Electronic Supplementary Material (ESI) for ChemComm.

Supporting Information

Copper-Catalyzed Oxidative Oxyalkylation of Enol Ethers with α-Amino Carbonyl Compounds and Hydroperoxides

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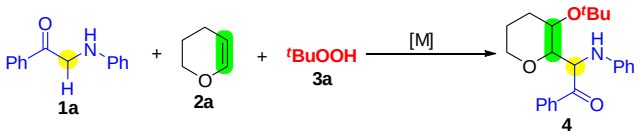
List of Contents

(A) Typical experimental procedure

(a) Typical Experimental Procedure for the Cu-Catalyzed Oxidative Difunctionalization:

To a Schlenk tube were added *α*-amino carbonyl compounds **1** (0.3 mmol), enol ethers **2** (1.5 mmol), hydroperoxides **3** (0.66 mmol), CuCl (5 mol %), and *n*-hexane (1 mL). Then the tube was charged with argon, and was stirred at 50 ^{o}C for the indicated time until complete consumption of starting material as monitored by TLC and/or GC-MS analysis. After the reaction was finished, the reaction mixture was washed with brine. The aqueous phase was re-extracted with ethyl acetate. The combined organic extracts were dried over Na_2SO_4, concentrated in vacuum, and the resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to afford the desired product.

(b) Table S1. Screening Optimal Conditions[a]



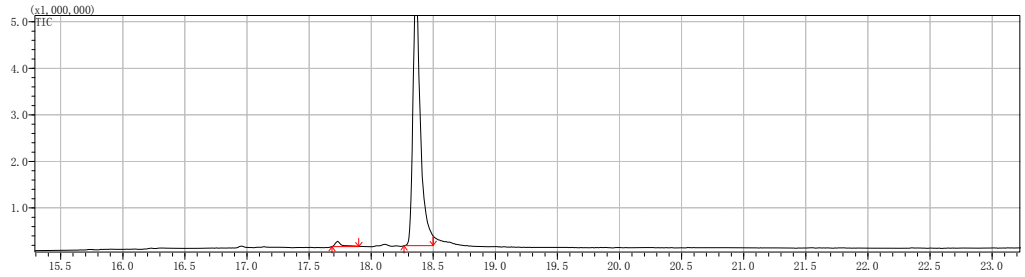
Entry	[M] (mol %)	**2a** (equiv)	**3a** (equiv)	Solvent	T (^{o}C)	Isolated yield (%)
1	CuCl (5)	5	2.2	*n*-hexane	50	72
2	CuBr (5)	5	2.2	*n*-hexane	50	61
3	CuI (5)	5	2.2	*n*-hexane	50	49
4	CuOAc (5)	5	2.2	*n*-hexane	50	48
5	$CuCl_2$ (5)	5	2.2	*n*-hexane	50	66
6	$FeCl_2$ (5)	5	2.2	*n*-hexane	50	12
7	—	5	2.2	*n*-hexane	50	0
8	CuCl (2)	5	2.2	*n*-hexane	50	29
9	CuCl (10)	5	2.2	*n*-hexane	50	71
10	CuCl (5)	5	2.2	*c*-hexane	50	42
11	CuCl (5)	5	2.2	C_6H_5Cl	50	32
12	CuCl (5)	5	2.2	MeCN	50	trace
13	CuCl (5)	3	2.2	*n*-hexane	50	27
14	CuCl (5)	10	2.2	*n*-hexane	50	71
15	CuCl (5)	5	3	*n*-hexane	50	72
16	CuCl (5)	5	1.2	*n*-hexane	50	15
17	CuCl (5)	5	2.2	*n*-hexane	25	18
18	CuCl (5)	5	2.2	*n*-hexane	70	37
19[b]	CuCl (5)	5	2.2	*n*-hexane	50	63
20[c]	CuCl (5)	5	2.2	*n*-hexane	50	67
21[d]	CuCl (5)	5	2.2	*n*-hexane	50	68

[a] Reaction conditions: **1a** (0.3 mmol), **2a** (5 equiv), **3a** (2.2 equiv; 5 M in decane), [M] and solvent (1 mL) under argon atmosphere for 12 h. The d.r. value of **4** is about 21:1 determined by GC-MS

analysis of the crude products. [b] Air instead of argon. [c] **3a** (2.2 equiv; 70% in water) was added. [d] **1a** (10 mmol, 2.11 g) for 48 h.

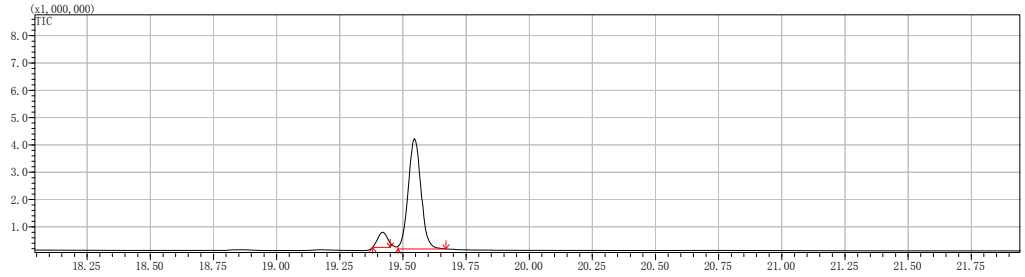
(c) GC-MS datas

Product 4



Peak area	Peak area ratio
1109756	4.50
23304895	95.50

Product 5



Peak area	Peak area ratio
786897	5.26
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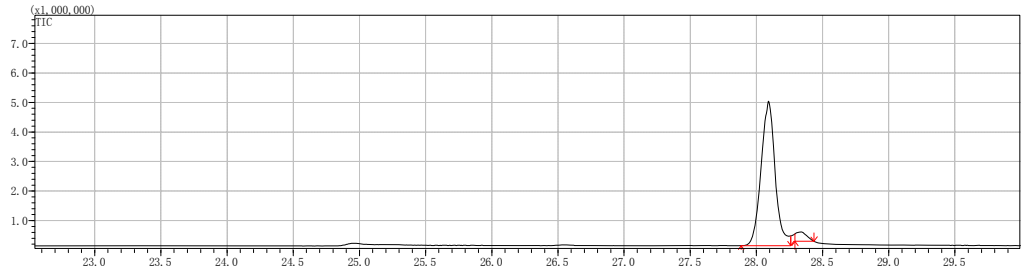

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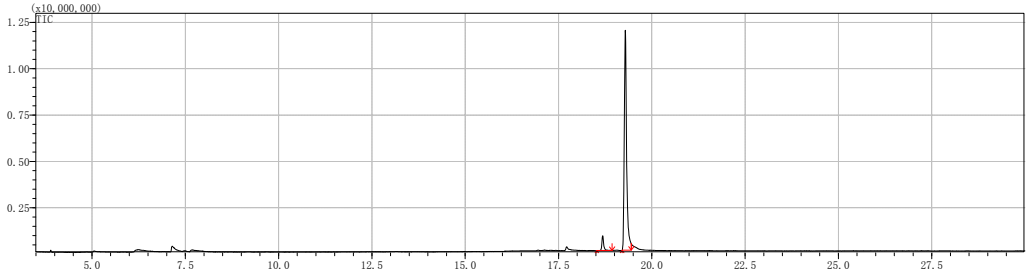

Peak area Peak area ratio

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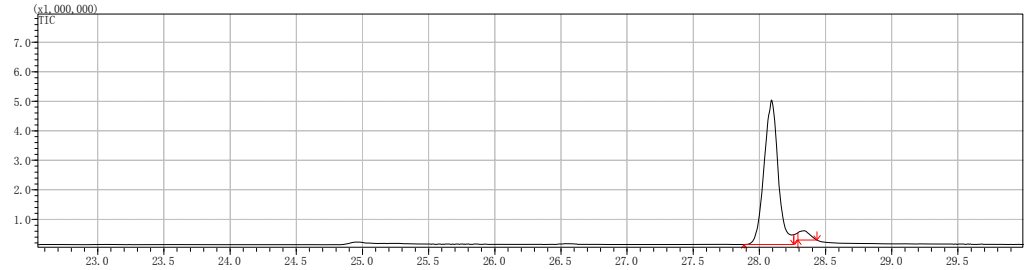
51559454 94.51

Product 9

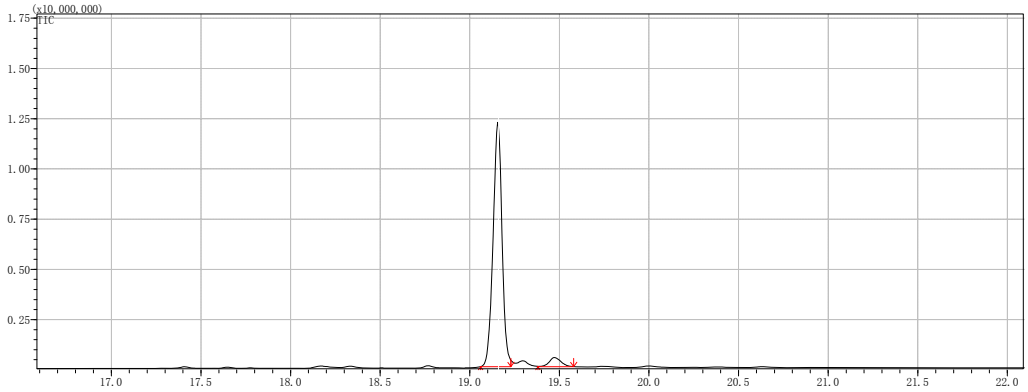


Peak area Peak area ratio

36027099 94.74

2001505 5.26

Product 10



Peak area Peak area ratio

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2641527 5.88

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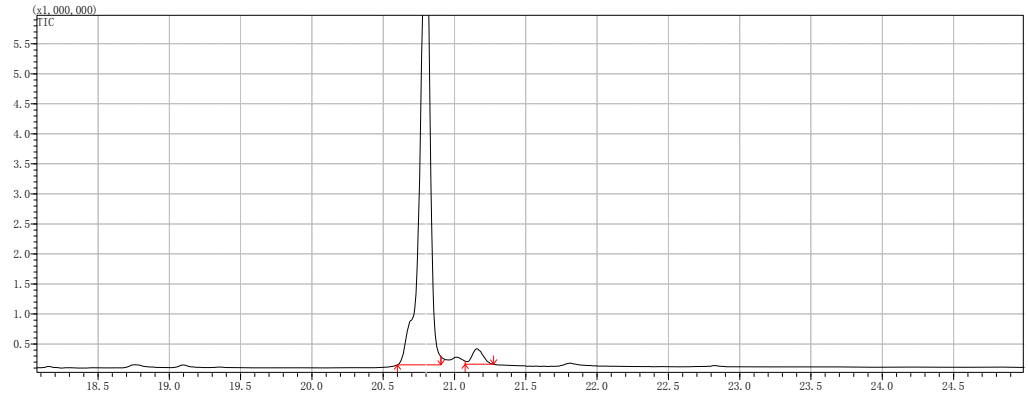

Peak area Peak area ratio

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2488142 6.02

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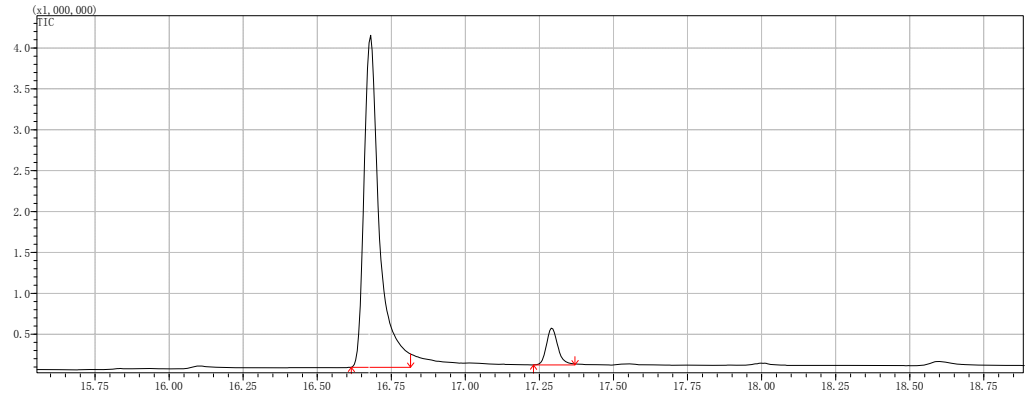

Peak area Peak area ratio

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981227 6.33

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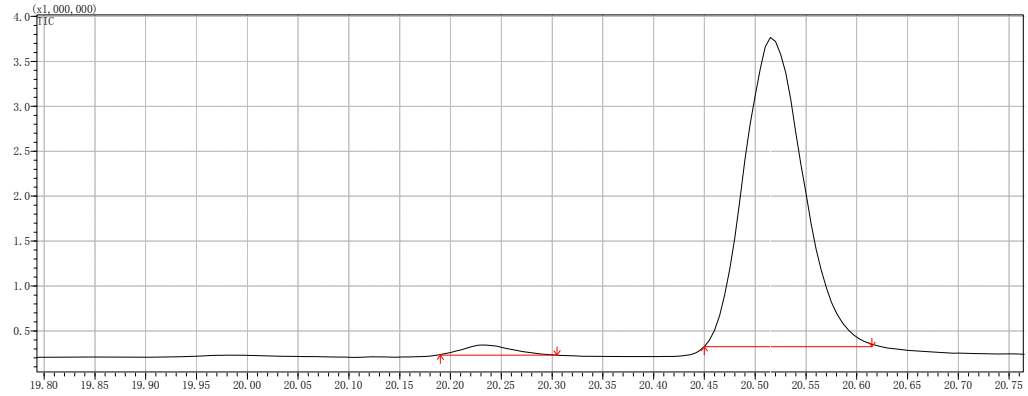

Peak area Peak area ratio

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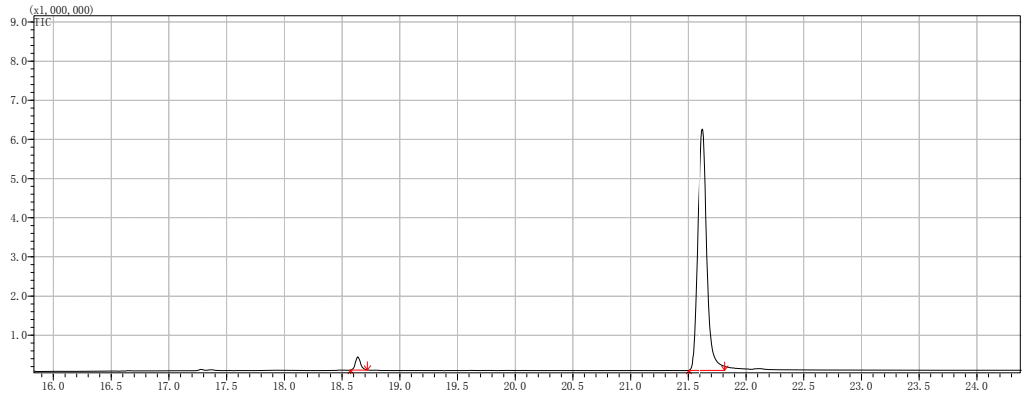
Product 14



Peak area Peak area ratio

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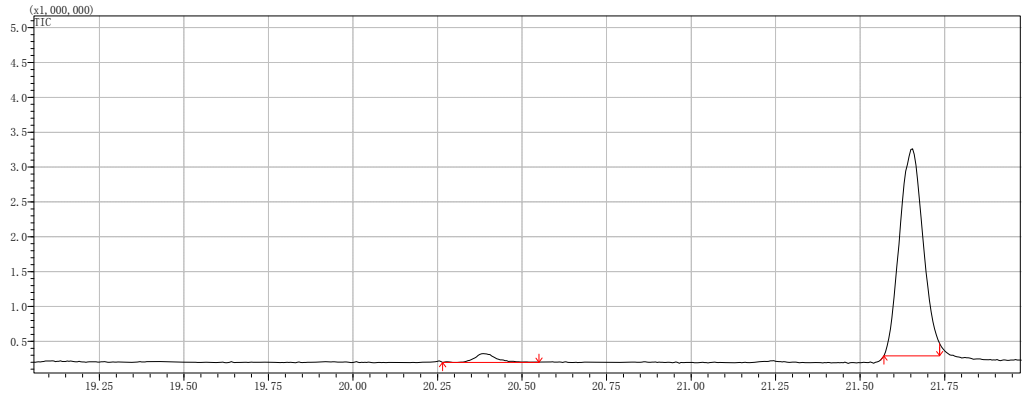
32859006 95.24

Product 15

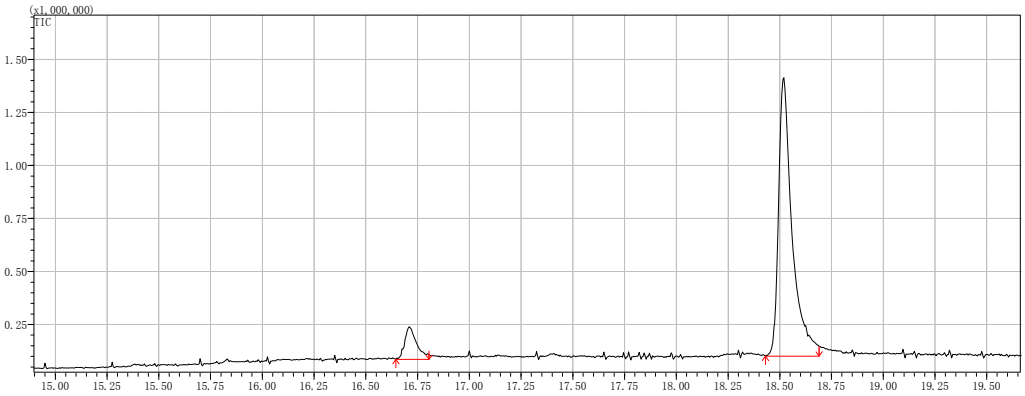


Peak area Peak area ratio

1024396 6.67

14341554 93.33

Product 16



Peak area	Peak area ratio
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5986800	92.59

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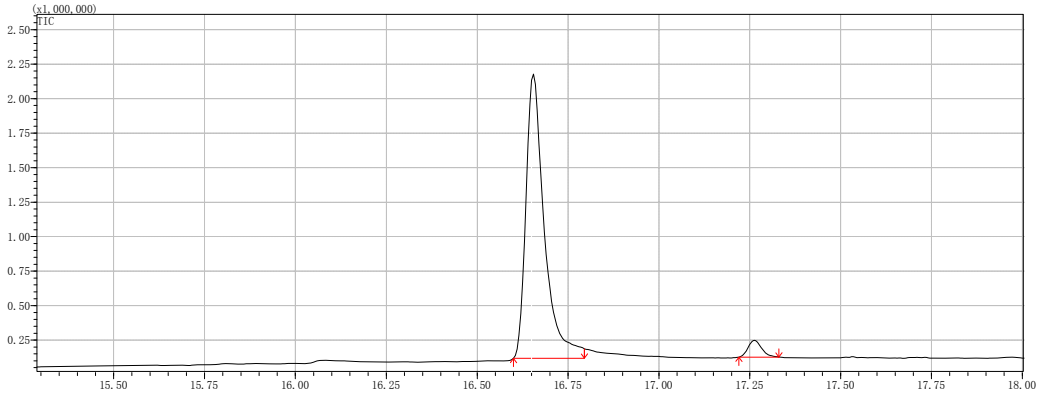

Peak area	Peak area ratio
7251472	93.75
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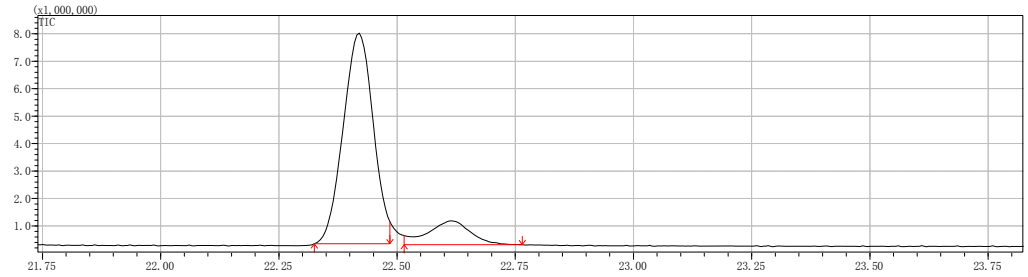
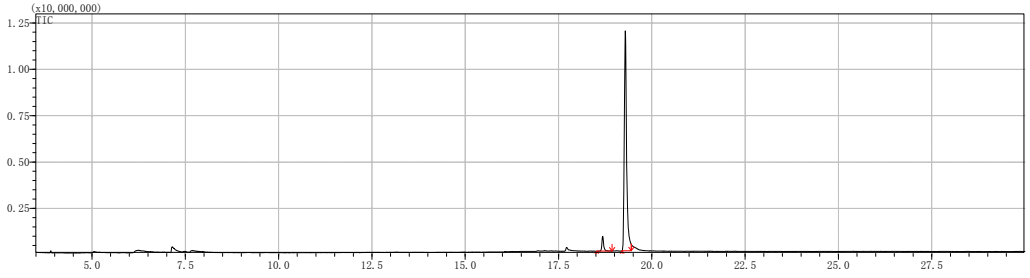
Product 18



Peak area	Peak area ratio
33948436	91.53
3143374	8.47

Product 19



Peak area	Peak area ratio
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51459484	93.75

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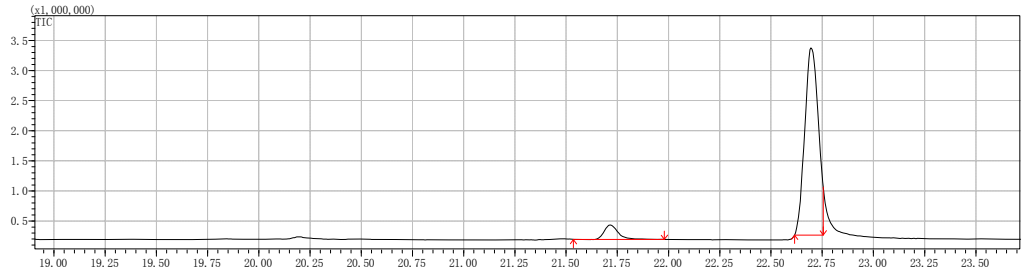

Peak area	Peak area ratio
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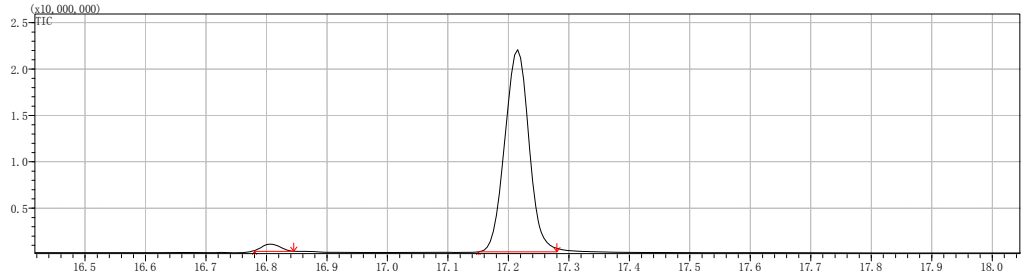
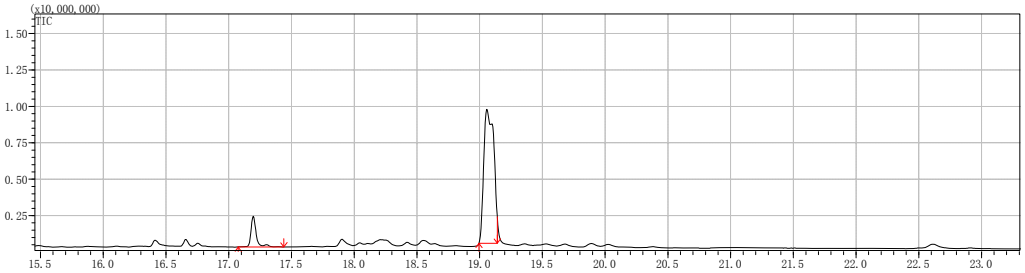
14344594	93.16

Product 21



Peak area	Peak area ratio
2628107	4.16
60446470	95.84

Product 22



Peak area	Peak area ratio
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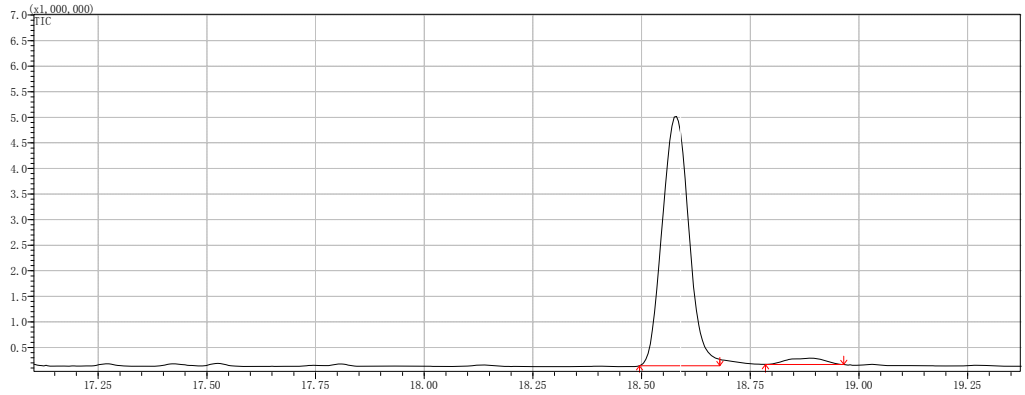
51303174	95.50

Product 23



Peak area Peak area ratio

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1221415 5.56

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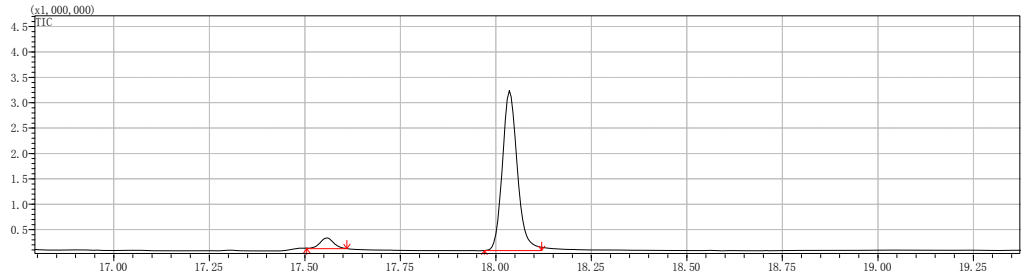
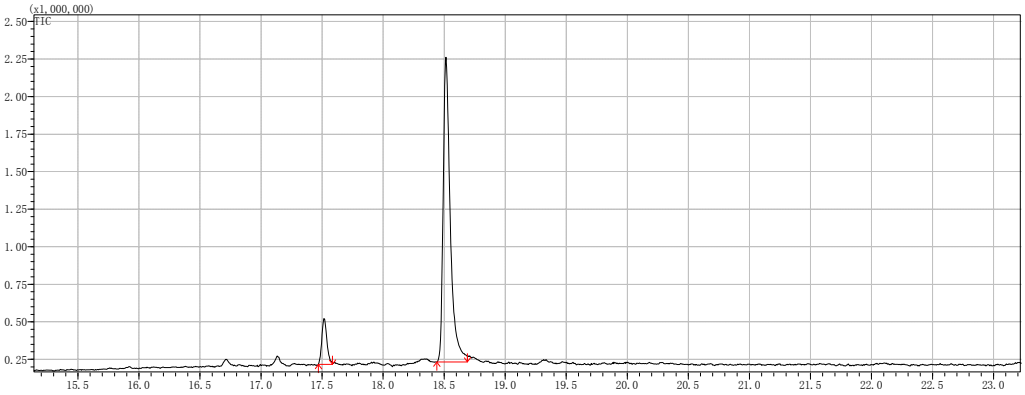


Peak area Peak area ratio

713717 7.69

8564609 92.31

Product 30

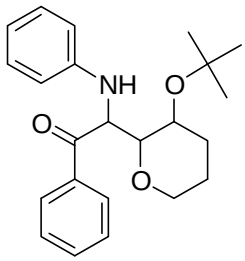


Peak area Peak area ratio

548137 6.25

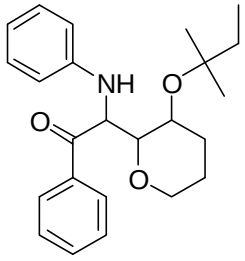
8222057 93.75

(B) Analytical datas



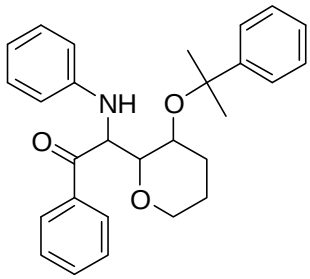
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-phenyl-2-(phenylamino)ethanone (4):

Yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.94 (t, *J* = 4.5 Hz, 2H), 7.54 (t, *J* = 7.5 Hz, 1H), 7.46 (t, *J* = 7.5 Hz, 2H), 7.18-7.15 (m, 2H), 6.87 (d, *J* = 8.0 Hz, 2H), 6.72 (t, *J* = 7.5 Hz, 1H), 5.16 (d, *J* = 7.0 Hz, 1H), 4.95 (s, 1H), 3.95-3.92 (m, 1H), 3.68-3.66 (m, 2H), 3.32-3.27 (m, 1H), 1.62-1.54 (m, 4H), 1.18 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 199.2, 147.6, 135.2, 133.2, 129.1, 128.8, 128.5, 117.9, 113.5, 80.7, 74.6, 68.2, 66.8, 56.4, 33.3, 29.2, 25.2; IR (KBr, cm^{-1}): 1689; LRMS (EI, 70 eV) *m/z* (%): 367 (M^+, 7), 262 (100), 206 (84); HRMS *m/z* (ESI) calcd for $C_{23}H_{30}NO_3$ ($[M+H]^+$) 368.2220, found 368.2231.



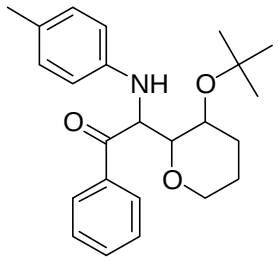
2-(3-(*tert*-Pentyloxy)tetrahydro-2*H*-pyran-2-yl)-1-phenyl-2-(phenylamino)ethanone (5):

Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.13 (d, *J* = 7.6 Hz, 2H), 7.60 (t, *J* = 6.4 Hz, 1H), 7.51 (t, *J* = 7.2 Hz, 2H), 7.08 (t, *J* = 7.2 Hz, 2H), 6.65 (t, *J* = 6.8 Hz, 1H), 6.59 (d, *J* = 7.6 Hz, 2H), 5.59 (s, 1H), 4.87 (t, *J* = 13.2 Hz, 1H), 3.89 (d, *J* = 10.8 Hz, 1H), 3.83 (t, *J* = 8.8 Hz, 1H), 3.62 (d, *J* = 8.8 Hz, 1H), 3.20 (t, *J* = 11.6 Hz, 1H), 1.70-1.49 (m, 6H), 1.19 (s, 6H), 0.98 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 199.3, 147.6, 135.1, 133.2, 129.1, 128.8, 128.6, 117.9, 113.5, 80.8, 76.8, 68.2, 66.5, 56.5, 35.8, 33.3, 25.3, 25.2, 8.9; IR (KBr, cm^{-1}): 1658; LRMS (EI, 70 eV) *m/z* (%): 381 (M^+, 6), 276 (78), 206 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_3$ ($[M+H]^+$) 382.2377, found 382.2387.



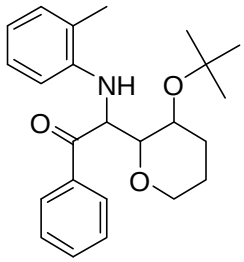
1-Phenyl-2-(phenylamino)-2-(3-(2-phenylpropan-2-yloxy)tetrahydro-2*H*-pyran-2-yl)ethanone (6):

Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.13 (d, *J* = 7.2 Hz, 2H), 7.55 (s, 1H), 7.50 (d, *J* = 10.4 Hz, 4H), 7.35-7.28 (m, 3H), 7.09 (d, *J* = 7.2 Hz, 2H), 6.67 (t, *J* = 9.2 Hz, 1H), 6.61 (d, *J* = 7.2 Hz, 2H), 5.67 (s, 1H), 4.87 (s, 1H), 3.84 (d, *J* = 10.8 Hz, 2H), 3.69 (d, *J* = 8.8 Hz, 1H), 3.16 (t, *J* = 11.6 Hz, 1H), 1.62 (s, 6H), 1.61-1.43 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 199.3, 147.6, 147.5, 135.1, 133.3, 129.2, 128.8, 128.6, 128.0, 127.0, 125.5, 117.9, 113.6, 80.7, 77.2, 68.2, 67.6, 56.6, 32.5, 27.1, 25.0; IR (KBr, cm^{-1}): 1640; LRMS (EI, 70 eV) *m/z* (%): 429 (M^+, 2), 324 (21), 206 (100); HRMS *m/z* (ESI) calcd for $C_{28}H_{32}NO_3$ ($[M+H]^+$) 430.2377, found 430.2387.



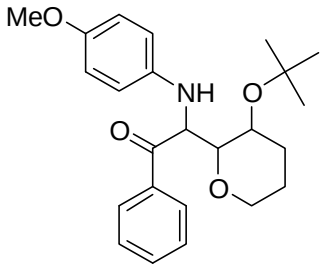
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-phenyl-2-(*p*-tolylamino)ethanone (8):

Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.12 (d, *J* = 7.2 Hz, 2H), 7.59-7.51 (m, 1H), 7.48 (t, *J* = 7.2 Hz, 2H), 6.94-6.88 (m, 2H), 6.51 (d, *J* = 7.6 Hz, 2H), 5.56 (s, 1H), 4.03 (s, 1H), 3.87 (t, *J* = 14.0 Hz, 2H), 3.61-3.55 (m, 1H), 3.18 (t, *J* = 11.6 Hz, 1H), 2.17 (s, 3H), 1.70-1.49 (m, 4H), 1.28 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 199.4, 145.3, 135.2, 133.2, 129.6, 128.7, 128.5, 126.9, 113.5, 80.7, 74.5, 68.2, 66.8, 56.6, 33.3, 29.2, 25.2, 20.4; IR (KBr, cm^{-1}): 1667; LRMS (EI, 70 eV) *m/z* (%): 381 (M^+, 9), 276 (100), 149 (15); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_3$ ($[M+H]^+$) 382.2377, found 382.2374.



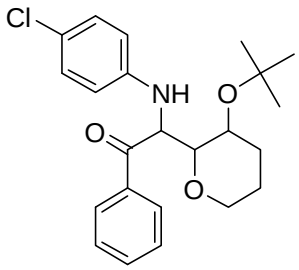
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-phenyl-2-(*o*-tolylamino)ethanone (9):

Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.92 (d, *J* = 7.2 Hz, 2H), 7.56 (s, 1H), 7.48 (d, *J* = 7.2 Hz, 2H), 7.12-7.05 (m, 3H), 6.68 (t, *J* = 6.4 Hz, 1H), 5.04 (s, 1H), 4.06-3.91 (m, 2H), 3.72 (s, 2H), 3.35 (t, *J* = 11.2 Hz, 1H), 2.33 (s, 3H), 1.61-1.47 (m, 4H), 1.20 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.1, 146.7, 136.5, 132.7, 130.0, 128.6, 128.4, 127.1, 123.1, 117.7, 112.2, 83.0, 74.5, 68.4, 67.6, 64.0, 33.2, 29.2, 24.9, 17.8; IR (KBr, cm^{-1}): 1679; LRMS (EI, 70 eV) *m/z* (%): 381 (M^+, 7), 276 (89), 132 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_3$ ($[M+H]^+$) 382.2377, found 382.2379.



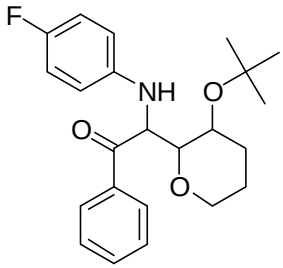
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-methoxyphenylamino)-1-phenylethanone (10):

Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.12 (d, *J* = 7.6 Hz, 2H), 7.59 (t, *J* = 6.8 Hz, 1H), 7.50 (t, *J* = 7.2 Hz, 2H), 6.68 (d, *J* = 8.4 Hz, 2H), 6.54 (d, *J* = 8.0 Hz, 2H), 5.51 (s, 1H), 3.88 (t, *J* = 9.2 Hz, 2H), 3.68 (s, 3H), 3.58 (d, *J* = 9.2 Hz, 1H), 3.50 (s, 1H), 3.18 (t, *J* = 11.6 Hz, 1H), 1.74-1.66 (m, 4H), 1.28 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 199.6, 152.2, 141.7, 135.2, 133.2, 128.8, 128.5, 114.7, 114.6, 80.8, 74.5, 68.2, 66.8, 57.1, 55.6, 33.3, 29.2, 25.2; IR (KBr, cm^{-1}): 1655; LRMS (EI, 70 eV) *m/z* (%): 397 (M^+, 2), 292 (99), 236 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_4$ ($[M+H]^+$) 398.2326, found 398.2298.



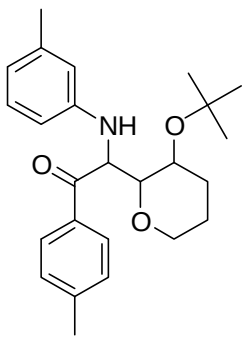
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-chlorophenylamino)-1-phenylethanone (11):

Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.11 (d, *J* = 7.6 Hz, 2H), 7.61 (t, *J* = 6.4 Hz, 1H), 7.51 (t, *J* = 5.2 Hz, 2H), 7.02 (d, *J* = 7.6 Hz, 2H), 6.49 (d, *J* = 7.6 Hz, 2H), 5.52 (s, 1H), 4.90 (s, 1H), 3.88 (d, *J* = 5.6 Hz, 1H), 3.78 (d, *J* = 12.8 Hz, 1H), 3.61 (d, *J* = 4.4 Hz, 1H), 3.20 (t, *J* = 11.6 Hz, 1H), 1.70-1.52 (m, 4H), 1.26 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.8, 146.2, 134.9, 133.4, 129.0, 128.9, 128.5, 122.4, 114.5, 80.6, 74.6, 68.3, 66.8, 56.6, 33.2, 29.1, 25.1; IR (KBr, cm^{-1}): 1645; LRMS (EI, 70 eV) *m/z* (%): 403 (M^++2, 3), 401 (M^+, 9), 296 (67), 57 (100); HRMS *m/z* (ESI) calcd for $C_{23}H_{29}ClNO_3$ ($[M+H]^+$) 402.1830, found 402.1811.



2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-fluorophenylamino)-1-phenylethanone (12):

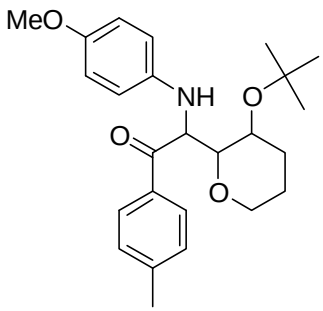
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.94 (d, *J* = 7.6 Hz, 2H), 7.54 (d, *J* = 7.2 Hz, 1H), 7.47 (t, *J* = 7.2 Hz, 2H), 6.89-6.83 (m, 4H), 4.85 (s, 1H), 3.94 (d, *J* = 10.8 Hz, 1H), 3.76-3.70 (m, 1H), 3.66 (s, 2H), 3.32 (t, *J* = 11.6 Hz, 1H), 1.35-1.23 (m, 4H), 1.18 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.2, 157.4, 155.1, 144.6, 136.5, 132.7, 128.6, 128.5, 115.6, 115.5 (2), 115.4, 82.6, 74.6, 68.4, 68.1, 64.9, 33.3, 29.2, 24.9; IR (KBr, cm^{-1}): 1694; LRMS (EI, 70 eV) *m/z* (%): 385 (M^+, 3), 262 (100), 228 (48); HRMS *m/z* (ESI) calcd for $C_{23}H_{29}FNO_3$ ($[M+H]^+$) 386.2126, found 386.2137.



2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-*p*-tolyl-2-(*m*-tolylamino)ethanone (13):

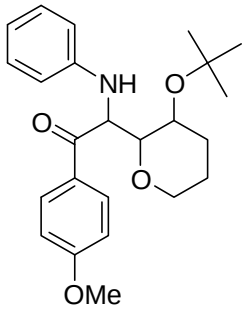
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.86 (d, *J* = 7.6 Hz, 2H), 7.26 (s, 1H), 7.24 (s, 1H), 7.05 (t, *J* = 7.2 Hz, 1H), 6.69

(d, *J* = 7.2 Hz, 2H), 6.54 (d, *J* = 7.2 Hz, 1H), 4.94 (d, *J* = 6.8 Hz, 2H), 3.94 (d, *J* = 11.6 Hz, 1H), 3.71 (t, *J* = 13.6 Hz, 2H), 3.31 (t, *J* = 11.2 Hz, 1H), 2.41 (s, 3H), 2.27 (s, 3H), 1.62-1.55 (m, 4H), 1.18 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 197.8, 148.2, 143.4, 138.8, 134.0, 129.2, 129.0, 128.6, 118.9, 115.3, 111.5, 82.8, 74.4, 68.4, 68.1, 63.6, 33.3, 29.2, 25.4, 21.6 (2); IR (KBr, cm^{-1}): 1661; LRMS (EI, 70 eV) *m/z* (%): 395 (M^+, 7), 289 (42), 276 (100); HRMS *m/z* (ESI) calcd for $C_{25}H_{34}NO_3$ ($[M+H]^+$) 396.2533, found 396.2546.



2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-methoxyphenylamino)-1-*p*-tolylethanone (14):

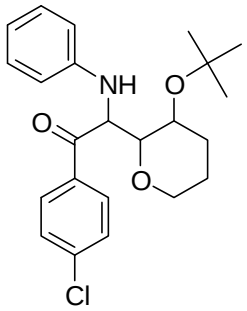
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.02 (d, *J* = 7.2 Hz, 2H), 7.29 (d, *J* = 8.4 Hz, 2H), 6.67 (d, *J* = 7.6 Hz, 2H), 6.54 (d, *J* = 8.0 Hz, 2H), 5.49 (s, 1H), 3.87 (t, *J* = 14.0 Hz, 3H), 3.68 (s, 3H), 3.57 (d, *J* = 8.8 Hz, 1H), 3.18 (t, *J* = 11.6 Hz, 1H), 2.43 (s, 3H), 1.51-1.39 (m, 4H), 1.28 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 197.8, 148.2, 143.4, 138.8, 129.2, 129.0, 128.6, 118.9, 115.3, 82.8, 74.4, 68.3, 68.1, 62.9, 57.5, 33.3, 29.2, 25.4, 19.7; IR (KBr, cm^{-1}): 1667; LRMS (EI, 70 eV) *m/z* (%): 411 (M^+, 7), 292 (99), 289 (100); HRMS *m/z* (ESI) calcd for $C_{25}H_{34}NO_4$ ($[M+H]^+$) 412.2482, found 412.2490.



2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(4-methoxyphenyl)-2-(phenylamino)ethanone (15):

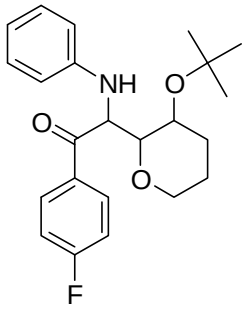
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.98 (d, *J* = 8.0 Hz, 2H), 7.16 (t, *J* = 7.2 Hz, 2H), 6.93 (d, *J* = 8.0 Hz, 2H), 6.85

(d, *J* = 7.6 Hz, 2H), 6.71 (t, *J* = 7.2 Hz, 1H), 4.90 (s, 1H), 3.95 (t, *J* = 12.8 Hz, 2H), 3.86 (s, 3H), 3.67 (s, 2H), 3.31 (t, *J* = 11.6 Hz, 1H), 1.66-1.52 (m, 4H), 1.18 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 196.5, 163.2, 148.2, 130.8, 129.3, 129.1, 117.9, 114.3, 113.7, 82.8, 74.4, 68.4, 68.3, 63.5, 55.4, 33.3, 29.2, 24.9; IR (KBr, cm^{-1}): 1656; LRMS (EI, 70 eV) *m/z* (%): 397 (M^+, 9), 262 (100), 206 (88); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_4$ ($[M+H]^+$) 398.2326, found 398.2337.



2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(4-chlorophenyl)-2-(phenylamino)ethanone (16):

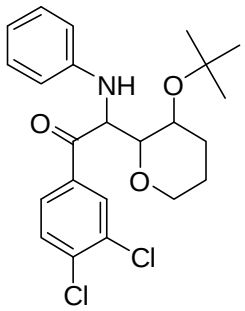
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.07 (d, *J* = 8.0 Hz, 2H), 7.47 (d, *J* = 8.0 Hz, 2H), 7.09 (d, *J* = 7.2 Hz, 2H), 6.66 (t, *J* = 7.2 Hz, 1H), 6.56 (d, *J* = 7.6 Hz, 2H), 4.83 (s, 1H), 3.92-3.80 (m, 1H), 3.78 (t, *J* = 4.8 Hz, 1H), 3.56 (d, *J* = 8.8 Hz, 2H), 3.20 (t, *J* = 11.6 Hz, 1H), 1.72-1.62 (m, 4H), 1.26 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.3, 147.4, 139.7, 133.4, 130.0, 129.2, 129.1, 118.0, 113.4, 80.6, 74.6, 68.3, 66.8, 63.4, 33.2, 29.2, 25.1; IR (KBr, cm^{-1}): 1677; LRMS (EI, 70 eV) *m/z* (%): 403 (M^++2, 1), 401 (M^+, 3), 262 (100), 206 (94); HRMS *m/z* (ESI) calcd for $C_{23}H_{29}ClNO_3$ ($[M+H]^+$) 402.1830, found 402.1819.



2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(4-fluorophenyl)-2-(phenylamino)ethanone (17):

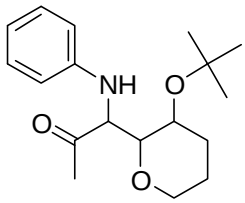
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.02 (t, *J* = 6.4 Hz, 2H), 7.18-7.11 (m, 4H), 6.82 (d, *J* = 7.6 Hz, 2H), 6.73 (t, *J* =

7.2 Hz, 1H), 4.87 (s, 1H), 3.92 (d, *J* = 11.6 Hz, 1H), 3.76-3.62 (m, 3H), 3.29 (t, *J* = 11.2 Hz, 1H), 1.67-1.57 (m, 4H), 1.18 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 197.0, 147.9, 131.2, 131.1, 129.2, 118.1, 115.7, 115.5, 114.3, 82.5, 74.6, 68.5, 68.4, 64.1, 33.3, 29.1, 24.9; IR (KBr, cm^{-1}): 1664; LRMS (EI, 70 eV) *m/z* (%): 385 (M^+, 4), 312 (28), 262 (100); HRMS *m/z* (ESI) calcd for $C_{23}H_{29}FNO_3$ ($[M+H]^+$) 386.2126, found 386.2138.



2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(3,4-dichlorophenyl)-2-(phenylamino)ethanone (18):

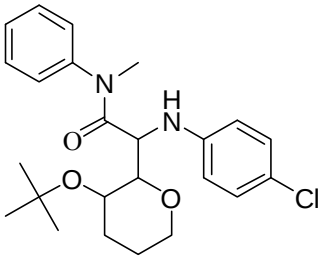
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.08 (s, 1H), 7.82 (d, *J* = 8.4 Hz, 1H), 7.52 (d, *J* = 8.0 Hz, 1H), 7.16 (t, *J* = 7.6 Hz, 2H), 6.79-6.72 (m, 3H), 4.77 (s, 1H), 3.90 (d, *J* = 9.6 Hz, 2H), 3.67 (d, *J* = 8.0 Hz, 1H), 3.60 (d, *J* = 8.8 Hz, 1H), 3.28 (t, *J* = 11.6 Hz, 1H), 1.63-1.55 (m, 4H), 1.18 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 197.0, 147.5, 137.1, 136.2, 133.0, 130.5, 129.2, 127.6, 125.9, 118.4, 114.2, 82.3, 74.7, 68.9, 68.5, 64.6, 33.3, 29.1, 24.9; IR (KBr, cm^{-1}): 1683; LRMS (EI, 70 eV) *m/z* (%): 437 (M^++2, 2), 435 (M^+, 3), 278 (37), 262 (100); HRMS *m/z* (ESI) calcd for $C_{23}H_{28}Cl_2NO_3$ ($[M+H]^+$) 436.1441, found 436.1455.



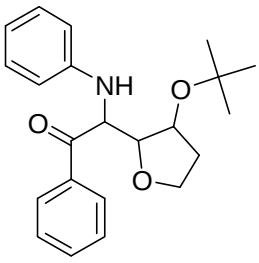
1-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(phenylamino)propan-2-one (19):

Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.16 (t, *J* = 7.2 Hz, 2H), 6.74-6.67 (m, 3H), 4.93 (s, 1H), 4.06 (s, 1H), 3.94 (d, *J* = 10.4 Hz, 1H), 3.65 (t, *J* = 4.4 Hz, 1H), 3.51 (d, *J* = 8.8 Hz, 1H), 3.35 (t, *J* = 10.8 Hz, 1H), 2.19 (s, 3H), 1.67-1.44 (m, 4H), 1.21 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 208.6, 147.5, 129.3,

118.0, 113.6, 82.4, 74.6, 68.4, 68.3, 66.1, 33.5, 29.1, 27.5, 25.0; IR (KBr, cm^{-1}): 1587; LRMS (EI, 70 eV) *m/z* (%): 305 (M^+, 6), 206 (53), 106 (100); HRMS *m/z* (ESI) calcd for $C_{18}H_{28}NO_3$ ($[M+H]^+$) 306.2064, found 306.2095.

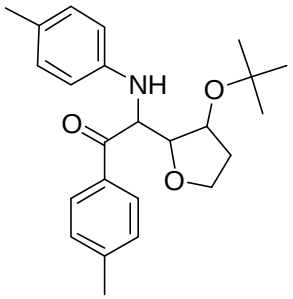


2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-chlorophenylamino)-*N*-methyl-*N*-phenylacetamide (20): Yellow oil; ^1H NMR (400 MHz, $CDCl_3$) δ: 8.10 (d, *J* = 7.2 Hz, 1H), 7.47 (s, 3H), 7.22 (t, *J* = 8.4 Hz, 2H), 7.01 (d, *J* = 7.2 Hz, 2H), 6.40 (d, *J* = 8.0 Hz, 1H), 4.31 (s, 1H), 3.93 (d, *J* = 5.2 Hz, 1H), 3.46 (d, *J* = 9.6 Hz, 1H), 3.39 (s, 1H), 3.22 (t, *J* = 7.6 Hz, 2H), 3.17 (s, 3H), 1.26-1.12 (m, 4H), 0.74 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 171.8, 146.3, 143.0, 134.5, 130.5, 128.9(2), 127.7, 114.9, 81.2, 73.5, 68.2, 65.9, 52.5, 38.4, 33.2, 28.7, 25.1; IR (KBr, cm^{-1}): 1670; LRMS (EI, 70 eV) *m/z* (%): 432 (M^++2, 4), 430 (M^+, 12), 296 (91), 146 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}ClN_2O_3$ ($[M+H]^+$) 431.2086, found 431.2095.



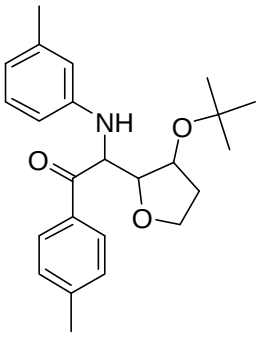
2-(3-*tert*-Butoxytetrahydrofuran-2-yl)-1-phenyl-2-(phenylamino)ethanone (21): White solid, mp 168.6-170.4 ^oC (uncorrected); ^1H NMR (400 MHz, $CDCl_3$) δ: 7.93 (d, *J* = 7.2 Hz, 2H), 7.50 (d, *J* = 6.8 Hz, 1H), 7.41 (t, *J* = 9.6 Hz, 2H), 7.10 (t, *J* = 6.8 Hz, 2H), 6.79 (d, *J* = 5.6 Hz, 2H), 6.66 (t, *J* = 6.8 Hz, 1H), 5.06 (s, 1H), 4.20-4.08 (m, 2H), 3.92-3.79 (m, 3H), 2.06-1.97 (m, 1H), 1.74-1.61 (m, 1H), 1.01 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 199.0, 147.9, 135.5, 133.6, 129.2, 128.7, 128.6, 118.3, 114.3, 86.6, 74.4, 72.4, 67.7, 62.2,

35.7, 28.4; IR (KBr, cm^{-1}): 1668; LRMS (EI, 70 eV) *m/z* (%): 353 (M^+, 7), 248 (58), 118 (100); HRMS *m/z* (ESI) calcd for $C_{22}H_{28}NO_3$ ($[M+H]^+$) 354.2064, found 354.2079.



2-(3-*tert*-Butoxytetrahydrofuran-2-yl)-1-*p*-tolyl-2-(*p*-tolylamino)ethanone (22):

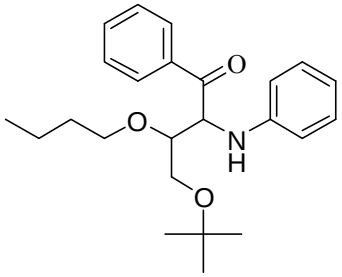
White solid, mp 178.3-180.3 ^oC (uncorrected); ^1H NMR (400 MHz, $CDCl_3$) δ: 7.82 (d, *J* = 7.2 Hz, 2H), 7.19 (d, *J* = 7.6 Hz, 2H), 6.89 (d, *J* = 7.6 Hz, 2H), 6.70 (d, *J* = 7.6 Hz, 2H), 4.97 (s, 1H), 4.13 (t, *J* = 6.0 Hz, 2H), 3.85-3.78 (m, 3H), 2.33 (s, 3H), 2.14 (s, 3H), 1.79-1.68 (m, 2H), 1.00 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.6, 145.7, 144.5, 132.9, 131.0, 129.6, 129.4, 128.7, 114.4, 86.8, 74.3, 72.4, 67.7, 62.5, 35.8, 28.4, 21.7, 20.3; IR (KBr, cm^{-1}): 1656; LRMS (EI, 70 eV) *m/z* (%): 381 (M^+, 5), 262 (51), 132 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_3$ ($[M+H]^+$) 382.2362, found 382.2378.



2-(3-*tert*-Butoxytetrahydrofuran-2-yl)-1-*p*-tolyl-2-(*m*-tolylamino)ethanone (23):

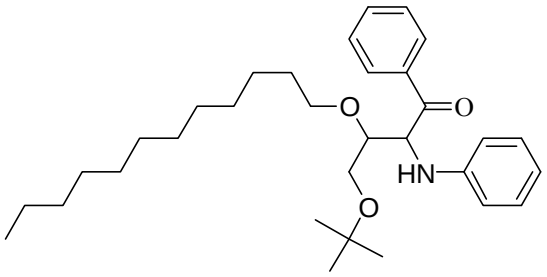
White solid, mp 177.5-179.4 ^oC (uncorrected); ^1H NMR (400 MHz, $CDCl_3$) δ: 7.90 (d, *J* = 7.6 Hz, 2H), 7.27 (d, *J* = 8.0 Hz, 2H), 7.06 (t, *J* = 7.2 Hz, 1H), 6.68 (d, *J* = 9.2 Hz, 2H), 6.56 (d, *J* = 7.2 Hz, 1H), 5.10 (d, *J* = 13.2 Hz, 1H), 5.03 (s, 1H), 4.19 (s, 2H), 3.93-3.86 (m, 2H), 2.42 (s, 3H), 2.27 (s, 3H), 2.06 (t, *J* = 6.4 Hz, 1H), 1.76-1.70 (m, 1H), 1.07 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.5, 148.1, 144.6, 139.0, 132.9, 129.4, 129.1, 128.8, 119.1, 115.2, 111.4, 86.8, 74.4, 72.4, 67.8, 62.2, 35.8, 28.4, 21.7, 21.6; IR (KBr,

cm^{-1}): 1673; LRMS (EI, 70 eV) *m/z* (%): 381 (M^+, 9), 239 (22), 132 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_3$ ($[M+H]^+$) 382.2362, found 382.2376.



4-*tert*-Butoxy-3-butoxy-1-phenyl-2-(phenylamino)butan-1-one (24):

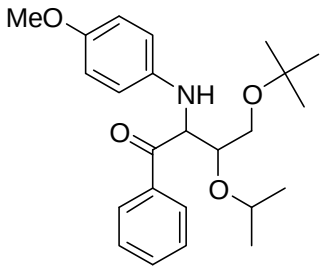
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.93 (d, *J* = 7.6 Hz, 2H), 7.47 (d, *J* = 7.2 Hz, 1H), 7.38 (t, *J* = 7.2 Hz, 2H), 7.07 (t, *J* = 7.2 Hz, 2H), 6.71 (t, *J* = 6.4 Hz, 2H), 6.63 (t, *J* = 7.6 Hz, 1H), 5.19 (s, 1H), 4.73 (s, 1H), 3.66-3.62 (m, 1H), 3.50-3.41 (m, 4H), 1.31-1.26 (m, 4H), 1.10 (s, 9H), 0.72 (t, *J* = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 200.9, 147.4, 137.2, 133.0, 129.2, 128.6, 128.4, 118.0, 114.0, 81.2, 75.3, 70.6, 60.6, 59.2, 31.8, 27.4, 19.1, 13.7; IR (KBr, cm^{-1}): 1652; LRMS (EI, 70 eV) *m/z* (%): 383 (M^+, 5), 278 (70), 211 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{34}NO_3$ ($[M+H]^+$) 384.2520, found 384.2516.



4-*tert*-Butoxy-3-(dodecyloxy)-1-phenyl-2-(phenylamino)butan-1-one (25):

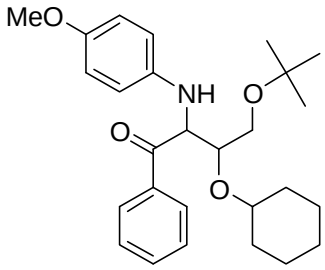
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.00 (d, *J* = 7.2 Hz, 2H), 7.51 (d, *J* = 6.8 Hz, 1H), 7.42 (t, *J* = 6.8 Hz, 2H), 7.05 (t, *J* = 7.6 Hz, 2H), 6.65-6.59 (m, 3H), 5.28 (d, *J* = 4.0 Hz, 1H), 4.72 (d, *J* = 4.0 Hz, 1H), 3.66-3.50 (m, 3H), 3.44 (d, *J* = 2.0 Hz, 1H), 3.32 (t, *J* = 7.6 Hz, 1H), 1.38-1.15 (m, 20H), 1.13 (s, 9H), 0.80 (t, *J* = 2.8 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 199.7, 148.1, 135.4, 133.2, 129.1, 128.7, 128.6, 117.9, 114.0, 79.2, 73.5, 71.6, 60.5, 58.9, 31.9, 29.9, 29.6, 29.5, 29.3, 27.6,

25.8, 22.7, 14.1; IR (KBr, cm^{-1}): 1658; LRMS (EI, 70 eV) *m/z* (%): 495 (M^+, 3), 390 (94), 211 (100); HRMS *m/z* (ESI) calcd for $C_{32}H_{50}NO_3$ ($[M+H]^+$) 496.3781, found 496.3793.



4-*tert*-Butoxy-3-isopropoxy-2-(4-methoxyphenylamino)-1-phenylbutan-1-one (26):

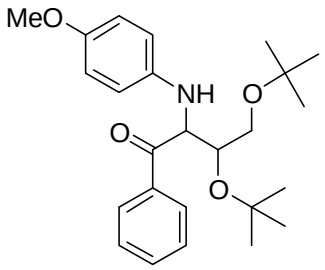
Yellow oil; ^1H NMR (400 MHz, $CDCl_3$) δ: 7.70 (d, *J* = 7.6 Hz, 2H), 7.40 (t, *J* = 7.2 Hz, 1H), 7.27 (t, *J* = 7.2 Hz, 2H), 6.79 (d, *J* = 8.0 Hz, 2H), 6.60 (d, *J* = 8.0 Hz, 2H), 4.58 (t, *J* = 5.6 Hz, 1H), 3.86 (t, *J* = 8.0 Hz, 3H), 3.80-3.73 (m, 1H), 3.64 (s, 3H), 1.16 (s, 6H), 1.14 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.6, 169.3, 157.0, 141.8, 133.6, 129.3, 128.2, 122.2, 113.8, 79.6, 77.2, 73.3, 72.5, 64.0, 55.2, 27.4, 22.3, 22.0; IR (KBr, cm^{-1}): 1656; LRMS (EI, 70 eV) *m/z* (%): 399 (M^+, 1), 134 (69), 57 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{34}NO_4$ ($[M+H]^+$) 400.2481, found 400.2492.



4-*tert*-Butoxy-3-(cyclohexyloxy)-2-(4-methoxyphenylamino)-1-phenylbutan-1-one (27):

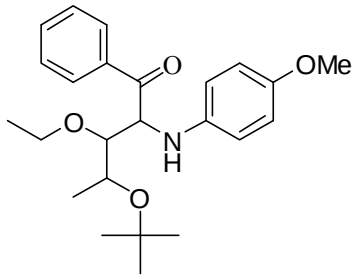
Yellow oil; ^1H NMR (400 MHz, $CDCl_3$) δ: 7.70 (d, *J* = 7.6 Hz, 2H), 7.40 (t, *J* = 6.8 Hz, 1H), 7.27 (t, *J* = 6.8 Hz, 2H), 6.79 (d, *J* = 7.6 Hz, 2H), 6.60 (d, *J* = 7.6 Hz, 2H), 4.64 (t, *J* = 5.6 Hz, 1H), 3.89-3.83 (m, 2H), 3.76 (t, *J* = 7.6 Hz, 1H), 3.65 (s, 3H), 3.52 (s, 1H), 2.30-2.19 (m, 1H), 1.66-1.55 (m, 6H), 1.49-1.36 (m, 4H), 1.14 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.7, 169.3, 157.0, 141.8, 133.5, 129.3, 128.2, 122.2, 113.8, 79.3, 78.3, 77.2, 73.3, 64.0, 55.2, 32.3, 32.2, 29.7, 27.4, 25.6, 24.1; IR (KBr, cm^{-1}): 1668; LRMS (EI, 70 eV)

m/z (%): 439 (M^+, 1), 265 (19), 134 (100); HRMS *m/z* (ESI) calcd for $C_{27}H_{38}NO_4$ ($[M+H]^+$) 440.2789, found 440.2781.



3,4-*di-tert*-Butoxy-2-(4-methoxyphenylamino)-1-phenylbutan-1-one (28):

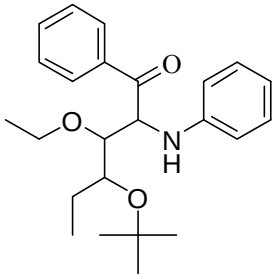
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.67 (d, *J* = 7.6 Hz, 2H), 7.25 (t, *J* = 8.0 Hz, 3H), 6.79 (d, *J* = 7.6 Hz, 2H), 6.59 (d, *J* = 8.0 Hz, 2H), 4.74 (t, *J* = 6.4 Hz, 1H), 3.84 (s, 1H), 3.78 (t, *J* = 7.6 Hz, 1H), 3.72 (s, 1H), 3.64 (s, 3H), 3.33 (t, *J* = 12.0 Hz, 1H), 1.25 (s, 6H), 1.21 (s, 6H), 1.19 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.5, 169.9, 156.9, 133.4, 129.5, 128.5, 128.0, 122.1, 113.8, 75.4, 74.7, 73.3, 64.6, 60.8, 55.2, 28.1, 27.2; IR (KBr, cm^{-1}): 1667; LRMS (EI, 70 eV) *m/z* (%): 413 (M^+, 6), 308 (72), 57 (100); HRMS *m/z* (ESI) calcd for $C_{25}H_{36}NO_4$ ($[M+H]^+$) 414.2636, found 414.2642.



4-*tert*-Butoxy-3-ethoxy-2-(4-methoxyphenylamino)-1-phenylpentan-1-one (29):

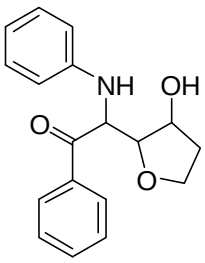
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.07 (d, *J* = 7.6 Hz, 1H), 7.55 (t, *J* = 6.8 Hz, 2H), 7.44 (t, *J* = 6.8 Hz, 3H), 6.61 (d, *J* = 8.0 Hz, 2H), 6.46 (d, *J* = 7.6 Hz, 1H), 4.08-4.03 (m, 1H), 3.92 (t, *J* = 7.6 Hz, 1H), 3.76 (s, 1H), 3.62 (s, 3H), 3.44 (d, *J* = 8.8 Hz, 1H), 3.30-3.25 (m, 2H), 1.19 (s, 9H), 1.11 (d, *J* = 9.6 Hz, 3H), 1.02 (t, *J* = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 201.0, 152.1, 141.7, 133.3, 131.4, 128.9, 128.5, 121.5, 114.7, 84.2, 74.5, 68.8, 68.0, 57.8, 55.6, 29.2, 20.3, 15.5; IR (KBr, cm^{-1}): 1683; LRMS (EI, 70 eV) *m/z*

(%): 399 (M^+, 8), 294 (38), 194 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{34}NO_4$ ($[M+H]^+$) 400.2482, found 400.2490.



4-*tert*-Butoxy-3-ethoxy-1-phenyl-2-(phenylamino)hexan-1-one (30):

Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.07 (d, *J* = 7.6 Hz, 1H), 7.55 (t, *J* = 6.8 Hz, 2H), 7.44 (t, *J* = 7.2 Hz, 3H), 6.86 (d, *J* = 8.0 Hz, 1H), 6.63-6.56 (m, 2H), 6.47 (d, *J* = 7.6 Hz, 1H), 4.08-4.03 (m, 1H), 3.92 (t, *J* = 7.2 Hz, 1H), 3.76 (s, 1H), 3.44 (d, *J* = 8.8 Hz, 1H), 3.30-3.25 (m, 2H), 1.28-1.24 (m, 2H), 1.19 (s, 9H), 1.11 (t, *J* = 8.0 Hz, 3H), 1.02 (t, *J* = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 201.0, 141.7, 133.3, 131.5, 128.9, 128.5, 121.5, 114.7 (2), 84.2, 74.6, 68.8, 68.1, 57.8, 29.2, 20.3, 15.5, 14.2; IR (KBr, cm^{-1}): 1660; LRMS (EI, 70 eV) *m/z* (%): 383 (M^+, 3), 278 (24), 164 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{34}NO_3$ ($[M+H]^+$) 384.2512, found 384.2508.



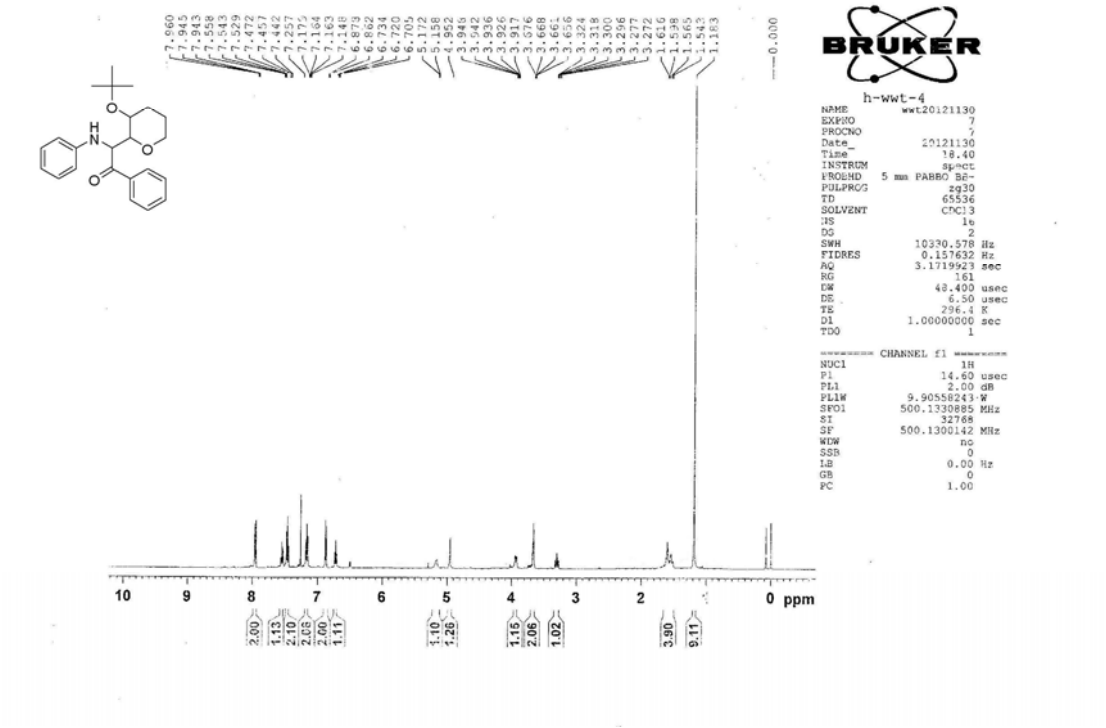
2-(3-Hydroxytetrahydrofuran-2-yl)-1-phenyl-2-(phenylamino)ethanone(33):

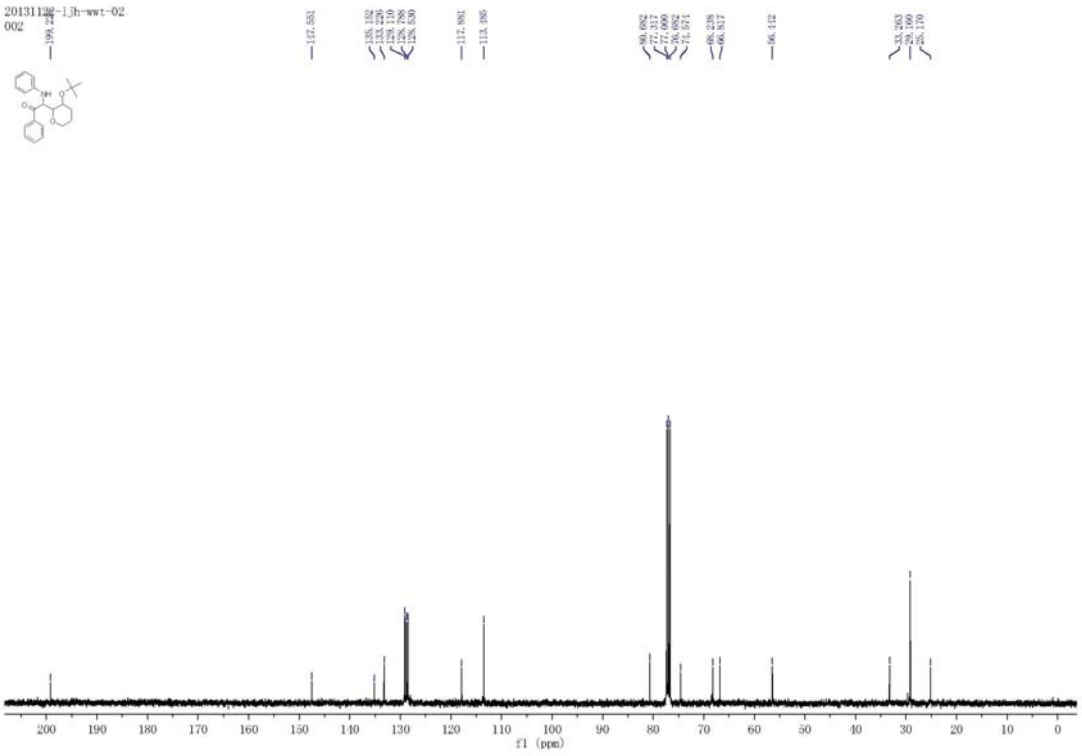
Yellow oil; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.01 (d, *J* = 7.2 Hz, 2H), 7.58 (d, *J* = 6.4 Hz, 1H), 7.48 (t, *J* = 6.8 Hz, 2H), 7.17 (t, *J* = 6.8 Hz, 2H), 6.87 (d, *J* = 7.6 Hz, 2H), 6.73 (t, *J* = 6.8 Hz, 1H), 5.12 (s, 1H), 4.66 (s, 1H), 4.30-4.16 (m, 2H), 3.99-3.81 (m, 3H), 2.14-2.03 (m, 1H), 1.83-1.70 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 199.0, 147.9, 135.4, 133.6, 129.2, 128.7, 128.6, 118.2, 114.2, 86.6, 74.4, 67.7, 62.2, 35.7; IR (KBr, cm^{-1}): 1662; LRMS (EI, 70 eV) *m/z* (%):

297 (M^+, 3), 192 (100), 92 (41); HRMS *m/z* (ESI) calcd for $C_{18}H_{20}NO_3$ ($[M+H]^+$) 298.1425, found 298.1431.

(C) Spectra

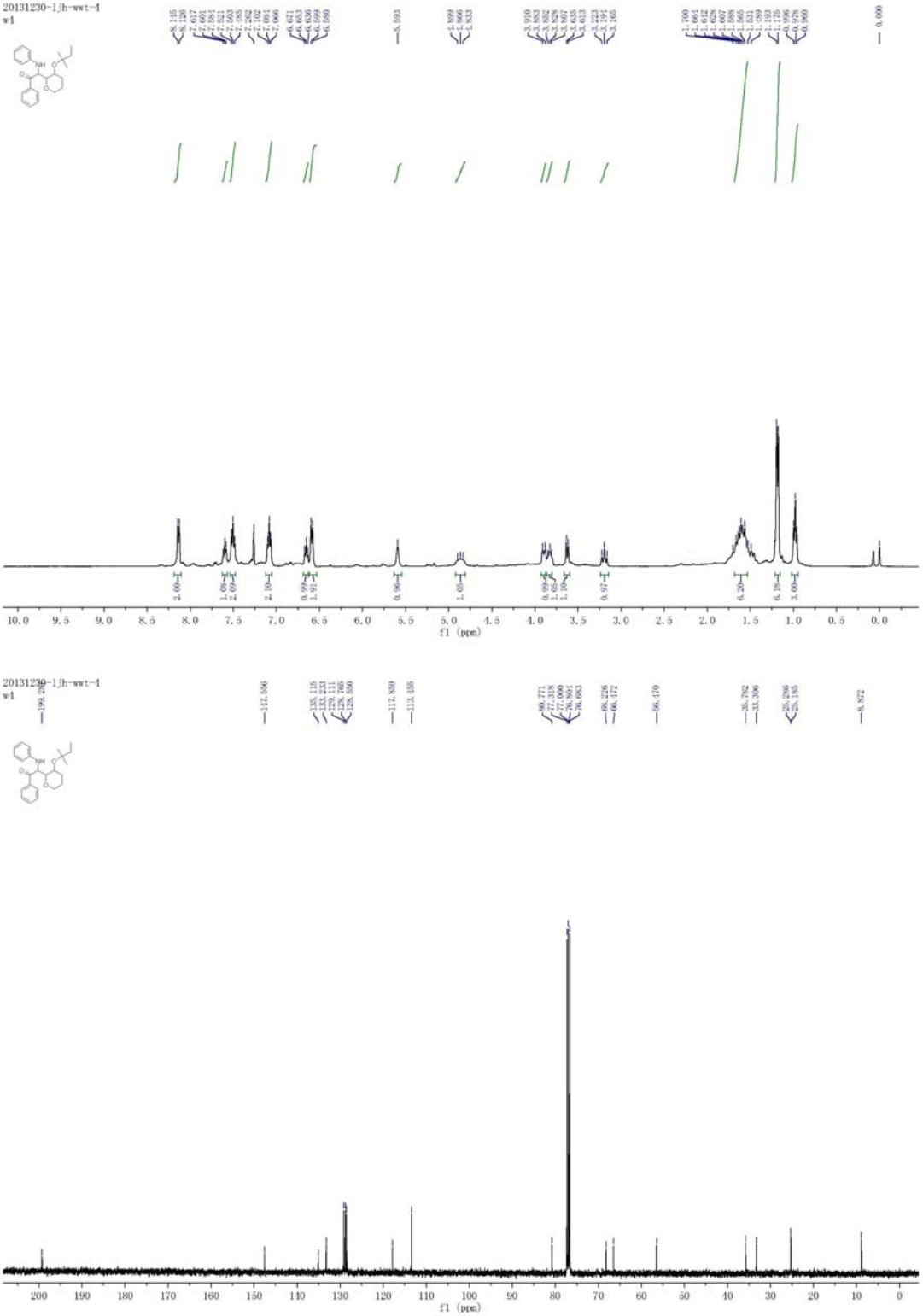
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-phenyl-2-(phenylamino)ethanone (4)



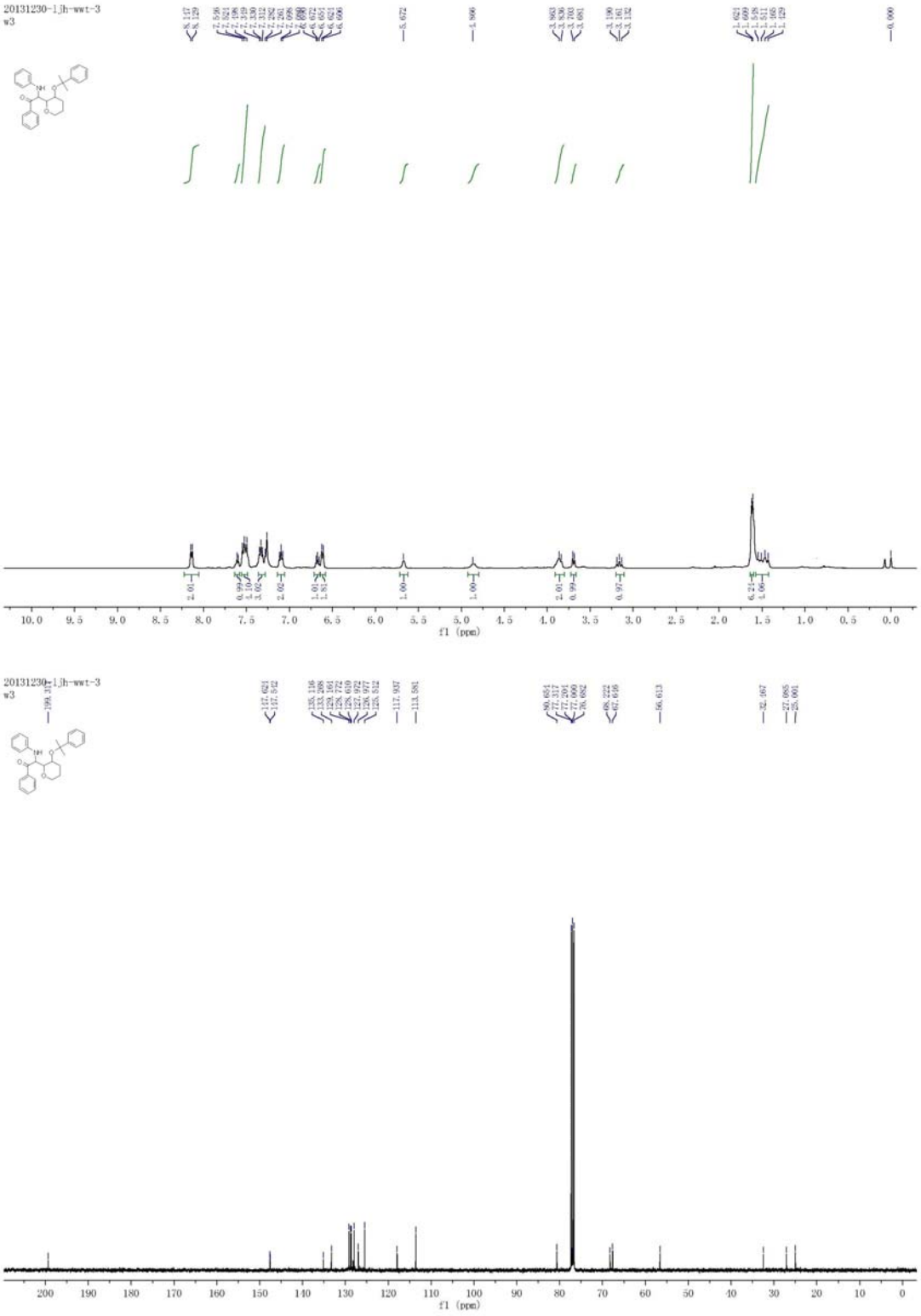


2-(3-(*tert*-Pentyloxy)tetrahydro-2*H*-pyran-2-yl)-1-phenyl-2-

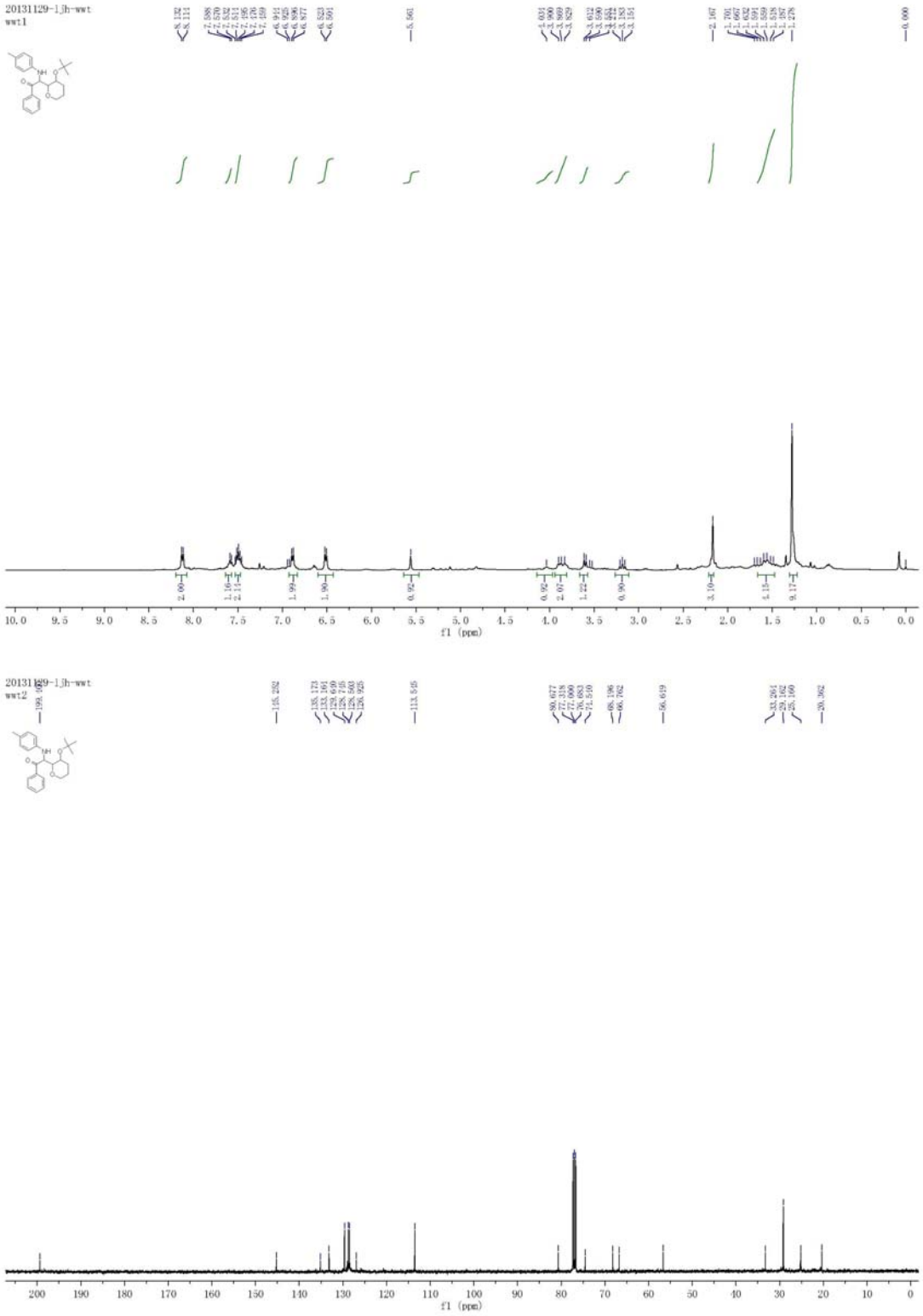
(phenylamino)ethanone (5)



1-Phenyl-2-(phenylamino)-2-(3-(2-phenylpropan-2-yloxy)tetrahydro-2*H*-pyran-2-yl)ethanone (6)

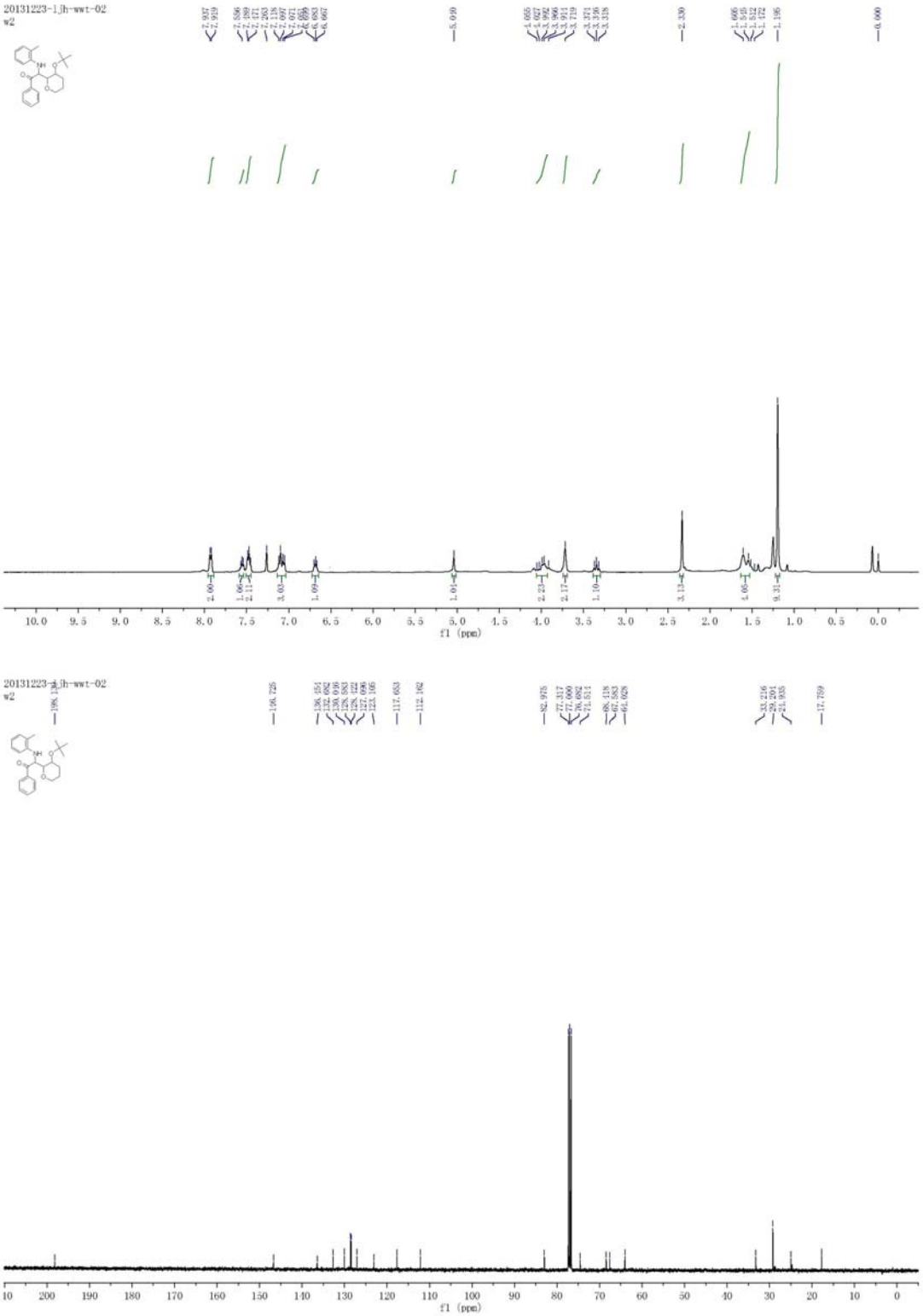


2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-phenyl-2-(*p*-tolylamino)ethanone (8)

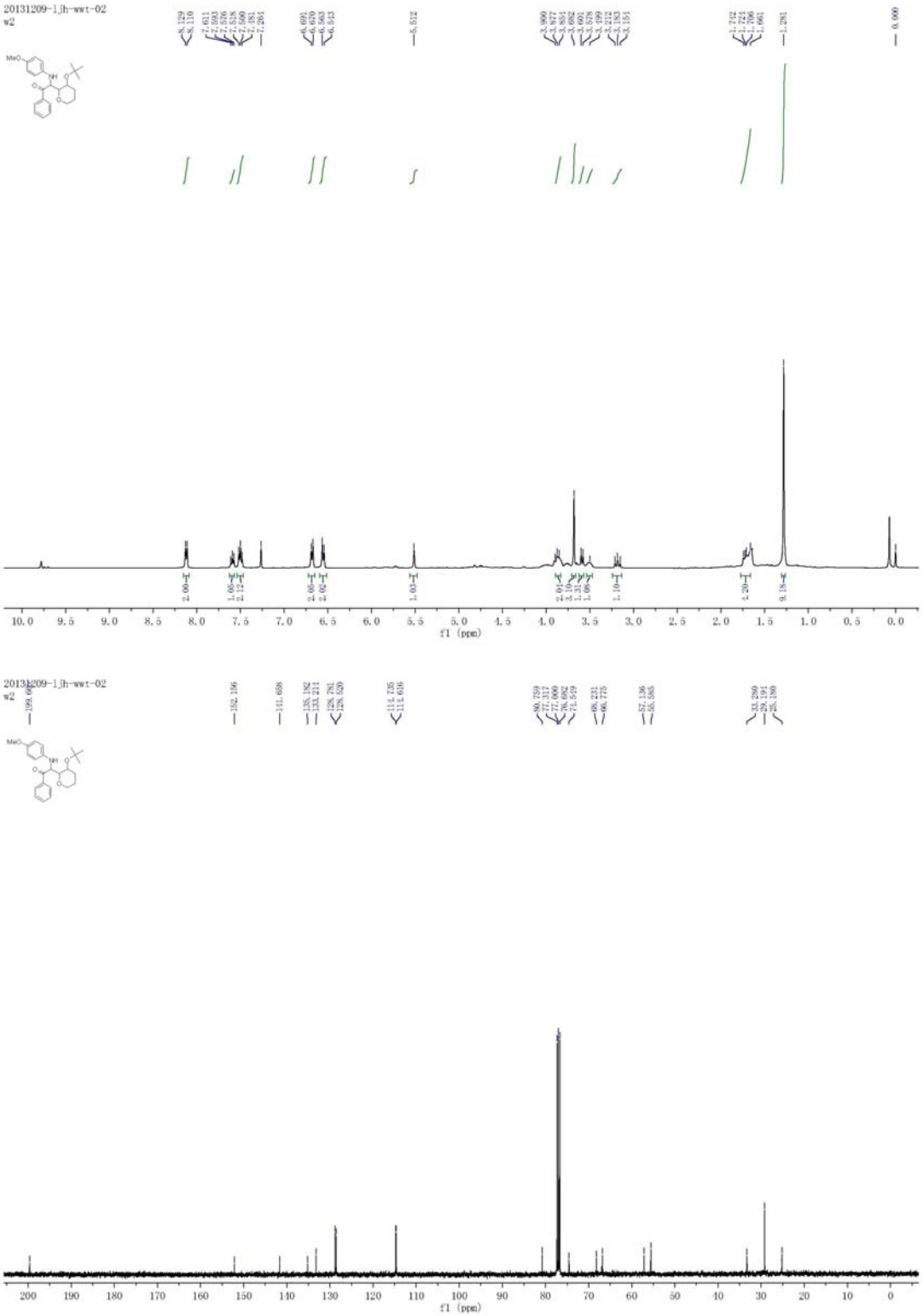


2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-phenyl-2-(*o*-tolylamino)ethanone

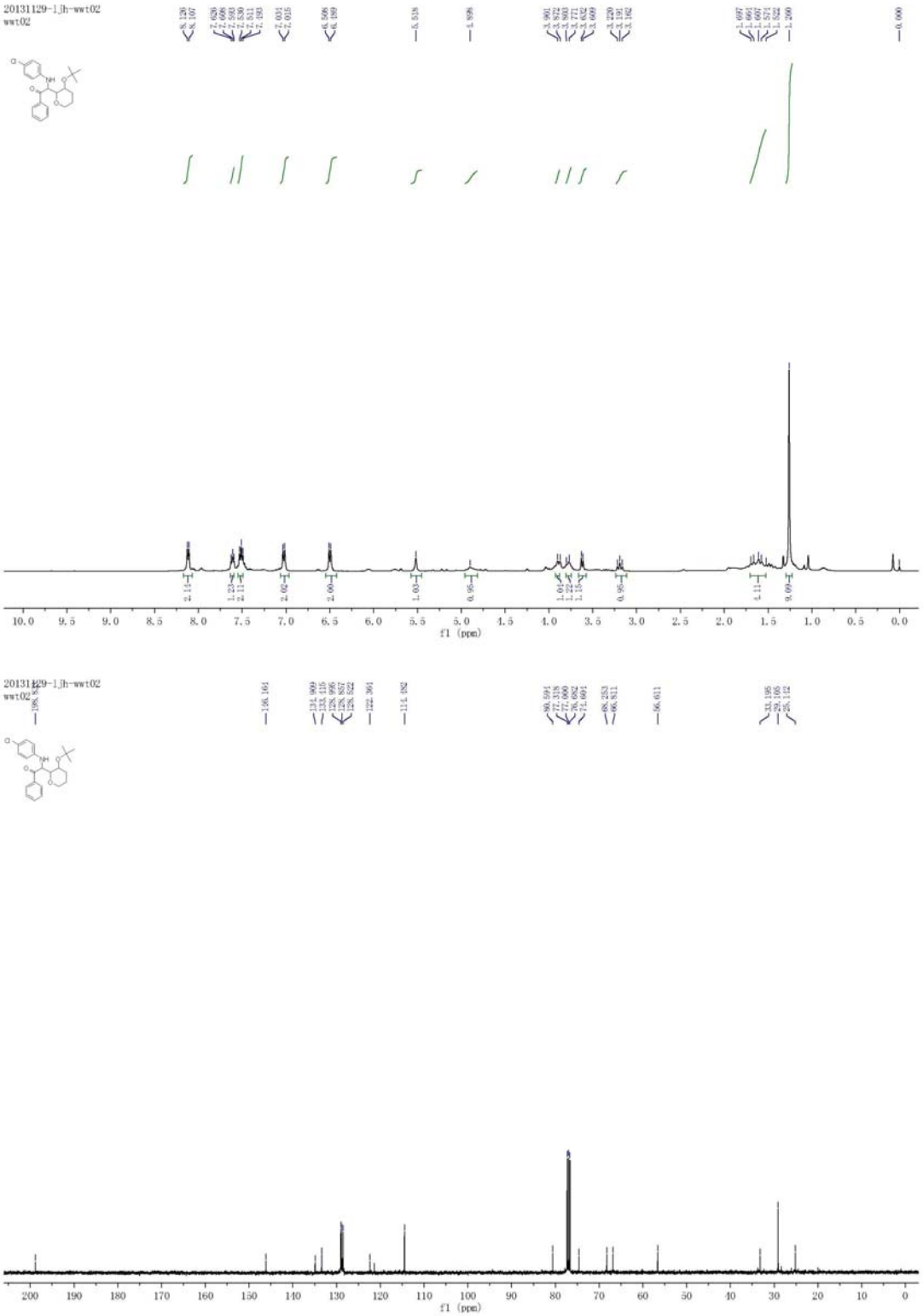
(9)



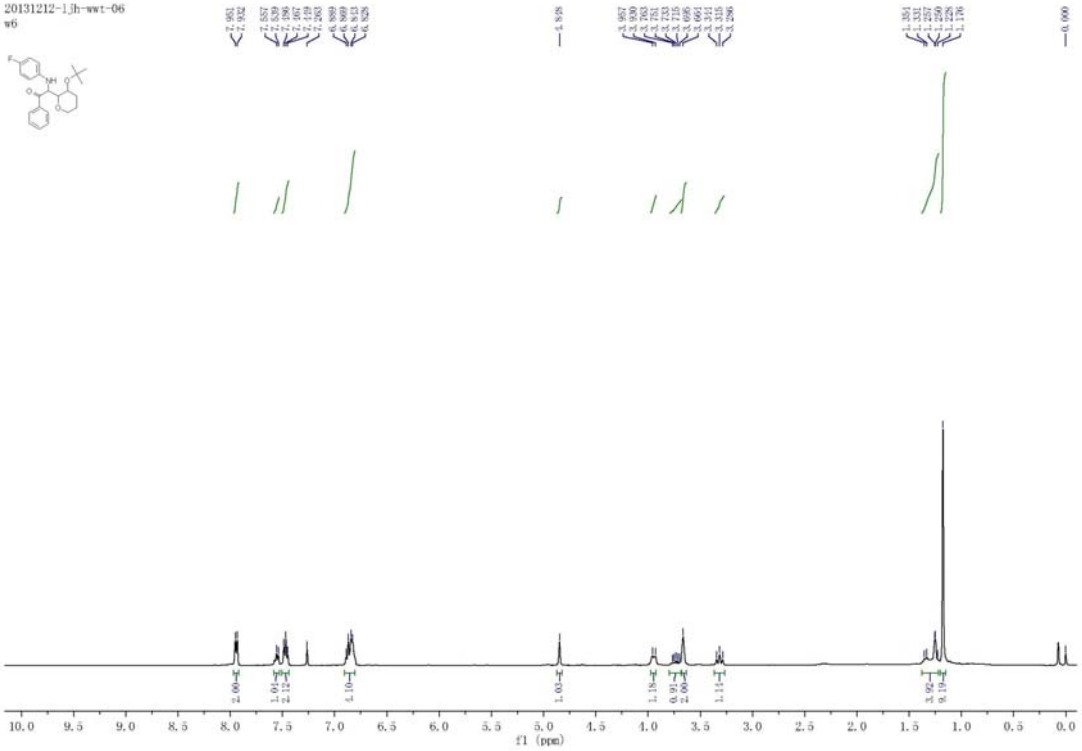
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-methoxyphenylamino)-1-phenylethanone (10)

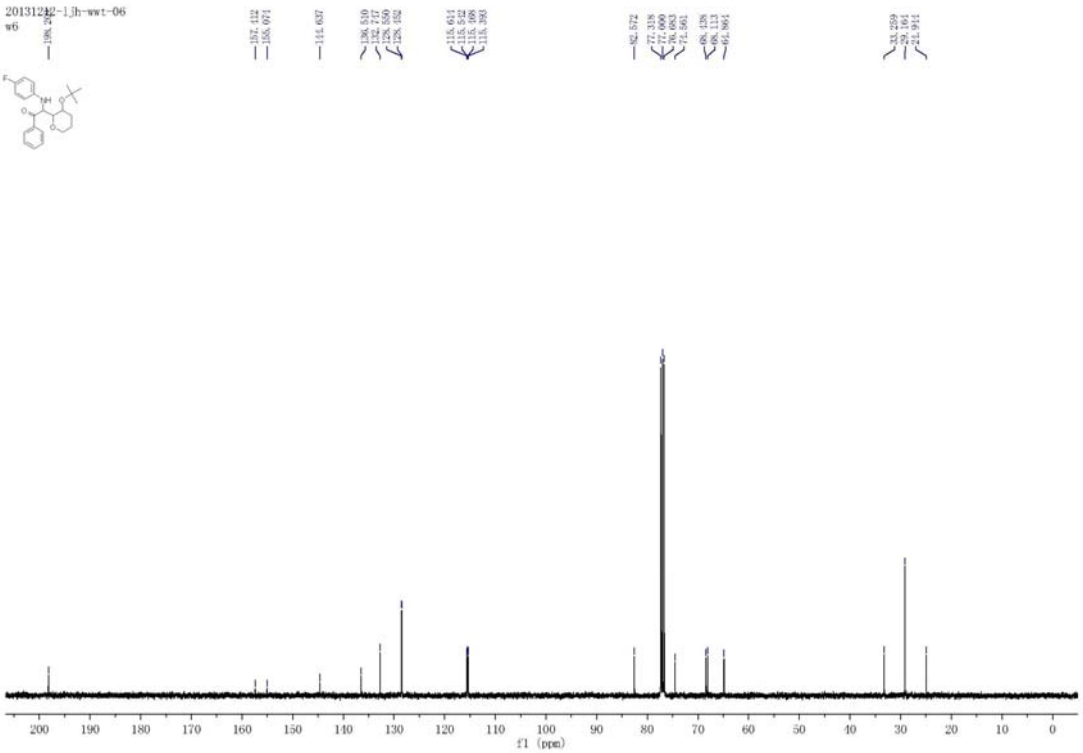


2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-chlorophenylamino)-1-phenylethanone (11)



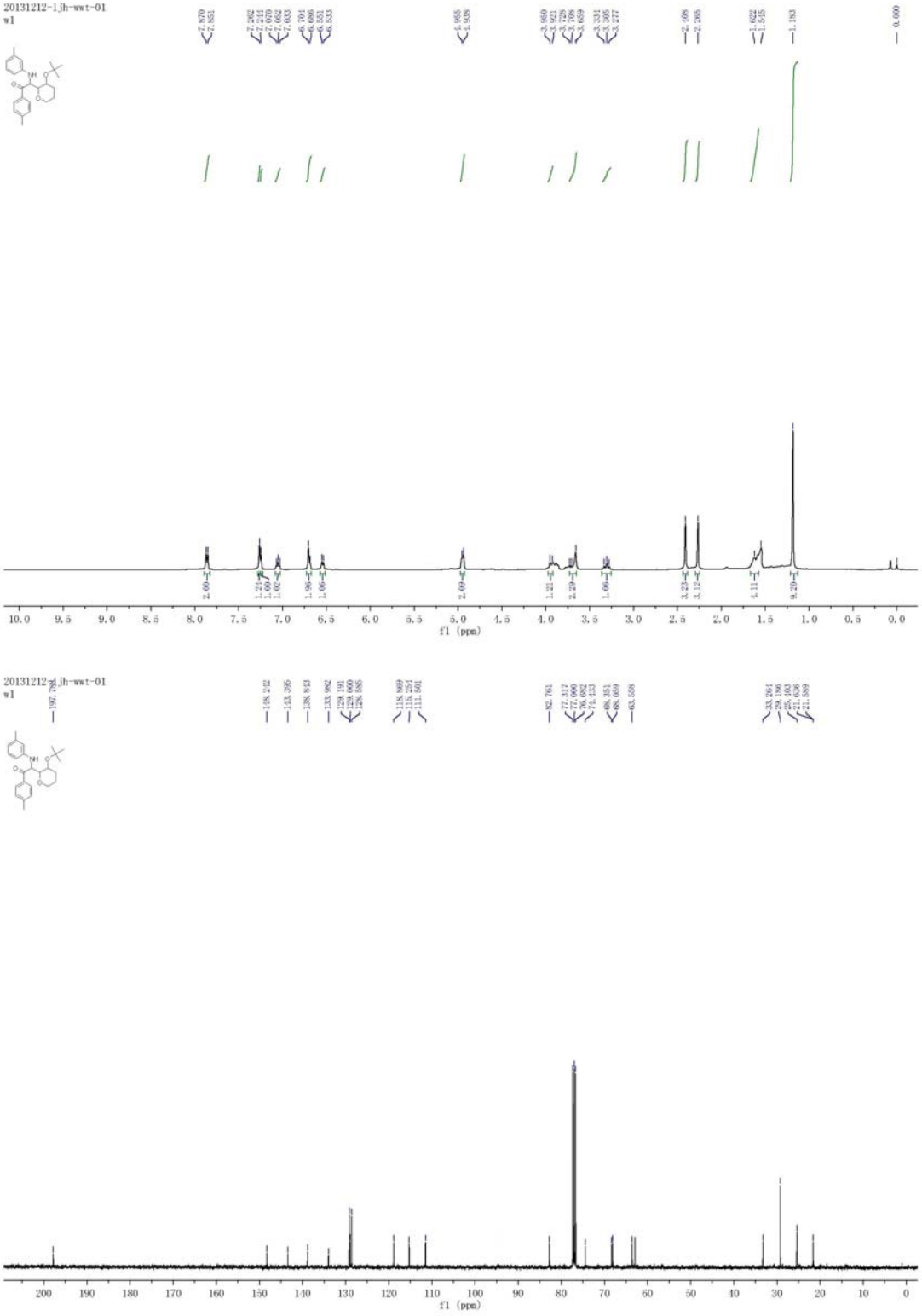
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-fluorophenylamino)-1-phenylethanone (12)



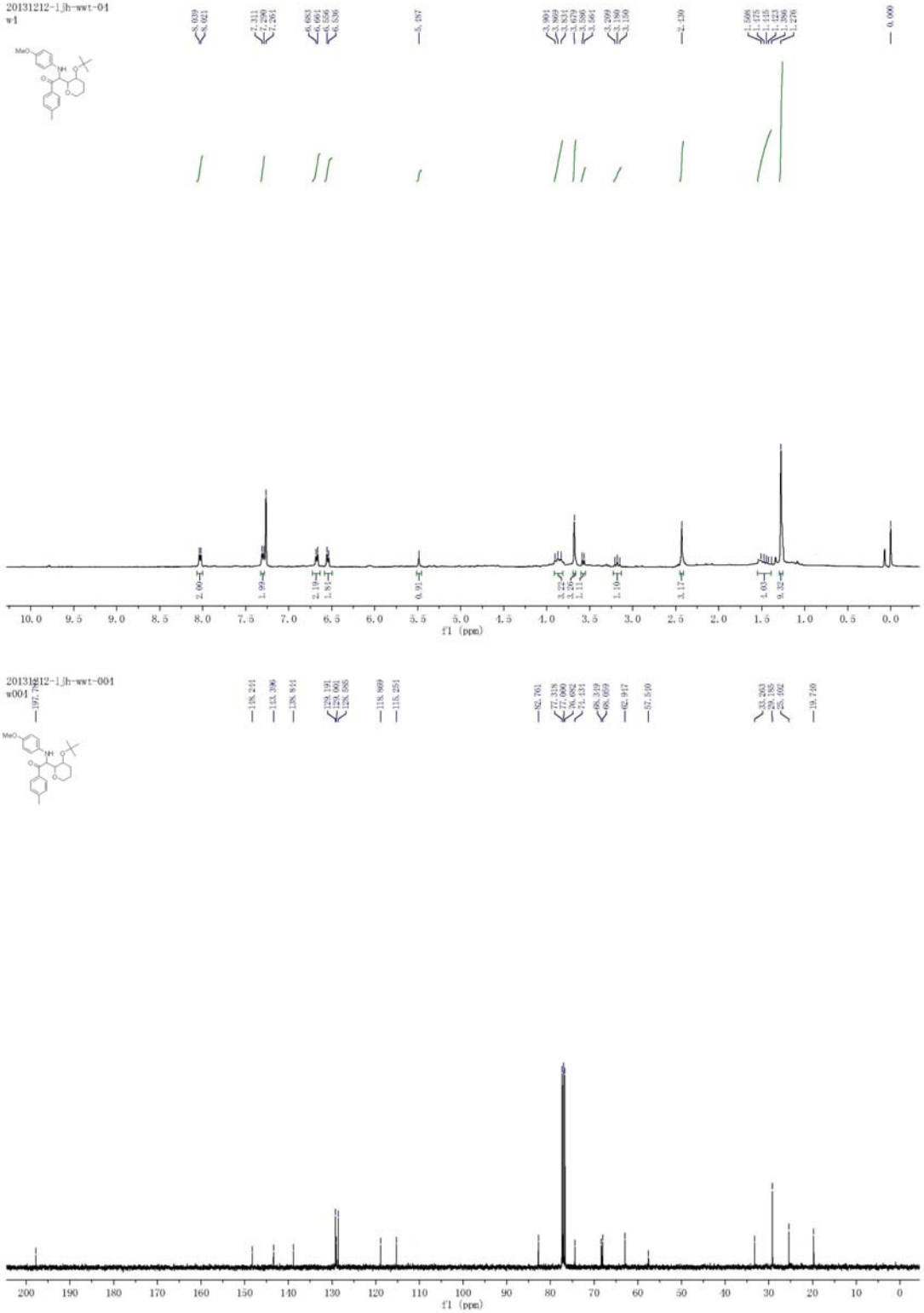


2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-*p*-tolyl-2-(*m*-tolylamino)ethanone

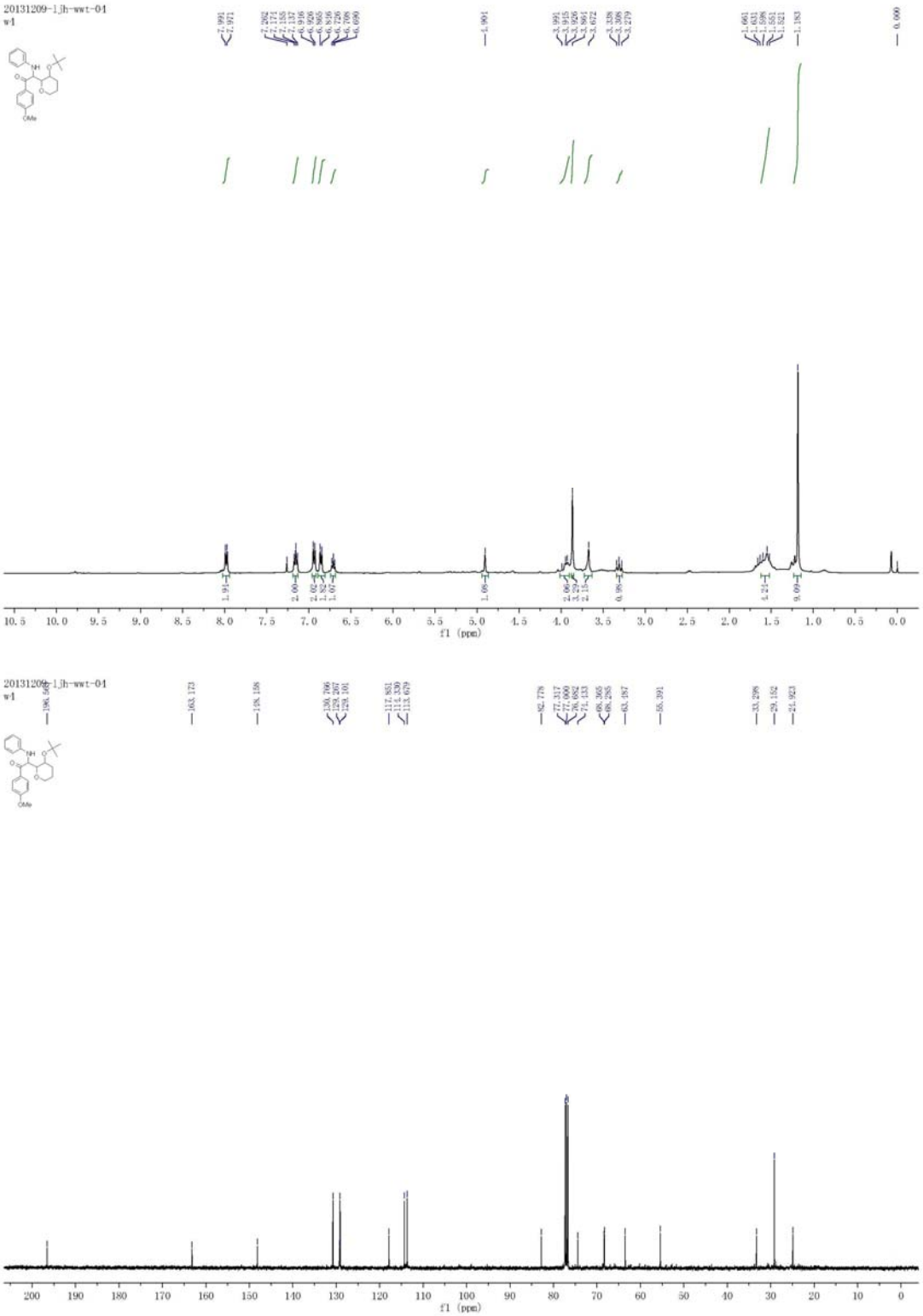
(13)



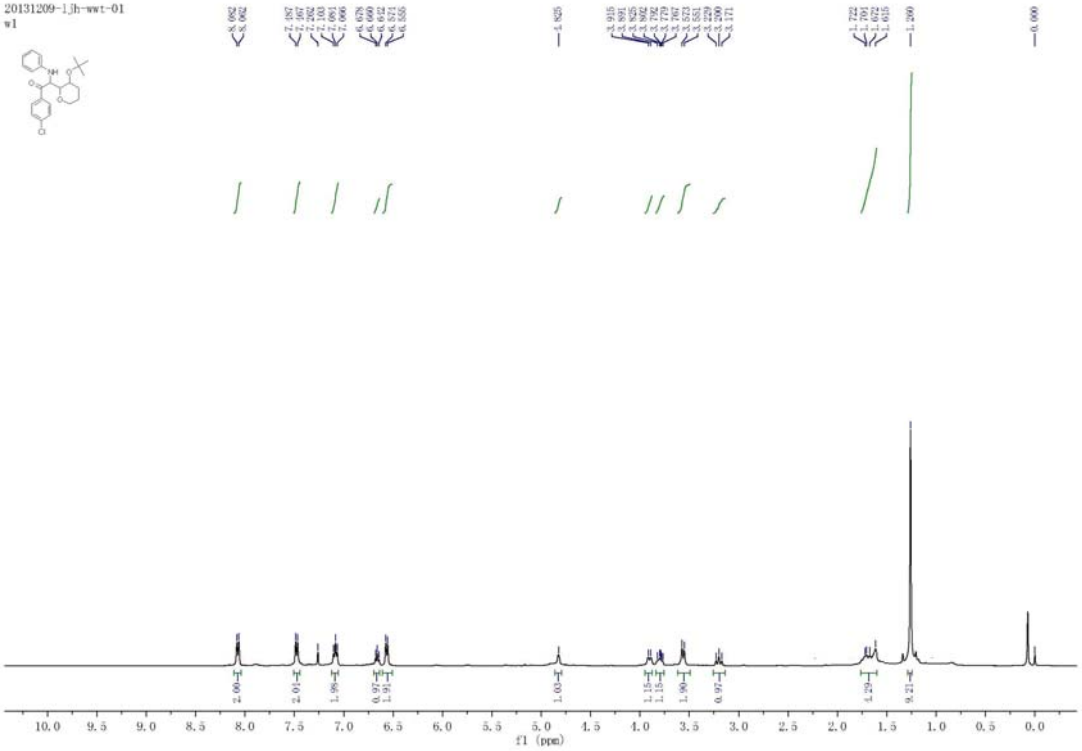
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-methoxyphenylamino)-1-*p*-tolylethanone (14)

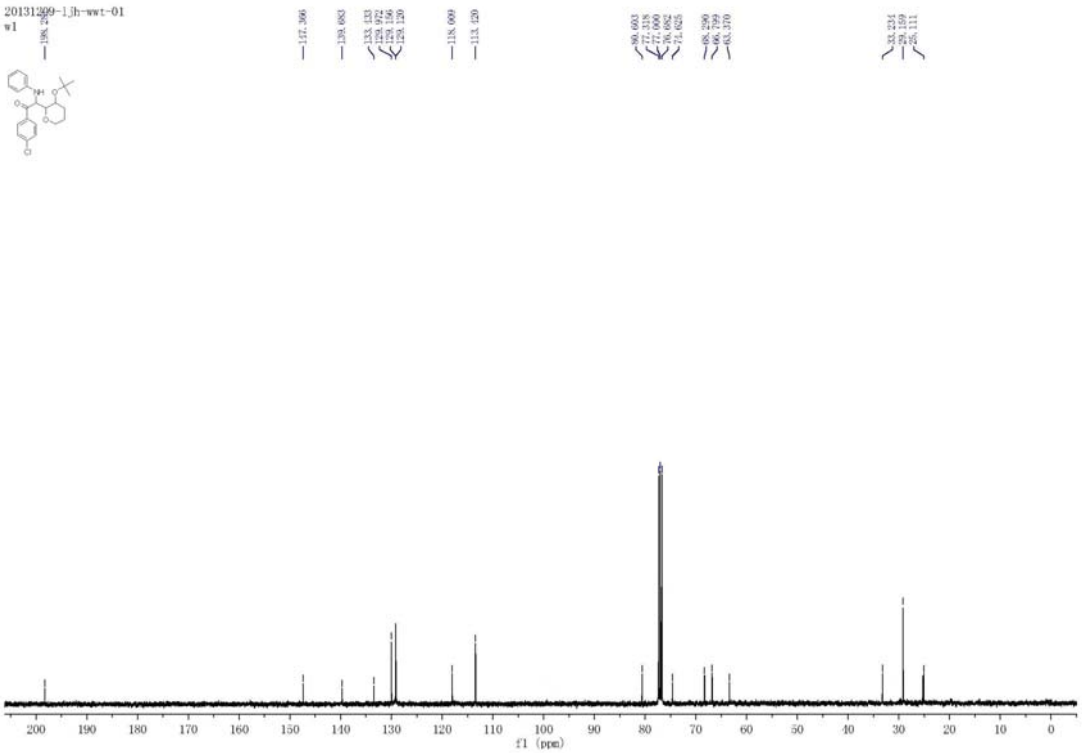


2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(4-methoxyphenyl)-2-(phenylamino)ethanone (15)

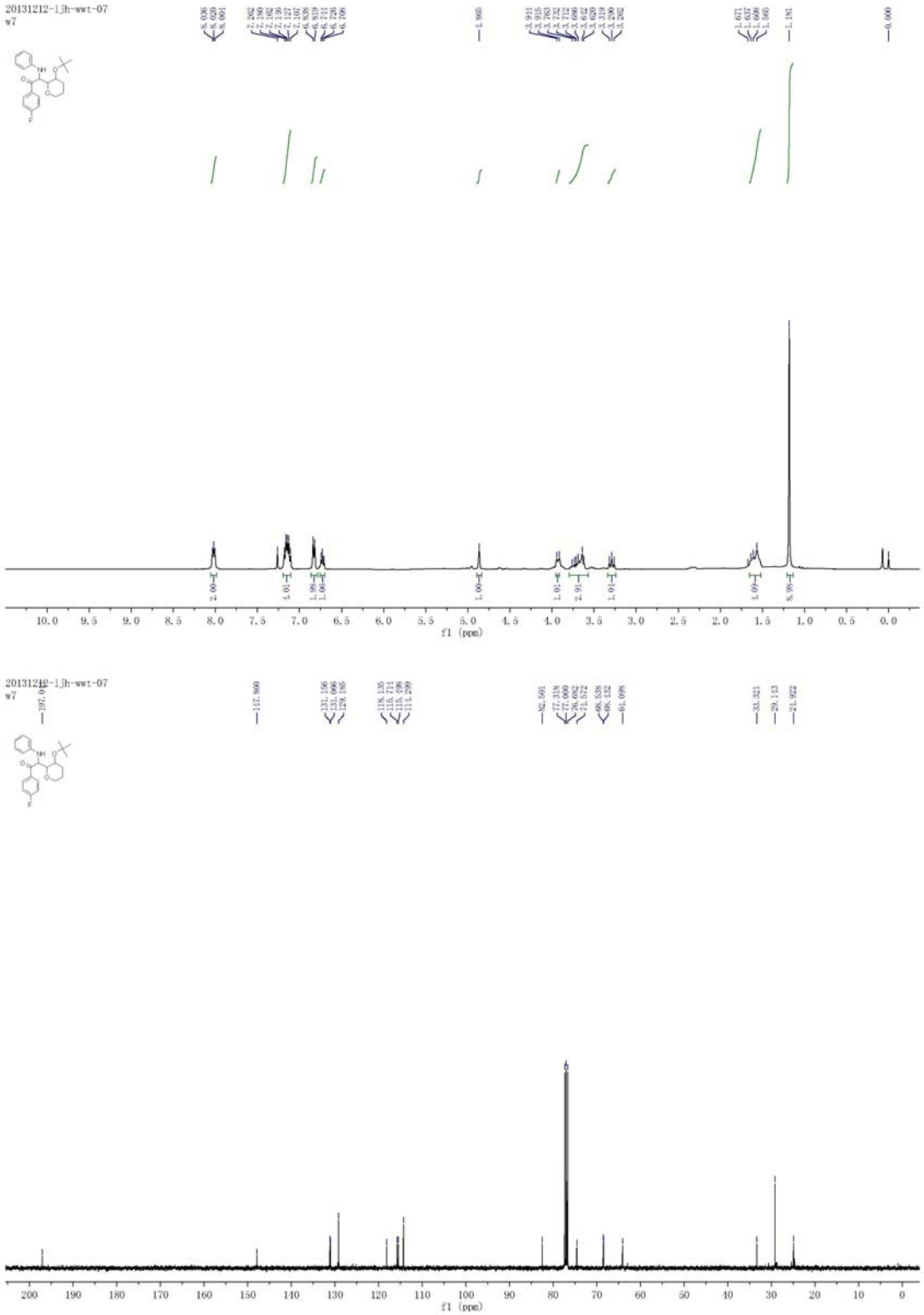


2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(4-chlorophenyl)-2-(phenylamino)ethanone (16)

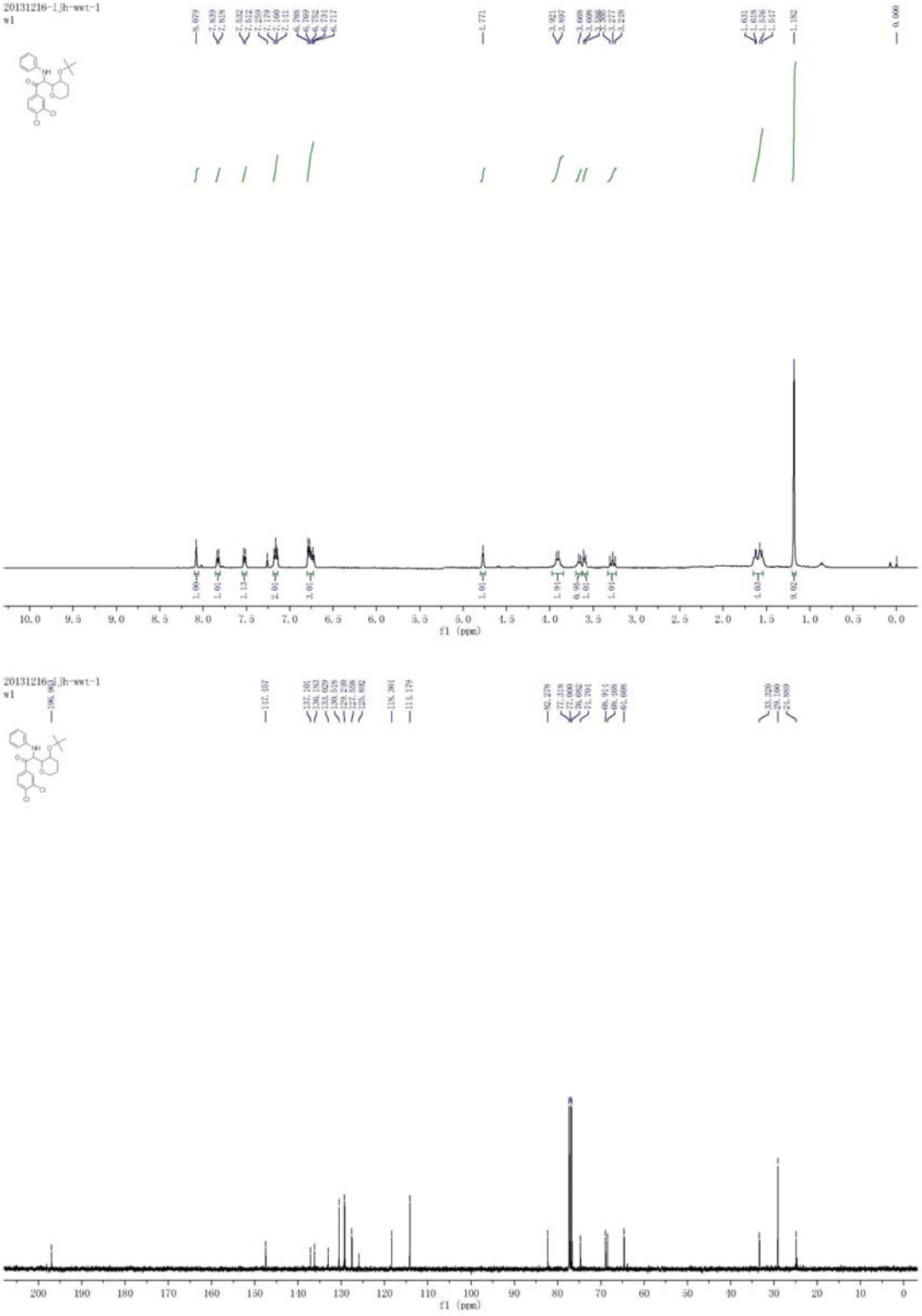




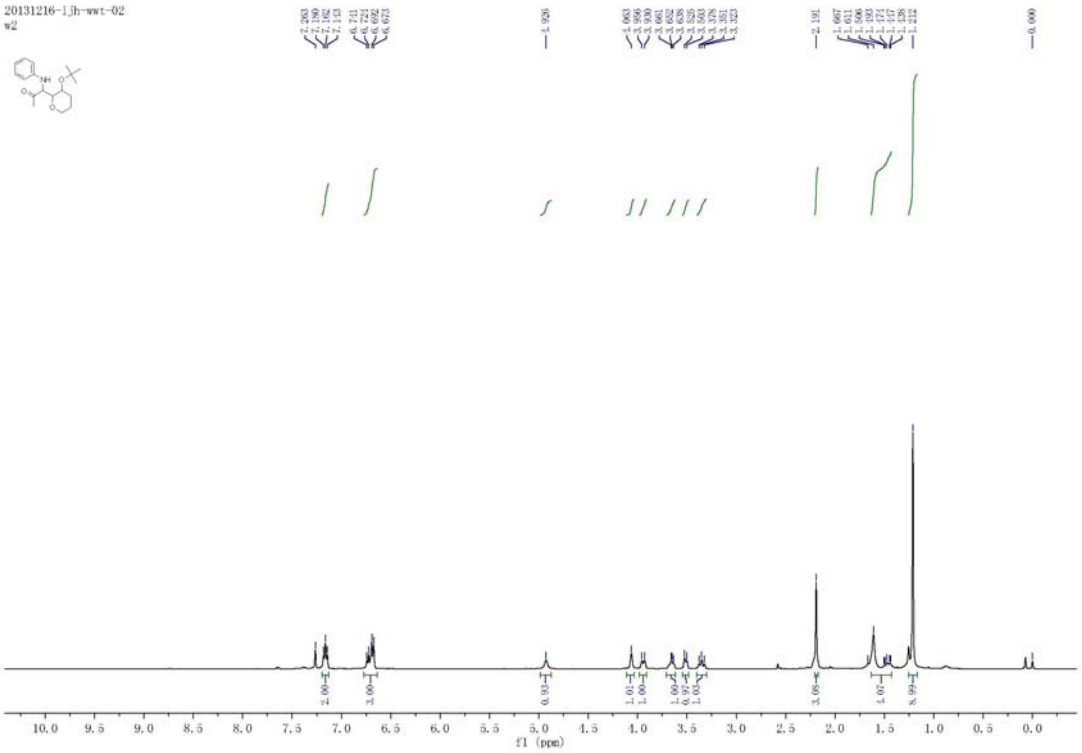
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(4-fluorophenyl)-2-(phenylamino)ethanone (17)

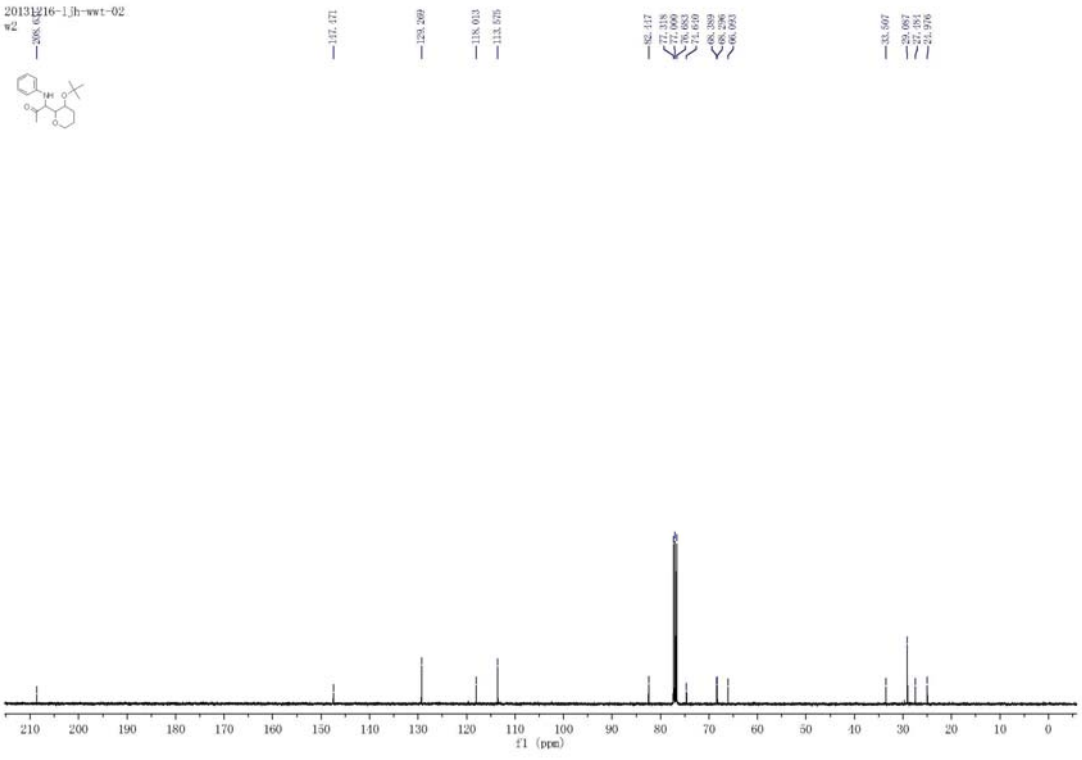


2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(3,4-dichlorophenyl)-2-(phenylamino)ethanone (18)

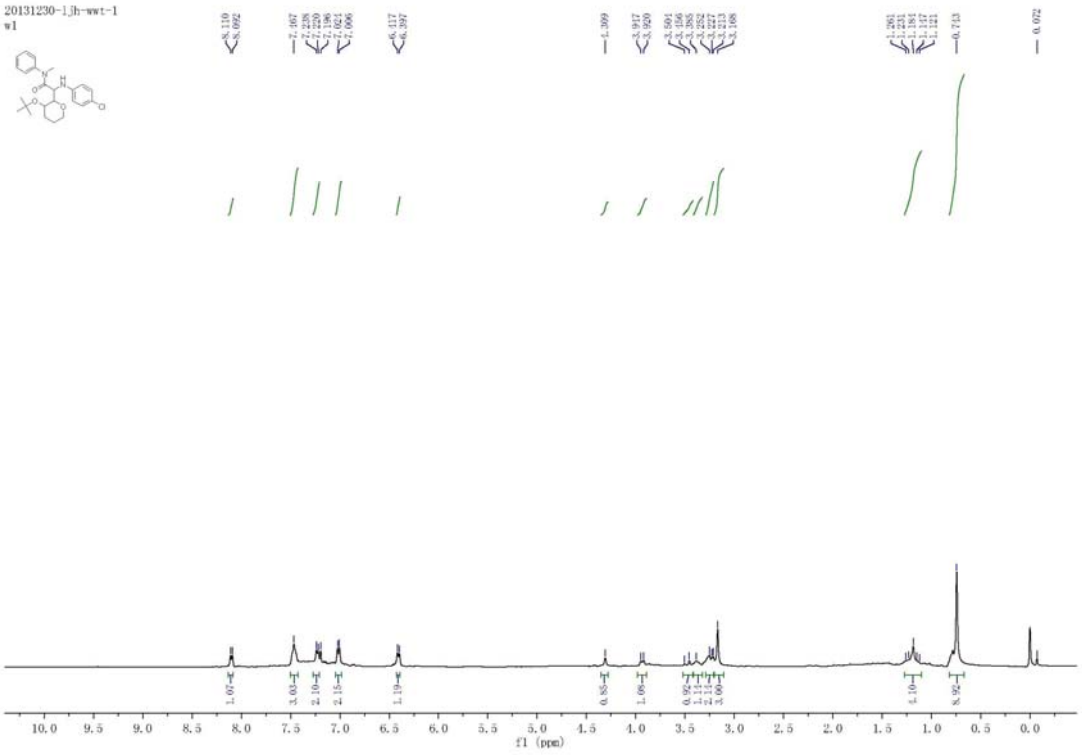


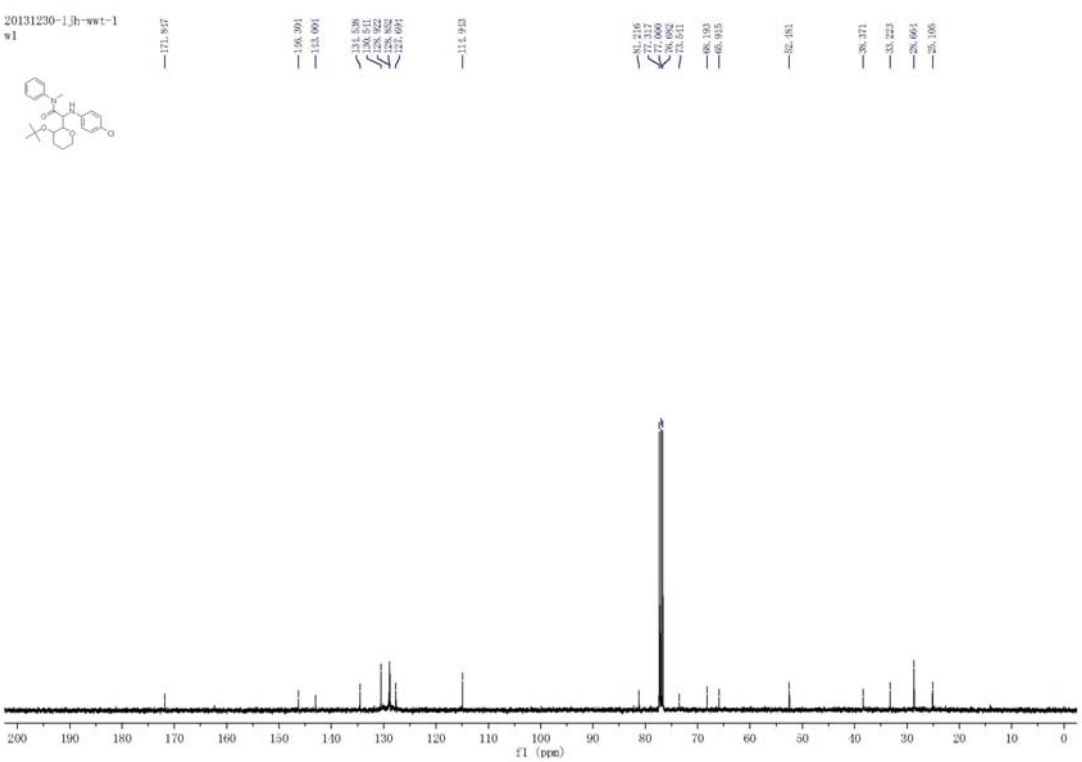
1-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-1-(phenylamino)propan-2-one (19)



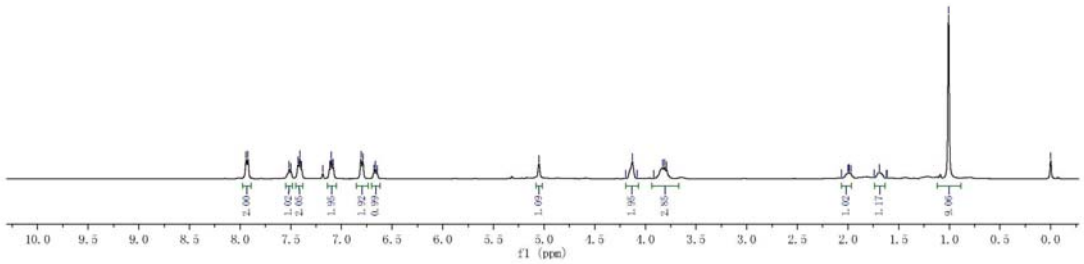


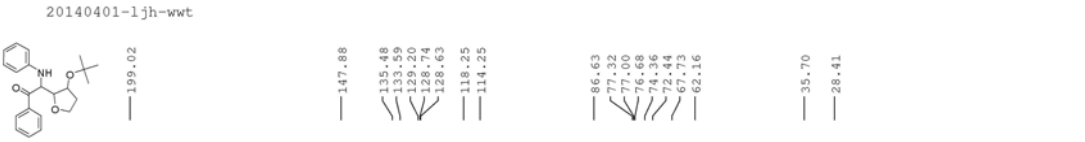
2-(3-*tert*-Butoxytetrahydro-2*H*-pyran-2-yl)-2-(4-chlorophenylamino)-*N*-methyl-*N*-phenylacetamide (20)

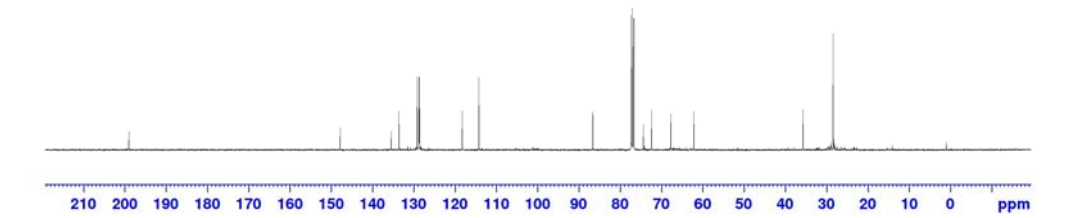


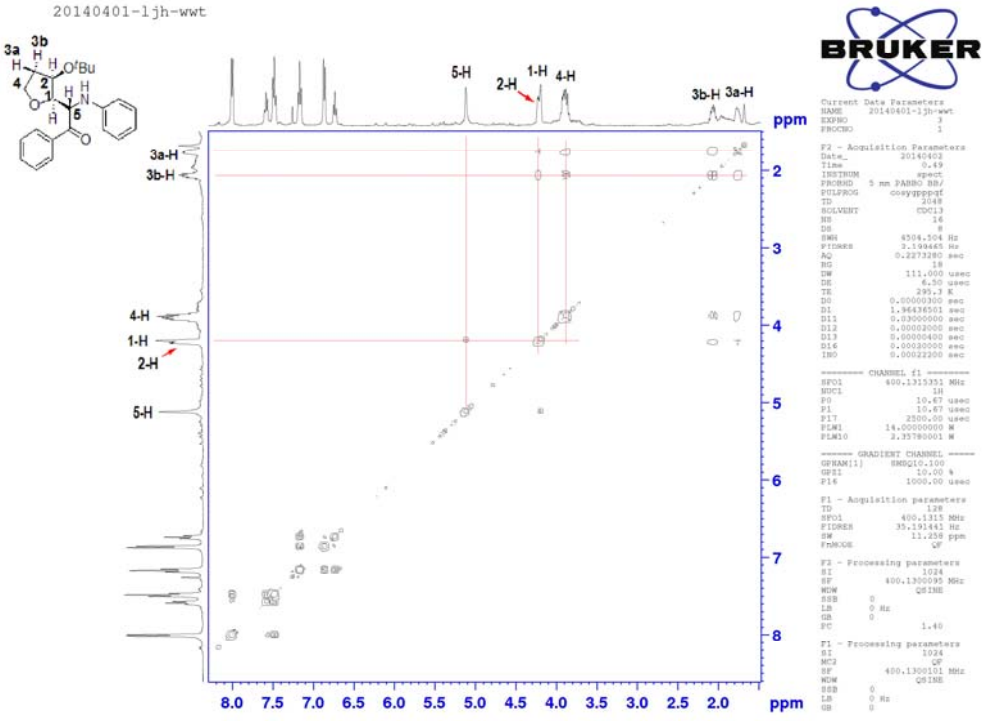


2-(3-*tert*-Butoxytetrahydrofuran-2-yl)-1-phenyl-2-(phenylamino)ethanone (21)

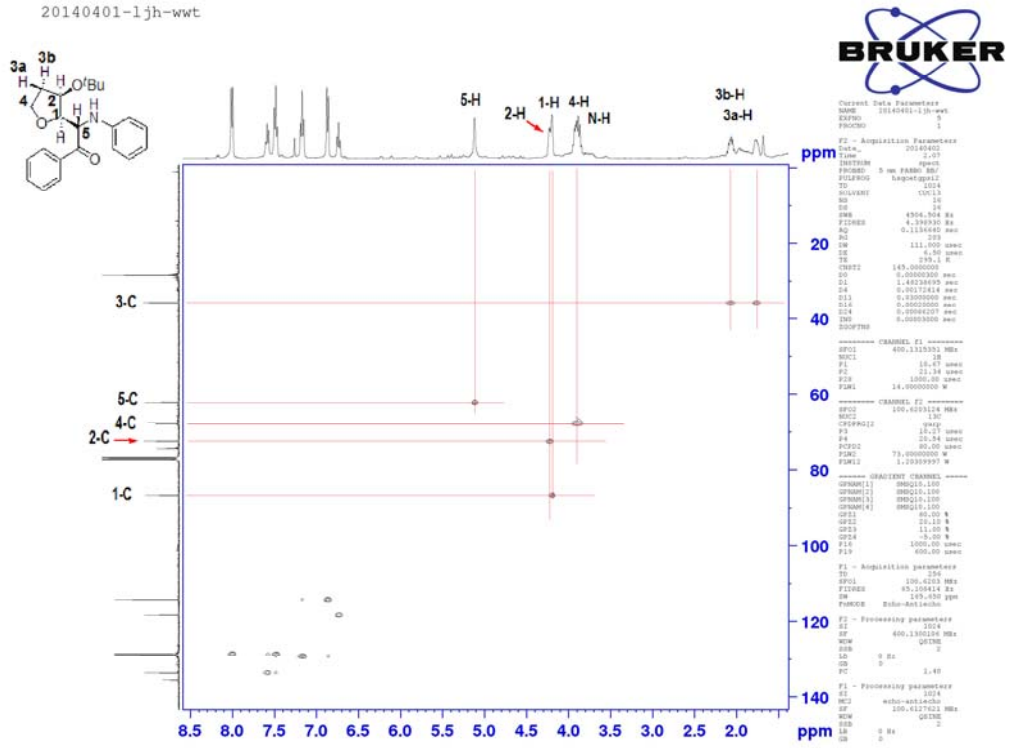




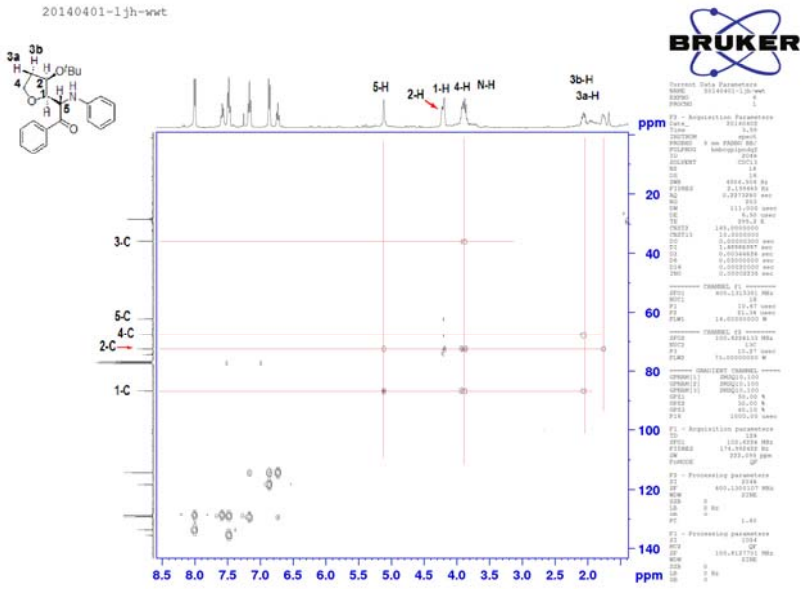



20140401-1jh-wwt
BRUKER
5-H
2-H
1-H
4-H
3b-H
3a-H
ppm

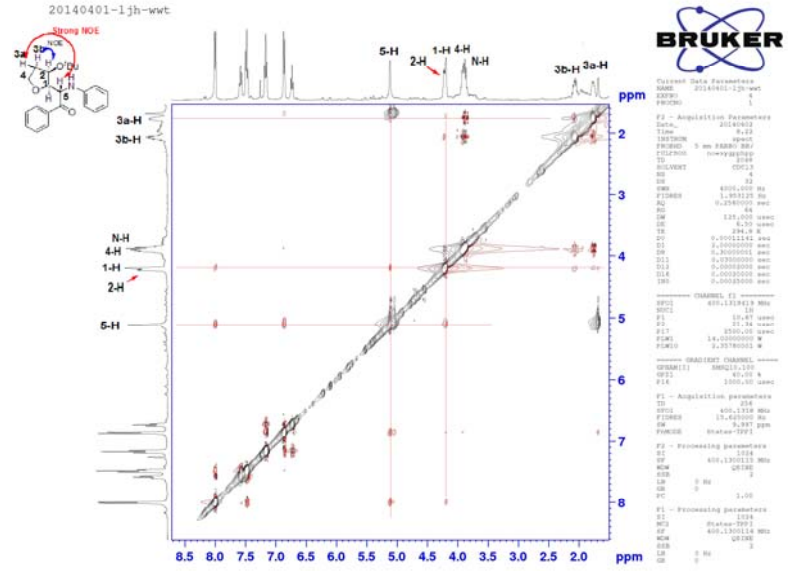
H-H cosy


20140401-1jh-wwt
BRUKER
5-H
2-H
1-H
4-H
N-H
3b-H
3a-H
3-C
5-C
4-C
2-C
1-C
ppm

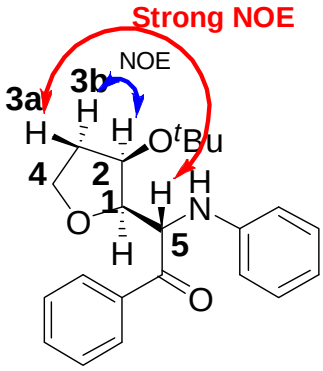
HSQC



HMBC



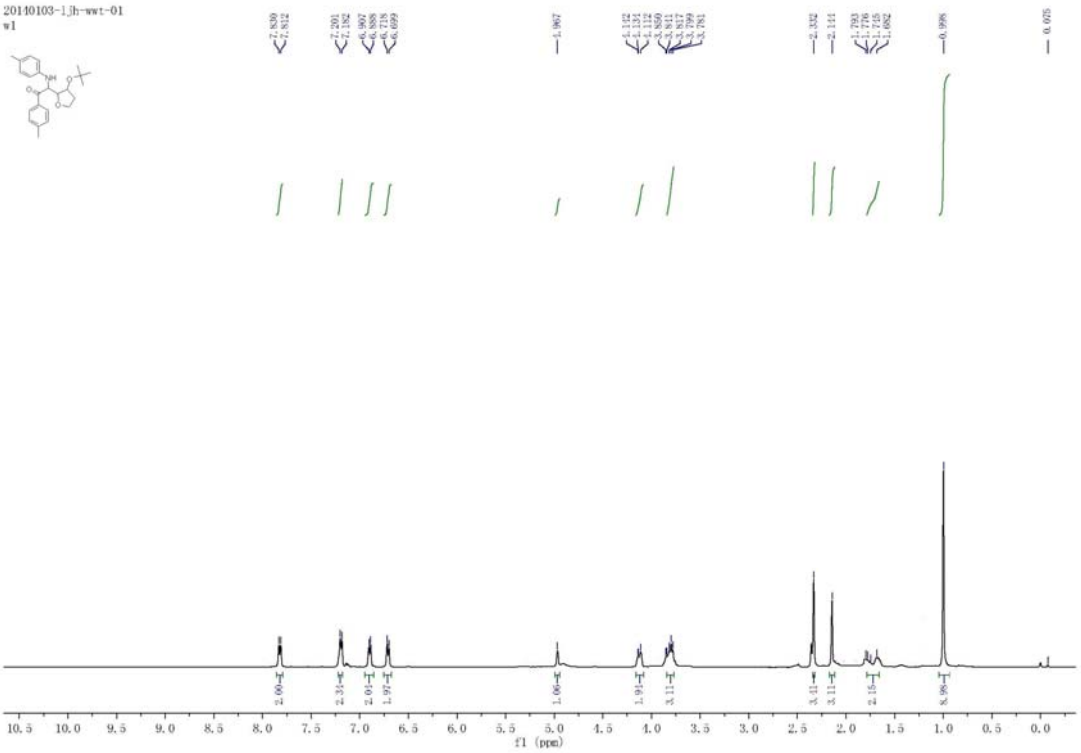
H-H Noesy

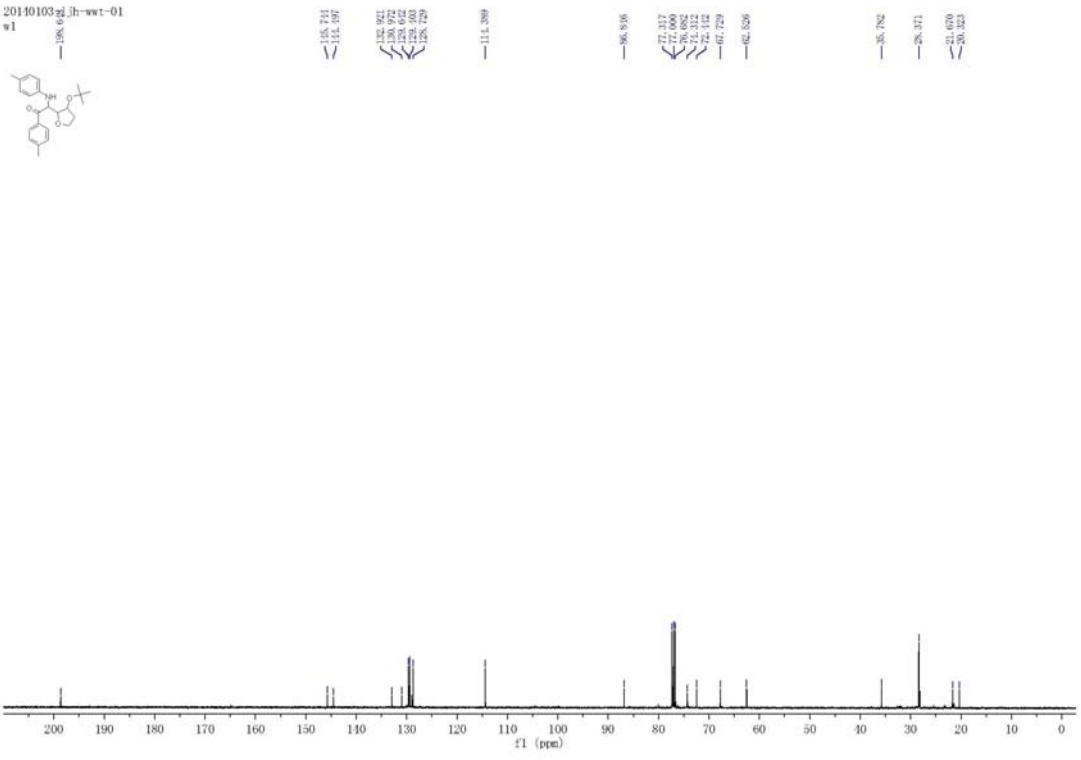


A strong NOE between 3a-H and 5-H

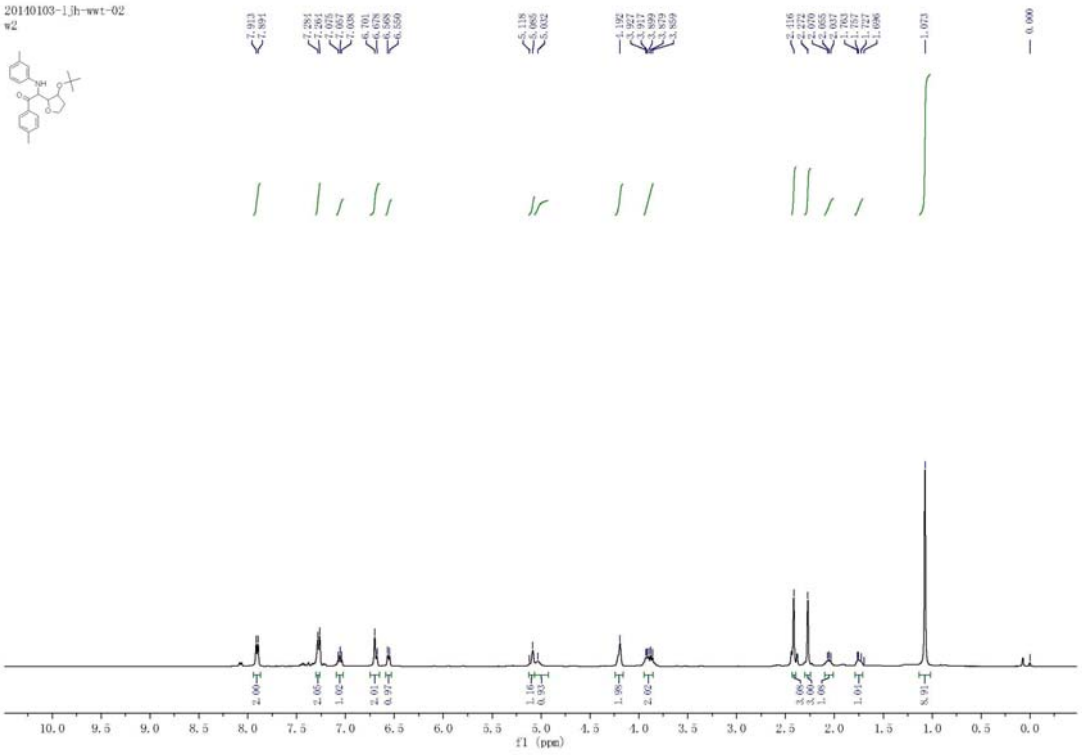
A weak NOE between 3b-H and 2-H

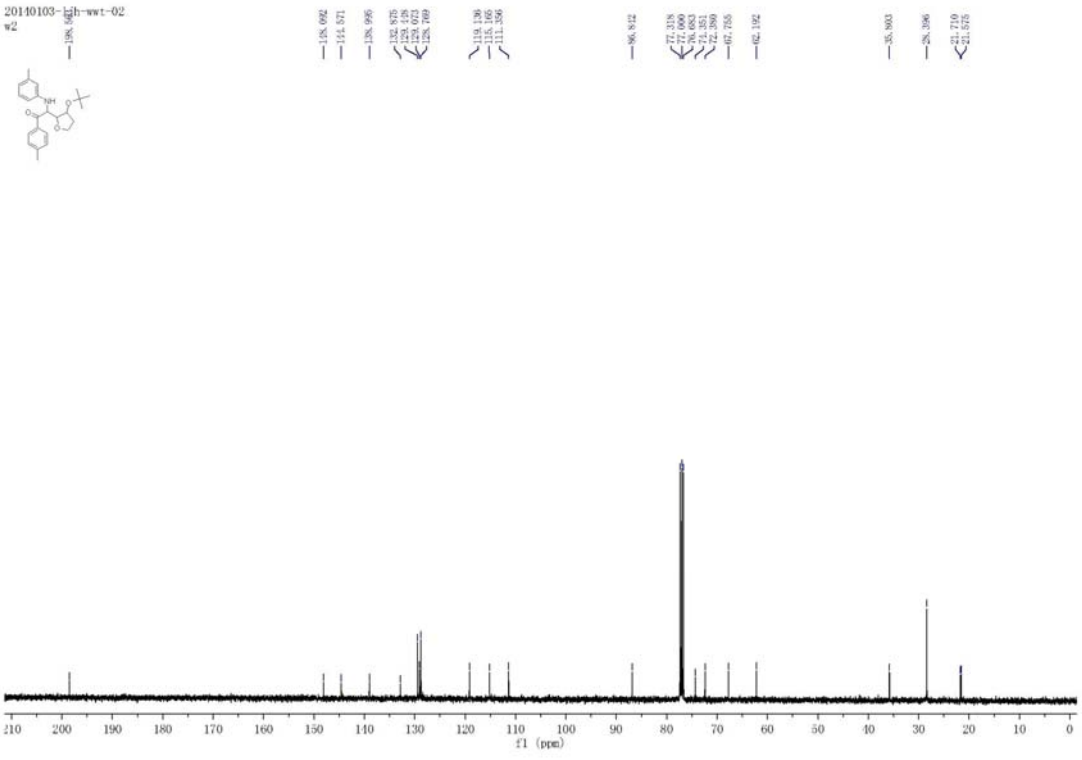
2-(3-*tert*-Butoxytetrahydrofuran-2-yl)-1-*p*-tolyl-2-(*p*-tolylamino)ethanone (22)



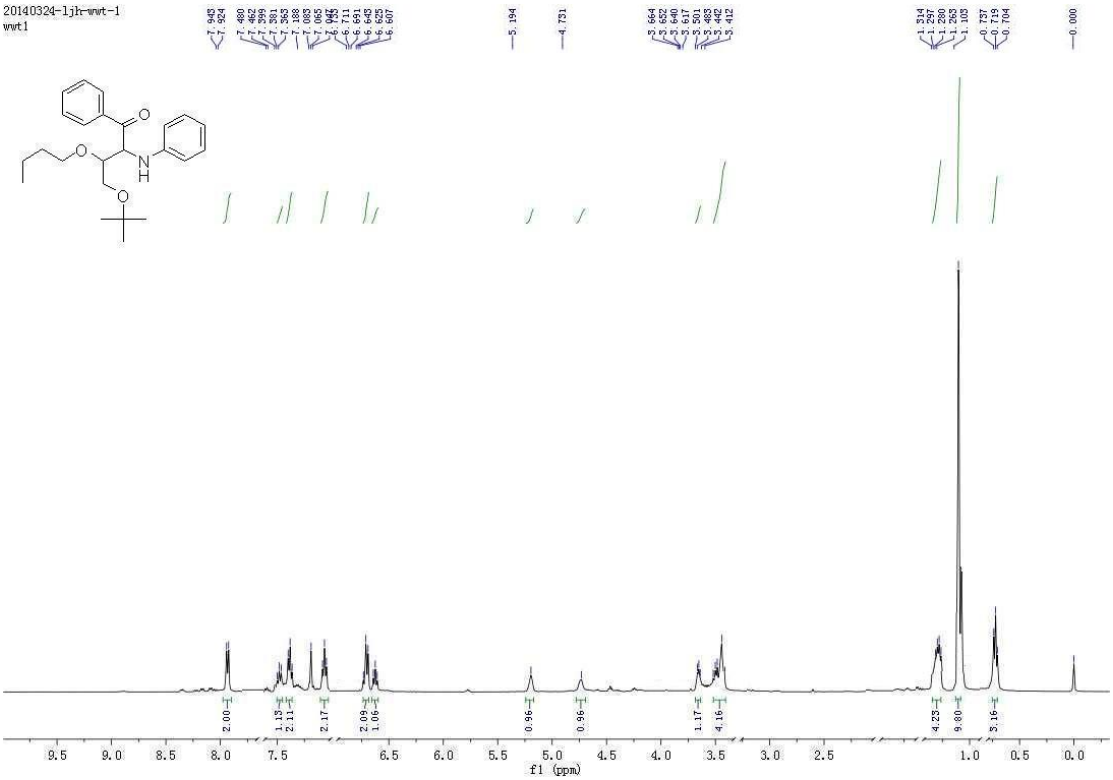


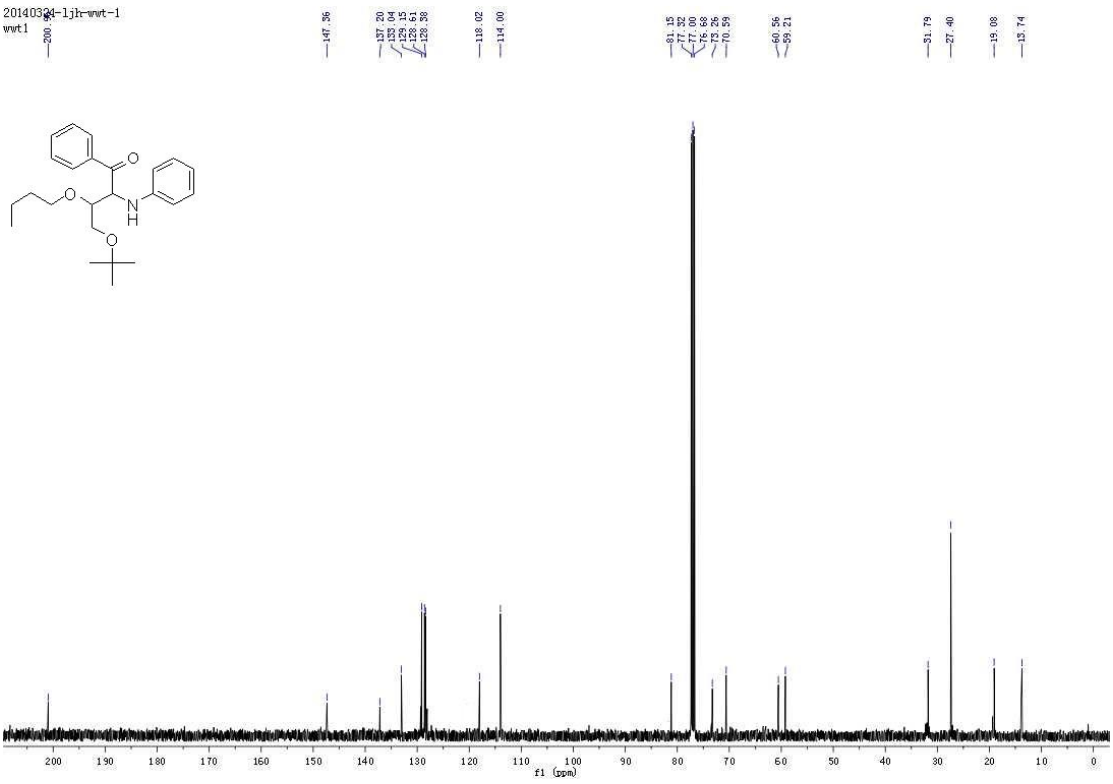
2-(3-*tert*-Butoxytetrahydrofuran-2-yl)-1-*p*-tolyl-2-(*m*-tolylamino)ethanone (23)



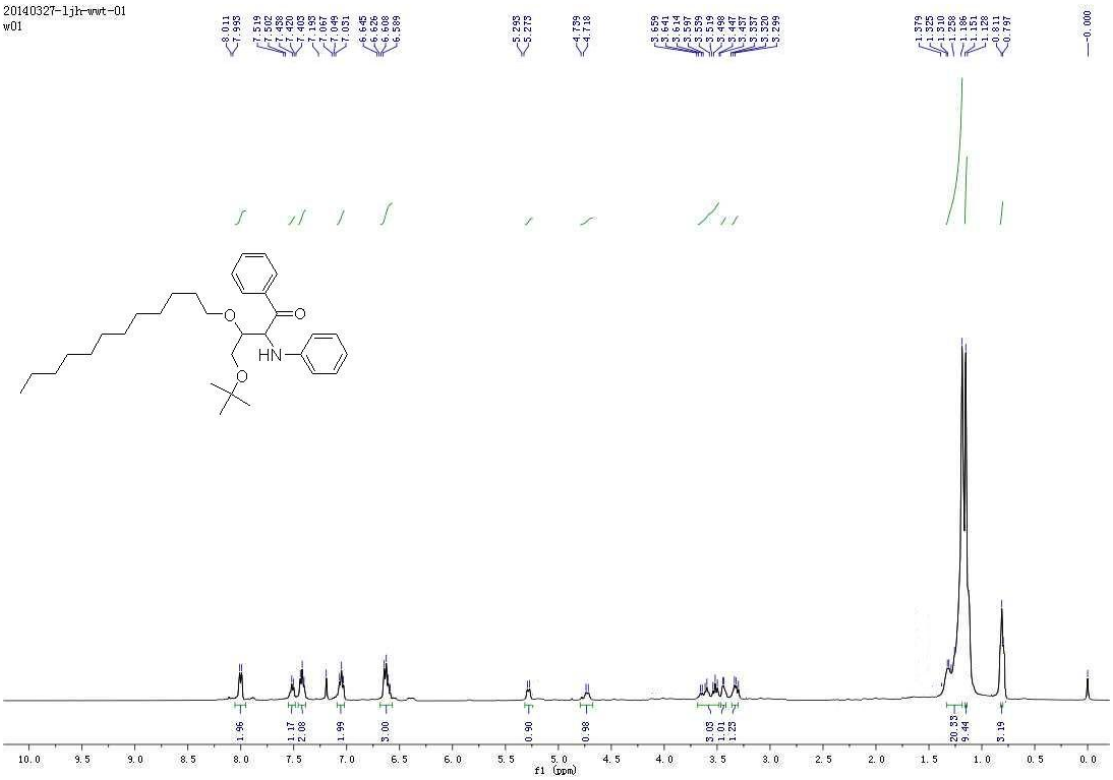


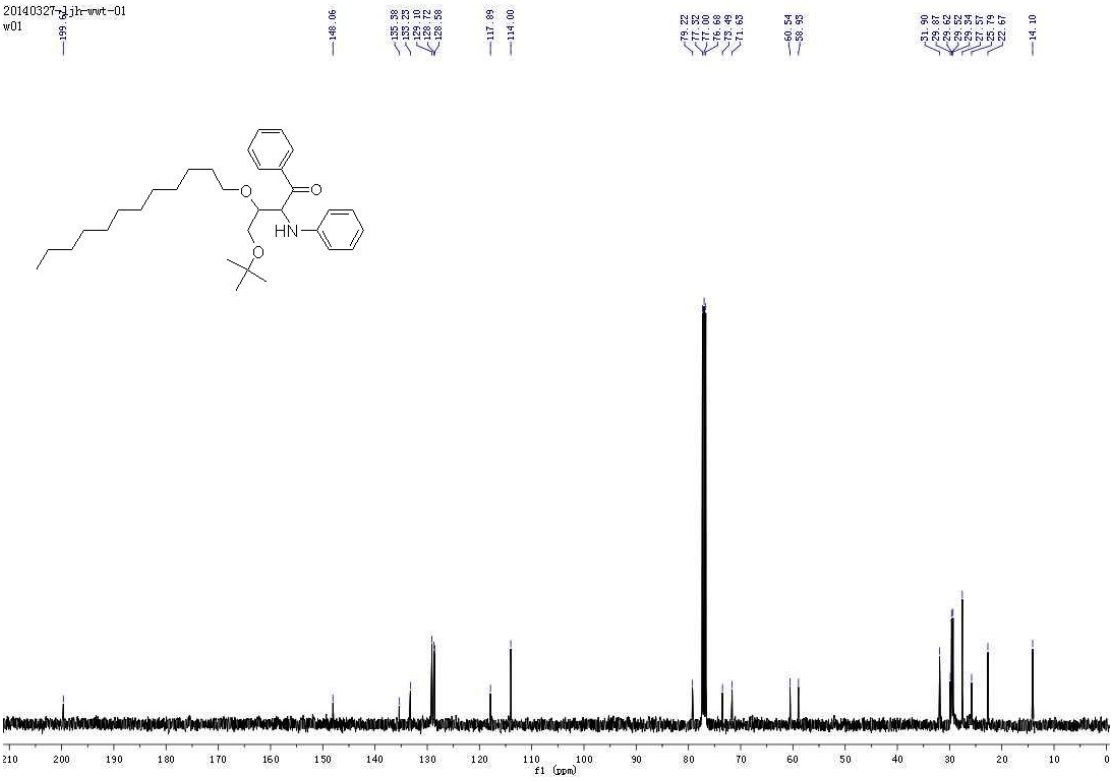
4-*tert*-Butoxy-3-butoxy-1-phenyl-2-(phenylamino)butan-1-one (24)



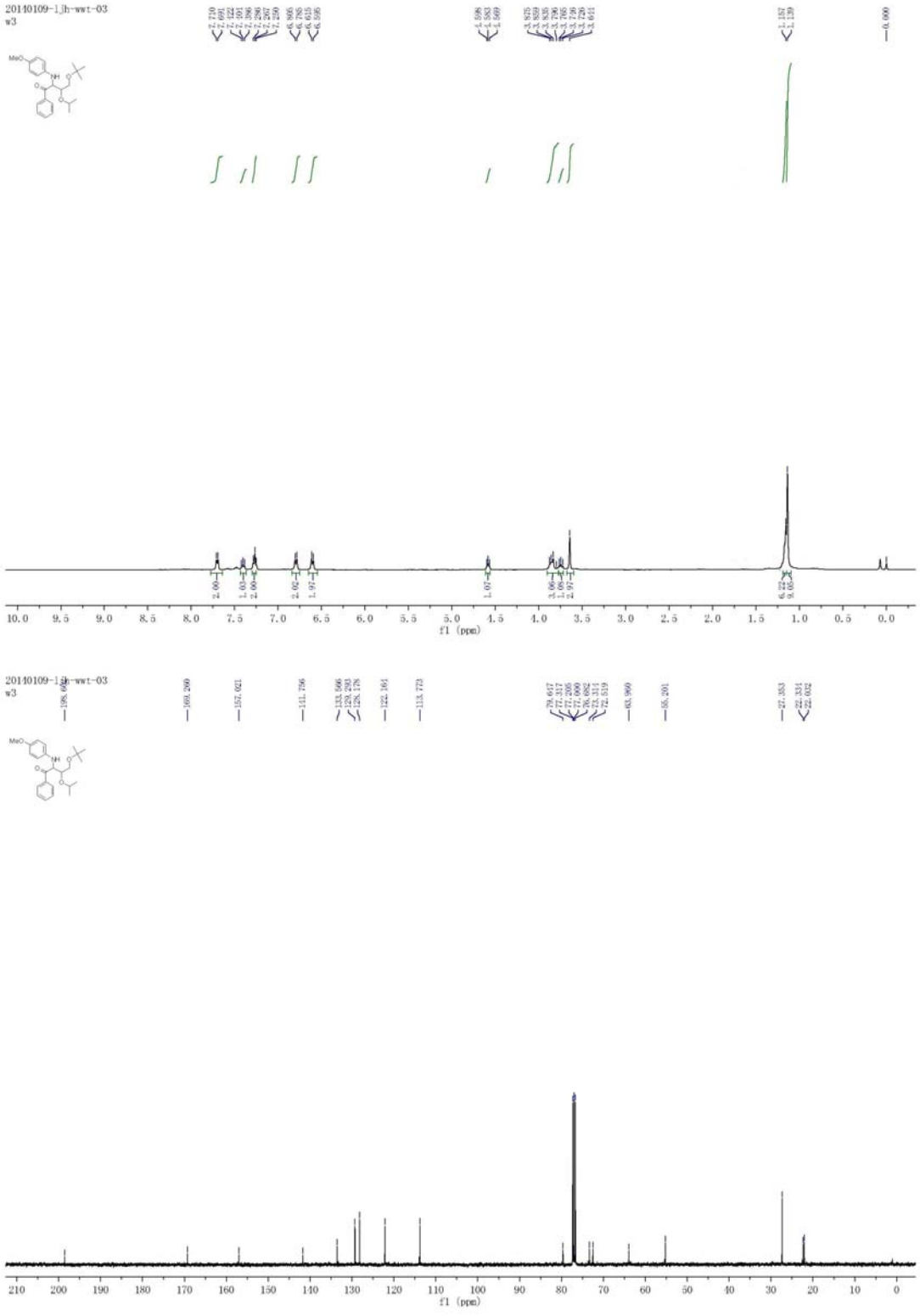


4-*tert*-Butoxy-3-(dodecyloxy)-1-phenyl-2-(phenylamino)butan-1-one (25)



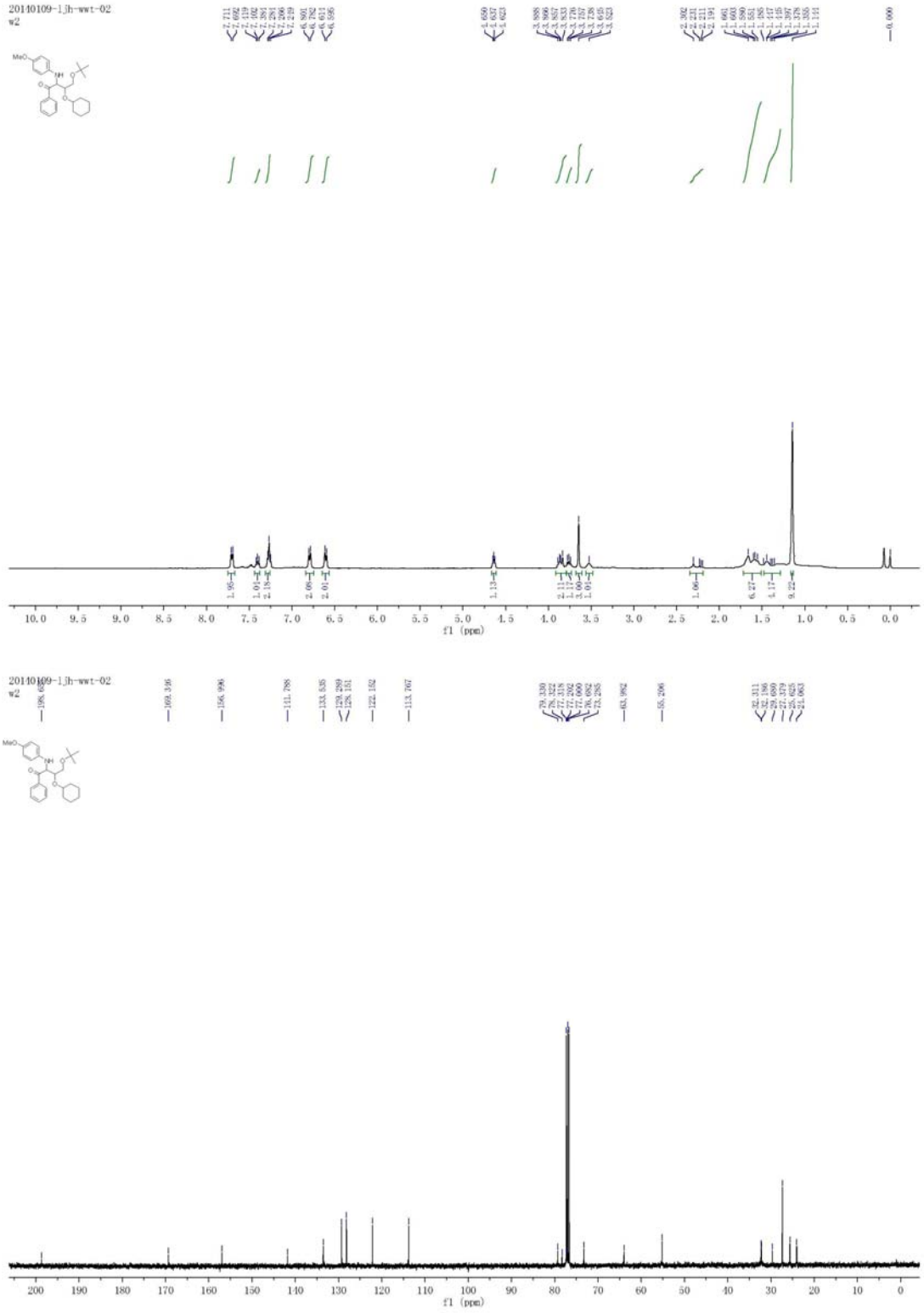


4-*tert*-Butoxy-3-isopropoxy-2-(4-methoxyphenylamino)-1-phenylbutan-1-one (26)

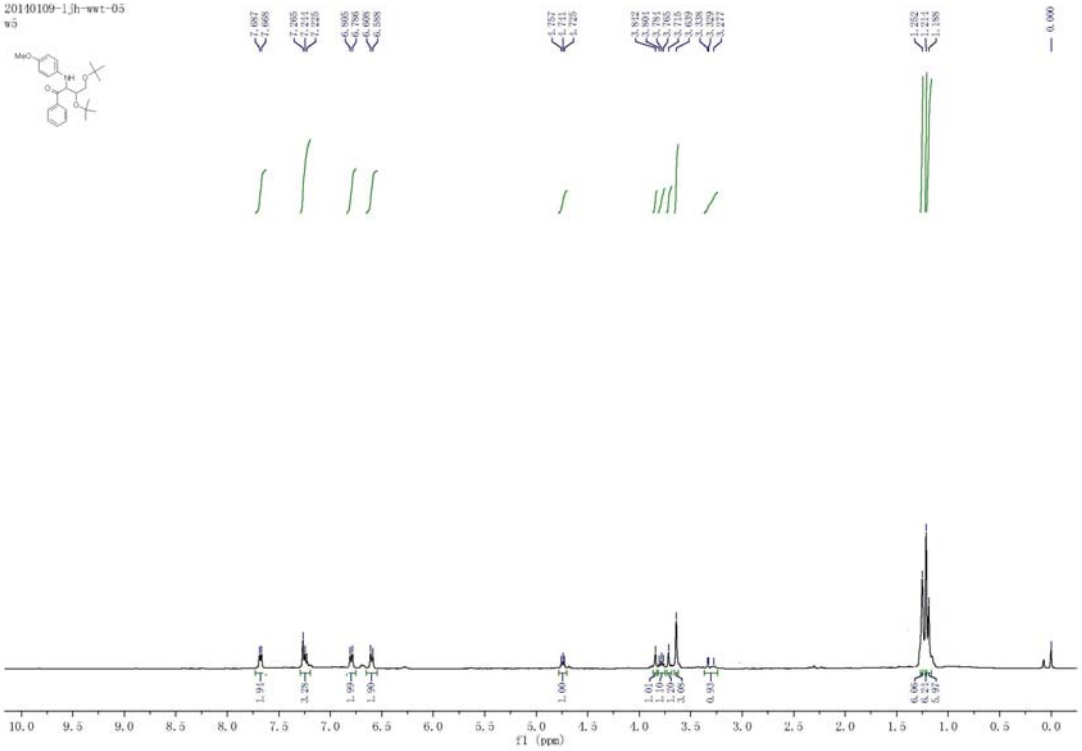


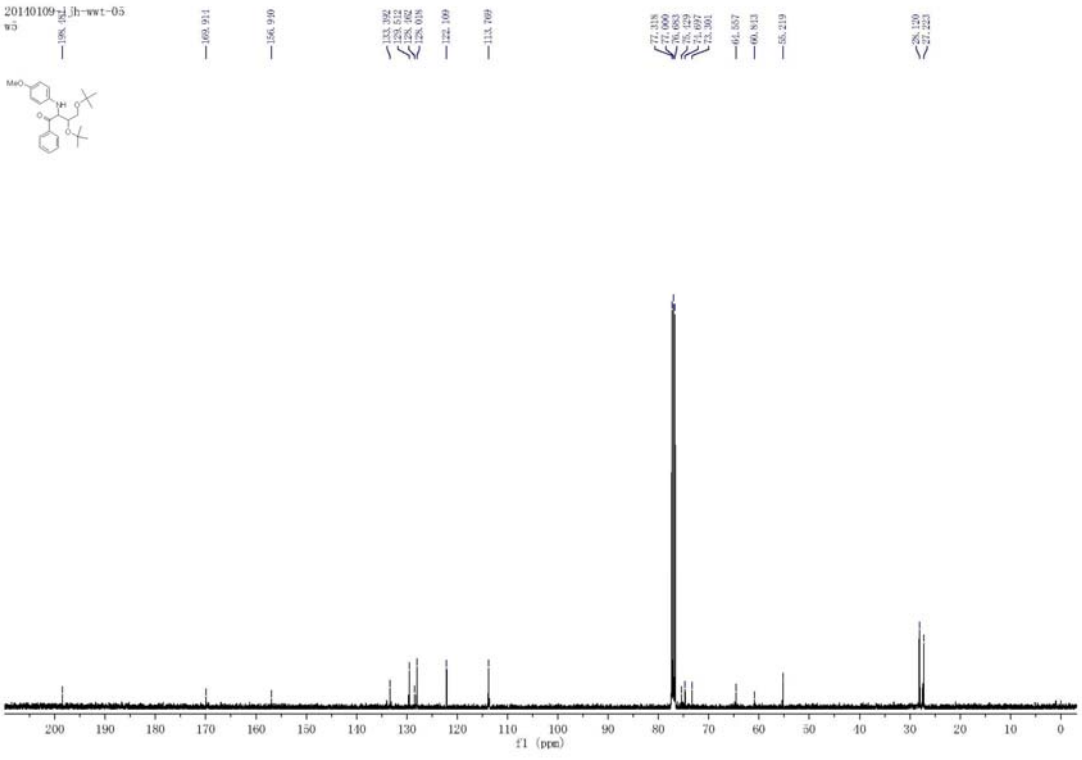
4-*tert*-Butoxy-3-(cyclohexyloxy)-2-(4-methoxyphenylamino)-1-phenylbutan-1-one

(27)

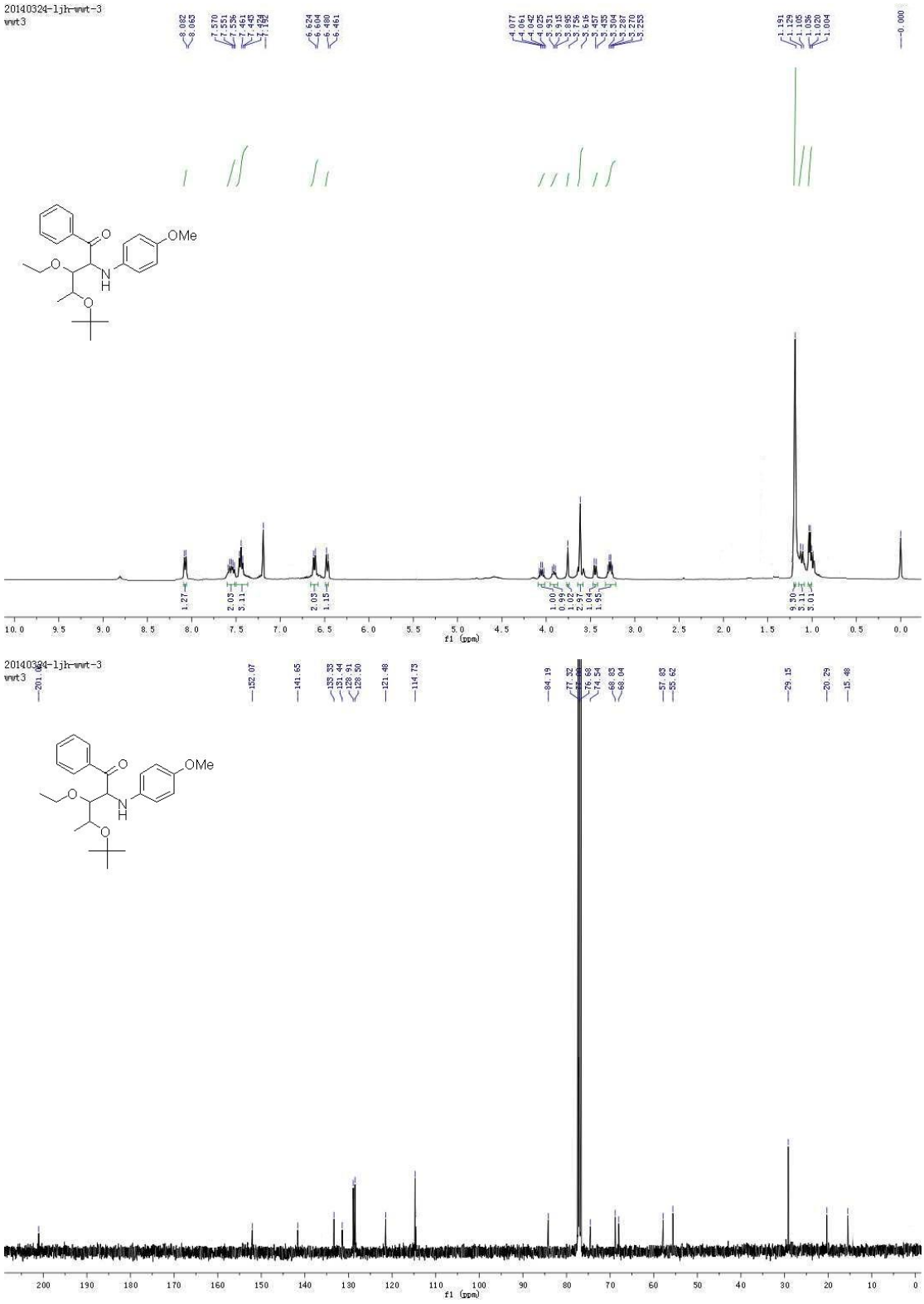


3,4-*di-tert*-Butoxy-2-(4-methoxyphenylamino)-1-phenylbutan-1-one (28)

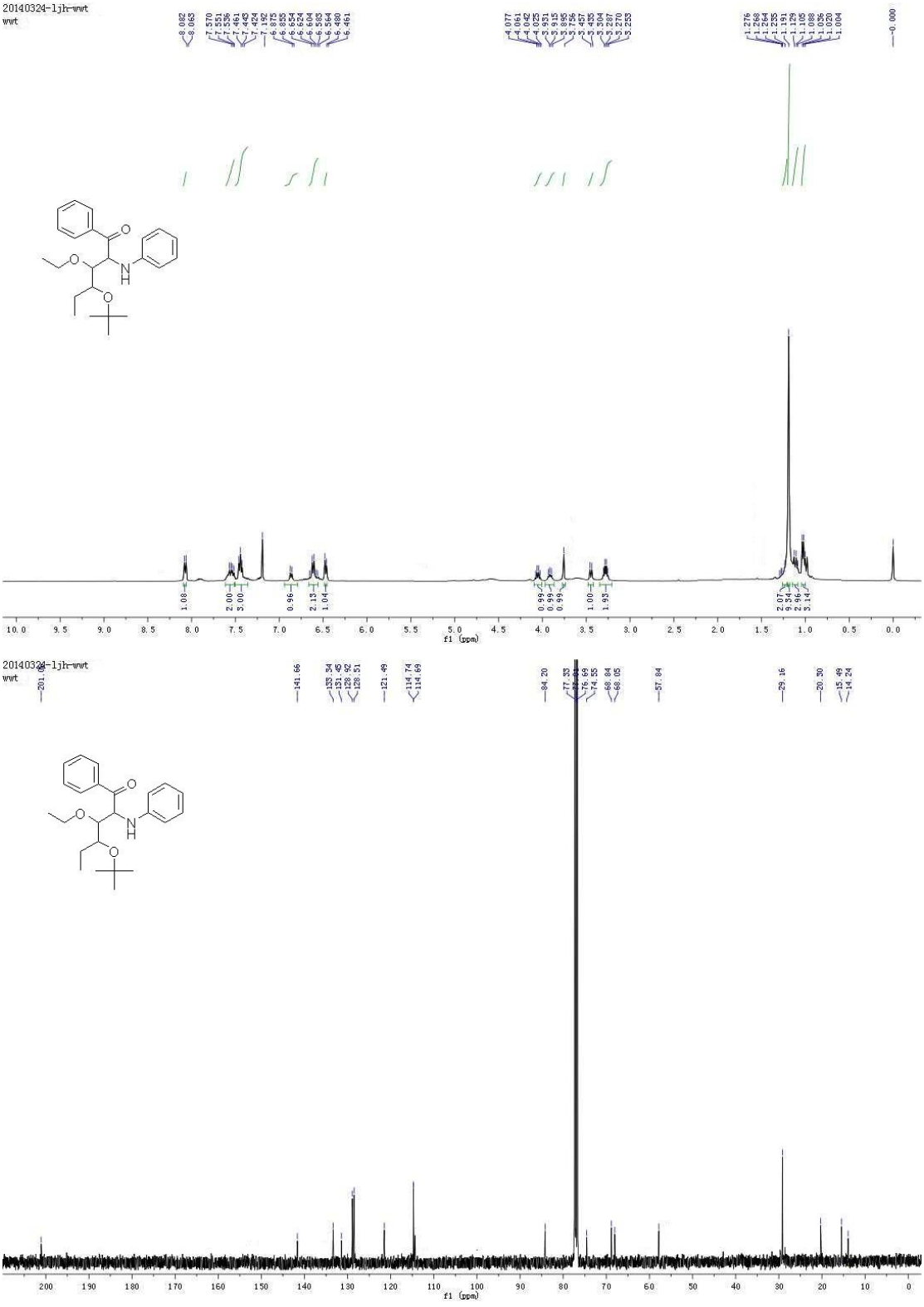




4-*tert*-Butoxy-3-ethoxy-2-(4-methoxyphenylamino)-1-phenylpentan-1-one (29)



4-*tert*-Butoxy-3-ethoxy-1-phenyl-2-(phenylamino)hexan-1-one (30)



2-(3-Hydroxytetrahydrofuran-2-yl)-1-phenyl-2-(phenylamino)ethanone (33)