Electronic Supplementary Material (ESI) for RSC Advances

Iodide-catalyzed Amide Synthesis from Alcohols and Amines

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Supporting Information

I. General Methods

All reagents were purchased from commercial suppliers and used without further purification. ^{1}H-NMR, ^{13}C-NMR spectra were measured on a Bruker AM 400 NMR spectrometer (400 MHz or 100MHz, respectively) with $CDCl_3$ as solvent and recorded in ppm relative to internal tetramethylsilane standard. The following abbreviations were used to describe splitting patterns: s = singlet, d = doublet, t = triplet, q = quartet. Coupling constants J are given in Hz. Mass spectra were recorded on a Waters Q-TOF Premier instrument by using ESI method or Agilent 6890-5973N GCMS-EI instrument. Thin layer chromatography was performed on fluorescence indicator marked precoated silca gel 60 plates and visualization was achieved by UV light (254 nm). Flash chromatography was performed on silica gel (0.040-0.063mm). Unless otherwise stated, all commercially available substances and reagents were used as received from their suppliers

General procedure for NHS active ester. (Table 2)

Alcohol **1** (0.5 mmol) and N-hydroxysuccinimide **2a** (0.75 mmol) were added to a tube (10 mL) with a magnetic stirring bar and solvent (CH_3CN, 2 mL). To this mixture 10 mol% of nBu$_4$NI (0.05 mmol) and anhydrous TBHP (4.0 equiv) were added at room temperature. After stirring at 80 °C for 18h, 10 mL water was added and the mixture was extracted with EtOAc (3×15 mL). The combined organic phase was wished by saturated solution of NaCl (1×10 mL) and dried with Na_2SO_4 and evaporated in vacuum. The residue was purified by flash silica gel column chromatography using a mixture of petroleum ether and ethyl acetate (8:1 to 4:1) as eluent to afford the desired products.

General procedure for NHPI active ester. (Table 3)

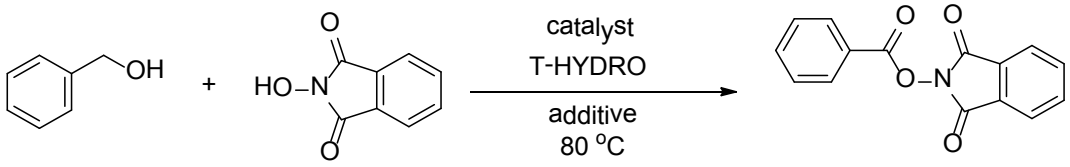
Alcohol **1** (0.5 mmol) and N-hydroxyphthalimide **2b** (0.75 mmol) were added to a tube (10 mL) with a magnetic stirring bar and solvent (CH_3CN, 2 mL). To this mixture 10 mol% of NaI (0.05 mmol), 0.2mmol KOH and aqueous TBHP (4.0 equiv) were added at room temperature. After stirring at 80 °C for 8h, the solvent was removed under vacuum and the residue was purified by flash silica gel column chromatography using a mixture of petroleum ether and ethyl acetate (7:1) as eluent to afford the desired products.

General procedure for amide. (Table 5)

Alcohol **1** (0.5 mmol) and N-hydroxysuccinimide **2a** (0.75 mmol) were added to a tube (10 mL) with a magnetic stirring bar and solvent (CH_3CN, 2 mL). To this mixture 10 mol% of nBu$_4$NI (0.05 mmol) and anhydrous TBHP (4.0 equiv) were added at room temperature. The mixture stir at 80 °C for 18h. After the mixture was cooled to room temperature, amine (0.75 mmol) was added to the mixture in one portion and the mixture was stirred at room temperature for 12 h. 10 mL water was added and the mixture was extracted with EtOAc (3×15 mL). The combined organic phase was wished by saturated solution of NaCl (1×10 mL) and dried with Na_2SO_4 and evaporated in vacuum. The residue was purified by flash silica gel column chromatography using a mixture of petroleum ether and ethyl acetate (10:1) as eluent to afford the desired products.

II. Added Experimental Date

Table S1 Optimization of the conditions for the esterification of NHPI.[a]



1a **2b** **3ab**

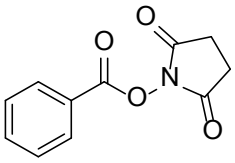
Entry	n(**1a**): n(**2a**)	Catalyst	additive	Yield(%)
1	1.0 : 0.5	NaI	NaOH	65%
2	1.0 : 0.5	KI	NaOH	58%
3	1.0 : 0.5	I_2	NaOH	65%
4	1.0 : 0.5	nBu$_4$NI	NaOH	61%
5	1.0 : 0.5	Et$_4$NI	NaOH	57%
6	1.0 : 0.5	PhI(OAc)$_2$	NaOH	0%
7	1.0 : 0.5	-	NaOH	0%
8	0.5 : 1.0	NaI	Cs_2CO_3	71%
9	0.5 : 1.0	NaI	K_3PO_4	78%
10	0.5 : 1.0	NaI	KOH	95%
11	0.5 : 1.0	NaI	K_2CO_3	87%
12[b]	0.5 : 0.75	NaI	KOH	34%
13[c]	**0.5 : 0.75**	**NaI**	**KOH**	**93%**

[a] Unless otherwise specified, all reactions were carried out using benzyl alcohol and **NHPI** in ethyl acetate (2.0 mL) with 10 mol% of catalyst and aqueous TBHP (4.0 equiv) at 80°C for 18 hours. [b] 4 hours. [c] 8 hours

III. Experimental Data of Products (Table 2, Table 3 and Table 5)

Table 2:

2,5-dioxopyrrolidin-1-yl benzoate

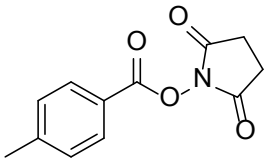


(**3aa**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.15 (d, J = 7.2 Hz, 2H), 7.69 (t, J = 7.5 Hz, 1H), 7.52 (t, J = 7.9 Hz, 2H), 2.91 (s, 4H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.3, 161.9, 135.0, 130.6, 128.9, 125.1, 25.7.

MS (ESI) m/z 242.01 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl 4-methylbenzoate

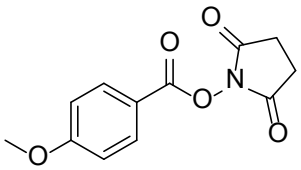


(**3ba**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (d, J = 8.0 Hz, 2H), 7.31 (d, J = 8.0 Hz, 2H), 2.91(s, 4H), 2.45(s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.4, 161.9, 146.1, 130.6, 129.6, 122.3, 25.7, 21.9.

MS (ESI) m/z 256.06 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl 4-methoxybenzoate

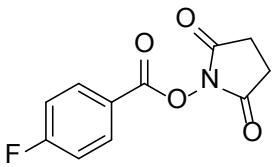


(**3ca**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 (d, J = 9.0 Hz, 2H), 6.98 (d, J = 9.0 Hz, 2H), 3.89 (s, 3H), 2.90 (s, 4H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.6, 164.9, 161.5, 132.9, 117.0, 114.2, 55.6, 25.7.

MS (ESI) m/z 272.06 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl 4-fluorobenzoate

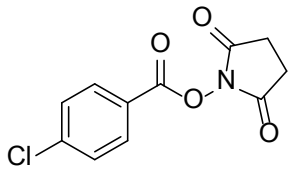


(**3da**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (m, 2H), 7.20 (t, J = 8.4 Hz, 2H), 2.92 (s, 4H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 169.3, 168.1, 165.6, 160.9, 133.4, 121.4, 116.3, 25.7.

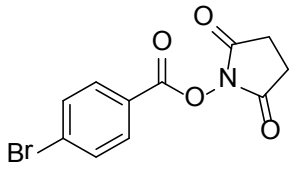
MS (ESI) m/z 260.04 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl 4-chlorobenzoate



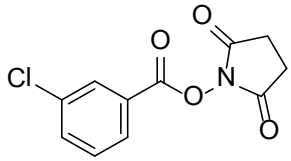
(**3ea**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 (d, J = 8.6 Hz, 2H), 7.50 (d, J = 8.4 Hz, 2H), 2.92 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.2, 161.1, 141.7, 131.9, 129.4, 123.5, 25.7.
MS (ESI) m/z 276.04 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl 4-bromobenzoate



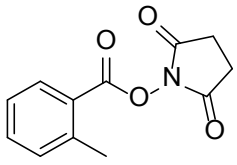
(**3fa**) White solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.00 (d, J = 8.6 Hz, 2H), 7.67 (d, J = 8.6 Hz, 2H), 2.92 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.2, 161.3, 132.3, 131.9, 130.5, 124.0, 25.7.
MS (ESI) m/z 319.77 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl 3-chlorobenzoate



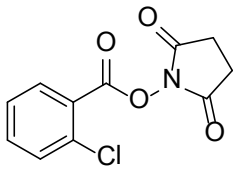
(**3ga**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (s, 1H), 8.03 (d, J = 8.0 Hz, 1H), 7.65 (m, 1H), 7.47 (t, J = 8.0 Hz, 1H), 2.92 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.1, 160.9, 135.1, 135.0, 130.5, 130.3, 128.7, 126.8, 25.7.
MS (ESI) m/z 276.02 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl 2-methylbenzoate



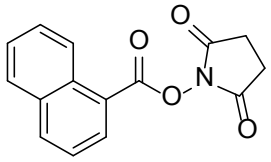
(**3ha**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (d, J = 7,3 Hz, 1H), 7.52 (t, J=6.7 Hz, 1H), 7.32 (t, J=7.6 Hz, 2H), 2.91 (s, 4H), 2.62 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.5, 162.1, 142.1, 134.0, 132.0, 131.3, 126.1, 124.2, 25.7, 21.6.
MS (ESI) m/z 256.10 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl 2-chlorobenzoate



(**3ia**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (d, J = 8.2 Hz, 1H), 7.57 (m, 2H), 7.40 (m, 1H), 2.92 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.1, 160.2, 135.6, 134.7, 132.4, 131.7, 126.9, 124.5, 25.7.
MS (ESI) m/z 276.02 [$(M+Na)^+$]

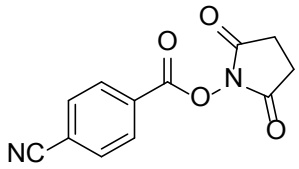
2,5-dioxopyrrolidin-1-yl 1-naphthoate



(**3ja**) white solid

^{1}H NMR (400 MHz, $CDCl_3$) δ8.81 (d, J = 8.6 Hz, 1H), 8.46 (d, J = 7,3 Hz, 1H), 8.15 (d, J = 8.0 Hz, 1H), 7.92 (d, J = 8.0 Hz, 1H), 7.66 (t, J = 7.2 Hz, 1H), 7.58 (t, J = 8.0 Hz, 2H), 2.95 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.6, 162.2, 135.6, 133.7, 131.9, 131.4, 128.8, 128.7, 126.9,125.2, 124.5, 121.5, 25.8.
MS (ESI) m/z 292.08 [$(M+Na)^+$]

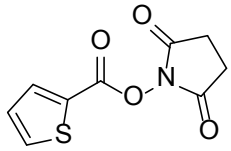
2,5-dioxopyrrolidin-1-yl 4-cyanobenzoate



(**3ka**) white solid

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25 (d, J = 8.4 Hz, 2H), 7.83 (d, J = 8.4 Hz, 2H), 2.94 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.7, 160.5, 132.5, 130.9, 129.0, 126.9, 118.2, 117.3, 105.4, 25.7
MS (ESI) m/z 267.06 [$(M+Na)^+$]

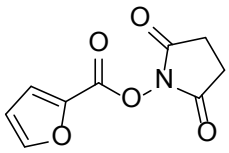
2,5-dioxopyrrolidin-1-yl thiophene-2-carboxylate



(**3la**) yellow solid

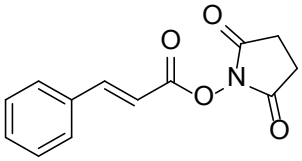
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 (d, J = 3.7 Hz, 1H), 7.78 (d, J = 4.8 Hz, 1H), 7.21 (t, J = 4.3 Hz, 1H), 2.91 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.2, 157.4, 136.7, 135.8, 128.4, 126.9, 25.7.
MS (ESI) m/z 248.04 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl furan-2-carboxylate



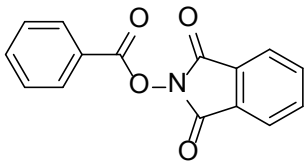
(**3ma**) yellow solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, J = 0.8 Hz, 1H), 7.50 (d, J = 3.6 Hz, 1H), 6.63 (q, J = 1.6 Hz, 1H), 2.91 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.2, 153.6, 148.9, 139.6, 122.3, 112.7, 25.6.
MS (ESI) m/z 232.04 [$(M+Na)^+$]

2,5-dioxopyrrolidin-1-yl cinnamate



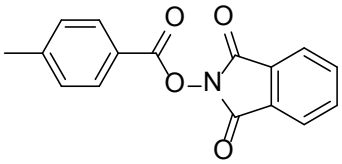
(**3na**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93 (d, J = 16.0 Hz, 1H), 7.58 (dd, J = 7.8, 1.5 Hz, 2H), 7.43 (m, 3H), 6.60 (d, J = 16.0 Hz, 1H), 2.89 (s, 4H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.5, 162.1, 150.1, 133.4, 131.6, 129.1, 128.7, 111.5, 25.7.
MS (ESI) m/z 268.08 [$(M+Na)^+$]

Table 3:
1,3-dioxoisoindolin-2-yl benzoate



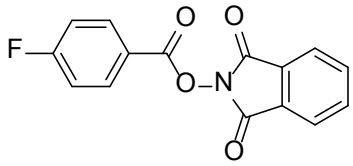
(**3ab**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.20 (d, J = 7.7 Hz, 2H), 7.93 (dd, J = 5.2, 3.4 Hz, 2H), 7.82 (dd, J = 5.2, 3.4 Hz, 2H), 7.71 (t, J = 7.4 Hz, 1H), 7.55 (t, J = 7.7, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ162.8, 162.1, 134.9, 134.8, 130.7, 128.9, 128.2, 125.3, 124.1.
MS (ESI) m/z 290.01 [$(M+Na)^+$]

1,3-dioxoisoindolin-2-yl 4-methylbenzoate



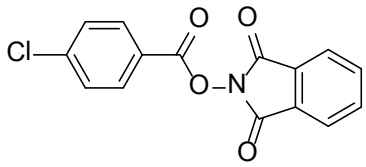
(**3bb**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08(d, J = 7.2 Hz, 2H), 7.93 (t, J = 2.4 Hz, 2H), 7.81 (t, J = 2.4 Hz, 2H), 7.33 (d, J = 7.6 Hz, 2H), 2.47(s,3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 162.8, 162.2, 146.1, 134.8, 130.7, 129.6, 129.0, 124.0, 122.4, 21.9.
MS (ESI) m/z 304.07 [$(M+Na)^+$]

1,3-dioxoisoindolin-2-yl 4-fluorobenzoate



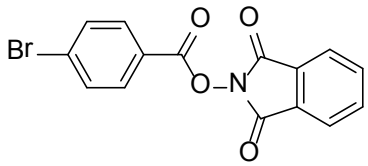
(**3db**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.23(m, 2H), 7.93(d, J=2.9Hz, 2H), 7.83(d, J=1.7Hz, 2H), 7.23(t, J=8.6Hz, H=2).
^{13}C NMR (100 MHz, $CDCl_3$) δ 168.2, 165.6, 162.0, 161.9, 134.9, 133.5, 133.4, 128.9, 124.1, 116.4, 116.2.
MS (ESI) m/z 308.06 [$(M+Na)^+$]

1,3-dioxoisoindolin-2-yl 4-chlorobenzoate



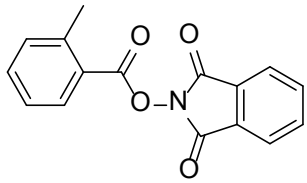
(**3eb**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.14 (d, J = 8.0 Hz, 2H), 7.93 (dd, J = 4.9, 3.1 Hz, 2H), 7.82 (dd, J = 4.9, 3.1 Hz, 2H), 7.53 (d, J = 8.4 Hz, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 162.1, 162.0, 141.7, 134.9, 132.0, 129.4, 128.9, 124.1, 123.7.
MS (ESI) m/z 324.01 [$(M+Na)^+$].

1,3-dioxoisoindolin-2-yl 4-bromobenzoate



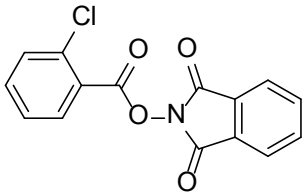
(**3fb**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06(d, J = 8.3 Hz, 2H), 7.93 (dd, J = 4.8, 3.1 Hz, 2H), 7.82 (dd, J = 4.9, 3.1 Hz, 2H), 7.69 (d, J = 8.3 Hz, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 162.3, 162.0, 135.0, 132.4, 132.0, 130.5, 128.9, 124.2, 124.1.
MS (ESI) m/z 367.94 [$(M+Na)^+$]

1,3-dioxoisoindolin-2-yl 2-methylbenzoate



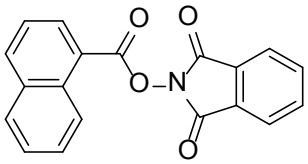
(**3hb**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.21(d, J = 7.4 Hz, 1H), 7.93 (dd, J =5.2, 3.0 Hz, 2H), 7.82 (dd, J =5.2, 3.0 Hz, 2H), 7.55 (t, J=7.1, 1H), 7.35 (t,J=6.4, 2H), 2.65 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 171.2, 163.1, 162.3, 142.2, 134.8, 134.0, 132.0, 131.4, 129.0, 126.1, 124.0, 21.7.
MS (ESI) m/z 304.07 [$(M+Na)^+$]

1,3-dioxoisoindolin-2-yl 2-chlorobenzoate



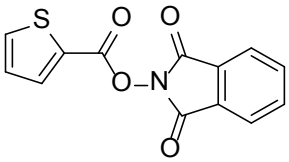
(**3ib**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.19(d, J = 7.8 Hz, 1H), 7.94 (dd, J =5, 3.2 Hz, 2H), 7.83 (dd, J =5, 3.2 Hz, 2H), 7.57 (s, 2H), 7.44 (m, 1H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 161.9, 161.2, 135.6, 134.9, 134.7, 132.5, 131.7, 129.0, 126.9,124.7,124.1.
MS (ESI) m/z 324.01 [$(M+Na)^+$]

1,3-dioxoisoindolin-2-yl 1-naphthoate



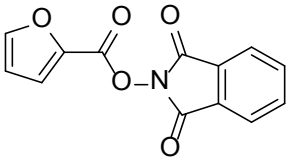
(**3jb**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.84 (d, J =8.5 Hz, 1H), 8.54 (d, J =7.2 Hz, 1H), 8.16 (d, J =8.1 Hz, 1H), 7.93 (m, 3H), 7.81 (dd, J =5.3, 3.1 Hz, 2H), 7.66 (t, J=7.0, 1H), 7.59 (t, J=7.2, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 163.1, 162.4, 135.6, 134.8, 133.7, 132.0, 131.5, 129.1, 128.9, 128.8, 126.8, 125.3, 124.5, 124.1, 121.6.
MS (ESI) m/z 340.0 [$(M+Na)^+$]

1,3-dioxoisoindolin-2-yl thiophene-2-carboxylate



(**3lb**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09(t, J = 1.0 Hz, 1H), 7.93 (dd, J =5.4, 3.1 Hz, 2H), 7.82 (m, 3H), 7.23 (t, J=3.8, 1H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 162.0, 158.3, 136.7, 135.7, 134.9, 128.9, 128.5, 127.0, 124.1.
MS (ESI) m/z 295.98 [$(M+Na)^+$]

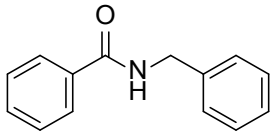
1,3-dioxoisoindolin-2-yl furan-2-carboxylate



(**3mb**) yellow solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93 (dd, J =5.3, 3.1 Hz, 2H), 7.82 (dd, J =5.3, 3.1 Hz, 2H), 7.77 (s, 1H), 7.55 (d, J=3.5, 1H), 6.66 (dd, J=3.4, 1.4Hz,1H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 161.9, 154.5, 148.8, 139.8, 134.9, 128.8, 124.1, 122.3, 112.7
MS (ESI) m/z 280.02 [$(M+Na)^+$]

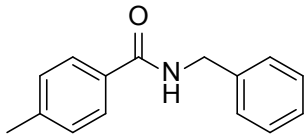
Table 5:

N-benzylbenzamide



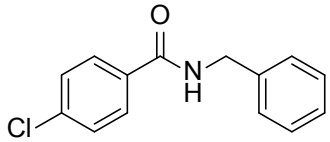
(**4a**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 (d, J = 7.2 Hz, 2H), 7.49 (m, 1H), 7.41 (t, J = 7.2 Hz, 2H), 7.32 (m, 5H), 6.5 (br, 1H), 4.63 (d, J = 6.4 Hz, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 138.2, 134.4, 131.5, 128.8, 128.6, 127.9, 127.6, 127.0, 44.1.
MS (EI) m/z (%) 211 (M^+, 100), 105 (86), 91 (9), 77 (42).

N-benzyl-4-methylbenzamide



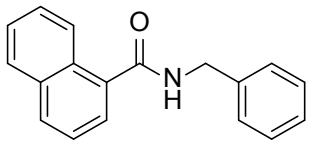
(**4b**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.68 (d, J = 6.8 Hz, 2H), 7.33 (m, 5H), 7.22 (d, J = 6.8 Hz, 2H), 6.54 (br, 1H), 4.61 (d, J = 7.9 Hz, 2H), 2.38 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 142.0, 138.3, 131.5, 129.2, 128.8, 127.9, 127.6, 127.0, 44.1, 21.4.
MS (EI) m/z (%) 225 (M^+, 48), 119 (100), 106 (12), 91 (67), 77 (15).

N-benzyl-4-chlorobenzamide



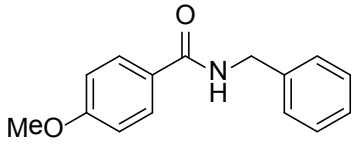
(**4c**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 (s, 2H), 6.78 (m, 7H), 6.61 (br, 1H), 4.60 (s, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 166.4, 138.0, 137.8, 132.7, 128.8, 128.5, 127.9, 127.7, 44.2.
MS (EI) m/z (%) 247 (M^+, 20), 245 (M^+, 62), 139 (100), 111(48), 91 (28), 77 (30).

N-benzyl-1-naphthamide



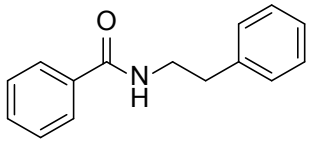
(**4d**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.31 (s, 1H), 7.87 (m, 2H), 7.36 (m, 9H), 6.39 (br, 1H), 4.89 (s, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.5, 138.1, 134.2, 133.7, 130.7, 130.2, 128.8, 128.3, 127.9, 127.7, 127.2, 126.5, 125.4, 125.0, 124.7, 44.1.
MS (EI) m/z (%) 261 (M^+, 58), 155 (72), 127 (100), 91 (25), 77 (28).

N-benzyl-4-methoxybenzamide



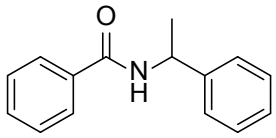
(**4e**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 (d, J = 10.0 Hz, 1H), 7.76 (d, J = 10.0 Hz, 2H), 7.32 (m, 3H), 6.91 (t, J = 8.0 Hz, 3H), 6.46 (br, 1H), 6.62 (d, J = 4.6 Hz, 2H), 3.83 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 162.3, 138.4, 132.3, 128.8, 127.9, 127.6, 126.6, 113.8, 55.4, 44.1.
MS (EI) m/z (%) 241 (M^+, 48), 135 (100), 127 (6), 107 (9), 92 (20), 77 (32).

N-phenethylbenzamide



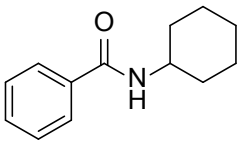
(**4f**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.69 (d, J = 7.2 Hz, 2H), 7.47 (t, J = 6.8 Hz, 1H), 7.39 (t, J = 6.8 Hz, 2H), 7.32 (t, J = 6.8 Hz, 2H), 7.24 (s, 3H), 6.21 (br, 1H), 3.72 (d, J = 6.0 Hz, 2H), 2.93 (t, J = 6.0 Hz, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 138.9, 134.7, 131.4, 128.8, 128.7, 128.6, 126.8, 126.6, 41.2, 35.7.
MS (EI) m/z (%) 225 (M^+, 26), 134 (12), 105 (100), 91 (18), 77 (59).

N-(1-phenylethyl)benzamide



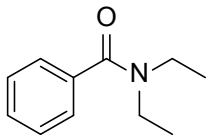
(**4g**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.76 (d, J = 7.2 Hz, 2H), 7.26-7.48 (m, 8H), 6.43 (br, 1H), 5.33 (t, J = 6.8 Hz, 1H), 1.60 (d, J = 6.8 Hz, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 166.7, 143.1, 134.6, 131.5, 128.8, 128.7, 126.9, 126.3, 49.3, 21.7.
MS (EI) m/z (%) 225 (M^+, 39), 210 (8), 120 (7), 105 (100), 91 (2), 77 (64).

N-cyclohexylbenzamide



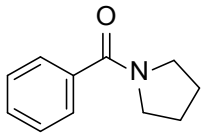
(**4h**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, J = 7.2 Hz, 2H), 7.43 (m, 3H), 6.03 (br, 1H), 3.98 (t, J = 4.0 Hz, 1H), 2.03(d, J = 7.0 Hz, 2H), 1.75(d, J = 12.8 Hz, 2H), 1.65(d, J = 12.4 Hz, 1H), 1.43(q, J = 24.3,12.8 Hz, 2H), 1.24(q, J = 23.2,10.7 Hz, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 166.7, 135.1, 131.2, 128.5, 126.8, 48.7, 33.2, 25.6, 24.9.
MS (EI) m/z (%) 203 (M^+, 34), 160 (5), 122 (66), 105 (100), 92 (20), 77 (62).

N, N-diethylbenzamide



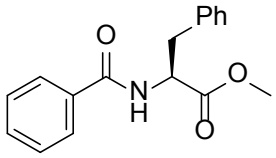
(**4i**) colourless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38 (m, 5H), 3.55 (s, 2H), 3.25 (s, 2H), 1.24 (s, 3H), 1.11 (s, 3H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 171.3, 137.3, 129.1, 128.4, 126.2, 43.3, 39.2, 14.2, 12.9.
MS (EI) m/z (%) 177 (M^+, 22), 176 (60), 148 (4), 134 (3), 105 (100), 77 (34).

phenyl (pyrrolidin-1-yl) methanone



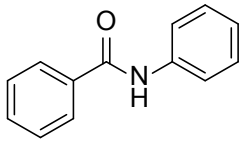
(**4j**) colourless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (m, 2H), 7.39 (m, 3H), 3.65 (t, J = 7.2 Hz, 2H), 3.42 (t, J = 7.2 Hz, 2H), 1.96 (m, 2H), 1.87 (m, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 169.7, 137.2, 129.8, 128.2, 127.0, 49.6, 46.1, 26.4, 24.5.
MS (EI) m/z (%) 175 (M^+, 63), 146 (22), 105 (100), 77 (46).

(S)-methyl 2-benzamido-3-phenylpropanoate



(**4k**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (d, J = 7.2 Hz, 2H), 7.44 (t, J = 7.2 Hz, 1H), 7.35 (t, J = 7.6 Hz, 2H), 7.20 (m, 3H), 7.06 (d, J = 6.8 Hz, 2H), 6.51 (br, 1H), 5.02 (q, J = 13.2, 7.2 Hz, 1H). 3.70 (s, 3H), 3.19 (m, 2H), 1.63 (s, 1H).
^{13}C NMR (100 MHz, $CDCl_3$) δ 172.1, 166.8, 135.9, 133.9, 131.8, 129.3, 128.6, 128.6, 127.2, 127.0, 53.5, 52.4, 37.9.
MS (EI) m/z (%) 283 (M^+, 2), 224 (7), 207 (7), 162 (72), 131 (14), 105 (100), 91 (10), 77 (35).

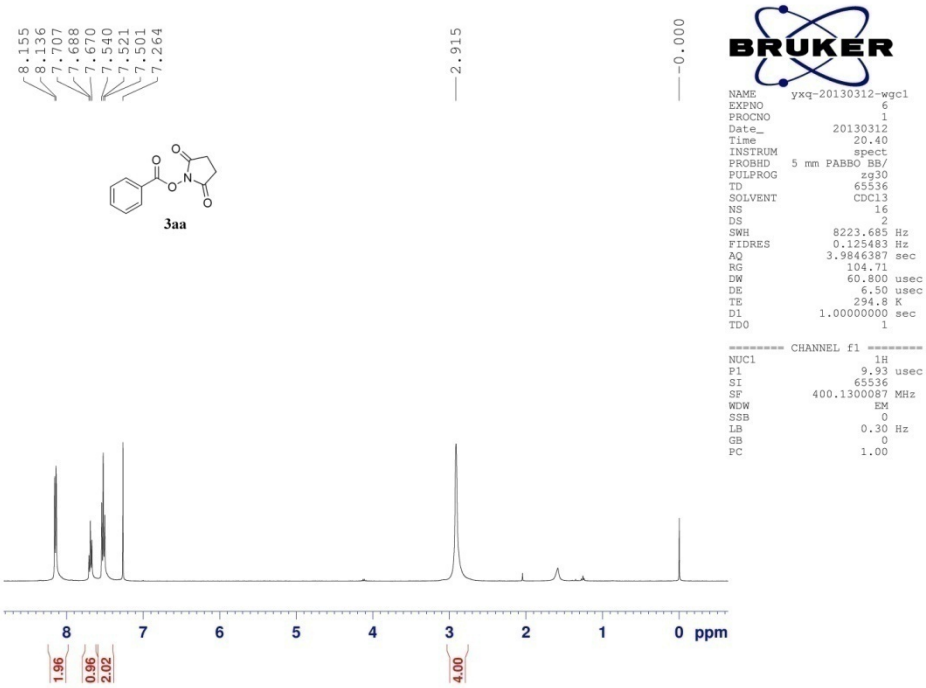
N-phenylbenzamide

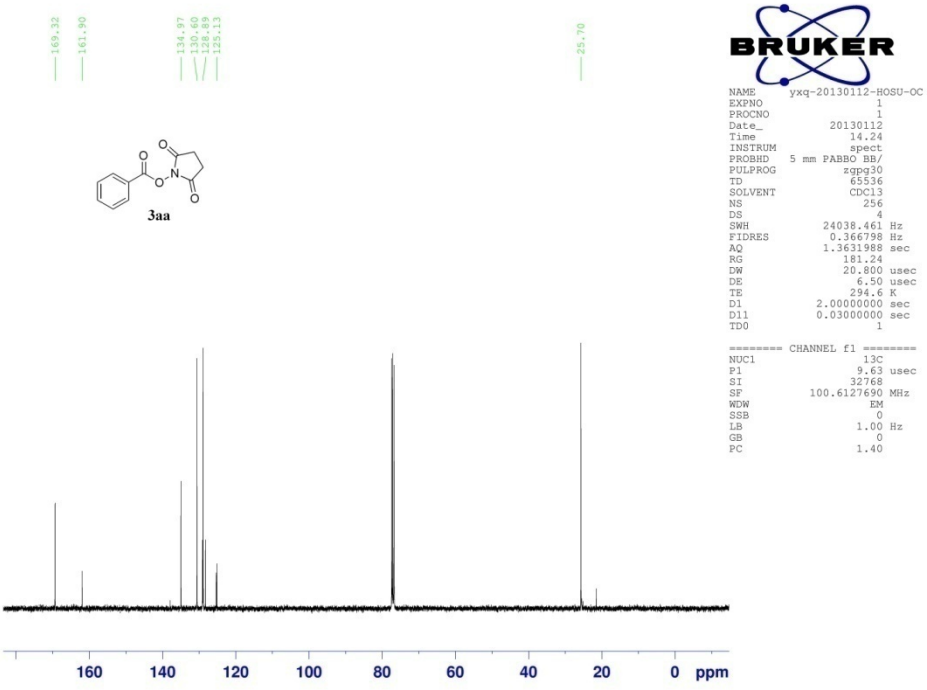


(**4l**) white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.98 (br, 1H), 7.85 (d, J = 7.2 Hz, 2H), 7.63 (d, J = 7.6 Hz, 2H), 7.47 (m, 3H), 7.35 (t, J = 7.2 Hz, 2H), 7.14 (t, J = 7.2 Hz, 1H)
^{13}C NMR (100 MHz, $CDCl_3$) δ 165.9, 138.0, 135.0, 131.8, 129.0, 128.8, 127.1, 124.6, 120.3.
MS (EI) m/z (%) 197 (M^+, 40), 105 (100), 92 (4), 77 (69).

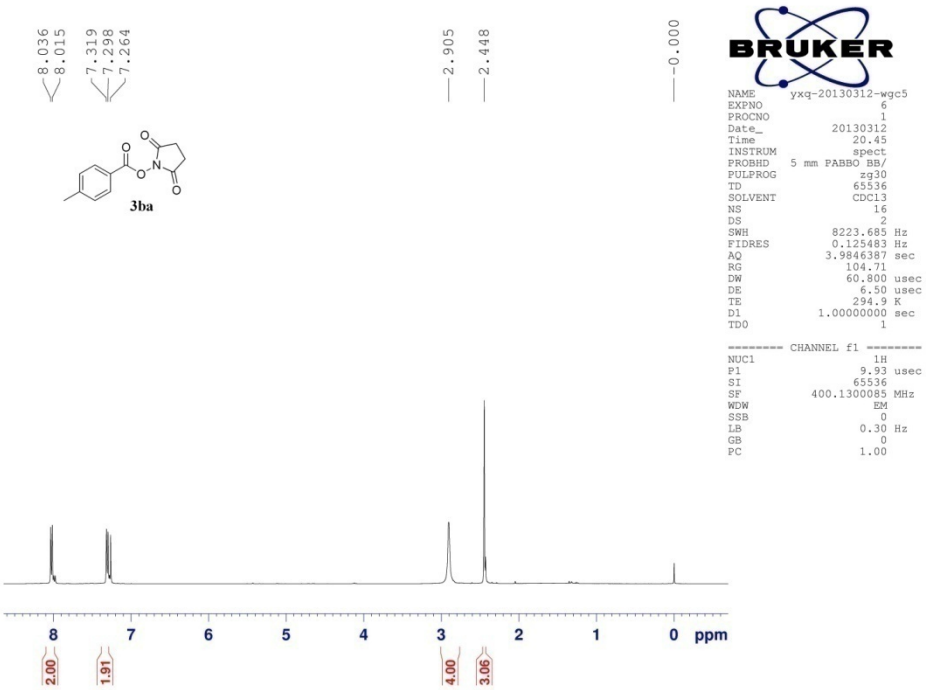
IV. Copies of ^{1}H and ^{13}C-NMR Spectra

2,5-dioxopyrrolidin-1-yl benzoate (3aa)





2,5-dioxopyrrolidin-1-yl 4-methylbenzoate (3ba)

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PROCNO                         1
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PULPROG                    zg30
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SOLVENT                   CDCl3
NS                            16
DS                             2
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FIDRES                  0.125483 Hz
AQ                    3.9846387 sec
RG                        104.71
DW                        60.800 usec
DE                         6.50 usec
TE                        294.9 K
D1                    1.00000000 sec
TD0                            1

======== CHANNEL f1 ========
NUC1                          1H
P1                         9.93 usec
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SF                  400.1300085 MHz
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SSB                            0
LB                          0.30 Hz
GB                             0
PC                          1.00
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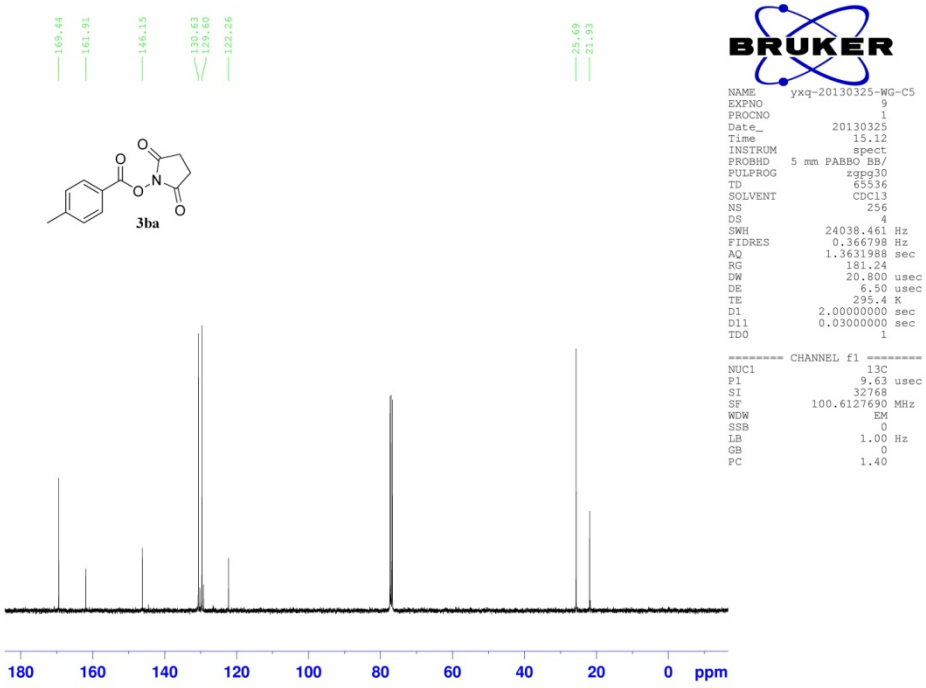


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PROCNO                         1
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INSTRUM                    spect
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SOLVENT                   CDCl3
NS                           256
DS                             4
SWH                    24038.461 Hz
FIDRES                  0.366798 Hz
AQ                    1.3631988 sec
RG                        181.24
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DE                         6.50 usec
TE                        295.4 K
D1                    2.00000000 sec
D11                   0.03000000 sec
TD0                            1

======== CHANNEL f1 ========
NUC1                         13C
P1                         9.63 usec
SI                        32768
SF                  100.6127690 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
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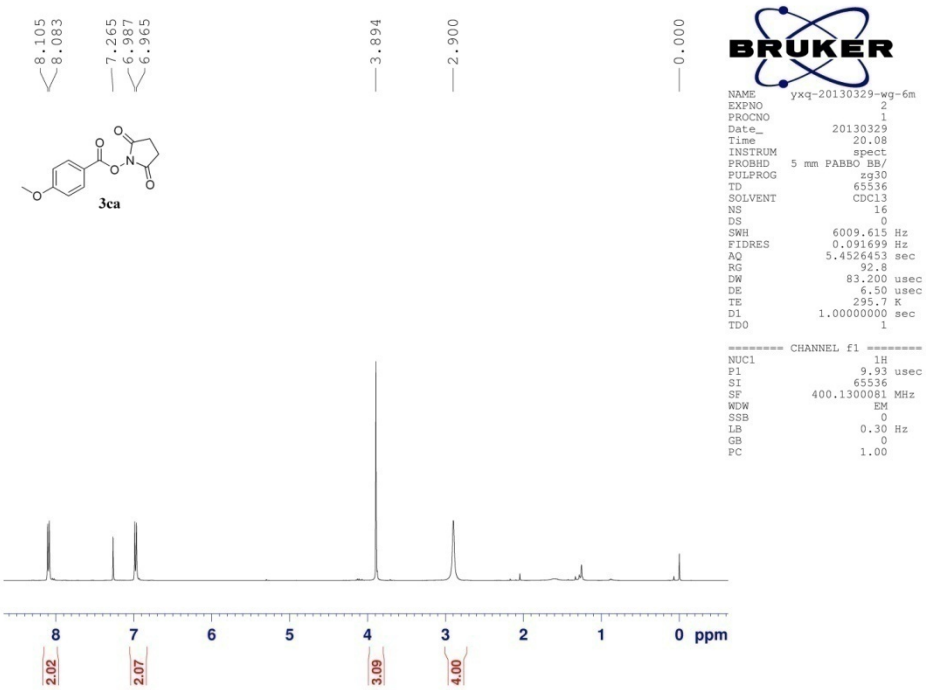
2,5-dioxopyrrolidin-1-yl 4-methoxybenzoate (3ca)

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PROCNO                           1
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Time                         20.08
INSTRUM                      spect
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PULPROG                      zg30
TD                          65536
SOLVENT                     CDCl3
NS                             16
DS                              0
SWH                    6009.615 Hz
FIDRES                 0.091699 Hz
AQ                     5.4526453 sec
RG                          92.8
DW                        83.200 usec
DE                          6.50 usec
TE                         295.7 K
D1                    1.00000000 sec
TD0                             1

======== CHANNEL f1 ========
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P1                          9.93 usec
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LB                           0.30 Hz
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PC                           1.00
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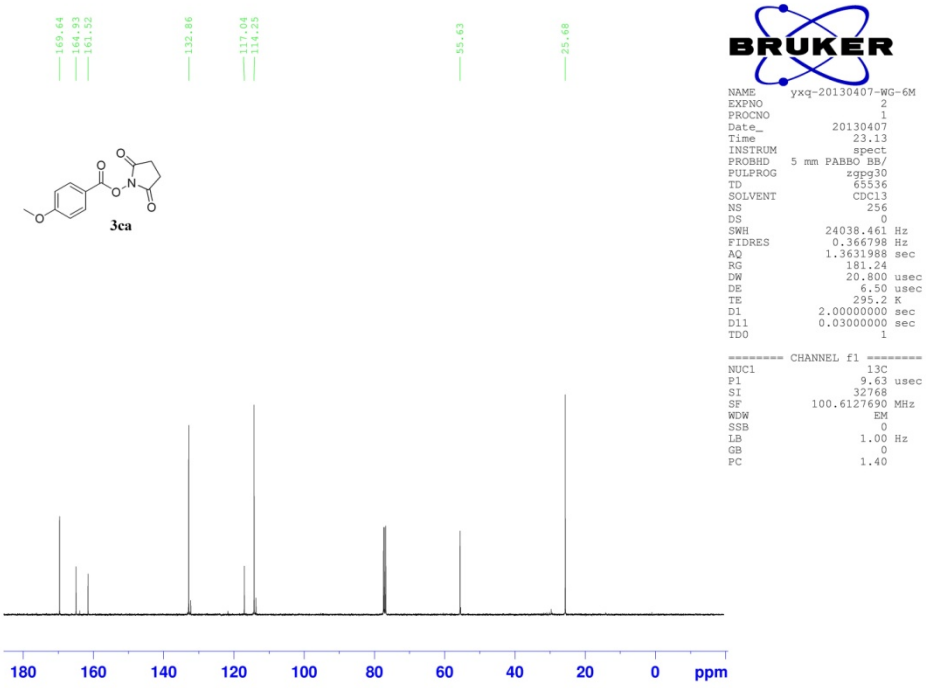


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PROCNO                           1
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PULPROG                    zgpg30
TD                          65536
SOLVENT                     CDCl3
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DS                              0
SWH                   24038.461 Hz
FIDRES                 0.366798 Hz
AQ                     1.3631988 sec
RG                         181.24
DW                        20.800 usec
DE                          6.50 usec
TE                         295.2 K
D1                    2.00000000 sec
D11                   0.03000000 sec
TD0                             1

======== CHANNEL f1 ========
NUC1                           13C
P1                          9.63 usec
SI                         32768
SF                 100.6127690 MHz
WDW                            EM
SSB                             0
LB                           1.00 Hz
GB                              0
PC                           1.40
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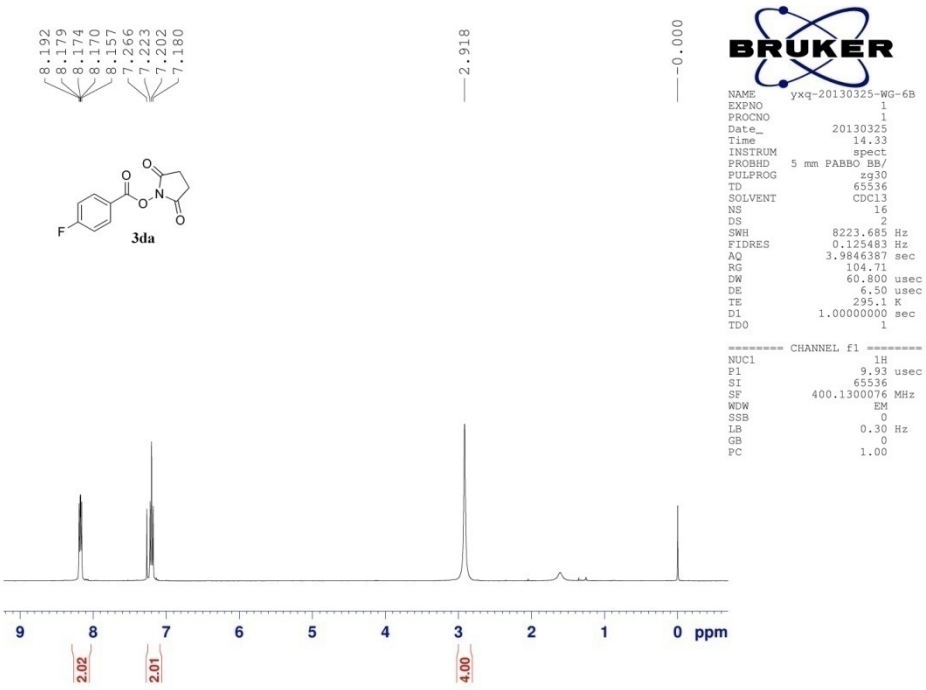
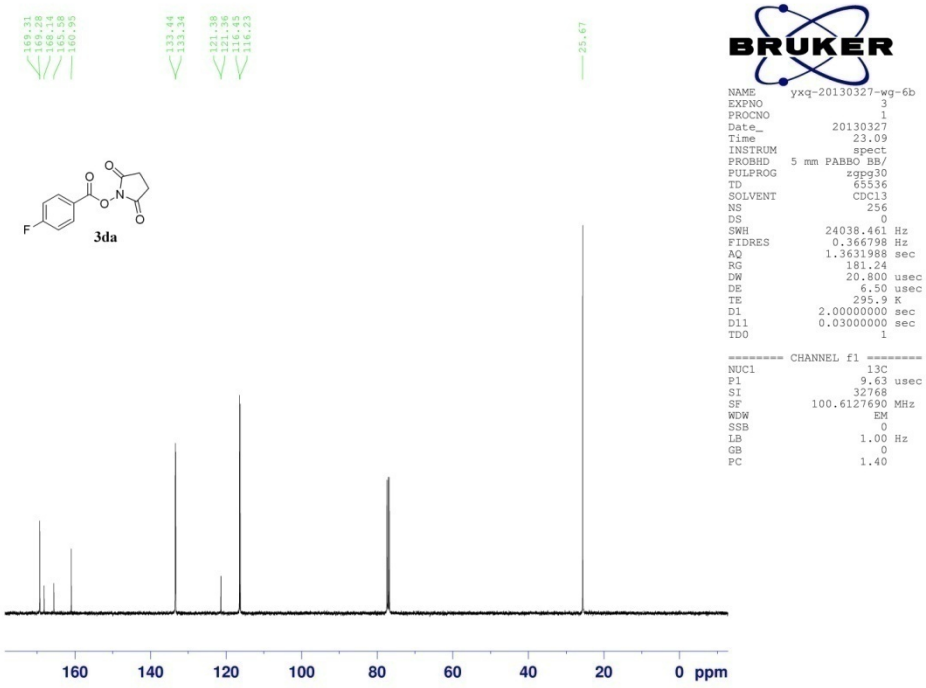
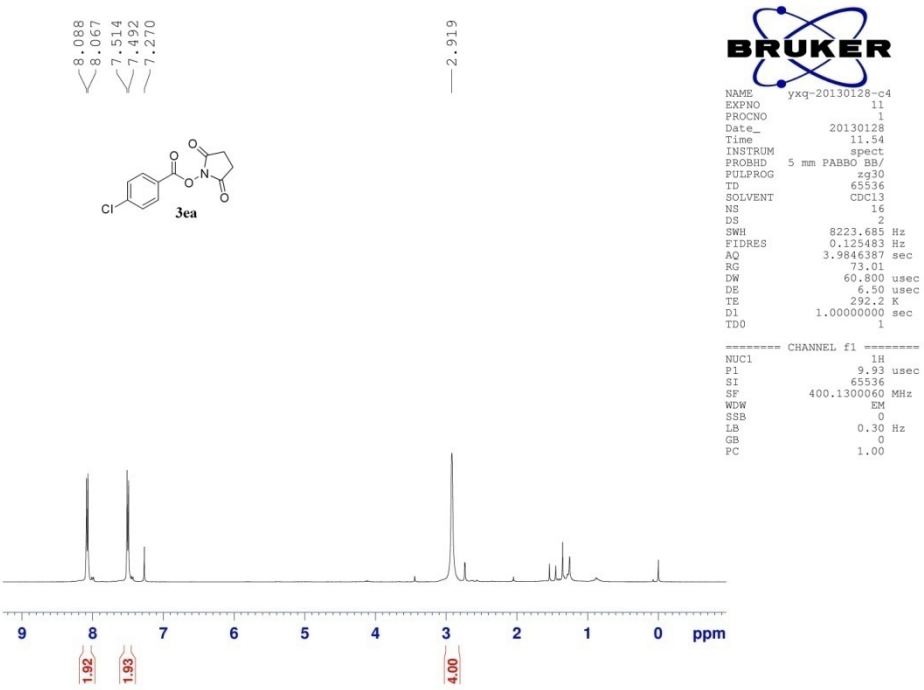
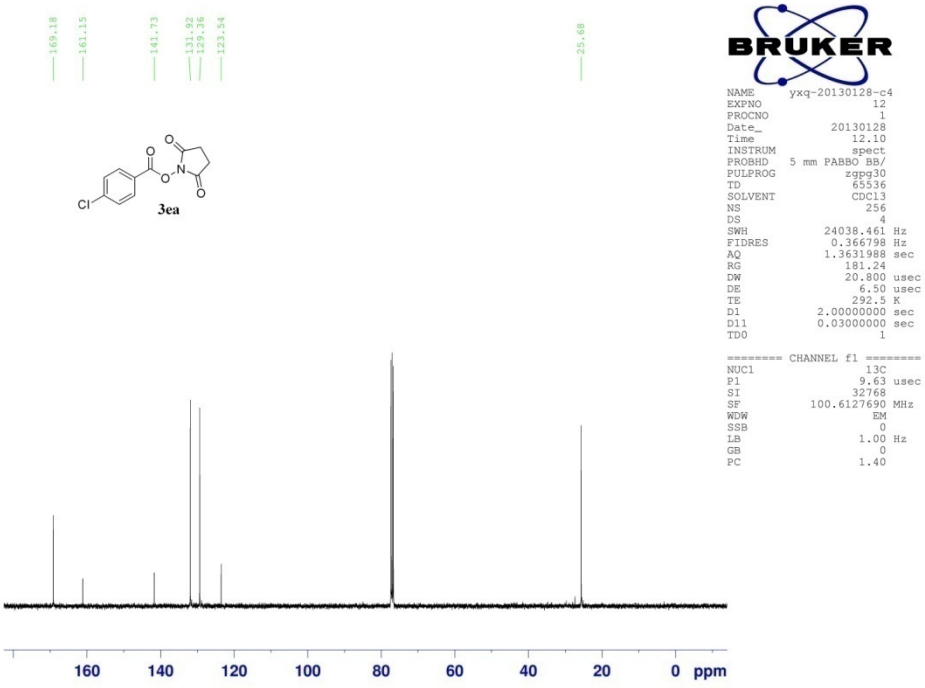
2,5-dioxopyrrolidin-1-yl 4-fluorobenzoate (3da)



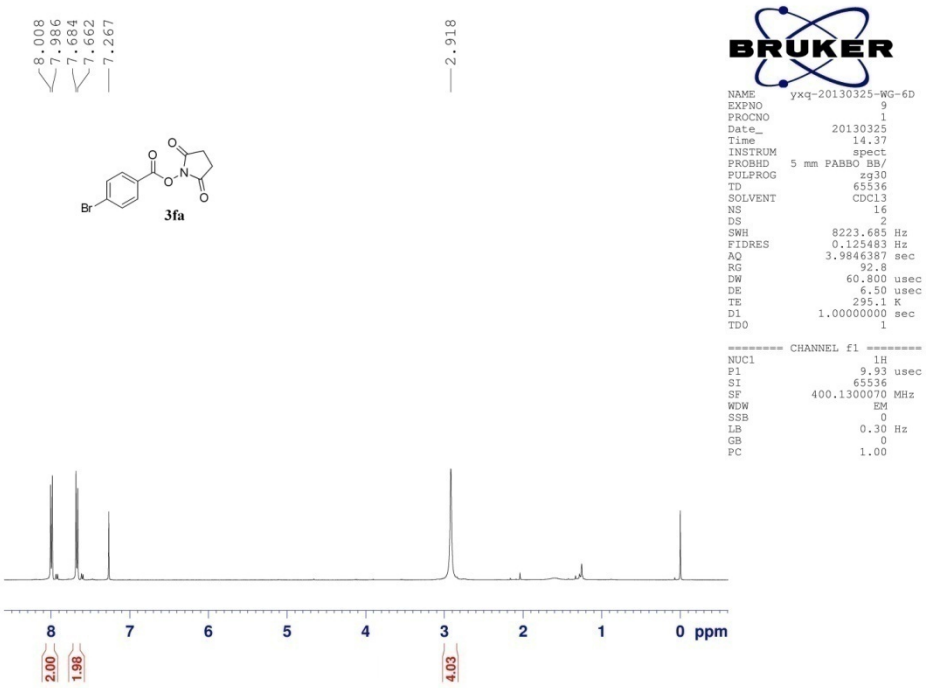


2,5-dioxopyrrolidin-1-yl 4-chlorobenzoate (3ea)





2,5-dioxopyrrolidin-1-yl 4-bromobenzoate (3fa)

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PROCNO                           1
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Time                         14.37
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PULPROG                      zg30
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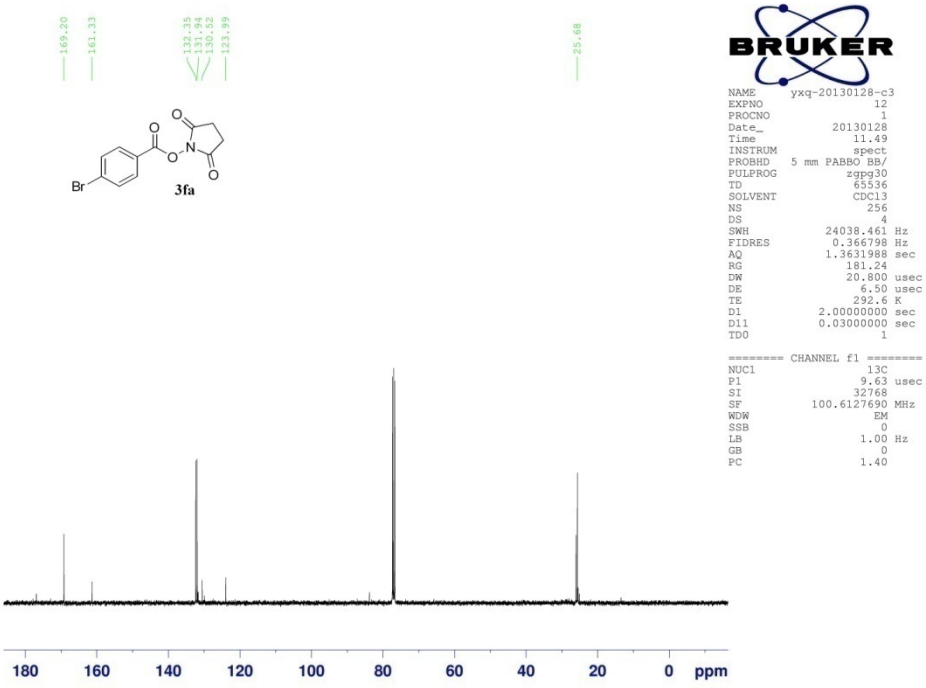
NS                             16
DS                              2
SWH                      8223.685 Hz
FIDRES                   0.125483 Hz
AQ                       3.9846387 sec
RG                            92.8
DW                          60.800 usec
DE                           6.50 usec
TE                          295.1 K
D1                    1.00000000 sec
TD0                             1

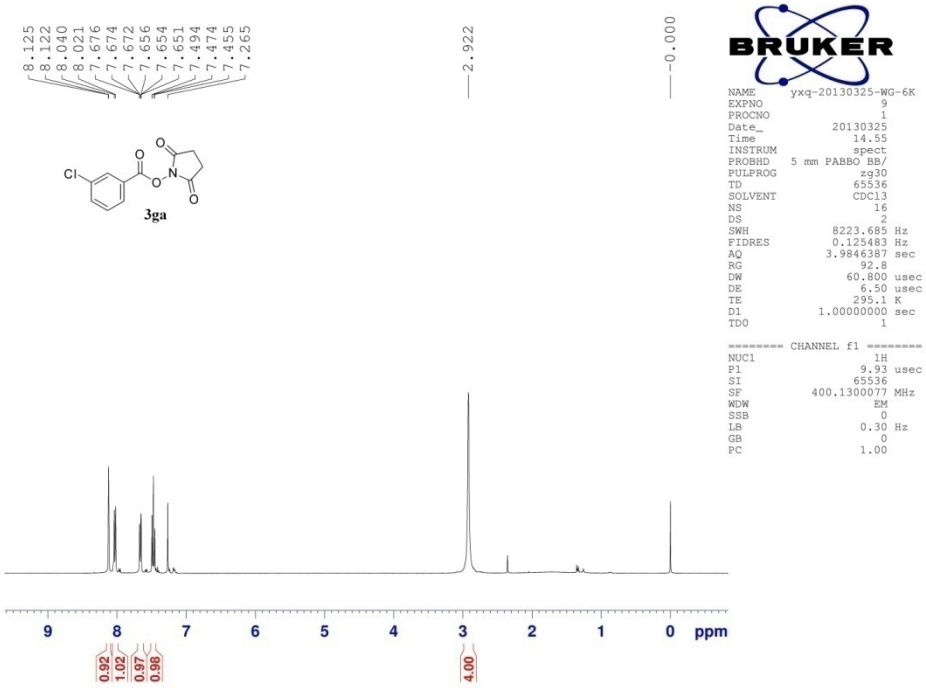
======== CHANNEL f1 ========
NUC1                           1H
P1                           9.93 usec
SI                          65536
SF                  400.1300070 MHz
WDW                            EM
SSB                             0
LB                           0.30 Hz
GB                              0
PC                           1.00
```




```
NAME            yxq-20130128-c3
EXPNO                           12
PROCNO                           1
Date_                     20130128
Time                         11.49
INSTRUM                      spect
PROBHD   5 mm PABBO BB/
PULPROG                    zgpg30
TD                          65536
SOLVENT                     CDCl3
NS                            256
DS                              4
SWH                     24038.461 Hz
FIDRES                   0.366798 Hz
AQ                       1.3631988 sec
RG                           181.24
DW                          20.800 usec
DE                           6.50 usec
TE                          292.6 K
D1                    2.00000000 sec
D11                   0.03000000 sec
TD0                             1

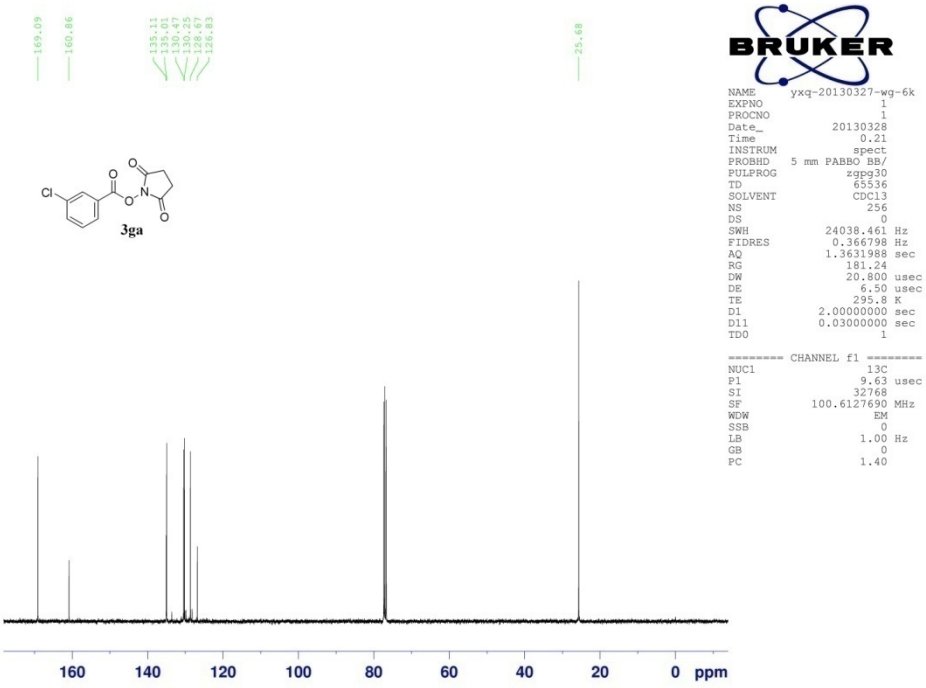
======== CHANNEL f1 ========
NUC1                           13C
P1                           9.63 usec
SI                          32768
SF                  100.6127690 MHz
WDW                            EM
SSB                             0
LB                           1.00 Hz
GB                              0
PC                           1.40
```

2,5-dioxopyrrolidin-1-yl 3-chlorobenzoate (3ga)




```
NAME            yxq-20130325-WG-6K
EXPNO                            9
PROCNO                           1
Date_                     20130325
Time                         14.55
INSTRUM                      spect
PROBHD    5 mm PABBO BB/
PULPROG                      zg30
TD                          65536
SOLVENT                     CDCl3
NS                              16
DS                               2
SWH                     8223.685 Hz
FIDRES                  0.125483 Hz
AQ                      3.9846387 sec
RG                           92.8
DW                         60.800 usec
DE                          6.50 usec
TE                         295.1 K
D1                      1.00000000 sec
TD0                              1

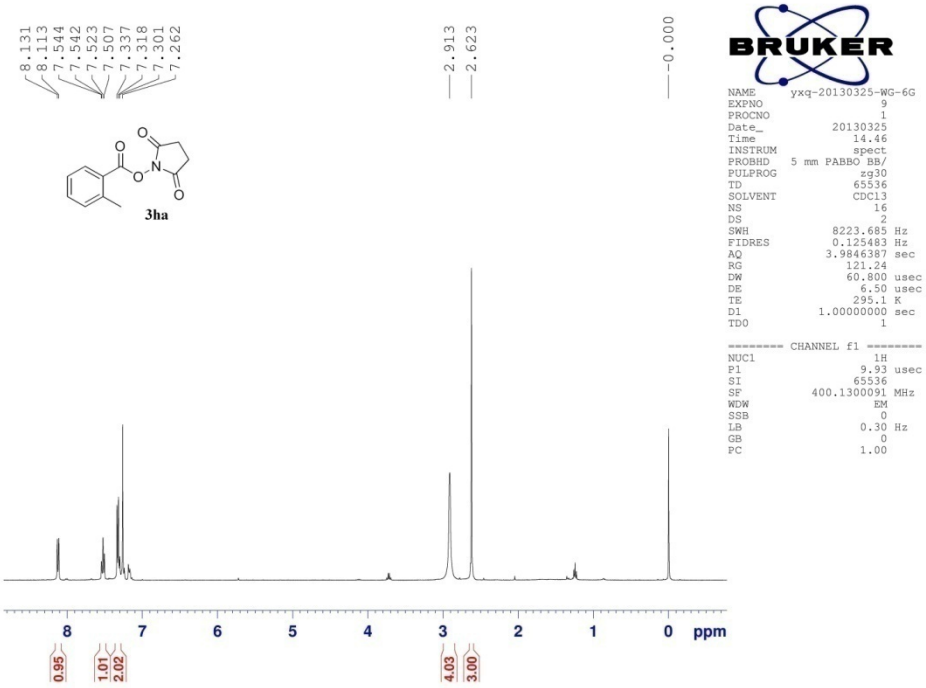
======== CHANNEL f1 ========
NUC1                            1H
P1                           9.93 usec
SI                          65536
SF                    400.1300077 MHz
WDW                             EM
SSB                              0
LB                            0.30 Hz
GB                               0
PC                            1.00
```

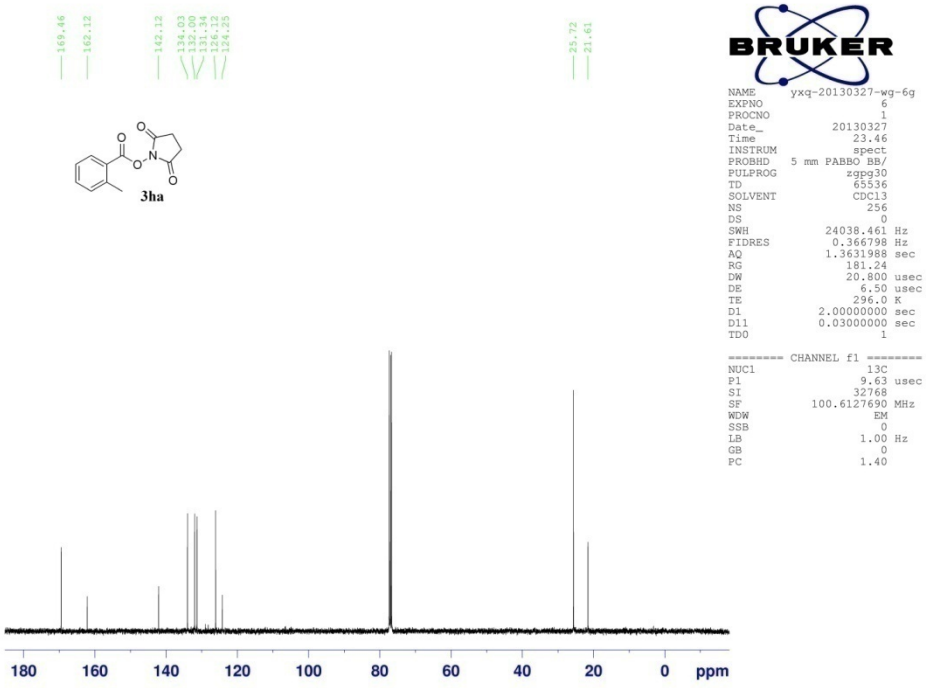



```
NAME            yxq-20130327-wg-6k
EXPNO                            1
PROCNO                           1
Date_                     20130328
Time                          0.21
INSTRUM                      spect
PROBHD    5 mm PABBO BB/
PULPROG                    zgpg30
TD                          65536
SOLVENT                     CDCl3
NS                             256
DS                               0
SWH                    24038.461 Hz
FIDRES                  0.366798 Hz
AQ                      1.3631988 sec
RG                          181.24
DW                         20.800 usec
DE                          6.50 usec
TE                         295.8 K
D1                      2.00000000 sec
D11                     0.03000000 sec
TD0                              1

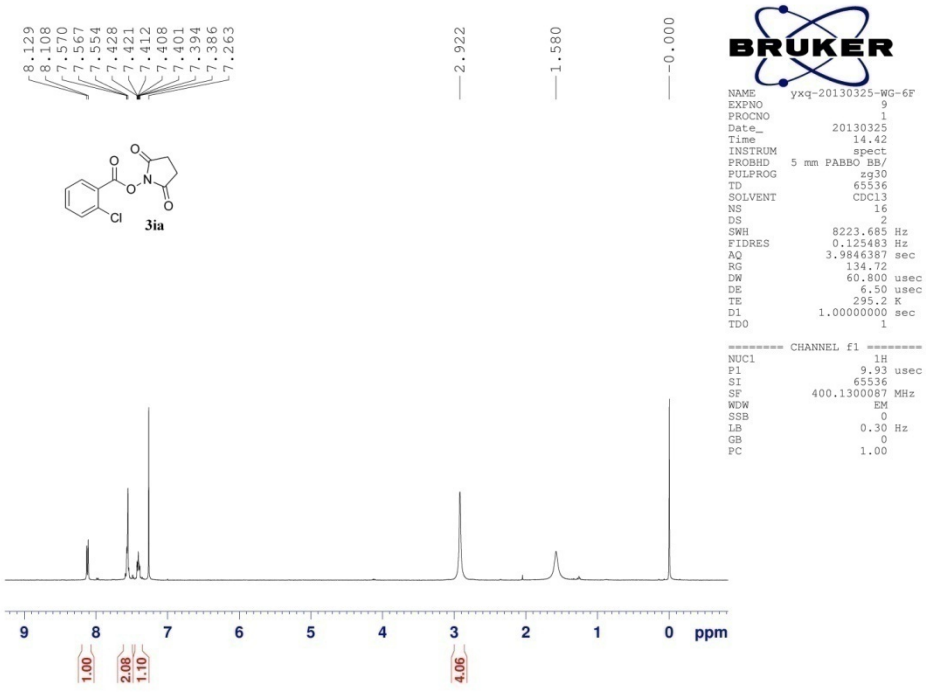
======== CHANNEL f1 ========
NUC1                           13C
P1                           9.63 usec
SI                          32768
SF                    100.6127690 MHz
WDW                             EM
SSB                              0
LB                            1.00 Hz
GB                               0
PC                            1.40
```

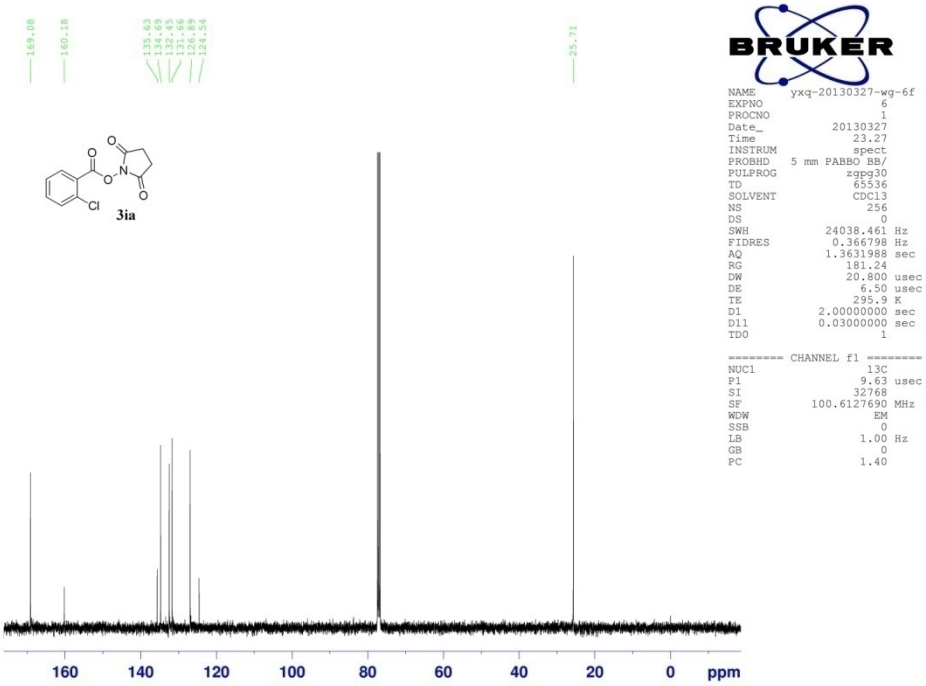
2,5-dioxopyrrolidin-1-yl 2-methylbenzoate (3ha)



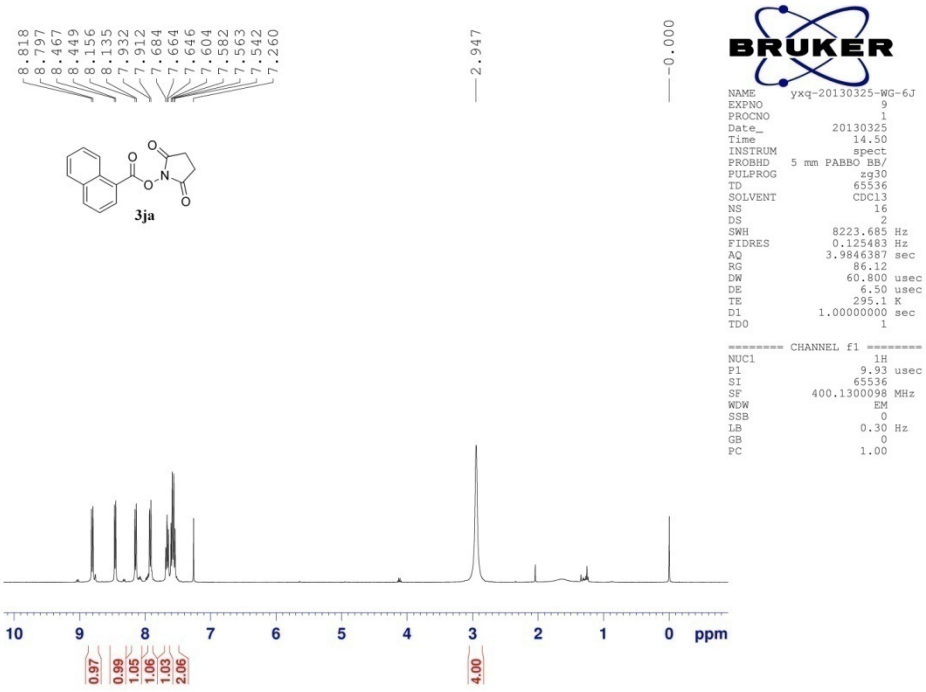


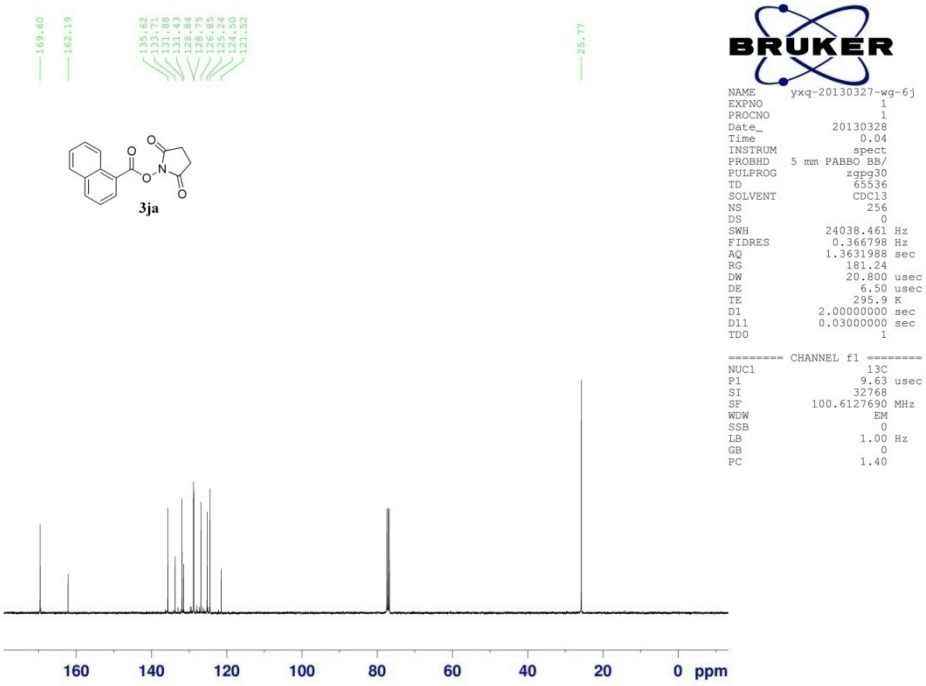
2,5-dioxopyrrolidin-1-yl 2-chlorobenzoate (3ia)



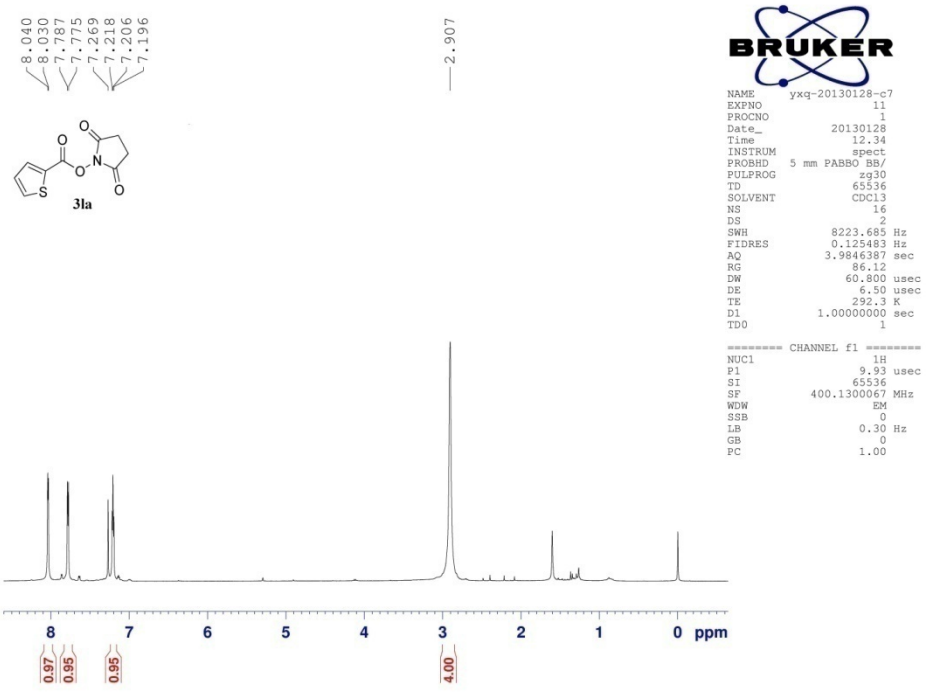


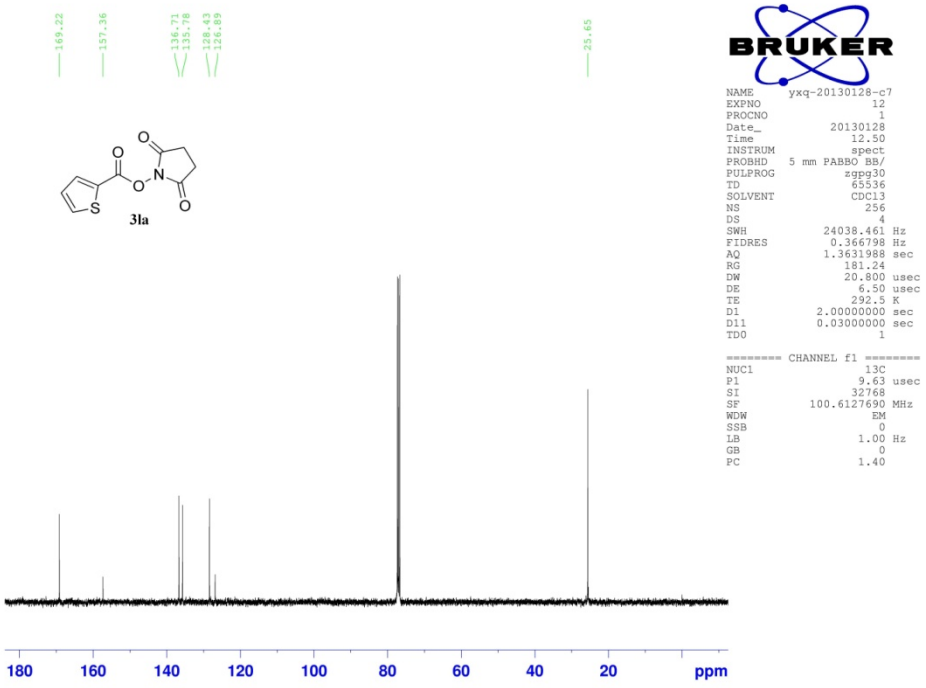
2,5-dioxopyrrolidin-1-yl 1-naphthoate (3ja)



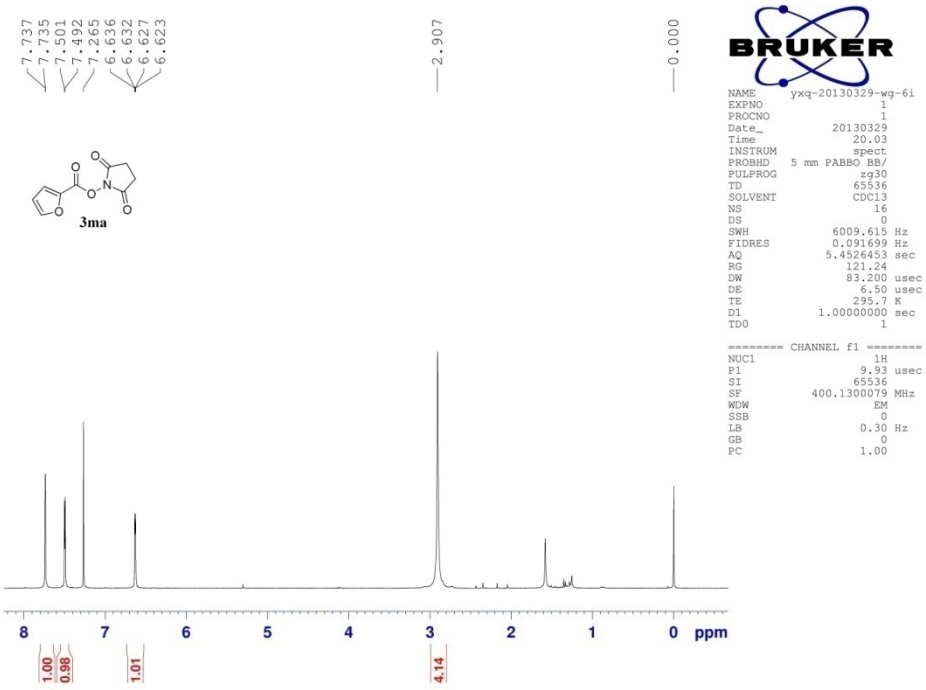


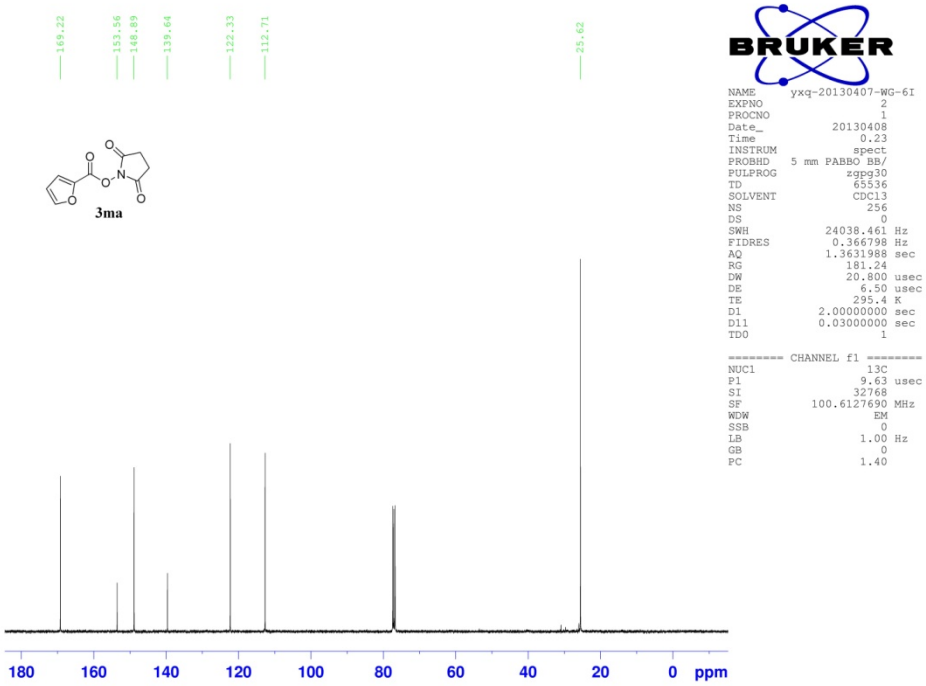
2,5-dioxopyrrolidin-1-yl thiophene-2-carboxylate (3la)



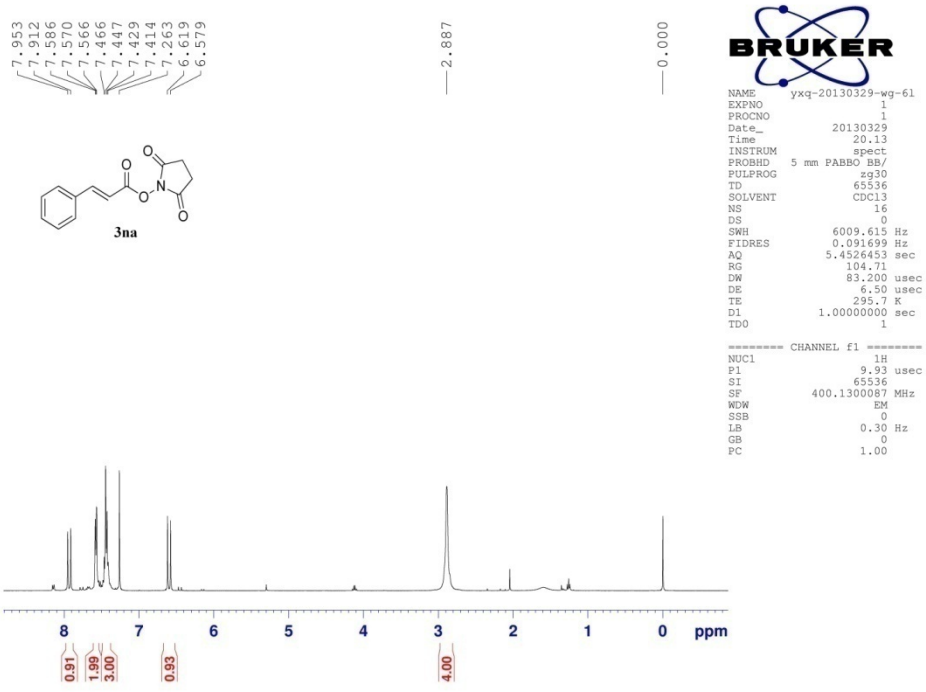


2,5-dioxopyrrolidin-1-yl furan-2-carboxylate (3ma)





2,5-dioxopyrrolidin-1-yl cinnamate (3na)



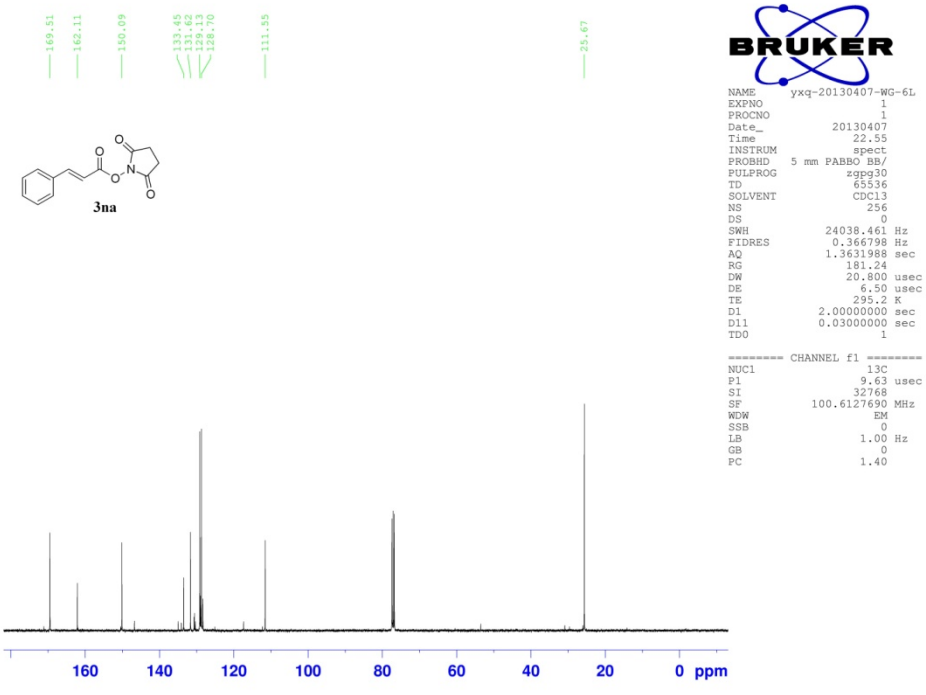
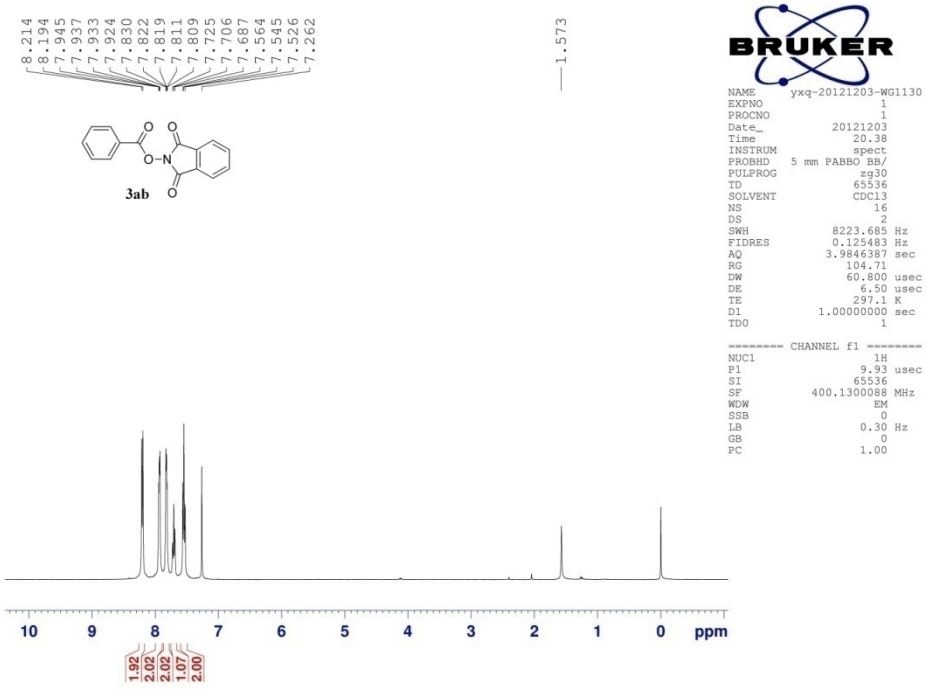
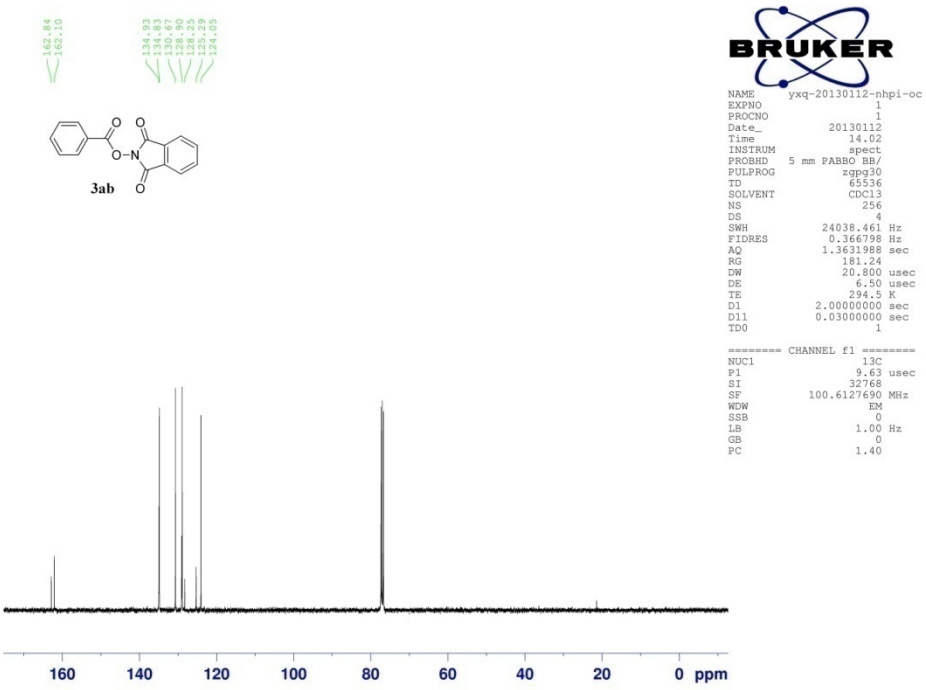


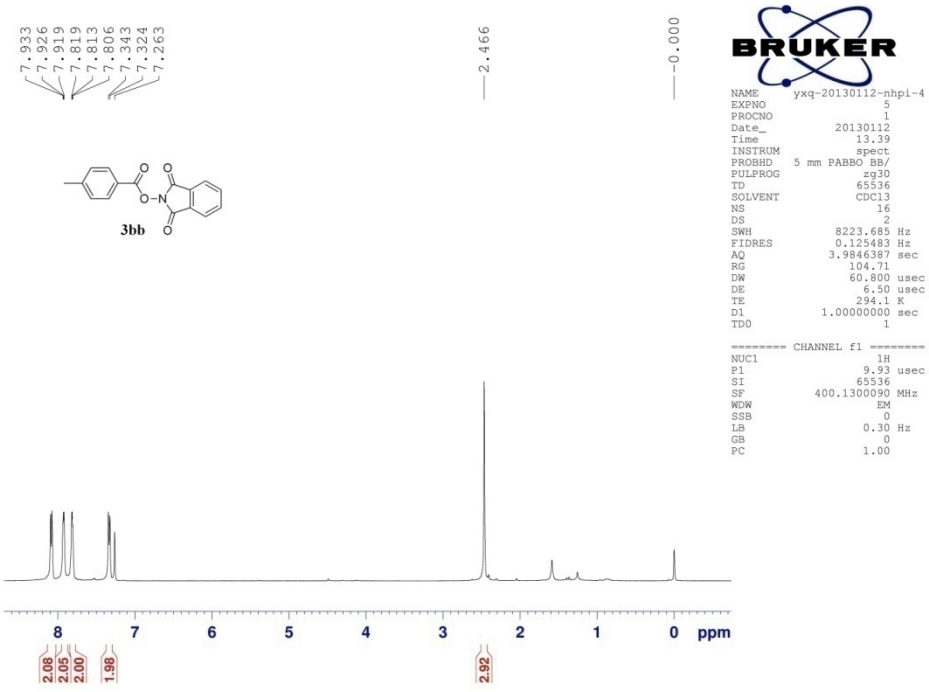
Table 3:

1,3-dioxoisoindolin-2-yl benzoate (3ab)





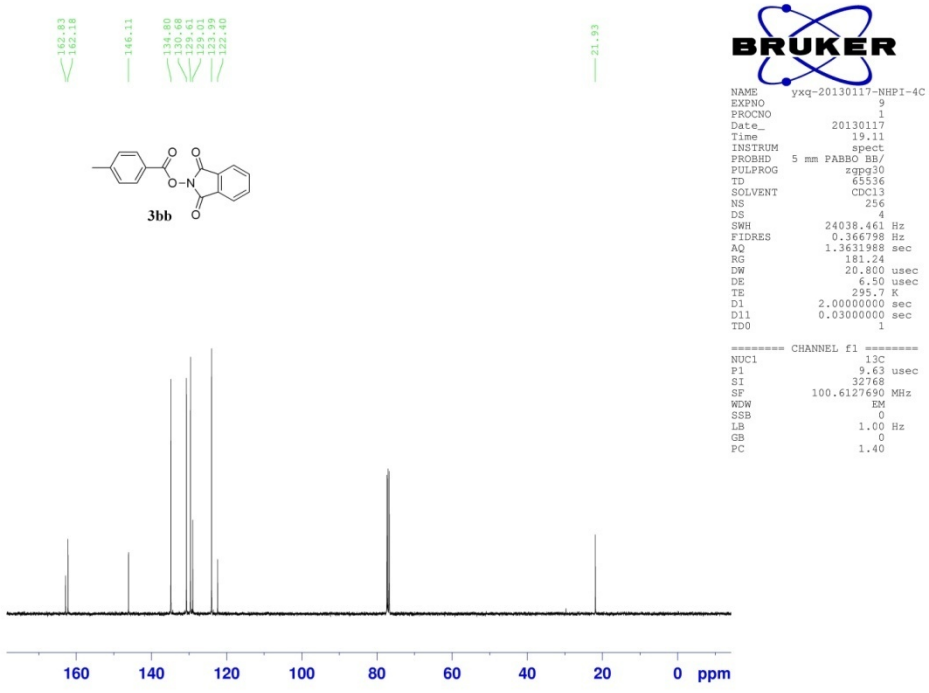
1,3-dioxoisoindolin-2-yl 4-methylbenzoate (3bb)



BRUKER

```
NAME          yxq-20130112-nhpi-4
EXPNO                           5
PROCNO                          1
Date_                    20130112
Time                        13.39
INSTRUM                     spect
PROBHD    5 mm PABBO BB/
PULPROG                      zg30
TD                          65536
SOLVENT                     CDCl3
NS                             16
DS                              2
SWH                      8223.685 Hz
FIDRES                   0.125483 Hz
AQ                       3.9846387 sec
RG                         104.71
DW                         60.800 usec
DE                          6.50 usec
TE                         294.1 K
D1                       1.00000000 sec
TD0                             1

======== CHANNEL f1 ========
NUC1                           1H
P1                           9.93 usec
SI                          65536
SF                  400.1300090 MHz
WDW                            EM
SSB                             0
LB                           0.30 Hz
GB                              0
PC                           1.00
```

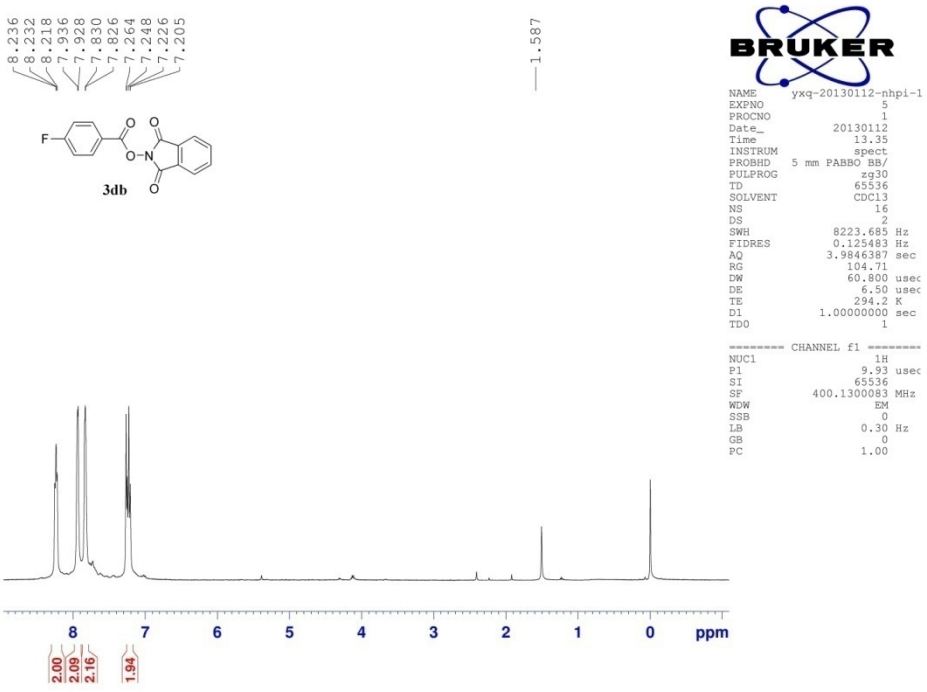


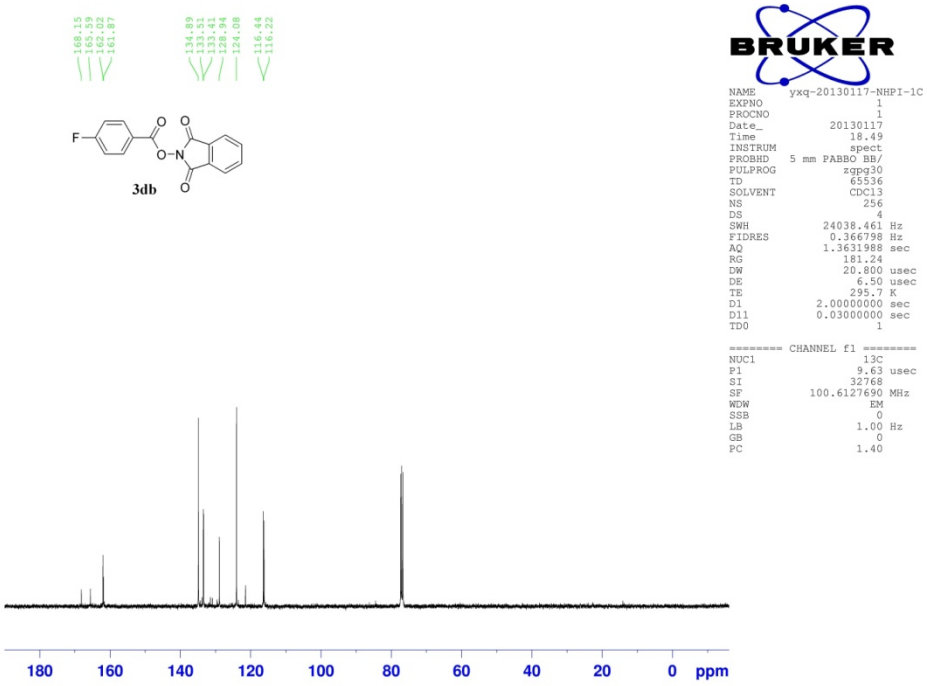
BRUKER

```
NAME          yxq-20130117-NHPI-4C
EXPNO                           9
PROCNO                          1
Date_                    20130117
Time                        19.11
INSTRUM                     spect
PROBHD    5 mm PABBO BB/
PULPROG                   zgpg30
TD                          65536
SOLVENT                     CDCl3
NS                            256
DS                              4
SWH                     24038.461 Hz
FIDRES                   0.366798 Hz
AQ                       1.3631988 sec
RG                         181.24
DW                         20.800 usec
DE                          6.50 usec
TE                         295.7 K
D1                       2.00000000 sec
D11                      0.03000000 sec
TD0                             1

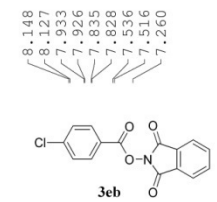
======== CHANNEL f1 ========
NUC1                          13C
P1                           9.63 usec
SI                          32768
SF                  100.6127690 MHz
WDW                            EM
SSB                             0
LB                           1.00 Hz
GB                              0
PC                           1.40
```

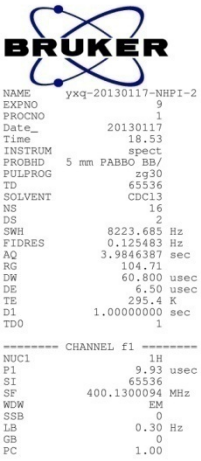
1,3-dioxoisoindolin-2-yl 4-fluorobenzoate (3db)

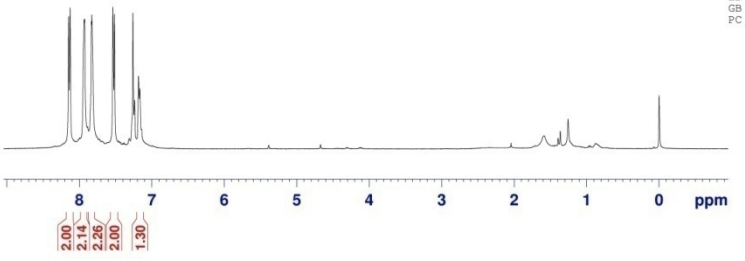


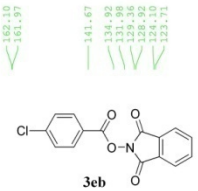


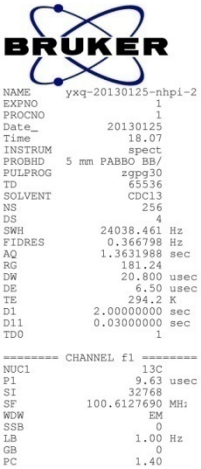
1,3-dioxoisoindolin-2-yl 4-chlorobenzoate (3eb)

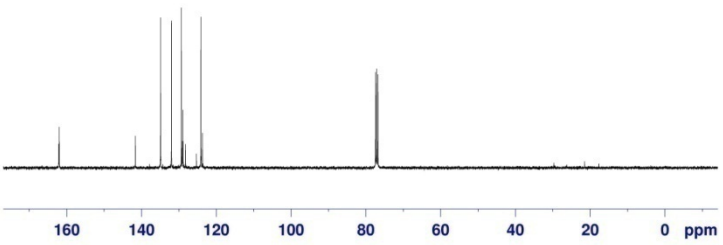




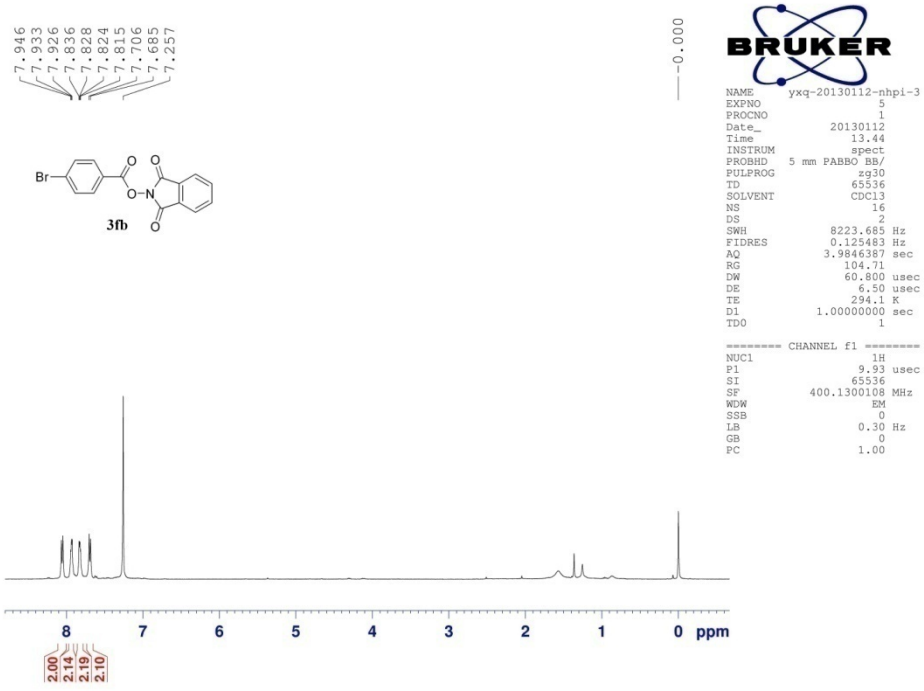






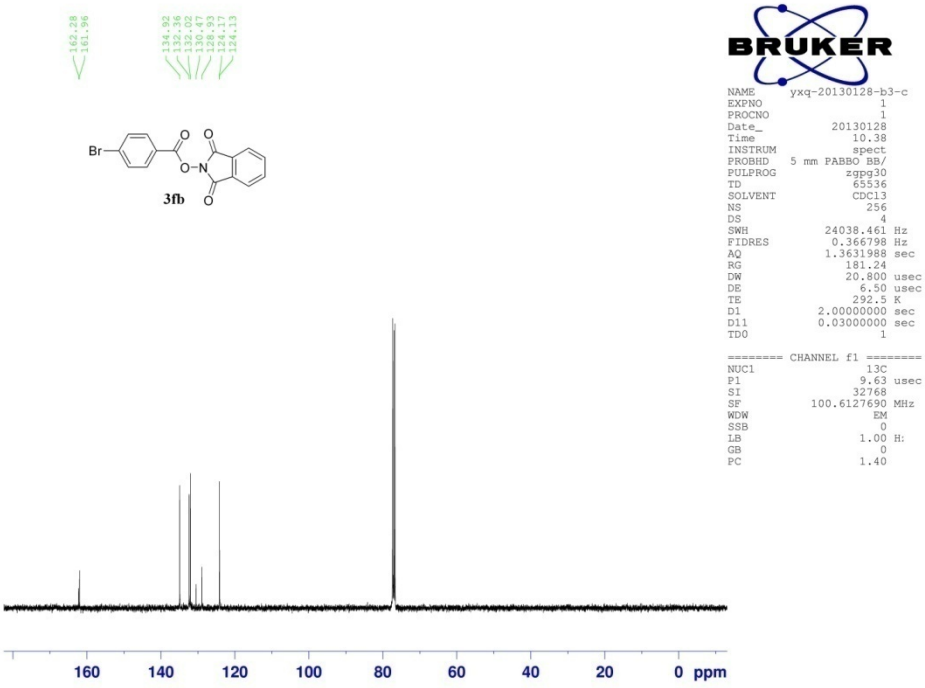


1,3-dioxoisoindolin-2-yl 4-bromobenzoate (3fb)




```
NAME          yxq-20130112-nhpi-3
EXPNO                           5
PROCNO                          1
Date_                    20130112
Time                        13.44
INSTRUM                     spect
PROBHD    5 mm PABBO BB/
PULPROG                      zg30
TD                          65536
SOLVENT                     CDCl3
NS                             16
DS                              2
SWH                      8223.685 Hz
FIDRES                   0.125483 Hz
AQ                       3.9846387 sec
RG                          104.71
DW                          60.800 usec
DE                           6.50 usec
TE                          294.1 K
D1                       1.00000000 sec
TD0                             1

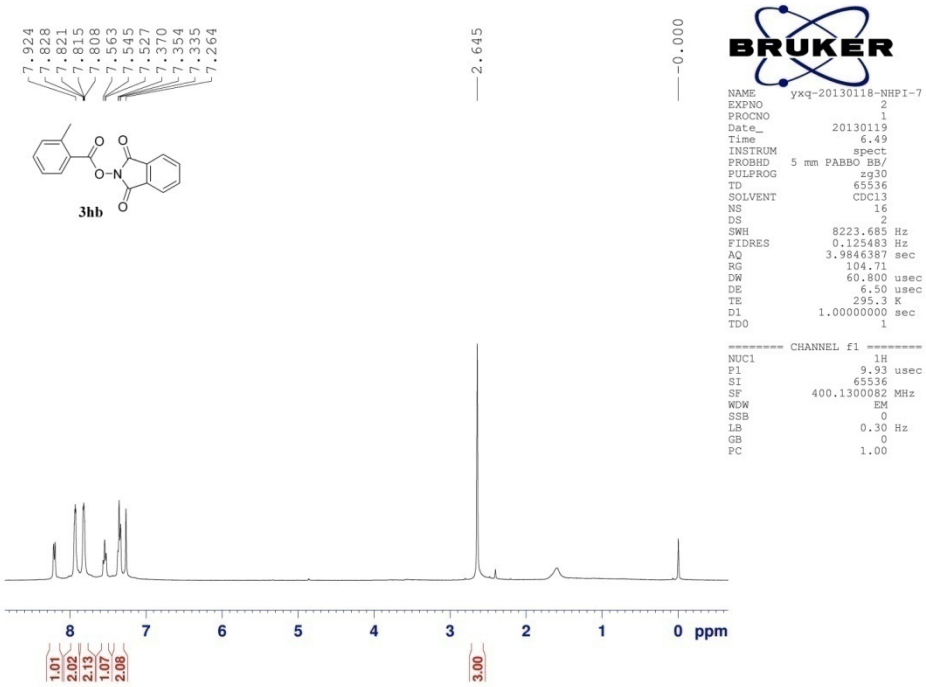
======== CHANNEL f1 ========
NUC1                           1H
P1                           9.93 usec
SI                          65536
SF                  400.1300108 MHz
WDW                            EM
SSB                             0
LB                           0.30 Hz
GB                              0
PC                           1.00
```




```
NAME          yxq-20130128-b3-c
EXPNO                           1
PROCNO                          1
Date_                    20130128
Time                        10.38
INSTRUM                     spect
PROBHD    5 mm PABBO BB/
PULPROG                    zgpg30
TD                          65536
SOLVENT                     CDCl3
NS                            256
DS                              4
SWH                      24038.461 Hz
FIDRES                   0.366798 Hz
AQ                       1.3631988 sec
RG                          181.24
DW                          20.800 usec
DE                           6.50 usec
TE                          292.5 K
D1                       2.00000000 sec
D11                      0.03000000 sec
TD0                             1

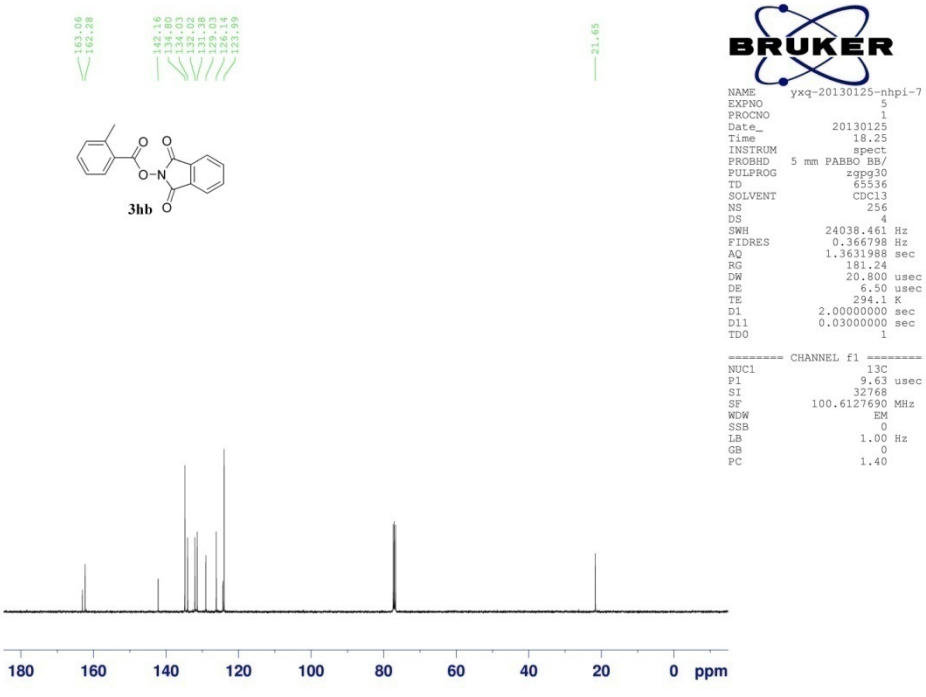
======== CHANNEL f1 ========
NUC1                          13C
P1                           9.63 usec
SI                          32768
SF                  100.6127690 MHz
WDW                            EM
SSB                             0
LB                           1.00 H:
GB                              0
PC                           1.40
```

1,3-dioxoisoindolin-2-yl 2-methylbenzoate (3hb)




```
NAME            yxq-20130118-NHPI-7
EXPNO                             2
PROCNO                            1
Date_                      20130119
Time                           6.49
INSTRUM                       spect
PROBHD     5 mm PABBO BB/
PULPROG                       zg30
TD                           65536
SOLVENT                      CDCl3
NS                              16
DS                               2
SWH                       8223.685 Hz
FIDRES                    0.125483 Hz
AQ                        3.9846387 sec
RG                           104.71
DW                           60.800 usec
DE                            6.50 usec
TE                           295.3 K
D1                        1.00000000 sec
TD0                              1

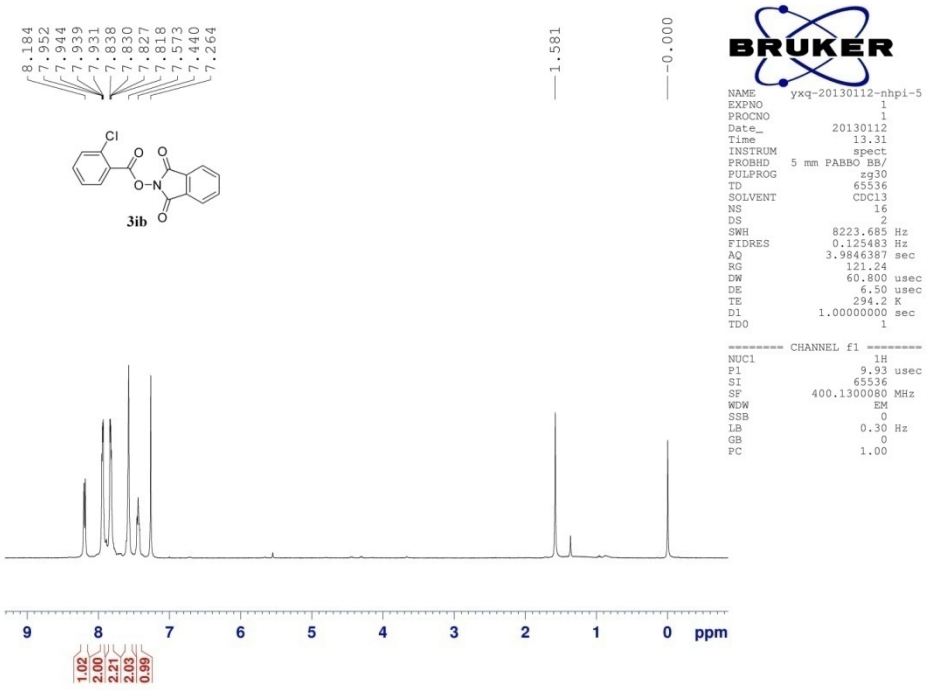
======== CHANNEL f1 ========
NUC1                            1H
P1                            9.93 usec
SI                           65536
SF                    400.1300082 MHz
WDW                             EM
SSB                              0
LB                            0.30 Hz
GB                               0
PC                            1.00
```

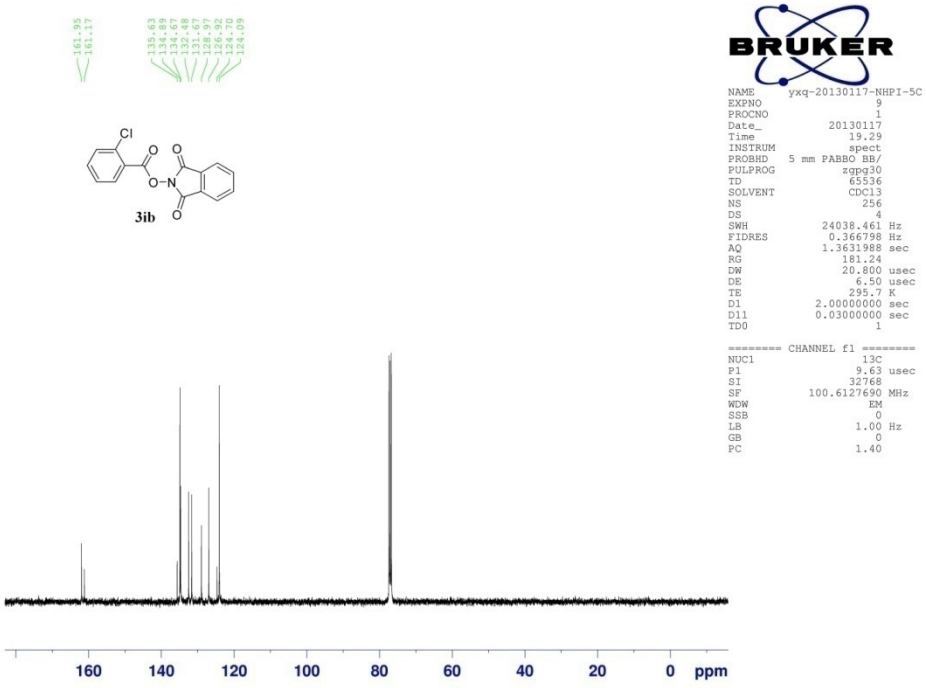



```
NAME            yxq-20130125-nhpi-7
EXPNO                             5
PROCNO                            1
Date_                      20130125
Time                          18.25
INSTRUM                       spect
PROBHD     5 mm PABBO BB/
PULPROG                     zgpg30
TD                           65536
SOLVENT                      CDCl3
NS                             256
DS                               4
SWH                       24038.461 Hz
FIDRES                    0.366798 Hz
AQ                        1.3631988 sec
RG                           181.24
DW                           20.800 usec
DE                            6.50 usec
TE                           294.1 K
D1                        2.00000000 sec
D11                       0.03000000 sec
TD0                              1

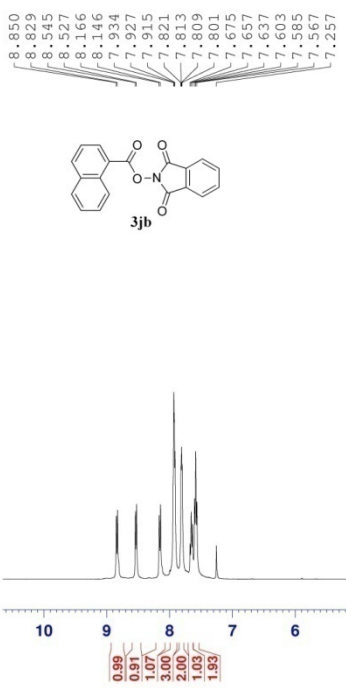
======== CHANNEL f1 ========
NUC1                           13C
P1                            9.63 usec
SI                           32768
SF                    100.6127690 MHz
WDW                             EM
SSB                              0
LB                            1.00 Hz
GB                               0
PC                            1.40
```

1,3-dioxoisoindolin-2-yl 2-chlorobenzoate (3ib)



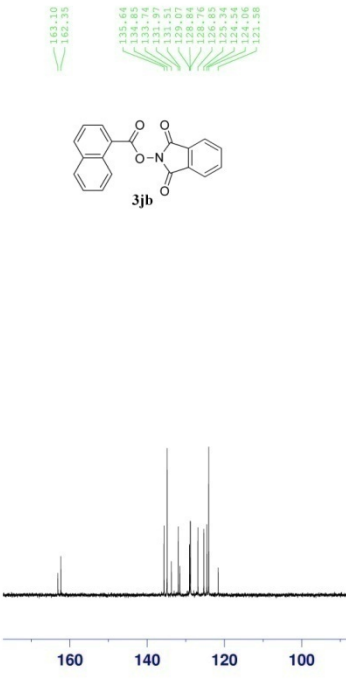


1,3-dioxoisoindolin-2-yl 1-naphthoate (3jb)




```
NAME            yxq-20130128-nhpi-12
EXPNO                              6
PROCNO                             1
Date_                       20130128
Time                            9.59
INSTRUM                        spect
PROBHD     5 mm PABBO BB/
PULPROG                        zg30
TD                            65536
SOLVENT                       CDCl3
NS                               16
DS                                2
SWH                        8223.685 Hz
FIDRES                     0.125483 Hz
AQ                         3.9846387 sec
RG                             66.34
DW                            60.800 usec
DE                             6.50 usec
TE                            292.3 K
D1                      1.00000000 sec
TD0                               1

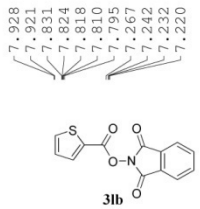
======== CHANNEL f1 ========
NUC1                             1H
P1                             9.93 usec
SI                            65536
SF                    400.1300121 MHz
WDW                              EM
SSB                               0
LB                             0.30 Hz
GB                                0
PC                             1.00
```




```
NAME            yxq-20130128-nhpi-12
EXPNO                              5
PROCNO                             1
Date_                       20130128
Time                            9.57
INSTRUM                        spect
PROBHD     5 mm PABBO BB/
PULPROG                     zgpg30
TD                            65536
SOLVENT                       CDCl3
NS                              256
DS                                4
SWH                        24038.461 Hz
FIDRES                     0.366798 Hz
AQ                         1.3631988 sec
RG                            181.24
DW                            20.800 usec
DE                             6.50 usec
TE                            292.5 K
D1                      2.00000000 sec
D11                     0.03000000 sec
TD0                               1

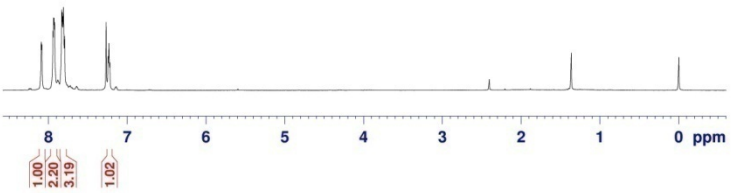
======== CHANNEL f1 ========
NUC1                            13C
P1                             9.63 usec
SI                            32768
SF                    100.6127690 MHz
WDW                              EM
SSB                               0
LB                             1.00 Hz
GB                                0
PC                             1.40
```

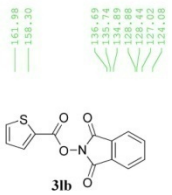
1,3-dioxoisoindolin-2-yl thiophene-2-carboxylate (3lb)




```
NAME          yxq-20130118-NHPI-9
EXPNO                           8
PROCNO                          1
Date_                    20130119
Time                         6.57
INSTRUM                     spect
PROBHD     5 mm PABBO BB/
PULPROG                     zg30
TD                         65536
SOLVENT                    CDCl3
NS                            16
DS                             2
SWH                     8223.685 Hz
FIDRES                  0.125483 Hz
AQ                      3.9846387 sec
RG                         104.71
DW                         60.800 usec
DE                          6.50 usec
TE                         295.3 K
D1                      1.00000000 sec
TD0                            1

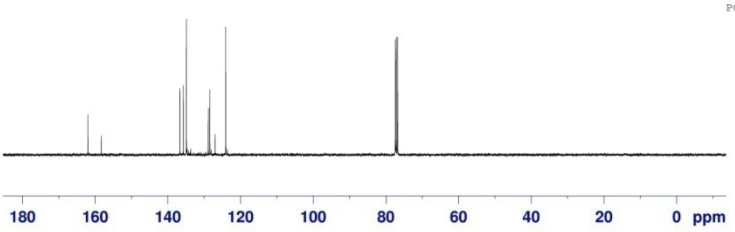
======== CHANNEL f1 ========
NUC1                          1H
P1                          9.93 usec
SI                         65536
SF                  400.1300067 MHz
WDW                           EM
SSB                            0
LB                          0.30 Hz
GB                             0
PC                          1.00
```



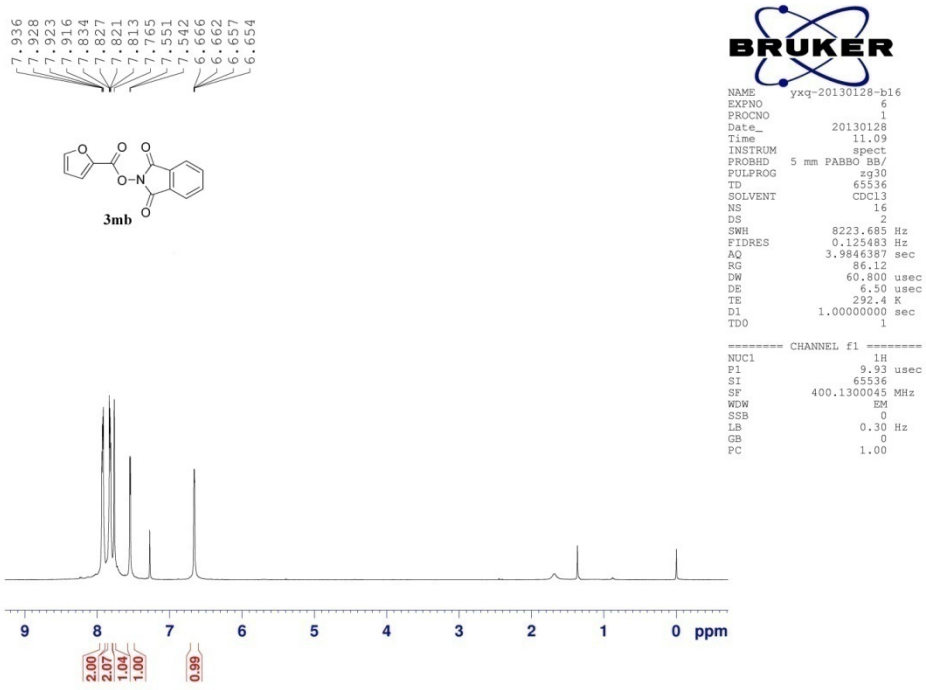



```
NAME          yxq-20130125-nhpi-9
EXPNO                           5
PROCNO                          1
Date_                    20130125
Time                        18.44
INSTRUM                     spect
PROBHD     5 mm PABBO BB/
PULPROG                   zgpg30
TD                         65536
SOLVENT                    CDCl3
NS                           256
DS                             4
SWH                    24038.461 Hz
FIDRES                  0.366798 Hz
AQ                      1.3631988 sec
RG                         181.24
DW                         20.800 usec
DE                          6.50 usec
TE                         294.0 K
D1                      2.00000000 sec
D11                     0.03000000 sec
TD0                            1

======== CHANNEL f1 ========
NUC1                         13C
P1                          9.63 usec
SI                         32768
SF                  100.6127690 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```



1,3-dioxoisoindolin-2-yl furan-2-carboxylate (3mb)



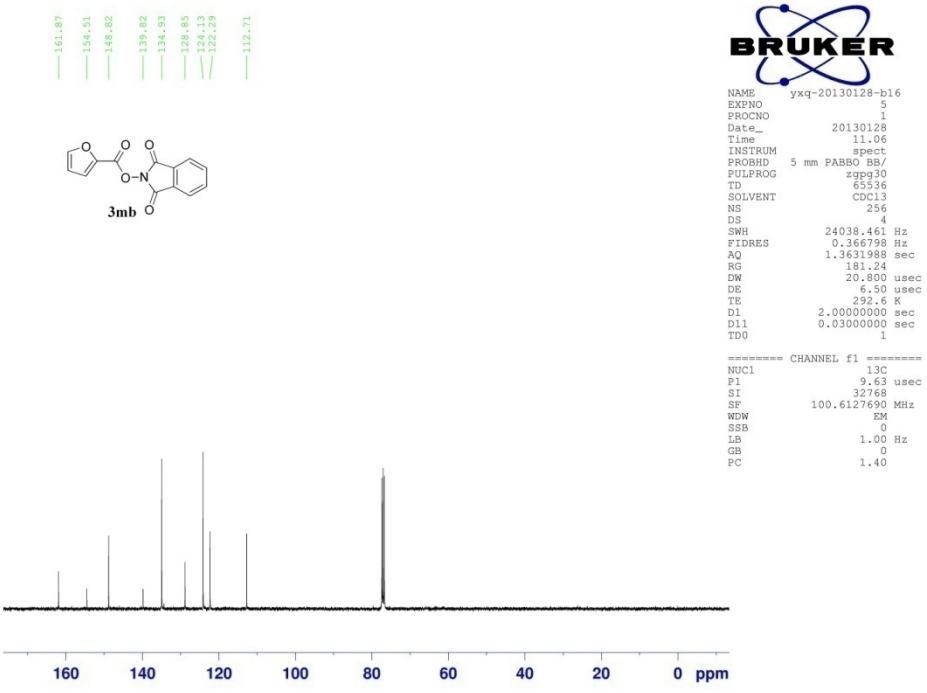
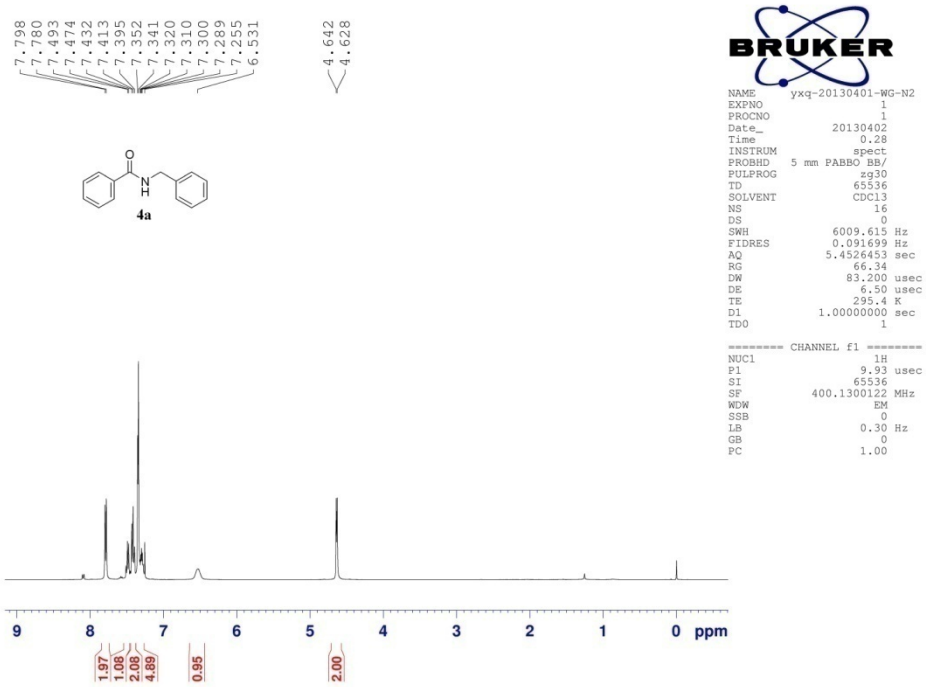
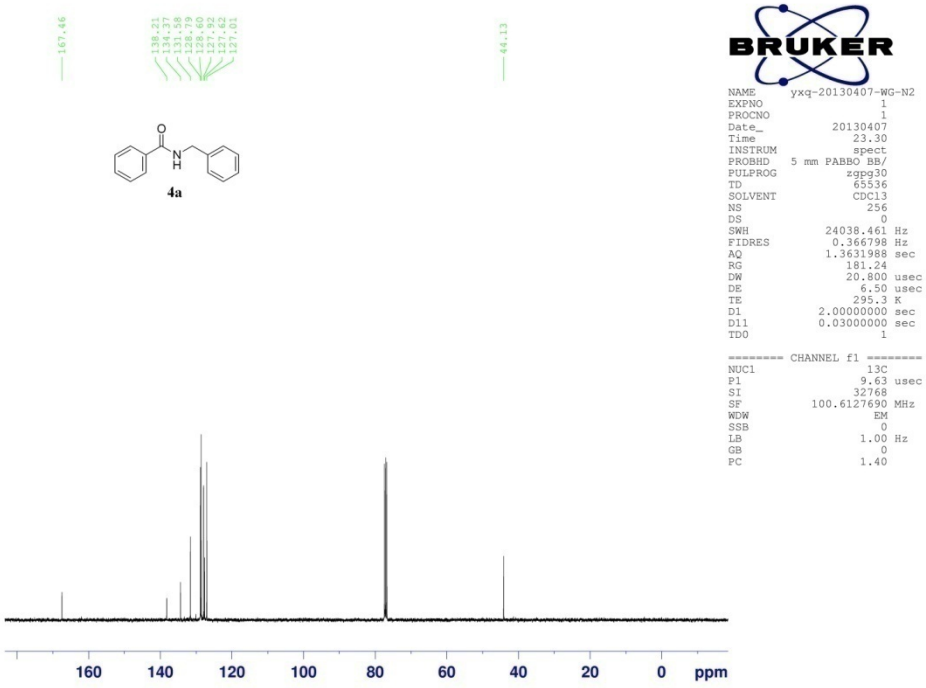
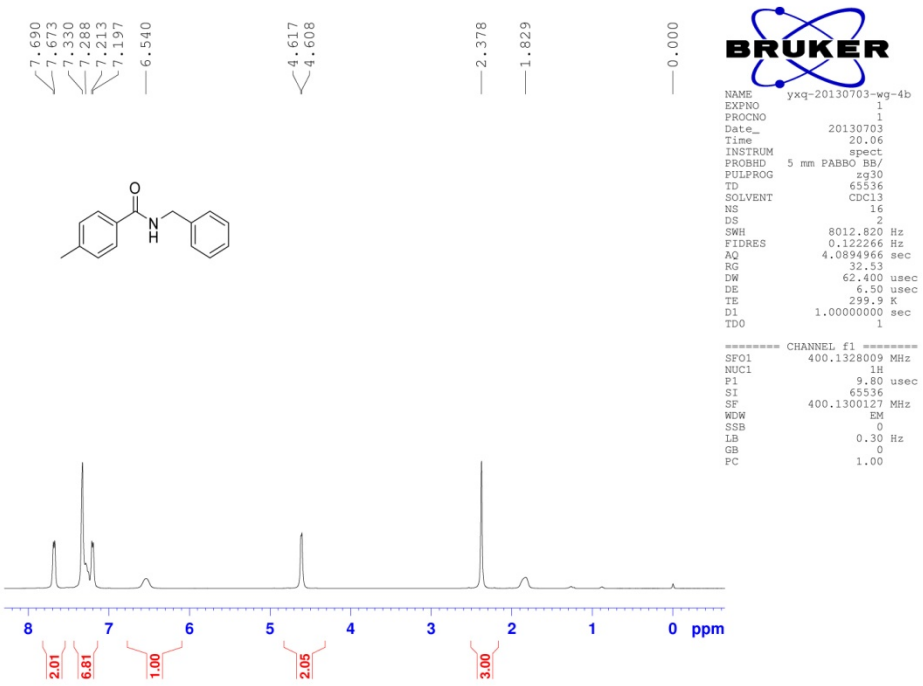


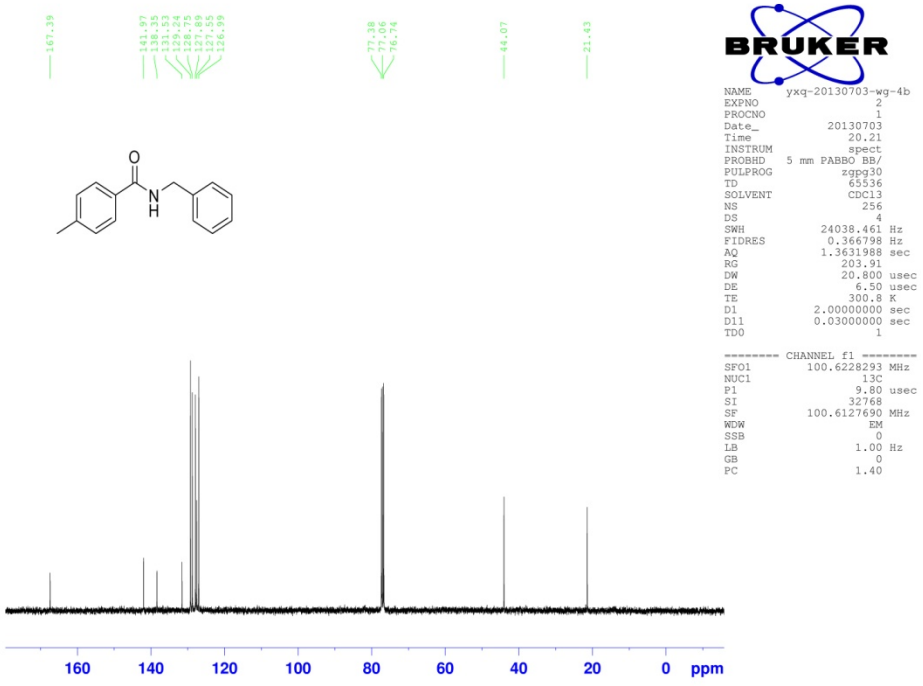
Table 5:
N-benzylbenzamide (4a)



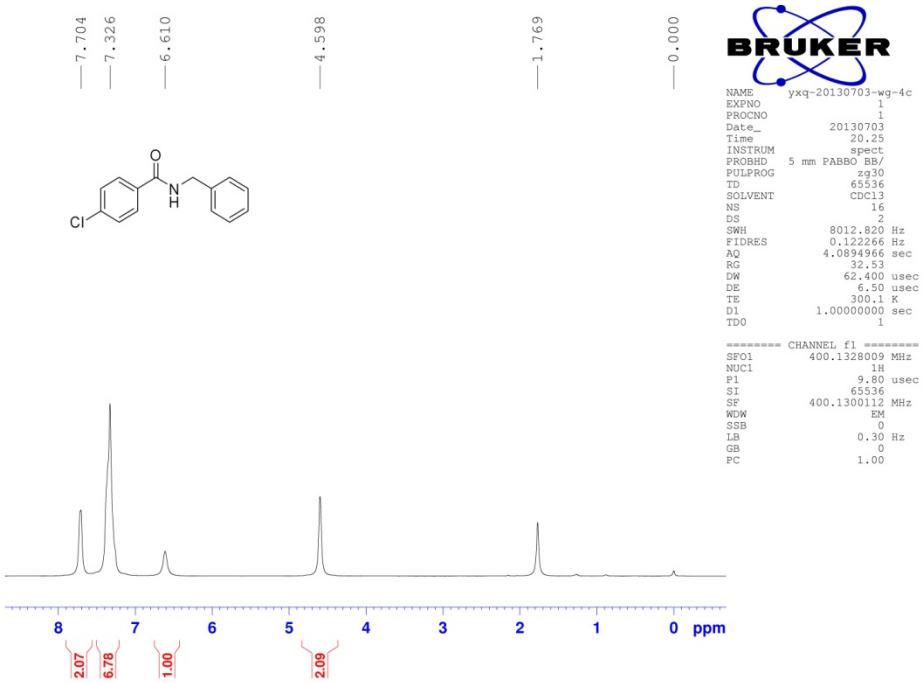


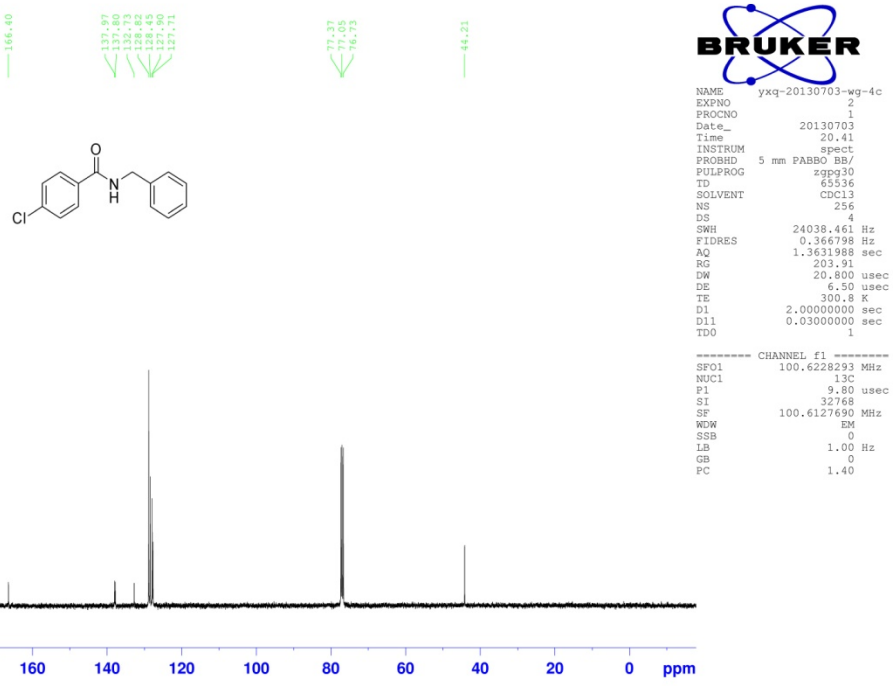
N-benzyl-4-methylbenzamide(4b)



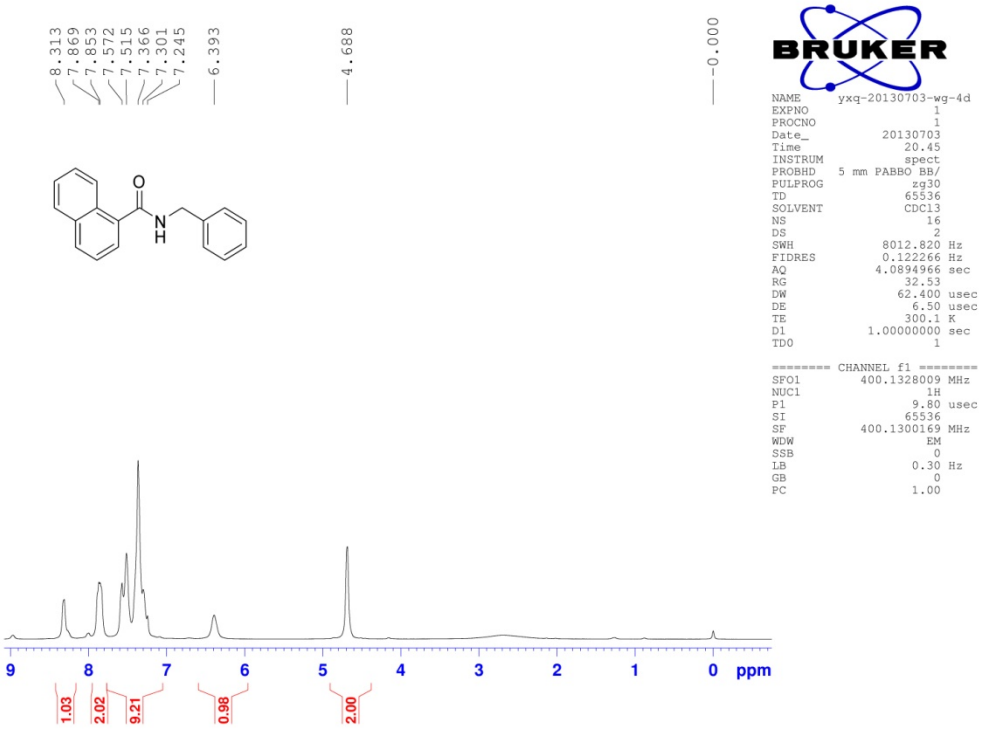


N-benzyl-4-chlorobenzamide(4c)



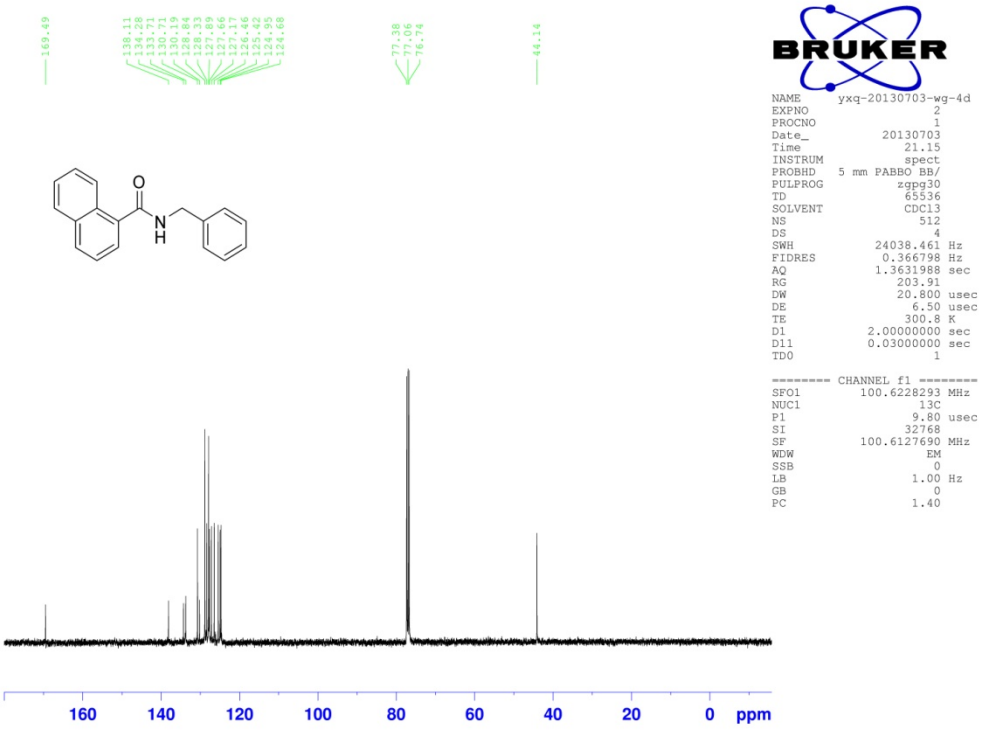


N-benzyl-1-naphthamide(4d)




```
NAME            yxq-20130703-wg-4d
EXPNO                            1
PROCNO                           1
Date_                     20130703
Time                         20.45
INSTRUM                      spect
PROBHD   5 mm PABBO BB/
PULPROG                      zg30
TD                          65536
SOLVENT                     CDCl3
NS                              16
DS                               2
SWH                     8012.820 Hz
FIDRES                  0.122266 Hz
AQ                      4.0894966 sec
RG                          32.53
DW                         62.400 usec
DE                          6.50 usec
TE                         300.1 K
D1                      1.00000000 sec
TD0                              1

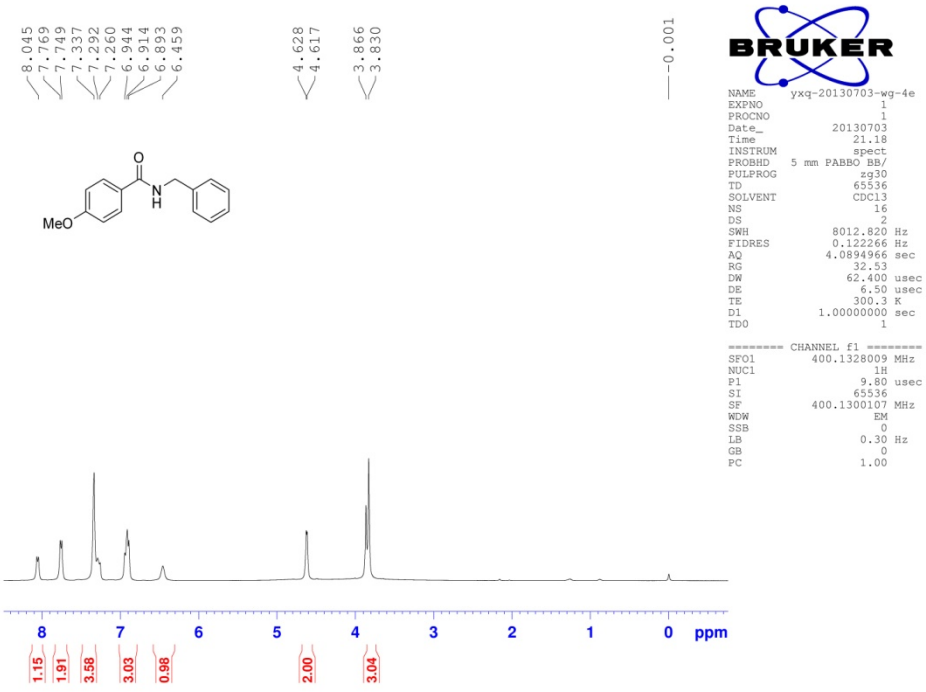
======== CHANNEL f1 ========
SFO1                400.1328009 MHz
NUC1                        1H
P1                         9.80 usec
SI                         65536
SF                  400.1300169 MHz
WDW                          EM
SSB                           0
LB                         0.30 Hz
GB                            0
PC                         1.00
```




```
NAME            yxq-20130703-wg-4d
EXPNO                            2
PROCNO                           1
Date_                     20130703
Time                         21.15
INSTRUM                      spect
PROBHD   5 mm PABBO BB/
PULPROG                    zgpg30
TD                          65536
SOLVENT                     CDCl3
NS                             512
DS                               4
SWH                    24038.461 Hz
FIDRES                  0.366798 Hz
AQ                      1.3631988 sec
RG                         203.91
DW                         20.800 usec
DE                          6.50 usec
TE                         300.8 K
D1                      2.00000000 sec
D11                     0.03000000 sec
TD0                              1

======== CHANNEL f1 ========
SFO1                100.6228293 MHz
NUC1                        13C
P1                         9.80 usec
SI                         32768
SF                  100.6127690 MHz
WDW                          EM
SSB                           0
LB                         1.00 Hz
GB                            0
PC                         1.40
```

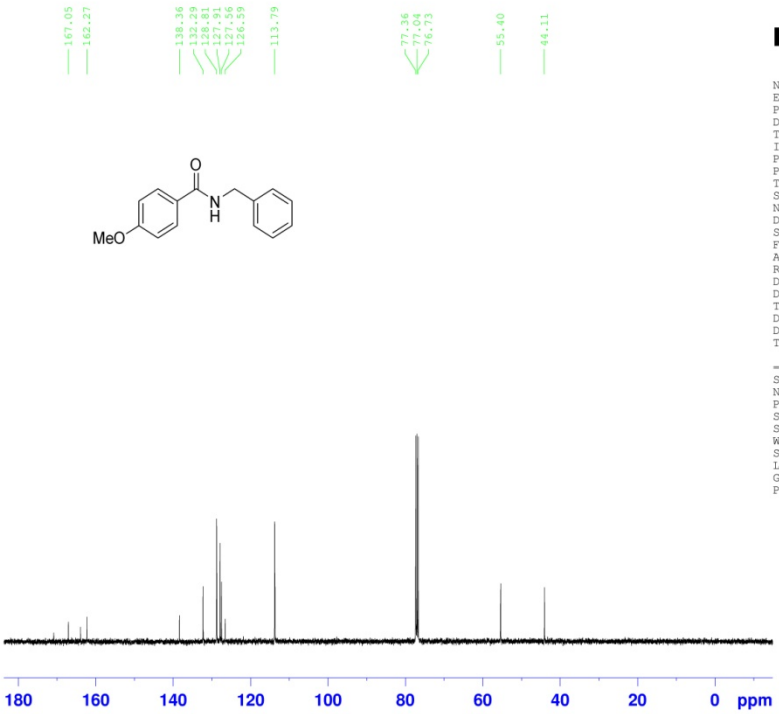
N-benzyl-4-methoxybenzamide(4e)



BRUKER

```
NAME          yxq-20130703-wg-4e
EXPNO                          1
PROCNO                         1
Date_                   20130703
Time                       21.18
INSTRUM                    spect
PROBHD    5 mm PABBO BB/
PULPROG                     zg30
TD                         65536
SOLVENT                    CDCl3
NS                            16
DS                             2
SWH                     8012.820 Hz
FIDRES                  0.122266 Hz
AQ                      4.0894966 sec
RG                         32.53
DW                         62.400 usec
DE                          6.50 usec
TE                         300.3 K
D1                      1.00000000 sec
TD0                            1

======== CHANNEL f1 ========
SFO1                 400.1328009 MHz
NUC1                          1H
P1                          9.80 usec
SI                         65536
SF                   400.1300107 MHz
WDW                           EM
SSB                            0
LB                          0.30 Hz
GB                             0
PC                          1.00
```

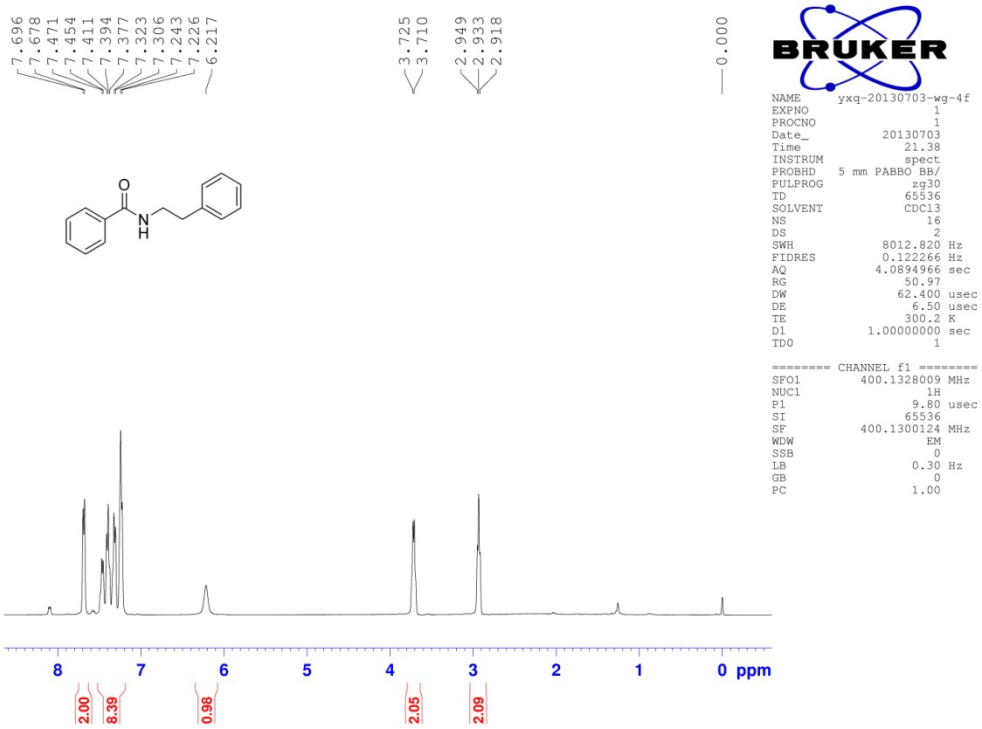


BRUKER

```
NAME          yxq-20130703-wg-4e
EXPNO                          2
PROCNO                         1
Date_                   20130703
Time                       21.34
INSTRUM                    spect
PROBHD    5 mm PABBO BB/
PULPROG                   zgpg30
TD                         65536
SOLVENT                    CDCl3
NS                           256
DS                             4
SWH                    24038.461 Hz
FIDRES                  0.366798 Hz
AQ                      1.3631988 sec
RG                        203.91
DW                         20.800 usec
DE                          6.50 usec
TE                         300.8 K
D1                      2.00000000 sec
D11                     0.03000000 sec
TD0                            1

======== CHANNEL f1 ========
SFO1                 100.6228293 MHz
NUC1                          13C
P1                          9.80 usec
SI                         32768
SF                   100.6127690 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```

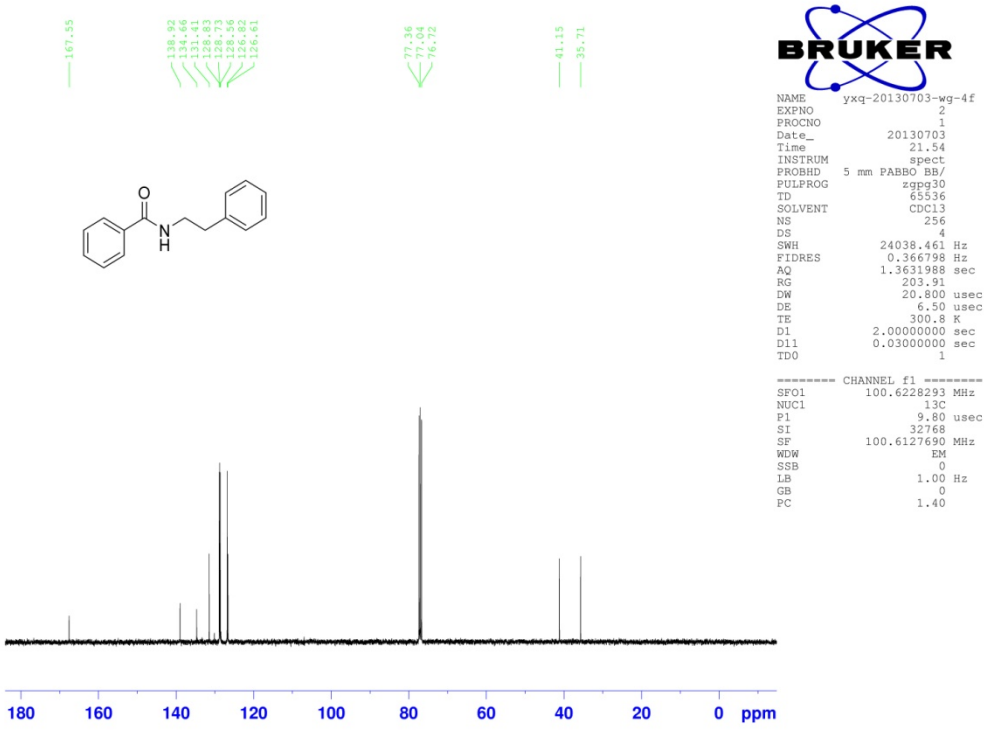
N-phenethylbenzamide (4f)



BRUKER

```
NAME          yxq-20130703-wg-4f
EXPNO                          1
PROCNO                         1
Date_                   20130703
Time                       21.38
INSTRUM                    spect
PROBHD   5 mm PABBO BB/
PULPROG                    zg30
TD                        65536
SOLVENT                   CDCl3
NS                           16
DS                            2
SWH                    8012.820 Hz
FIDRES                 0.122266 Hz
AQ                     4.0894966 sec
RG                         50.97
DW                        62.400 usec
DE                         6.50 usec
TE                        300.2 K
D1                     1.00000000 sec
TD0                            1

======== CHANNEL f1 ========
SFO1                 400.1328009 MHz
NUC1                         1H
P1                         9.80 usec
SI                        65536
SF                   400.1300124 MHz
WDW                           EM
SSB                            0
LB                          0.30 Hz
GB                             0
PC                          1.00
```

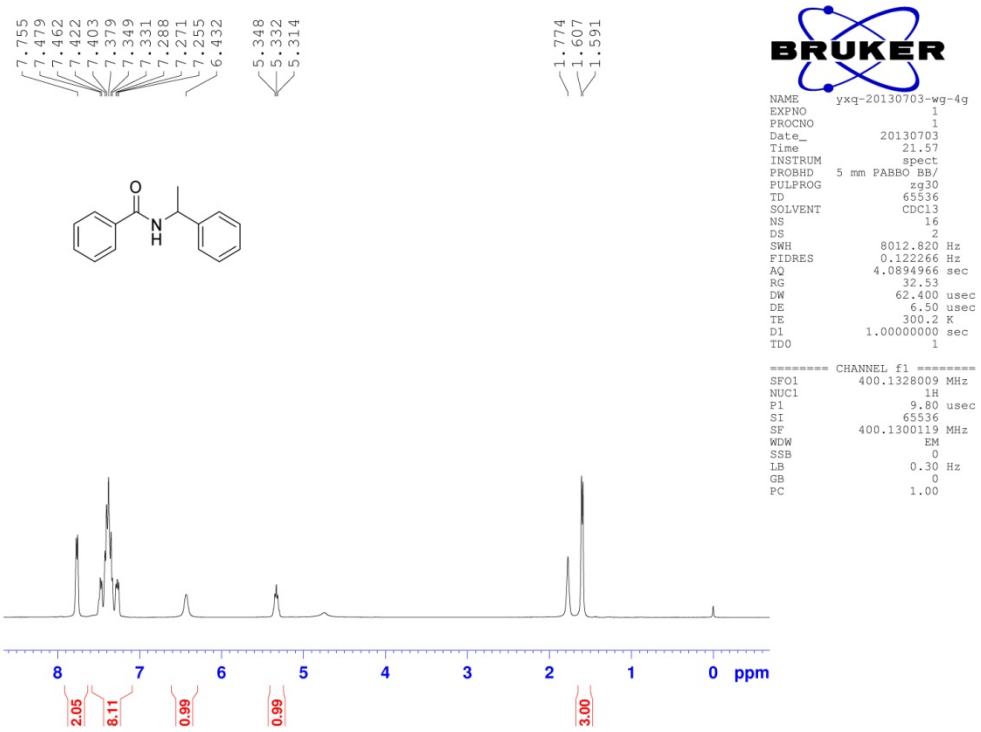


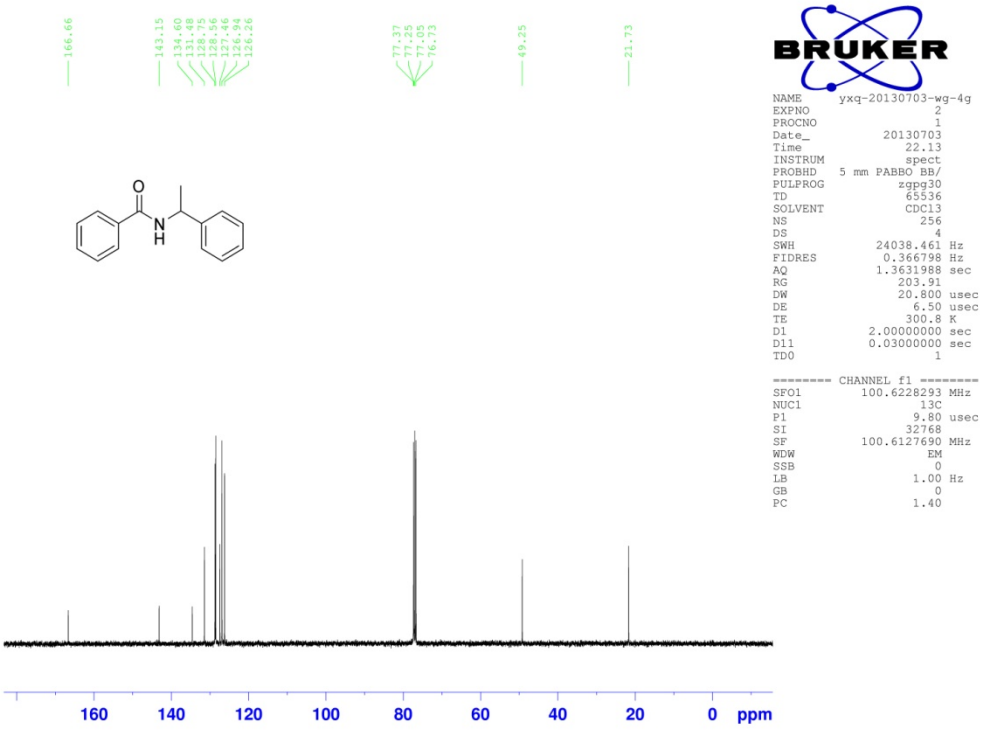
BRUKER

```
NAME          yxq-20130703-wg-4f
EXPNO                          2
PROCNO                         1
Date_                   20130703
Time                       21.54
INSTRUM                    spect
PROBHD   5 mm PABBO BB/
PULPROG                  zgpg30
TD                        65536
SOLVENT                   CDCl3
NS                          256
DS                            4
SWH                   24038.461 Hz
FIDRES                 0.366798 Hz
AQ                     1.3631988 sec
RG                        203.91
DW                        20.800 usec
DE                         6.50 usec
TE                        300.8 K
D1                     2.00000000 sec
D11                    0.03000000 sec
TD0                            1

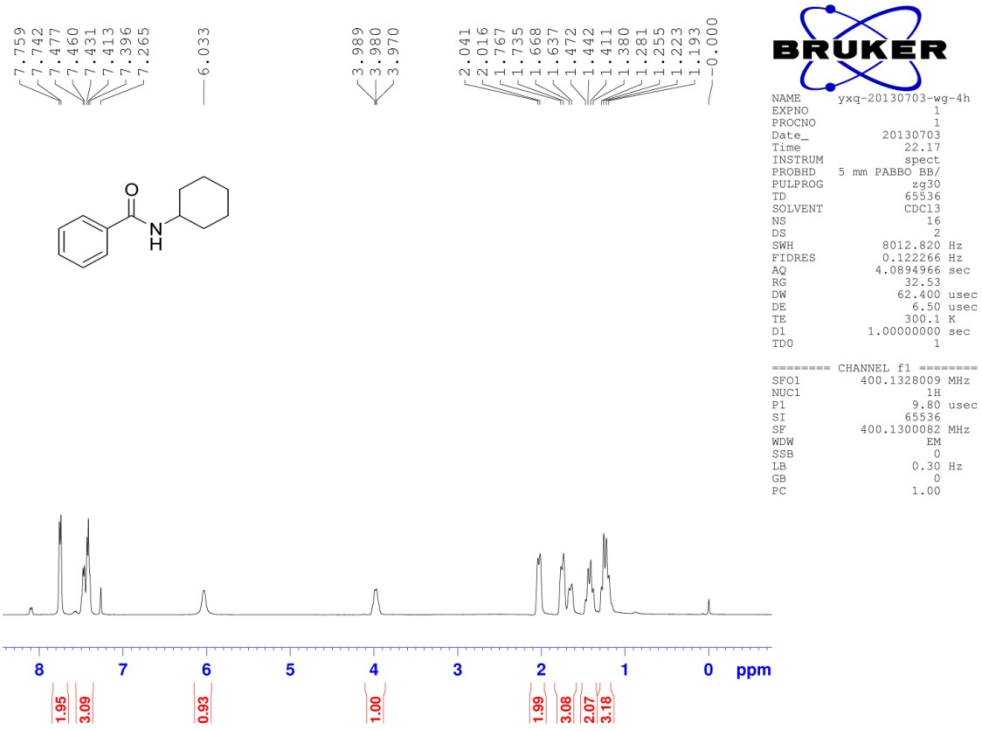
======== CHANNEL f1 ========
SFO1                 100.6228293 MHz
NUC1                         13C
P1                         9.80 usec
SI                        32768
SF                   100.6127690 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```

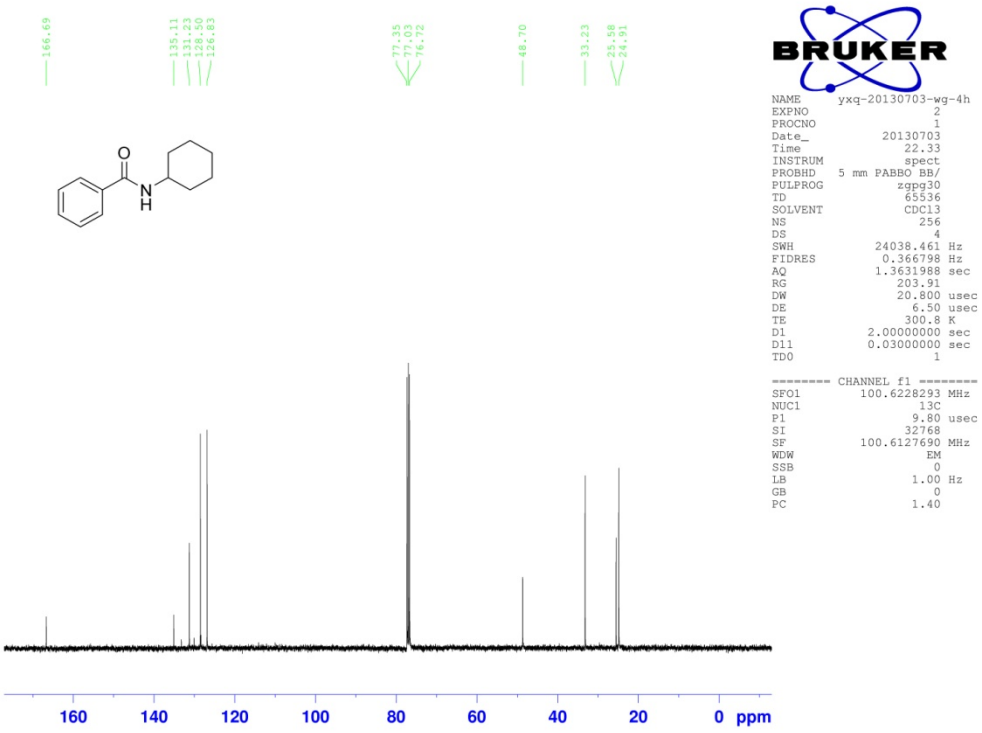
N-(1-phenylethyl)benzamide(4g)



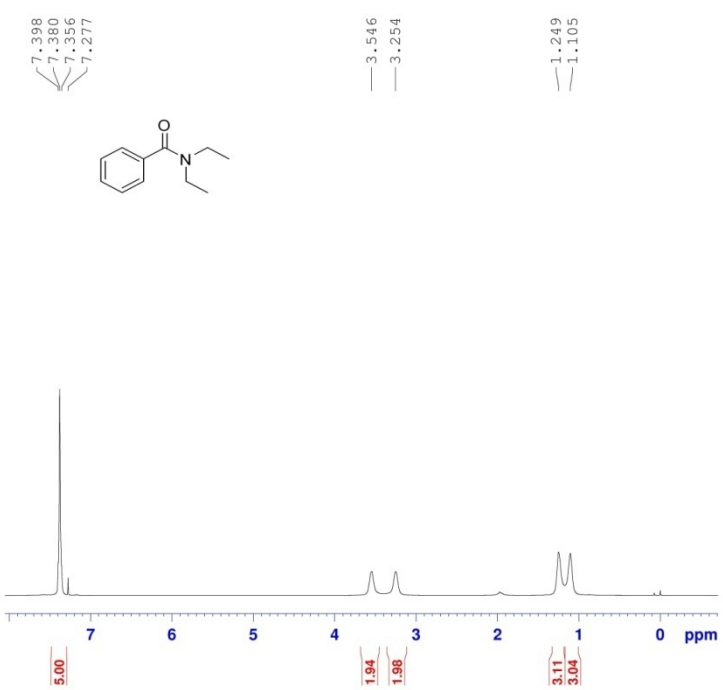


N-cyclohexylbenzamide(4h)



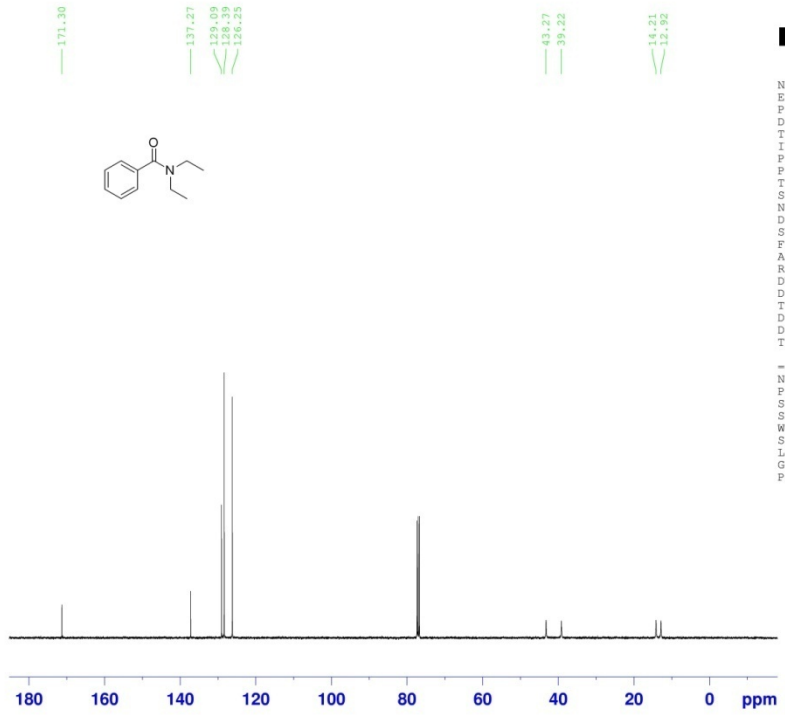


N, N-diethylbenzamide (4i)




```
NAME            yxq-20130401-WG-N3
EXPNO                            2
PROCNO                           1
Date_                     20130402
Time                          0.32
INSTRUM                      spect
PROBHD    5 mm PABBO BB/
PULPROG                      zg30
TD                          65536
SOLVENT                     CDCl3
NS                             16
DS                              0
SWH                    6009.615 Hz
FIDRES                 0.091699 Hz
AQ                     5.4526453 sec
RG                          32.31
DW                         83.200 usec
DE                          6.50 usec
TE                         295.2 K
D1                    1.00000000 sec
TD0                             1

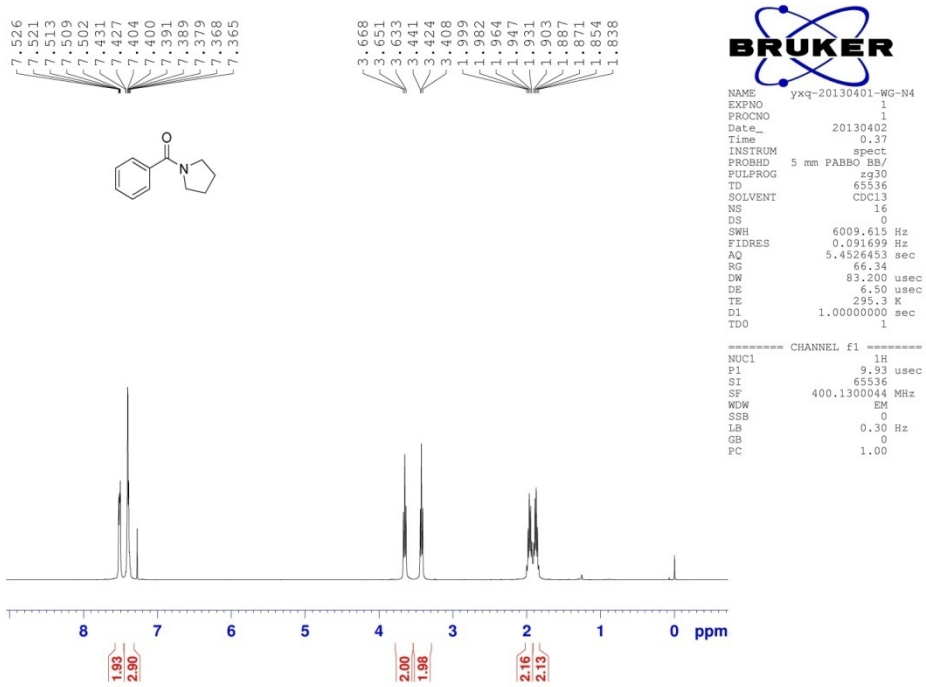
======== CHANNEL f1 ========
NUC1                           1H
P1                          9.93 usec
SI                         65536
SF                 400.1300033 MHz
WDW                            EM
SSB                             0
LB                           0.30 Hz
GB                              0
PC                           1.00
```




```
NAME            yxq-20130407-WG-N3
EXPNO                            2
PROCNO                           1
Date_                     20130407
Time                         23.47
INSTRUM                      spect
PROBHD    5 mm PABBO BB/
PULPROG                    zgpg30
TD                          65536
SOLVENT                     CDCl3
NS                            256
DS                              0
SWH                   24038.461 Hz
FIDRES                 0.366798 Hz
AQ                     1.3631988 sec
RG                         181.24
DW                         20.800 usec
DE                          6.50 usec
TE                         295.4 K
D1                    2.00000000 sec
D11                   0.03000000 sec
TD0                             1

======== CHANNEL f1 ========
NUC1                           13C
P1                          9.63 usec
SI                         32768
SF                 100.6127690 MHz
WDW                            EM
SSB                             0
LB                           1.00 Hz
GB                              0
PC                           1.40
```

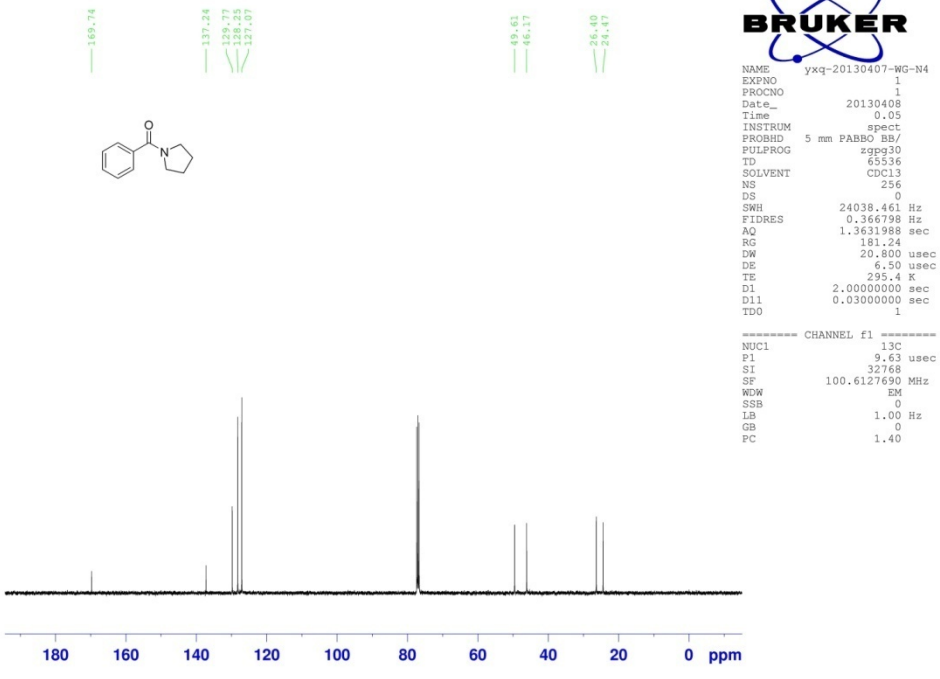
phenyl (pyrrolidin-1-yl) methanone (4j)



BRUKER

```
NAME            yxq-20130401-WG-N4
EXPNO                            1
PROCNO                           1
Date_                     20130402
Time                          0.37
INSTRUM                      spect
PROBHD     5 mm PABBO BB/
PULPROG                      zg30
TD                          65536
SOLVENT                     CDCl3
NS                             16
DS                              0
SWH                    6009.615 Hz
FIDRES                 0.091699 Hz
AQ                     5.4526453 sec
RG                         66.34
DW                        83.200 usec
DE                         6.50 usec
TE                        295.3 K
D1                     1.00000000 sec
TD0                             1

======== CHANNEL f1 ========
NUC1                           1H
P1                          9.93 usec
SI                         65536
SF                 400.1300044 MHz
WDW                           EM
SSB                            0
LB                          0.30 Hz
GB                             0
PC                          1.00
```

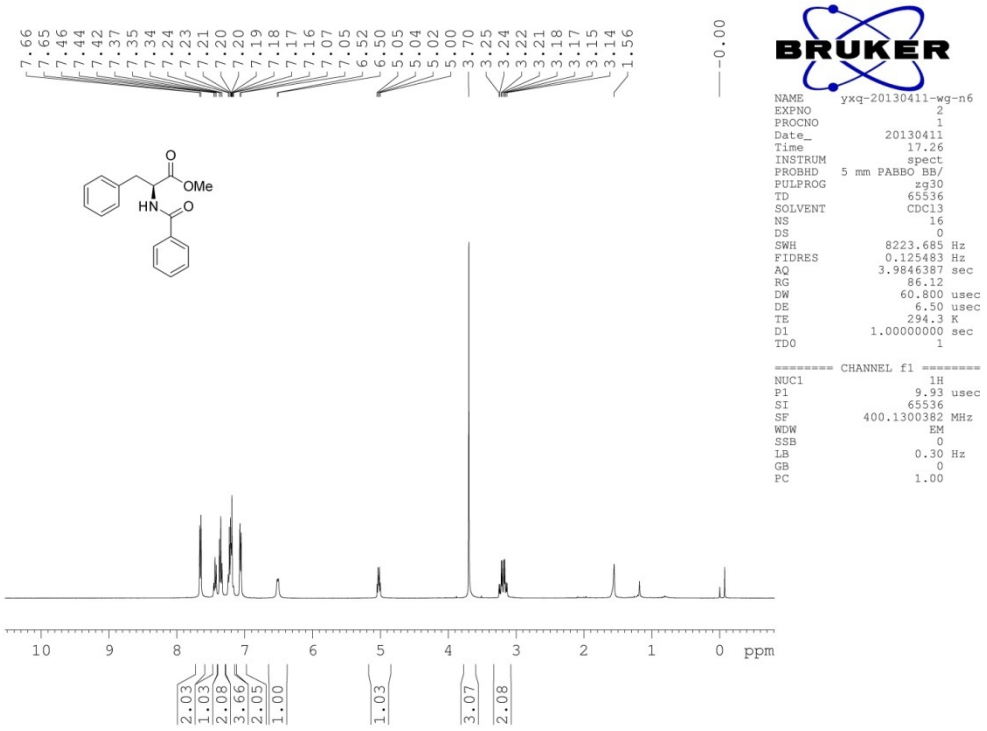


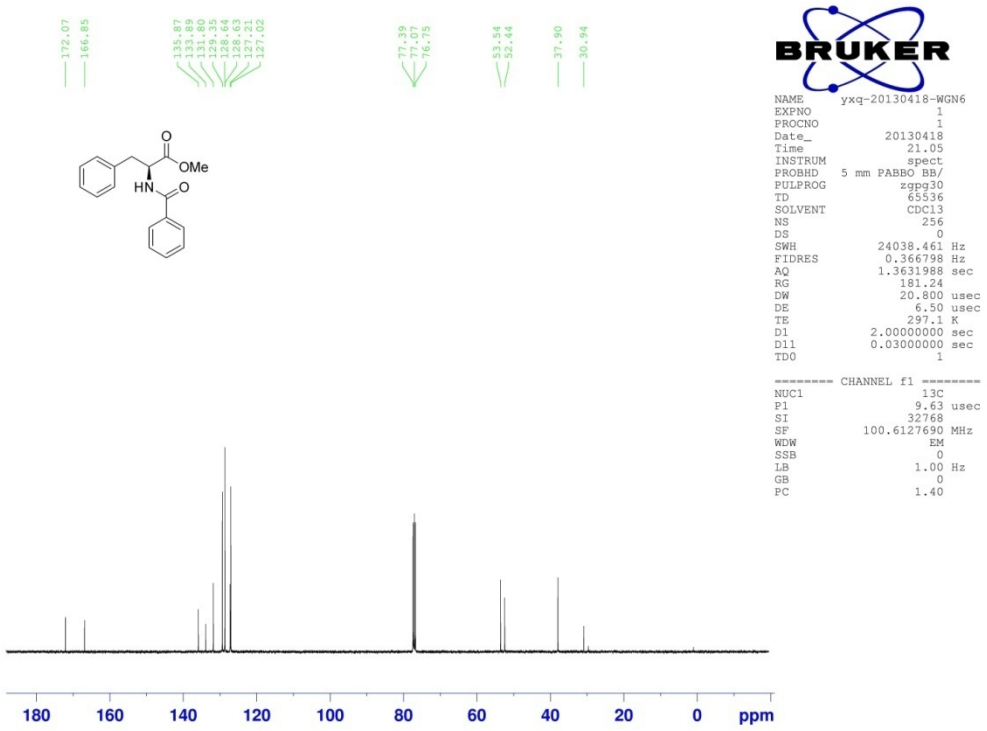
BRUKER

```
NAME            yxq-20130407-WG-N4
EXPNO                            1
PROCNO                           1
Date_                     20130408
Time                          0.05
INSTRUM                      spect
PROBHD     5 mm PABBO BB/
PULPROG                    zgpg30
TD                          65536
SOLVENT                     CDCl3
NS                            256
DS                              0
SWH                   24038.461 Hz
FIDRES                 0.366798 Hz
AQ                     1.3631988 sec
RG                        181.24
DW                        20.800 usec
DE                         6.50 usec
TE                        295.4 K
D1                     2.00000000 sec
D11                    0.03000000 sec
TD0                             1

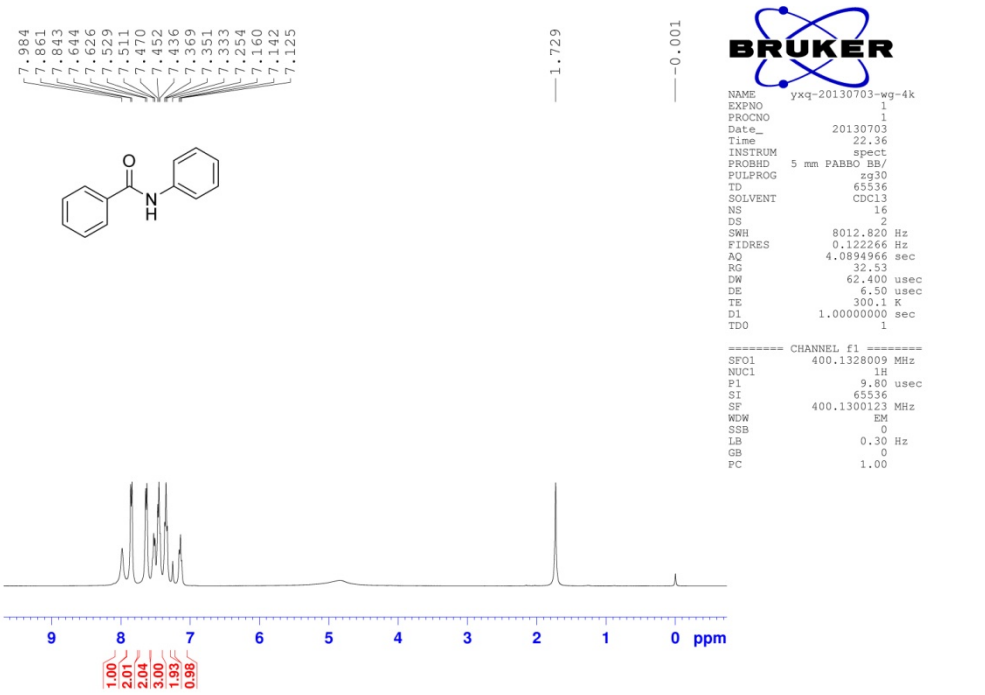
======== CHANNEL f1 ========
NUC1                          13C
P1                          9.63 usec
SI                         32768
SF                 100.6127690 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```

(S)-methyl 2-benzamido-3-phenylpropanoate (4k)



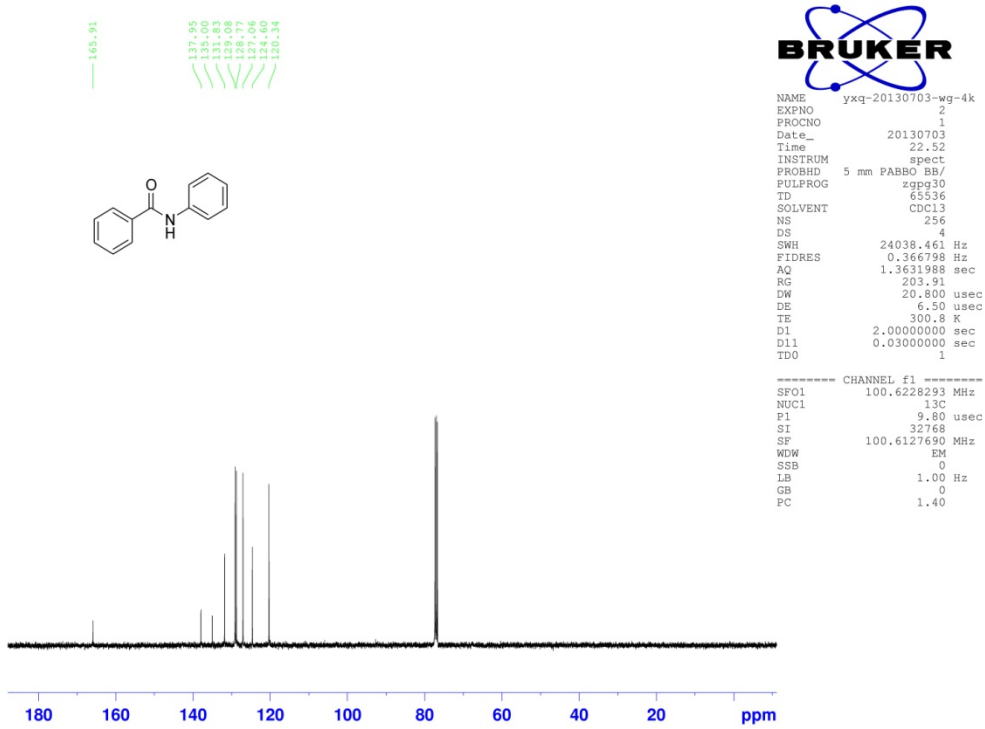


N-phenylbenzamide (4l)




```
NAME            yxq-20130703-wg-4k
EXPNO                            1
PROCNO                           1
Date_                     20130703
Time                         22.36
INSTRUM                      spect
PROBHD    5 mm PABBO BB/
PULPROG                      zg30
TD                          65536
SOLVENT                     CDCl3
NS                             16
DS                              2
SWH                      8012.820 Hz
FIDRES                   0.122266 Hz
AQ                       4.0894966 sec
RG                           32.53
DW                          62.400 usec
DE                           6.50 usec
TE                          300.1 K
D1                       1.00000000 sec
TD0                              1

======== CHANNEL f1 ========
SFO1                400.1328009 MHz
NUC1                        1H
P1                        9.80 usec
SI                         65536
SF                  400.1300123 MHz
WDW                           EM
SSB                            0
LB                          0.30 Hz
GB                             0
PC                          1.00
```




```
NAME            yxq-20130703-wg-4k
EXPNO                            2
PROCNO                           1
Date_                     20130703
Time                         22.52
INSTRUM                      spect
PROBHD    5 mm PABBO BB/
PULPROG                   zgpg30
TD                          65536
SOLVENT                     CDCl3
NS                            256
DS                              4
SWH                     24038.461 Hz
FIDRES                   0.366798 Hz
AQ                       1.3631988 sec
RG                          203.91
DW                          20.800 usec
DE                           6.50 usec
TE                          300.8 K
D1                       2.00000000 sec
D11                      0.03000000 sec
TD0                              1

======== CHANNEL f1 ========
SFO1                100.6228293 MHz
NUC1                        13C
P1                        9.80 usec
SI                         32768
SF                  100.6127690 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.40
```