Electronic Supplementary Material (ESI) for Organic Chemistry Frontiers.

Supporting Information

Palladium-Catalyzed Direct *ortho*-C–H Ethoxycarboxylation of Anilides at Room Temperature

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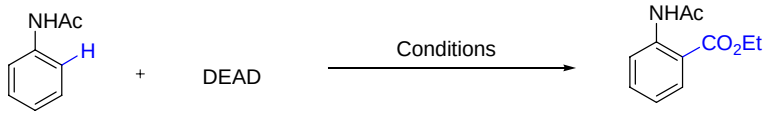
I. General Remarks

NMR spectra were obtained on a Bruker AMX-400. The ^{1}H NMR (400 MHz) chemical shifts were measured using $CDCl_3$ or DMSO-d_6 as the internal reference ($CDCl_3$: δ = 7.26 ppm; DMSO-d_6: δ = 2.50 ppm). The ^{13}C NMR (100 MHz) chemical shifts are given using $CDCl_3$ or DMSO-d_6 as the internal standard ($CDCl_3$: δ = 77.16 ppm; DMSO-d_6: δ = 39.52 ppm). High-resolution mass spectra (HR-MS) were obtained with a Waters-Q-TOF-Premier (ESI). Melting points were determined with XRC-1 and are uncorrected.

Unless otherwise noted, all reagents were obtained from commercial suppliers and used without further purification. Acetanilide substrates were prepared according to the literature procedure.[1] Unless otherwise indicated, all reactions were carried out under air atmosphere.

II. Optimization of the coupling reaction of acetanilide 1a with DEAD

Table S1 Screening of oxidants[a]

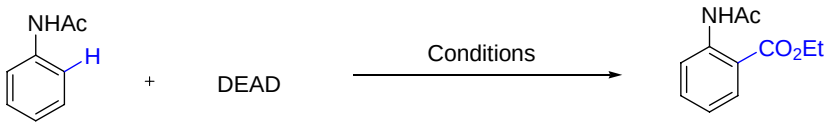


1a **2** **3a**

Entry	Oxidant	Yield[b] (%)
1	Oxone	n. d.
2	IBX	n. d.
3	CAN	n. d.
4	TBHP	n. d.
5	$Cu(OAc)_2$	n. d.
6	$PhI(OAc)_2$	n. d.
7	$Na_2S_2O_8$	n. d.
8	$K_2S_2O_8$	n. d.
9	BQ	n. d.
10	$(NH_4)_2S_2O_8$	28%

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD (2.5 equiv), $Pd(OAc)_2$ (10 mol%), oxidant (2.0 equiv), *p*-TsOH·H_2O (0.5 equiv) in DCM (1 mL) for 24 h at rt. [b] Isolated yield.

Table S2 Influence of the amount of DEAD[a]

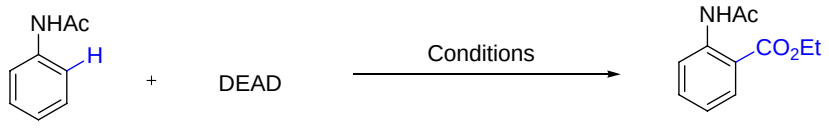


1a **2** **3a**

Entry	DEAD (equiv)	Yield[b] (%)
1	2.5	28%
2	3	34%
3	4	34%

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD, $Pd(OAc)_2$ (10 mol%), $(NH_4)_2S_2O_8$ (2.0 equiv), *p*-TsOH·H_2O (0.5 equiv) in DCM (1 mL) for 24 h at rt. [b] Isolated yield.

Table S3 Screening of additives[a]

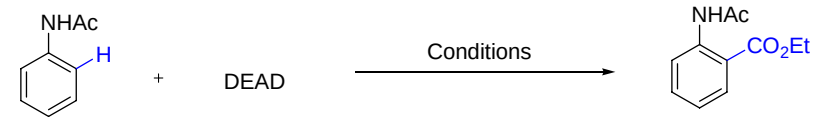


1a **2** **3a**

Entry	Additive	Yield[b] (%)
1	-	trace
2	*p*-TsOH·H_2O (0.5 equiv)	34%
3	*p*-TsOH·H_2O (1.0 equiv)	26%
4	CH_3SO_3H (0.5 equiv)	13%
5	TfOH (0.5 equiv)	27%

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD (3.0 equiv), $Pd(OAc)_2$ (10 mol%), $(NH_4)_2S_2O_8$ (2.0 equiv), additive in DCM (1 mL) for 24 h at rt. [b] Isolated yield.

Table S4 Screening of solvents[a]



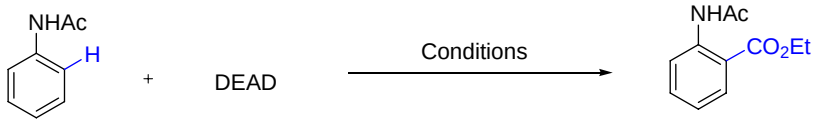
1a **2** **3a**

Entry	Solvent	Yield[b] (%)
1	DCM	34%

2	dioxane	29%
3	THF	21%
4	DCE	16%
5	DME	trace
6	DMF	n. d.
7	MeCN	n. d.
8	DMSO	n. d.
9	TFA	n. d.

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD (3.0 equiv), $Pd(OAc)_2$ (10 mol%), $(NH_4)_2S_2O_8$ (2.0 equiv), *p*-TsOH·H_2O (0.5 equiv) in Solvent (1 mL) for 24 h at rt. [b] Isolated yield.

Table S5 Effect of copper salts[a]

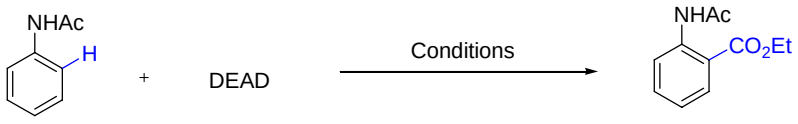


1a **2** **3a**

Entry	Cu salt	Yield[b] (%)
1	CuI	n. d.
2	CuBr	24%
3	CuCl	n. d.
4	$Cu(OAc)_2·H_2O$	37%
5	$Cu(OTf)_2$	37%
6	$Cu(TFA)_2·H_2O$	43%
7	$CuCl_2$	23%
8	$CuBr_2$	40%
9	-	34%

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD (3.0 equiv), $Pd(OAc)_2$ (10 mol%), Cu salt (10 mol%), $(NH_4)_2S_2O_8$ (2.0 equiv), *p*-TsOH·H_2O (0.5 eq) in DCM (1 mL) for 24 h at rt. [b] Isolated yield.

Table S6 Screening of Pd sources[a]



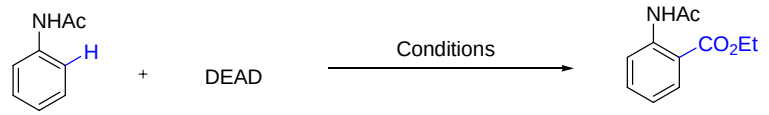
1a **2** **3a**

Entry	Pd	Yield[b] (%)
1	$Pd(OAc)_2$	34%

2[c]	$Pd(OAc)_2$	32%
3	$Pd(TFA)_2$	48%
4	$PdCl_2$	n. d.
5	$Pd(PhCN)_2Cl_2$	trace
6	$Pd(PPh_3)_2Cl_2$	n. d.
7	$Pd(acac)_2$	39%
8	$Pd(cod)Cl_2$	n. d.

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD (3.0 equiv), Pd (10 mol%), $(NH_4)_2S_2O_8$ (2.0 equiv), *p*-TsOH·H_2O (0.5 eq) in DCM (1 mL) for 24 h at rt. [b] Isolated yield. [c] Pd (20 mol%).

Table S7 Further optimization of C–H esterification[a]



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

Entry	Pd	Cu	Yield (%)[b]
1	-	$Cu(TFA)_2·H_2O$	n. d.
2	$Pd(TFA)_2$	-	48%
3	$Pd(TFA)_2$	$Cu(TFA)_2·H_2O$	68%
4[c]	$Pd(TFA)_2$	$Cu(TFA)_2·H_2O$	66%

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD (3.0 equiv), $Pd(TFA)_2$ (10 mol%), $Cu(TFA)_2·H_2O$ (10 mol%), $(NH_4)_2S_2O_8$ (2.0 equiv), *p*-TsOH·H_2O (0.5 equiv) in DCM (1 mL) at rt. [b] Isolated yield. [c] 48 h.

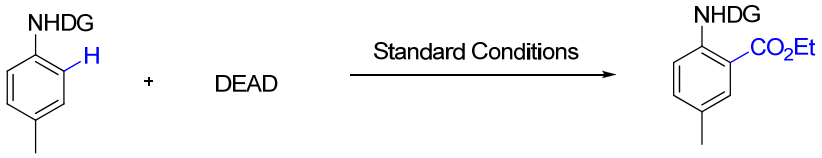
Table S8 Effect of radical scavengers[a]

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

Entry	Inhibitor	Yield (%)[b]
1	3.0 equiv TEMPO	n. d.
2	3.0 equiv hydroquinone	n. d.
3	50 mol% BHT	trace

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD (3.0 equiv), $Pd(TFA)_2$ (10 mol%), $Cu(TFA)_2·H_2O$ (10 mol%), $(NH_4)_2S_2O_8$ (2.0 equiv), *p*-TsOH·H_2O (0.5 equiv) in DCM (1 mL) at rt. [b] Isolated yield.

Table S9 Screening of different directing groups[a]



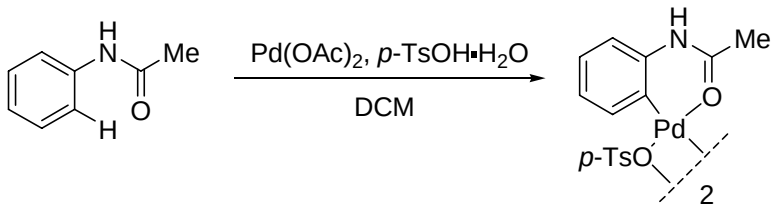
Entry	Direacting group (DG)	Yield (%)[b]
1	COOEt	n. d.
2	CHO	n. d.
3	Ac	83%
4	COEt	84%
5	Piv	73%
6	Ts	n. d.
7	$CONMe_2$	trace

[a] Reactions were carried out by using acetanilide (0.3 mmol), DEAD (3.0 equiv), $Pd(TFA)_2$ (10 mol%), $Cu(TFA)_2{\cdot}H_2O$ (10 mol%), $(NH_4)_2S_2O_8$ (2.0 equiv), *p*-TsOH·H_2O (0.5 equiv) in DCM (1 mL) at rt. [b] Isolated yield.

III. General procedure for the reaction

A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ or $Pd(OAc)_2$, $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol) or Selectfluor (212.6 mg, 0.6 mmol), acetanilide (0.3 mmol), $Cu(TFA)_2{\cdot}H_2O$ (8.7 mg, 0.03 mmol), *p*-TsOH·H_2O (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for indicated time. The solvent was evaporated and the residue was diluted with 30 mL CH_2Cl_2, filtered through a Celite pad, and washed with CH_2Cl_2(10-20 mL). The combined organic phases were concentrated and the resulting residue was purified by column chromatography on silica gel to provide the desired product.

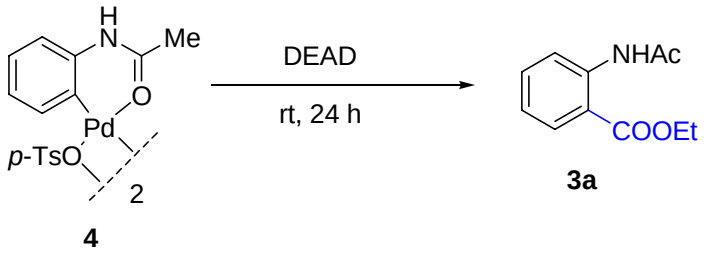
IV. Procedure for preparation of palladacycle 4[2]



1a **4**

A solution of acetanilide (27 mg, 0.2 mmol), *p*-TsOH·H_2O (38 mg, 0.2 mmol) and $Pd(OAc)_2$ (45 mg, 0.2 mmol) in DCM was heated at 40 °C for 1 min. The mixture was filtered and dried under vacuum to afford the complex **4** as a pale green solid, which was existed as a dimer (82 mg, 99%). ^{1}H NMR (400 MHz, DMSO-d_6): δ = 2.28 (s, 3H), 2.40 (s, 3H), 7.00-7.06 (m, 2H), 7.11 (d, J = 8.0 Hz, 2H), 7.17-7.21 (m, 1H), 7.48 (d, J = 8.0 Hz, 2H), 7.60 (d, J = 8.0 Hz, 1H), 12.02 (s, 1H) ppm. ^{13}C NMR (100 MHz, DMSO-d_6): δ = 20.8, 21.2, 117.5, 120.6, 124.8, 125.5, 126.6, 128.1, 131.7, 134.4, 137.7, 145.7, 168.4 ppm. Anal. calcd. for $C_{30}H_{30}N_2O_8Pd_2S_2$·$H_2O$: C 42.82, H 3.83, N 3.33; Found: C 42.97, H 3.39, N 2.84.

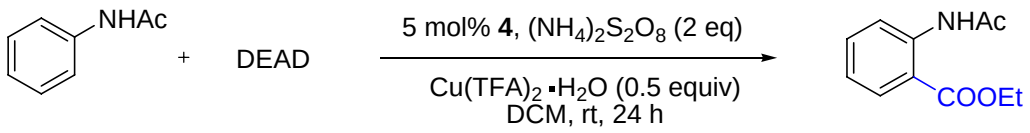
V. Procedure for reaction using stoichiometric palladacycle 4



4 **3a**

A Schlenk tube with a magnetic stir bar was charged with **4** (123.5 mg, 0.15 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), $Cu(TFA)_2$·H_2O (8.7 mg, 0.03 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (30 mg, 48% yield).

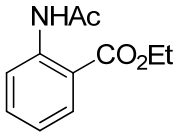
VI. Procedure for esterification of acetanilide using palladacycle 4 as the catalyst



A Schlenk tube with a magnetic stir bar was charged with **4** (12.3 mg, 0.015 mmol),

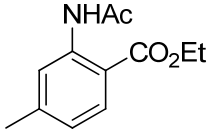
$(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-phenylacetamide (40.5 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-TsOH·H_2O (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (39 mg, 63% yield).

VII. Characterization of compounds 3a-3s



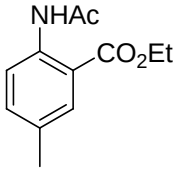
Ethyl 2-acetamidobenzoate (3a)

A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-phenylacetamide (40.5 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-TsOH·H_2O (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (42 mg, 68% yield). M.p.: 58-61 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.42 (t, *J* = 7.2 Hz, 3H), 2.24 (s, 3H), 4.38 (q, *J* = 7.2 Hz, 2H), 7.07 (t, *J* = 7.6 Hz, 1H), 7.53 (t, *J* = 7.6 Hz, 1H), 8.04 (d, *J* = 8.0 Hz, 1H), 8.69 (d, *J* = 8.4 Hz, 1H), 11.10 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 25.6, 61.5, 115.2, 120.4, 122.5, 130.9, 134.7, 141.8, 168.5, 169.2 ppm. HRMS (ESI^+): calcd for $C_{11}H_{13}NNaO_3$ $[M+Na]^+$ 230.0793, found 230.0797.



Ethyl 2-acetamido-4-methylbenzoate (3b)

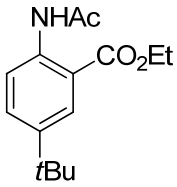
A Schlenk tube with a magnetic stir bar was charged with $Pd(OAc)_2$ (6.7 mg, 0.03 mmol), Selectfluor (212.6 mg, 0.6 mmol), *N*-*m*-tolylacetamide (44.7 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 48 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (38 mg, 57% yield). M.p.: 70-72 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.40 (t, *J* = 7.2 Hz, 3H), 2.22 (s, 3H), 2.38 (s, 3H), 4.35 (q, *J* = 7.2 Hz, 2H), 6.87 (d, *J* = 8.0 Hz, 1H), 7.91 (d, *J* = 8.4 Hz, 1H), 8.53 (s, 1H), 11.10 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 22.2, 25.6, 61.3, 112.6, 120.7, 123.5, 130.8, 141.7, 145.9, 168.5, 169.2 ppm. HRMS (ESI^+): calcd for $C_{12}H_{15}NNaO_3$ $[M+Na]^+$ 244.0950, found 244.0950.



Ethyl 2-acetamido-5-methylbenzoate (3c)

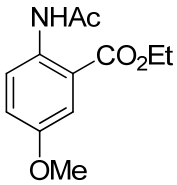
A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-*p*-tolylacetamide (44.7 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (55 mg, 83% yield). M.p.: 98-100 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.42 (t, *J* = 7.2 Hz, 3H), 2.21 (s, 3H), 2.32 (s, 3H), 4.36 (q, *J* = 7.2 Hz, 2H), 7.34 (d, *J* = 8.4 Hz, 1H), 7.82 (s, 1H), 8.57 (d, *J* = 8.8 Hz, 1H), 10.98 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 20.8, 25.6, 61.4,

115.1, 120.4, 130.9, 132.0, 135.4, 139.3, 168.5, 169.0 ppm. HRMS (ESI^+): calcd for $C_{12}H_{15}NNaO_3$ $[M+Na]^+$ 244.0950, found 244.0953.



Ethyl 2-acetamido-5-*tert*-butylbenzoate (3d)

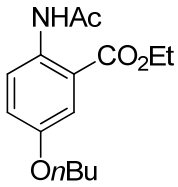
A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-(4-*tert*-butylphenyl)acetamide (57.4 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (58 mg, 73% yield). M.p.: 88-89 ºC; ^1H NMR (400 MHz, $CDCl_3$): δ = 1.31 (s, 9H), 1.43 (t, J = 7.2 Hz, 3H), 2.22 (s, 3H), 4.39 (q, J = 7.2 Hz, 2H), 7.57 (dd, J = 2.4 Hz, 8.8 Hz, 1H), 8.02 (d, J = 2.4 Hz, 1H), 8.59 (d, J = 8.8 Hz, 1H), 10.98 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.4, 25.6, 31.3, 34.4, 61.4, 114.9, 120.4, 127.2, 131.9, 139.2, 145.4, 168.6, 169.1 ppm. HRMS (ESI^+): calcd for $C_{15}H_{21}NNaO_3$ $[M+Na]^+$ 286.1419, found 286.1422.



Ethyl 2-acetamido-5-methoxybenzoate (3e)

A Schlenk tube with a magnetic stir bar was charged with $Pd(OAc)_2$ (6.7 mg, 0.03

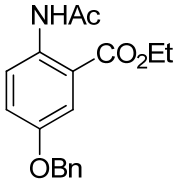
mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-(4-methoxyphenyl)acetamide (49.6 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 48 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (44 mg, 62% yield). M.p.: 88-91 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.41 (t, *J* = 7.2 Hz, 3H), 2.21 (s, 3H), 3.81 (s, 3H), 4.38 (q, *J* = 7.2 Hz, 2H), 7.11 (dd, *J* = 2.8 Hz, 9.2 Hz, 1H), 7.52 (d, *J* = 2.8 Hz, 1H), 8.61 (d, *J* = 9.2 Hz, 1H), 10.80 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 25.4, 55.7, 61.6, 114.9, 116.2, 120.6, 121.9, 135.3, 154.4, 168.0, 168.7 ppm. HRMS (ESI^+): calcd for $C_{12}H_{15}NNaO_4$ $[M+Na]^+$ 260.0899, found 260.0897.



Ethyl 2-acetamido-5-butoxybenzoate (3f)

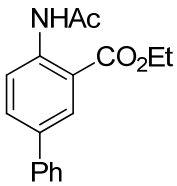
A Schlenk tube with a magnetic stir bar was charged with $Pd(OAc)_2$ (6.7 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-(4-butoxyphenyl)acetamide (62.2 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 48 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (50 mg, 60% yield). M.p.: 68-70 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 0.97 (t, *J* = 7.6 Hz, 3H), 1.41 (t, *J* = 7.2 Hz, 3H), 1.46-1.52 (m, 2H), 1.74-1.77 (m, 2H), 2.20 (s, 3H), 3.95 (t, *J* = 6.4 Hz, 2H), 4.37 (q, *J* = 7.2 Hz, 2H), 7.09 (dd, *J* = 2.8 Hz, 9.2 Hz, 1H), 7.51 (d, *J* = 2.8 Hz, 1H), 8.59 (d, *J* = 9.2 Hz, 1H), 10.80 (s, 1H) ppm. ^{13}C NMR (100 MHz,

$CDCl_3$): δ = 14.0, 14.3, 19.3, 25.5, 31.4, 61.6, 68.2, 115.8, 116.3, 121.1, 121.9, 135.2, 154.0, 168.1, 168.8 ppm. HRMS (ESI^+): calcd for $C_{15}H_{21}NNaO_4$ $[M+Na]^+$ 302.1368, found 302.1373.



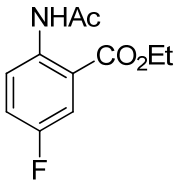
Ethyl 2-acetamido-5-(benzyloxy)benzoate (3g)

A Schlenk tube with a magnetic stir bar was charged with $Pd(OAc)_2$ (6.7 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-(4-(benzyloxy)phenyl)acetamide (72.4 mg, 0.3 mmol), $Cu(TFA)_2{\cdot}H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH{\cdot}H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 48 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (49 mg, 52% yield). M.p.: 88-90 ºC; ^1H NMR (400 MHz, $CDCl_3$): δ = 1.41 (t, *J* = 7.2 Hz, 3H), 2.21 (s, 3H), 4.37 (q, *J* = 7.2 Hz, 2H), 5.06 (s, 2H), 7.17 (dd, *J* = 2.8 Hz, 8.8 Hz, 1H), 7.33-7.44 (m, 5H), 7.62 (d, *J* = 2.8 Hz, 1H), 8.61 (d, *J* = 9.2 Hz, 1H), 10.82 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 25.5, 61.6, 70.6, 116.3, 116.4, 121.4, 122.0, 127.7, 128.3, 128.8, 135.6, 136.7, 153.6, 168.0, 168.8 ppm. HRMS (ESI^+): calcd for $C_{18}H_{19}NNaO_4$ $[M+Na]^+$ 336.1212, found 336.1208.



Ethyl 4-acetamidobiphenyl-3-carboxylate (3h)

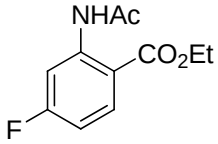
A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), Selectfluor (212.6 mg, 0.6 mmol), *N*-(biphenyl-4-yl)acetamide (63.4 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (56 mg, 66% yield). M.p.: 116-118 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.44 (t, *J* = 7.2 Hz, 3H), 2.26 (s, 3H), 4.42 (q, *J* = 7.2 Hz, 2H), 7.34-7.38 (m, 1H), 7.44-7.47 (m, 2H), 7.57-7.60 (m, 2H), 7.77 (dd, *J* = 2.0 Hz, 8.8 Hz, 1H), 8.26 (d, *J* = 2.4 Hz, 1H), 8.78 (d, *J* = 8.8 Hz, 1H), 11.12 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.4, 25.7, 61.7, 115.5, 120.9, 126.9, 127.6, 129.0, 129.2, 133.2, 135.4, 139.8, 140.9, 168.4, 169.2 ppm. HRMS (ESI^+): calcd for $C_{17}H_{17}NNaO_3$ $[M+Na]^+$ 306.1106, found 306.1106.



Ethyl 2-acetamido-5-fluorobenzoate (3i)

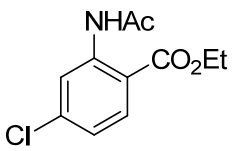
A Schlenk tube with a magnetic stir bar was charged with $Pd(OAc)_2$ (6.7 mg, 0.03 mmol), Selectfluor (212.6 mg, 0.6 mmol), *N*-(4-fluorophenyl)acetamide (45.9 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. $Pd(OAc)_2$ (3.4 mg, 0.015 mmol) was then added, and the reaction mixture was stirred for another 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (30 mg, 44% yield). M.p.: 83-84 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.43 (t, *J* = 7.2 Hz, 3H), 2.23 (s, 3H), 4.39 (q, *J* = 7.2 Hz, 2H), 7.25-7.28 (m, 1H), 7.71 (dd, *J* = 3.2

Hz, 9.2 Hz, 1H), 8.71 (dd, J = 5.2 Hz, 9.2 Hz, 1H), 10.94 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 25.5, 62.0, 116.8, 117.0, 121.6, 121.8, 122.2, 122.3, 138.1, 156.1, 158.5, 167.42, 167.44, 169.1 ppm. HRMS (ESI^+): calcd for $C_{11}H_{12}FNNaO_3$ $[M+Na]^+$ 248.0699, found 248.0701.



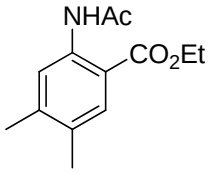
Ethyl 2-acetamido-4-fluorobenzoate (3j)

A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), Selectfluor (212.6 mg, 0.6 mmol), *N*-(3-fluorophenyl)acetamide (45.9 mg, 0.3 mmol), $Cu(TFA)_2{\cdot}H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH{\cdot}H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. $Pd(TFA)_2$ (5.0 mg, 0.015 mmol) was then added, and the reaction mixture was stirred for another 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (34 mg, 50% yield). M.p.: 76-78 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.41 (t, J = 7.2 Hz, 3H), 2.24 (s, 3H), 4.37 (q, J = 7.2 Hz, 2H), 6.73-6.77 (m, 1H), 8.03-8.07 (m, 1H), 8.52 (d, J = 12.0 Hz, 1H), 11.26 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 25.7, 61.6, 107.3, 107.6, 109.7, 109.9, 111.3, 133.1, 133.2, 143.8, 144.0, 165.1, 167.6, 167.8, 169.4 ppm. HRMS (ESI^+): calcd for $C_{11}H_{12}FNNaO_3$ $[M+Na]^+$ 248.0699, found 248.0700.



Ethyl 2-acetamido-4-chlorobenzoate (3k)

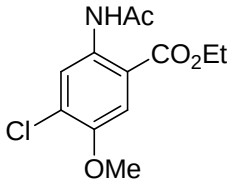
A Schlenk tube with a magnetic stir bar was charged with $Pd(OAc)_2$ (6.7 mg, 0.03 mmol), Selectfluor (212.6 mg, 0.6 mmol), *N*-(3-chlorophenyl)acetamide (50.9 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. $Pd(OAc)_2$ (3.4 mg, 0.015 mmol) was then added, and the reaction mixture was stirred for another 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (35 mg, 48% yield). M.p.: 68-70 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.41 (t, *J* = 7.2 Hz, 3H), 2.23 (s, 3H), 4.37 (q, *J* = 7.2 Hz, 2H), 7.04 (d, *J* = 8.8 Hz, 1H), 7.96 (d, *J* = 8.8 Hz, 1H), 8.81 (s, 1H), 11.15 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 25.6, 61.8, 113.3, 120.3, 122.8, 132.0, 141.0, 142.6, 167.9, 169.3 ppm. HRMS (ESI^+): calcd for $C_{11}H_{12}ClNNaO_3$ $[M+Na]^+$ 264.0403, found 264.0402.



Ethyl 2-acetamido-4,5-dimethylbenzoate (3l)

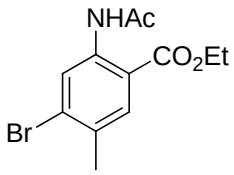
A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-(3,4-dimethylphenyl)acetamide (49.0 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (53 mg, 75% yield). M.p.: 108-110 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.41 (t, *J* = 7.2 Hz, 3H), 2.21 (s, 3H), 2.23 (s, 3H), 2.30 (s, 3H), 4.35 (q, *J* = 7.2 Hz, 2H), 7.76 (s, 1H), 8.48 (s, 1H), 10.96 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.4, 19.2, 20.6,

25.6, 61.2, 112.8, 121.3, 130.9, 131.3, 139.6, 144.5, 168.6, 169.0 ppm. HRMS (ESI^+): calcd for $C_{13}H_{17}NNaO_3$ $[M+Na]^+$ 258.1106, found 258.1110.



Ethyl 2-acetamido-4-chloro-5-methoxybenzoate (3m)

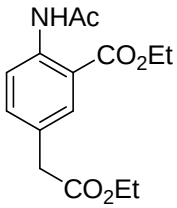
A Schlenk tube with a magnetic stir bar was charged with $Pd(OAc)_2$ (6.7 mg, 0.03 mmol), Selectfluor (212.6 mg, 0.6 mmol), *N*-(3-chloro-4-methoxyphenyl)acetamide (59.9 mg, 0.3 mmol), $Cu(TFA)_2{\cdot}H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH{\cdot}H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. $Pd(OAc)_2$ (3.4 mg, 0.015 mmol) was then added, and the reaction mixture was stirred for another 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (43 mg, 53% yield). M.p.: 119-121 ºC; ^1H NMR (400 MHz, $CDCl_3$): δ = 1.43 (t, *J* = 7.2 Hz, 3H), 2.21 (s, 3H), 3.90 (s, 3H), 4.40 (q, *J* = 7.2 Hz, 2H), 7.51 (s, 1H), 8.83 (s, 1H), 10.88 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.4, 25.5, 56.5, 61.9, 112.9, 114.2, 122.5, 129.6, 135.9, 150.0, 167.6, 168.9 ppm. HRMS (ESI^+): calcd for $C_{12}H_{14}ClNNaO_4$ $[M+Na]^+$ 294.0509, found 294.0508.



Ethyl 2-acetamido-4-bromo-5-methylbenzoate (3n)

A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03

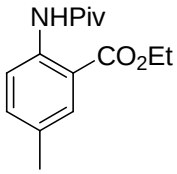
mmol), Selectfluor (212.6 mg, 0.6 mmol), *N*-(3-bromo-4-methylphenyl)acetamide (68.4 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. $Pd(TFA)_2$ (5.0 mg, 0.015 mmol) was then added, and the reaction mixture was stirred for another 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (38 mg, 42% yield). M.p.: 108-111 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.42 (t, *J* = 7.2 Hz, 3H), 2.22 (s, 3H), 2.37 (s, 3H), 4.37 (q, *J* = 7.2 Hz, 2H), 7.85 (s, 1H), 8.97 (s, 1H), 10.98 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.3, 22.4, 25.6, 61.7, 114.1, 124.0, 131.9, 132.0, 132.1, 140.0, 168.0, 169.0 ppm. HRMS (ESI^+): calcd for $C_{12}H_{14}BrNNaO_3$ $[M+Na]^+$ 322.0055, found 322.0057.



Ethyl 2-acetamido-5-(2-ethoxy-2-oxoethyl)benzoate (3o)

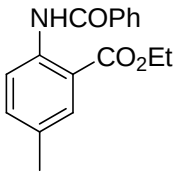
A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), Selectfluor (212.6 mg, 0.6 mmol), ethyl 2-(4-acetamidophenyl)acetate (66.4 mg, 0.3 mmol), $Cu(TFA)_2 \cdot H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH \cdot H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as colorless oil (55 mg, 62% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.24 (t, *J* = 7.2 Hz, 3H), 1.40 (t, *J* = 7.2 Hz, 3H), 2.21 (s, 3H), 3.58 (s, 2H), 4.14 (q, *J* = 7.2 Hz, 2H), 4.36 (q, *J* = 7.2 Hz, 2H), 7.44 (dd, *J* = 2.4 Hz, 8.8 Hz, 1H), 7.94 (d, *J* = 2.4 Hz, 1H), 8.65 (d, *J* = 8.8 Hz, 1H), 11.05 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.27, 14.31, 25.6, 40.6, 61.1, 61.6,

115.2, 120.6, 128.2, 131.4, 135.5, 140.7, 168.2, 169.1, 171.4 ppm. HRMS (ESI^+): calcd for $C_{15}H_{19}NNaO_5$ $[M+Na]^+$ 316.1161., found 316.1167.



Ethyl 5-methyl-2-pivalamidobenzoate (3p)

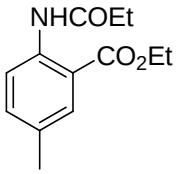
A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-*p*-tolylpivalamide (57.4 mg, 0.3 mmol), $Cu(TFA)_2{\cdot}H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH{\cdot}H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (58 mg, 73% yield). M.p.: 103-105 ºC; ^1H NMR (400 MHz, $CDCl_3$): δ = 1.34 (s, 9H), 1.42 (t, *J* = 7.2 Hz, 3H), 2.33 (s, 3H), 4.38 (q, *J* = 7.2 Hz, 2H), 7.34 (d, *J* = 8.4 Hz, 1H), 7.84 (s, 1H), 8.66 (d, *J* = 8.4 Hz, 1H), 11.24 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.4, 20.8, 27.7, 40.4, 61.4, 115.2, 120.4, 130.9, 131.7, 135.4, 139.7, 168.6, 177.9 ppm. HRMS (ESI^+): calcd for $C_{15}H_{21}NNaO_3$ $[M+Na]^+$ 286.1419, found 286.1417.



Ethyl 2-benzamido-5-methylbenzoate (3q)

A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-*p*-tolylbenzamide (63.4 mg, 0.3 mmol),

$Cu(TFA)_2·H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH·H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (61 mg, 72% yield). M.p.: 103-105 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.44 (t, *J* = 7.2 Hz, 3H), 2.37 (s, 3H), 4.42 (q, *J* = 7.2 Hz, 2H), 7.42 (d, *J* = 8.4 Hz, 1H), 7.52-7.55 (m, 3H), 7.90 (s, 1H), 8.05 (d, *J* = 7.2 Hz, 2H), 8.82 (d, *J* = 8.4 Hz, 1H), 11.99 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.4, 20.9, 61.6, 115.5, 120.5, 127.5, 128.9, 131.1, 131.9, 132.3, 135.1, 135.6, 139.6, 165.7, 168.8 ppm. HRMS (ESI^+): calcd for $C_{17}H_{17}NNaO_3$ $[M+Na]^+$ 306.1106, found 306.1105.



Ethyl 5-methyl-2-propionamidobenzoate (3r)

A Schlenk tube with a magnetic stir bar was charged with $Pd(TFA)_2$ (10.0 mg, 0.03 mmol), $(NH_4)_2S_2O_8$ (136.9 mg, 0.6 mmol), *N*-*p*-tolylpropionamide (49.0 mg, 0.3 mmol), $Cu(TFA)_2·H_2O$ (8.7 mg, 0.03 mmol), *p*-$TsOH·H_2O$ (28.5 mg, 0.15 mmol) and DCM (1 mL). After the reaction mixture was stirred for 1 min at room temperature, DEAD (156.7 mg, 0.9 mmol) was added. The resulting mixture was stirred at 25 ºC for 24 h. Purification via silica gel column chromatography (petroleum ether/ EtOAc = 7/1-5/1, v/v) afforded the desired product as a white solid (59 mg, 84% yield). M.p.: 71-73 ºC; ^{1}H NMR (400 MHz, $CDCl_3$): δ = 1.26 (t, *J* = 7.6 Hz, 3H), 1.41 (t, *J* = 7.2 Hz, 3H), 2.32 (s, 3H), 2.46 (q, *J* = 7.6 Hz, 2H), 4.36 (q, *J* = 7.2 Hz, 2H), 7.34 (d, *J* = 7.6 Hz, 1H), 7.82 (s, 1H), 8.61 (d, *J* = 8.8 Hz, 1H), 11.00 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 9.8, 14.3, 20.8, 31.8, 61.4, 115.0, 120.4, 130.9, 131.8, 135.4, 139.4, 168.5, 172.8 ppm. HRMS (ESI^+): calcd for $C_{13}H_{17}NNaO_3$ $[M+Na]^+$ 258.1106, found

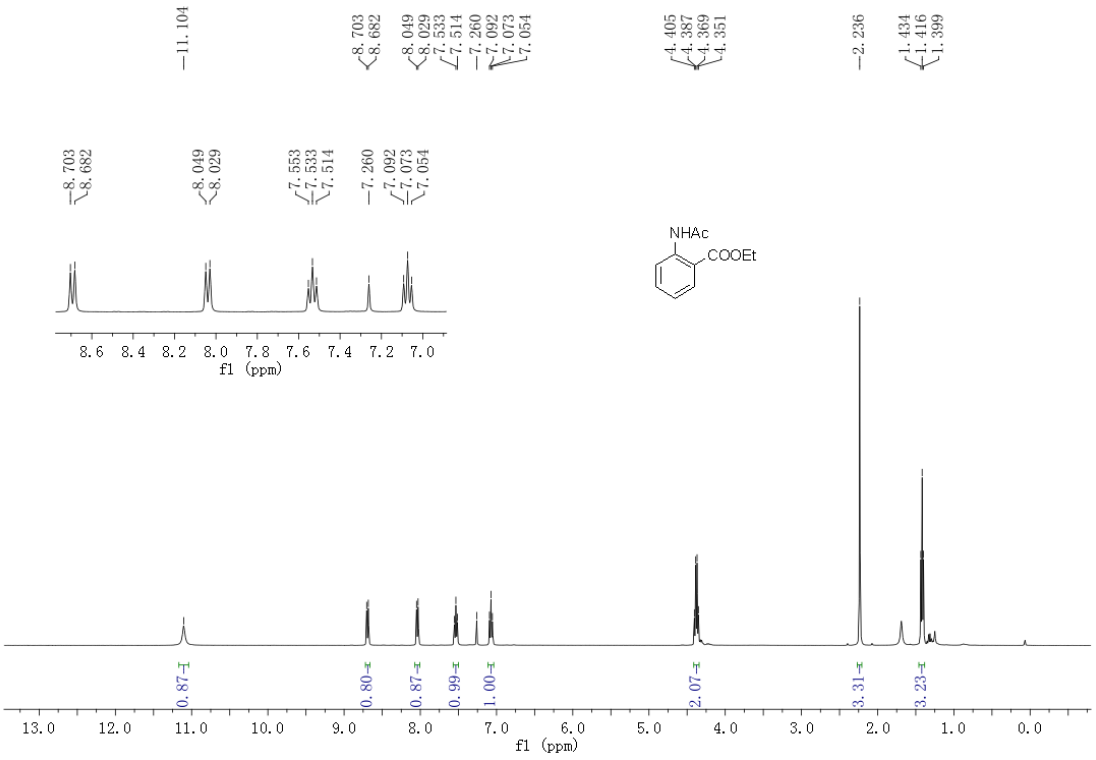
258.1105.

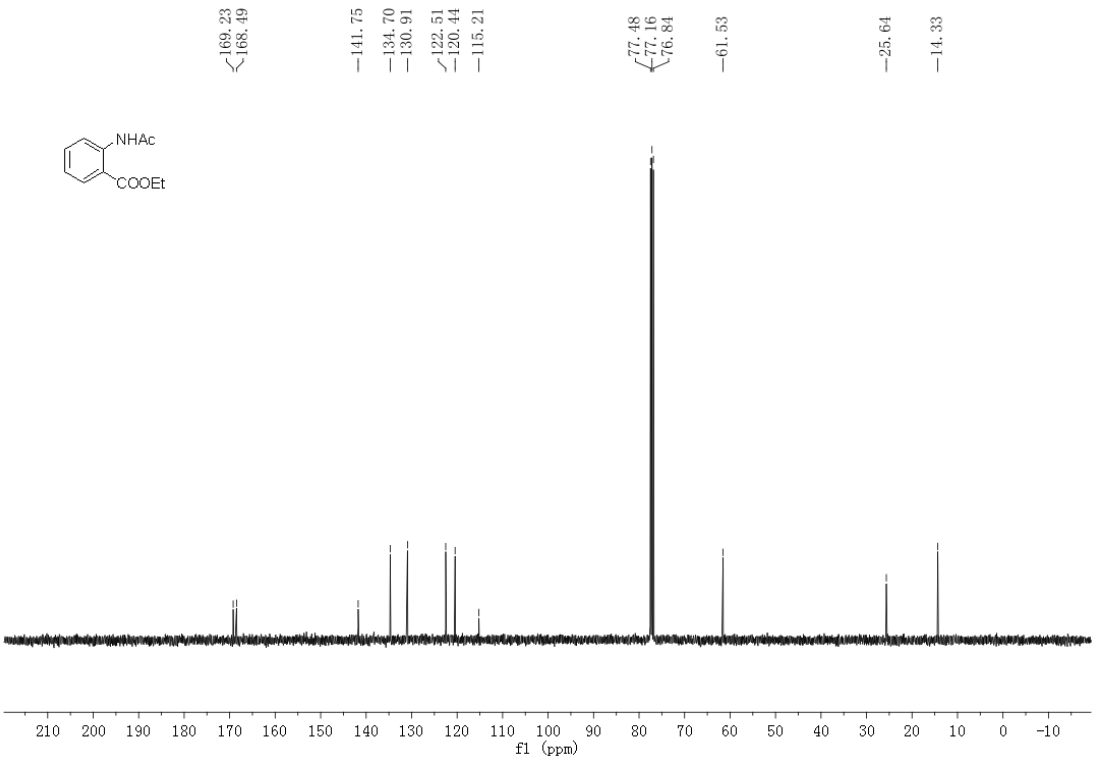
VIII. References

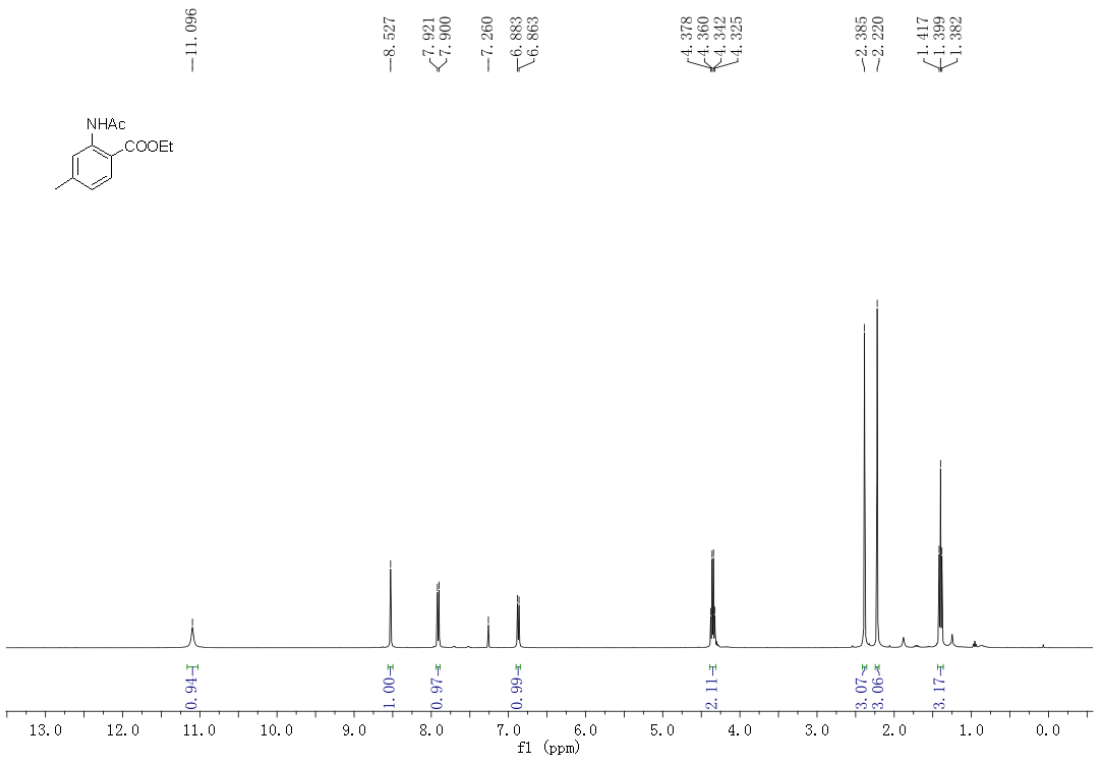
(1) B. S. Kim, C. Jang, D. J. Lee and S. W. Youn, *Chem. Asian. J.*, 2010, **5**, 2336.

(2) R. Giri, J. K. Lam and J.-Q. Yu, *J. Am. Chem. Soc.*, 2010, **132**, 686.

IX. ^{1}H and ^{13}C NMR spectra of compounds 3a-3r, 4



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1.417
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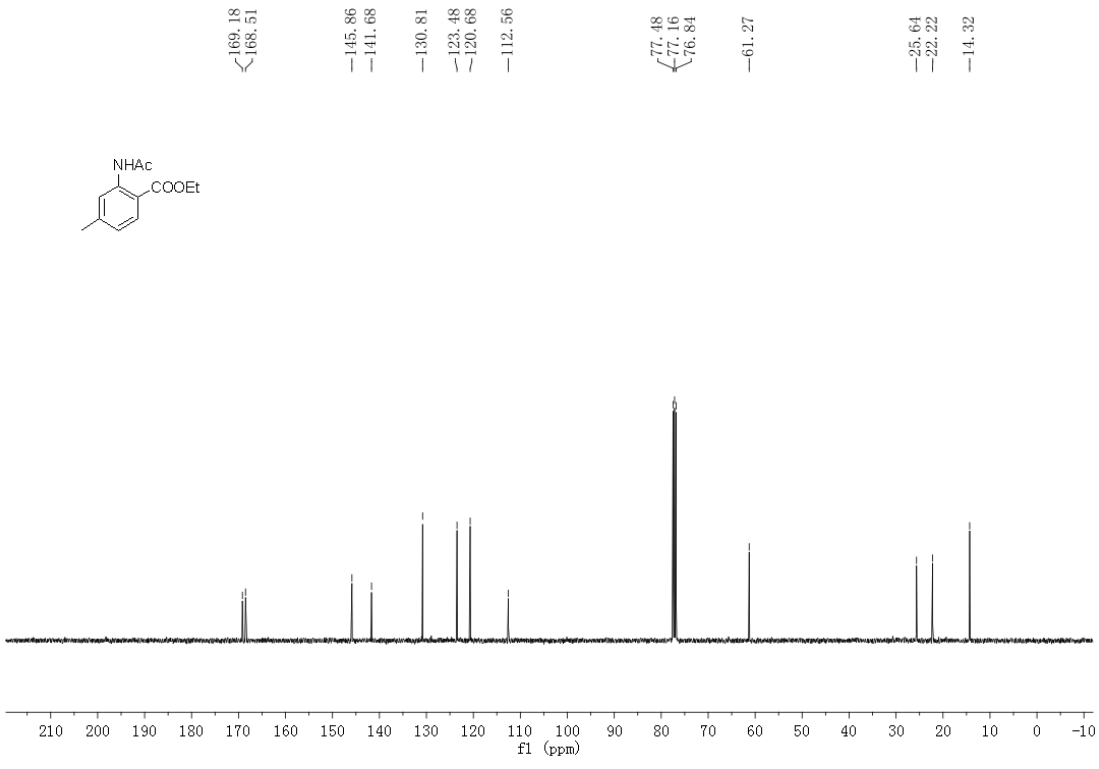
3.06
3.17
f1 (ppm)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22.22
14.32
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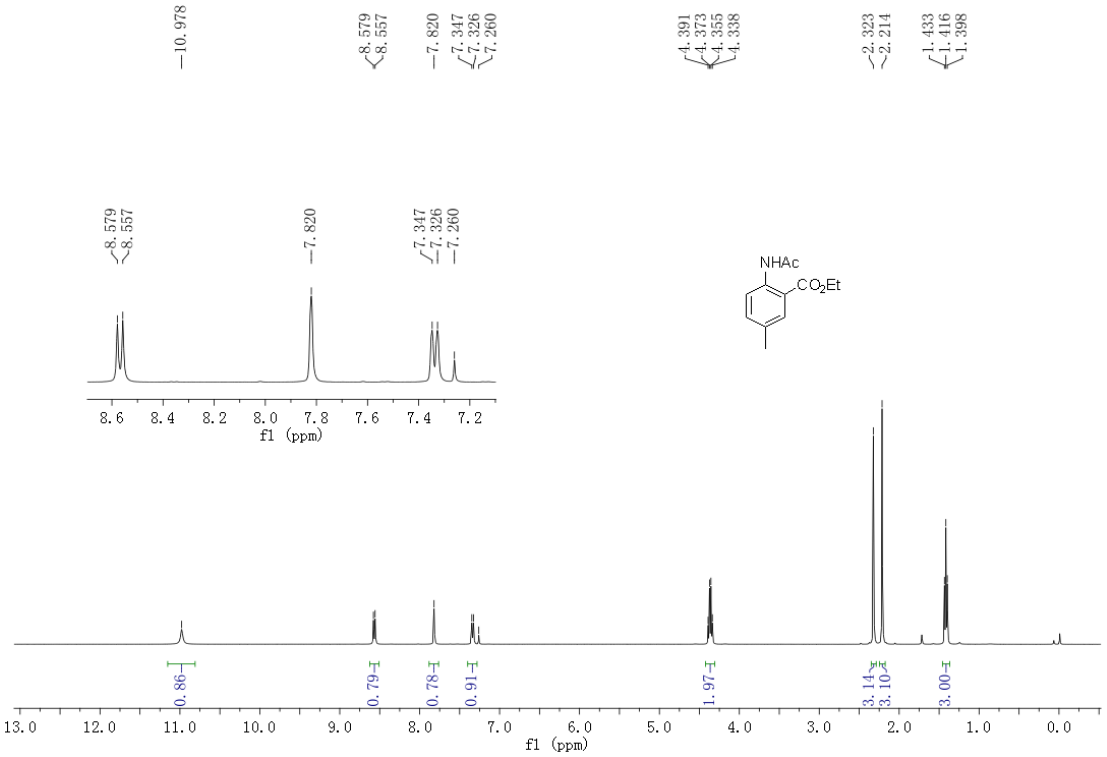
COOEt
f1 (ppm)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1.433
1.416
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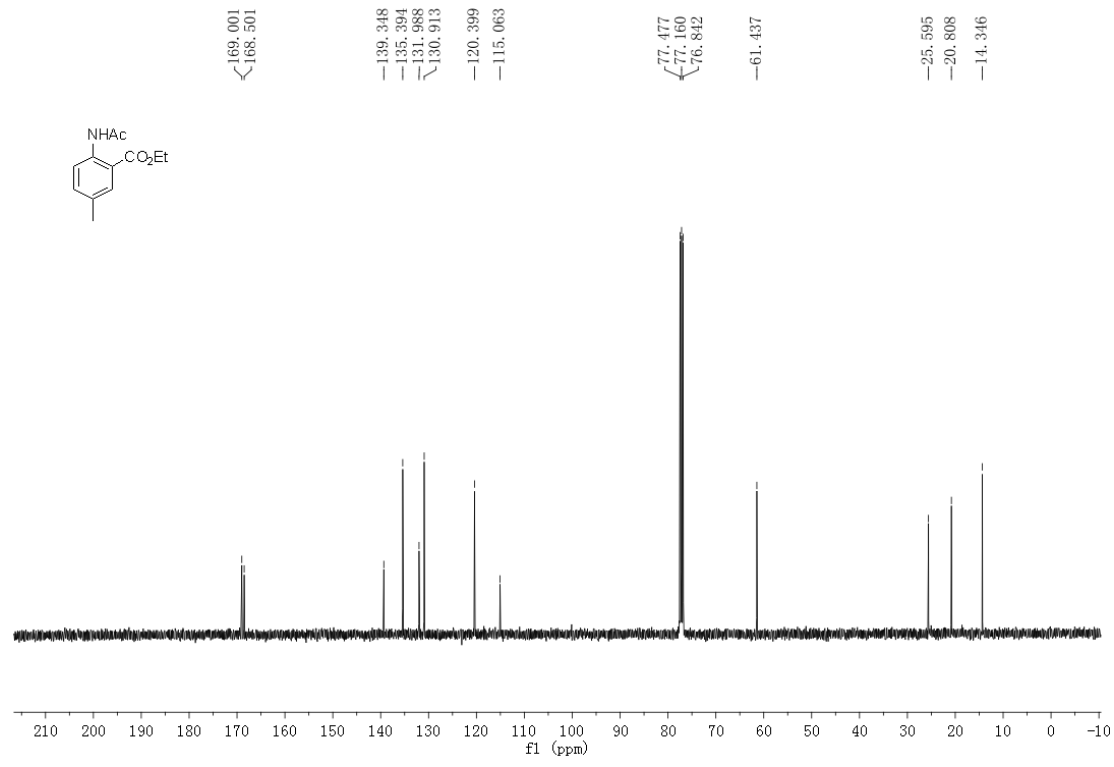
3.00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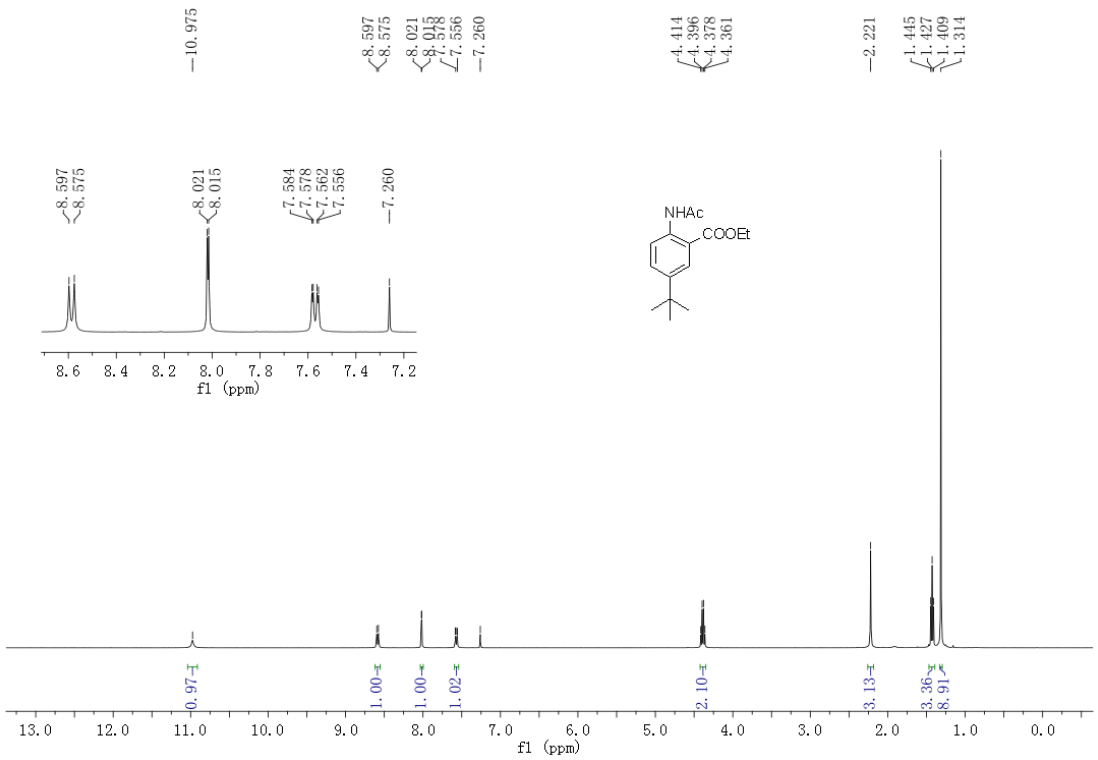
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4.361
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1.427
1.409
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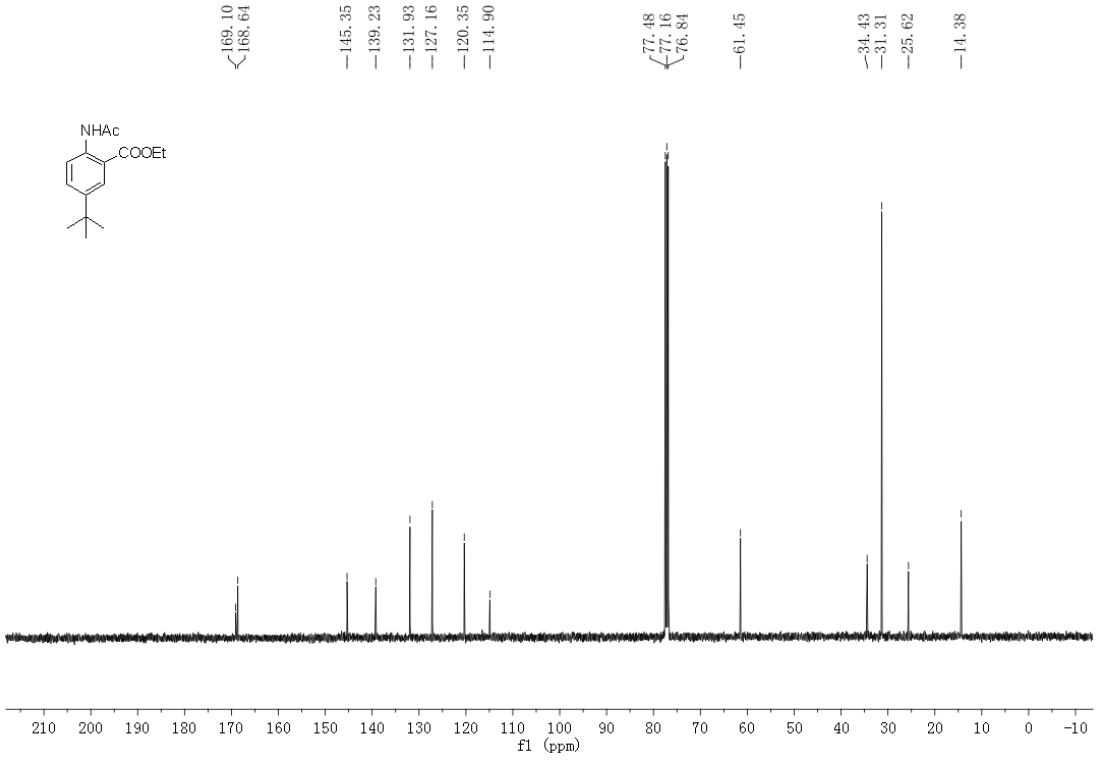
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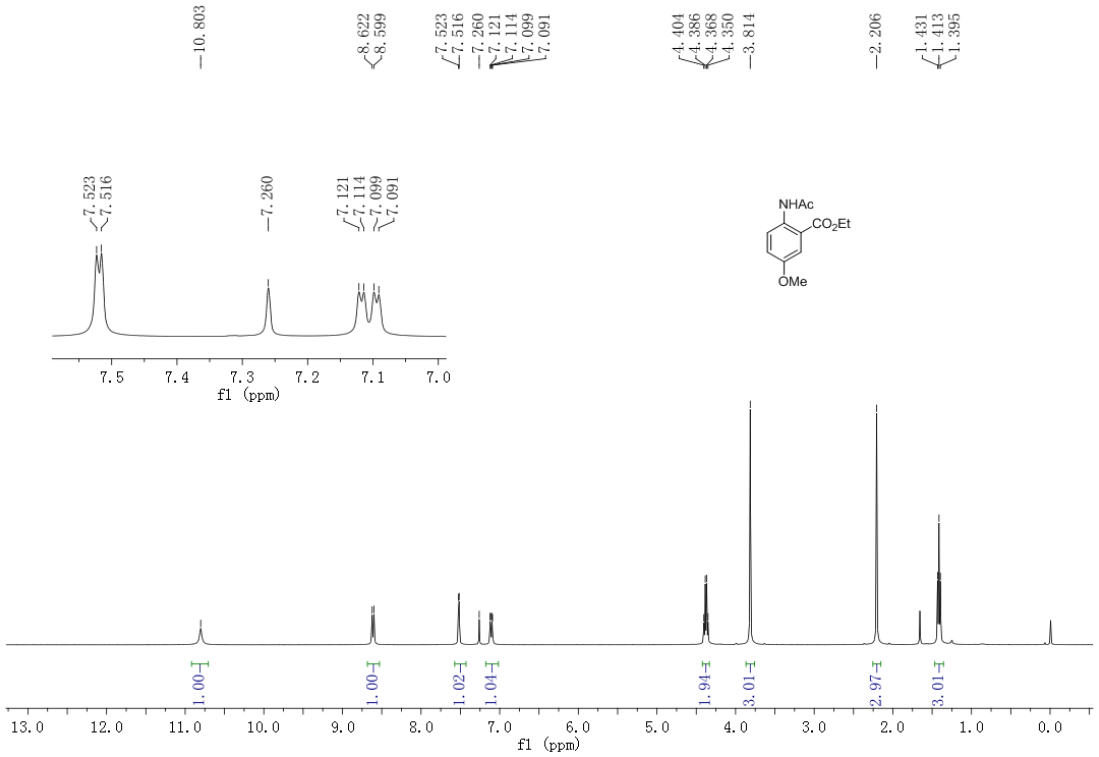
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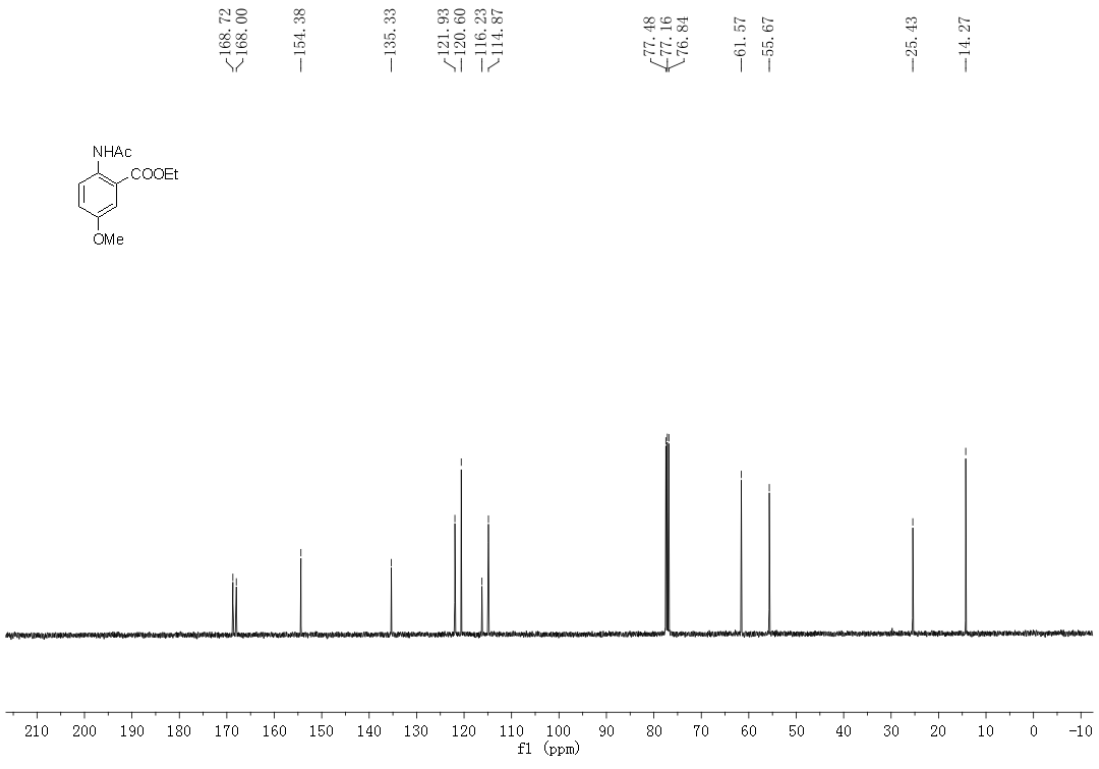
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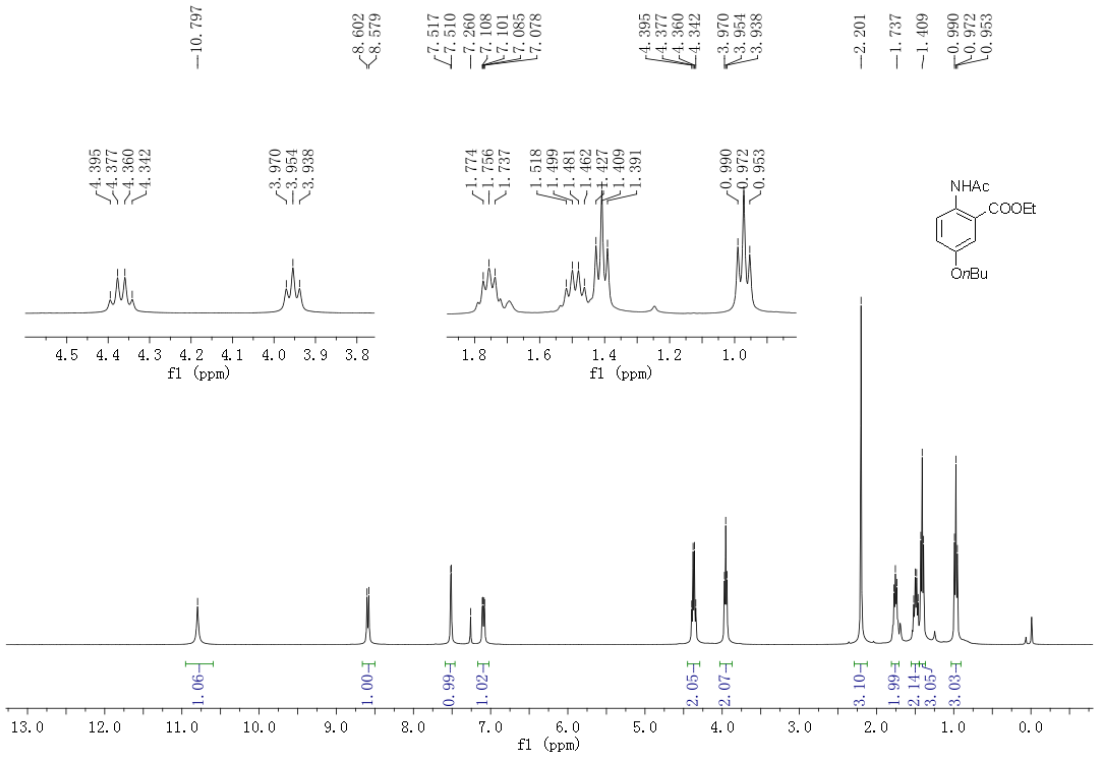
OMe
f1 (ppm)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4.342
3.970
3.954
3.938
2.201
1.737
1.409
0.990
0.972
0.953
1.774
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OnBu
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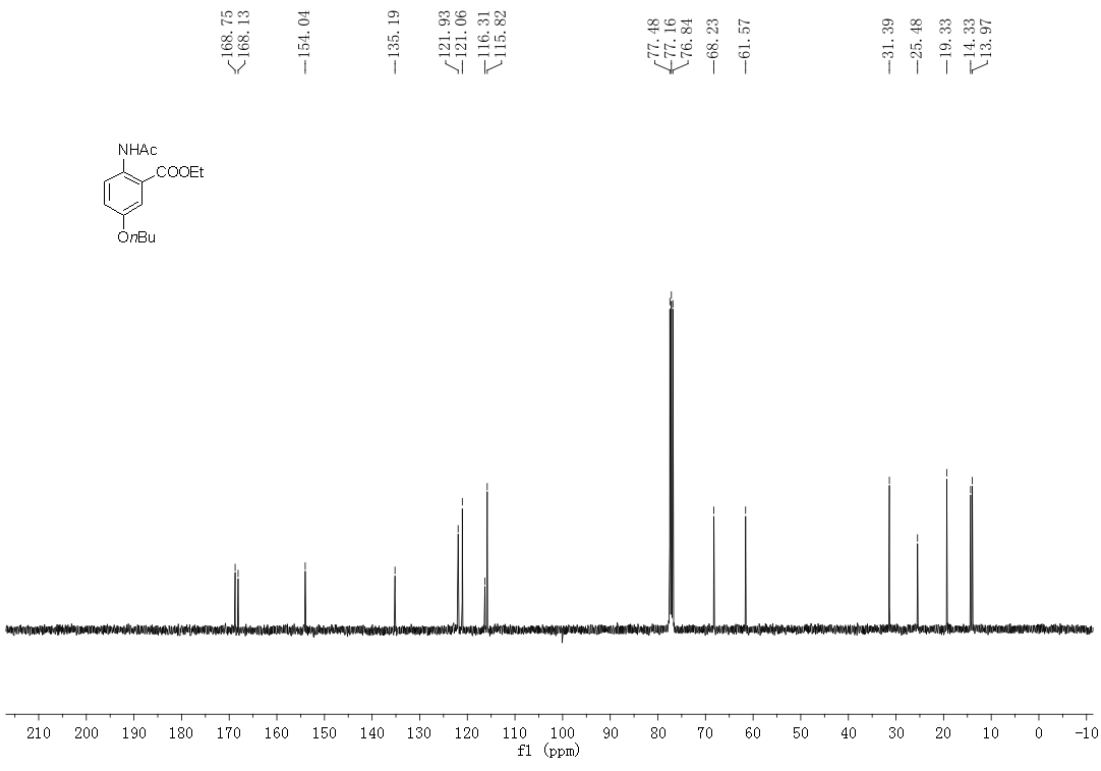
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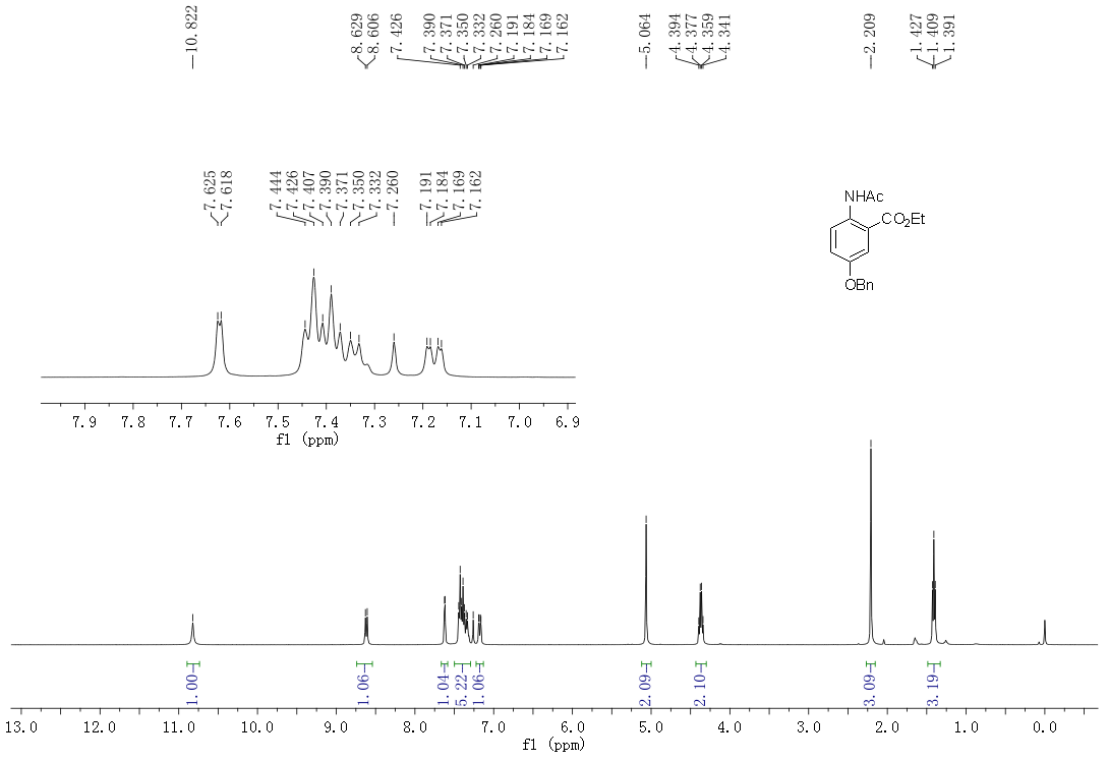
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4.359
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1.409
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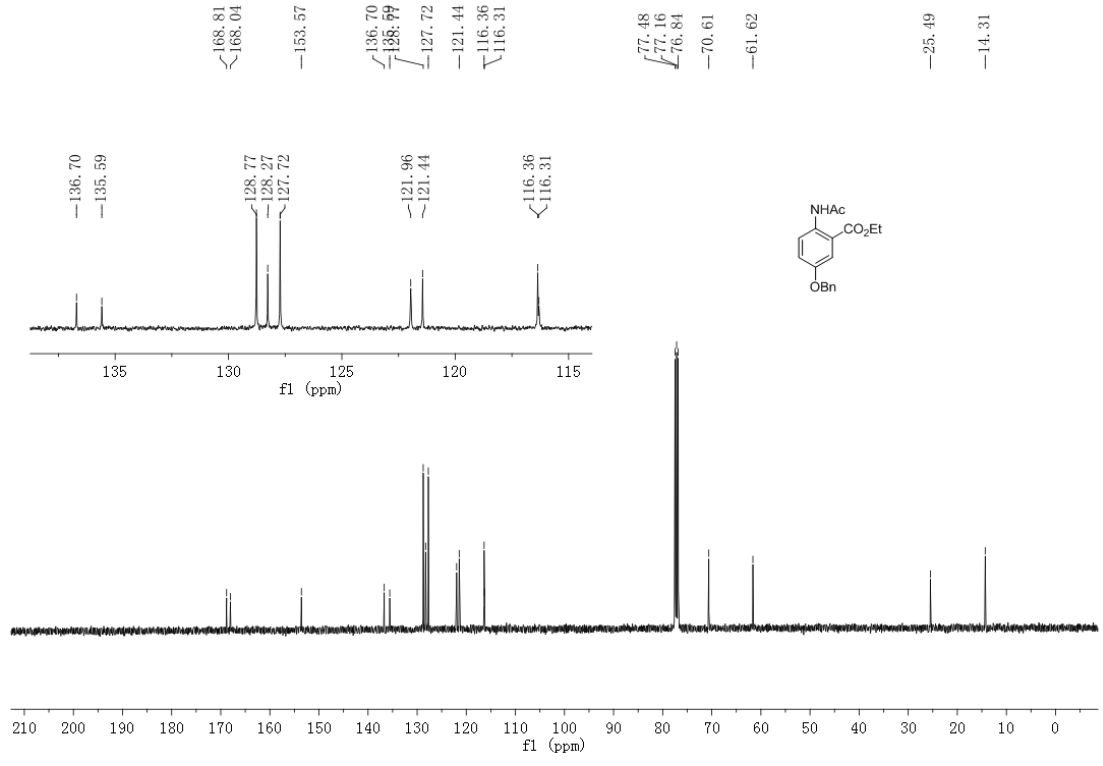
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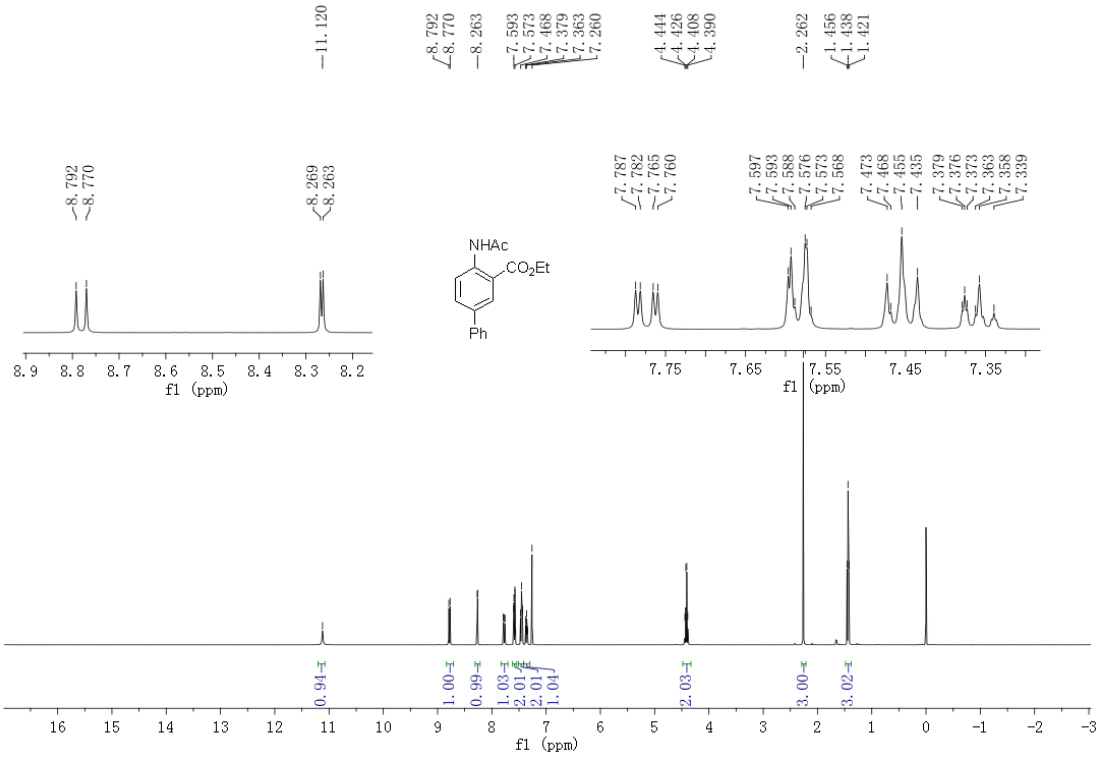
f1 (ppm)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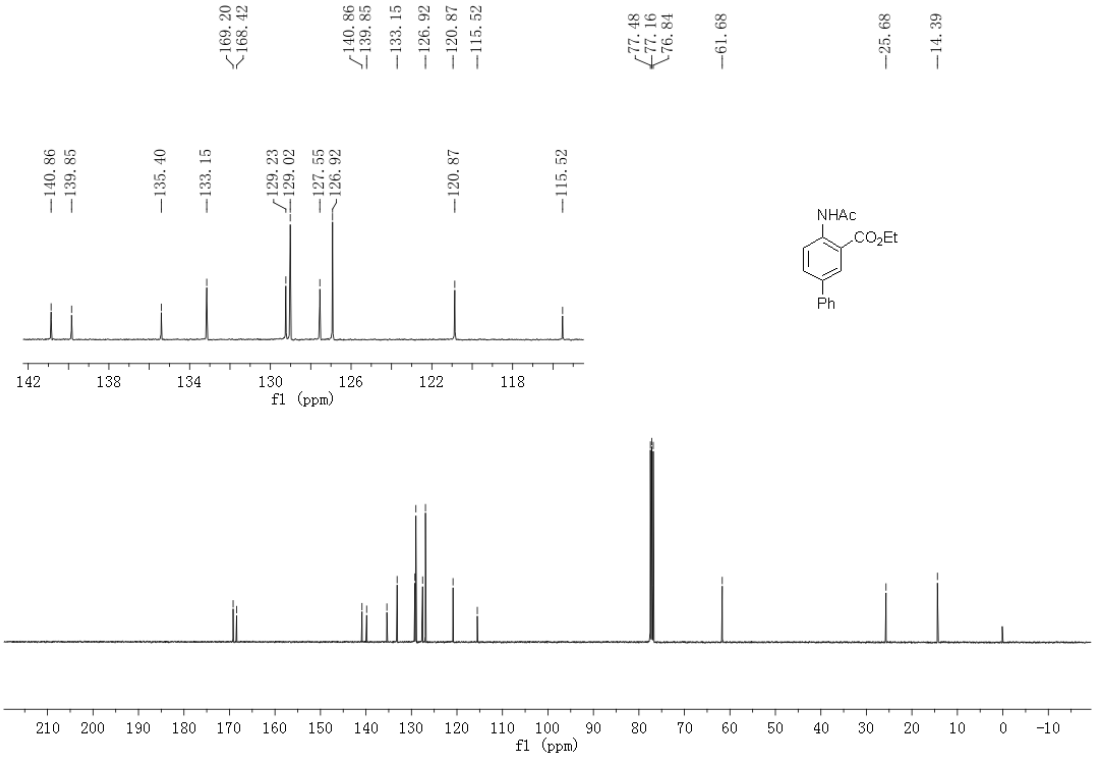
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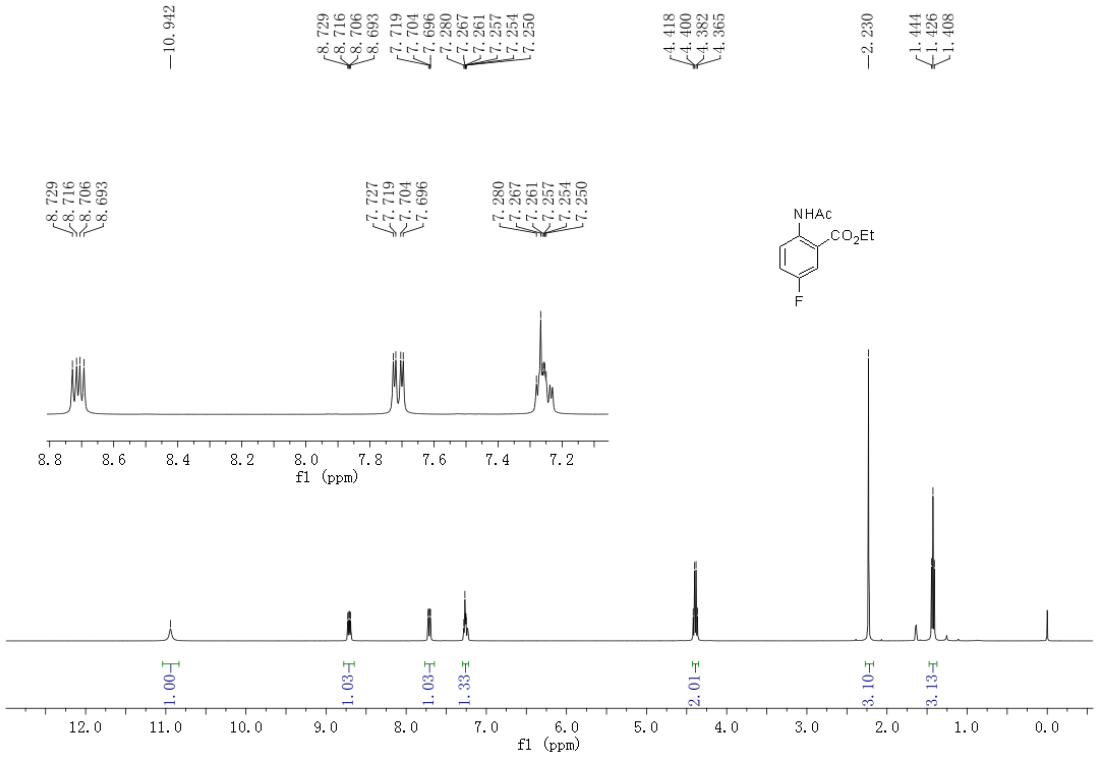
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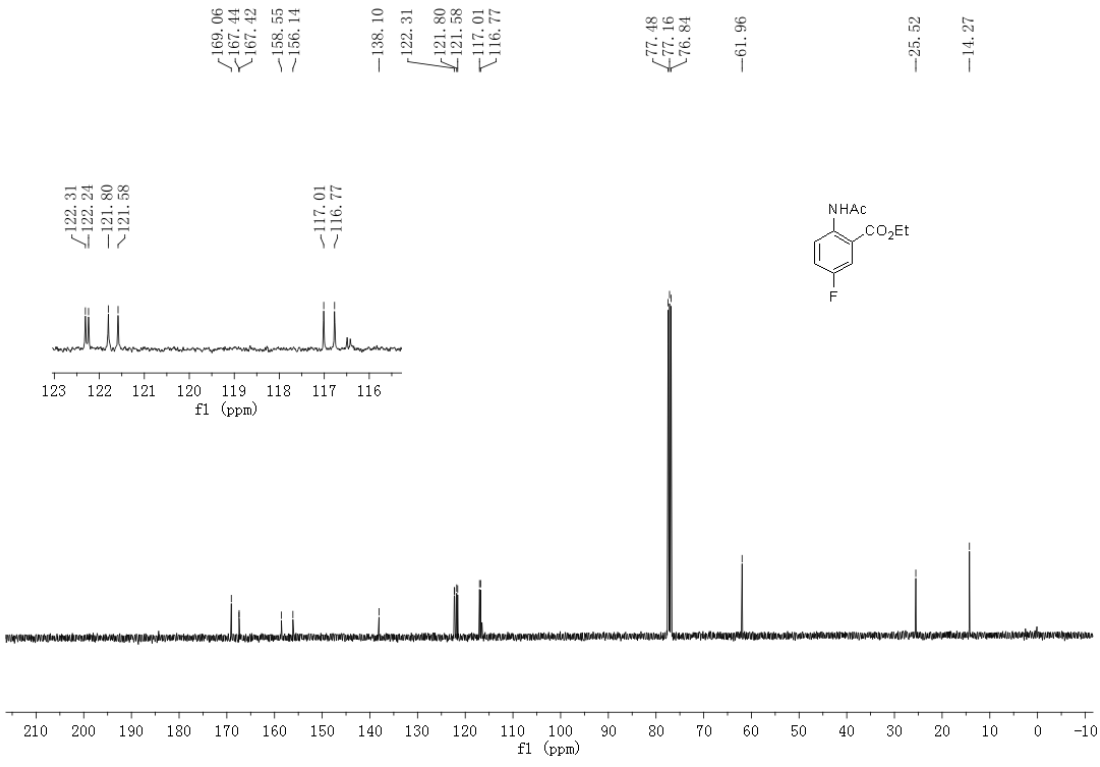
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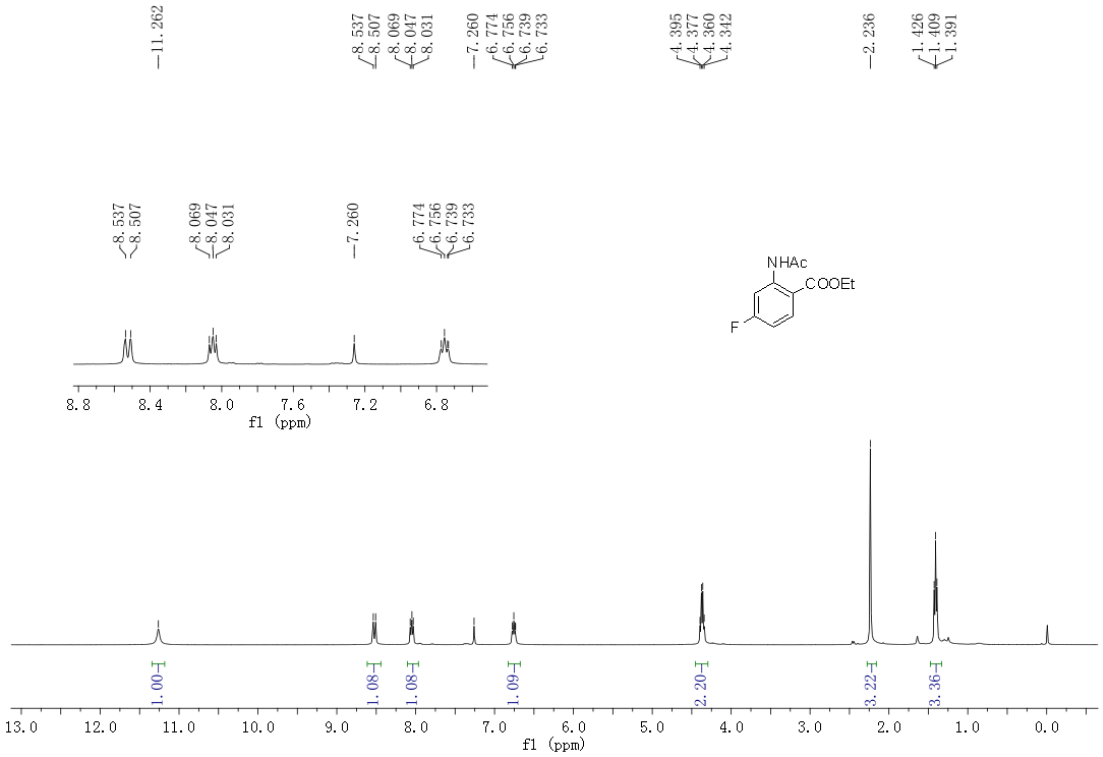
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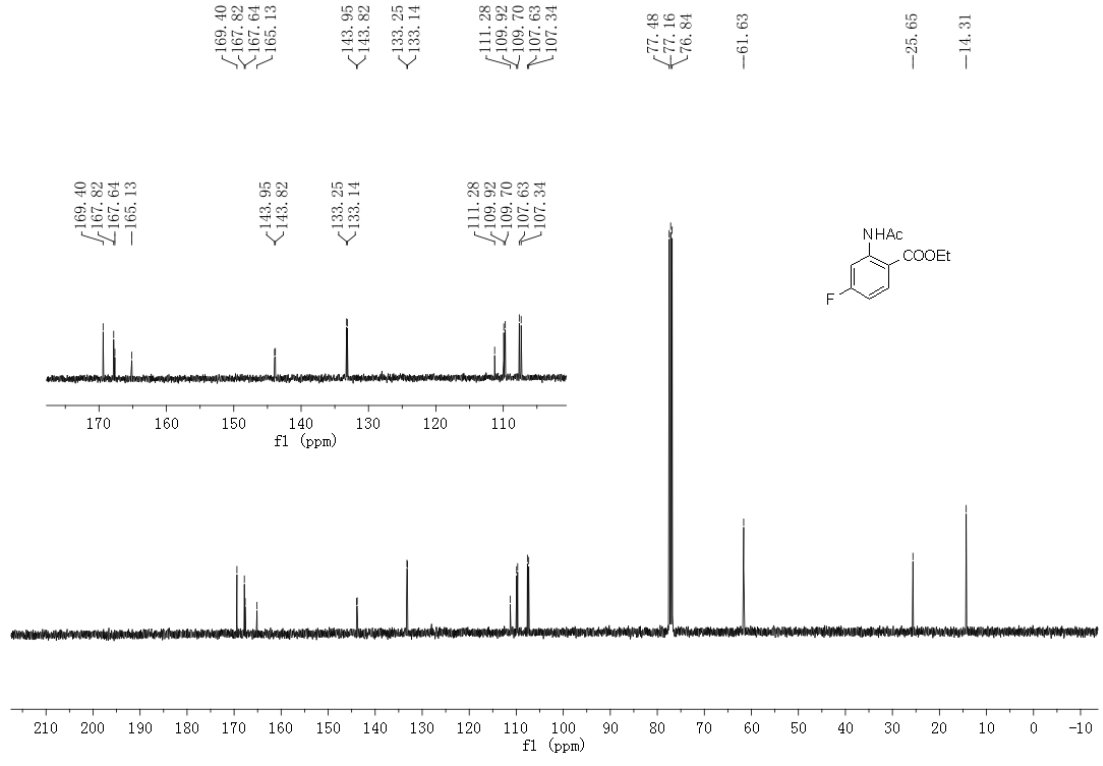
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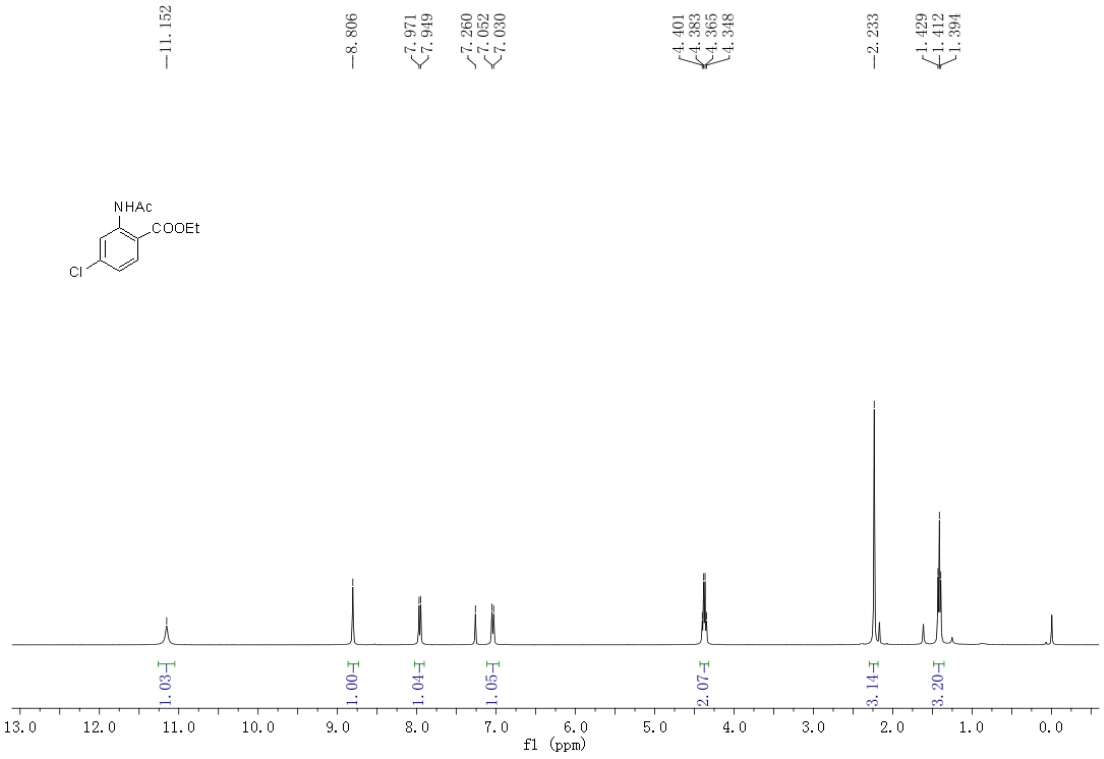
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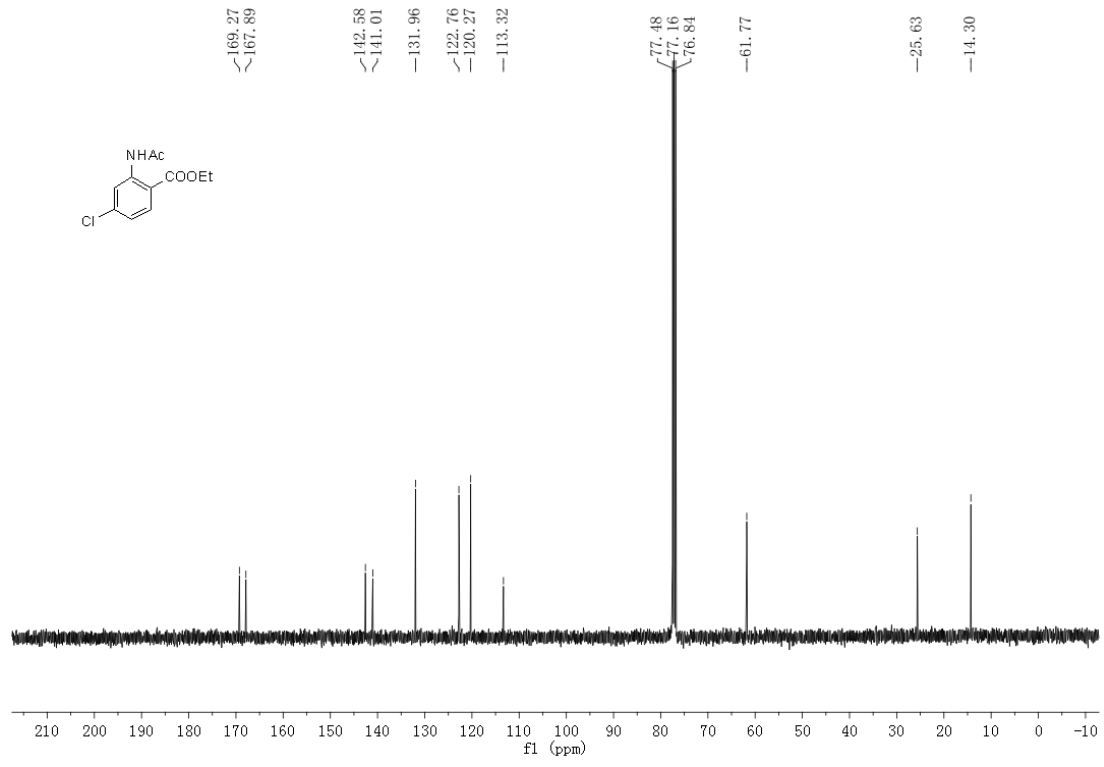
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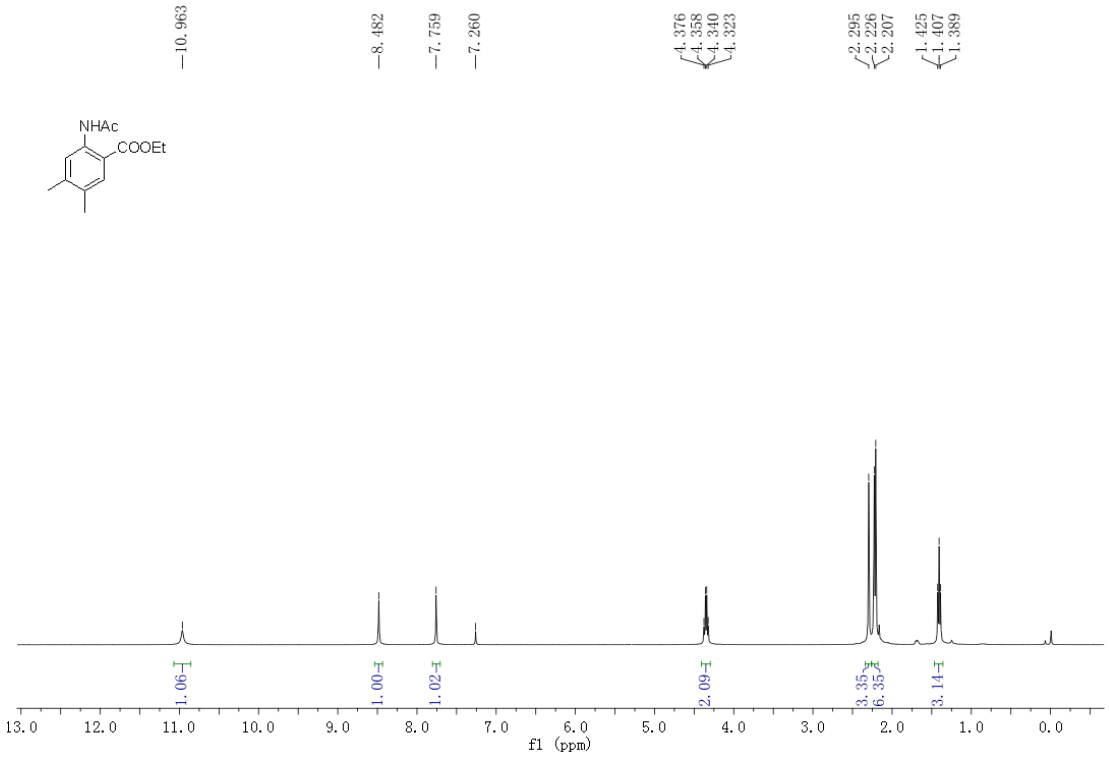
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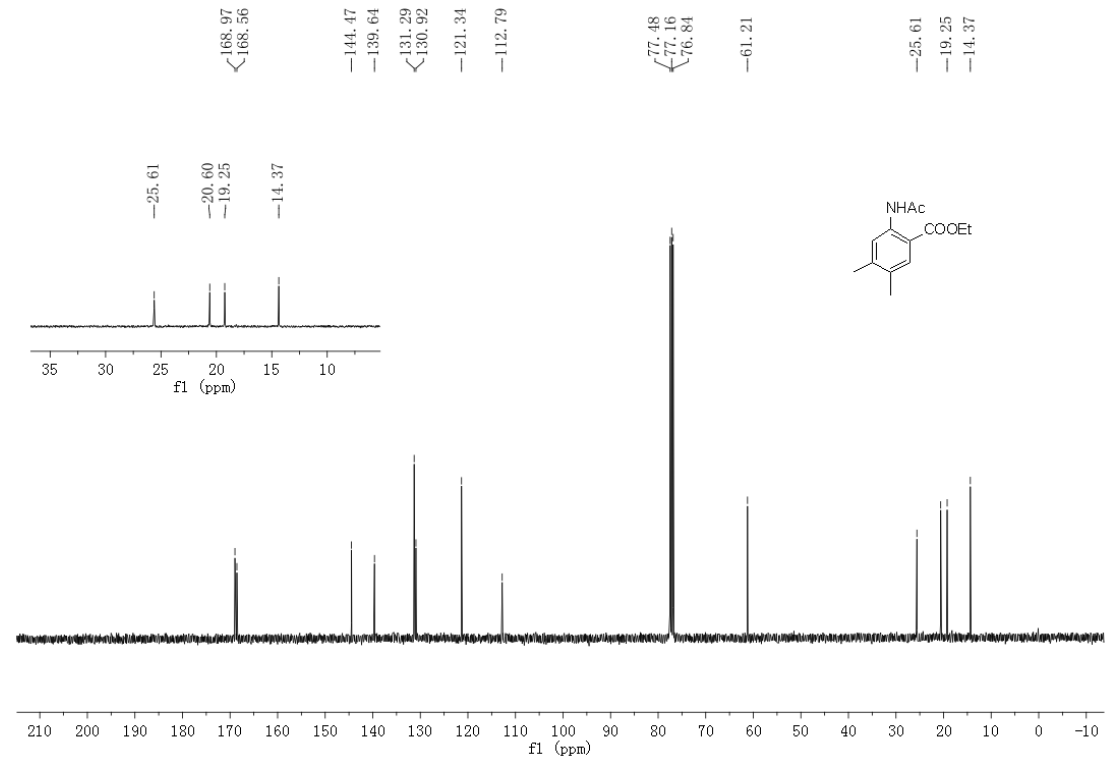
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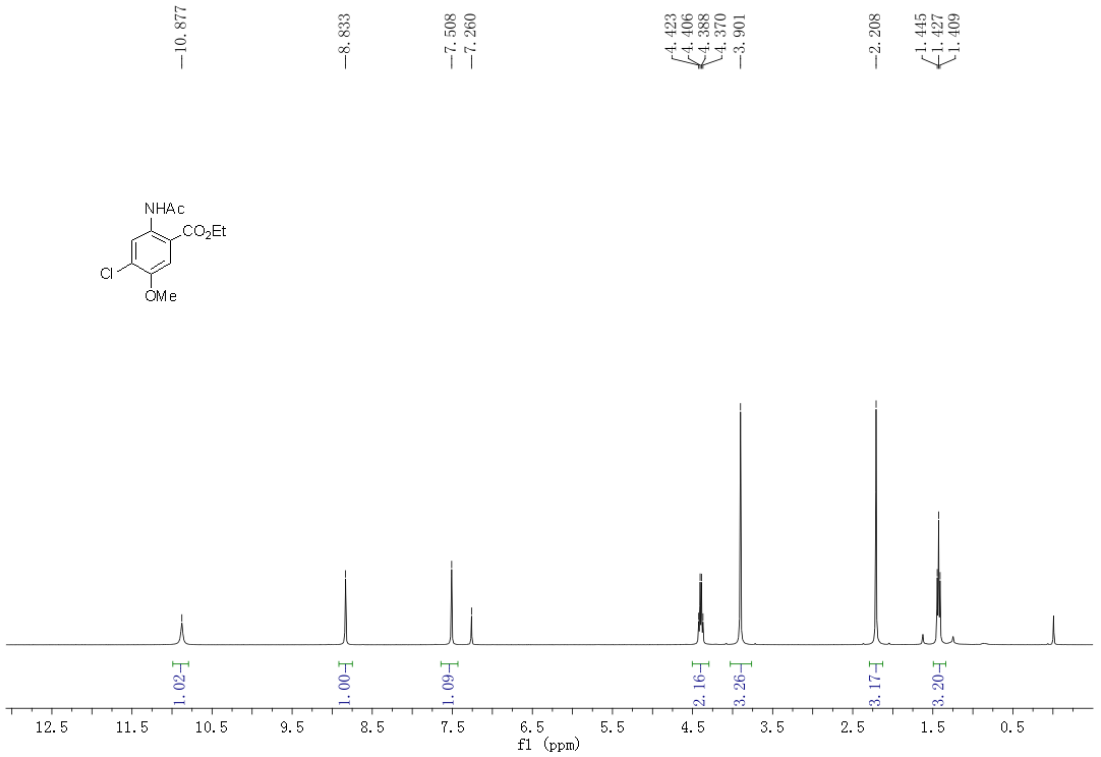
f1 (ppm)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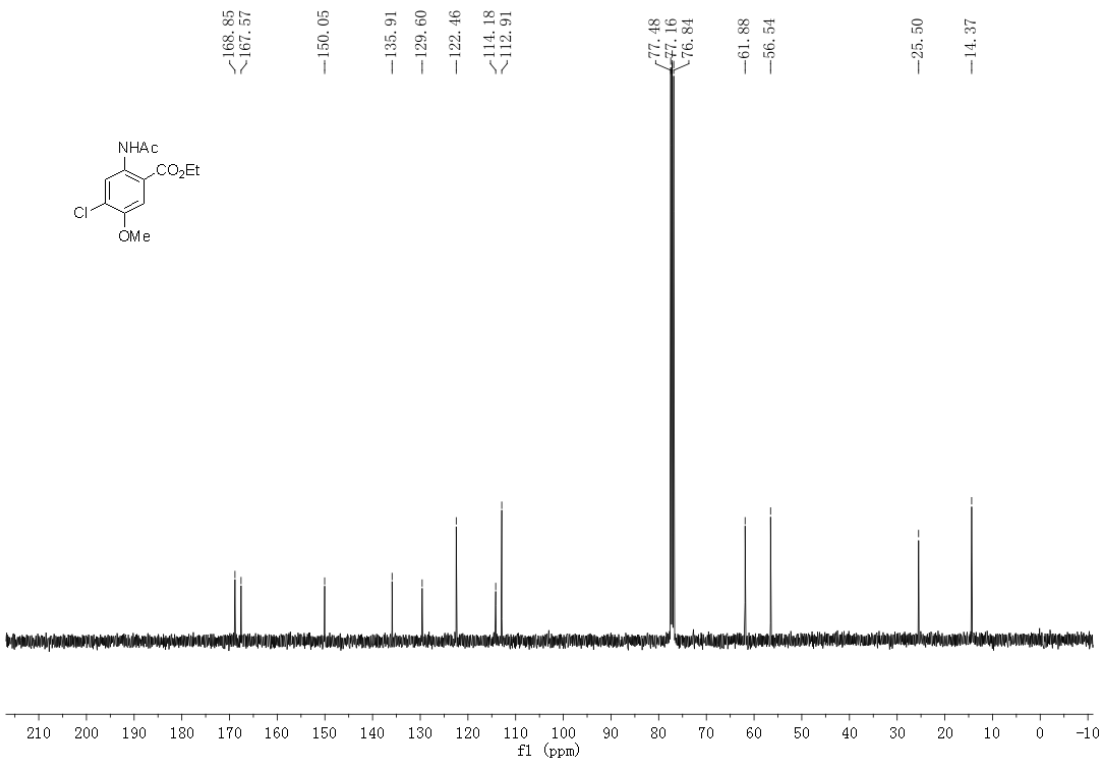
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25.50
14.37
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Cl
OMe
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190
180
170
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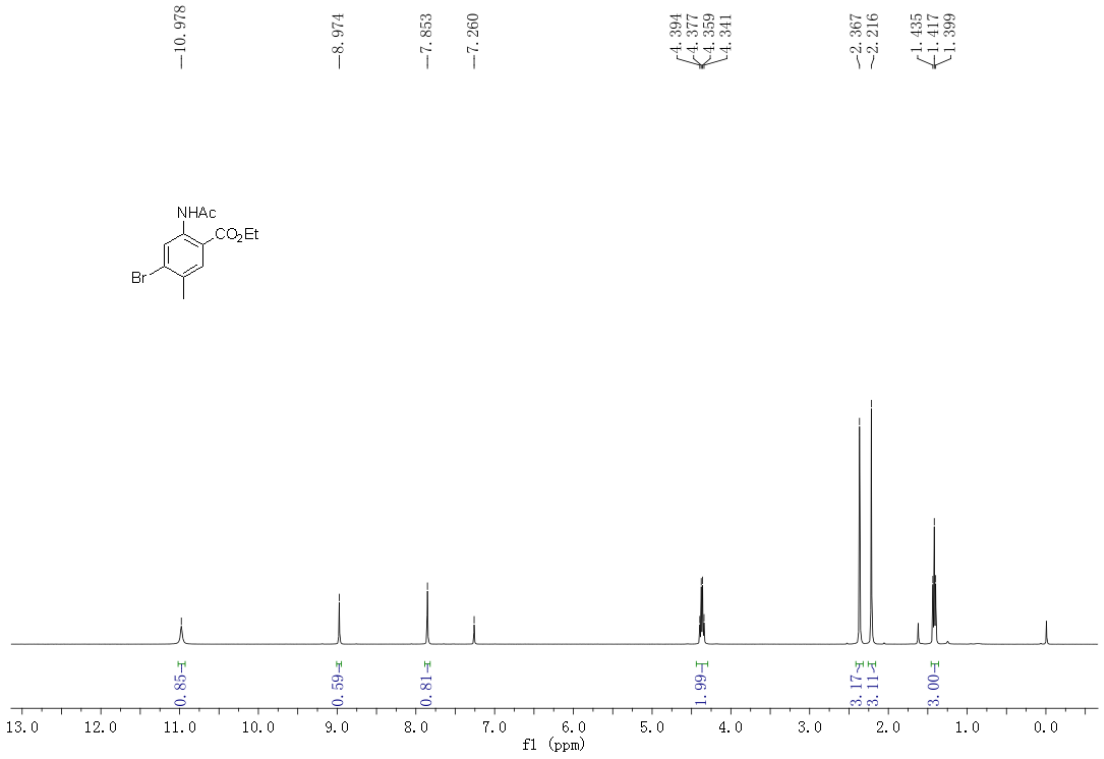
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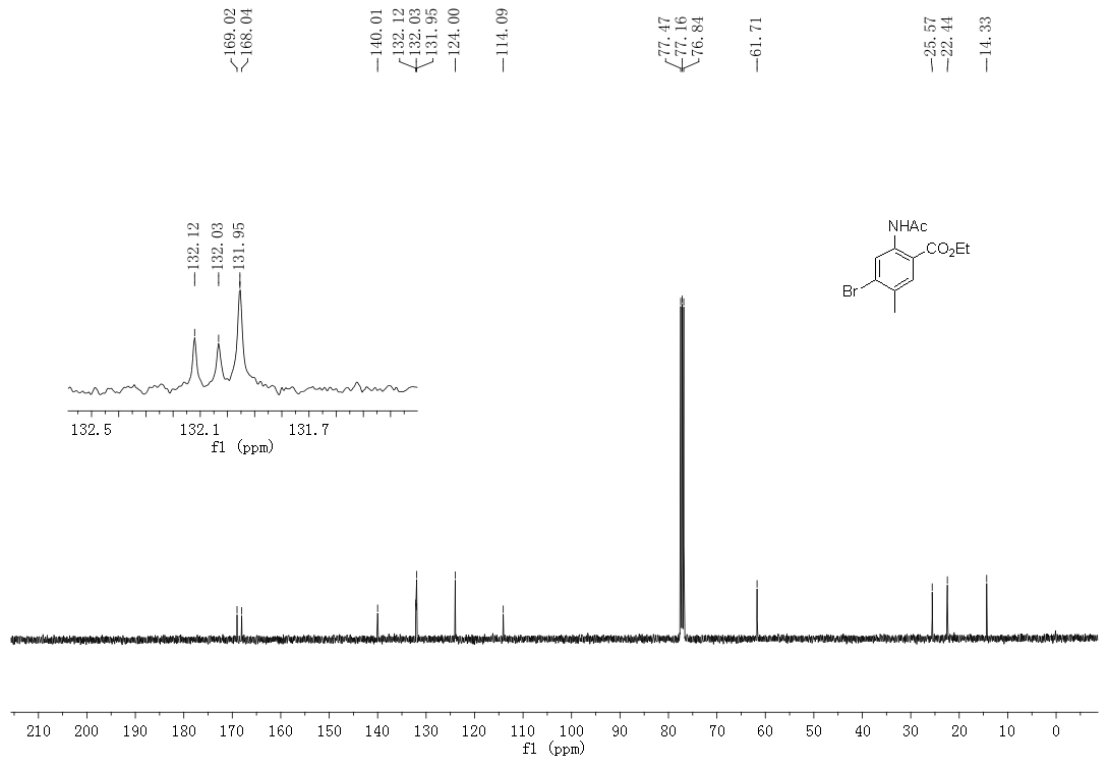
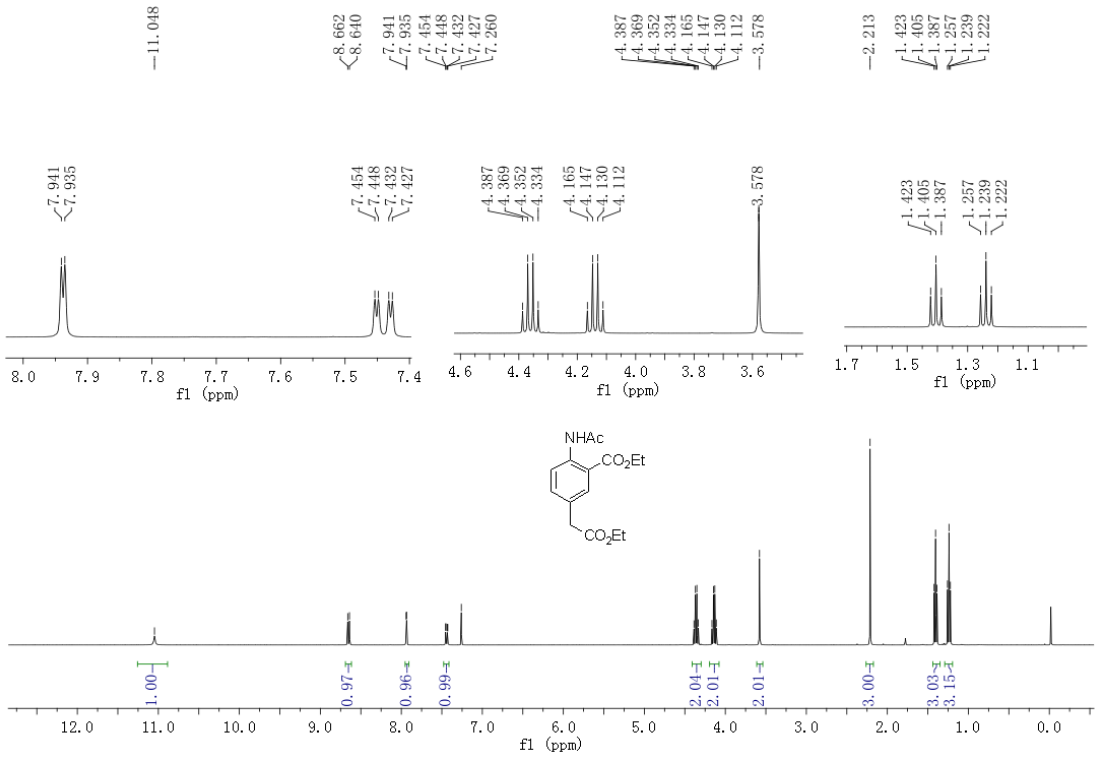
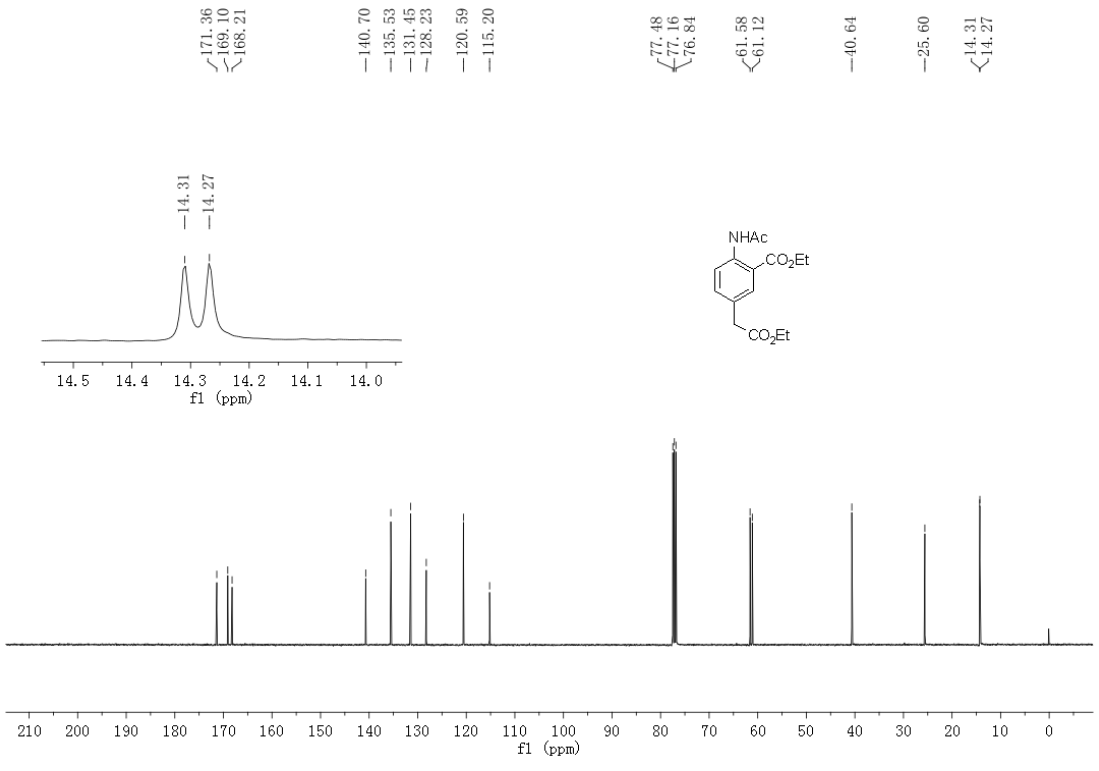
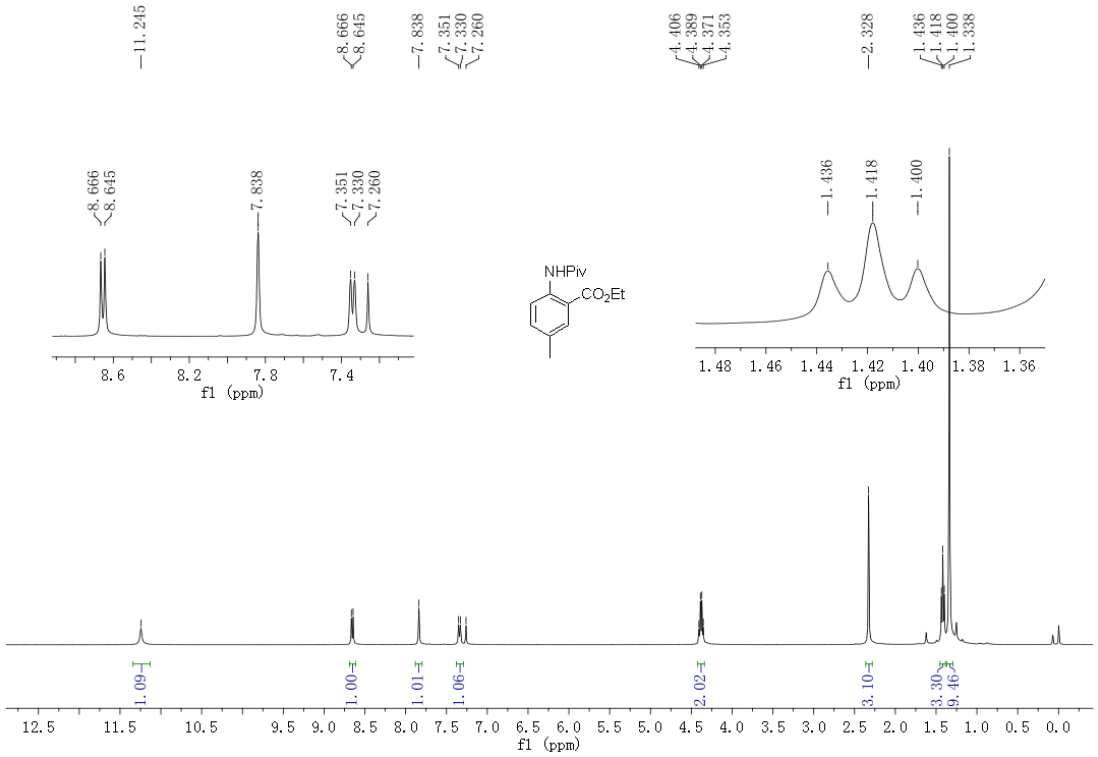
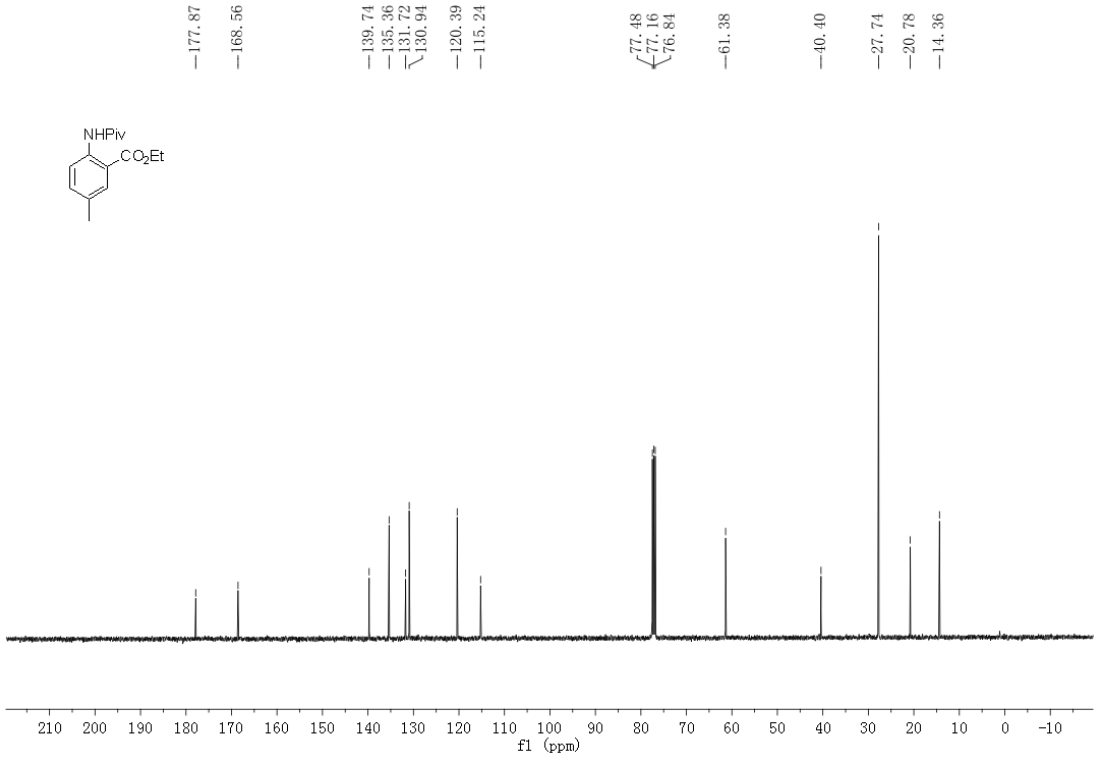
3.11
3.00
f1 (ppm)

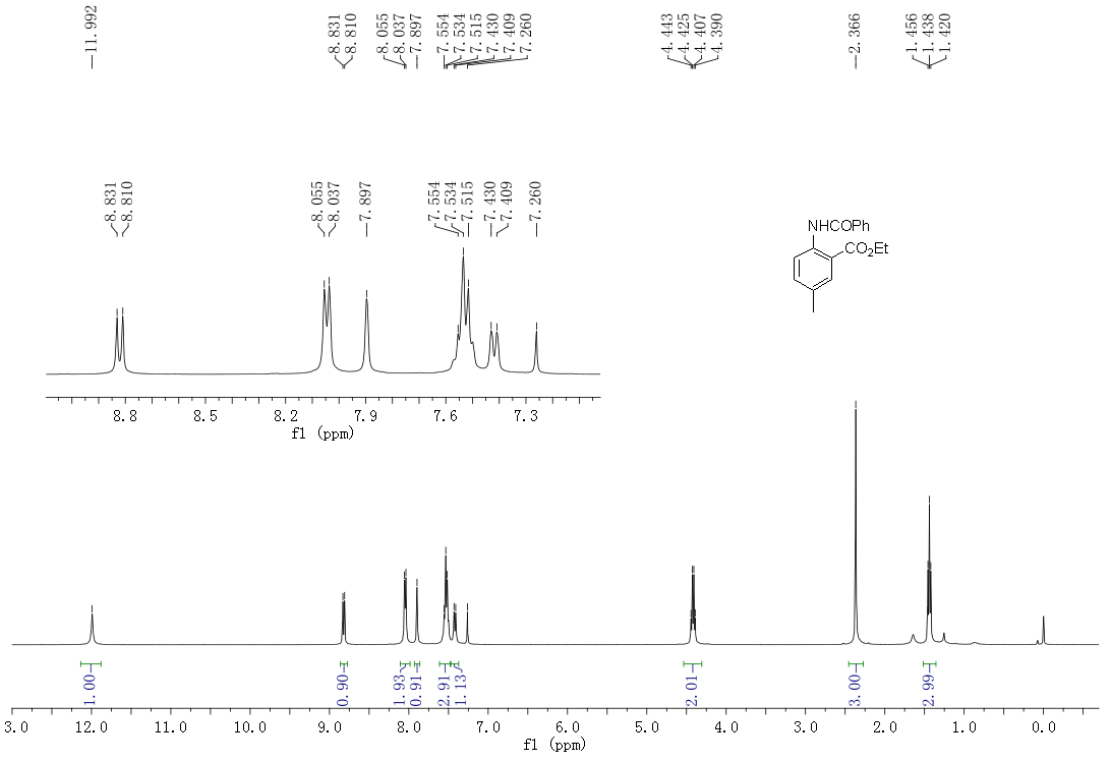

169.02
168.04
140.01
132.12
132.03
131.95
124.00
114.09
77.47
77.16
76.84
61.71
25.57
22.44
14.33
NHAc
CO2Et
Br
f1 (ppm)

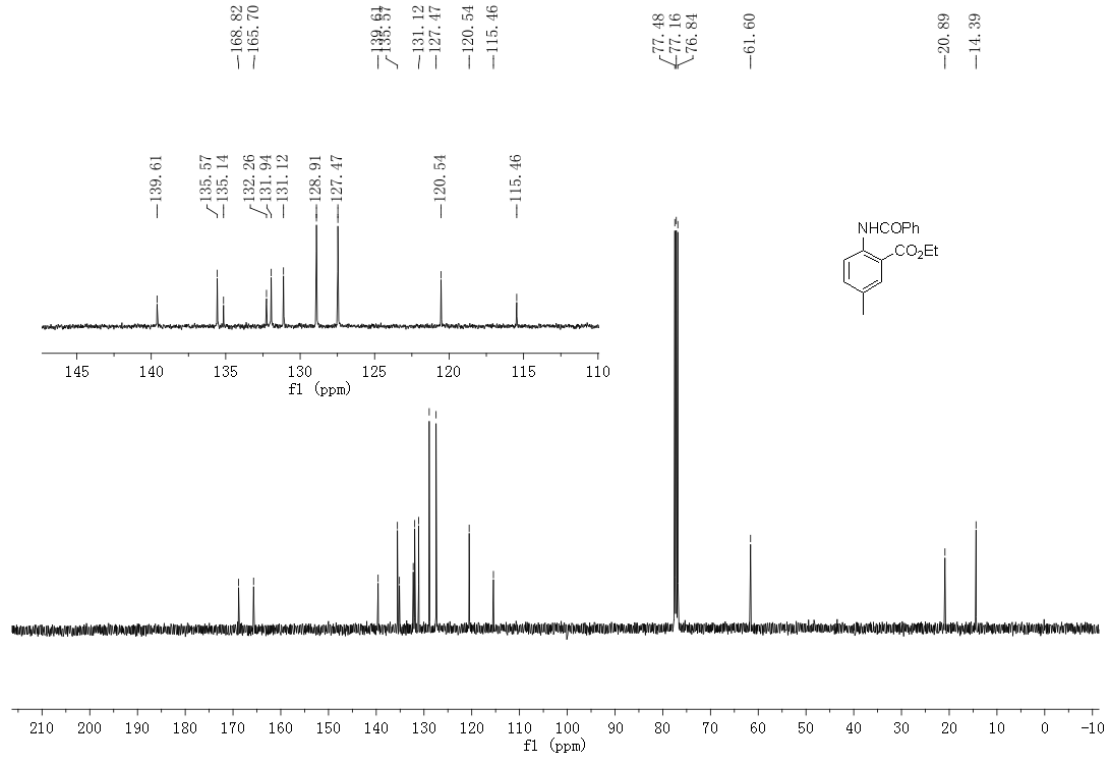

11.048
8.662
8.640
7.941
7.935
7.454
7.448
7.432
7.427
7.260
4.387
4.369
4.352
4.334
4.165
4.147
4.130
4.112
3.578
2.213
1.423
1.405
1.387
1.257
1.239
1.222
NHAc
CO2Et
CO2Et
1.00
0.97
0.96
0.99
2.04
2.01
2.01
3.00
3.03
3.15
f1 (ppm)

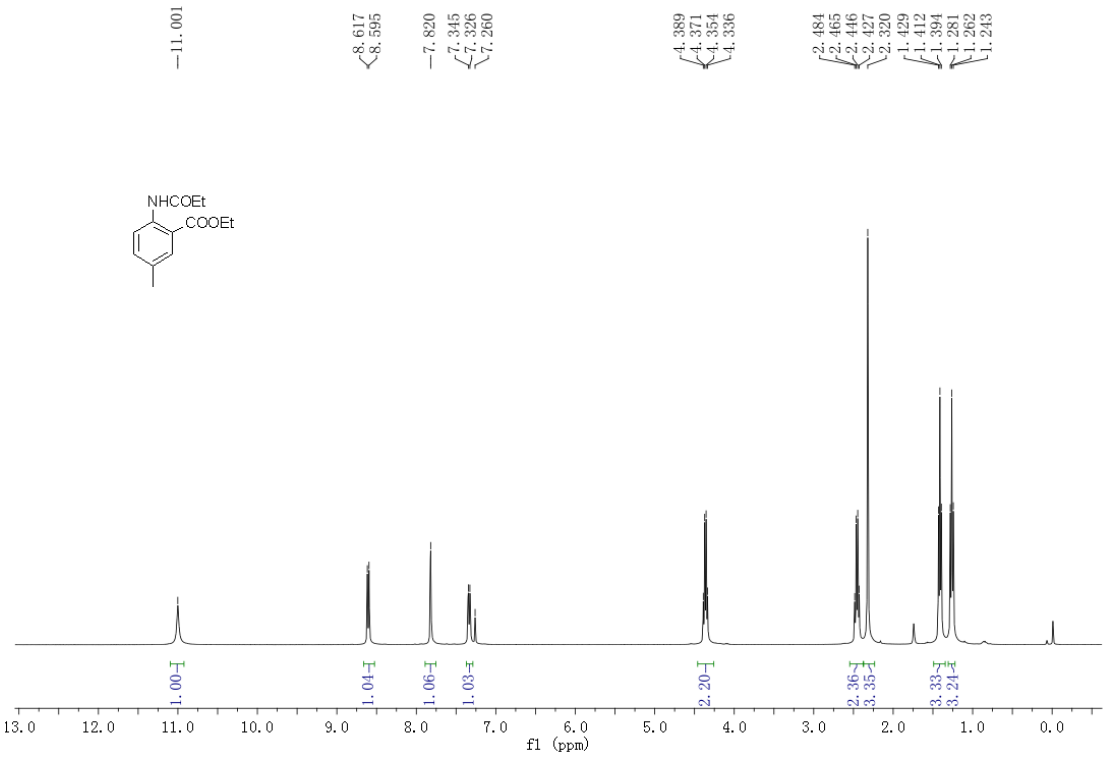

171.36
169.10
168.21
140.70
135.53
131.45
128.23
120.59
115.20
77.48
77.16
76.84
61.58
61.12
40.64
25.60
14.31
14.27
NHAc
CO2Et
CO2Et
f1 (ppm)

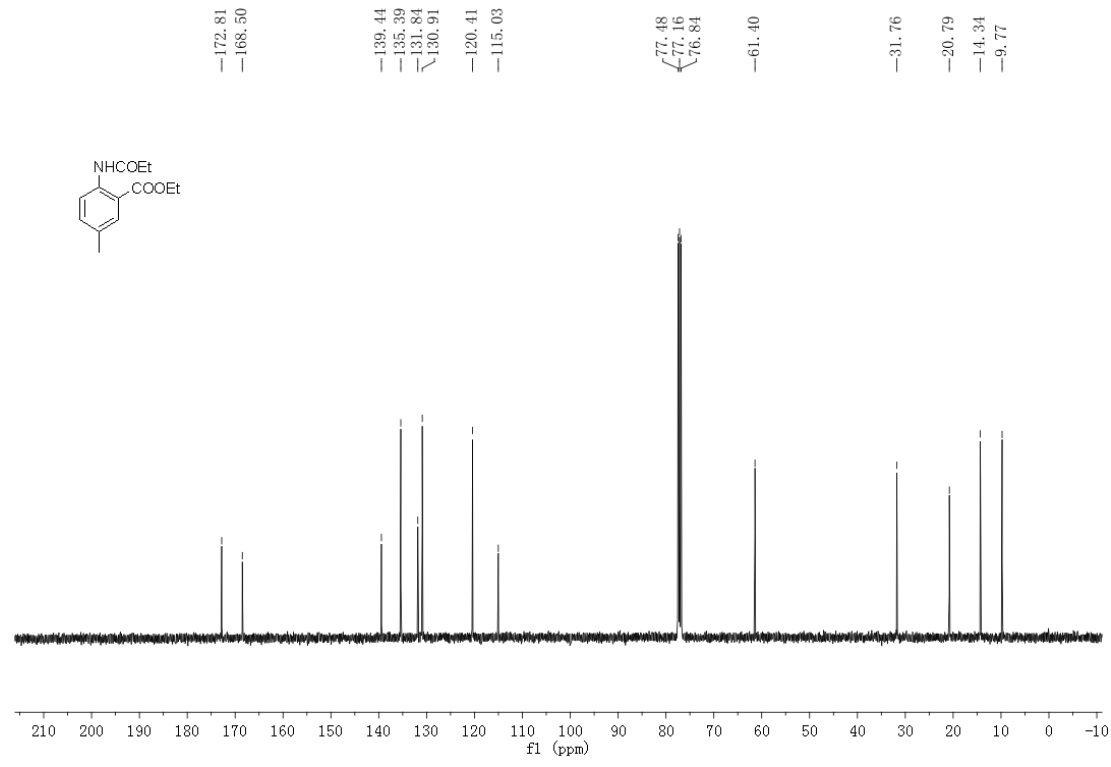

11.245
8.666
8.645
7.838
7.351
7.330
7.260
4.406
4.389
4.371
4.353
2.328
1.436
1.418
1.400
1.338
NHPiv
CO2Et
f1 (ppm)
1.09
1.00
1.01
1.06
2.02
3.10
3.30
9.46

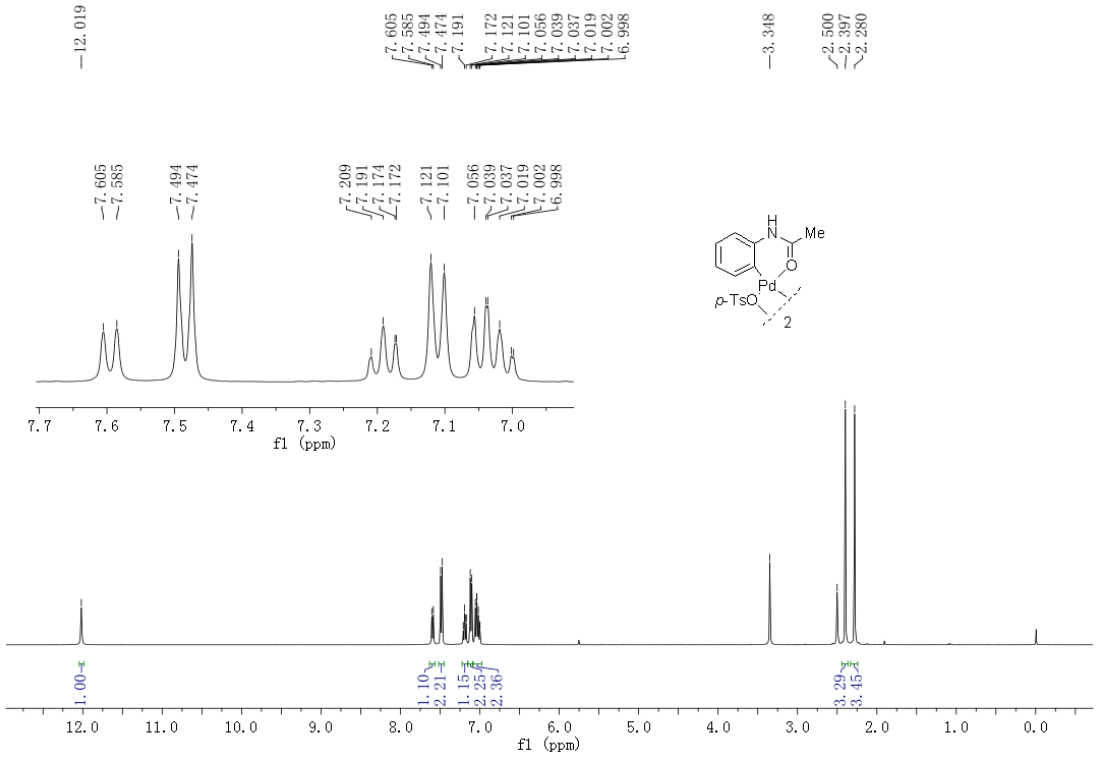

177.87
168.56
139.74
135.36
131.72
130.94
120.39
115.24
77.48
77.16
76.84
61.38
40.40
27.74
20.78
14.36
NHPiv
CO2Et
f1 (ppm)

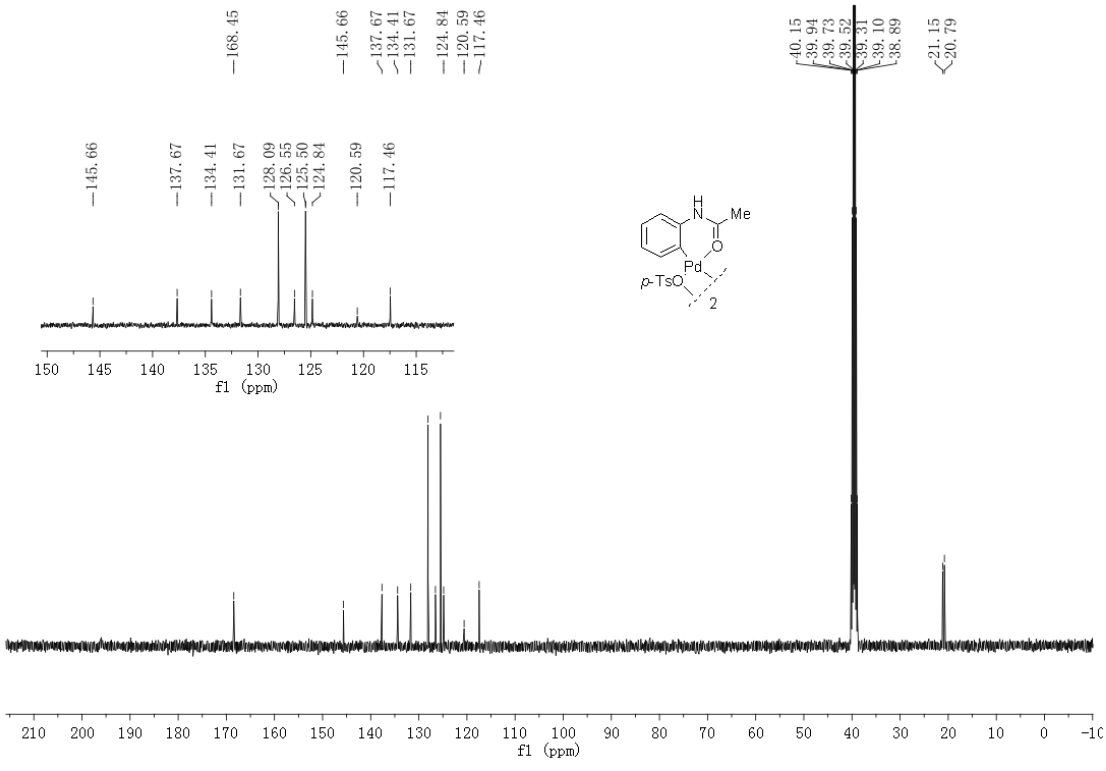

11.992
8.831
8.810
8.055
8.037
7.897
7.554
7.534
7.515
7.430
7.409
7.260
4.443
4.425
4.407
4.390
2.366
1.456
1.438
1.420
NHCOPh
CO2Et
f1 (ppm)
1.00
0.90
1.93
0.91
2.91
1.13
2.01
3.00
2.99


168.82
165.70
139.61
135.57
135.14
132.26
131.94
131.12
127.47
120.54
115.46
77.48
77.16
76.84
61.60
20.89
14.39
NHCOPh
CO2Et
f1 (ppm)


11.001
8.617
8.595
7.820
7.345
7.326
7.260
4.389
4.371
4.354
4.336
2.484
2.465
2.446
2.427
2.320
1.429
1.412
1.394
1.281
1.262
1.243
NHCOEt
COOEt
1.00
1.04
1.06
1.03
2.20
2.36
3.35
3.33
3.24
f1 (ppm)


172.81
168.50
139.44
135.39
131.84
130.91
120.41
115.03
77.48
77.16
76.84
61.40
31.76
20.79
14.34
9.77
NHCOEt
COOEt
f1 (ppm)


12.019
7.605
7.585
7.494
7.474
7.191
7.172
7.121
7.101
7.056
7.039
7.037
7.019
7.002
6.998
3.348
2.500
2.397
2.280
Me
N
H
O
Pd
p-TsO
2
f1 (ppm)
1.00
1.10
2.21
1.15
2.25
2.36
3.29
3.45


168.45
145.66
137.67
134.41
131.67
124.84
120.59
117.46
128.09
126.55
125.50
40.15
39.94
39.73
39.52
39.31
39.10
38.89
21.15
20.79
Me
N
H
O
Pd
p-TsO
2
f1 (ppm)