Angewandte Chemie
Eine Zeitschrift der Gesellschaft Deutscher Chemiker

Supporting Information

69451 Weinheim, Germany

Palladium-Catalyzed Direct Arylation of Aryl (Herero)Arenes with Aryl Boronic Acids

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General. All the reactions were carried out under dry oxygen atmosphere. CH_3COOH was used without further purification. $Pd(OAc)_2$ was purchased from Alfa Aesar Chemical. ^1H NMR (300 MHz) and ^{13}C NMR (75 MHz) were registered on Varian 300M spectrometers with $CDCl_3$ and acetone-d_6 as solvent and tetramethylsilane (TMS) as an internal standard. Chemical shifts were reported in units (ppm) by assigning TMS resonance in the ^1H spectrum as 0.00 ppm and $CDCl_3$ resonance in the ^{13}C spectrum as 77.0 ppm. All coupling constants (*J* values) were reported in Hertz (Hz). Column chromatography was performed on silica gel 200-300 mesh. IR, GC, MS, and HRMS were performed by the State-authorized Analytical Center at Peking University.

General procedures for arylation of mesitylene:

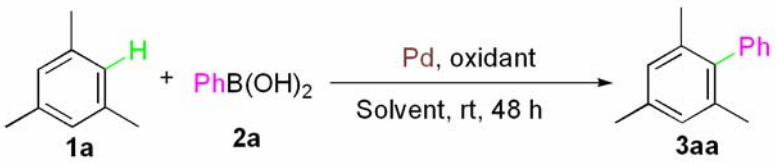
Mesitylene **1a** (120.0 mg, 1.0 mmol, 2.0 equiv), phenyl boronic acid **2a** (61 mg, 0.5 mmol, 1.0 equiv), $Cu(OAc)_2$ (91.0 mg, 0.5 mmol, 1.0 equiv and $Pd(OAc)_2$ (5.6 mg, 0.025 mmol, 0.05 equiv) were added to a Schlenck tube. After the addition of CF_3COOH (5.0 mL) by syringe, the reaction solution was degassed twice and refilled with O_2 (1.0 atm). The reaction mixture was further stirred for 48 h at room temperature. CF_3COOH was distilled under reduced pressure and recovered. The residue was dissolved in CH_2Cl_2 (50 mL) and washed with aqueous $NaHCO_3$ (2 x 30 mL). The organic layer was dried over $MgSO_4$. The desired product **3aa** was detected by GC with the use of *n*-dodecane as an internal standard.

General procedures for 2-arylation of 1-methylindole 1b:

1-Methylindole **1b** (65.5 mg, 0.5 mmol, 1.0 equiv), phenyl boronic acid **2a** (91.5 mg, 0.75 mmol, 1.5 equiv) and $Pd(OAc)_2$ (5.6 mg, 0.025 mmol, 0.05 equiv) were added to a Schlenck tube. After AcOH (5.0 mL) was added by syringe, the resulting solution was degassed twice and refilled with O_2 (1.0 atm.). The mixture was stirred for 6-8 h at room temperature. AcOH was distilled under reduced pressure and recovered, and the residue was dissolved in CH_2Cl_2 (50 mL) and washed with aqueous $NaHCO_3$ (2 x 30 mL). The organic layer was dried over $MgSO_4$. After the removal of the solvent, the product **3ba** was purified in 77% yield by flash chromatography on silica gel (hexanes/dichloromethane = 10:1 as an eluent).

Reaction Condition Screening for Arylation of Mesitylene 1a.

Table 1. Direct Arylation of mesitylene (**1a**) with phenyl boronic acid (**2a**).[a]



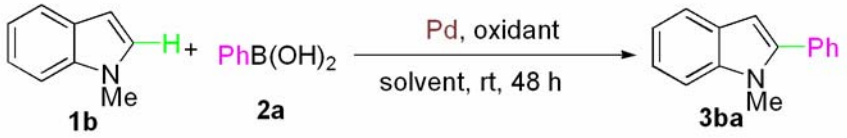
1a **2a** **3aa**

entry	Pd (mol%)	oxidant (equiv)	solvent	GC yield (%)[b]
1	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	toluene	< 5
2	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	DMF	< 5
3	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	CH_2Cl_2	< 5
4	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	HOAc	< 5
5	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	TFA	83
6	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (1.0)	TFA	48
7	$Pd(OAc)_2$ (5.0)	$Cu(OTf)_2$ (1.0)/O_2	TFA	12
8	$Pd(OAc)_2$ (5.0)	BQ (1.0)	TFA	15
9	$Pd(OAc)_2$ (5.0)	TBHP (1.0)	TFA	15
10	$Pd(OAc)_2$ (5.0)	oxone (1.0)	TFA	42
11	$Pd(OAc)_2$ (5.0)	$Cu(OTf)_2$ (0.2)/O_2	TFA	30
12	$Pd(OAc)_2$ (5.0)	O_2 (1 atm)	TFA	20
13	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	TFA/CH_2Cl_2	68
14	$PdCl_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	TFA	10
15	$Pd(PPh)_3Cl_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	TFA	19
16	$Pd(PhCN)_2Cl_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	TFA	18
17	$Pd(OTFA)_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	TFA	13
18	$Pd(dba)_2$ (5.0)	$Cu(OAc)_2$ (1.0)/O_2	TFA	< 5

[a] All the reactions were carried out in the scale of 1.0 mmol of **1a** and 0.5 mmol **2a**.
[b] Yield were determined by GC with the *n*-dodecane as an internal standard.

Reaction Condition Screening for Arylation of N-Methylindole 1b.

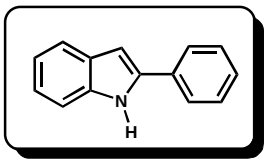
Table 2. Direct Arylation of N-methylindole (**1b**) with phenyl boronic acid (**2a**).[a]



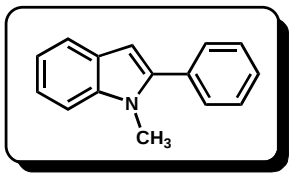
1b **2a** **3ba**

entry	Pd (mol%)	oxidant (equiv)	solvent	GC yield (%)[b]
1[c]	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (2.0)	CH_2Cl_2	64
2[c]	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (2.0)	CH_3CN	43
3[c]	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (2.0)	DMF	27
4[c]	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (2.0)	dioxane	58
5[c]	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (2.0)	toluene	31
6[c]	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (2.0)	HOAc	76
7[c]	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (2.5)	HOAc	89 (74)
8	$Pd(OAc)_2$ (5.0)	BQ (1.0)	HOAc	66
9	$Pd(OAc)_2$ (5.0)	TBHP (1.0)	HOAc	79
10	$Pd(OAc)_2$ (5.0)	oxone (1.0)	HOAc	47
11	$Pd(OAc)_2$ (5.0)	$Cu(OAc)_2$ (0.2)/O_2	HOAc	96
12	*$Pd(OAc)_2$ (5.0)*	*O_2 (1 atm)*	*HOAc*	*94 (77)*
13	$PdCl_2$ (5.0)	O_2 (1 atm)	HOAc	45
14	$Pd(PPh)_3Cl_2$ (5.0)	O_2 (1 atm)	HOAc	52
15	$Pd(PhCN)_2Cl_2$ (5.0)	O_2 (1 atm)	HOAc	49
16	$Pd(OTFA)_2$ (5.0)	O_2 (1 atm)	HOAc	92
17	$Pd(dba)_2$ (5.0)	O_2 (1 atm)	HOAc	38
18	$Pd(OAc)_2$ (1.0)	O_2 (1 atm)	HOAc	58

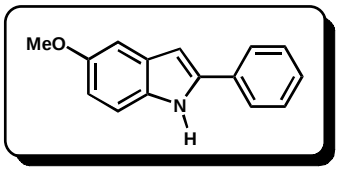
[a] All the reactions were carried out in the scale of 0.5 mmol of **1b** and 1.0 mmol of **2a**. [b] Yields were determined by GC with the use of with the *n*-dodecane as an internal standard. Isolated yields were reported in parathesis [c] These reactions were carried out at 60 °C.



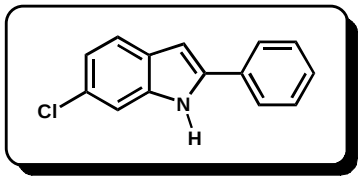
2-Phenyl-1*H*-indole (1la):[1] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 10 h. product **1la** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0801 g (83%). ^{1}H NMR (300 MHz, $CDCl_3$): 8.32 (s, 1 H), 7.69 (d, J = 8.4 Hz, 2 H), 7.52 (d, J = 7.8 Hz, 1 H), 7.49-7.41 (m, 4 H), 7.33-7.14 (m, 2 H), 6.87-6.6 (m, 1 H). ^{13}C NMR (75 MHz, $CDCl_3$): 137.8, 136.7, 132.3, 129.2, 129.0, 127.7, 125.1, 122.3, 120.6, 120.2, 110.9, 99.9. *m/z* (EI) 193 (M^+, 100%), 165 (32%); IR (KBr plate, $CDCl_3$) ν 3444, 1457, 742, 689.



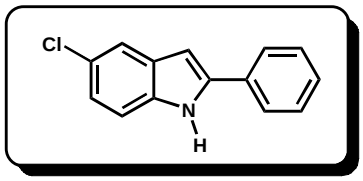
1-Methyl-2-phenyl-1*H*-indole (3ba):[2] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 6-8 h. product **3ba** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0797 g (77%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.64 (d, J = 7.9 Hz, 1H), 7.51-7.34 (m, 6H), 7.24 (t, J = 8.0 Hz, 1H), 7.15 (t, J = 7.8 Hz, 1H), 6.56 (s, 1H), 3.68 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 141.5, 138.3, 132.8, 129.3, 128.4, 127.9, 127.9, 127.8, 121.6, 120.4, 119.8, 109.6, 101.6, 31.1. *m/z* (EI) 207 (M^+, 100%), 169 (18%); IR (KBr plate, $CDCl_3$) ν 3055, 2923, 1468, 749, 702.



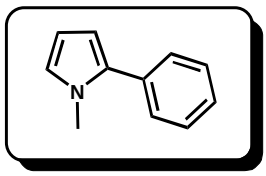
5-Methoxy-2-phenyl-1*H*-indole (1ma):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 10 h. product **1ma** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0814 g (73%). ^{1}H NMR (300 MHz, $CDCl_3$): 8.22 (s, 1H), 7.61 (d, J = 7.2 Hz, 2H), 7.43-7.24 (m, 4H), 7.08 (s, 1H), 6.85 (d, J = 8.1, 1H), 6.74 (s, 1H), 3.85 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 154.4, 152.0, 138.5, 129.7, 128.1, 127.7, 125.0, 112.6, 111.6, 102.2, 99.8, 55.8. *m/z* (EI) 223 (M^+, 100%), 199 (22%); IR (KBr plate, $CDCl_3$) ν 3424, 1476, 1215, 1150, 763, 737.



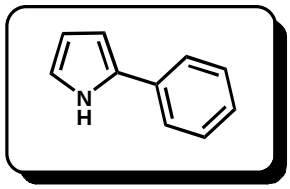
6-Chloro-2-phenyl-1*H*-indole (1na):[4] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 20 h. product **1na** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0601 g (53%). ^{1}H NMR (300 MHz, acetone-d_6): 10.85 (s, 1H), 7.83 (d, J = 7.2 Hz, 2H), 7.54 (d, J = 8.1 Hz,1H), 7.47-7.35 (m, 2H), 7.34-7.29 (m, 1H), 7.04(d, J = 10.5 Hz, 1H), 6.90 (s, 1H). ^{13}C NMR (75 MHz, acetone-d_6): 139.6, 138.3, 132.7, 129.4, 128.5, 128.2, 127.5, 125.6, 121.9, 120.6, 111.4, 99.6. *m/z* (EI) 229(M^+, 33%), 227 (M^+, 100%), 203 (37%); IR (KBr plate, acetone-d_6) ν 3433, 1450, 1346, 1063, 815,787, 688.



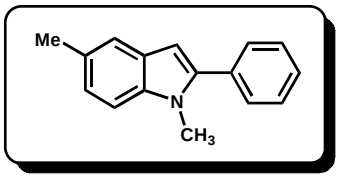
5-Chloro-2-phenyl-1*H*-indole (1oa):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 20 h. product **1oa** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0692 g (61%). ^{1}H NMR (300 MHz, acetone-d_6): 10.85 (s, 1H), 7.83 (d, *J* = 7.2 Hz, 2H), 7.54 (d, *J* = 8.1 Hz,1H), 7.47-7.35 (m, 2H), 7.34-7.29 (m, 1H), 7.04(d, *J* = 10.5 Hz, 1H), 6.90 (s, 1H). ^{13}C NMR (75 MHz, acetone-d_6): 139.6, 138.3, 132.7, 129.4, 128.5, 128.2, 127.5, 125.6, 121.9, 120.6, 111.4, 99.6. *m/z* (EI) 229(M^+, 33%), 227 (M^+, 100%), 203 (37%); IR (KBr plate, acetone-d_6) ν 3350, 1700, 1247, 762, 692.



1-Methyl-2-phenyl-1*H*-pyrrole (1ja): Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **1ja** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0307 g (43%). ^{1}H NMR (300 MHz, acetone-d_6): 7.37-7.50 (m, 4H), 7.27-7.34 (m, 1H), 6.72 (t, *J* = 2.0 Hz, 1H), 6.19-6.26 (m, 2H), 2.88 (s, 3H). ^{13}C NMR (75 MHz, acetone-d_6): 134.5, 133.3, 128.5, 128.2, 126.6, 123.6, 108.6, 107.7, 34.9. *m/z* (EI) 143 (M^+, 100%), 128 (21%); IR (KBr plate, acetone-d_6) ν 3062, 1478, 1308, 741, 698.

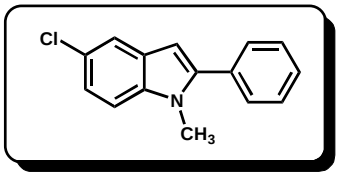


2-Phenyl-1*H*-pyrrole (1ka): Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 6 h. product **1ka** was obtained after silica gel chromatography (40:10 hexanes: dichloromethane), yield 0.0358 g (56%). ^{1}H NMR (300 MHz, acetone-d_6) 10.62 (s, 1 H), 7.51-7.54 (m, 2 H), 7.39-7.45 (m, 2 H), 7.21-7.29 (m, 1 H), 6.90-6.92 (m, 1 H), 6.58-6.60 (m, 1 H), 6.36 (d, *J* = 3.6, 1 H). ^{13}C NMR (75 MHz, acetone-d_6): 133.2, 132.5, 133.2, 132.5, 129.3, 126.6, 124.3, 119.3, 110.5, 106.4. *m/z* (EI) 129 (M^+, 100%), 54 (13%); IR (KBr plate, acetone-d_6) ν 3434, 3391, 1465, 1033, 904, 757, 719, 605.

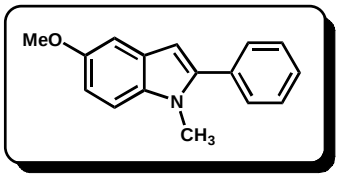


1,5-Dimethyl-2-phenyl-1*H*-indole (1pa):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **1pa** was obtained after silica gel chromatography (10:1

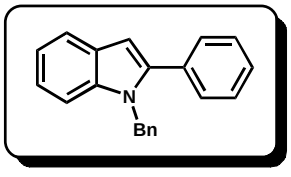
hexanes:dichloromethane), yield 0.0762 g (69%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.48-7.34 (m, 6H), 7.21 (d, *J* = 8.4 Hz, 1H), 7.06 (d, *J* = 2.1 Hz, 1H), 6.46 (s, 1H), 3.68 (s, 3H), 2.46 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 141.5, 136.8, 132.9, 130.5, 129.2, 129.0, 128.4, 128.2, 127.6, 123.2, 120.1, 109.3, 101.2, 30.2, 21.4; *m/z* (EI) 221 (M^+, 100%), 204 (12%); IR (KBr plate, $CDCl_3$) ν 3026, 2914, 1478, 1183, 795, 761, 695. Anal. Calcd. for $C_{16}H_{15}N$: C, 86.84; H, 6.83; N, 6.33. Found: C, 86.79; H, 6.81; N, 6.23.



5-Chloro-1-methyl-2-phenyl-1*H*-indole (1oa): Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 16 h. product **1oa** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0735 g (61%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.64 (d, *J* = 2.4 Hz, 1H), 7.54-7.47 (m, 5H), 7.29-7.21 (m, 3H), 6.54 (s, 1H). ^{13}C NMR (75 MHz, $CDCl_3$): 142.8, 136.7, 132.2, 130.0, 129.2, 128.8, 128.5, 128.1, 125.4, 121.7, 120.1, 110.5, 101.1, 31.2. *m/z* (EI) 241 (M^+, 100%), 205 (31%); IR (KBr plate, $CDCl_3$) ν 3058, 1470, 1277, 1065, 765, 698. Anal. Calcd. for $C_{14}H_{12}NOCl$: C, 74.53; H, 5.00; N, 5.79. Found: C, 74.49; H, 4.91; N, 5.68.

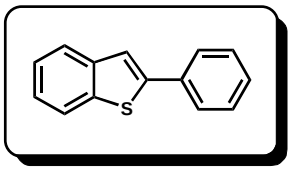


5-Methoxy-1-methyl-2-phenyl-1*H*-indole (1ra):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **1ra** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.1019 g (86%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.59-7.46 (m, 5H), 7.32 (d, *J* = 9.3 Hz, 1H), 7.19 (d, *J* = 2.4 Hz, 1H), 7.00 (d, *J* = 11.4, 1H), 6.58 (s, 1H), 3.94 (s, 3H), 3.77 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 154.3, 142.0, 133.7, 132.8, 129.2, 128.4, 128.1, 127.7, 111.8, 110.3, 102.1, 101.2, 55.8, 31.2. *m/z* (EI) 237 (M^+, 100%), 222 (55%), 194 (67%); IR (KBr plate, $CDCl_3$) ν 3054, 2927, 1490, 1209, 1085, 752, 714.

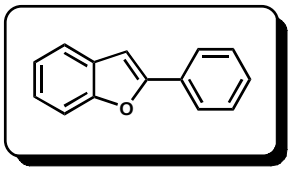


1-Benzyl-2-phenyl-1*H*-indole (1sa):[4] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **1sa** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.1033 g (73%). ^{1}H NMR (300MHz, $CDCl_3$) δ 7.85 (d, J = 4.2 Hz, 1H), 7.62 (d, J = 4.2 Hz, 2H), 7.60 (m, 3H), 7.51-7.32 (m, 6H), 7.18 (d, J =

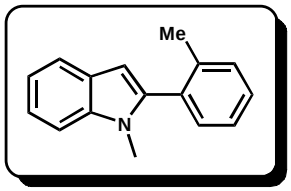
6.3 Hz, 2H), 6.84 (s, 1H), 5.50 (s, 2H), ; ^{13}C NMR (75 MHz, $CDCl_3$) δ141.7, 138.1, 137.9, 132.6, 129.1, 128.7, 128.5, 128.2, 127.9, 127.1, 125.9, 121.9, 120.5, 110.5, 102.3, 47.6; *m/z* (EI) 283 (M^+, 100%), 165 (9%), 91 (69%); IR (KBr plate, $CDCl_3$) 3060, 2924, 1461, 1346, 747, 697



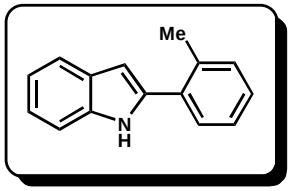
2-Phenyl-benzo[*b*]thiophene (1ha): Following the general procedures, the reaction was performed in a 0.5 mmol, 10 mol % $Pd(OAc)_2$ and 0.5 mmol CF_3SO_3Na scale at 100℃ for 12 h. product **1ha** was obtained after silica gel chromatography (hexanes), yield 0.0714 g (68%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.83 (d, J = 8.7 Hz, 2H), 7.55 - 7.39 (m, 4H), 7.35 -7.21 (m, 3H), 6.98(s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): 155.9, 154.8, 130.4, 129.2, 128.8, 128.5, 124.9, 124.2, 122.9, 120.9, 111.1, 101.3; *m/z* (EI) 178 (M^+, 100%), 134 (48%); IR (KBr plate, $CDCl_3$) ν 3021, 1463, 1109, 904, 755, 725, 605.



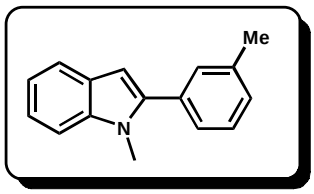
2-Phenyl-benzofuran (1ia): Following the general procedures, the reaction was performed in a 0.5 mmol, 5 mol % $Pd(OAc)_2$ and 0.5 mmol NaOAc scale at 60℃ for 8 h. product **1ia** was obtained after silica gel chromatography (hexanes), yield 0.0213-0.0563 g (22-58%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.86 (d, J = 9.9 Hz, 2H), 7.59 - 7.42 (m, 4H), 7.37 -7.22 (m, 3H), 7.02(s, 1H); ^{13}C NMR (75 MHz, $CDCl_3$): 155.9, 154.8, 130.4, 129.2, 128.8, 128.5, 124.9, 124.2, 122.9, 120.9, 111.1, 101.3; *m/z* (EI) 194 (M^+, 100%), 165 (62%); IR (CHCl3): 3020, 1615, 1510, 1492, 1109, 904, 755, 725, 605.



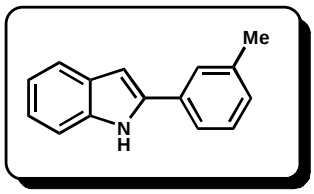
1-Methyl-2-o-tolyl-1*H*-indole (3bb):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **3bb** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0966 g (87%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.63 (d, *J* = 9.8 Hz, 1H), 7.37-7.14 (m, 7H), 6.55 (s, 1H), 3.75 (s, 3H), 2.42 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 141.7, 138.3, 138.1, 132.7, 130.1, 128.6, 128.3, 127.9, 126.4, 121.5, 120.4, 119.8, 109.5, 101.5, 31.3, 21.5. *m/z* (EI) 221 (M^+, 100%), 206 (29%); IR (KBr plate, $CDCl_3$) ν 3052, 2935, 1463, 766, 749, 734.



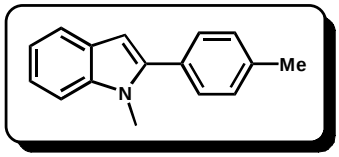
2-o-Tolyl-1*H*-indole (3lb):[4] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 10 h. product **3lb** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0517 g (50%). ^{1}H NMR (300 MHz, acetone-d_6): 7.53 (d, *J* = 7.5 Hz, 1H), 7.22 (s, 1H), 7.15 (s, 1H), 7.05 (s, 1H), 6.88-6.78 (m, 3H), 6.41 (s, 1H), 5.89 (s, 1H), 3.60 (s, 3H). ^{13}C NMR (75 MHz, acetone-d_6): 147.5, 141.2, 138.1, 127.8, 126.6, 123.1, 121.5, 120.3, 119.8, 109.7, 108.3, 101.2, 31.0. *m/z* (EI) 207 (M^+, 100%), 155 (13%); IR (KBr plate, acetone-d_6) ν 3400, 1455, 1302, 797, 746, 720.



1-Methyl-2-m-tolyl-1*H*-indole (3bc):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **3bc** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0966 g (87%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.61 (d, *J* = 7.5 Hz, 1H), 7.32-7.12 (m, 7H), 6.53 (s, 1H), 3.67 (s, 3H), 2.39 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 141.7, 138.3, 138.1, 132.7, 130.0, 128.6, 128.3, 127.9, 126.4, 121.5, 120.4, 119.7, 109.5, 101.5, 31.1, 21.4. *m/z* (EI) 221 (M^+, 100%), 204 (20%); IR (KBr plate, $CDCl_3$) ν 3050, 1465, 1146, 776, 749, 701.

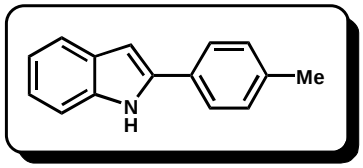


2-m-Tolyl-1*H*-indole (3lc):[4] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 10 h. product **3lc** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0755 g (73%). ^{1}H NMR (300 MHz, acetone-d_6): 10.51 (s, 1H), 7.69-7.55 (m, 3H), 7.43 (d, *J* = 9.0 Hz, 1H), 7.16-7.00 (m, 3H), 6.87 (s, 1H), 2.35 (s, 3H). ^{13}C NMR (75 MHz, acetone-d_6): 143.4, 143.2, 142.6, 137.8, 134.5, 133.9, 130.8, 127.3, 126.8, 125.3, 124.7, 116.2, 104.1, 25.7. *m/z* (EI) 207 (M^+, 100%), 155 (16%); IR (KBr plate, acetone-d_6) ν 3431, 2921, 1607, 1303, 785, 747, 688.

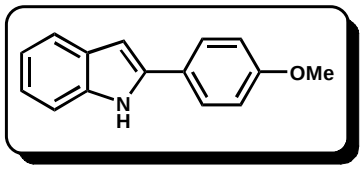


1-Methyl-2-p-tolyl-1*H*-indole (3bd):[3] Following the general procedures, the reaction

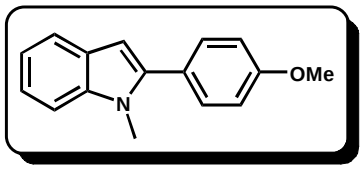
was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **3bd** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0718 g (65%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.73 (d, *J* = 8.4 Hz, 1H), 7.51-7.43 (m, 3H), 7.38-7.31 (m, 3H), 7.25 (m, 1H), 6.64 (s, 1H), 3.81 (s, 3H), 2.51 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 141.6, 138.2, 137.7, 129.9, 129.2, 129.1, 127.9, 121.4, 120.3, 119.7, 109.5, 101.2, 31.0, 21.2. *m/z* (EI) 221 (M^+, 100%), 204 (11%); IR (KBr plate, $CDCl_3$) ν 3054, 2913, 1465, 828, 773, 751.



2-p-Tolyl-1*H*-indole (3ld):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 10 h. product **3ld** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0797 g (77%). ^{1}H NMR (300 MHz, acetone-d_6): 10.56 (s, 1H), 7.71 (t, *J* = 8.4 Hz, 2H), 7.52 (d, *J* = 9.0 Hz, 1H), 7.38-7.34 (m, 1H), 7.23 (d, *J* = 7.8, 1H), 7.08-7.03 (m, 2H), 7.00-6.95 (m, 1H), 6.80 (s, 1H), 2.29 (s, 3H). ^{13}C NMR (75 MHz, acetone-d_6): 138.1, 137.1, 130.8, 130.2, 125.7, 122.3, 120.8, 120.2, 111.8, 99.2, 21.0. *m/z* (EI) 221 (M^+, 100%), 169 (18%); IR (KBr plate, acetone-d_6) ν 3441, 1698, 1248, 904, 790, 748.

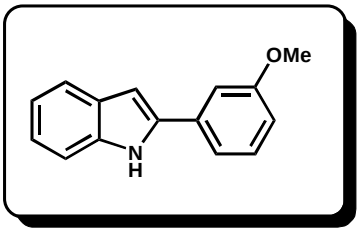


2-(4-Methoxy-phenyl)-1*H*-indole (3le):[4] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 10 h. product **3le** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0591 g (53%). ^{1}H NMR (300 MHz, acetone-d_6): 10.55 (s, 1H), 7.85-7.77 (m, 2H), 7.53 (d, *J* = 7.5 Hz, 1H), 7.38 (d, *J* = 9.0, 1H), 7.01-6.97 (m, 4H), 6.76 (s, 1H), 3.86 (s, 3H). ^{13}C NMR (75 MHz, acetone-d_6): 165.1, 143.8, 143.1, 135.2, 132.1, 131.1, 126.9, 125.5, 125.1, 120.0, 116.6, 103.5, 60.4. *m/z* (EI) 223 (M^+, 100%), 109 (53%); IR (KBr plate, acetone-d_6) ν 3432, 1501, 1027, 834, 786, 748.

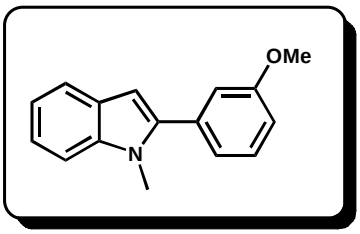


2-(4-Methoxy-phenyl)-1-methyl-1*H*-indole (3be):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **3be** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0995 g (84%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.67 (d, *J* = 8.7 Hz, 1H), 7.47 (d, *J* = 8.7 Hz, 2H), 7.39 (d, *J* = 8.1 Hz, 1H), 7.29 (d, *J* = 9.9 Hz, 1H), 7.22 (m, 1H), 7.04 (d, *J* = 11.7 Hz, 2H), 6.55 (s, 1H), 3.92 (s, 3H), 3.76 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 159.3, 141.3, 138.1, 130.5, 127.9, 125.1, 121.3,

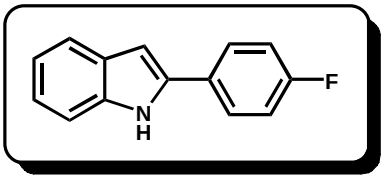
120.2, 119.7, 113.9, 109.5, 100.9, 55.2, 30.9. *m/z* (EI) 237 (M^+, 100%), 222 (63%); IR (KBr plate, $CDCl_3$) ν 3050, 2924, 1496, 1466, 1245, 841, 786, 750.



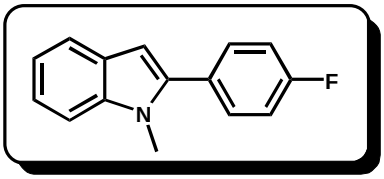
2-(3-Methoxy-phenyl)-1*H*-indole (3lf): [4] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 10 h. product **3lf** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0669 g (60%). ^{1}H NMR (300 MHz, $CDCl_3$): 8.23 (s, 1H), 7.61 (d, *J* = 7.2 Hz, 2H), 7.43-7.24 (m, 4H), 7.08 (s, 1H), 6.84 (d, *J* = 8.4 Hz, 1H), 6.74 (s, 1H), 3.85 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 154.4, 152.0, 138.6, 129.7, 128.9, 127.5, 125.0, 112.6, 111.6, 102.2, 99.8, 55.8. *m/z* (EI) 223 (M^+, 100%), 109 (53%); IR (KBr plate, $CDCl_3$) ν3432, 1501, 1027, 834, 786, 748.



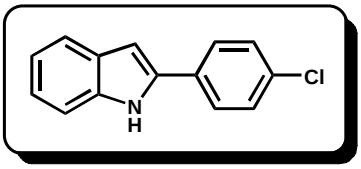
2-(3-Methoxy-phenyl)-1-methyl-1*H*-indole (3bf):[4] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **3bf** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0995 g (84%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.68 (d, *J* = 8.4 Hz, 1H), 7.38-7.27 (m, 2H), 7.22 (d, *J* = 8.2 Hz, 1H), 7.19-7.09 (m, 2H), 6.99 (d, *J* = 9.3, 1H), 6.62 (s, 1H), 3.88 (s, 3H), 3.78 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 159.5, 141.3, 138.3, 134.1, 129.4, 127.8, 121.7, 120.4, 119.8, 115.0, 113.3, 109.6, 101.6, 55.3, 31.1. *m/z* (EI) 237 (M^+, 100%), 194 (25%); IR (KBr plate, $CDCl_3$) ν3050, 2924, 1496, 1466, 1245, 841, 786, 750.



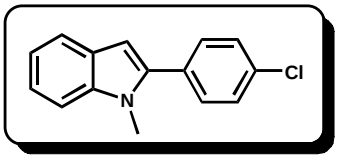
2-(4-Fluoro-phenyl)-1*H*-indole (3lg):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 10 mol % $Pd(OAc)_2$ scale at room temperature for 22 h. product **3lg** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0812 g (77%). ^{1}H NMR (300 MHz, acetone-d_6): δ 10.58 (s, 1H), 7.89-7.84 (m, 1H), 7.56 (d, *J* = 8.1 Hz, 1H), 7.42 (d, *J* = 10.2 Hz, 1H) ,7.24-7.01 (m, 3H), 6.84 (s, 1H). ^{13}C NMR (75 MHz, acetone-d_6): δ 164.3, 138.1, 129.9, 127.6, 127.5, 122.4, 120.8, 120.2, 116.3, 116.1, 111.7, 99.6. *m/z* (EI) 211 (M^+, 100%), 169 (34%); ,IR (KBr plate, acetone-d_6) ν 3415, 1499, 1235, 837, 794, 756.



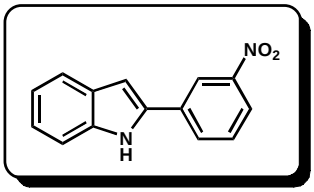
2-(4-Fluoro-phenyl)-1-methyl-1*H*-indole (3bg):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 16 h. product **3bg** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0922 g (82%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.64 (d, *J* = 7.8 Hz, 1H), 7.44 (d, *J* = 8.1 Hz, 1H), 7.35-7.12 (m, 5H), 7.10 (d, *J* = 7.2, 1H), 6.48 (s, 1H), 3.78 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 136.6, 131.0, 128.6, 127.8, 121.8, 121.4, 120.7, 119.6, 115.4, 109.4, 100.8, 32.8. *m/z* (EI) 225 (M^+, 100%), 183 (18%); IR (KBr plate, $CDCl_3$) ν 3061, 2925, 1495, 1219, 842, 787, 734.



2-(4-Chloro-phenyl)-1*H*-indole (3lh):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 10 mol % $Pd(OAc)_2$ scale at room temperature for 22 h. product **3lh** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0874 g (77%). ^{1}H NMR (300 MHz, acetone-d_6): δ 11.59 (s, 1H), 7.82 (d, *J* = 8.6 Hz, 2H), 7.65 (d, *J* = 8.6 Hz,2H), 7.54 (d, *J* = 7.9 Hz, 1H) ,7.40 (d, *J* = 8.0 Hz, 1H), 7.11 (d, *J* = 8.1, 1H), 7.00 (d, *J* = 7.8, 1H), 6.94 (d, *J* = 0.9 Hz, 1H). ^{13}C NMR (75 MHz, acetone-d_6): δ 137.1, 136.3, 131.7, 131.4, 128.4, 126.8, 121.8, 120.2, 120.1, 119.4, 111.3, 99.2. *m/z* (EI) 227 (M^+, 100%), 191 (22%); IR (KBr plate, acetone-d_6) ν 3443, 1701, 1246, 1095, 831, 793, 748.

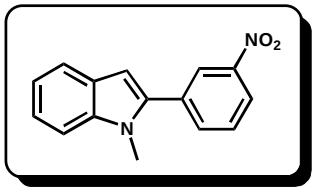


2-(4-Chloro-phenyl)-1-methyl-1*H*-indole (3bh):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 12 h. product **3bh** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0819 g (68%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.80-7.66 (m, 5H), 7.41 (d, *J* = 7.9 Hz, 1H), 7.37 (m, 1H), 7.27 (d, *J* = 7.9, 1H), 6.71 (s, 1H), 3.81 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): 139.8, 138.7, 136.3, 129.4, 127.8, 125.4, 122.3, 120.9, 120.2, 109.7, 102.8, 31.2. *m/z* (EI) 241 (M^+, 100%), 205 (19%); IR (KBr plate, $CDCl_3$) ν 3058, 2923, 1323, 1109, 1067, 789, 732.

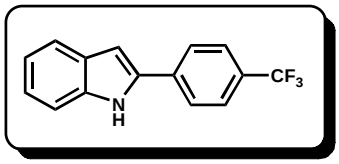


2-(3-Nitro-phenyl)-1*H*-indole (3li):[6] Following the general procedures, the reaction

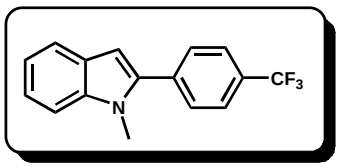
was performed in a 0.5 mmol and 10 mol % $Pd(OAc)_2$ scale at room temperature for 24 h. product **3li** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0976 g (82%). ^{1}H NMR (300 MHz, acetone-d_6): δ 10.53 (s, 1H), 8.35 (s, 1H), 8.21 (d, *J* = 9.0, 1H), 7.81 (d, *J* = 9.0, 1H), 7.66-7.58 (m, 2H), 7.38-7.16 (m, 4H), 6.65(s, 1H). ^{13}C NMR (75 MHz, acetone-d_6): δ 148.3, 138.7, 134.9, 134.4, 129.5, 127.6, 123.6, 122.6, 120.8, 120.3, 109.8, 103.2. *m/z* (EI) 238 (M^+, 100%), 192 (21%); IR (KBr plate, acetone-d_6) ν 3370, 1517, 1349, 794, 734.



1-Methyl-2-(3-nitro-phenyl)-1*H*-indole (3bi):[6] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 16 h. product **3bi** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0794 g (63%). ^{1}H NMR (300 MHz, $CDCl_3$): δ 8.35 (s, 1H), 8.21 (d, *J* = 9.0, 1H), 7.81 (d, *J* = 9.0, 1H), 7.66-7.58 (m, 2H), 7.38-7.16 (m, 4H), 6.65(s, 1H), 3.76 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$): δ 148.3, 138.7, 134.9, 134.4, 129.5, 127.6, 123.6, 122.6, 120.8, 120.3, 109.8, 103.2, 31.3. *m/z* (EI) 252 (M^+, 100%), 206 (18%); IR (KBr plate, $CDCl_3$) ν 2963, 2917, 1523, 1348, 738, 727.

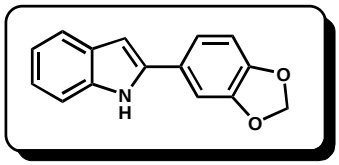


2-(4-Trifluoromethyl-phenyl)-1*H*-indole (3lj):[4] Following the general procedures, the reaction was performed in a 0.5 mmol and 10 mol % $Pd(OAc)_2$ scale at room temperature for 22 h. product **3lj** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0770 g (59%). ^{1}H NMR (300MHz, acetone-d_6) δ 10.36(br, 1H), 7.73 (d, J = 8.9 Hz, 1H), 7.53 (d, J = 7.5 Hz, 2H), 7.50 (d, J = 7.5 Hz, 2H), 7.43-7.24 (m, 4H), 6.64 (s, 1H); ^{13}C NMR (75 MHz, acetone-d_6) δ 140.2, 138.4, 133.9, 130.4, 128.7, 121.9, 120.5, 119.9, 109.6, 101.9; *m/z* (EI) 261 (M^+, 100%), 199 (21%); IR (KBr plate, acetone-d_6)3424, 1330, 1122, 1113, 842, 796, 756.

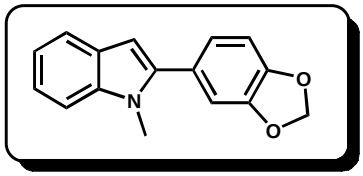


1-Methyl-2-(4-trifluoromethyl-phenyl)-1*H*-indole (3bj):[2] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 16 h. product **3bj** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.1076 g (78%). ^{1}H NMR (300MHz, $CDCl_3$) δ 7.73 (d, J = 8.9 Hz, 1H), 7.53 (d, J = 7.5 Hz, 2H), 7.50 (d, J = 7.5 Hz, 2H), 7.43-7.24 (m, 4H), 6.64 (s, 1H), 3.80 (s, 3H); 13C NMR (75 MHz, $CDCl_3$) δ 140.2, 138.4, 133.9, 130.4, 128.7, 121.9, 120.5, 119.9, 109.6, 101.9, 31.1; *m/z* (EI) 275 (M^+, 100%), 205

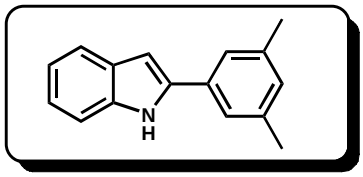
(24%); IR (KBr plate, $CDCl_3$) 3046, 2925, 1466, 1089, 834, 792, 736.



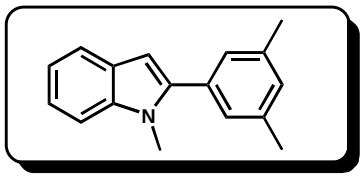
2-Benzo[1,3]dioxol-5-yl-1*H*-indole (3lk):[5] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 12 h. product **3lk** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0628 g (53%). ^{1}H NMR (300 MHz, acetone-d_6): 11.6 (s, 1 H), 7.87 (d, *J* = 8.4 Hz, 2 H), 7.52 (d, *J* = 7.8 Hz, 1 H), 7.41-7.49 (m, 3 H), 7.29-7.34 (m, 1 H), 7.09-7.14 (m, 1 H), 6.99-7.04 (m, 1 H), 6.91 (d, *J* = 0.9 Hz, 1 H). ^{13}C NMR (75 MHz, acetone-d_6): 147.6, 147.4, 141.2, 138.1, 127.8, 126.7, 123.2, 121.5, 119.8, 109.7, 109.5, 108.3, 101.3, 101.2. *m/z* (EI) 237 (M^+, 100%), 178 (17%); IR (KBr plate, acetone-d_6) 3417, 2899, 1702, 1481, 1451, 1041, 789, 750.



2-Benzo[1,3]dioxol-5-yl-1-methyl-1*H*-indole (3bk):[5] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 16 h. product **3bk** was obtained after silica gel chromatography (5:1 hexanes: dichloromethane), yield 0.0778 g (62%). ^{1}H NMR (300 MHz, $CDCl_3$): 7.53 (d, *J* = 7.8 Hz, 1 H), 7.23 (m, 1 H), 7.15 (m, 1 H), 7.05 (m, 1 H), 6.88-6.79 (m, 3 H), 6.41 (s, 1 H), 5.89 (s, 2 H), 3.50(s, 3 H). ^{13}C NMR (75 MHz, $CDCl_3$): 147.6, 147.4, 141.2, 138.1, 127.8, 126.7, 123.2, 121.5, 119.8, 109.7, 109.5, 108.3, 101.3, 101.2, 29.7. *m/z* (EI) 251 (M^+, 100%), 192 (12%); IR (KBr plate, $CDCl_3$) 2955, 2923, 2853, 1475, 1232, 1039, 781, 750.



2-(3,5-Dimethyl-phenyl)-1*H*-indole (3ll):[8] Following the general procedures, the reaction was performed in a 0.5 mmol and 10 mol % $Pd(OAc)_2$ scale at room temperature for 10 h. product **3ll** was obtained after silica gel chromatography (4:1 hexanes: dichloromethane), yield 0.0685 g (62%). ^{1}H NMR (300 MHz, acetone-d_6) δ 8.35 (bs, 1 H), 7.73 (d, *J* = 8.1 Hz, 1 H), 7.46-7.20 (m, 5 H), 7.06 (s, 1 H), 6.90-6.87 (m, 1 H), 2.47 (s, 6 H); ^{13}C NMR (75 MHz, acetone-d_6): δ 138.6, 138.3, 136.8, 132.3, 129.6, 129.4, 123.1, 122.2, 120.7, 120.2, 111.0, 99.8, 21.5. *m/z* (EI) 221 (M^+, 100%), 191 (38%); IR (KBr plate, acetone-d_6) ν 3402, 3049, 2918, 1607, 1457, 1311, 844, 797, 744. Anal. Calcd. for $C_{16}H_{15}N$: C, 86.84; H, 6.83; N, 6.33. Found: C, 86.72; H, 6.84; N, 6.69.



2-(3,5-Dimethyl-phenyl)-1-methyl-1*H*-indole (3bl):[3] Following the general procedures, the reaction was performed in a 0.5 mmol and 5 mol % $Pd(OAc)_2$ scale at room temperature for 8 h. product **3bl** was obtained after silica gel chromatography (10:1 hexanes: dichloromethane), yield 0.0587 g (50%). ^{1}H NMR (300 MHz,$CDCl_3$) δ 8.35 (bs, 1 H), 7.73 (d, *J* = 8.1 Hz, 1 H), 7.46-7.20 (m, 5 H), 7.06 (s, 1 H), 6.90-6.87 (m, 1 H), 2.47 (s, 6 H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 138.6, 138.3, 136.8, 132.3, 129.6, 129.4, 123.1, 122.2, 120.7, 120.2, 111.0, 99.8, 21.5. *m/z* (EI) 235 (M^+, 100%), 197 (34%); IR (KBr plate, $CDCl_3$) ν3050, 1465, 1146, 776, 749, 701.

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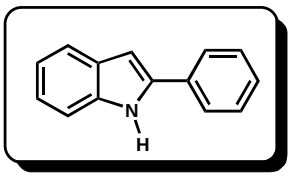
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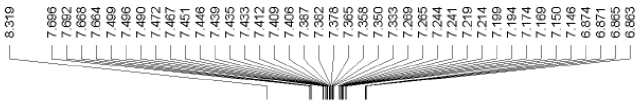
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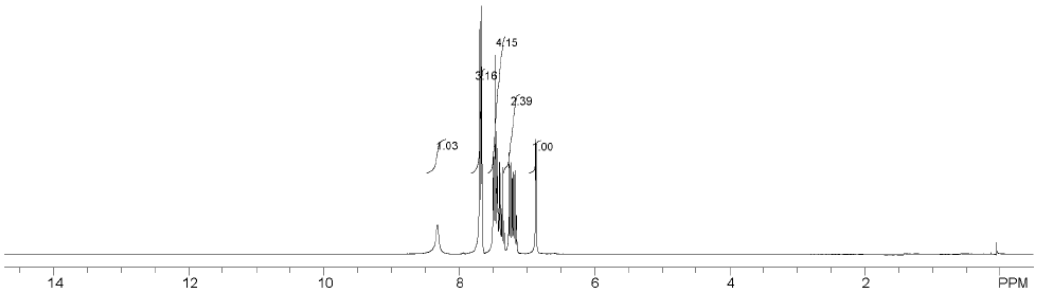
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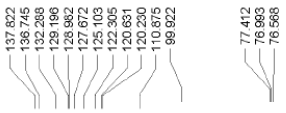
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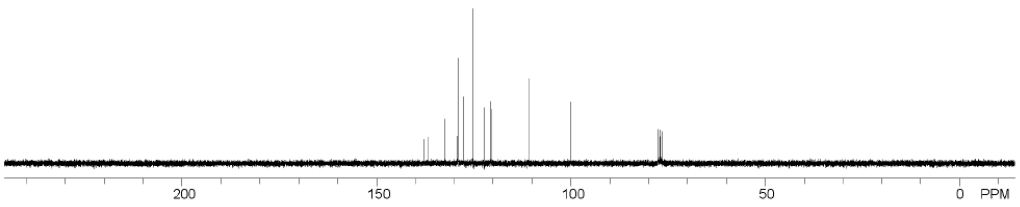
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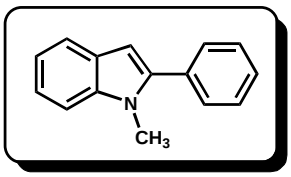
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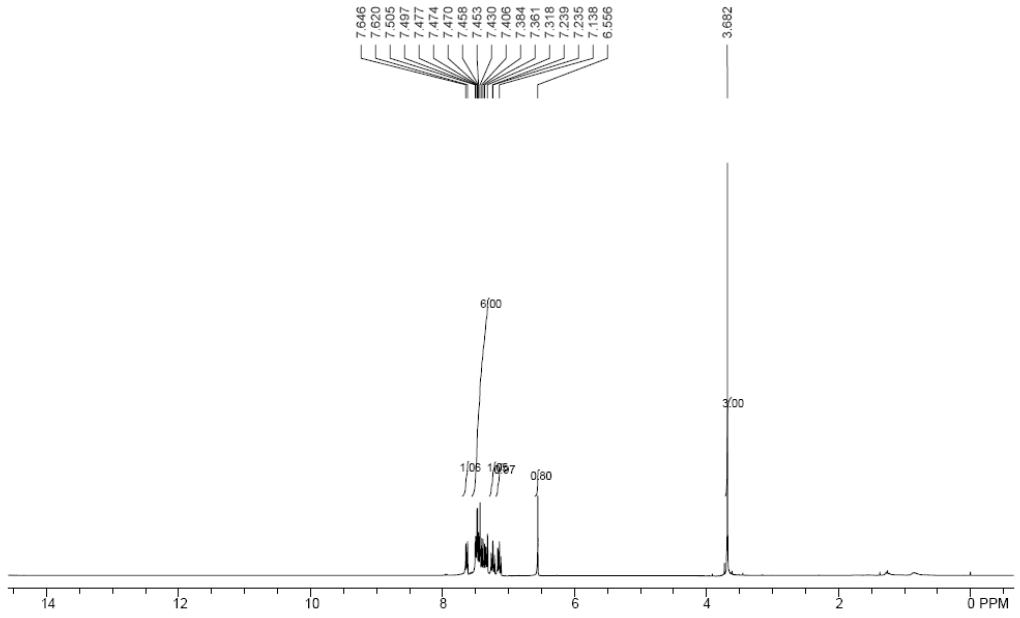
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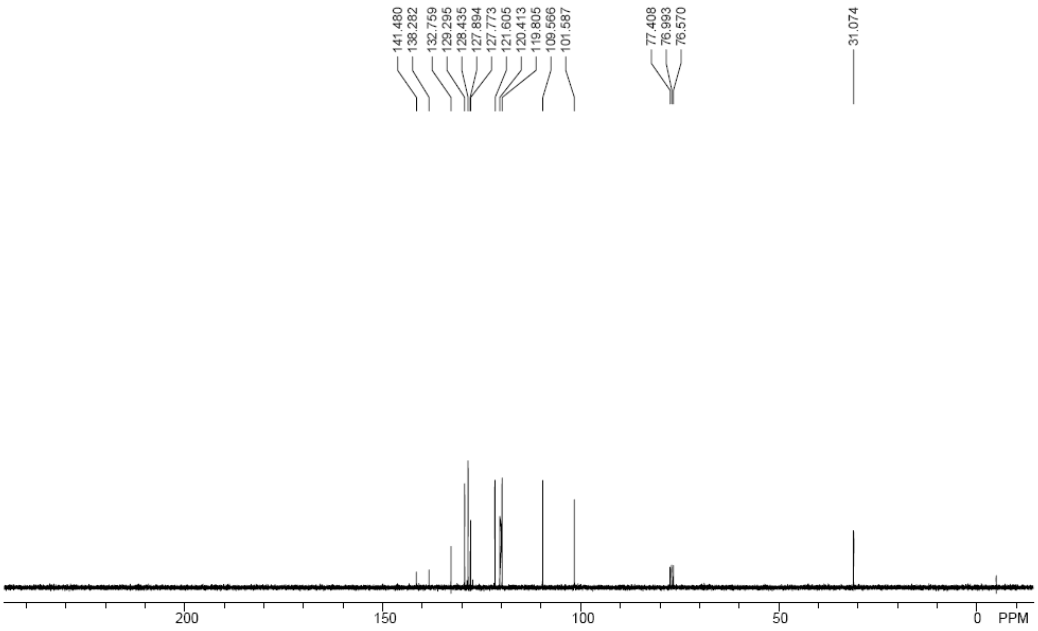
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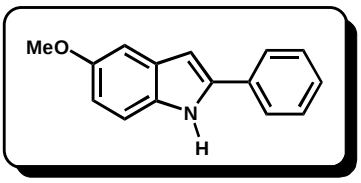
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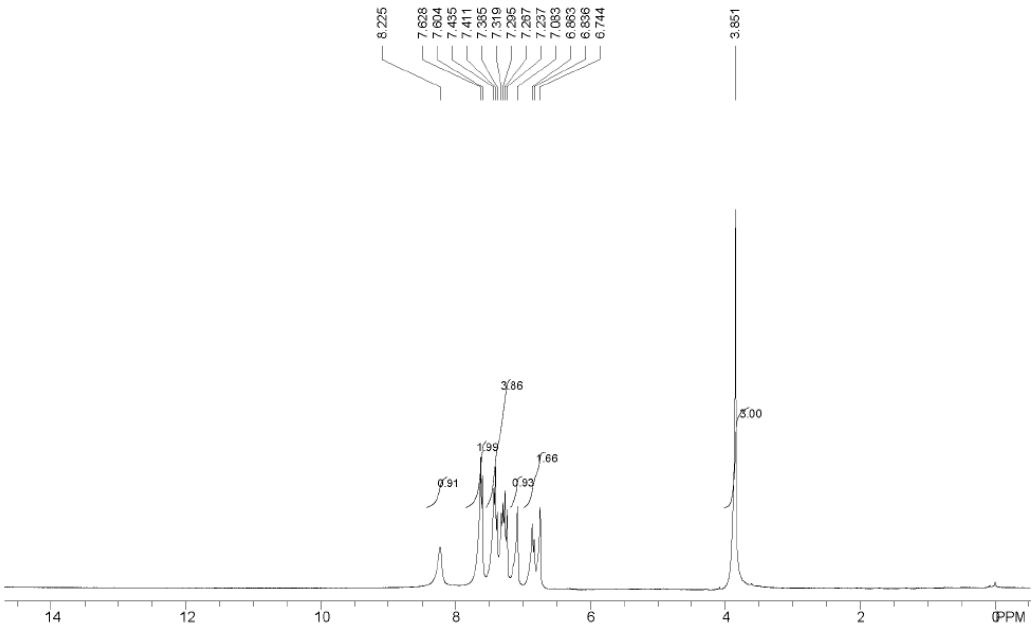
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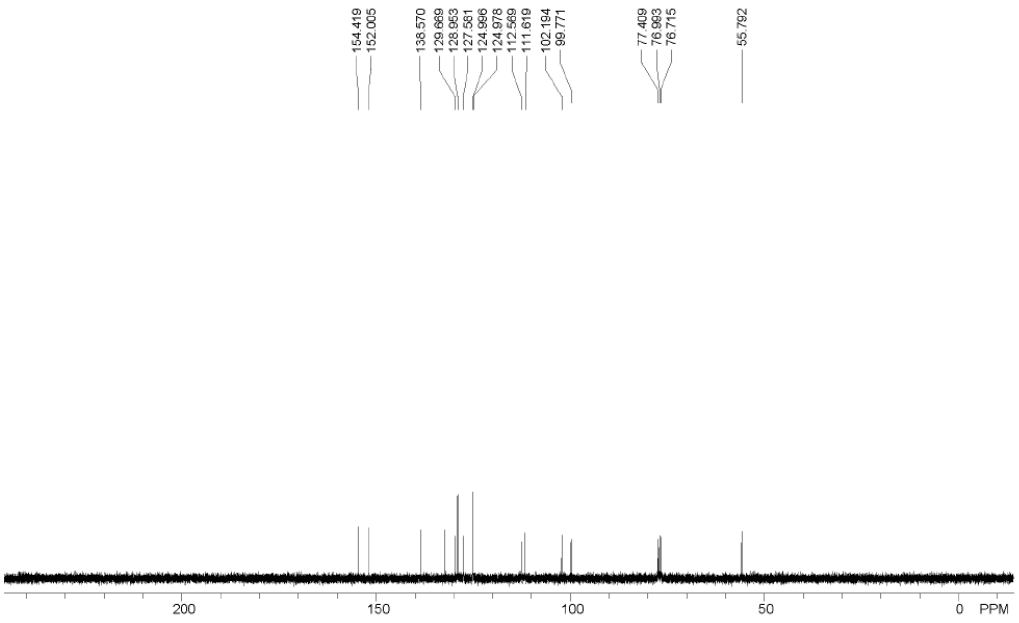
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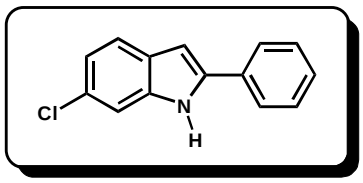
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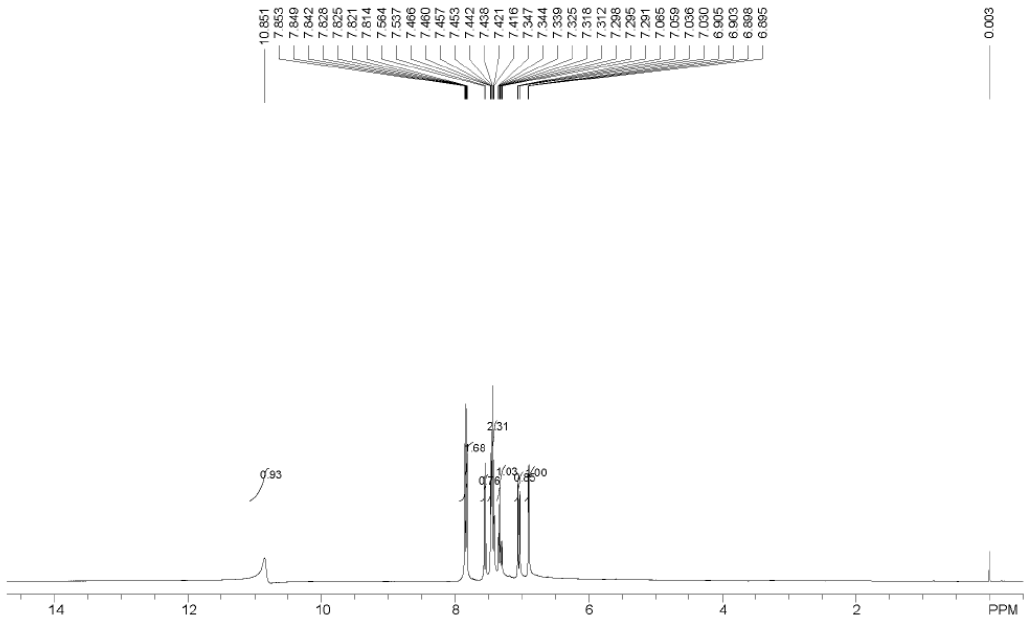
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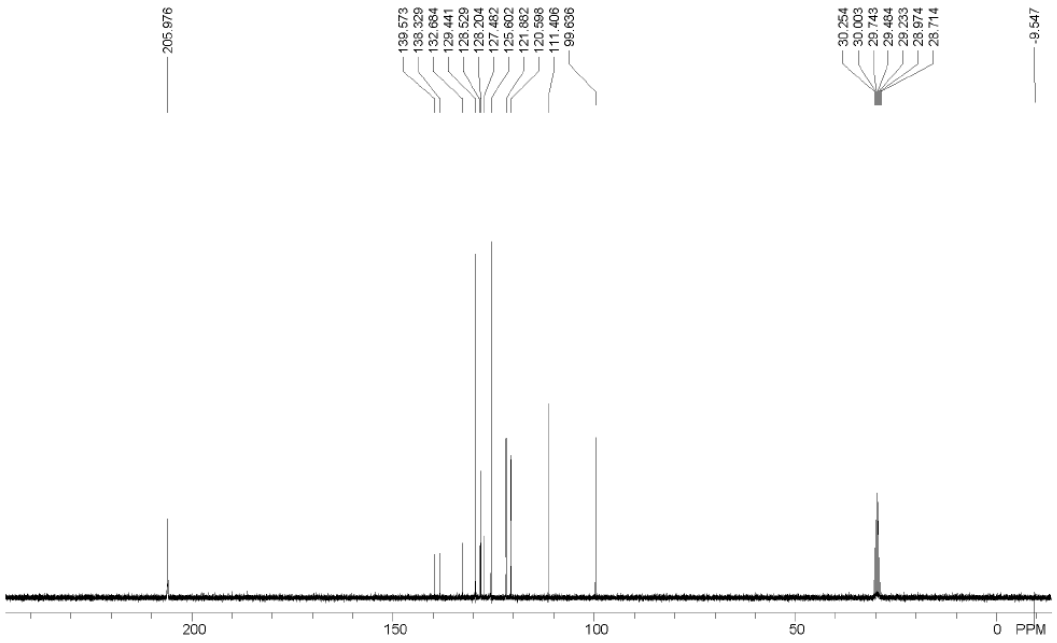
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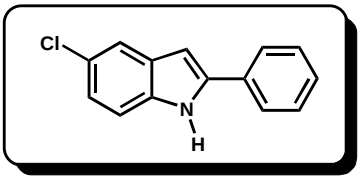
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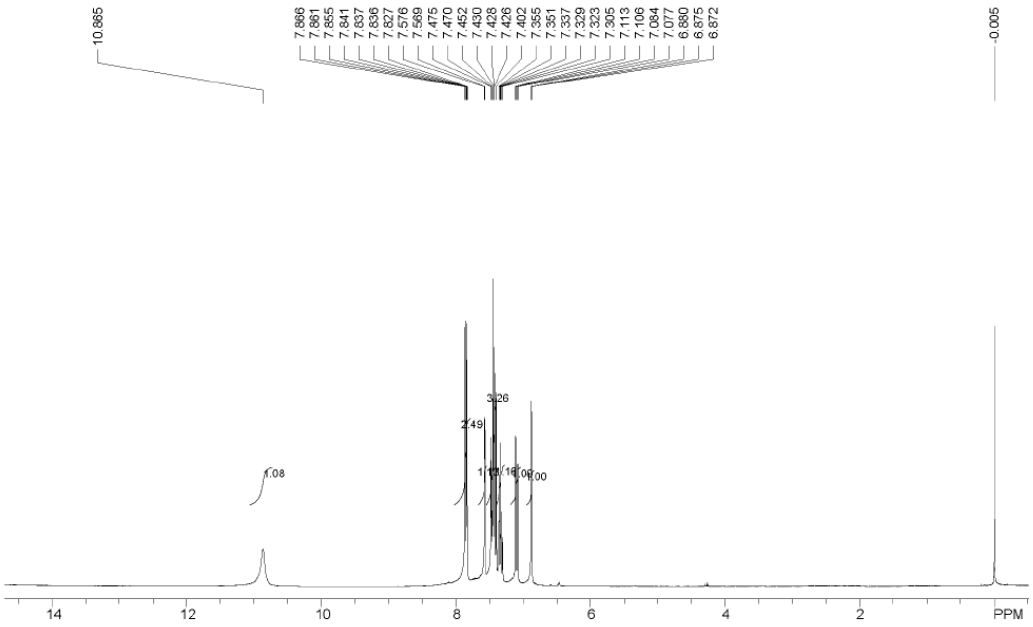
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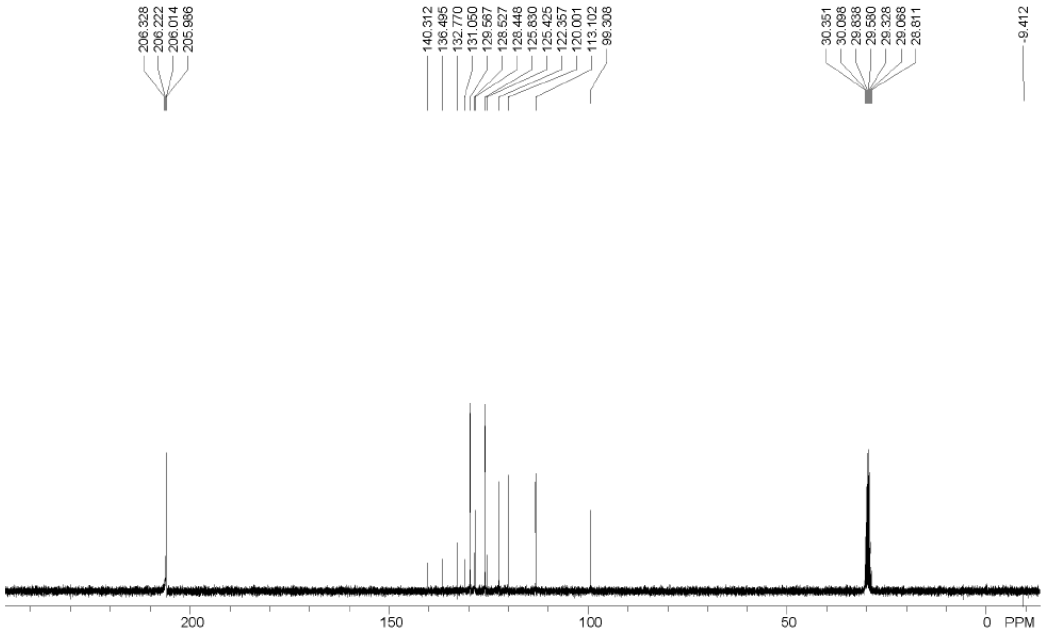
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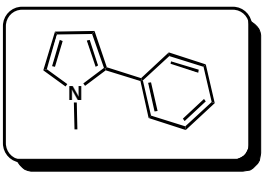

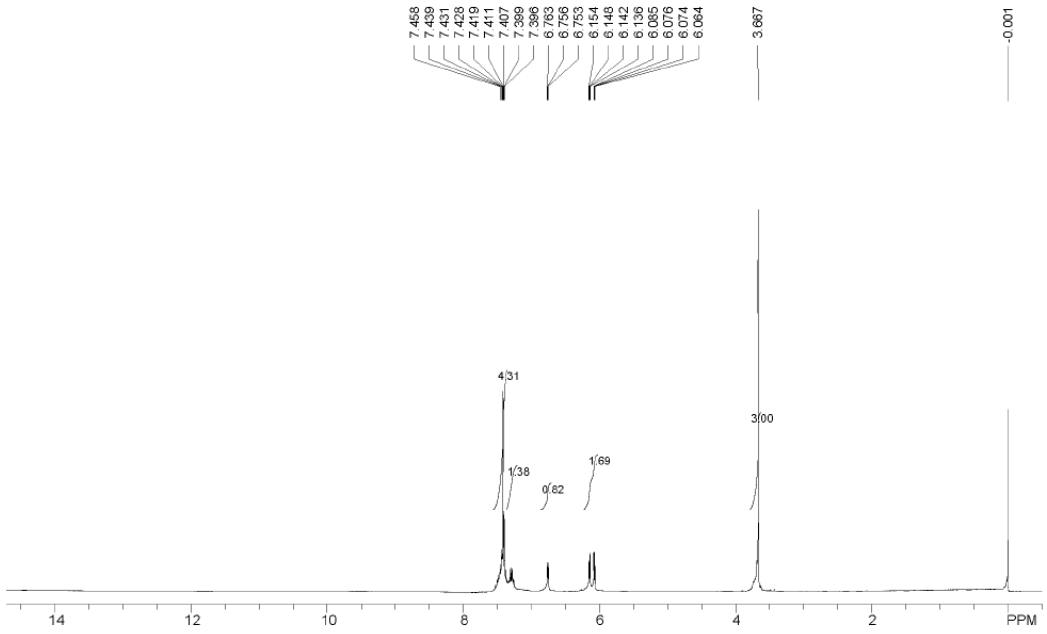
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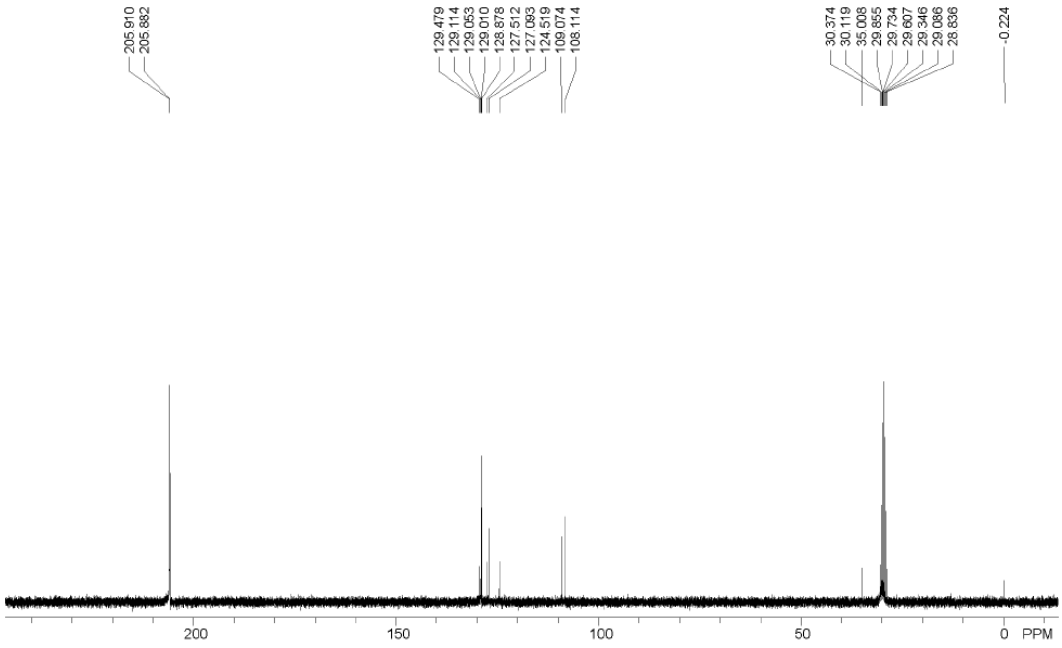
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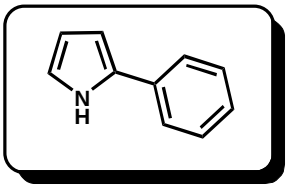

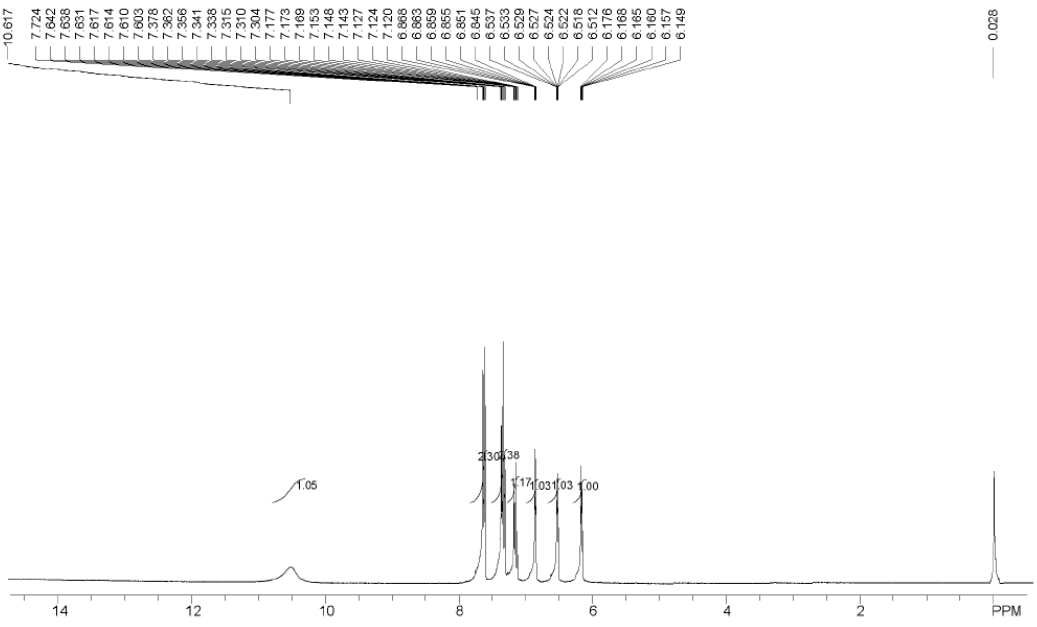
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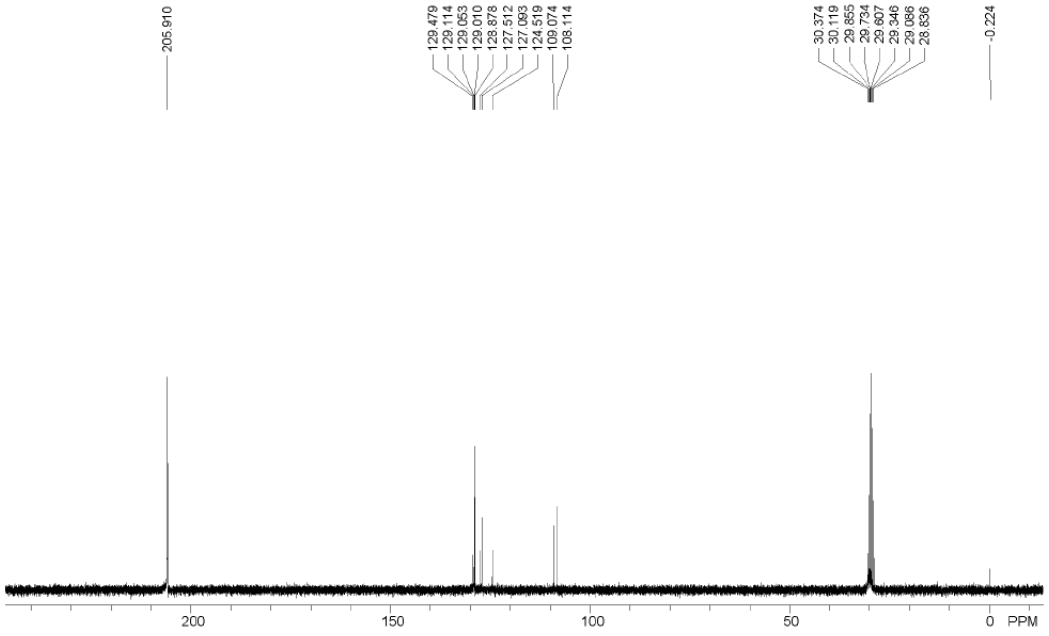
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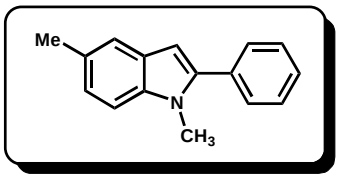
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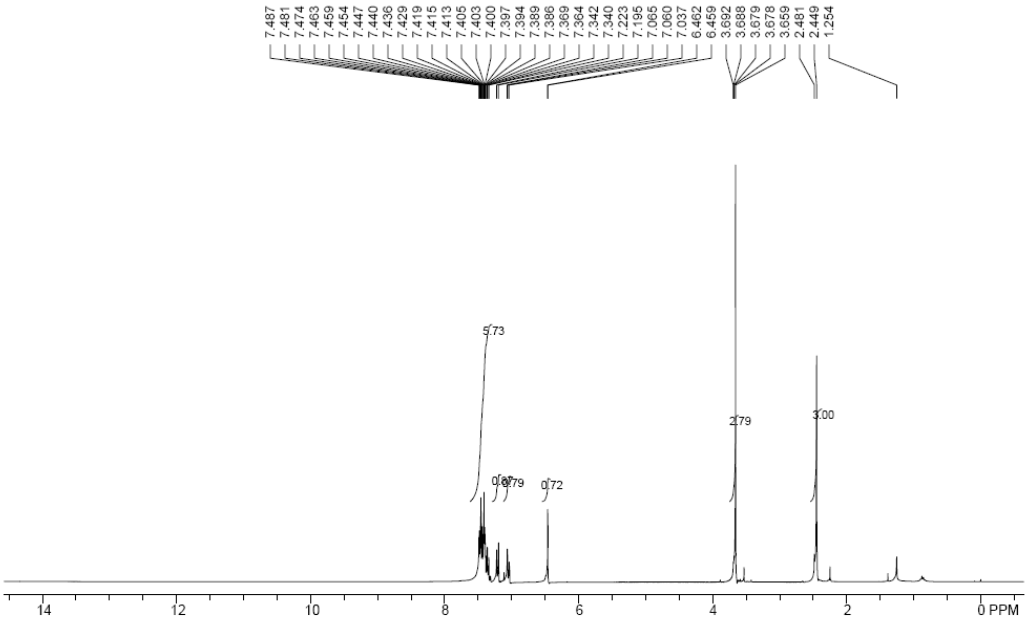
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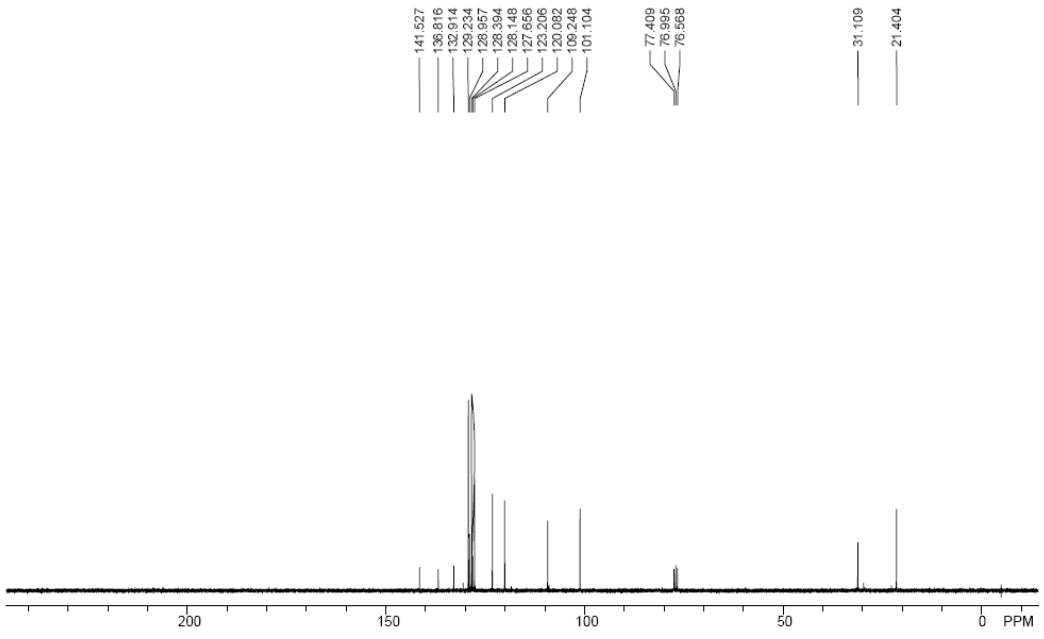
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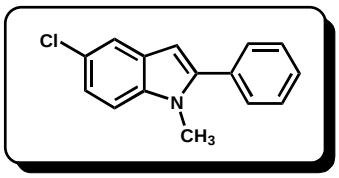
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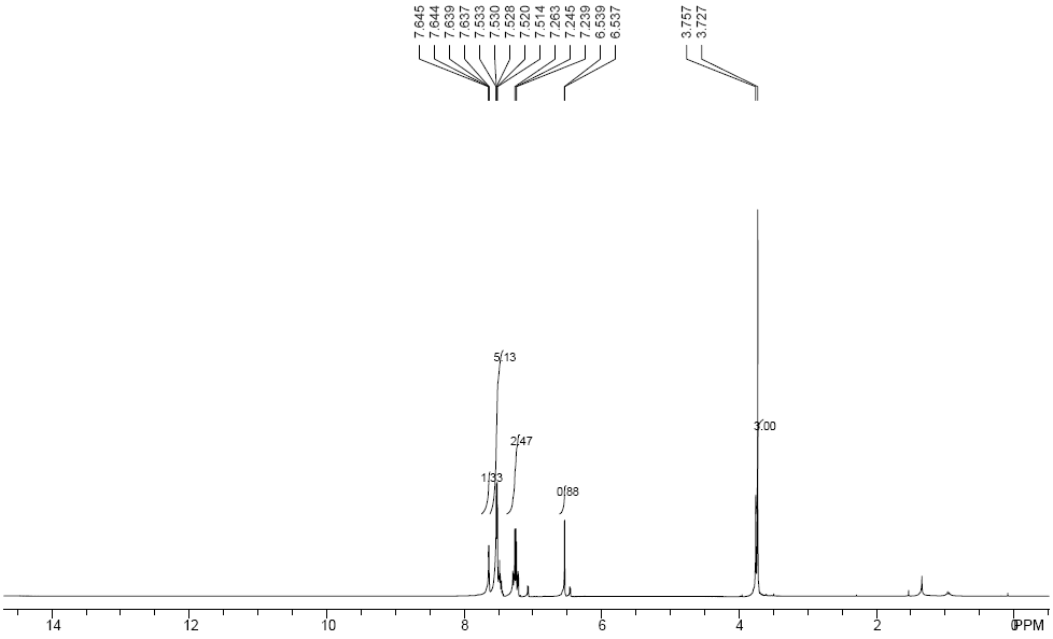
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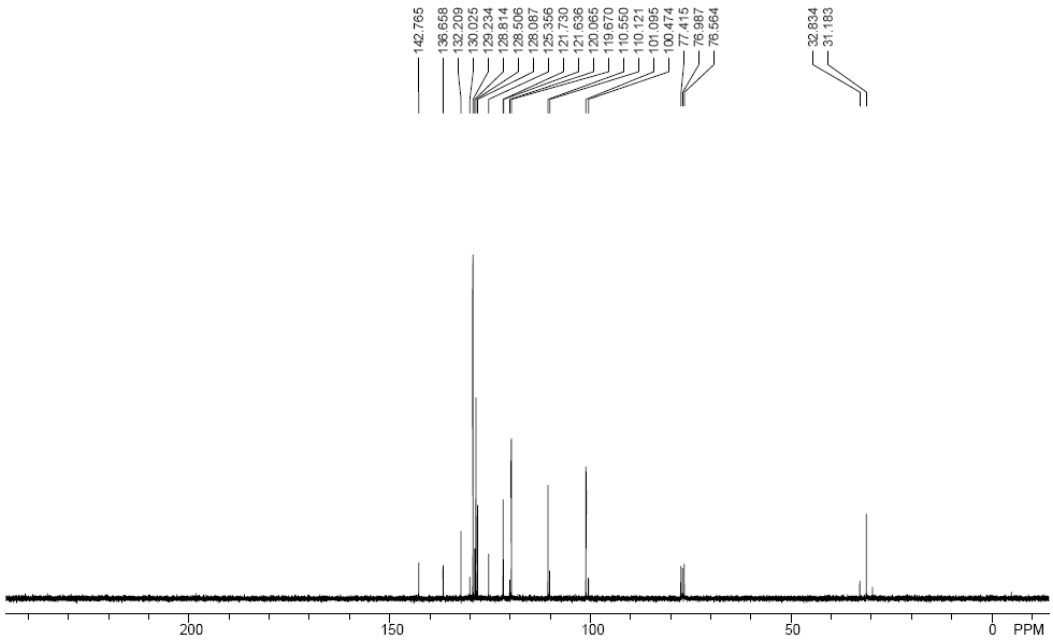
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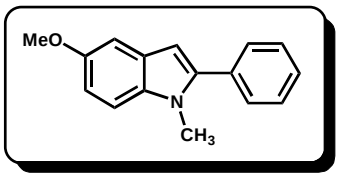
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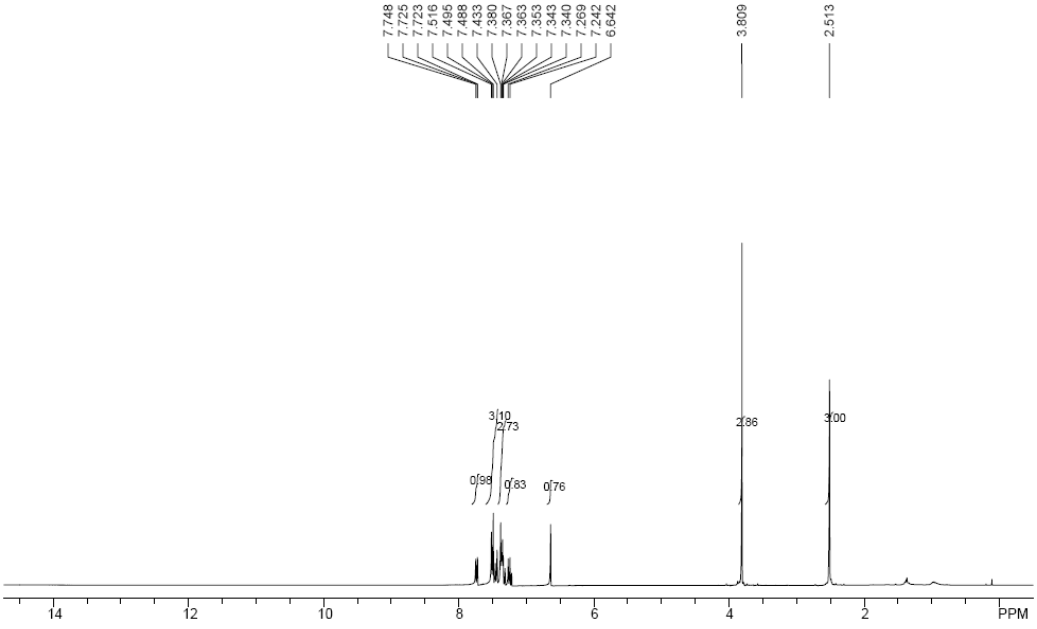
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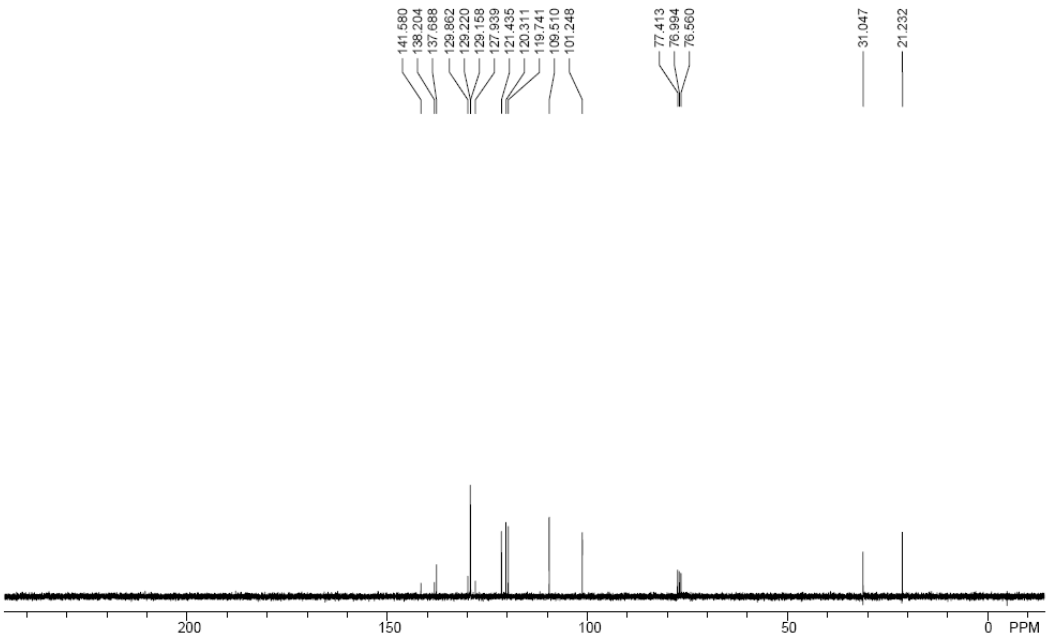
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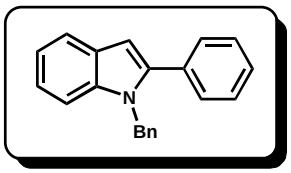
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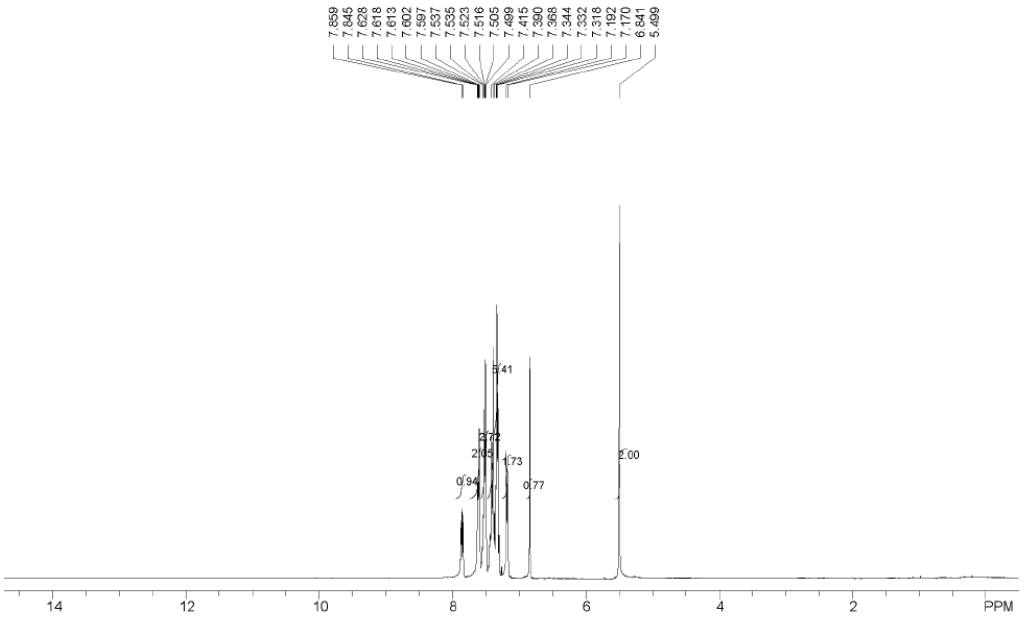
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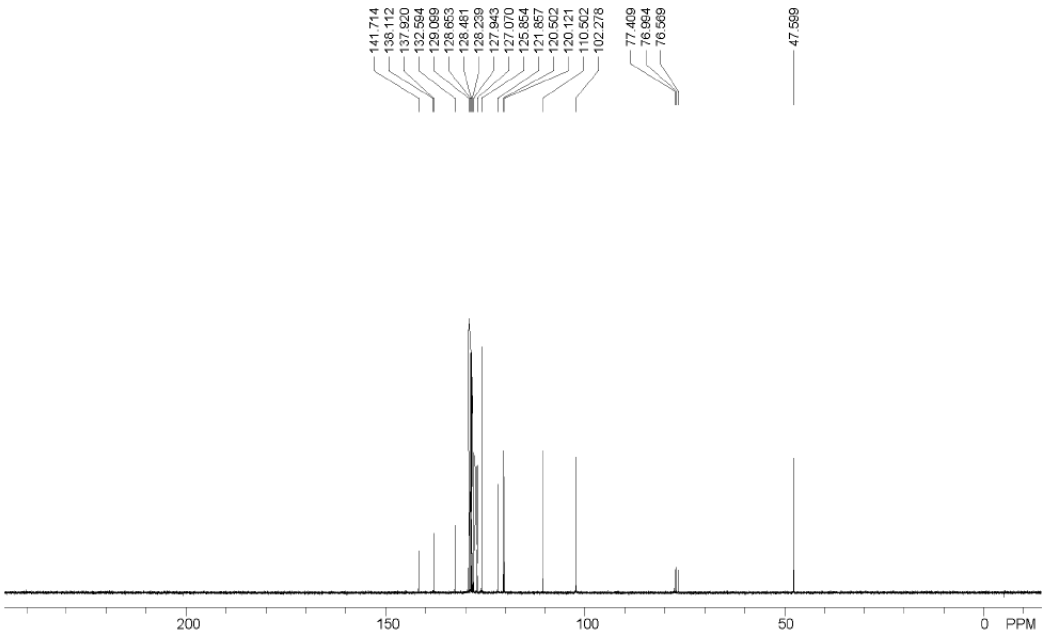
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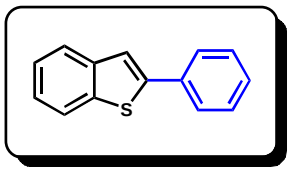

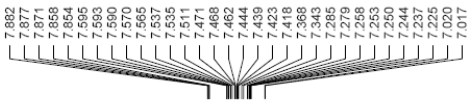
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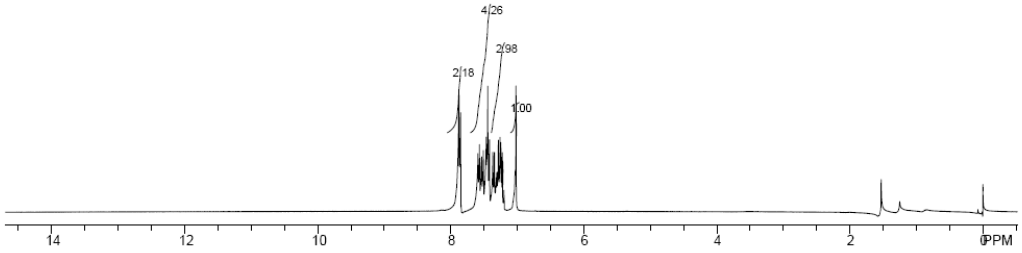
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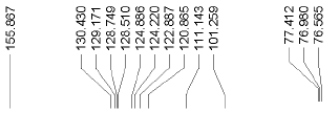
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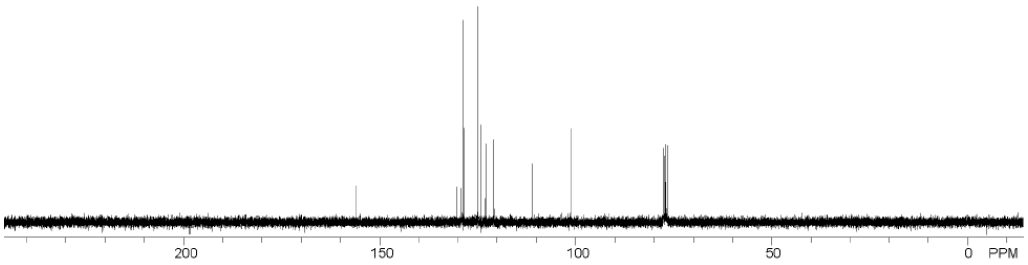
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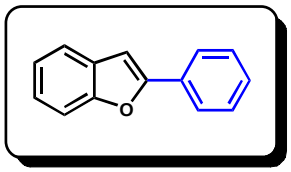

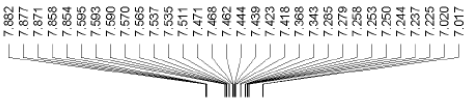
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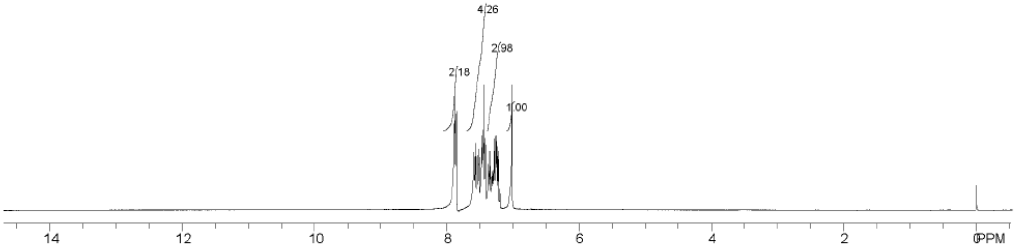
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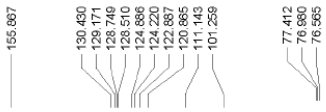
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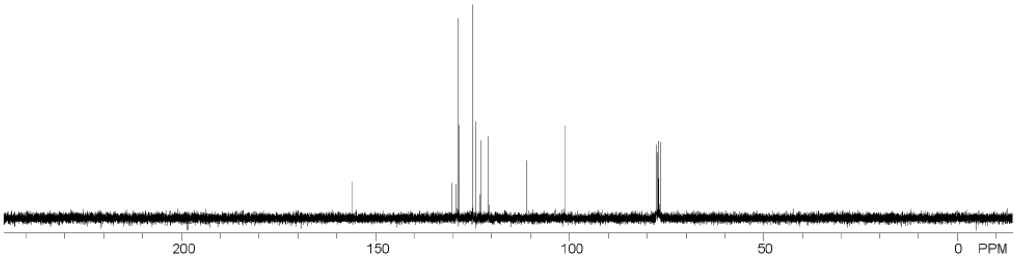
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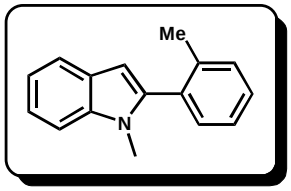
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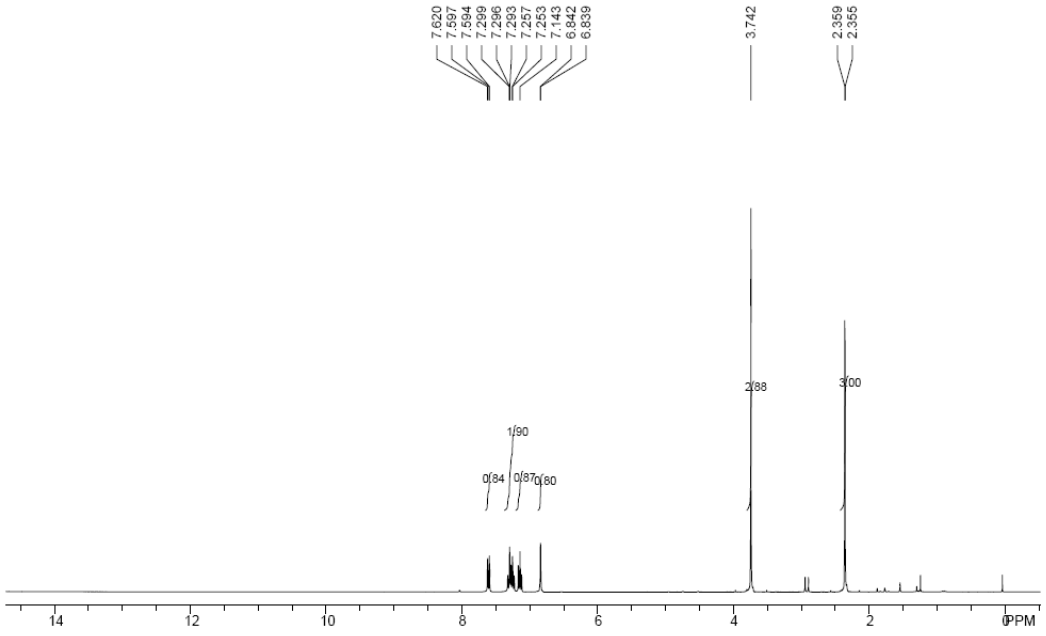
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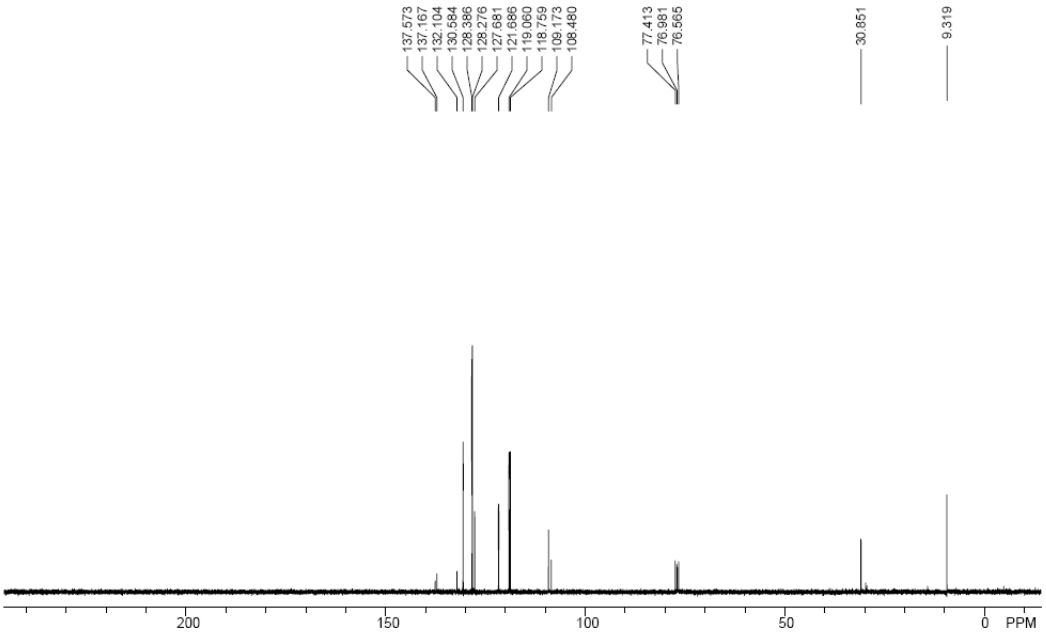
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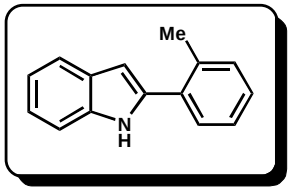
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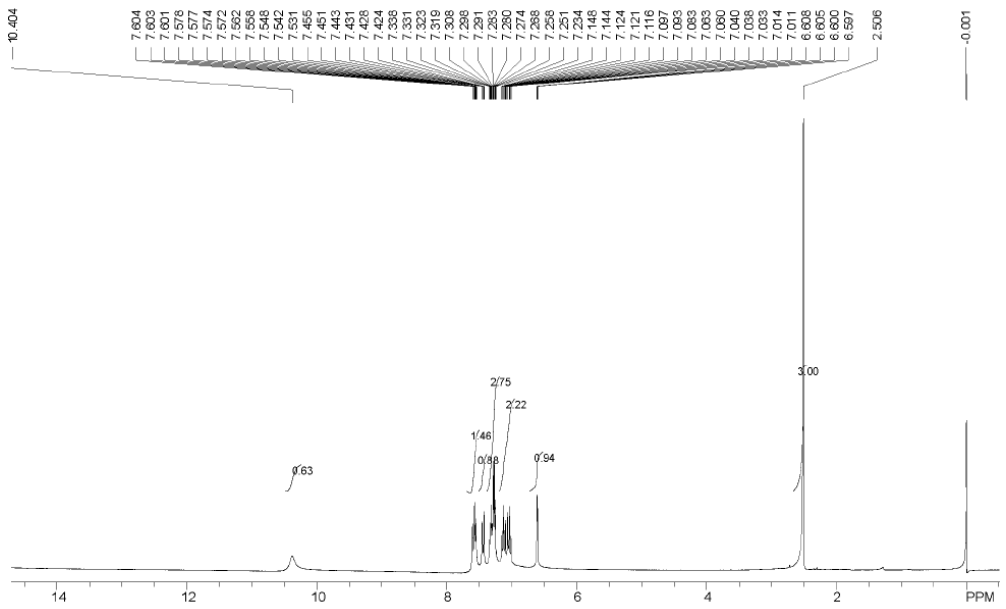
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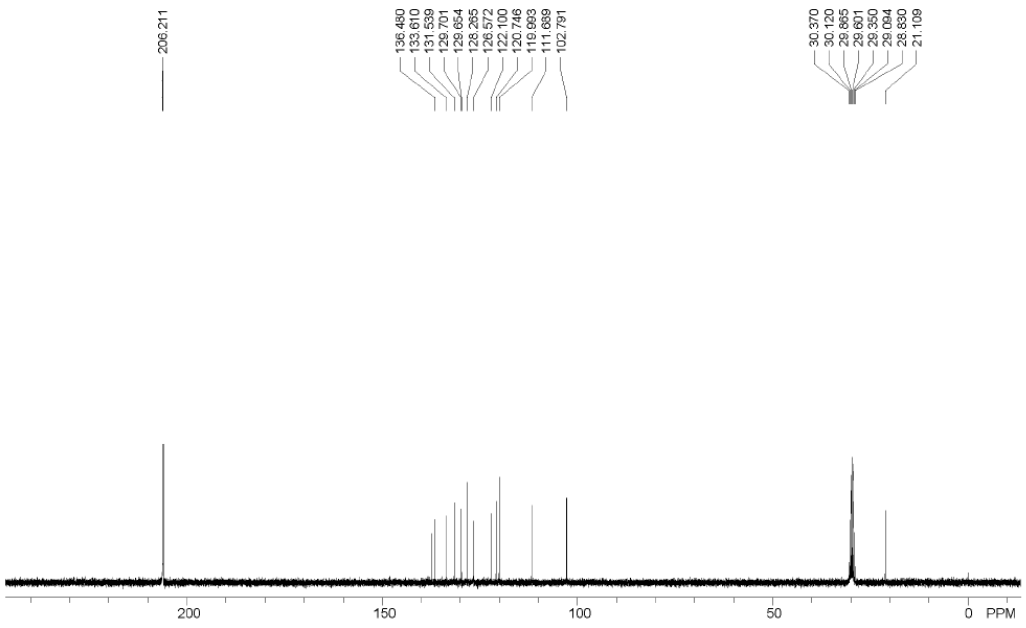
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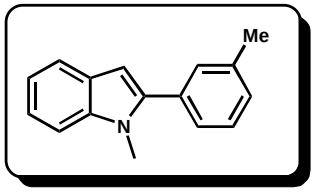
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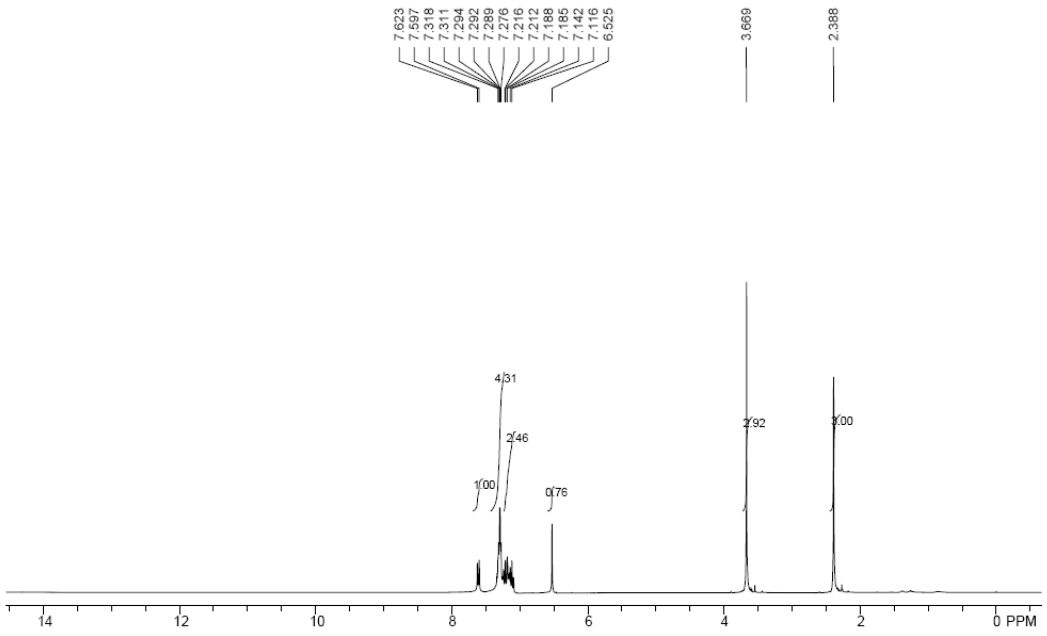
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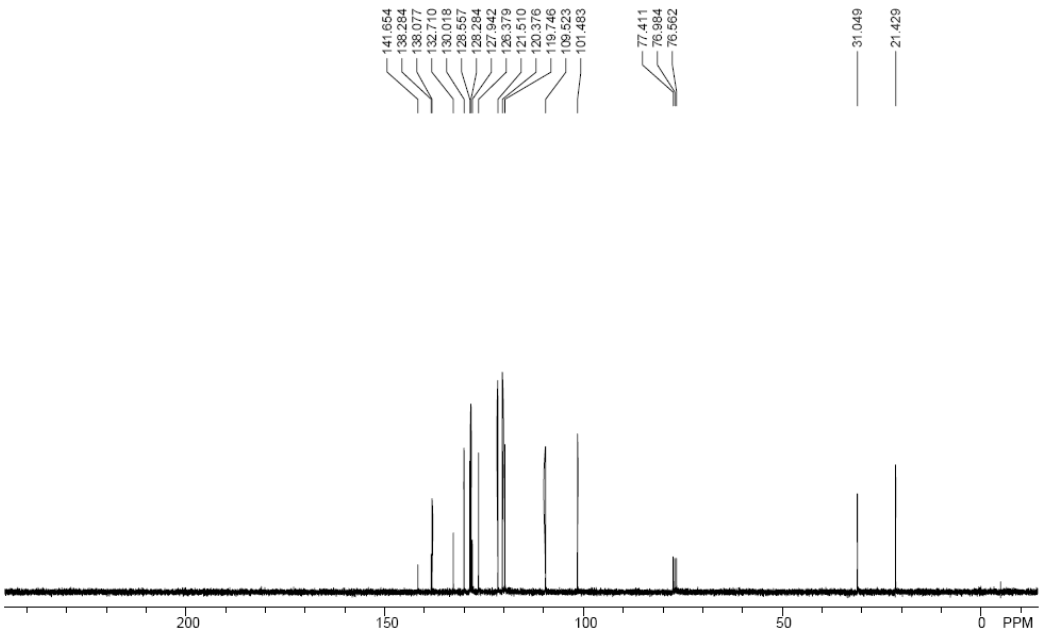
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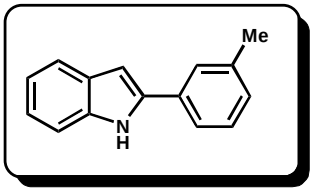
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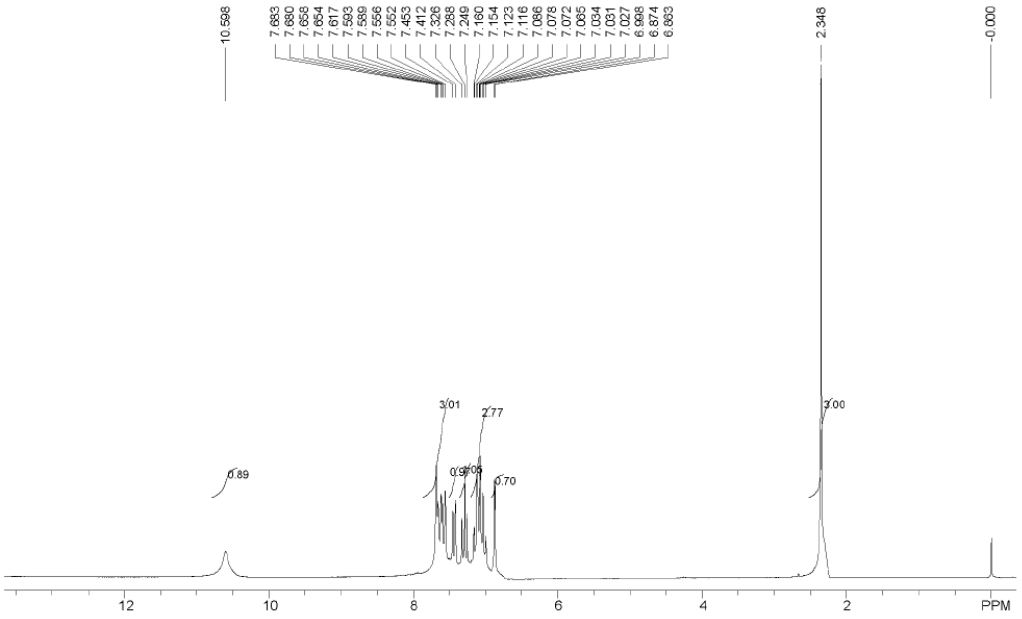
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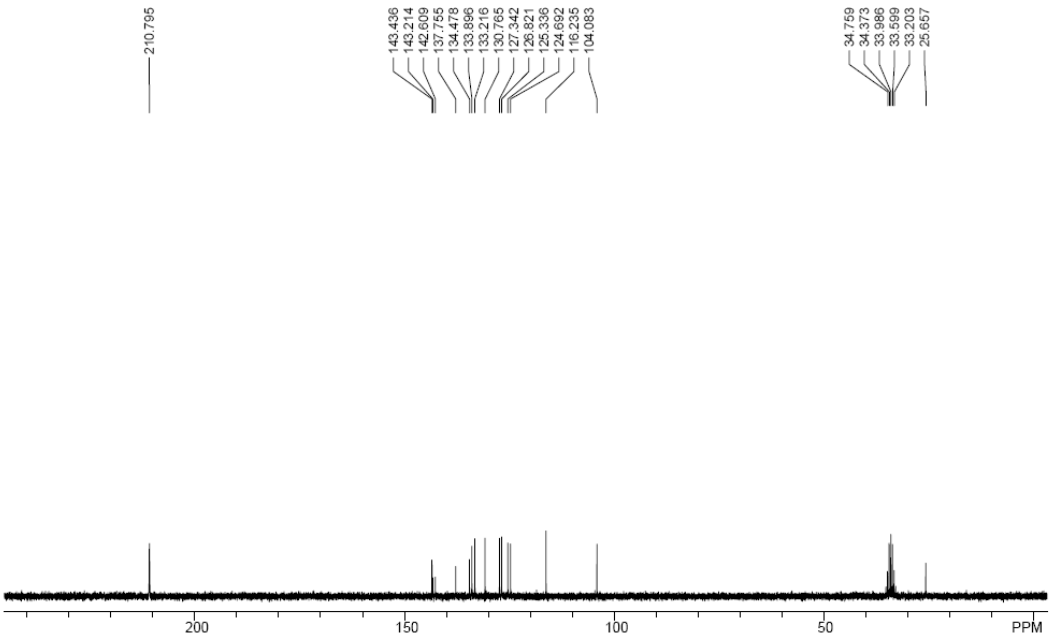
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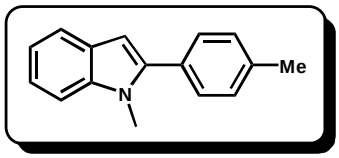
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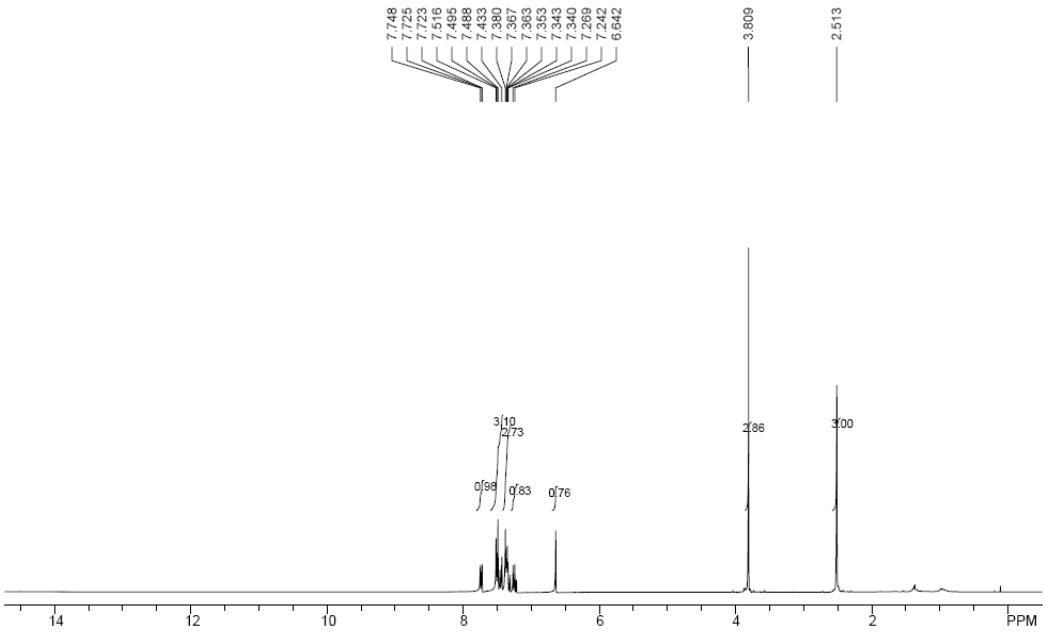
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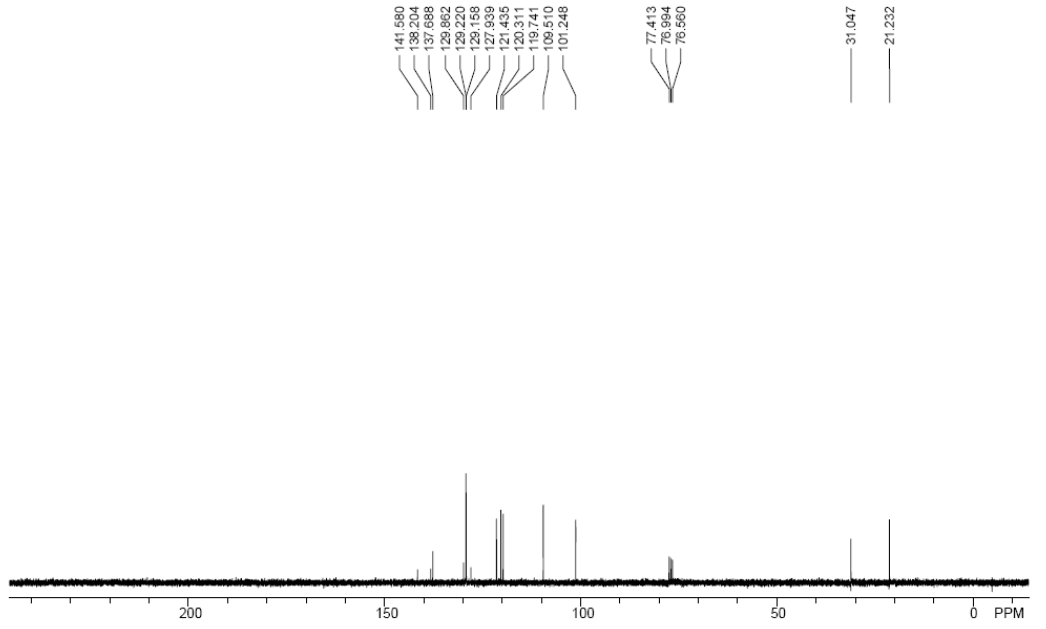
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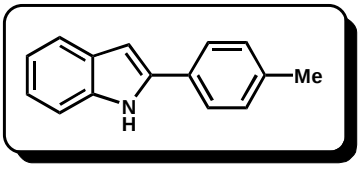
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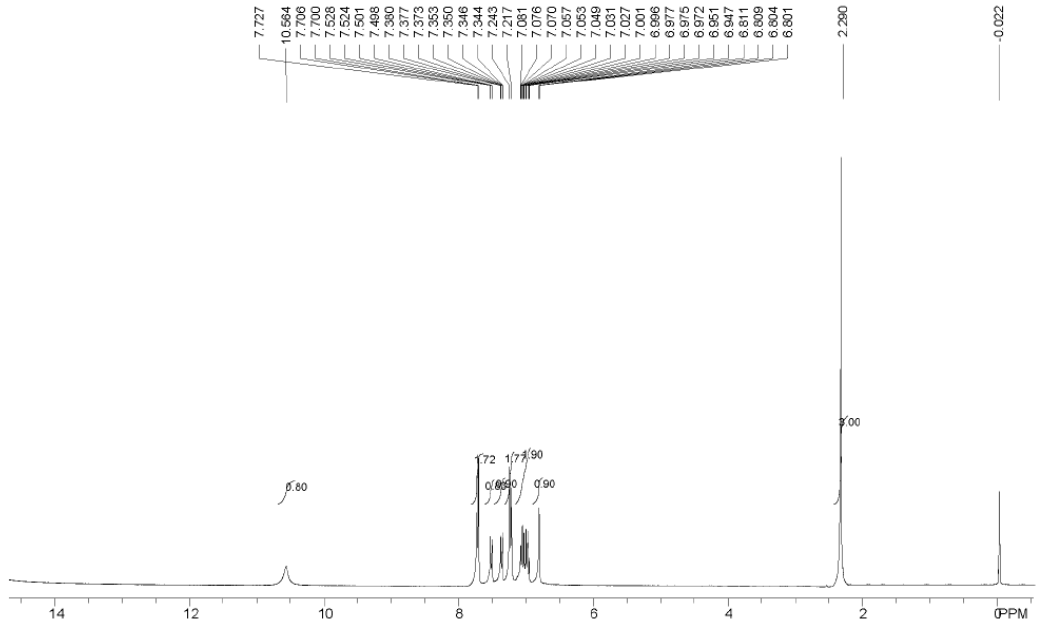
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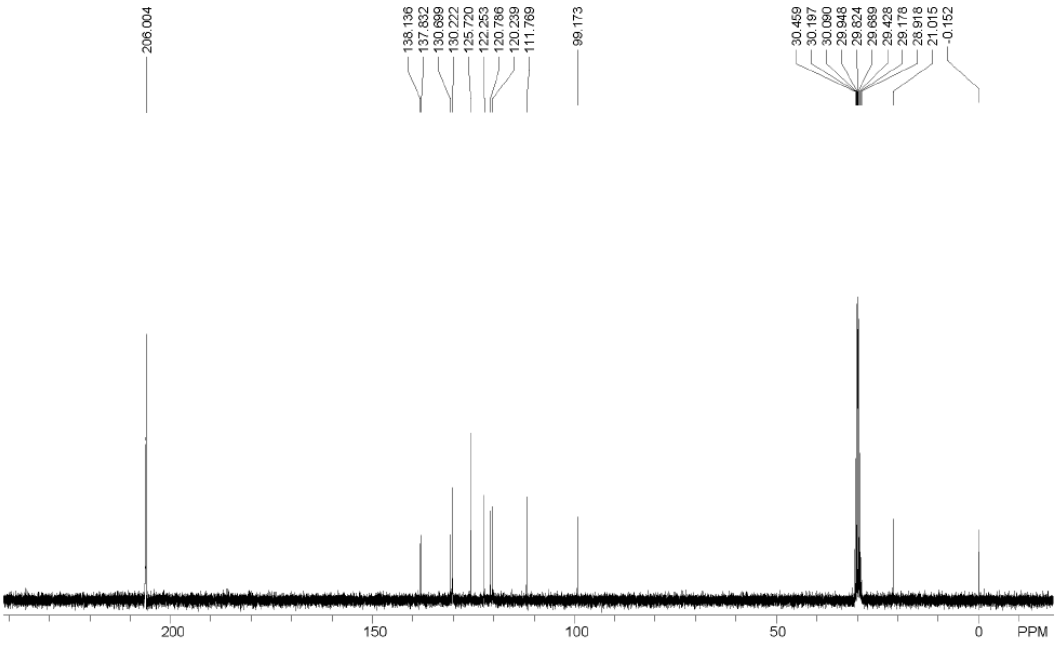
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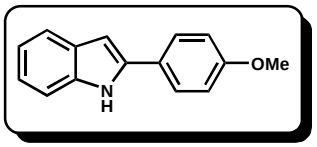
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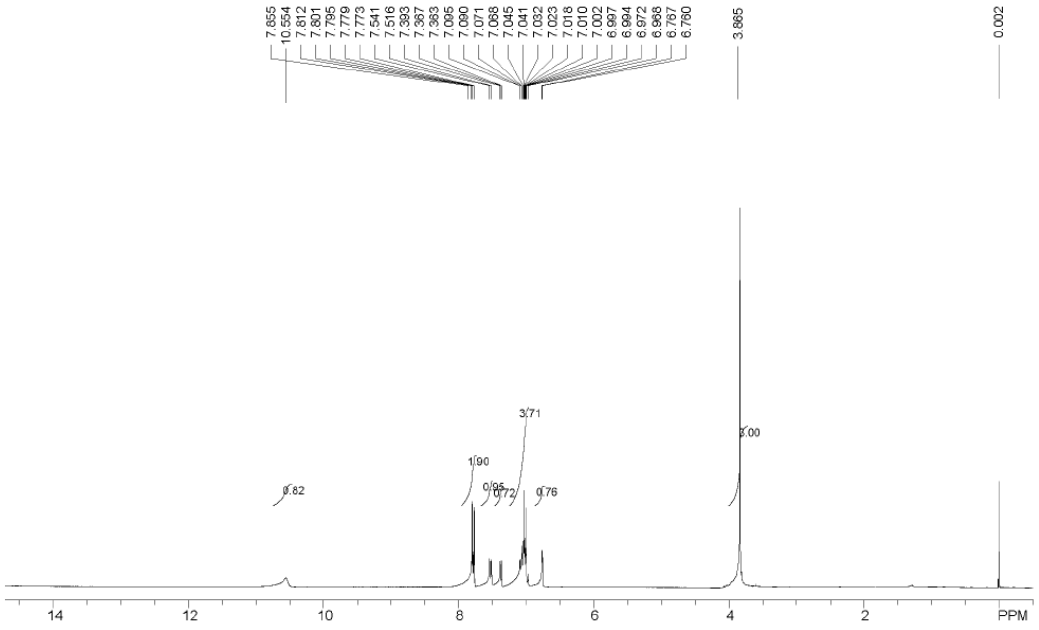
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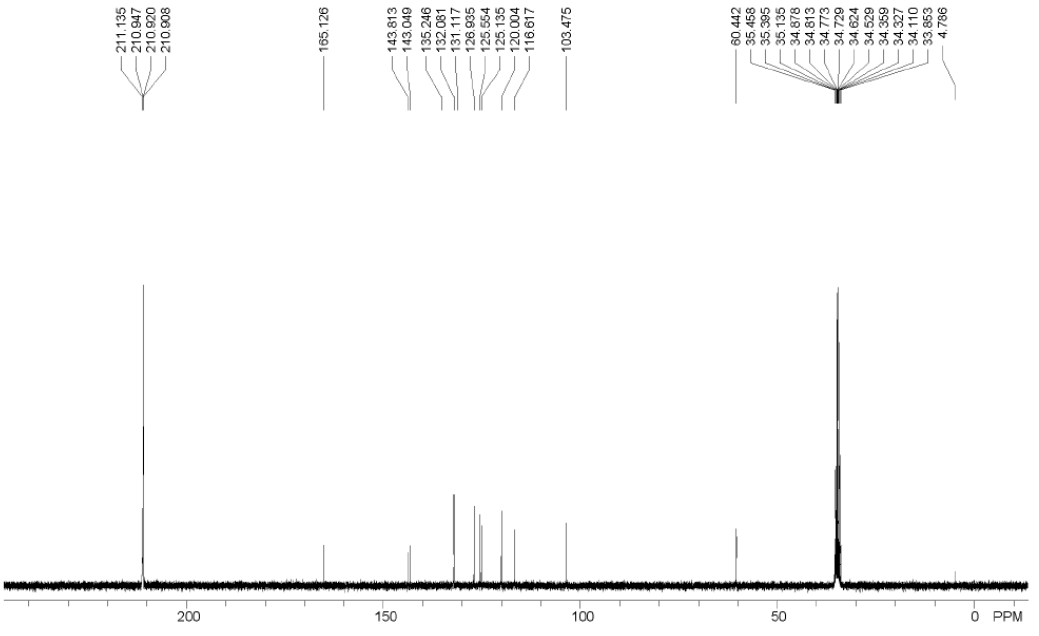
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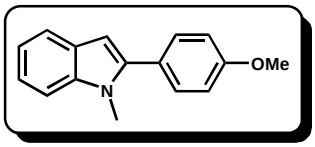
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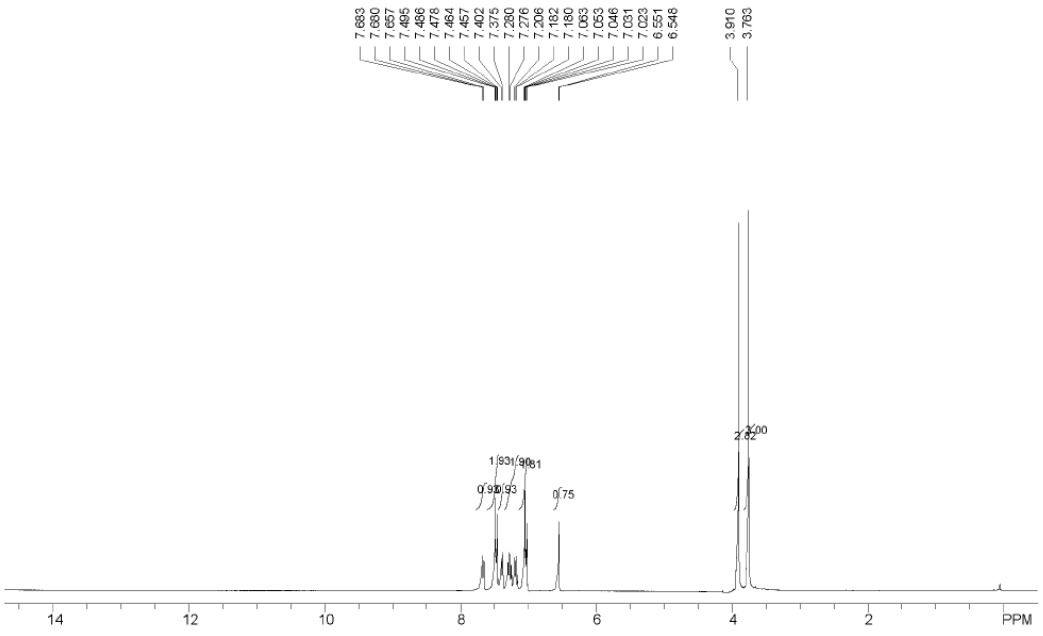
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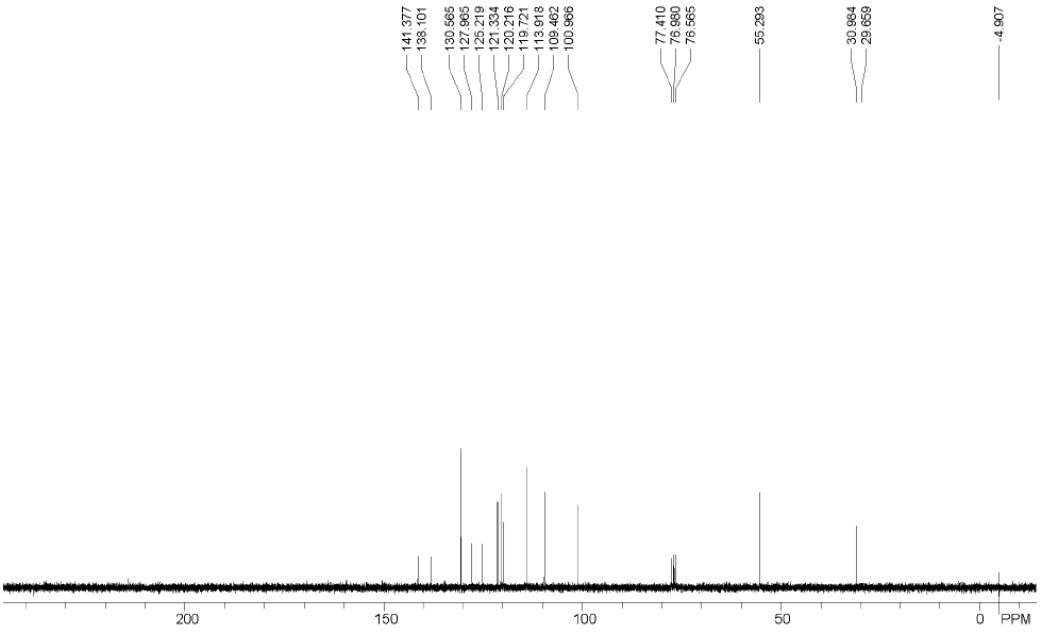
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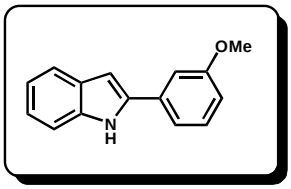
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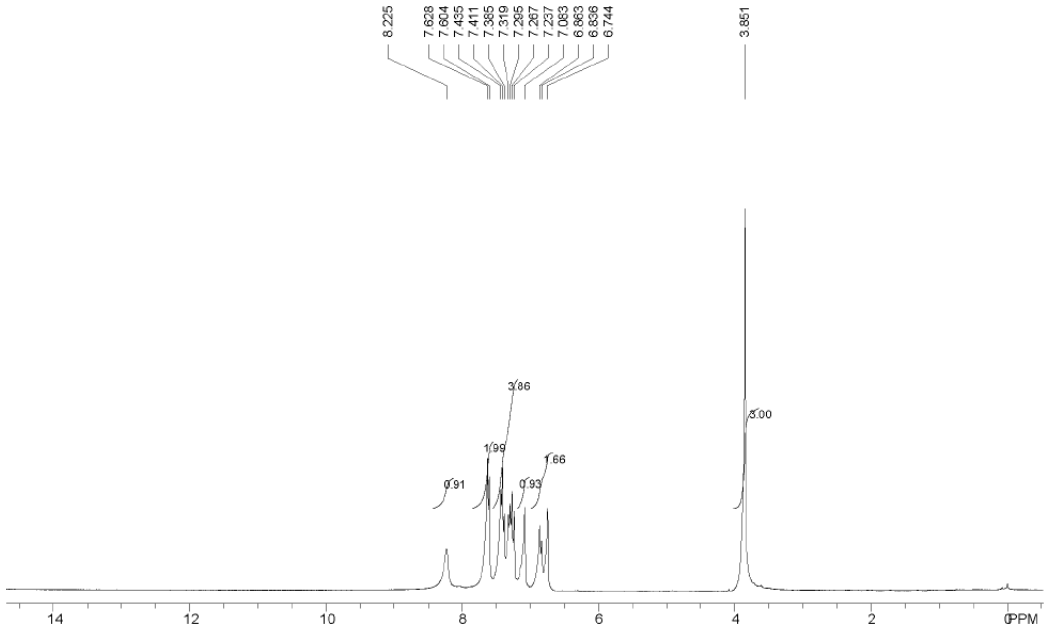
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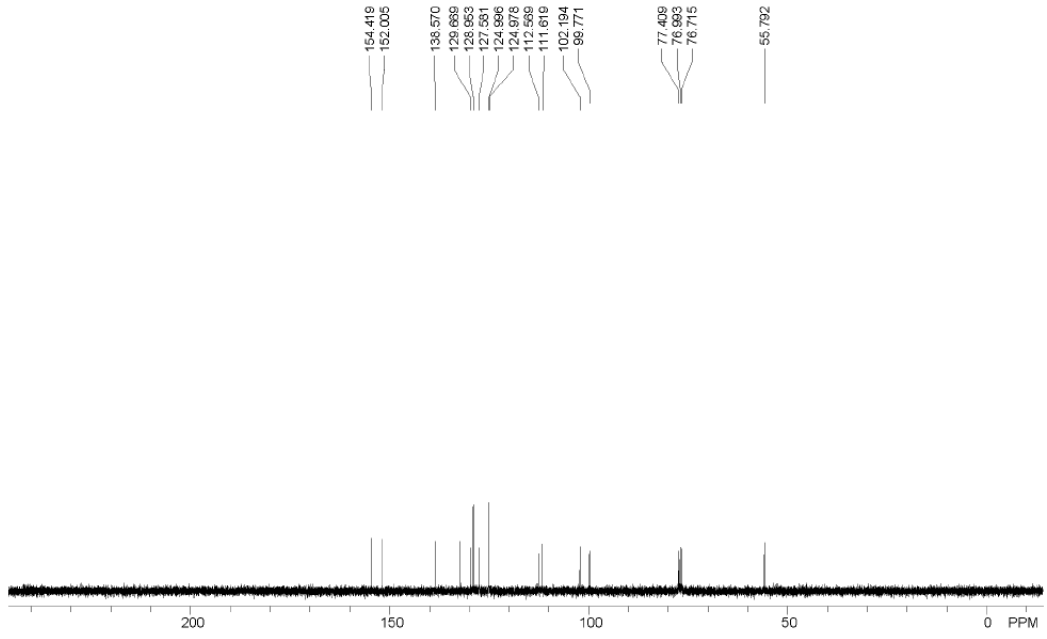
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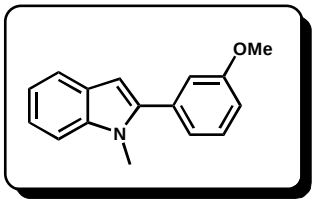
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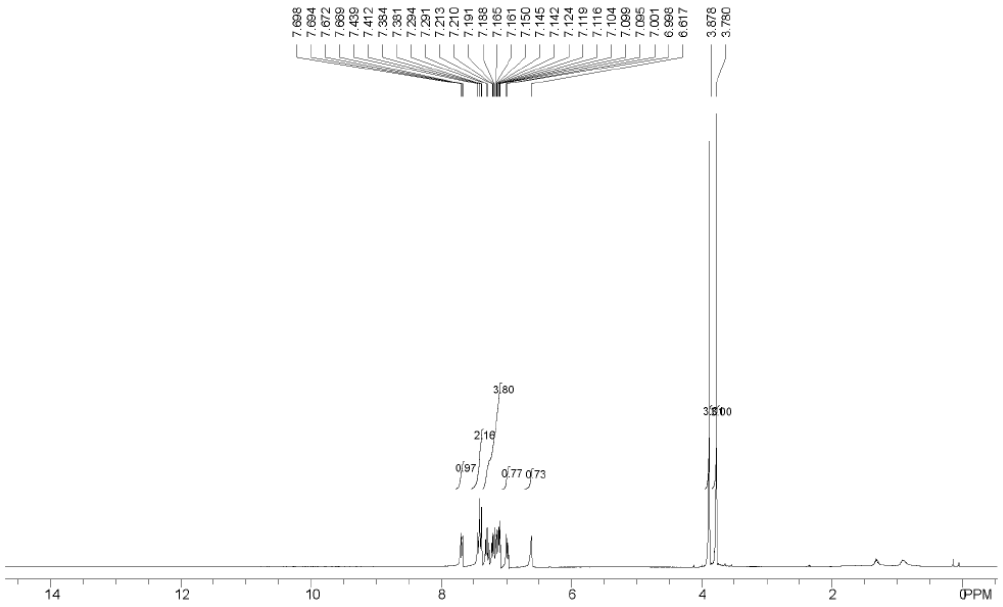
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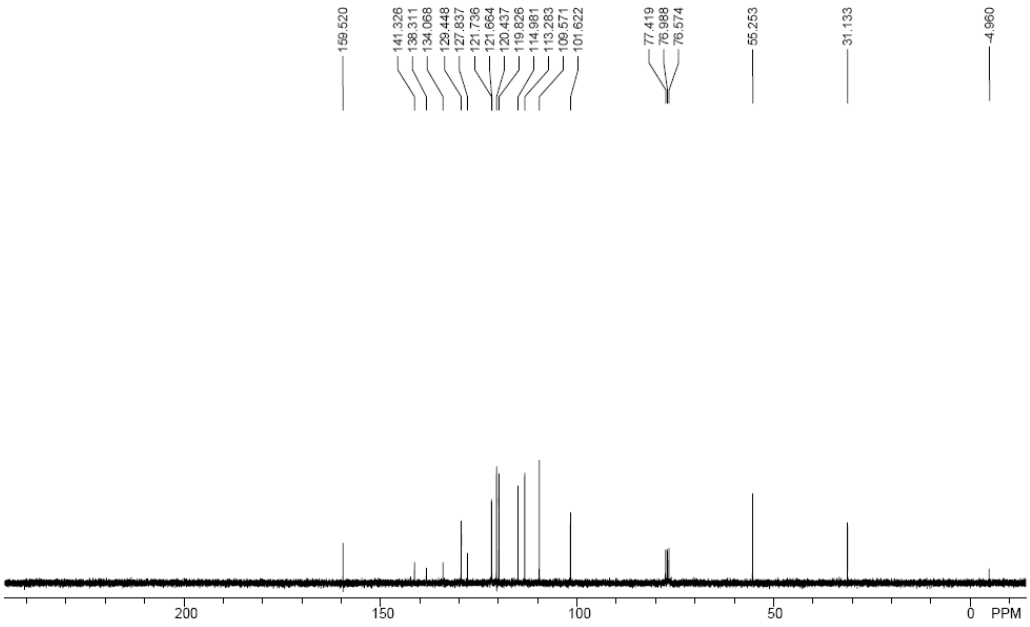
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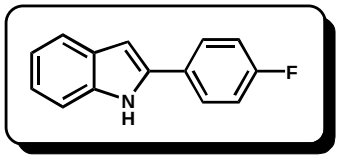
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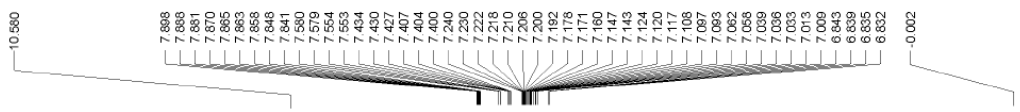
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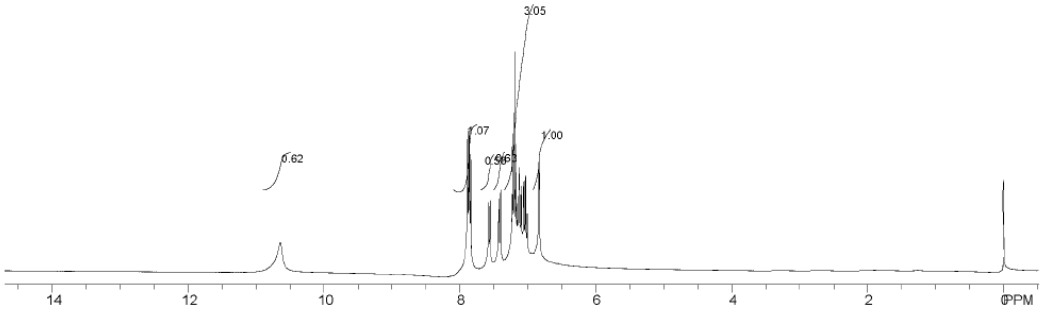
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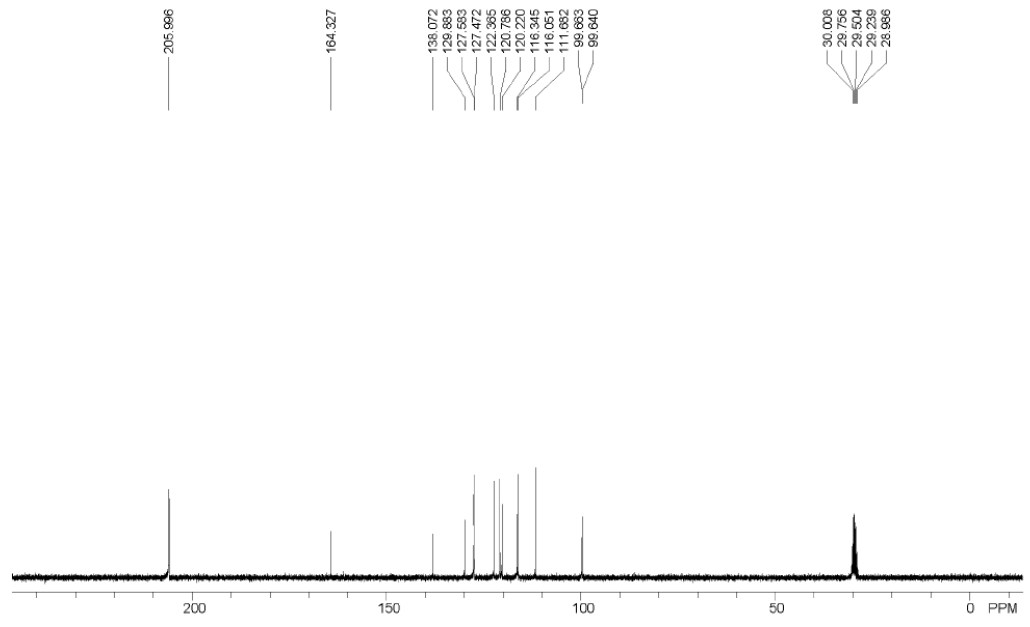
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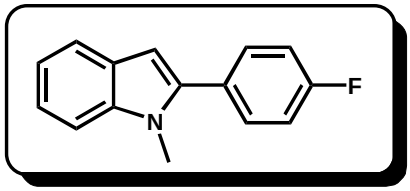
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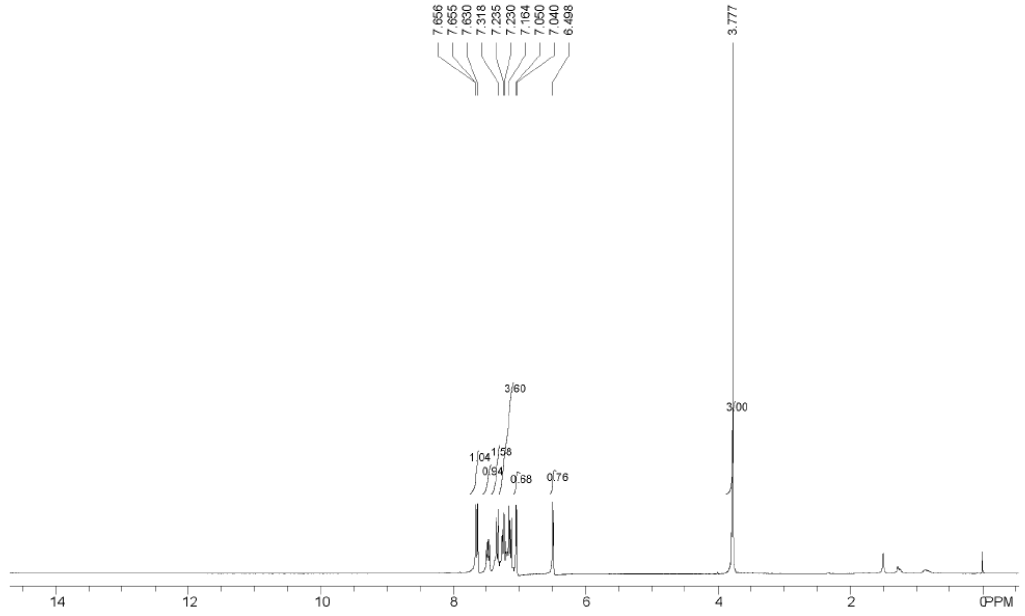
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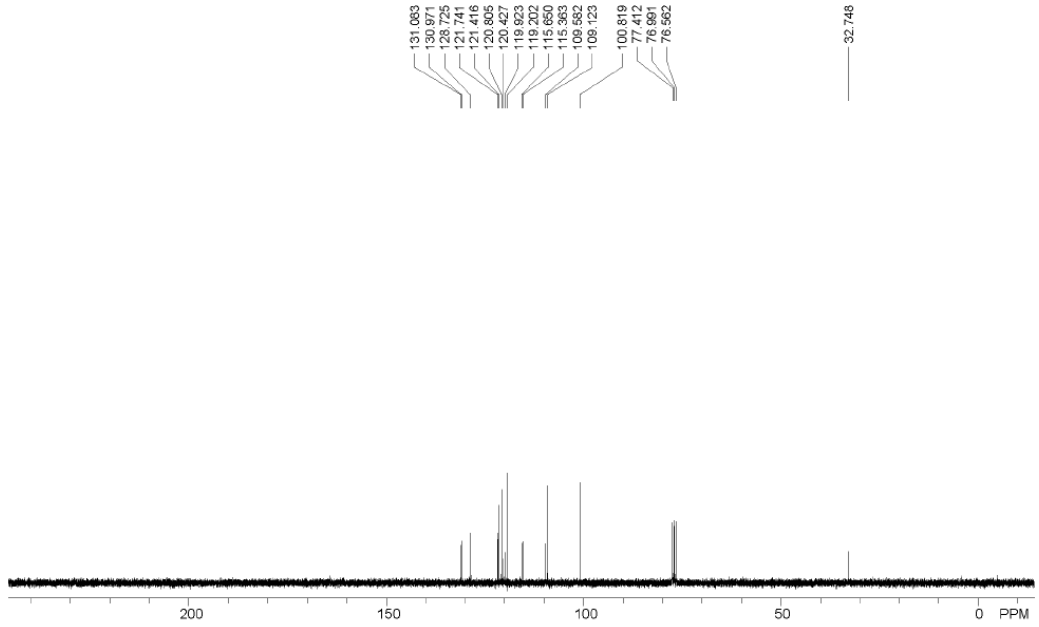
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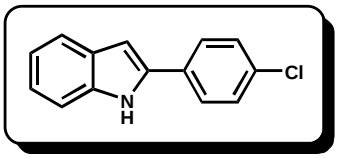
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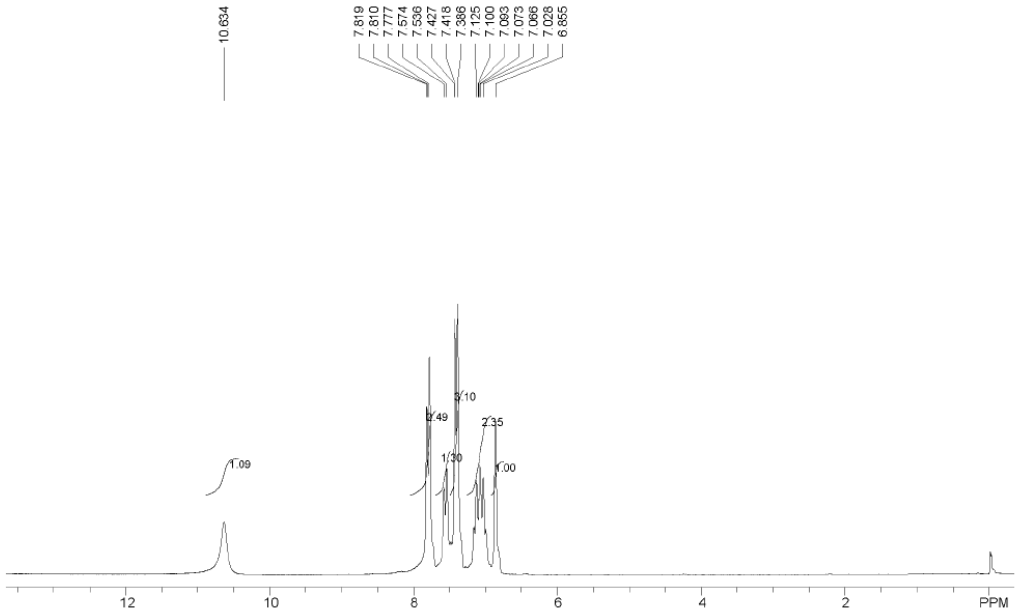
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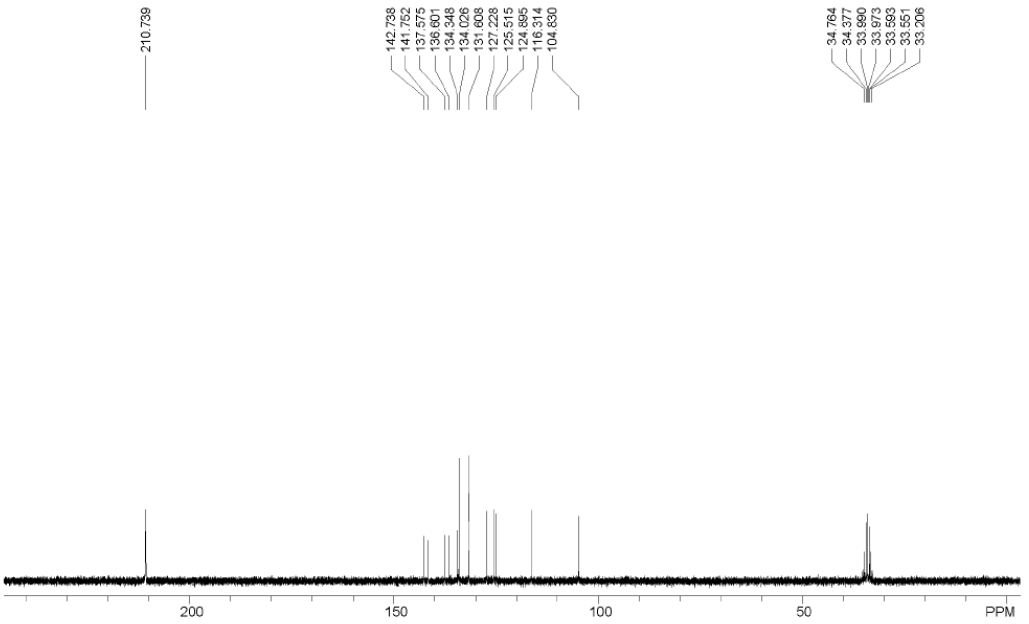
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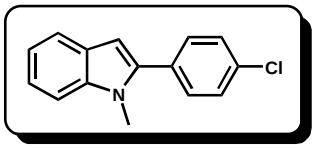
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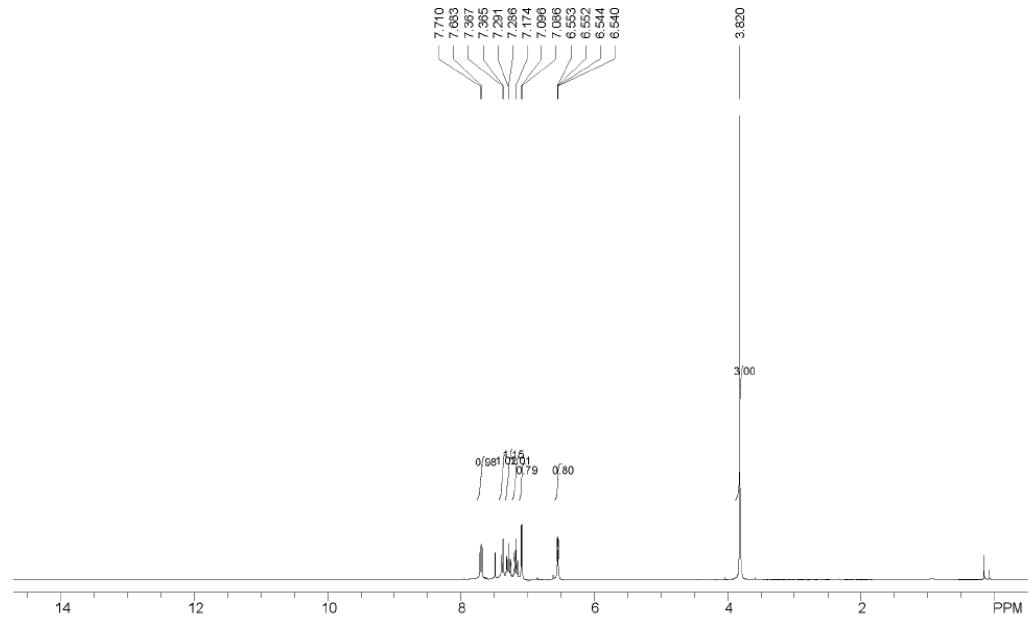
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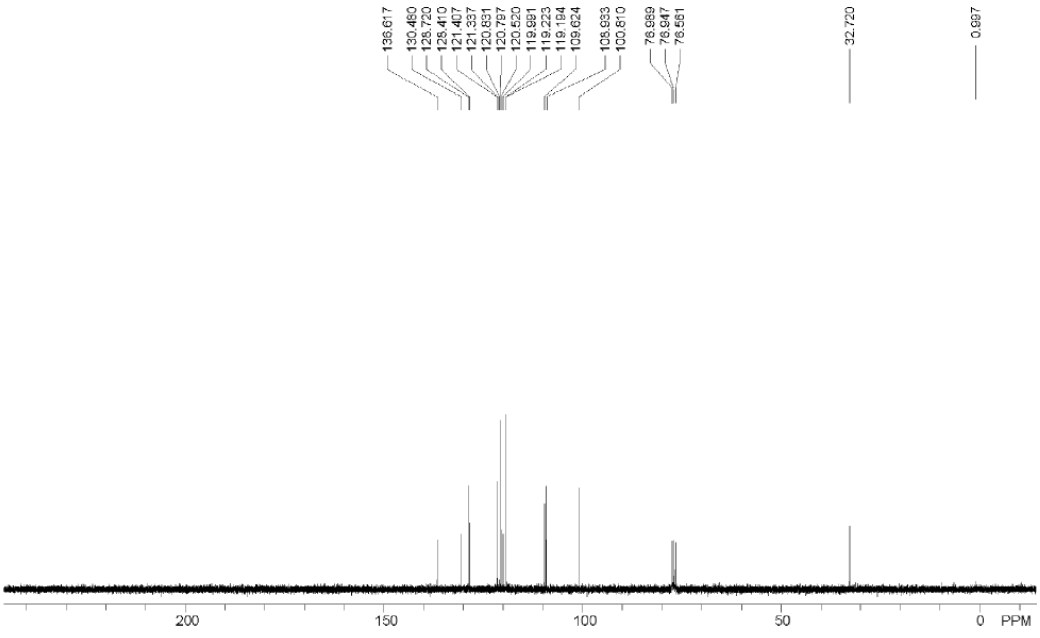
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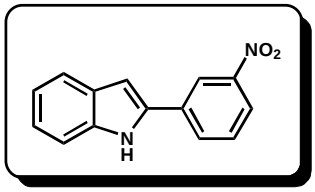
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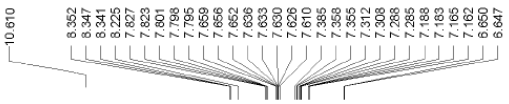
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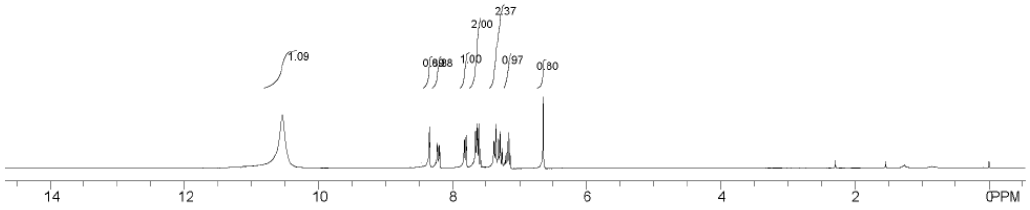
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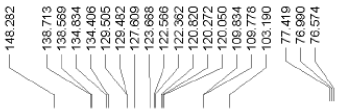
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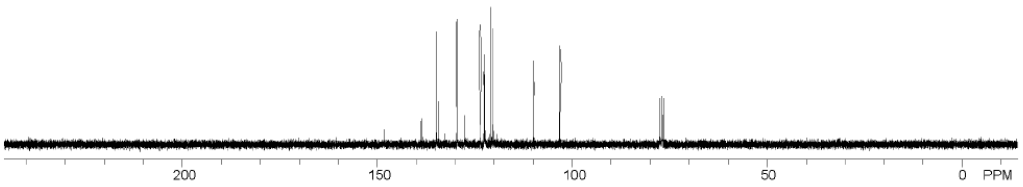
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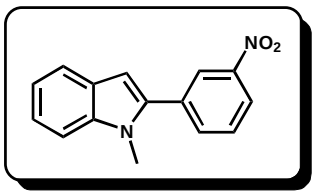
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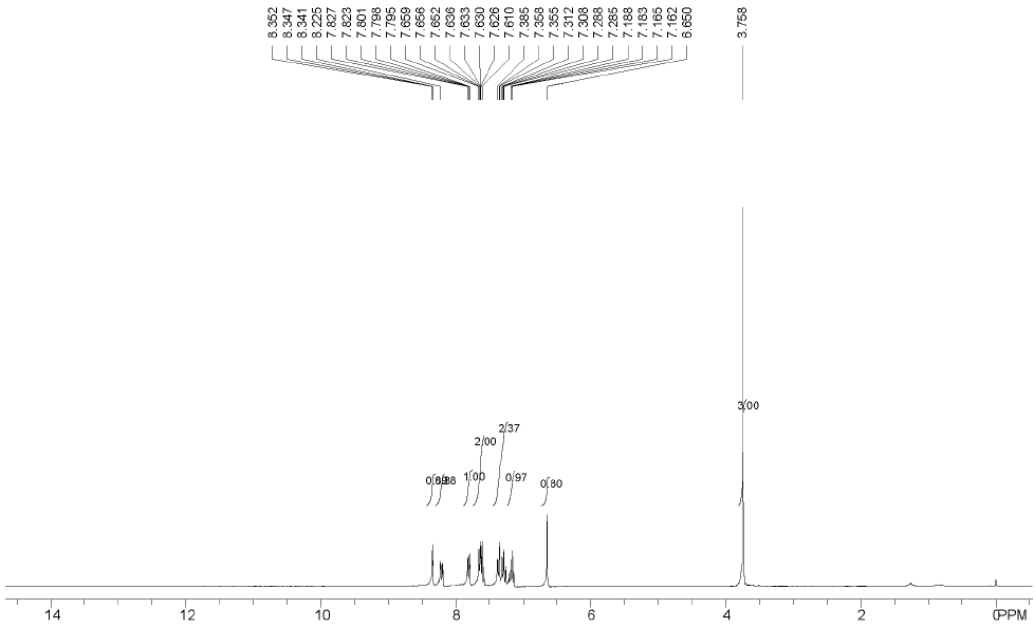
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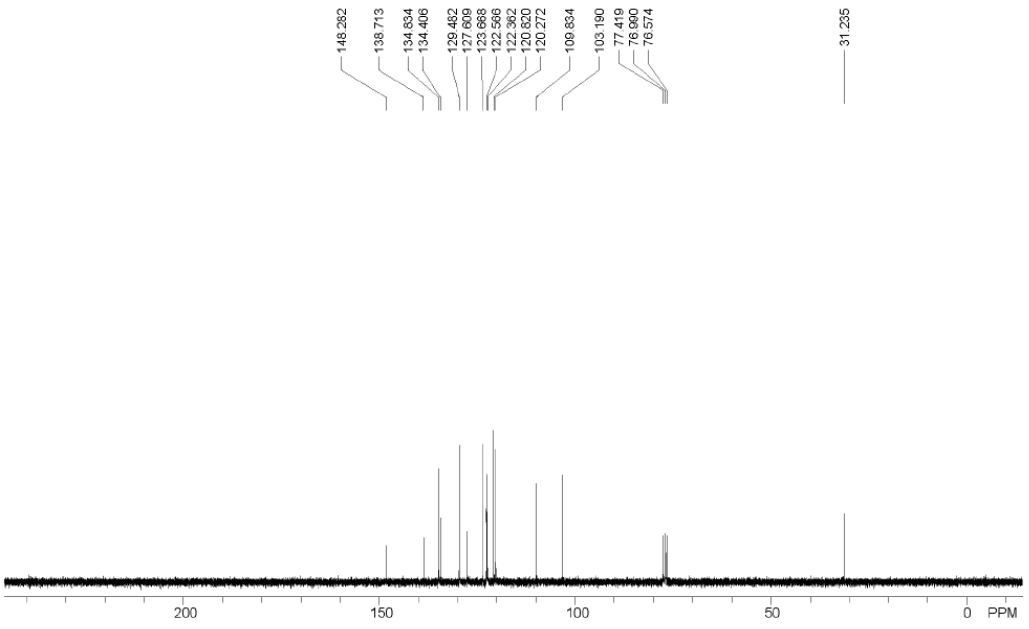
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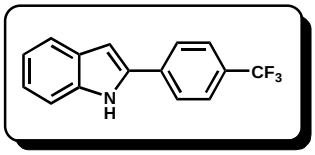
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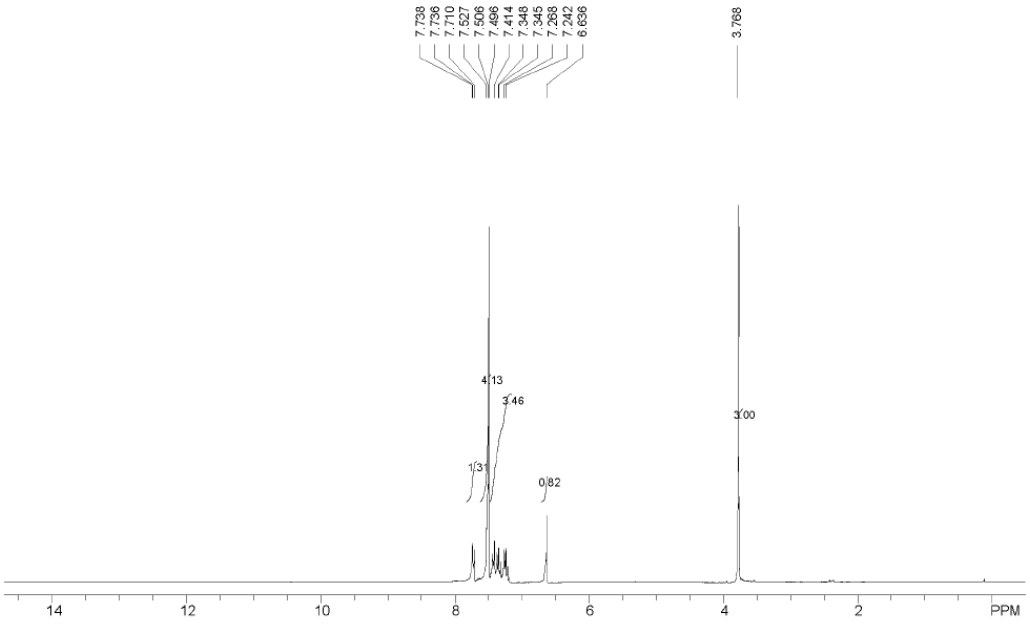
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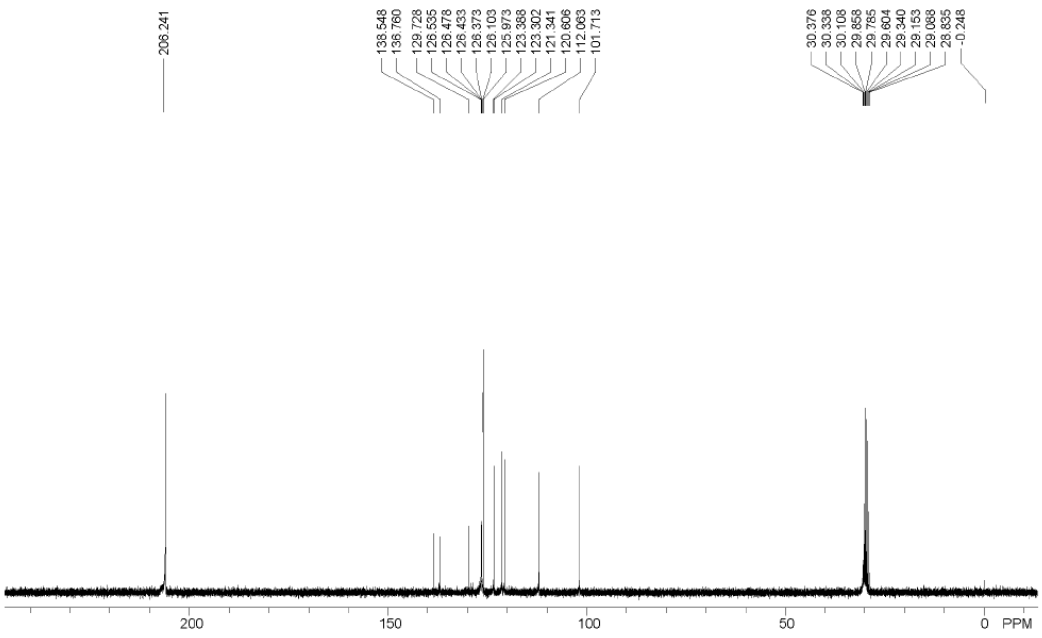
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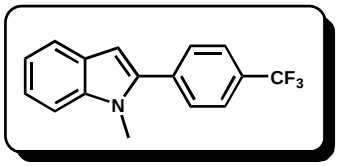
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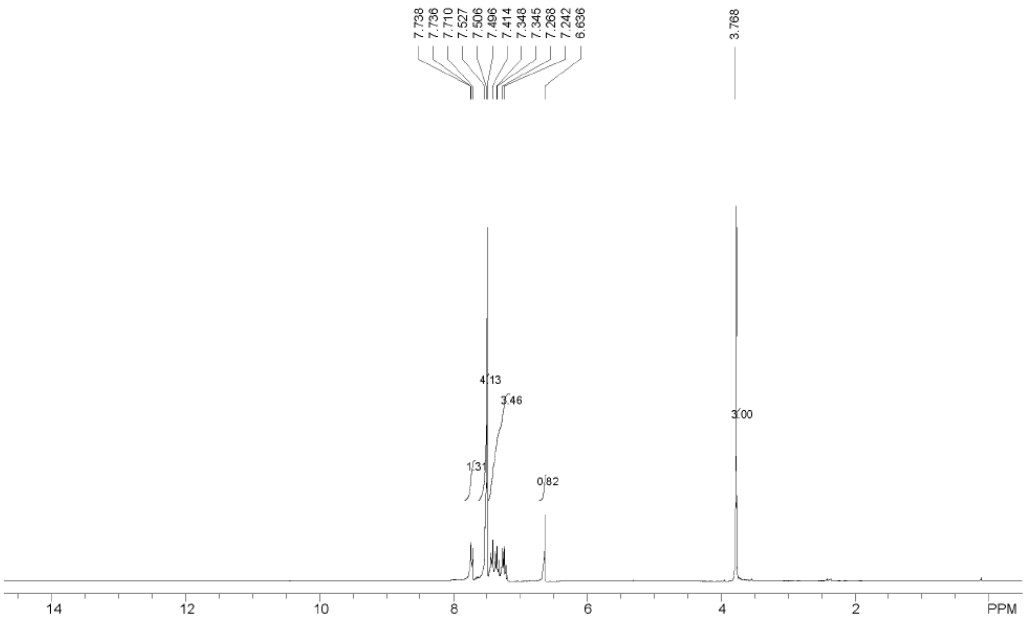
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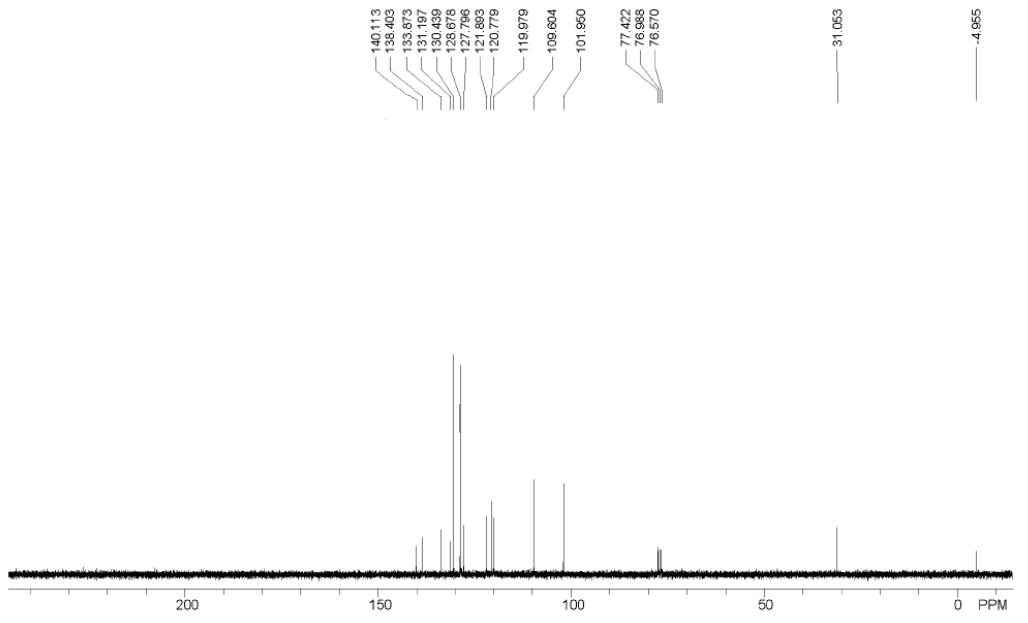
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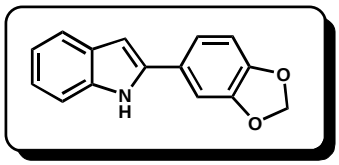
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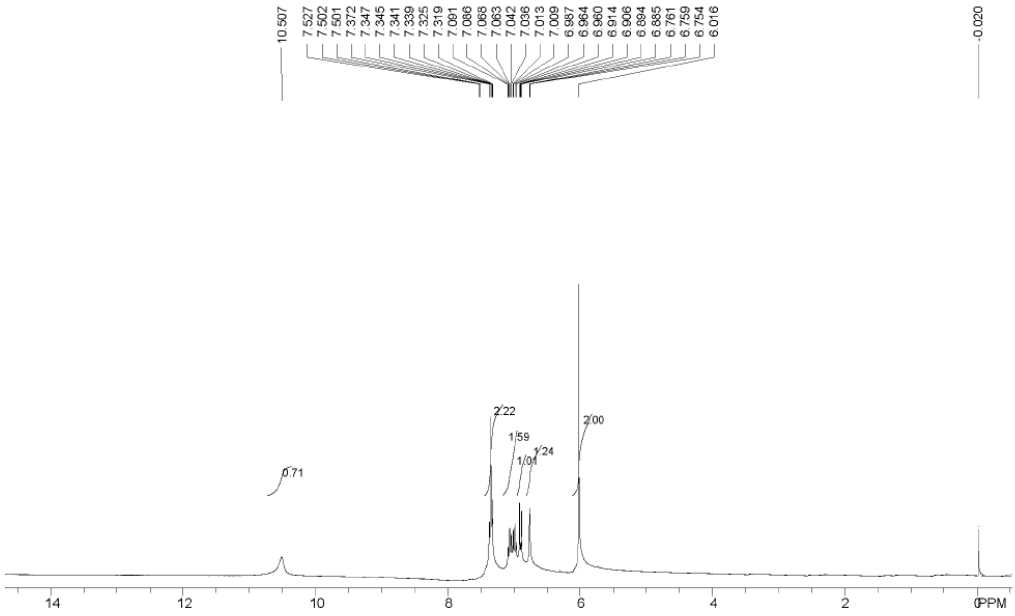
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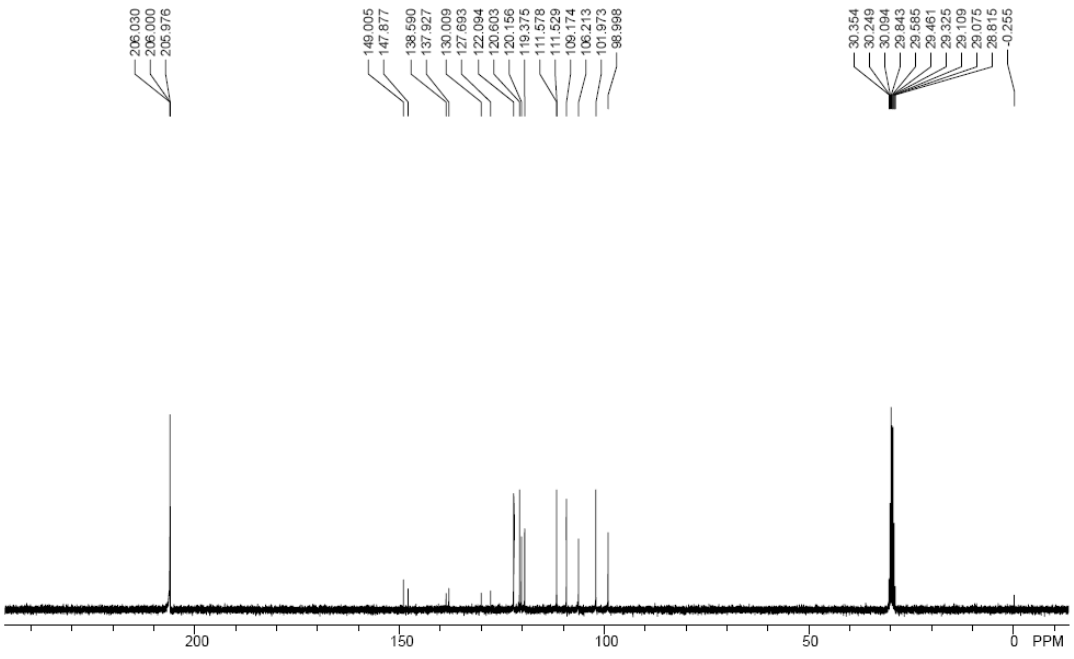
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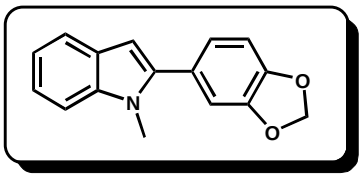
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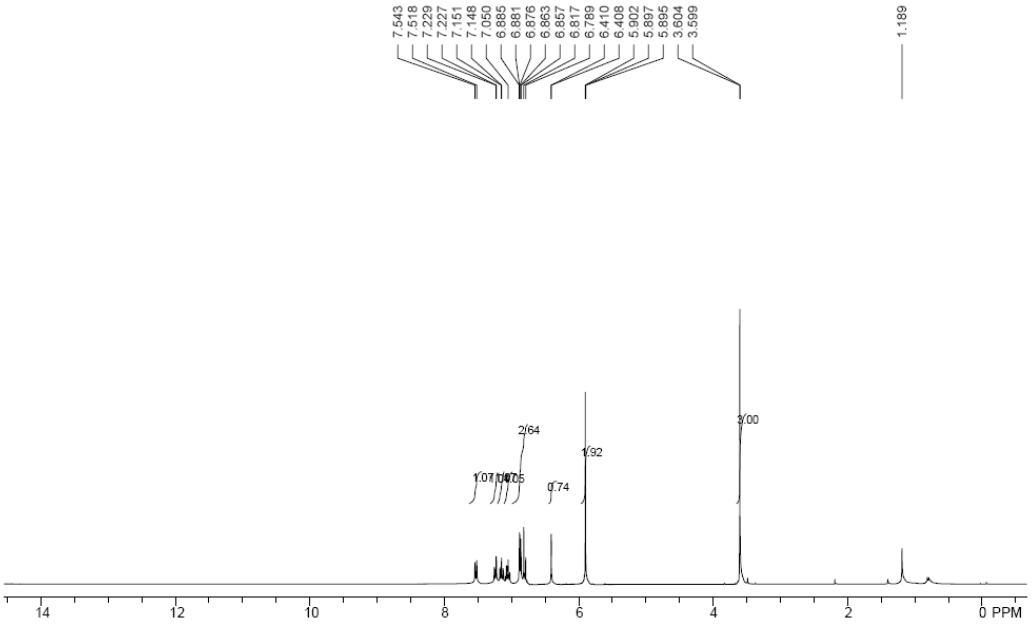
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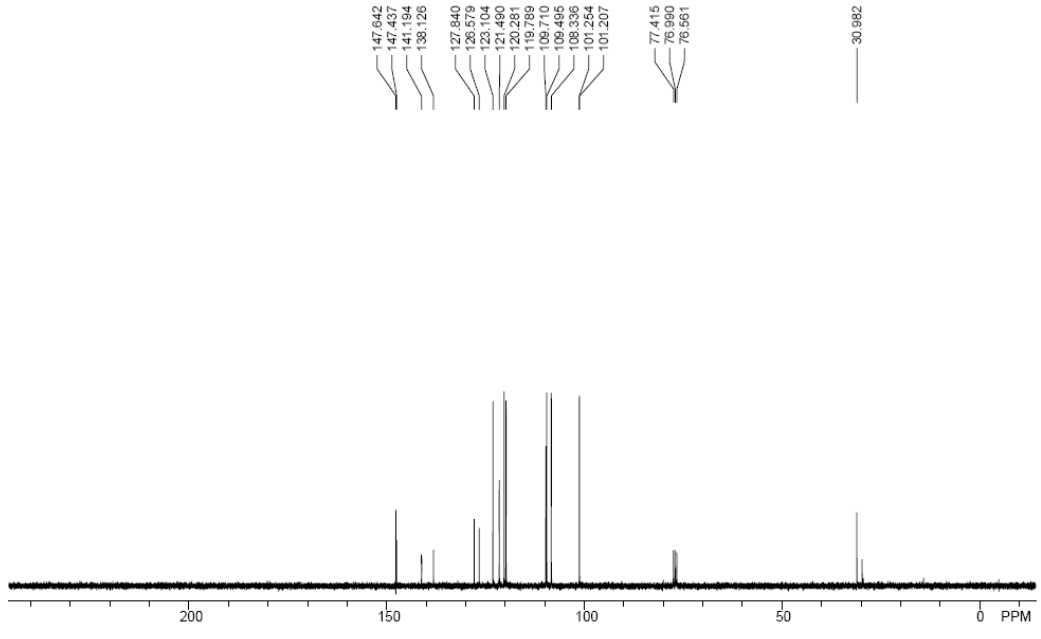
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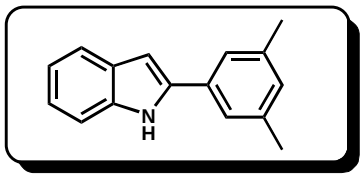

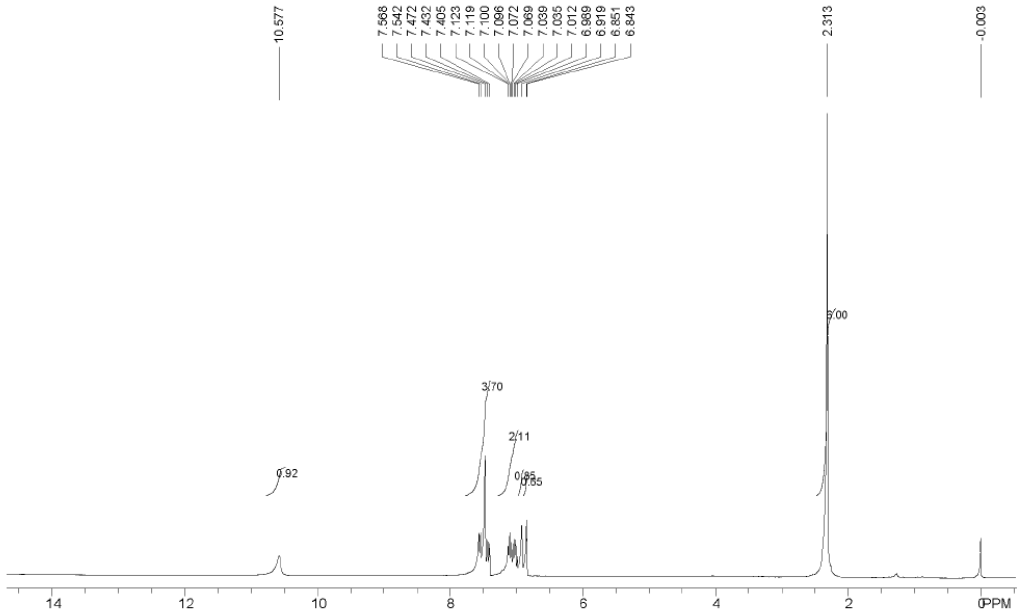
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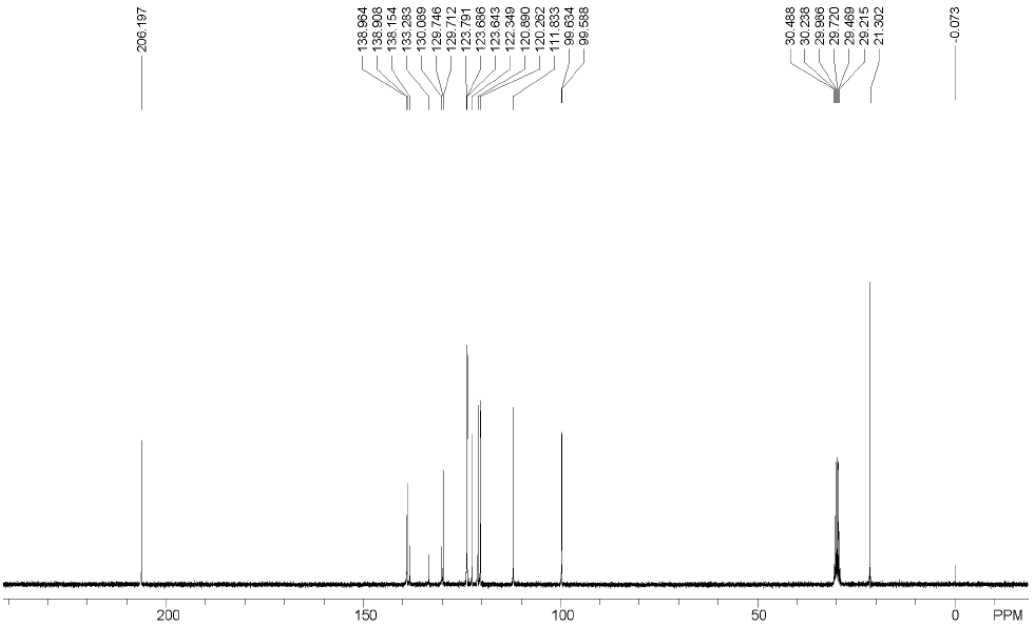
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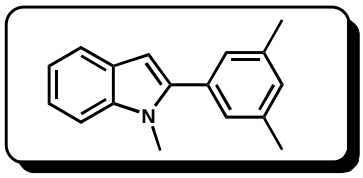

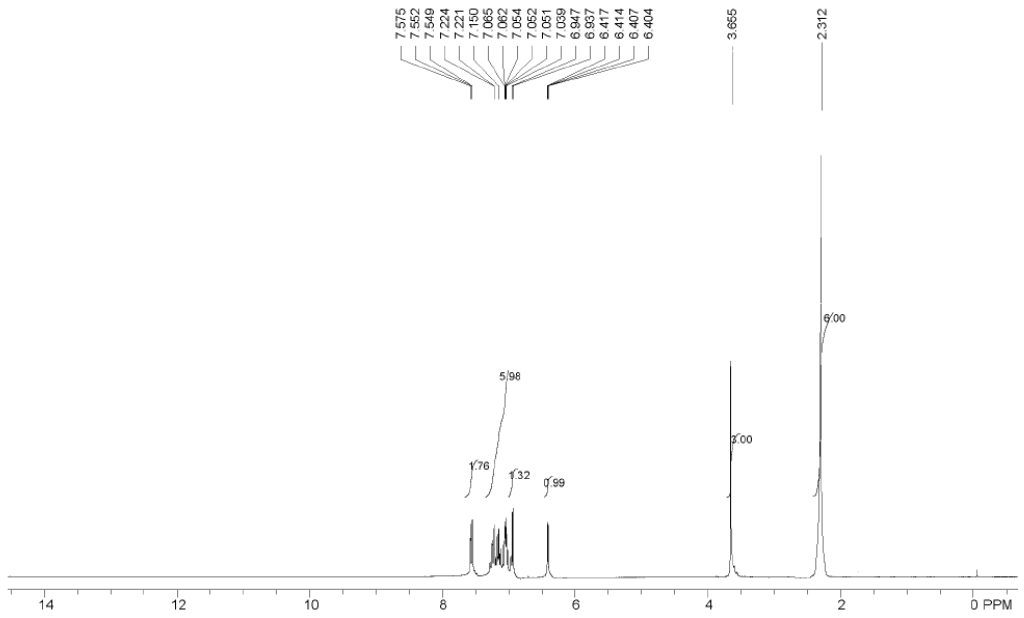
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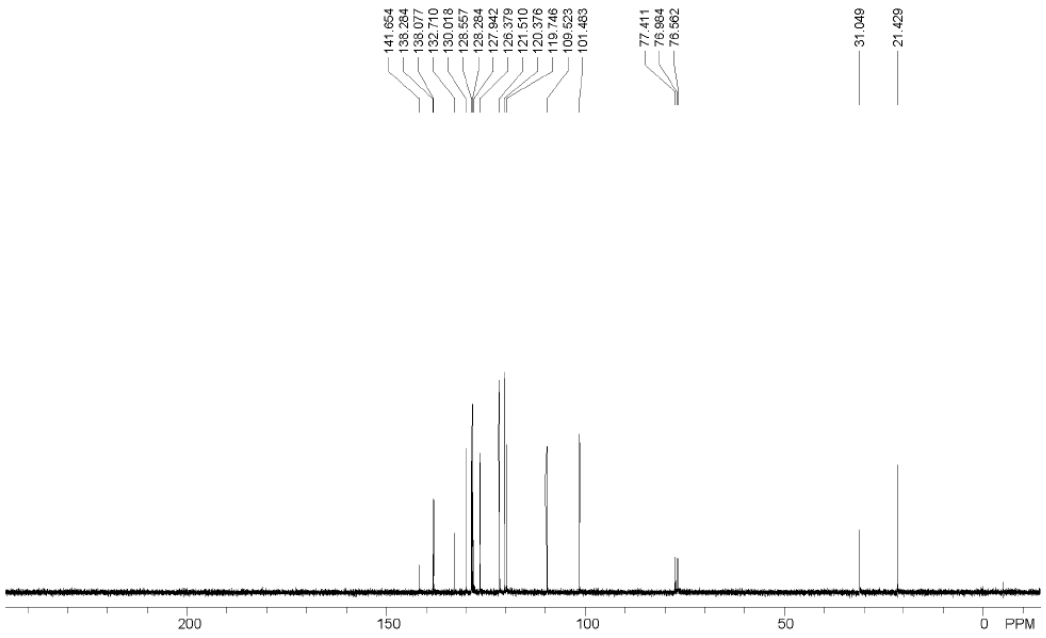
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