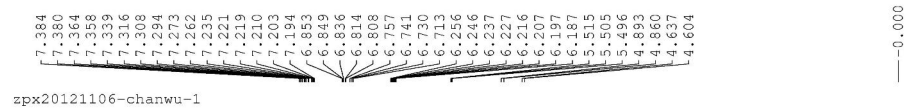
7.357
7.340
7.313
7.301
7.263
7.248
7.207
7.203
7.191
7.176
7.171
7.156
7.137
7.130
6.830
6.820
6.790
6.781
6.666
6.649
6.573
6.250
6.244
6.234
6.231
6.227
6.214
6.210
6.194
6.191
6.187
6.175
6.168
5.480
4.869
4.865
4.856
4.837
4.600
4.576
4.567
2.322
0.000
zpx20121223-cw-2
11 10 9 8 7 6 5 4 3 2 1 0 ppm
8.05
2.06
1.10
2.05
1.04
1.00
1.00
1.01
1.02
3.03


147.12
140.72
138.78
136.90
136.63
135.05
130.62
129.01
128.45
127.56
127.30
127.25
126.47
123.34
122.45
117.48
113.39
109.92
77.32
77.00
76.68
67.17
54.44
21.92
zpx20121223-cw-2
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm


N
3e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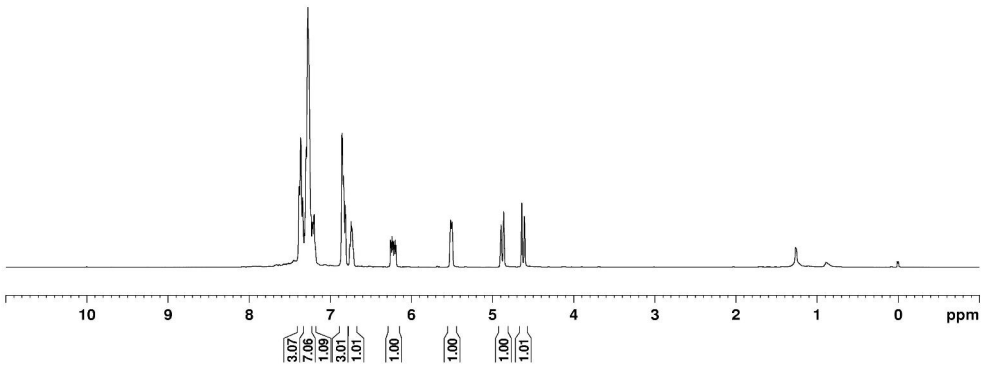
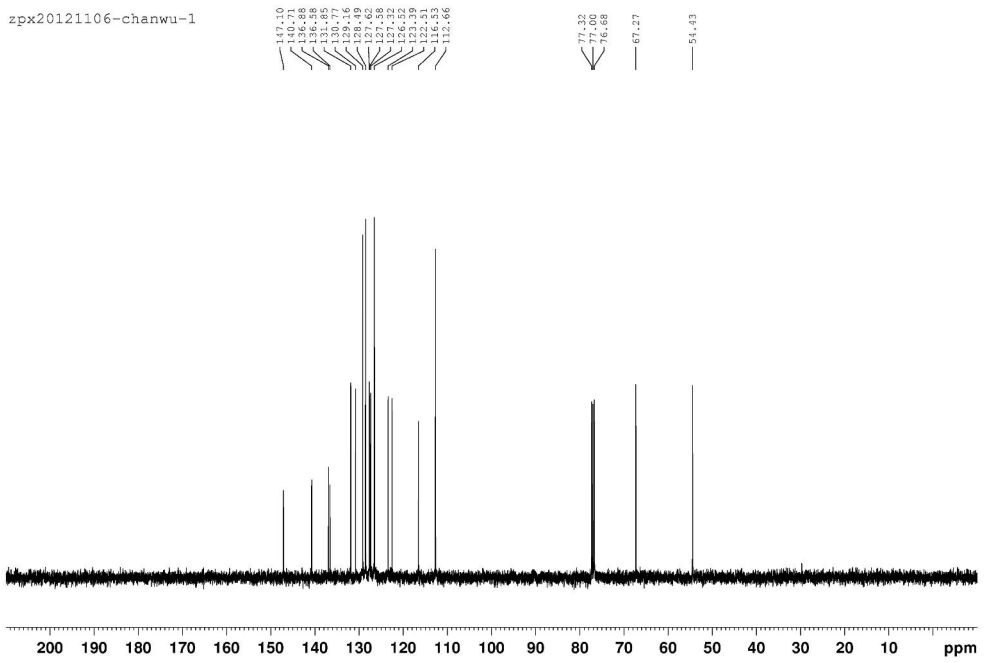
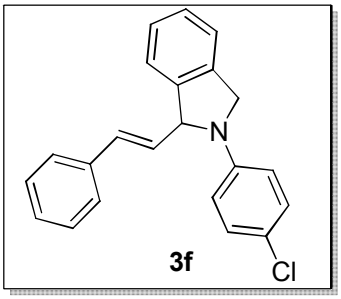
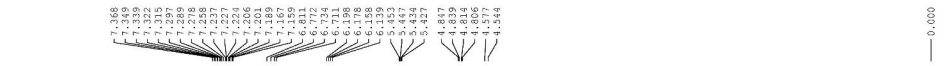
7.380
7.364
7.358
7.339
7.316
7.308
7.294
7.273
7.262
7.235
7.221
7.219
7.210
7.203
7.194
6.853
6.849
6.836
6.814
6.808
6.757
6.741
6.730
6.713
6.256
6.246
6.237
6.227
6.216
6.207
6.197
6.187
5.515
5.505
5.496
4.893
4.860
4.637
4.604
0.000
zpx20121106-chanwu-1

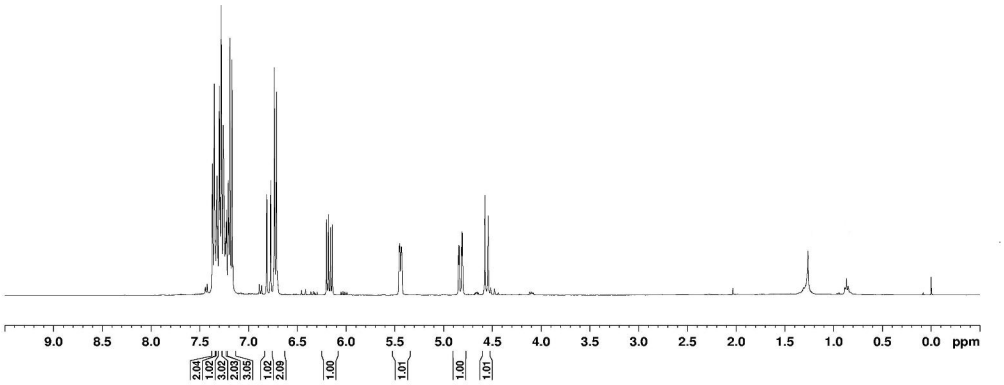

10
9
8
7
6
5
4
3
2
1
0
ppm
3.07
7.06
1.09
3.01
1.01
1.00
1.00
1.00
1.01


zpx20121106-chanwu-1
147.10
140.71
136.88
136.58
131.85
130.77
129.16
128.49
127.62
127.58
127.32
126.52
123.39
122.51
116.53
112.66
77.32
77.00
76.68
67.27
54.43
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

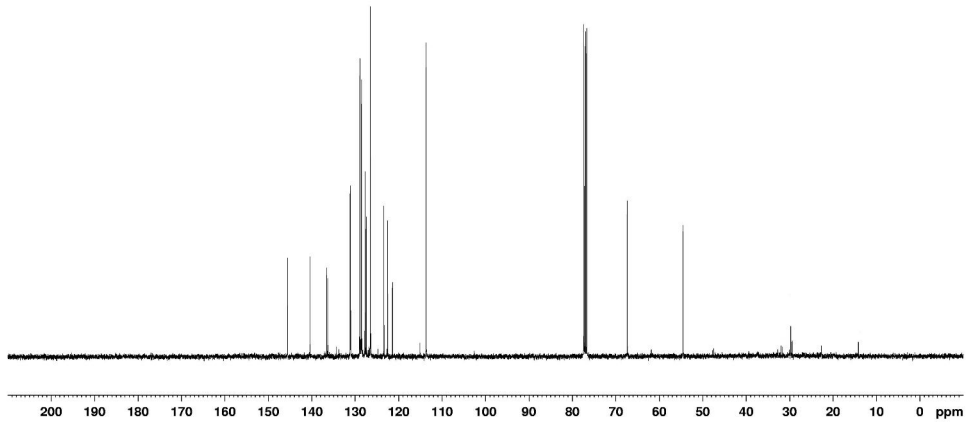


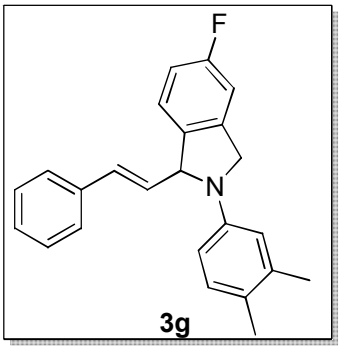


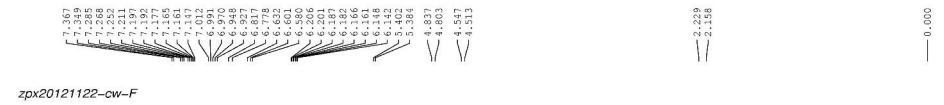
zpx20121230-1-cw



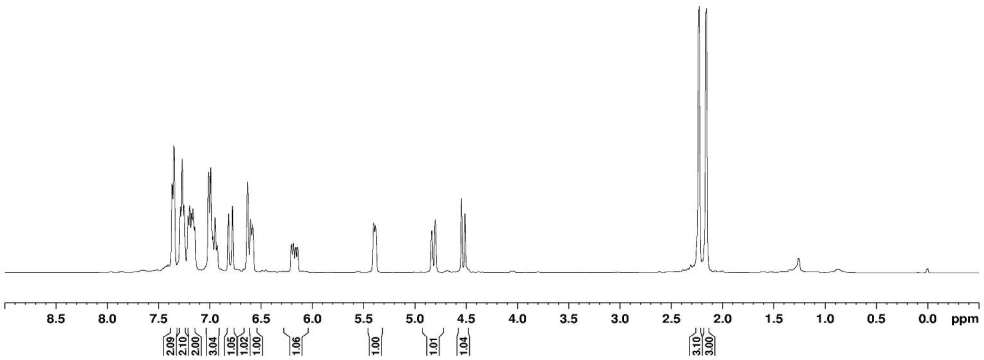
zpx20121230-1-cw

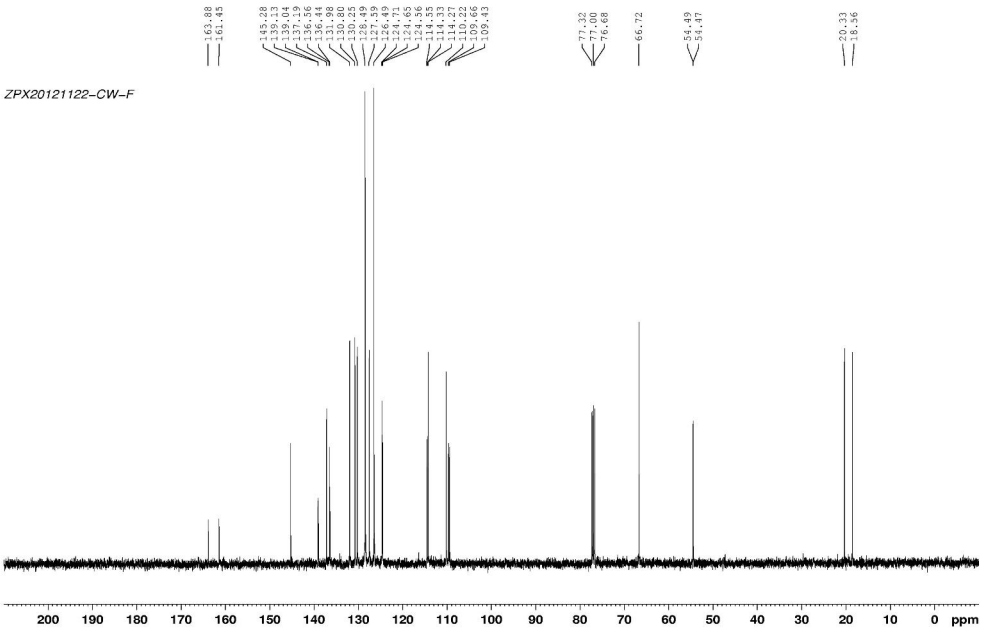




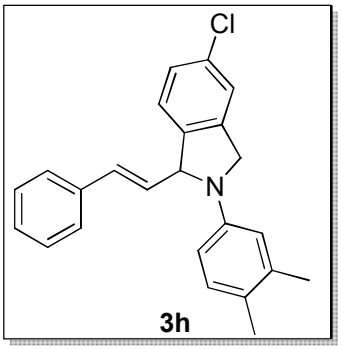


zpx20121122-cw-F

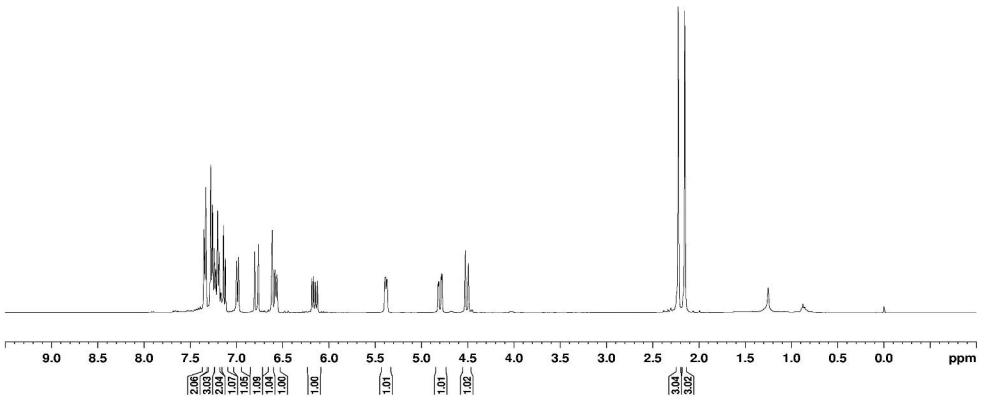


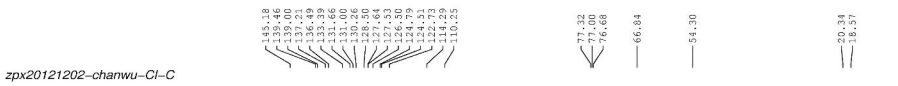


ZPX20121122-CW-F

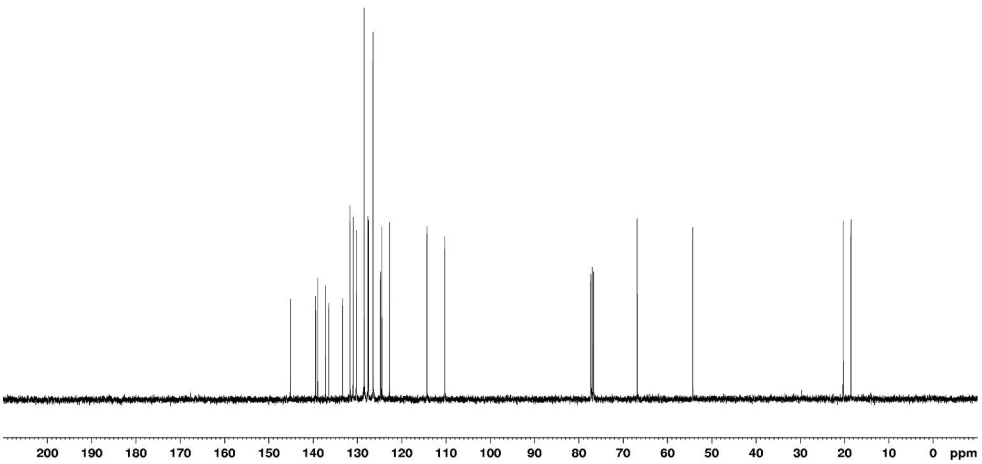


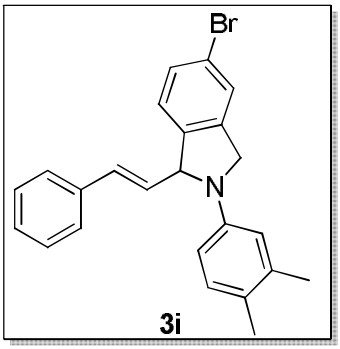
zpx20121202-chanwu-Cl

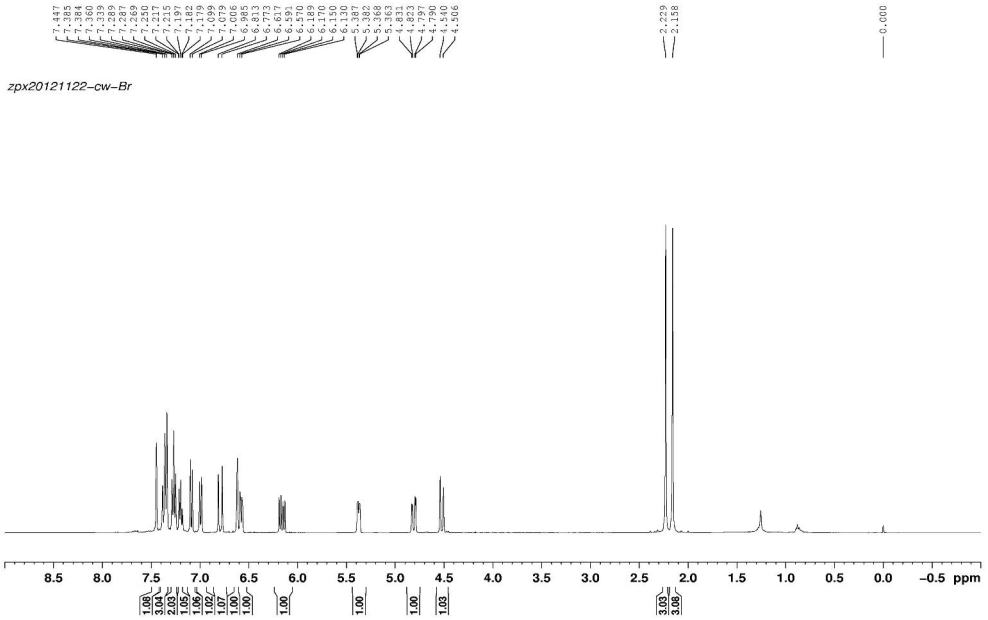




zpx20121202-chanwu-Cl-C




Br
N
3i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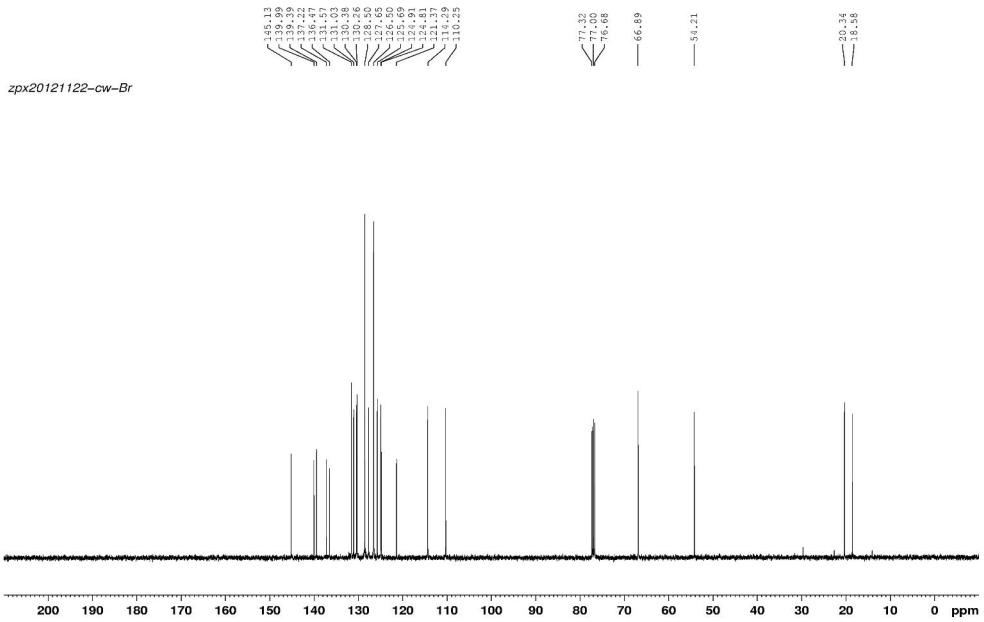
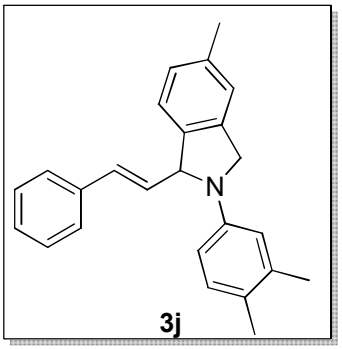
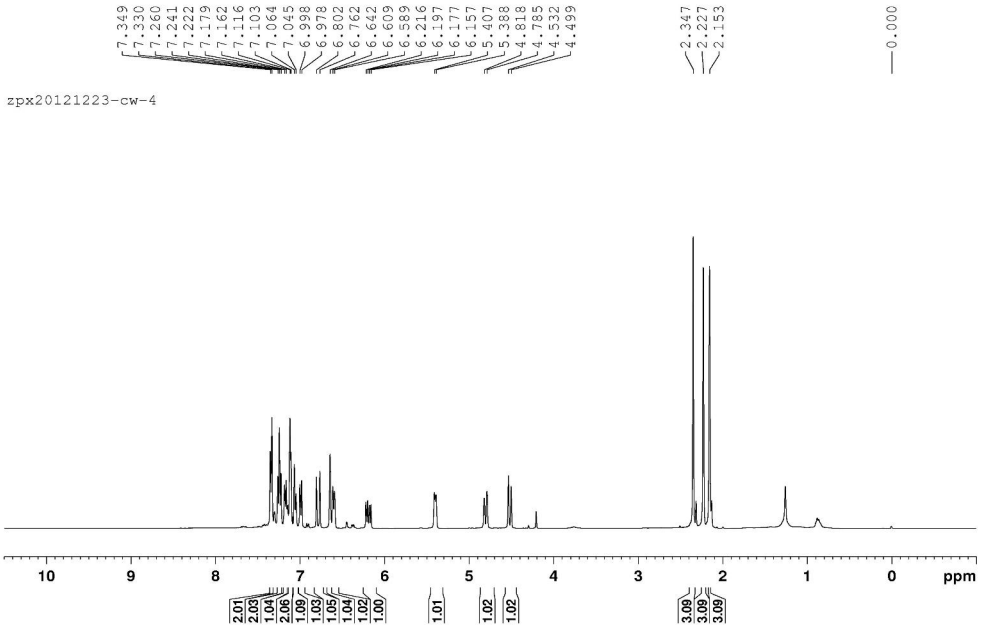
7.339
7.289
7.287
7.269
7.260
7.217
7.215
7.197
7.182
7.179
7.099
7.079
7.006
6.855
6.813
6.773
6.617
6.591
6.570
6.189
6.170
6.130
6.110
5.387
5.382
5.368
5.363
4.831
4.823
4.797
4.790
4.540
4.506
2.229
2.158
0.000
zpx20121122-cw-Br
8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 ppm
1.00
3.04
2.03
1.05
1.05
1.02
1.07
1.00
1.00
1.00
1.00
1.03
3.03
3.08


145.13
139.99
139.39
138.22
136.47
131.57
131.03
130.38
130.26
128.50
127.65
126.50
125.69
124.91
124.81
121.37
114.29
110.25
77.32
77.00
76.68
66.89
54.21
20.34
18.98
zpx20121122-cw-Br
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm


N
3j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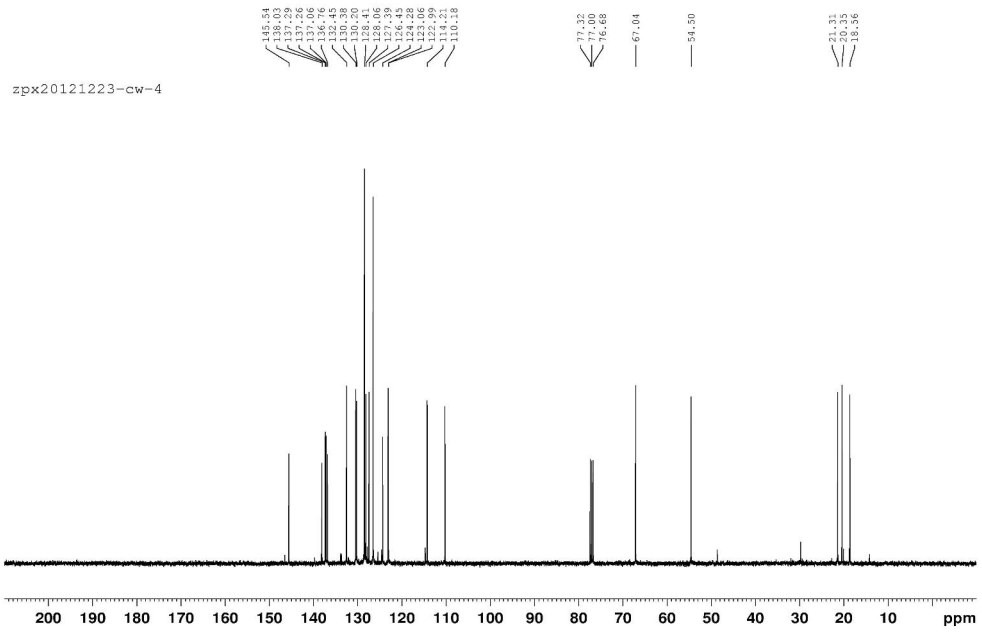
7.330
7.260
7.241
7.222
7.179
7.162
7.116
7.103
7.064
7.045
6.998
6.978
6.802
6.762
6.642
6.609
6.589
6.216
6.197
6.177
6.157
5.407
5.388
4.818
4.785
4.532
4.499
2.347
2.227
2.153
0.000
zpx20121223-cw-4
10
9
8
7
6
5
4
3
2
1
0
ppm
2.01
2.03
1.04
2.06
1.09
1.03
1.05
1.04
1.02
1.00
1.01
1.02
1.02
3.09
3.09
3.09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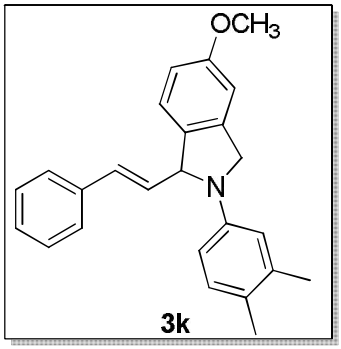
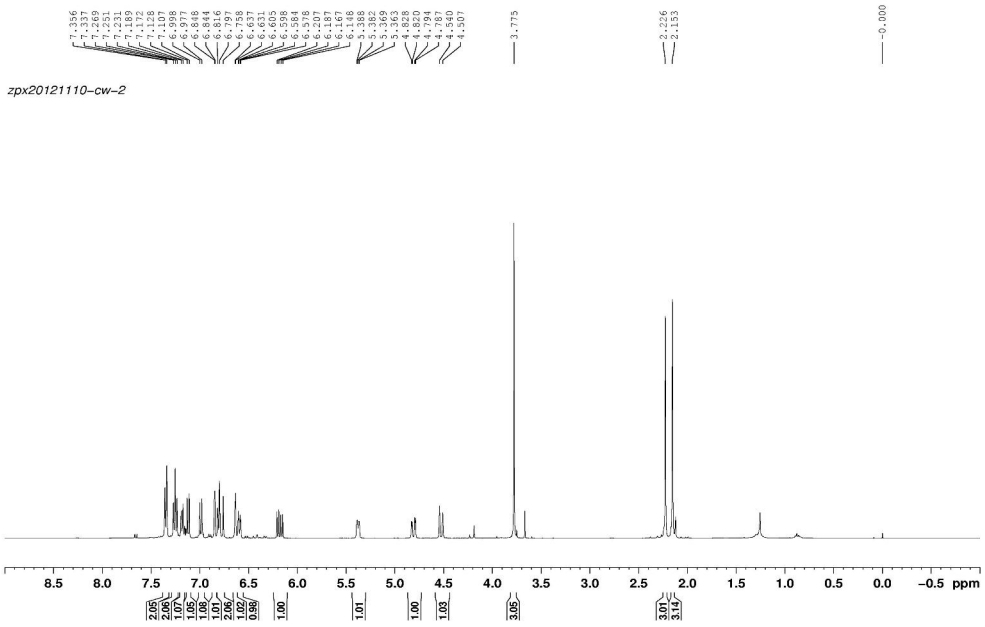
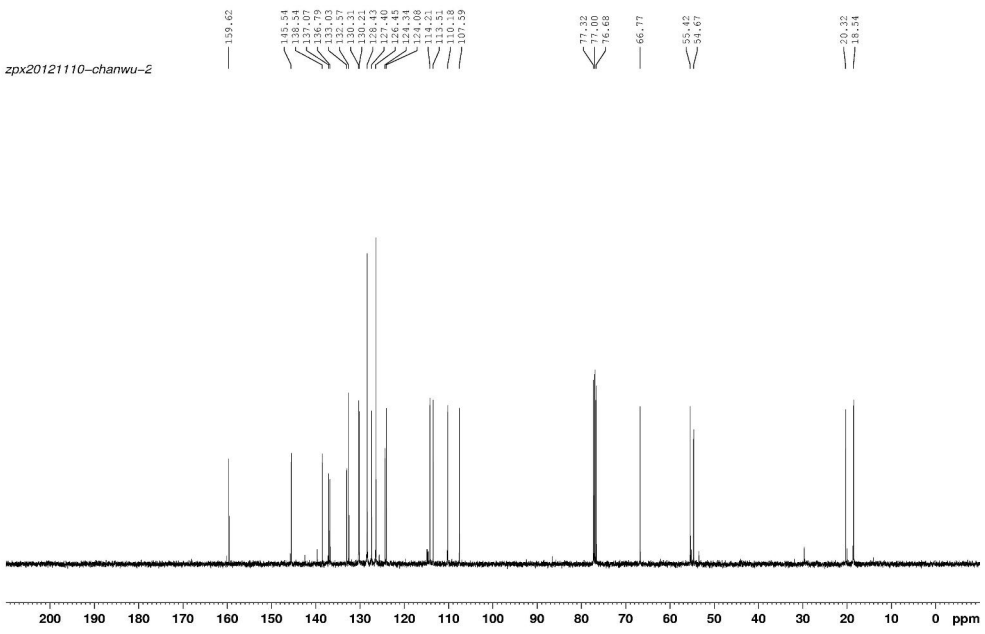
137.29
137.26
137.06
136.76
132.45
130.38
130.00
128.41
128.06
127.39
126.45
124.28
123.06
122.99
114.21
110.18
77.32
77.00
76.68
67.04
54.50
21.31
20.35
18.56
zpx20121223-cw-4
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm


OCH3
N
3k


7.356
7.337
7.269
7.251
7.231
7.189
7.172
7.138
7.117
6.998
6.977
6.846
6.844
6.816
6.797
6.758
6.637
6.631
6.605
6.598
6.584
6.578
6.287
6.187
6.167
6.148
5.388
5.382
5.369
5.363
4.828
4.820
4.794
4.787
4.540
4.507
3.775
2.226
2.153
0.000
zpx20121110-cw-2
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 -0.5 ppm
2.05
2.06
1.07
1.05
1.08
1.01
2.06
1.07
0.98
1.00
1.01
1.00
1.03
3.05
3.01
3.14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132.57
130.31
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128.43
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126.45
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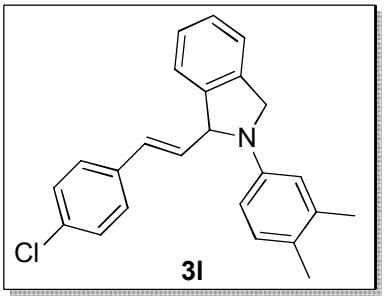
124.08
123.21
113.51
110.18
107.59
77.32
77.00
76.68
66.77
55.42
54.67
20.32
18.54
zpx20121110-chanwu-2
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm



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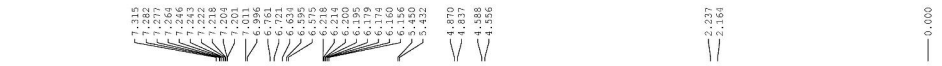

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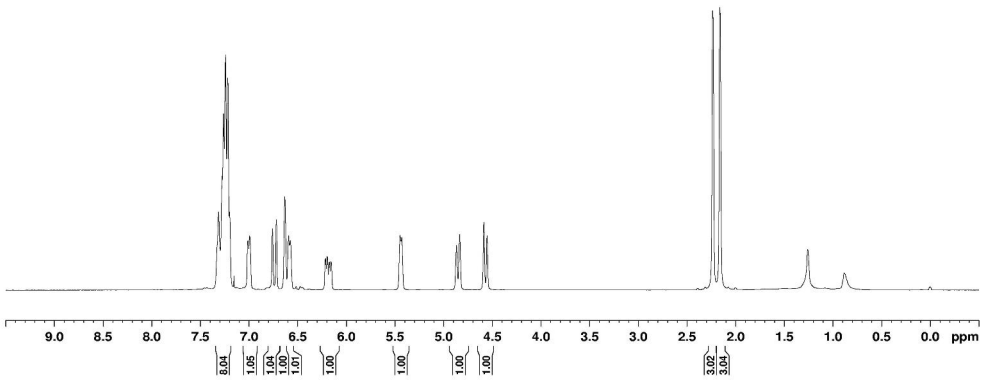

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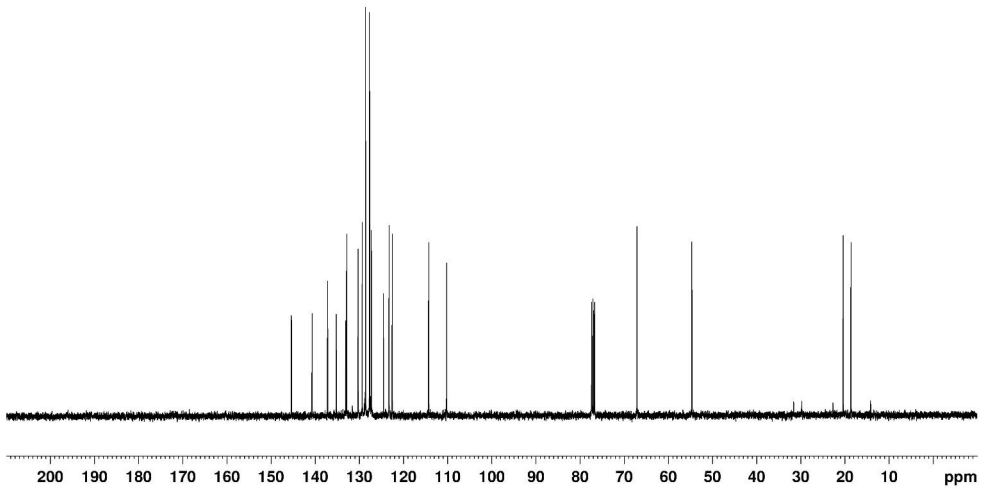

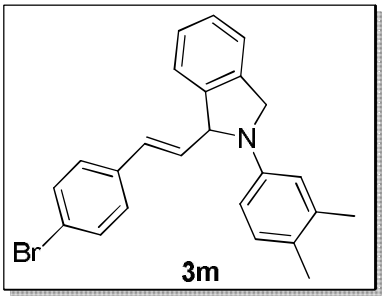

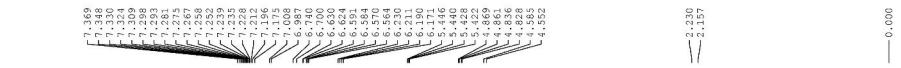

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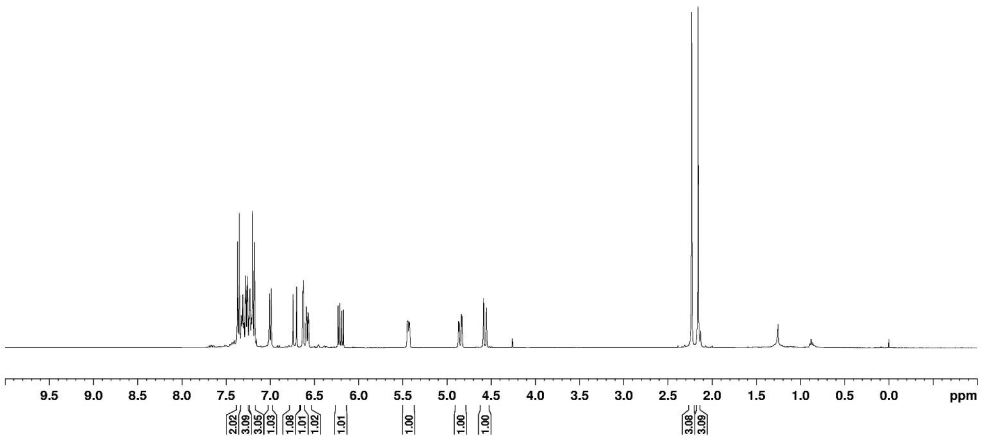

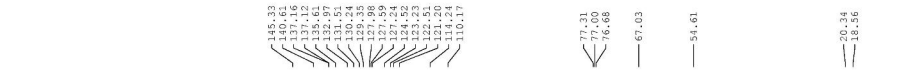

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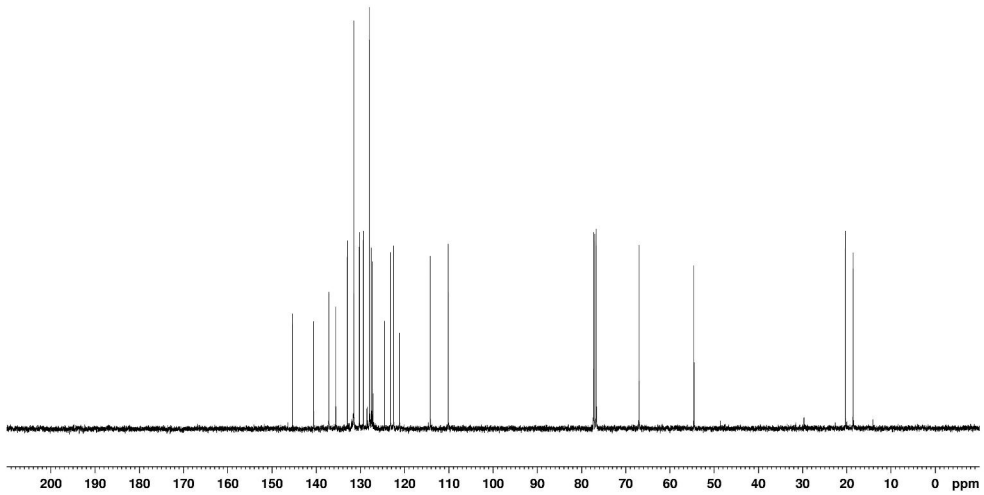

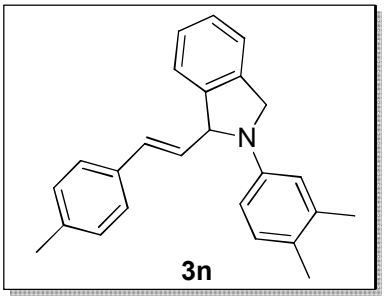
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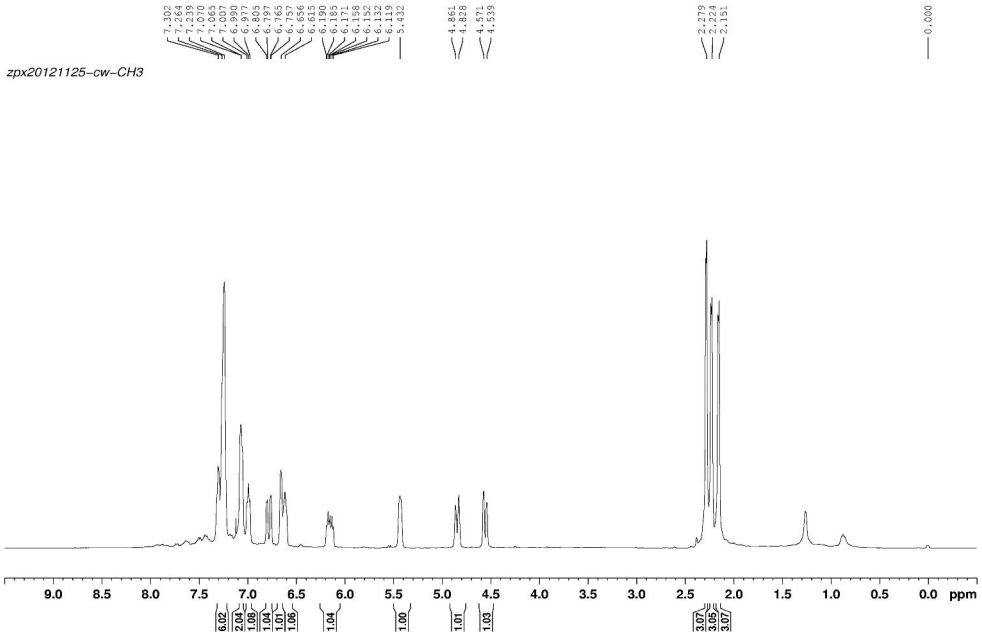
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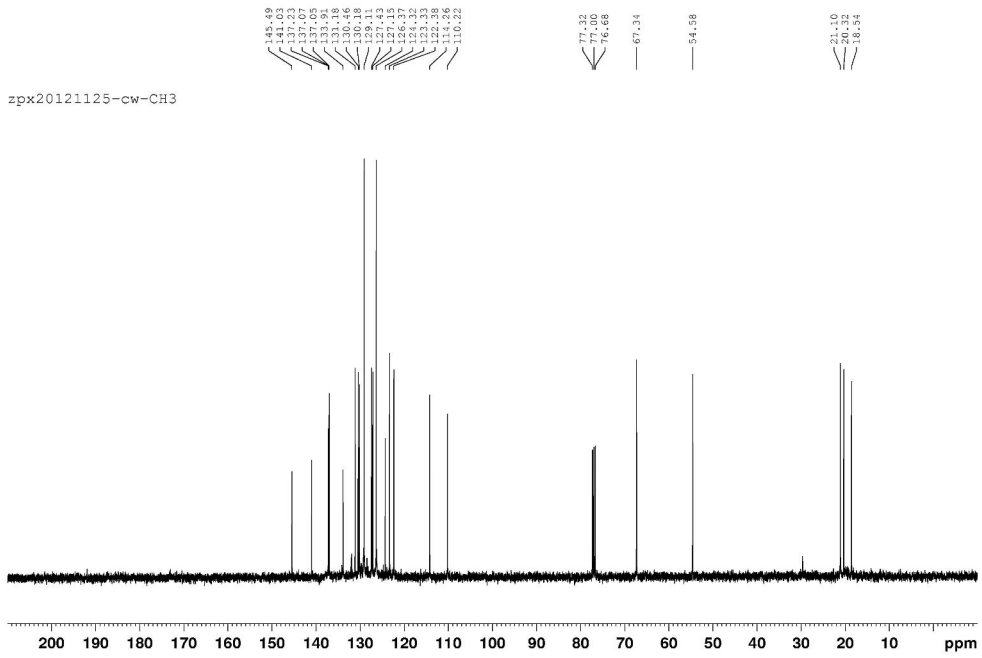
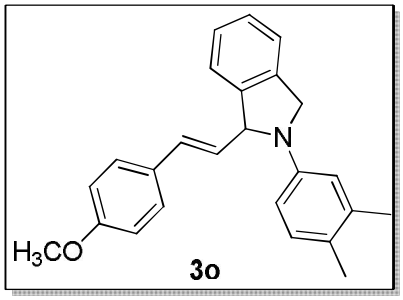
7.264
7.239
7.070
7.069
7.007
6.990
6.977
6.898
6.797
6.765
6.757
6.656
6.615
6.190
6.185
6.171
6.158
6.152
6.132
6.119
5.432
4.861
4.828
4.571
4.539
2.279
2.224
2.151
0.000
zpx20121125-cw-CH3
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm
6.02
2.04
1.08
1.04
1.01
1.06
1.04
1.00
1.01
1.03
3.07
3.05
3.07


145.49
141.03
137.23
137.07
135.65
133.91
131.18
130.46
130.18
129.11
127.43
127.15
126.37
124.32
123.33
122.38
114.26
110.22
77.32
77.00
76.68
67.34
54.58
21.10
20.32
18.34
zpx20121125-cw-CH3
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm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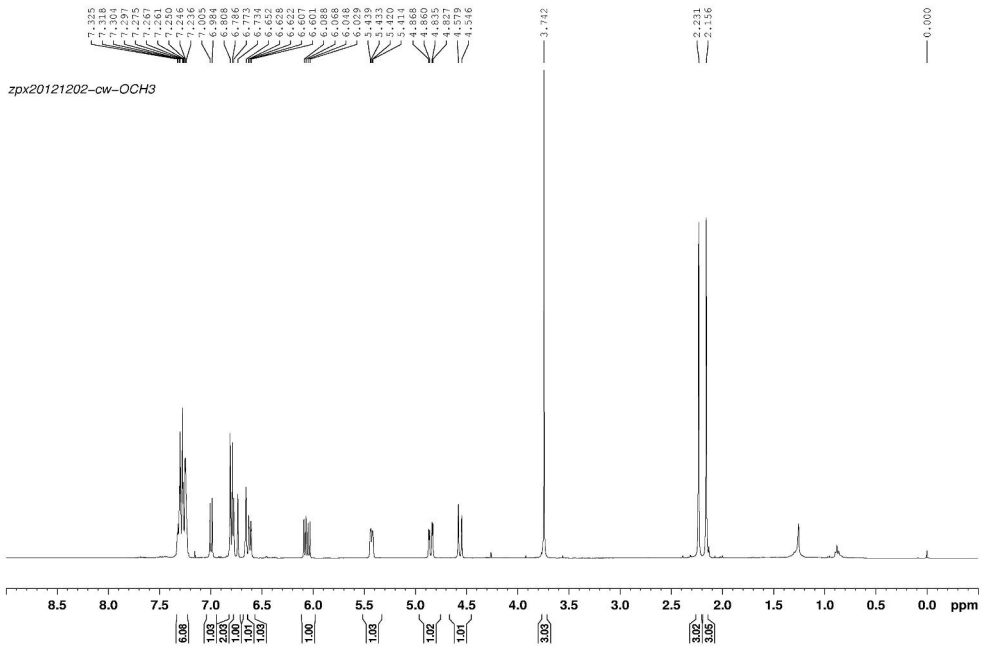
H3CO

3o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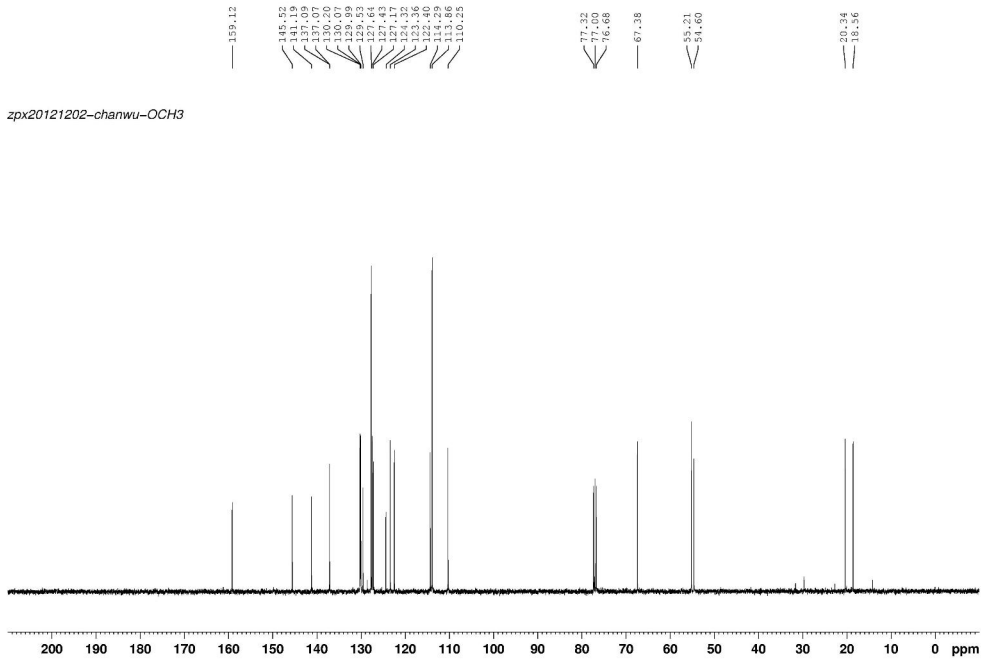
7.267
7.261
7.250
7.246
7.236
7.205
6.984
6.808
6.786
6.773
6.734
6.652
6.628
6.622
6.607
6.601
6.088
6.068
6.048
6.039
5.439
5.433
5.420
5.414
4.846
4.860
4.835
4.827
4.579
4.556
3.742
2.231
2.156
0.000
zpx20121202-cw-OCH3
8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm
6.08
1.03
2.03
1.00
1.01
1.09
1.00
1.03
1.02
1.01
3.03
3.02
3.05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130.20
130.07
129.99
129.63
127.64
127.43
127.17
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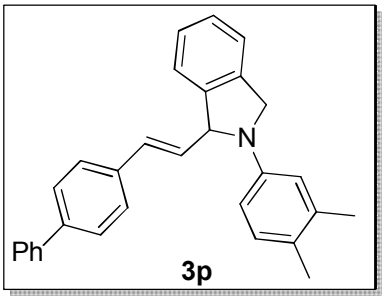
123.36
122.40
114.29
113.86
110.25
77.32
77.00
76.68
67.38
55.21
54.60
20.34
18.56
zpx20121202-chanwu-OCH3
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm



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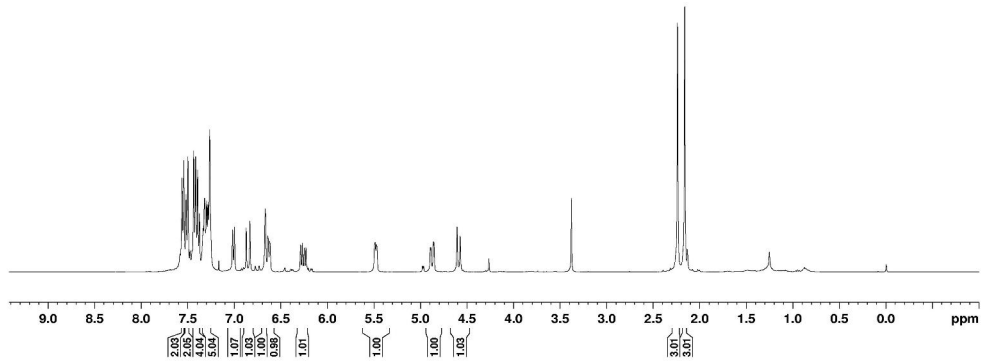
zpx20121209-cw-PH



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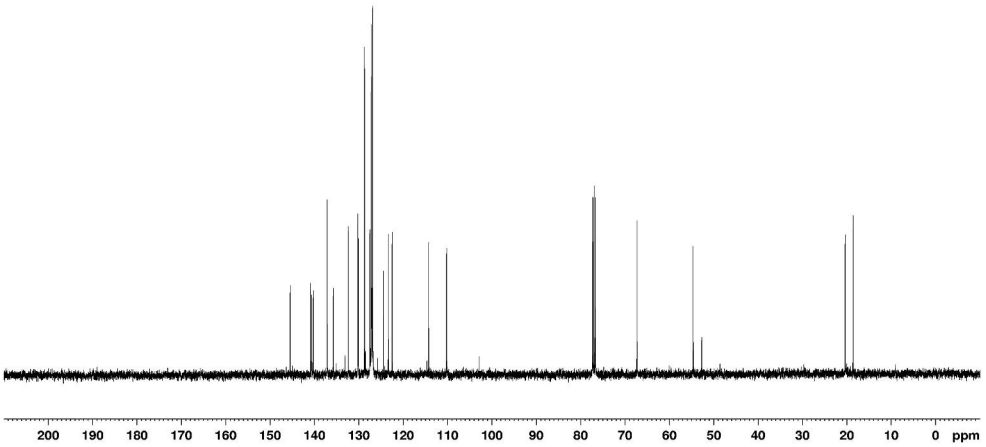
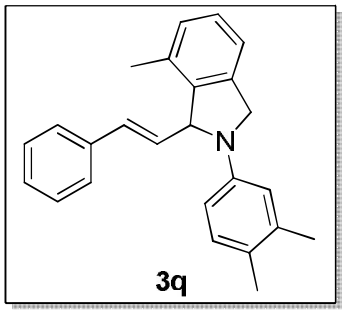
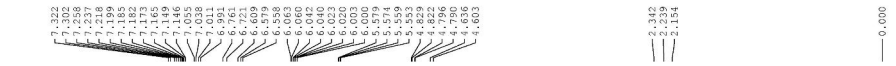
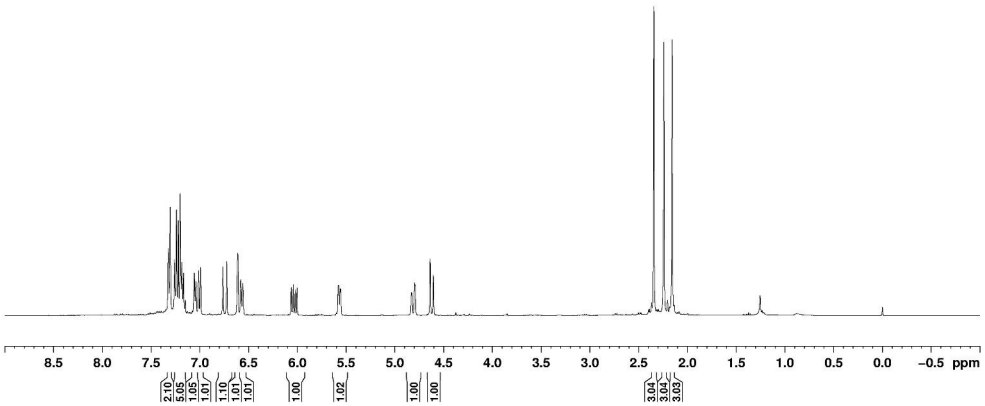
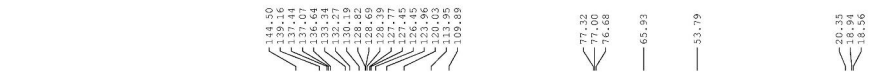




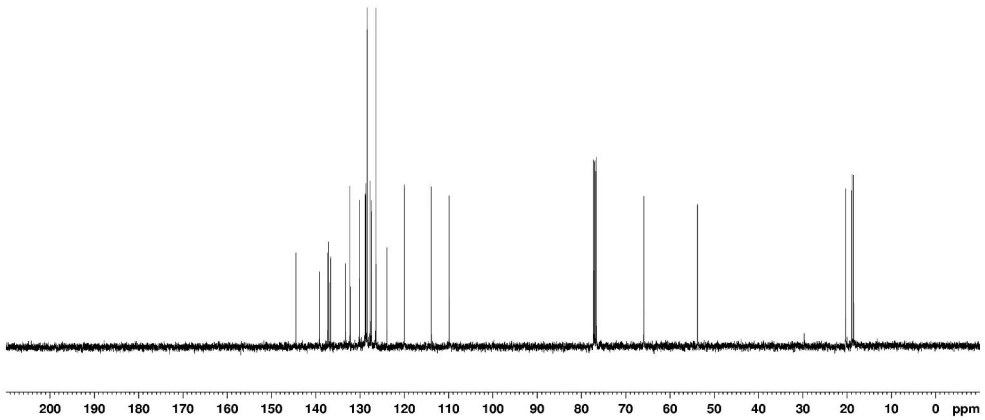


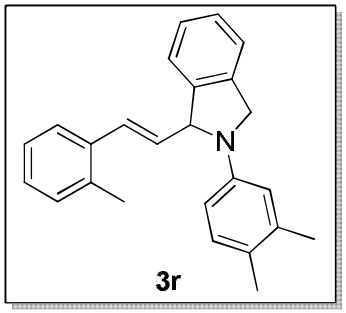
zpx20121115–chanwu





zpx20121115–chanwu–c

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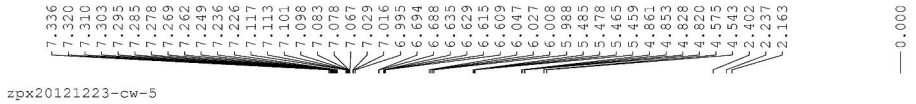
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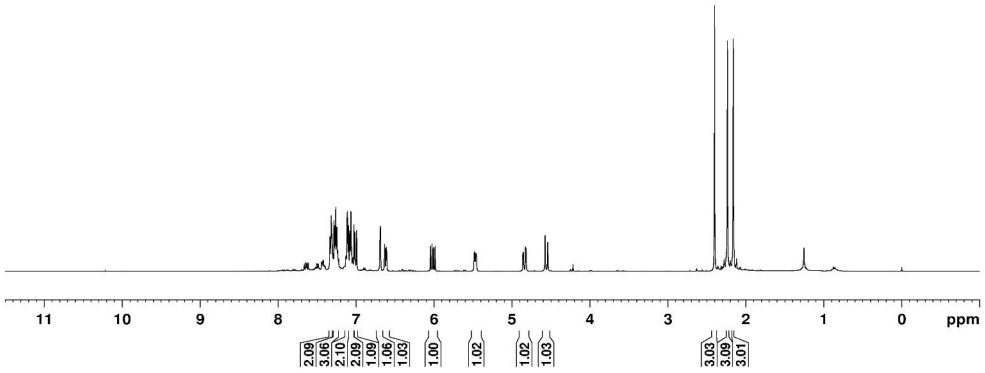
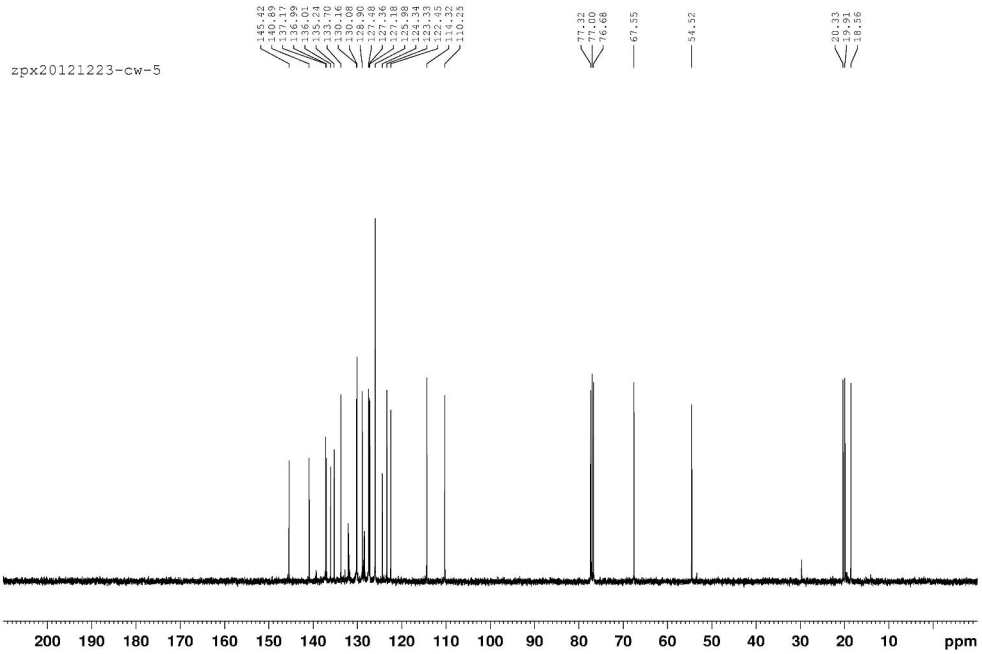
7.249
7.236
7.226
7.117
7.113
7.101
7.098
7.083
7.078
7.067
7.029
7.016
6.995
6.694
6.688
6.635
6.629
6.615
6.609
6.047
6.027
6.008
5.988
5.485
5.478
5.465
5.459
4.861
4.853
4.828
4.820
4.575
4.543
2.402
2.237
2.163
0.000
zpx20121223-cw-5


11
10
9
8
7
6
5
4
3
2
1
0
ppm
2.09
3.06
2.10
2.09
1.09
1.06
1.03
1.00
1.02
1.02
1.03
3.03
3.09
3.01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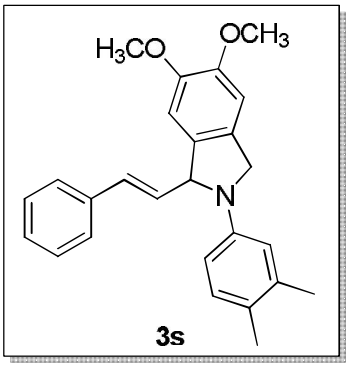
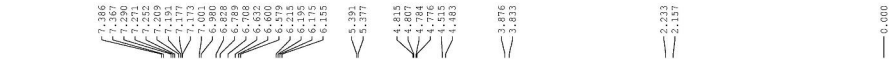
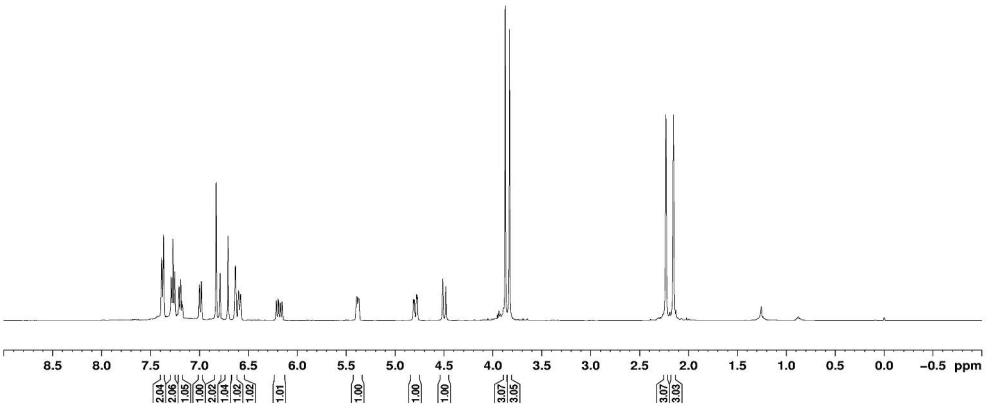
136.01
135.24
133.70
130.16
130.08
128.90
127.48
127.36
127.18
125.98
124.34
123.33
122.85
114.32
110.25
77.32
77.00
76.68
67.55
54.52
20.33
19.91
18.36
zpx20121223-cw-5
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

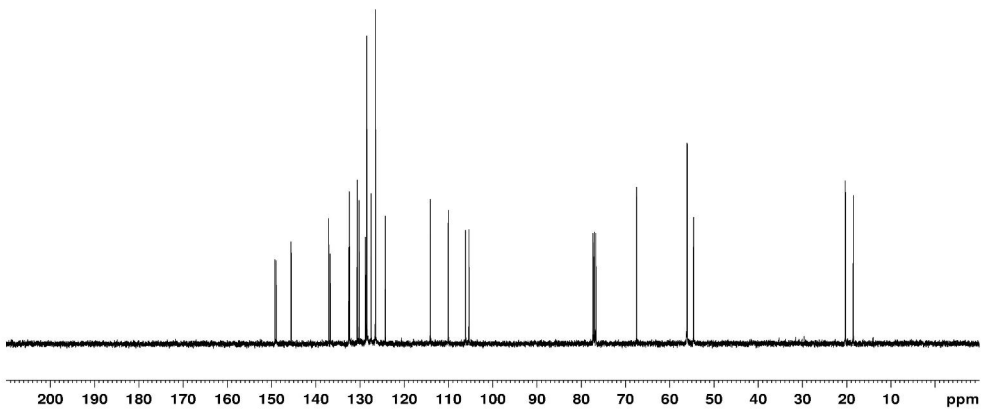


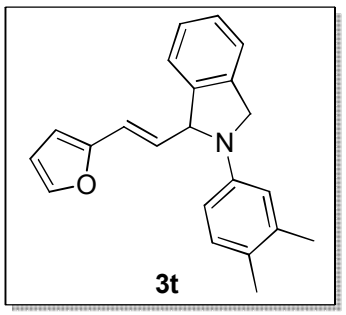


zpx20121112-chanwu



zpx20121112-chanwu

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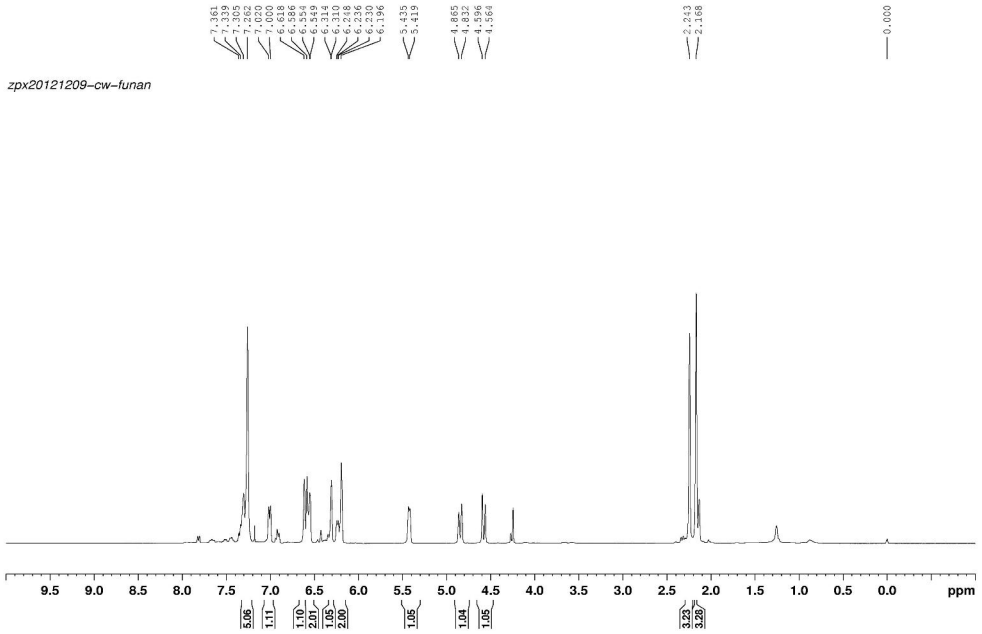
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6.586
6.554
6.549
6.314
6.310
6.238
6.236
6.230
6.196
5.435
5.419
4.865
4.832
4.596
4.564
2.243
2.168
0.000
zpx20121209–cw–funan
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 ppm
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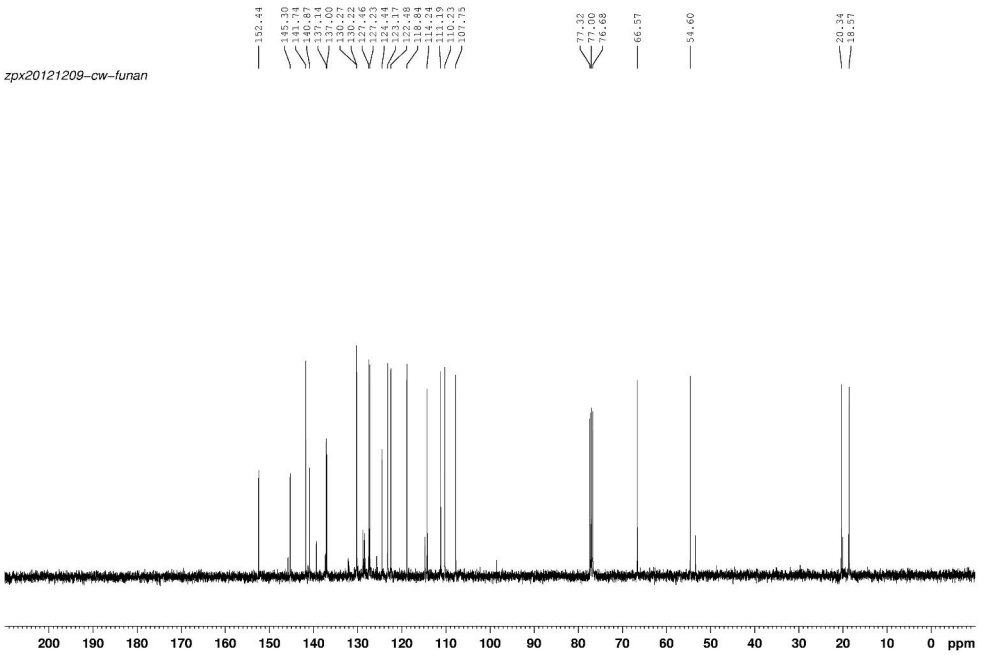
1.11
1.10
2.01
1.05
2.00
1.05
1.04
1.05
3.23
3.20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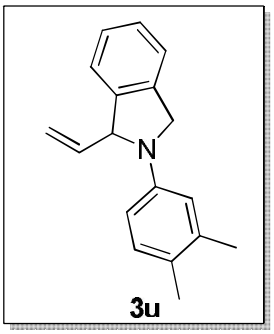
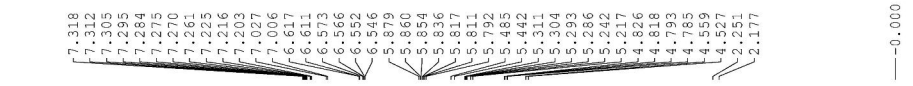
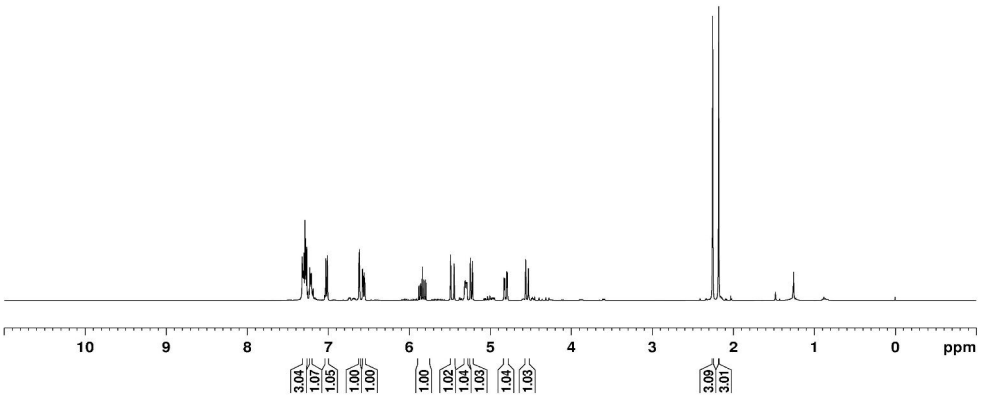
130.22
127.46
127.23
124.44
123.17
122.48
118.84
114.24
111.13
110.23
107.75
77.32
77.00
76.68
66.57
54.60
20.34
18.57
zpx20121209–cw–funan
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

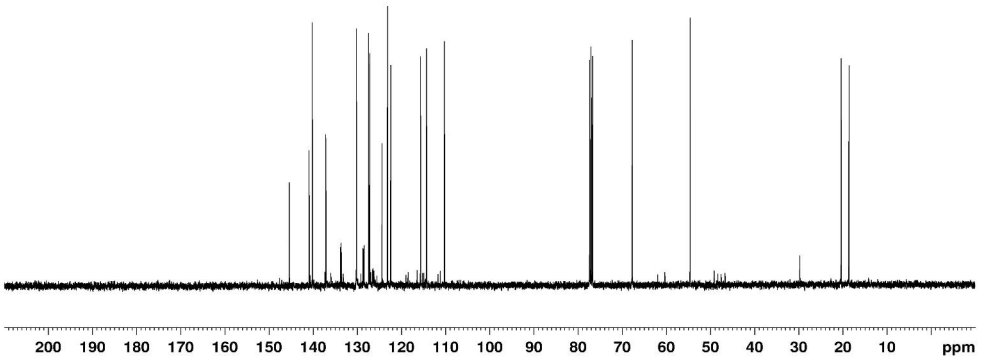


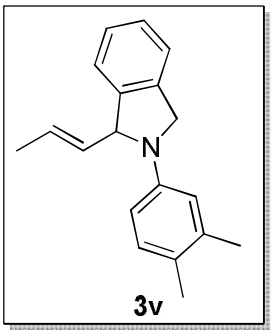


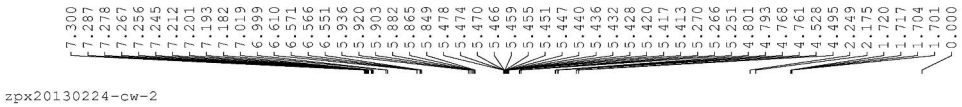
zpx20130224-cw-1



zpx20130224-cw-1







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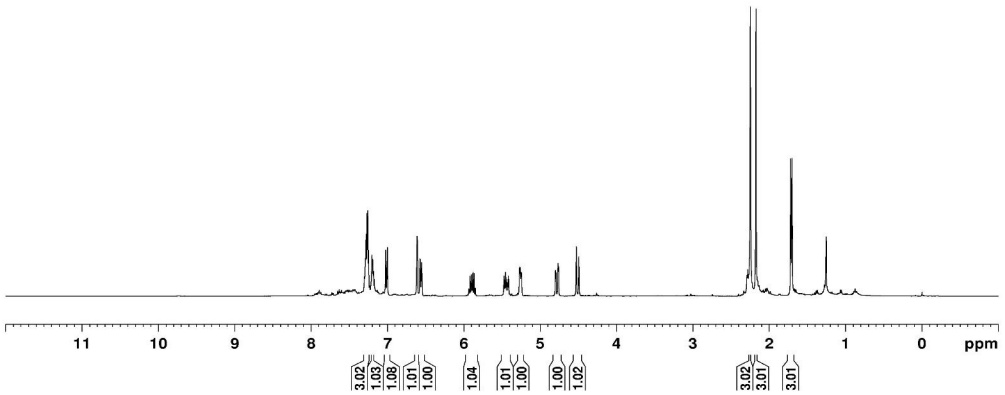

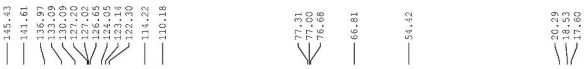

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