Supporting Information

Photochemically Induced Coupling Reaction of C(sp^3)–H Bonds and 4-Cyanopyridine

Tamaki Hoshikawa and Masayuki Inoue*

Graduate School of Pharmaceutical Sciences, The University of Tokyo,

Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

Contents

General Information

All reactions sensitive to air or moisture were carried out under argon atmosphere and anhydrous conditions unless otherwise noted. Reagents were used as supplied unless otherwise stated. Analytical thin-layer chromatography (TLC) was performed using E. Merck Silica gel 60 F254 pre-coated plates. Flash column chromatography was generally performed using 40-50 μm Silicagel 60N (Kanto) or 75 μm Activated Alumina (Wako). ^{1}H and ^{13}C NMR spectra were recorded on a JEOL JNM-ECX-500 (500 MHz), JNM-ECA-500 (500 MHz), or a JNM-ECS-400 (400 MHz) spectrometer. Chemical shifts are reported in δ (ppm) with reference to residual solvent signals [^{1}H-NMR: CDCl$_3$ (7.26); ^{13}C-NMR: CDCl$_3$ (77.0)]. Signal patterns are indicated as s, singlet; d, doublet; t, triplet; q, quartet; m, multiplet; br, broad. IR spectra were recorded on a JASCO FT/IR-4100 spectrometer. ESI-TOF mass spectra were recorded on a BRUKER DALTONICS micrOTOF II or JEOL JMS-T100LP instrument (HRMS). UV irradiation was carried out by using a Riko 100 W medium-pressure mercury lamp.

Procedure for Photochemically-Induced Coupling Reaction with 4-Cyanopyridine

To a MeCN/H$_2$O (2:1, 0.04 M) solution of 4-cyanopyridine **2** (16.3 mg, 157 μmol) in a test tube were added benzophenone (14.3 mg, 78.5 μmol) and cumene **1a** (44 μL, 313 μmol) at room temperature. The mixture was degassed by freeze-thaw procedure for 3 times. The test tube was placed at 5 cm distance from a UV-lamp and irradiated with a Riko 100 W medium-pressure mercury lamp at room temperature for 12 h. Then, the reaction mixture was treated with saturated aqueous sodium bicarbonate. The mixture was extracted with AcOEt (20 mL x 3), washed with brine, dried over Na$_2$SO$_4$, and concentrated. The analysis of crude's ^{1}H NMR chart indicated that the desired product **3a** was formed in 92% yield along with the formation of α,α-diphenyl-4-pyridylmethanol **4** in 7% yield. The residue was purified with flash column chromatography (hexane/AcOEt 5:1) to give the

pyridine derivative **3a** in 90% yield (27.7 mg).

Procedure for Photochemically-Induced Coupling Reaction on a Gram Scale

To a MeCN/H_2O (2:1, 0.4 M) solution of 4-cyanopyridine **2** (1.03 g, 9.89 mmol) in a 50 mL flask were added benzophenone (180 mg, 0.989 mmol) and cumene **1a** (2.76 mL, 19.8 mmol) at room temperature. The mixture was degassed by freeze-thaw procedure for 3 times. The flask was placed at 5 cm distance from a UV-lamp and irradiated with a Riko 100 W medium-pressure mercury lamp at room temperature for 160 h. Then, the reaction mixture was treated with saturated aqueous sodium bicarbonate. The mixture was extracted with AcOEt (40 mL x 3), washed with brine, dried over Na_2SO_4, and concentrated. The residue was purified with flash column chromatography (hexane/AcOEt 5:1) to give the pyridine derivative **3a** in 78% yield (1.52 g) along with the recovery of 4-cyanopyridine **2** in 10% yield (100 mg).

Analytical Data

4-(2-phenylpropan-2-yl)pyridine (3a):

90% yield (27.7 mg); colorless oil; IR (neat) 1596, 1491, 1410, 824, 765, 700 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.68 (6H, s), 7.13 (2H, dd, J = 1.4, 4.6 Hz), 7.18-7.25 (3H, m), 7.29 (2H, m), 8.48 (2H, d, J = 6.0 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 29.9, 42.8, 122.1, 126.2, 126.6, 128.2, 148.6, 149.5, 159.6; HRMS (ESI-TOF) calcd for C$_{14}$H$_{16}$N (M+H)$^+$ 198.1277, found 198.1301.
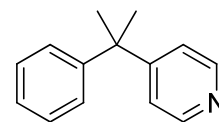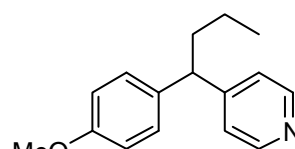
4-(1-phenylbutyl)pyridine (3b):

72% yield (23.8 mg); colorless oil; IR (neat) 1596, 1494, 1452, 1414, 815, 743, 700 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.93 (3H, t, J = 7.4 Hz), 1.28 (2H, m), 2.01 (2H, m), 3.88 (1H, t, J = 7.8 Hz), 7.15 (2H, dd, J = 1.4, 4.6 Hz), 7.18-7.24 (3H, m), 7.30 (2H, m), 8.47 (2H, d, J = 6.0 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 13.9, 20.9, 37.1, 50.5, 123.3, 126.6, 127.9, 128.6, 143.3, 149.7, 154.2; HRMS (ESI-TOF) calcd for C$_{15}$H$_{18}$N (M+H)$^+$ 212.1434, found 212.1435.
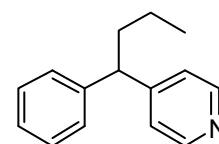
4-(1-(4-methoxyphenyl)butyl)pyridine (3c):

83% yield (29.4 mg); colorless oil; IR (neat) 1598, 1511, 1462, 1415, 1249, 1035, 824 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.92 (3H, t, J = 7.3 Hz), 1.26 (2H, m), 1.98 (2H, m), 3.77 (3H, s), 3.83 (1H, t, J = 7.8 Hz), 6.83 (2H, dd, J = 2.3, 6.4 Hz), 7.10-7.15 (4H, m), 8.46 (2H, dd, J = 1.6, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 13.9, 20.9, 37.2, 49.6, 55.2, 113.9, 123.1, 128.7, 135.3, 149.6, 154.7, 158.2; HRMS (ESI-TOF) calcd for C$_{16}$H$_{20}$NO (M+H)$^+$ 242.1539, found 242.1537.

4-(1-(pyridin-4-yl)butyl)phenyl acetate (3d):

71% yield (35.7 mg); colorless oil; IR (neat) 1761, 1597, 1504, 1415, 1201, 824 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.91 (3H, t, J = 7.3 Hz), 1.26 (2H, m), 1.98 (2H, q, J = 7.8 Hz), 2.27 (3H, s), 3.87 (1H, t, J = 7.8 Hz), 7.01 (2H, dd, J = 2.3, 6.9 Hz), 7.13 (2H, dd, J = 1.4, 4.6 Hz), 7.20 (2H, dd, J = 2.3, 6.9 Hz), 8.48 (2H, dd, J = 1.4, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 13.9, 20.8, 21.1, 37.1, 49.8, 121.6, 123.2, 128.7, 140.8, 149.2, 149.8, 153.8, 169.4; HRMS (ESI-TOF) calcd for C$_{17}$H$_{20}$NO$_2$ (M+H)$^+$ 270.1489, found 270.1484.
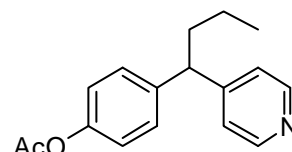
N-(4-(1-(pyridin-4-yl)butyl)phenyl)acetamide (3e):

63% yield (28.1 mg); colorless oil; IR (neat) 3254, 1668, 1602, 1538, 1513, 1413, 826 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.92 (3H, t, J = 7.3 Hz), 1.26 (2H, m), 1.98 (2H, q, J = 7.8 Hz), 2.15 (3H, s), 3.86 (1H, t, J = 7.8 Hz), 7.10-7.20 (4H, m), 7.35 (1H, brs), 7.43 (2H, d, J = 8.2 Hz), 8.48 (2H, d, J = 5.0 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 13.9, 20.8, 24.4, 37.0, 49.8, 120.2, 123.3, 128.3, 136.6, 138.9, 149.4, 154.5, 168.5; HRMS (ESI-TOF) calcd for C$_{17}$H$_{21}$N$_2$O (M+H)$^+$ 269.1648, found 269.1633.
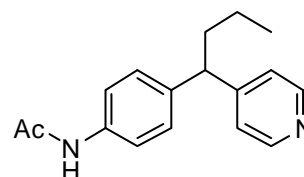
methyl 4-(1-(pyridin-4-yl)butyl)benzoate (3f):

65% yield (27.6 mg); colorless oil; IR (neat) 1721, 1596, 1436, 1415, 1281, 1112 cm^{-1}; ^{1}H NMR (500 MHz, CDCl$_3$) δ 0.93 (3H, t, J = 7.8 Hz), 1.27 (2H, sextet, J = 7.8 Hz), 2.02 (2H, q, J = 7.8 Hz), 3.89 (3H, s), 3.94 (1H, t, J = 7.8 Hz), 7.13 (2H, d, J = 5.8 Hz), 7.27 (2H, d, J = 8.0 Hz), 7.26 (2H, d, J = 8.0 Hz), 8.49 (2H, d, J = 5.8 Hz); ^{13}C NMR (125 MHz, CDCl$_3$) δ 13.9, 20.9, 36.9, 50.5, 52.1, 123.2, 127.9, 128.7, 130.0, 148.5, 149.8, 153.3, 166.8; HRMS (ESI-TOF) calcd for C$_{17}$H$_{20}$NO$_2$ (M+H)$^+$ 270.1489, found 270.1481.
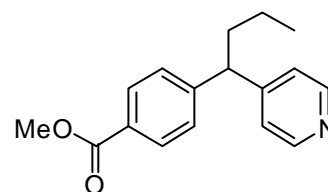
### 4-(1-(4-bromophenyl)butyl)pyridine (3g):

68% yield (29.7 mg); yellow oil; IR (neat) 1596, 1485, 1412, 1072, 811 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.92 (3H, t, J = 7.8 Hz), 1.26 (2H, m), 1.97 (2H, m), 3.84 (1H, t, J = 7.8 Hz), 7.07 (2H, d, J = 8.7 Hz), 7.11 (2H, d, J = 6.0 Hz), 7.41 (2H, d, J = 8.7 Hz), 8.48 (2H, d, J = 6.0 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 13.9, 20.8, 36.9, 49.8, 120.5, 123.1, 129.6, 131.7, 142.3, 149.8, 153.5; HRMS (ESI-TOF) calcd for C$_{15}$H$_{17}$NBr (M+H)$^+$ 290.0539, found 290.0532.
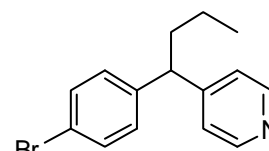
### 4-(1-(4-chlorophenyl)butyl)pyridine (3h):

70% yield (25.1 mg); yellow oil; IR (neat) 1596, 1490, 1462, 1412, 1092, 814 cm^{-1}; ^{1}H NMR

(400 MHz, CDCl$_3$) δ 0.92 (3H, t, J = 7.3 Hz), 1.26 (2H, m), 1.98 (2H, m), 3.85 (1H, t, J = 7.8 Hz), 7.10-7.15 (4H, m), 7.27 (2H, m), 8.48 (2H, d, J = 1.4, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 13.9, 20.8, 37.0, 49.8, 123.1, 128.7, 129.2, 132.4, 141.7, 149.8, 153.6; HRMS (ESI-TOF) calcd for C$_{15}$H$_{17}$NCl (M+H)$^+$ 246.1044, found 246.1035.
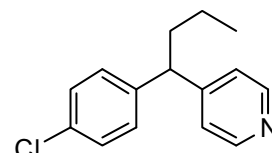
4-phenyl-4-(pyridin-4-yl)butyl benzoate (3i):

79% yield (38.8 mg); colorless oil; IR (neat) 1715, 1597, 1494, 1452, 1415, 1275, 1117, 713 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.75 (2H, m), 1.27 (2H, m), 3.95 (1H, t, J = 7.8 Hz), 4.33 (2H, dt, J = 0.9, 6.0 Hz), 7.20 (2H, dd, J = 1.4, 4.6 Hz), 7.23 (3H, m), 7.32 (2H, m), 7.44 (2H, t, J = 7.3 Hz), 7.56 (1H, t, J = 7.3 Hz), 8.01 (2H, d, J = 7.3 Hz), 8.50 (2H, dd, J = 1.4, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 27.1, 31.3, 50.3, 64.4, 123.1, 126.9, 127.8 128.3, 128.8, 129.5, 130.2, 132.9, 142.5, 149.8, 153.6, 166.5; HRMS (ESI-TOF) calcd for C$_{22}$H$_{22}$NO$_2$ (M+H)$^+$ 332.1645, found 332.1629.
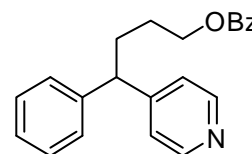
methyl 5-phenyl-5-(pyridin-4-yl)pentanoate (3j):

83% yield (28.4 mg); colorless oil; IR (neat) 1735, 1596, 1494, 1452, 1415, 1200, 744, 701 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.59 (2H, m), 2.07 (2H, m), 2.34 (2H, t, J = 7.3 Hz), 3.65 (3H, s), 3.88 (1H, t, J = 7.8 Hz), 7.15 (2H, d, J = 1.8, 4.6 Hz), 7.21 (3H, m), 7.30 (2H, m), 8.47 (2H, d, J = 1.8, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 23.2, 33.7, 34.2, 50.6, 51.5, 123.1, 126.8, 127.8, 128.7, 142.7, 149.8, 153.6, 173.6; HRMS (ESI-TOF) calcd for C$_{17}$H$_{20}$NO$_2$ (M+H)$^+$ 270.1489, found 270.1476.
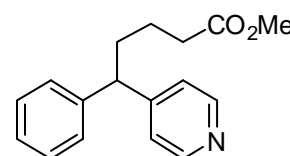
4-(1-(4-bromophenyl)butyl)pyridine (3k):

62% yield (27.8 mg); yellow oil; IR (neat) 1595, 1494, 1452, 1414, 743, 701 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.82 (2H, m), 2.22 (2H, m), 3.40 (2H, t, J = 6.4 Hz), 3.89 (1H, t, J = 7.8 Hz), 7.16 (2H, dd, J = 1.8, 4.6 Hz), 7.22 (3H, m), 7.31 (2H, m), 8.50 (2H, d, J = 1.8, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 30.8, 33.3, 33.4, 50.0, 123.0, 126.9, 127.8, 128.8, 142.4, 149.9, 153.4; HRMS (ESI-TOF) calcd for C$_{15}$H$_{17}$NBr (M+H)$^+$ 290.0539, found 290.0525.
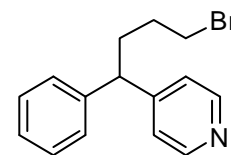
4-benzylpyridine (3l): [CAS: 2116-65-6]:[1]

51% yield (17.0 mg); colorless oil; ^{1}H NMR (400 MHz, CDCl$_3$) δ 3.97 (2H, s), 7.10 (2H, dd, J = 1.8, 4.6 Hz), 7.17 (2H, d, J = 7.3 Hz), 7.25 (1H, t,
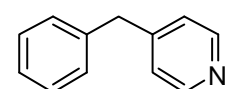
(1) Wu, G. G.; Chen, F. X.; LaFrance, D.; Liu, Z.; Greene, S. G.; Wong, Y.-S.; Xie, J. *Org. Lett.* **2011**, *13*, 5220.

J = 7.8 Hz), 7.32 (2H, m), 8.49 (2H, dd, J = 1.8, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 41.2, 124.2, 126.7, 128.7, 129.0, 138.8, 149.7, 150.0.

4-(1-phenylcyclohexyl)pyridine (3m):

50% yield (23.5 mg); colorless oil; IR (neat) 1593, 1494, 1449, 1411, 810, 759, 699 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.45-1.65 (6H, m), 2.20-2.35 (4H, m), 7.15-7.20 (3H, m), 7.25-7.35 (4H, m), 8.47 (2H, d, J = 6.4 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 22.6, 26.1, 36.3, 46.1, 122.4, 126.0, 127.0, 128.5, 146.5, 149.7, 157.8; HRMS (ESI-TOF) calcd for C$_{17}$H$_{20}$N (M+H)$^+$ 238.1596, found 238.1608.
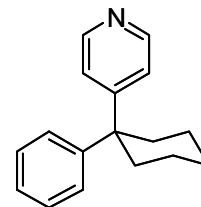
3-(1-(pyridin-4-yl)ethyl)phenyl acetate (3n):

83% yield (27.3 mg); colorless oil; IR (neat) 1765, 1595, 1486, 1442, 1414, 1203, 826, 801 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.62 (3H, d, J = 7.3 Hz), 2.28 (3H, s), 4.12 (1H, q, J = 7.3 Hz), 6.90 (1H, s), 6.96 (1H, d, J = 8.0 Hz), 7.05 (1H, d, J = 8.0 Hz), 7.12 (2H, d, J = 6.0 Hz), 7.31, (1H, t, J = 8.0 Hz), 8.49 (2H, d, J = 6.0 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 20.9, 21.1, 43.9, 119.8, 120.7, 122.9, 125.1, 129.5, 146.0, 149.8, 150.8, 154.5, 169.4; HRMS (ESI-TOF) calcd for C$_{15}$H$_{15}$NO$_2$Na (M+Na)$^+$ 264.0995, found 264.0999.
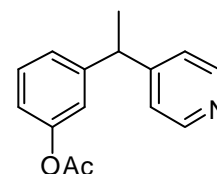
2-(1-(pyridin-4-yl)ethyl)phenyl acetate (3o):

68% yield (21.9 mg); colorless oil; IR (neat) 1764, 1597, 1488, 1451, 1414, 1201, 829, 755 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.59 (3H, d, J = 7.3 Hz), 2.16 (3H, s), 4.23 (1H, q, J = 7.3 Hz), 7.04 (1H, dd, J = 1.4, 7.8 Hz), 7.09 (2H, dd, J = 1.8, 4.6 Hz), 7.20-7.30 (3H, m), 8.47 (2H, dd, J = 1.8, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 20.2, 20.8, 38.1, 122.7, 122.8, 126.3, 127.8, 128.3, 135.9, 148.4, 149.6, 154.4, 169.0; HRMS (ESI-TOF) calcd for C$_{15}$H$_{16}$NO$_2$ (M+H)$^+$ 242.1176, found 242.1175.
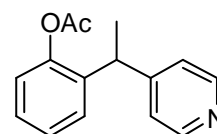
methyl 2-(4-(2-methyl-1-(pyridin-4-yl)propyl)phenyl)propanoate (3p):

75% yield based on the NMR analysis using CH$_2$Br$_2$ as an internal standard, 9.2 mg (20%) was isolated; colorless oil; IR (neat) 1736, 1595, 1459, 1415, 1210, 1166, 809 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.85 (3H, d, J = 6.4 Hz), 0.87 (3H, d, J = 6.4 Hz), 1.45 (3H, d, J = 7.3 Hz), 2.46 (1H, m), 3.37 (1H, d, J = 10.5 Hz), 3.64 (3H, s), 3.67 (1H, q, J = 7.3 Hz), 7.20 (6H, m), 8.46 (2H, dd, J = 1.4, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 18.5, 21.5, 21.6, 31.4, 44.9, 52.0, 59.9, 123.5, 127.7, 128.2, 138.7, 141.7, 149.6, 153.8, 175.0; HRMS (ESI-TOF) calcd for C$_{19}$H$_{23}$NO$_2$Na (M+Na)$^+$ 320.1621, found 320.1607.
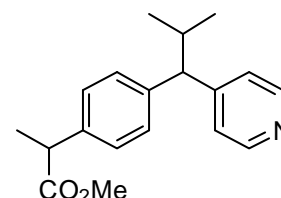
4-(butoxy(phenyl)methyl)pyridine (3q):

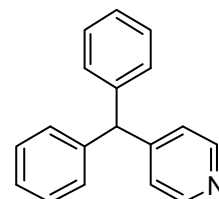66% yield (28.6 mg); colorless oil; IR (neat) 1596, 1493, 1453, 1412, 1100, 790, 740, 700 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.92 (3H, t, J = 7.3 Hz), 1.42 (2H, m), 1.63 (2H, m), 3.45 (2H, m), 5.29 (1H, s), 7.25-7.35 (7H, m), 8.53 (2H, dd, J = 1.4, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 13.9, 19.4, 31.9, 69.1, 82.3, 121.6, 127.1, 128.0, 128.6, 141.0, 149.7, 151.6; HRMS (ESI-TOF) calcd for C$_{16}$H$_{20}$NO (M+H)$^+$ 242.1539, found 242.1525.
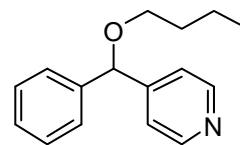
4-benzhydrylpyridine (3r) [CAS: 3678-72-6]:[2]

87% yield (38.5 mg); colorless solid; ^{1}H NMR (400 MHz, CDCl$_3$) δ 5.51 (1H, s), 7.05 (2H, dd, J = 1.4, 4.6 Hz), 7.09 (4H, m), 7.20-7.35 (6H, m), 8.51 (2H, dd, J = 1.4, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 56.2, 124.7, 126.9, 128.6, 129.3, 142.0, 149.6, 152.9.

4-(1,1-diphenylpropyl)pyridine (3s):

74% yield (31.0 mg); colorless oil; IR (neat) 1592, 1493, 1445, 1410, 815, 757, 702 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.78 (3H, t, J = 7.3 Hz), 2.62 (2H, q, J = 7.3 Hz), 7.20-7.35 (12H, m), 8.49 (2H, dd, J = 1.8, 5.0 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 10.1, 32.1, 56.8, 124.4, 126.3, 128.0, 129.1, 145.5, 149.3, 156.6; HRMS (ESI-TOF) calcd for C$_{20}$H$_{20}$N (M+H)$^+$ 274.1590, found 274.1576.
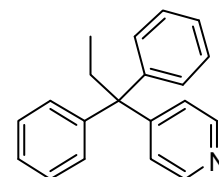
4-(2,3-dihydro-1H-inden-1-yl)pyridine (3t):

89% yield (23.0 mg); colorless oil; IR (neat) 1597, 1478, 1458, 1414, 819, 747 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 2.04 (1H, ddt, J = 8.2, 8.7, 12.8 Hz), 2.61 (1H, dddd, J = 4.6, 8.2, 8.7, 12.8 Hz), 2.95-3.15 (2H, m), 4.32 (1H, t, J = 8.2 Hz), 6.94 (1H, d, J = 7.3 Hz), 7.11 (2H, dd, J = 1.6, 4.6 Hz), 7.15 (1H, t, J = 7.3 Hz), 7.22 (1H, t, J = 7.3 Hz), 7.31 (1H, d, J = 7.3 Hz), 8.51 (2H, dd, J = 1.6, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 31.8, 35.8, 50.8, 123.3, 124.6, 124.7, 126.6, 127.1, 144.3, 144.9, 149.8, 154.3; HRMS (ESI-TOF) calcd for C$_{14}$H$_{14}$N (M+H)$^+$ 196.1121, found 196.1127.
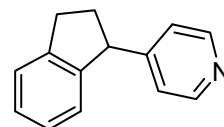
4-(1,2,3,4-tetrahydronaphthalen-1-yl)pyridine (3u):

70% yield (28.4 mg); colorless oil; IR (neat) 1596, 1492, 1450, 1412, 815, 743 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.70-1.90 (3H, m), 2.17 (1H, m),
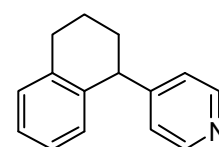
(2) Niwa, T.; Yorimitsu, H.; Oshima, K. *Org. Lett.* **2007**, *9*, 2373.

2.80-3.00 (2H, m), 4.12 (1H, dd, J = 6.0, 6.9 Hz), 6.78 (1H, d, J = 7.8 Hz), 7.02 (2H, dd, J = 1.8, 4.6 Hz), 7.06 (1H, dd, J = 7.3, 7.8 Hz), 7.16 (2H, d, J = 7.3 Hz), 8.49 (2H, dd, J = 1.8, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 20.5, 29.5, 32.5, 44.9, 124.1, 125.9, 126.4, 129.2, 130.0, 137.2, 137.6, 149.6, 156.3; HRMS (ESI-TOF) calcd for C$_{15}$H$_{16}$N (M+H)$^+$ 210.1277, found 210.1273.
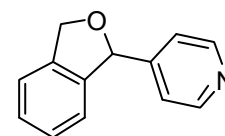
4-(1,3-dihydroisobenzofuran-1-yl)pyridine (3v):

75% yield (30.3 mg); yellow oil; IR (neat) 1599, 1462, 1414, 1044, 802, 748 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 5.25 (1H, dd, J = 1.8, 12.4 Hz), 5.37 (1H, dd, J = 2.8, 12.4 Hz), 6.14 (1H, brs), 7.07 (1H, d, J = 7.8 Hz), 7.20-7.35 (5H, m), 8.58 (2H, dd, J = 1.4, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 73.7, 84.6, 121.16, 121.24, 121.9, 127.7, 128.1, 138.7, 140.4, 150.0, 151.1; HRMS (ESI-TOF) calcd for C$_{13}$H$_{12}$NO (M+H)$^+$ 198.0913, found 198.0908.

tert-butyl 1-(pyridin-4-yl)isoindoline-2-carboxylate (3w):

77% yield (32.0 mg), mixture of two rotamers; amorphous; IR (neat) 1699, 1598, 1475, 1391, 1170, 747 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.24 (45/8H, s), 1.47 (27/8H, s), 4.86 (6/8H, s), 4.91 (10/8H, s), 5.83 (5/8H, s), 5.96 (3/8H, s), 6.97 (5/8H, d, J = 7.8 Hz), 7.02 (3/8H, d, J = 7.8 Hz), 7.15-7.25 (3H, m), 7.29 (2H, m), 8.54 (2H, d, J = 5.5 Hz); Detectable signals of ^{13}C NMR (100 MHz, CDCl$_3$) δ 28.1, 28.4, 52.7, 53.0, 66.2, 66.5, 80.4, 121.4, 121.5, 122.7, 123.0, 123.2, 123.3, 127.8, 128.2, 135.7, 140.0, 149.8, 152.9, 154.0; HRMS (ESI-TOF) calcd for C$_{18}$H$_{21}$N$_2$O$_2$ (M+H)$^+$ 297.1598, found 297.1584.
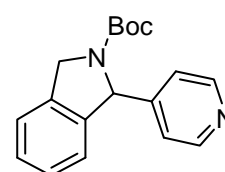
tert-butyl 1-(pyridin-4-yl)-3,4-dihydroisoquinoline-2(1H)-carboxylate (3x):

82% yield (40.3 mg), mixture of two rotamers; colorless oil; IR (neat) 1693, 1595, 1455, 1415, 1166, 750 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.48 (9H, s), 2.75 (1H, brs), 2.93 (1H, brs), 3.27 (1H, ddd, J = 4.6, 9.6, 13.2 Hz), 3.89 (1/2H, brs), 4.02 (1/2H, brs), 6.12 (1/2H, brs), 6.34 (1/2H, brs), 7.08 (1H, brs), 7.14 (2H, d, J = 6.0 Hz), 7.15-7.30 (3H, m), 8.51 (2H, d, J = 6.0 Hz); Detectable signals of ^{13}C NMR (100 MHz, CDCl$_3$) δ 28.35, 28.42, 38.4, 39.4, 56.3, 57.4, 80.5, 122.8, 126.3, 127.5, 128.2, 128.9, 134.1, 135.3, 149.6, 151.8, 154.9; HRMS (ESI-TOF) calcd for C$_{19}$H$_{23}$N$_2$O$_2$ (M+H)$^+$ 311.1754, found 311.1750.
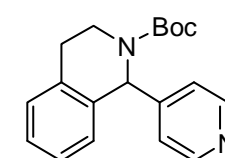
4-(pyridin-4-yl)chroman-2-one (3y):

84% yield (31.3 mg); yellow oil; IR (neat) 1770, 1597, 1486, 1455, 1416, 1216, 824, 759 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 3.03 (1H, dd, J = 6.4, 16.0 Hz), 3.11 (1H, dd, J = 6.4, 16.0 Hz), 4.34 (1H, t, J = 6.4 Hz), 7.00 (1H,
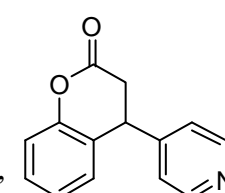
d, J = 6.8 Hz), 7.05-7.20 (4H, m), 7.35 (1H, m), 8.57 (2H, dd, J = 1.4, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 36.1, 40.1, 117.5, 122.6, 123.7, 124.9, 128.1, 129.5, 149.2, 150.5, 151.7, 166.6; HRMS (ESI-TOF) calcd for C$_{14}$H$_{12}$NO$_2$ (M+H)$^+$ 226.0863, found 226.0857.

4-(pyridin-4-yl)-3,4-dihydroquinolin-2(1H)-one (3z):

84% yield (29.2 mg); colorless solid; m.p. 210-213 °C; IR (neat) 3208, 1681, 1595, 1488, 1417, 825, 756 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 2.90 (1H, dd, J = 7.3, 16.5 Hz), 3.00 (1H, dd, J = 6.4, 16.5 Hz), 4.29 (1H, 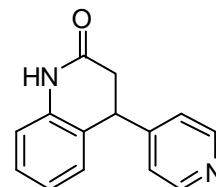dd, J = 6.4, 7.3 Hz), 6.90-7.05 (3H, m), 7.13 (2H, d, J = 6.0 Hz), 7.25 (1H, t, J = 7.8 Hz), 8.57 (2H, d, J = 6.0 Hz), 9.11 (1H, brs); ^{13}C NMR (100 MHz, CDCl$_3$) δ 37.5, 41.3, 116.1, 122.9, 123.6, 124.4, 128.3, 128.7, 137.1, 150.1, 150.7, 170.0; HRMS (ESI-TOF) calcd for C$_{14}$H$_{13}$N$_2$O (M+H)$^+$ 225.1022, found 225.1041.

Pyridinyl O-acetoxy podocarpic acid methyl ester (3aa):

71% (45.3 mg); **3aa-α** / **3aa-β** = 2:1; amorphous.
^{1}H NMR (400 MHz, CDCl$_3$) δ 0.81 (2H, s), 0.86 (2/3H, dt, J = 4.6, 13.7 Hz), 1.05 (2H, s), 1.10 (1/3H, dt, J = 4.1, 13.7 Hz), 1.16 (1H, s), 1.20-1.50 (10/3H, m), 1.62 (2/3H, m), 1.73 (2/3H, dd, J = 1.4, 12.4 Hz), 1.85-2.25 (10/3H, m), 2.27 (1H, s), 2.30 (2H, s), 2.38 (1/3H, dd, J = 6.0, 14.2 Hz), 2.52 (2/3H, ddd, J = 6.0, 12.8, 12.8 Hz), 3.63 (1H, s), 3.65 (2H, s), 3.99 (1/3H, dd, J = 6.0, 12.4 Hz), 4.31 (2/3H, d, J = 6.0 Hz), 6.66 (1/3H, d, J = 8.7 Hz), 6.74 (1/3H, dd, J = 2.3, 8.7 Hz), 6.80-7.00 (8/3H, m), 7.03 (1/3H, d, J = 2.3 Hz), 7.07 (2/3H, d, J = 1.8 Hz), 7.11 (2/3H, dd, J = 1.4, 4.6 Hz), 8.48 (4/3H, d, J = 6.0 Hz), 8.53 (2/3H, d, J = 6.0 Hz); Detectable signals of ^{13}C NMR (100 MHz, CDCl$_3$) δ 19.7, 19.8, 21.1, 21.2, 22.6, 23.4, 27.9, 28.4, 28.8, 31.5, 37.0, 37.4, 38.8, 38.9, 39.3, 43.1, 43.9, 44.5, 45.9, 48.3, 51.39, 51.44, 51.7, 118.3, 118.8, 119.1, 119.5, 124.07, 124.13, 130.6, 131.6, 131.7, 134.0, 149.4, 149.5, 149.7, 149.9, 150.3, 150.6, 156.2, 156.3, 169.5, 169.6, 177.3, 177.5; HRMS (ESI-TOF) calcd for C$_{25}$H$_{30}$NO$_4$ (M+H)$^+$ 408.2169, found 408.2159.
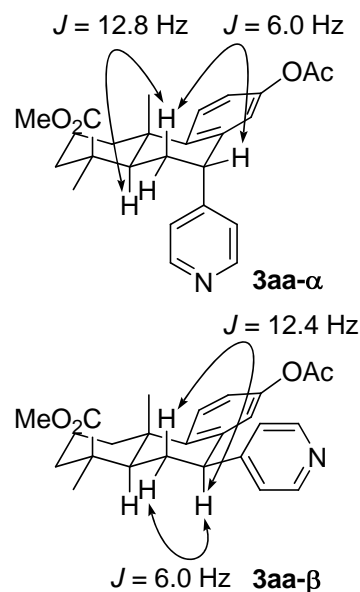
Preparation of *O-pivaloyl totarol* (1bb):

To a solution of (+)-totarol (94.0 mg, 328 μmol) in pyridine (1.6 mL, 0.2 M) were added pivaloyl chloride (480 μL, 3.90 mmol) and DMAP (2.0 mg, 16.4 μmol) at room temperature. The mixture was refluxed on 110 °C for three days, then the reaction was quenched with water. The mixture was extracted with Et$_2$O (20 mL x 3), washed with brine,
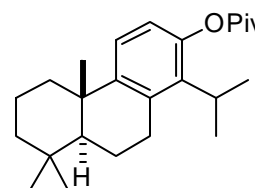
dried over Na_2SO_4, and concentrated. The residue was purified with flash column chromatography (hexane/AcOEt 40:1) to afford *O*-pivaloyl totarol **1aa** in 100% yield (122 mg): white solid; m.p. 113-115 °C; IR (neat) 1750, 1473, 1123, 733 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.93 (3H, s), 0.96 (3H, s), 1.21 (3H, s), 1.23-1.31 (9H, m), 1.39 (9H, s), 1.48 (1H, d, J = 13.8 Hz), 1.55-1.80 (3H, m), 1.93 (1H, dd, J = 7.8, 13.3 Hz), 2.25 (1H, d, J = 12.8 Hz), 2.78 (1H, m), 2.95 (1H, dd, J = 6.4, 17.4 Hz), 3.29 (1H, quintet, J = 7.3 Hz), 6.68 (1H, d, J = 8.7 Hz), 7.14 (1H, d, J = 8.7 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 19.2, 19.4, 20.69, 20.73, 21.6, 25.0, 27.0, 27.3, 28.8, 33.2, 33.3, 38.0, 39.1, 39.3, 41.4, 49.3, 120.5, 123.2, 134.0, 136.4, 147.6, 147.7, 177.5; HRMS (ESI-TOF) calcd for $C_{25}H_{38}O_2Na$ (M+Na)$^+$ 393.2764, found 393.2772.

Pyridinyl O-pivaloyl totarol (3bb):

72% (52.8 mg); **3bb-α** / **3bb-β** = 2:3; colorless oil.

3bb-α: IR (neat) 1748, 1595, 1471, 1122, 732 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.39 (3H, s), 0.69 (3H, d, J = 6.8 Hz), 0.84 (3H, s), 1.06 (1H, m), 1.14 (3H, d, J = 6.8 Hz), 1.23-1.40 (15H, m), 1.50-1.85 (3H, m), 2.19 (1H, ddd, J = 6.0, 13.3, 13.3 Hz), 2.30 (1H, d, J = 13.3 Hz), 2.78 (1H, quintet, J = 6.8 Hz), 4.41 (1H, d, J = 6.0 Hz), 6.81 (1H, d, J = 9.1 Hz), 6.91 (2H, brs), 7.26 (1H, d, J = 9.1 Hz), 8.0 Hz,46 (2H, d, J = 4.1 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 19.4, 19.7, 20.9, 21.6, 25.5, 27.3, 27.9, 28.1, 32.3, 32.5, 38.9, 39.1, 39.3, 40.9, 43.2, 43.6, 122.6, 123.8, 124.2, 133.3, 137.1, 148.2, 148.8, 149.3, 156.7, 177.4; HRMS (ESI-TOF) calcd for $C_{30}H_{42}NO_2$ (M+H)$^+$ 448.3210, found 448.3197.

NOE 5.3 %
J = 13.3 Hz J = 6.0 Hz
OPiv
i-Pr
3bb-α
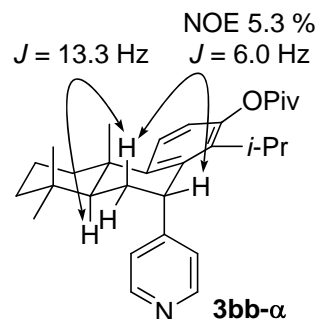
3bb-β: IR (neat) 1747, 1595, 1472, 1122, 732 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.55 (3H, d, J = 6.9 Hz), 0.83 (3H, s), 0.96 (3H, s), 1.08 (3H, d, J = 6.9 Hz), 1.15-1.90 (19H, m), 2.25-2.35 (2H, m), 2.86 (1H, quintet, J = 6.9 Hz), 4.37 (1H, dd, J = 9.6, 9.6 Hz), 6.78 (1H, d, J = 8.7 Hz), 6.94 (2H, brs), 7.24 (1H, d, J = 8.7 Hz), 8.47 (2H, d, J = 5.0 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 19.1, 19.2, 21.1, 21.3, 24.7, 27.3, 28.5, 31.5, 32.9, 33.3, 38.1, 39.1, 39.7, 41.4, 44.6, 48.8, 122.2, 122.5, 123.1, 134.4, 137.4, 148.9, 149.6, 149.8, 158.9, 177.4; HRMS (ESI-TOF) calcd for $C_{30}H_{42}NO_2$ (M+H)$^+$ 448.3210, found 448.3190.

J = 9.6 Hz
OPiv
MeO$_2$C   *i*-Pr
N
J = 9.6 Hz   **3bb-β**
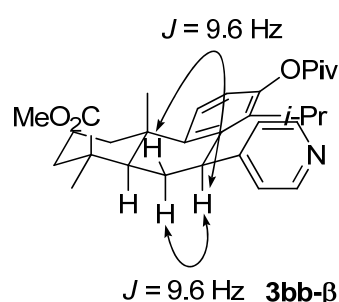
4-(1-(thiophen-2-yl)butyl)pyridine (3cc):

67% yield (22.9 mg); yellow oil; IR (neat) 1597, 1414, 822, 697 cm^{-1}; ^{1}H NMR (500 MHz, CDCl$_3$) δ 0.93 (3H, t, J = 7.5 Hz), 1.20-1.40 (2H, m), 1.90-2.10 (2H, m), 4.12 (1H, t, J = 7.5 Hz), 6.83 (1H, d, J = 3.4 Hz), 6.93 (1H, dd, J = 3.4, 5.2 Hz), 7.10-7.20 (3H, m), 8.51 (2H, d, J = 6.3 Hz); ^{13}C
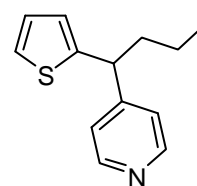
NMR (125 MHz, CDCl$_3$) δ 13.8, 20.9, 38.9, 45.9, 123.0, 123.9, 124.3, 126.7, 147.2, 149.8, 153.6; HRMS (ESI-TOF) calcd for C$_{13}$H$_{16}$NS (M+H)$^+$ 218.0998, found 218.1000.

4-(1-(thiophen-3-yl)butyl)pyridine (3dd):

47% yield (19.3 mg); yellow oil; IR (neat) 1598, 1415, 824, 775 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.92 (3H, t, J = 7.8 Hz), 1.20-1.40 (2H, m), 1.90-2.10 (2H, m), 3.96 (1H, t, J = 7.8 Hz), 6.87 (1H, dd, J = 1.4, 5.0 Hz), 7.01 (1H, dd, J = 1.4, 2.7 Hz), 7.13 (2H, dd, J = 1.8, 4.6 Hz), 7.25 (1H, dd, J = 2.7, 5.0 Hz), 8.49 (2H, dd, J = 1.8, 4.6 Hz); ^{13}C NMR (125 MHz, CDCl$_3$) δ 13.9, 20.8, 37.6, 46.1, 120.6, 123.2, 125.8, 127.3, 144.1, 149.7, 153.9; HRMS (ESI-TOF) calcd for C$_{13}$H$_{16}$NS (M+H)$^+$ 218.0998, found 218.0991.

4-(1-(furan-2-yl)pentyl)pyridine (3ee):
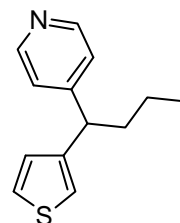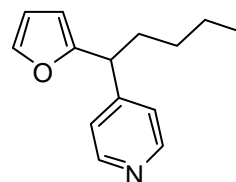
51% yield (14.2 mg); colorless oil; IR (neat) 1597, 1560, 1503, 1460, 1415, 1010, 801, 732 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 0.87 (3H, t, J = 7.3 Hz), 1.10-1.40 (4H, m), 1.87 (1H, m), 2.08 (1H, m), 3.89 (1H, t, J = 7.8 Hz), 6.10 (1H, d, J = 3.2 Hz), 6.30 (1H, dd, J = 1.8, 3.2 Hz), 7.15 (2H, dd, J = 1.4, 4.6 Hz), 7.32 (1H, d, J = 1.8 Hz), 8.51 (2H, dd, J = 1.4, 4.6 Hz); ^{13}C NMR (125 MHz, CDCl$_3$) δ 13.9, 22.4, 29.6, 33.8, 44.7, 105.9, 110.1, 123.2, 141.7, 149.8, 151.9, 156.1; HRMS (ESI-TOF) calcd for C$_{14}$H$_{18}$NO (M+H)$^+$ 216.1383, found 216.1392.

4-(cyclohex-2-enyl)pyridine (3ff) [CAS: 78905-51-8]:[3]

44% yield (9.8 mg); colorless oil; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.50-1.80 (3H, m), 1.95-2.15 (3H, m), 3.39 (1H, m), 5.66 (1H, dd, J = 1.8, 10.0 Hz), 5.95 (1H, ddd, J = 2.3, 3.6, 10.0 Hz), 7.15 (2H, d, J = 6.0 Hz), 8.50 (2H, d, J = 6.0 Hz); ^{13}C NMR (125 MHz, CDCl$_3$) δ 20.8, 24.8, 31.7, 41.1, 123.2, 128.1, 129.7, 149.6, 155.4.
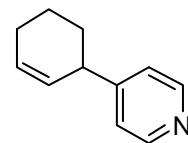
4-cyclooctylpyridine (3gg):

35% yield (11.1 mg); yellow oil; IR (neat) 1596, 1445, 1412, 832 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.50-1.90 (14H, m), 2.74 (1H, m), 7.10 (2H, dd, J = 1.8, 4.6 Hz), 8.46 (2H, dd, J = 1.8, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 25.7, 26.2, 26.8, 33.6, 44.0, 122.5, 149.6, 158.8; HRMS (ESI-TOF) calcd for C$_{13}$H$_{20}$N (M+H)$^+$ 190.1590, found 190.1598.

---
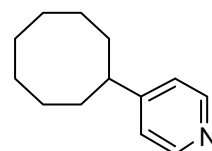
(3) Bernardi, R.; Caronna, T.; Morrocchi, S.; Traldi, P.; Vittimberga, B. M. *J. Chem. Soc., Perkin Trans. 1* **1981**, 1607.

4-methyl-4-(pyridin-4-yl)pentyl acetate (**3hh**):

43% yield (14.5 mg); colorless oil; IR (neat) 1738, 1597, 1411, 1240, 823 cm^{-1}; ^{1}H NMR (400 MHz, CDCl$_3$) δ 1.31 (6H, s), 1.37 (2H, m), 1.65 (2H, m), 2.01 (3H, s), 3.96 (2H, t, J = 6.9 Hz), 7.23 (2H, dd, J = 1.8, 4.6 Hz), 8.52 (2H, dd, J = 1.8, 4.6 Hz); ^{13}C NMR (100 MHz, CDCl$_3$) δ 20.9, 24.0, 28.0, 37.5, 39.7, 64.6, 121.3, 149.4, 158.4, 171.1; HRMS (ESI-TOF) calcd for C$_{13}$H$_{20}$NO$_2$ (M+H)$^+$ 222.1489, found 222.1491.
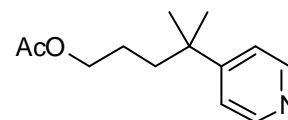
TH-12-121-f21-31-2nd-H

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\12\TH-12-121-f21-31-2nd-H-1.als

3a

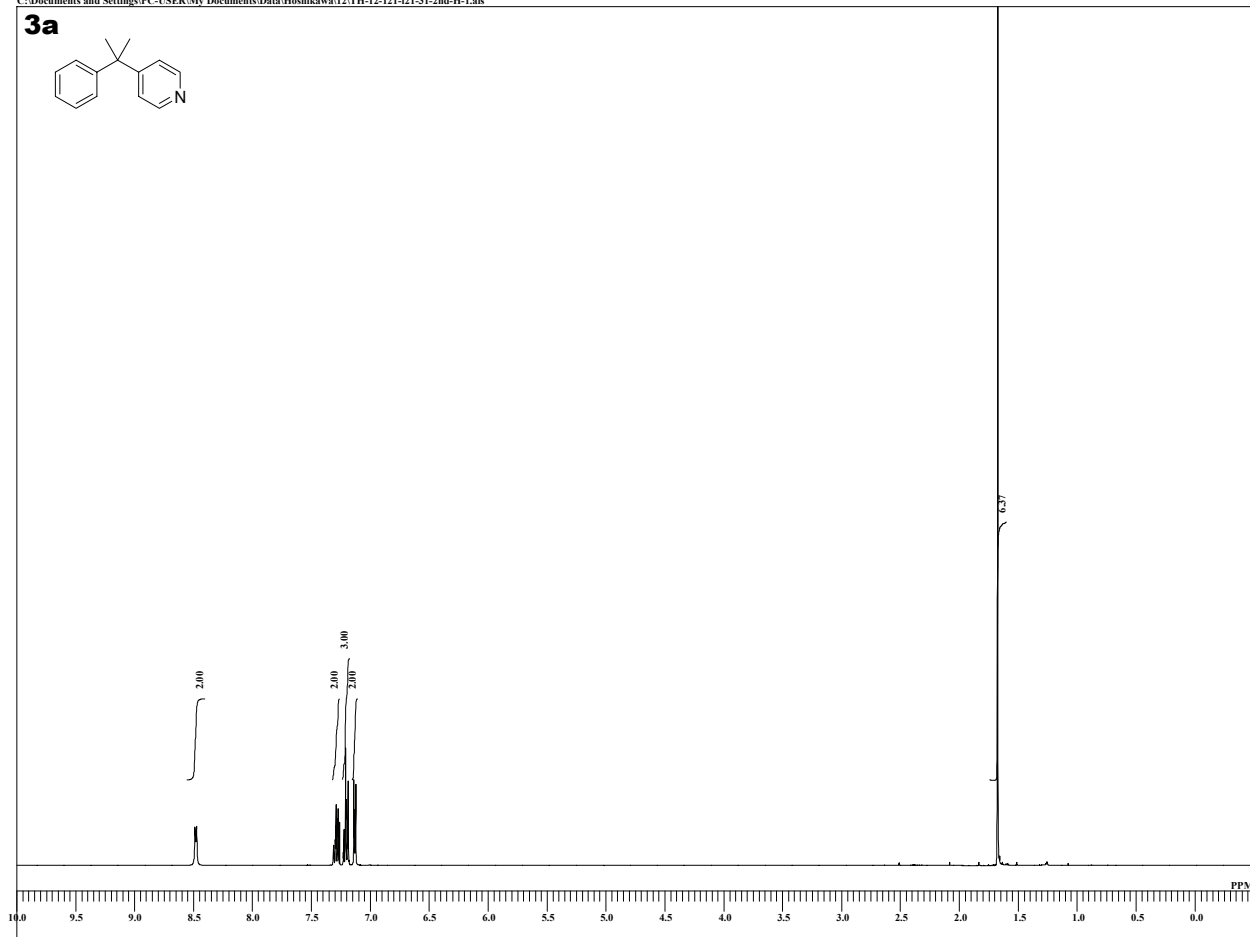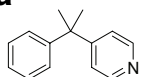| DFILE | TH-12-121-f21-31-2nd-H-1.als |
COMNT	TH-12-121-f21-31-2nd-H
DATIM	21-07-2012 15:11:17
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	13107
SPO	13107
TIMES	8
DUMMY	1
FREQU	5938.15 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	30
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-12-121-f21-31-2nd-H-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.3 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-12-121-f21-31-2ndC

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\12\TH-12-121-f21-31-2ndC-1.als
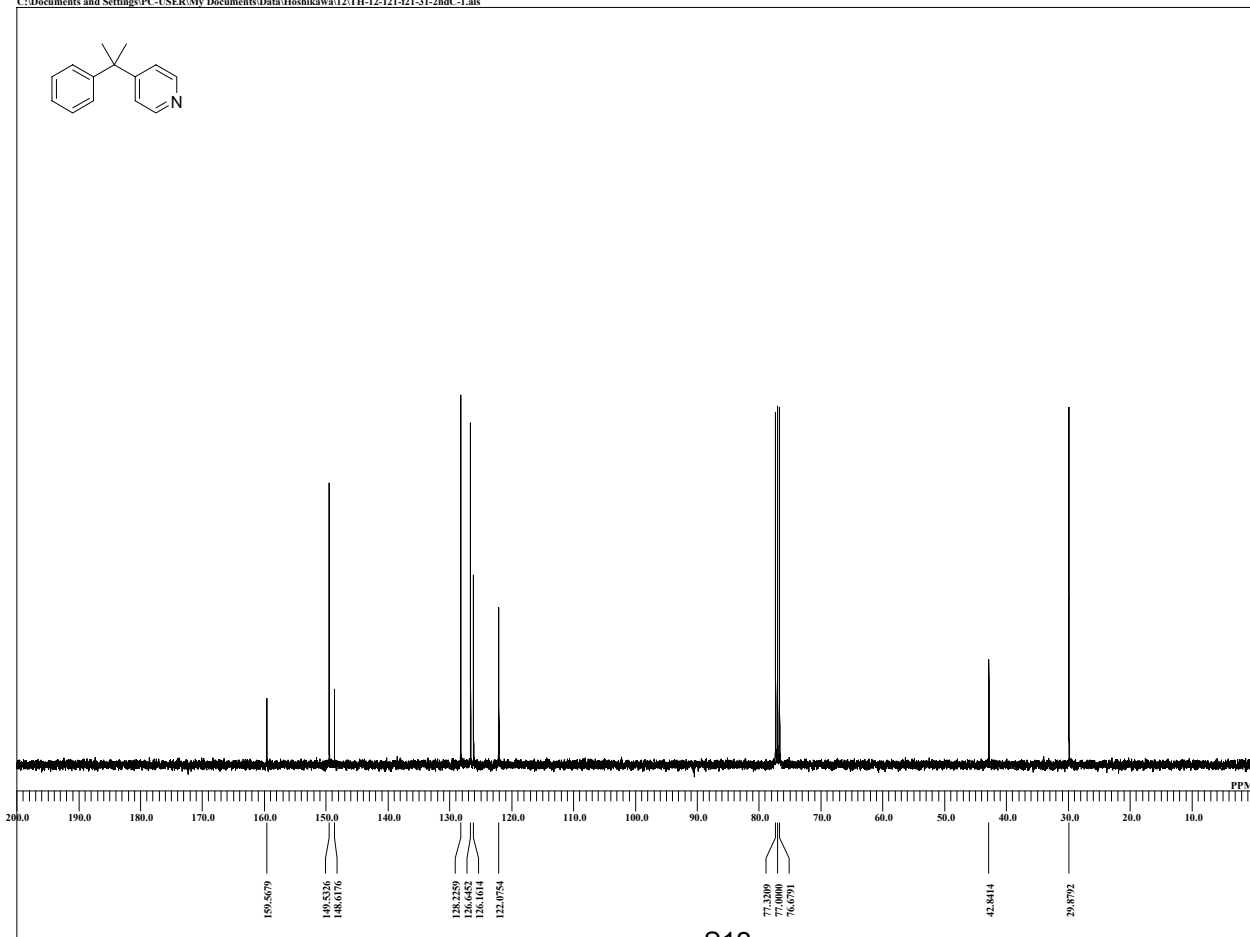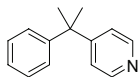
DFILE	TH-12-121-f21-31-2ndC-1.als
COMNT	TH-12-121-f21-31-2ndC
DATIM	21-07-2012 15:18:05
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	52428
SPO	52428
TIMES	52
DUMMY	4
FREQU	24999.62 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	5.0000 sec
SCANS	52
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-12-121-f21-31-2ndC-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.6 c
SLVNT	CDCL3
EXREF	77.00 ppm

159.5679
149.5326
148.6176
128.2259
126.6452
126.1614
122.0754
77.3209
77.0000
76.6791
42.8414
29.8792

TH-12-109-f23-28

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\12\TH-12-109-f23-28-1.als

3b

DFILE	TH-12-109-f23-28-1.als
COMNT	TH-12-109-f23-28
DATIM	13-07-2012 16:54:14
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	13107
SPO	13107
TIMES	8
DUMMY	1
FREQU	5938.15 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	38
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-12-109-f23-28-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.9 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-12-109-f23-28C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\12\TH-12-109-f23-28C-1.als
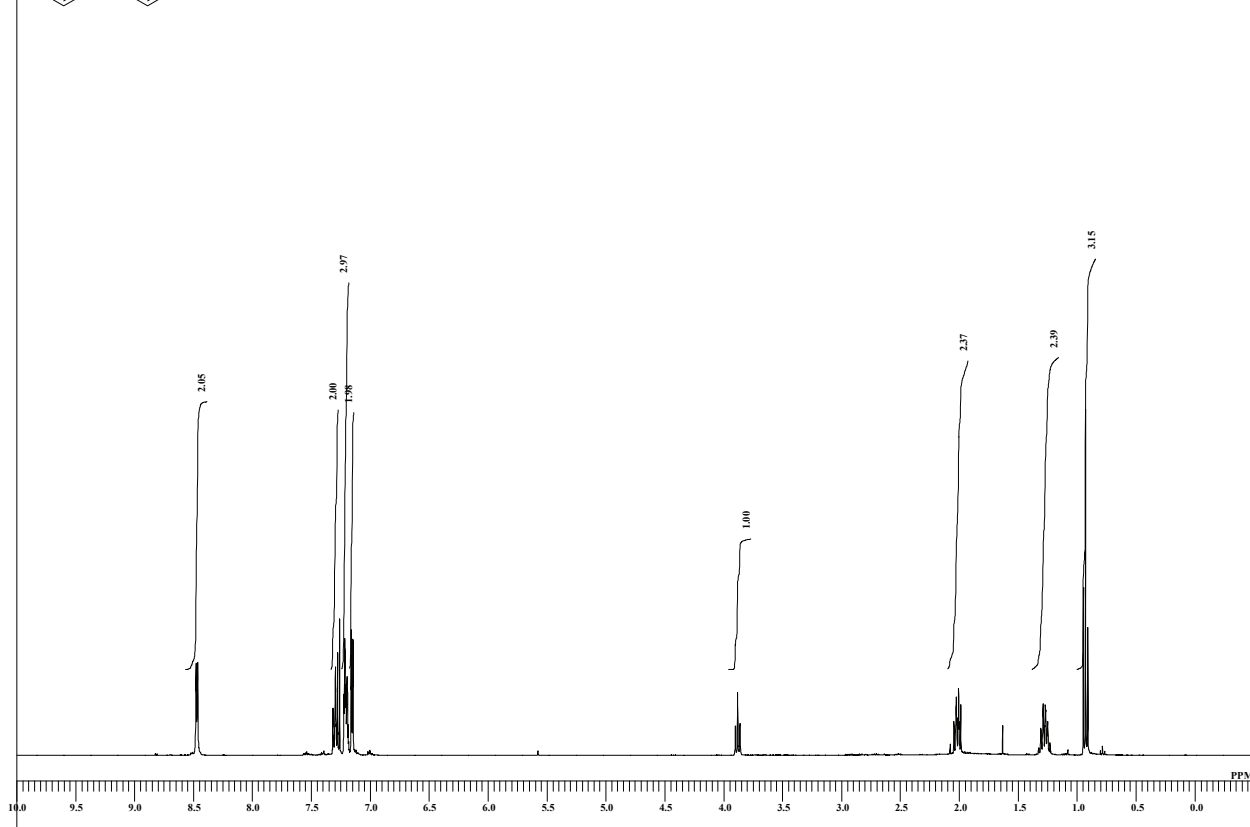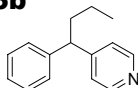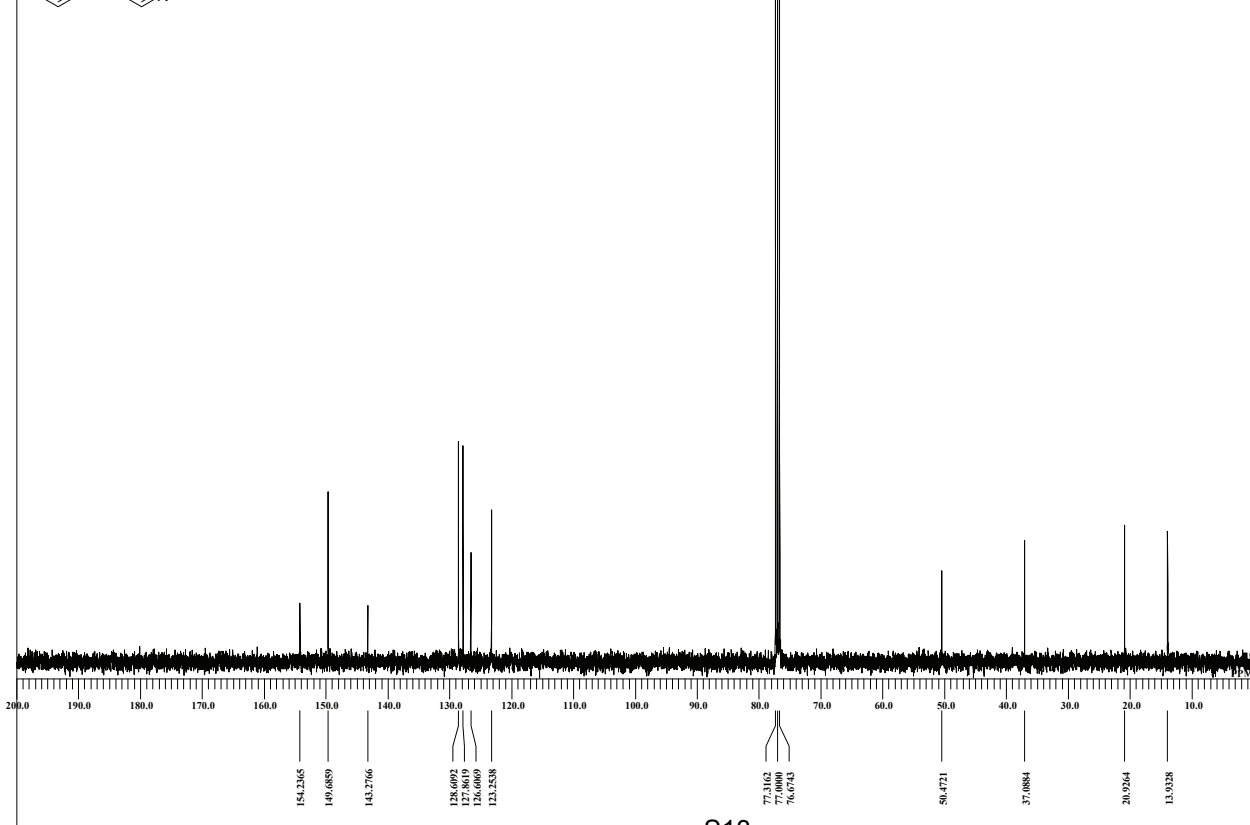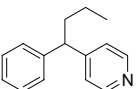

DFILE	TH-12-109-f23-28C-1.als
COMNT	TH-12-109-f23-28C
DATIM	13-07-2012 17:00:28
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	26214
SPO	26214
TIMES	52
DUMMY	4
FREQU	24999.62 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	5.0000 sec
SCANS	52
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-12-109-f23-28C-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	25.1 c
SLVNT	CDCL3
EXREF	77.00 ppm

S13

TH-13-37-f29-39

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-37-f29-39-1.als

3c
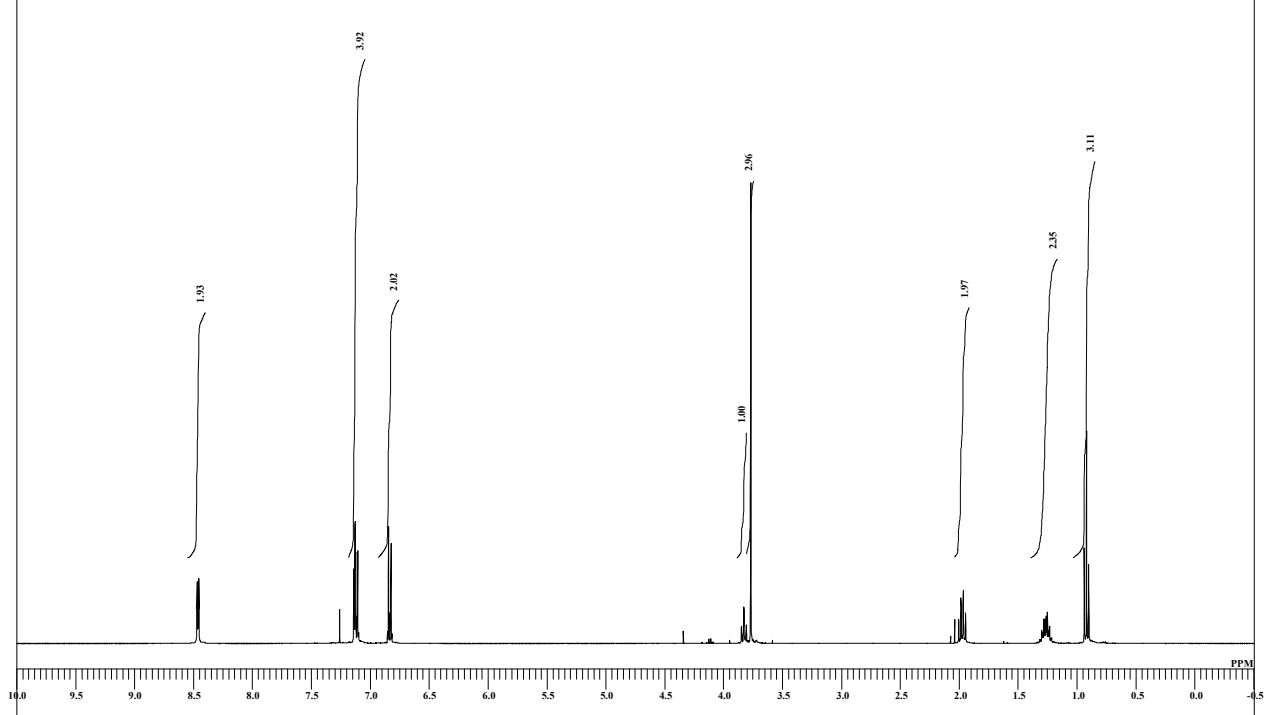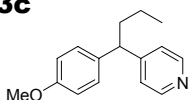
DFILE	TH-13-37-f29-39-1.als
COMNT	TH-13-37-f29-39
DATIM	05-09-2012 16:29:20
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	30
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-37-f29-39-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.8 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-37-f29-39C

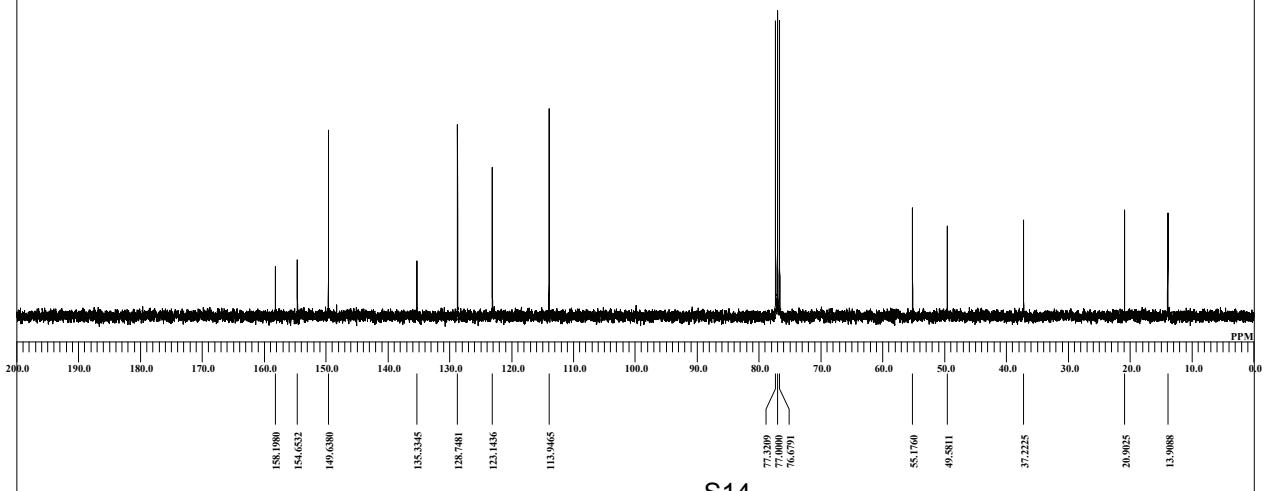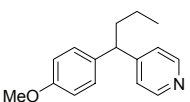C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-37-f29-39C-1.jdf

DFILE	TH-13-37-f29-39C-1.jdf
COMNT	TH-13-37-f29-39C
DATIM	05-09-2012 16:33:12
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	15
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	15
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-37-f29-39C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.0 c
SLVNT	CDCL3
EXREF	77.00 ppm

S14

TH-13-39-2nd-f10-19

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-39-2nd-f10-19-1.jdf

3d
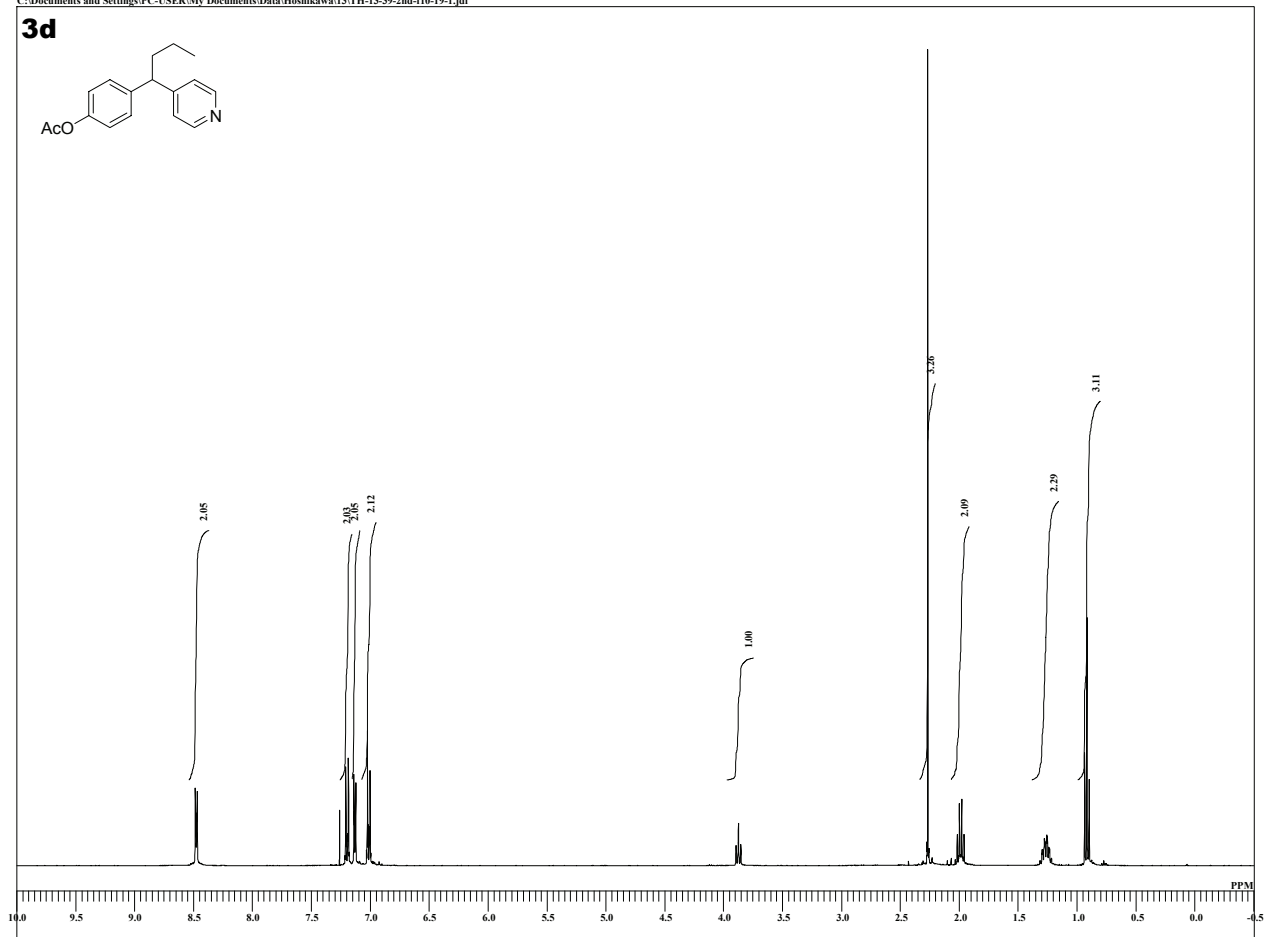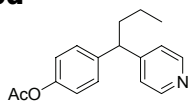
DFILE	TH-13-39-2nd-f10-19-1.jdf
COMNT	TH-13-39-2nd-f10-19
DATIM	06-09-2012 15:55:15
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	30
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-39-2nd-f10-19-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.9 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-39-2nd-f10-19C

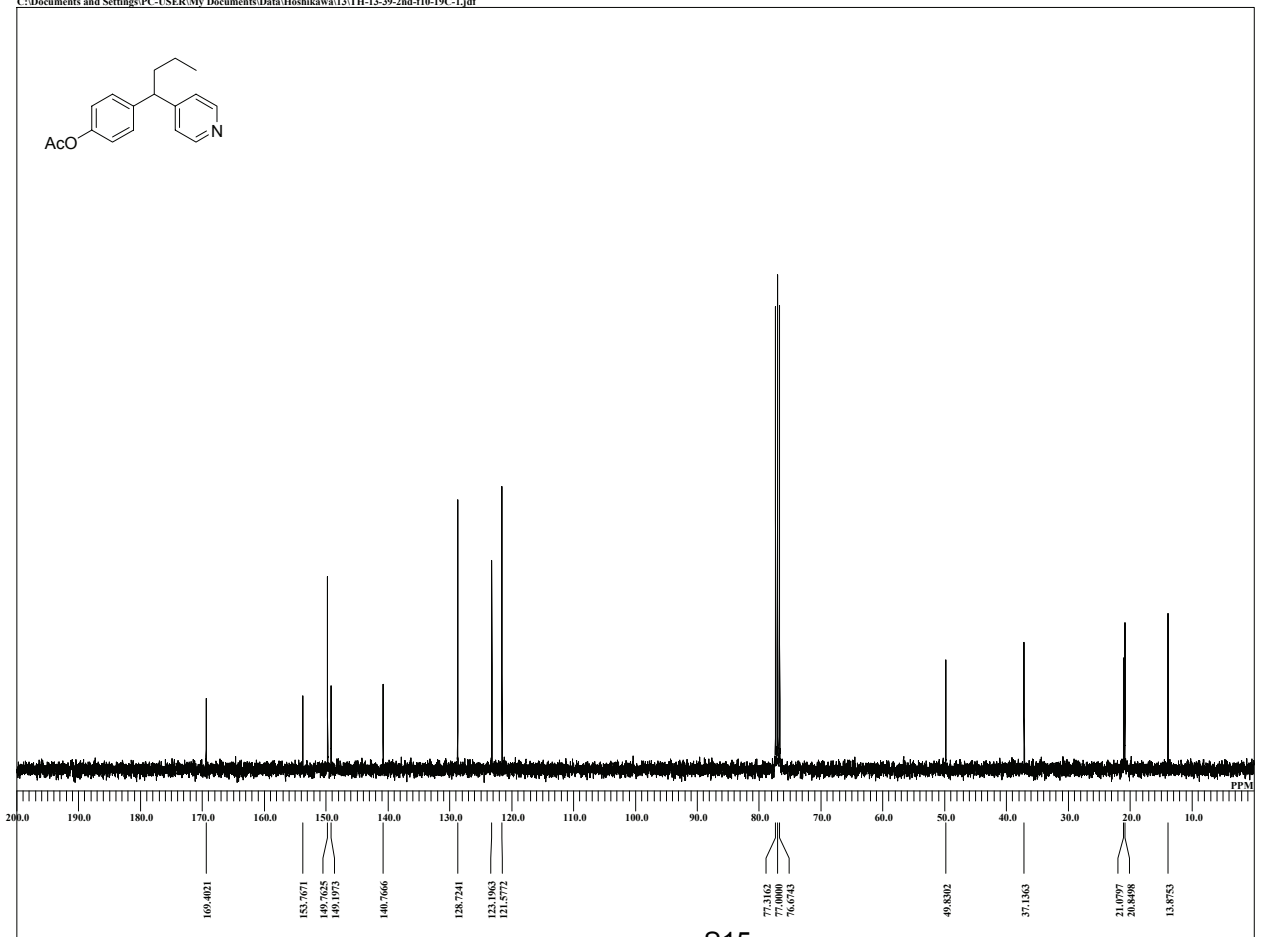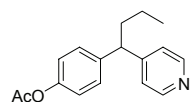C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-39-2nd-f10-19C-1.jdf

DFILE	TH-13-39-2nd-f10-19C-1.jdf
COMNT	TH-13-39-2nd-f10-19C
DATIM	06-09-2012 16:00:01
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	32768
SPO	32768
TIMES	22
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	22
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-39-2nd-f10-19C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.2 c
SLVNT	CDCL3
EXREF	77.00 ppm

S15

TH-13-69-f46-50-3rd

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-69-f46-50-3rd-1.jdf

3e
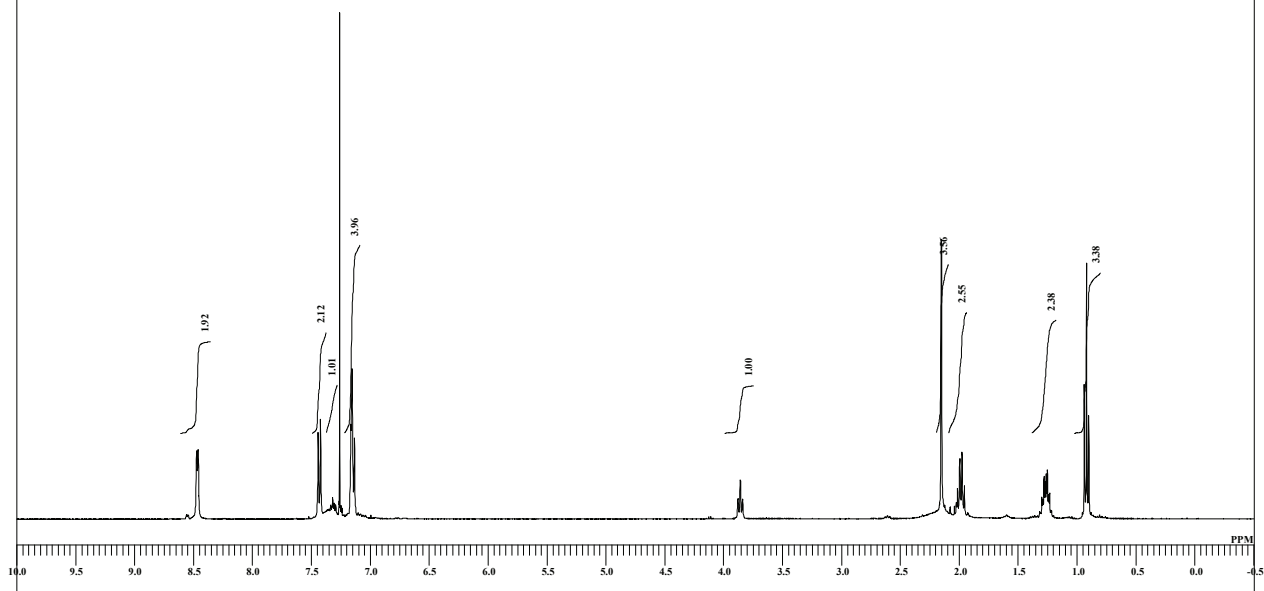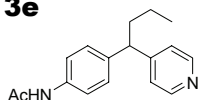
DFILE	TH-13-69-f46-50-3rd-1.jdf
COMNT	TH-13-69-f46-50-3rd
DATIM	03-10-2012 15:47:21
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	44
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-69-f46-50-3rd-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.7 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-69-f46-50C

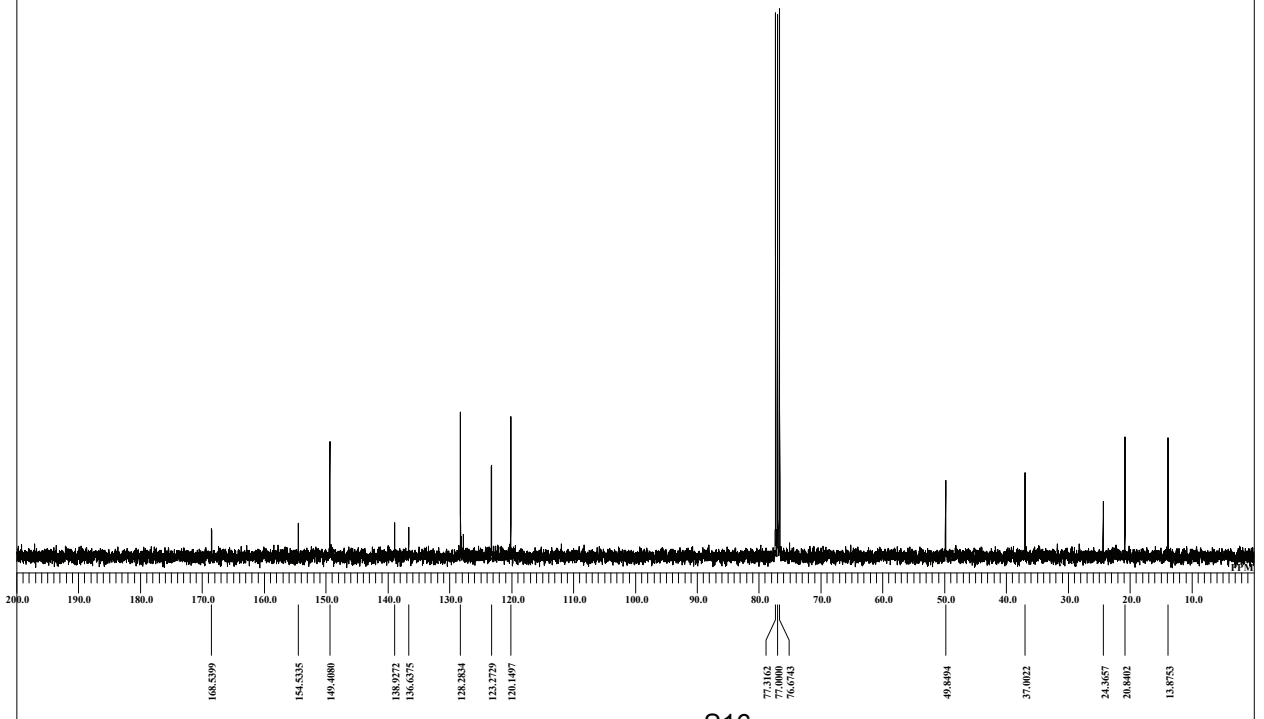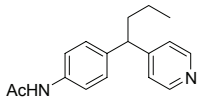C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-69-f46-50C-1.jdf

DFILE	TH-13-69-f46-50C-1.jdf
COMNT	TH-13-69-f46-50C
DATIM	03-10-2012 13:13:32
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	32768
SPO	32768
TIMES	30
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	30
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-69-f46-50C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.9 c
SLVNT	CDCL3
EXREF	77.00 ppm

S16

TH-13-75-f37-42

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-75-f37-42.als

3f

TH-13-75-f37-42C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-75-f37-42C.als

S17

TH-13-53-f24-35

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-53-f24-35-1.jdf

3g

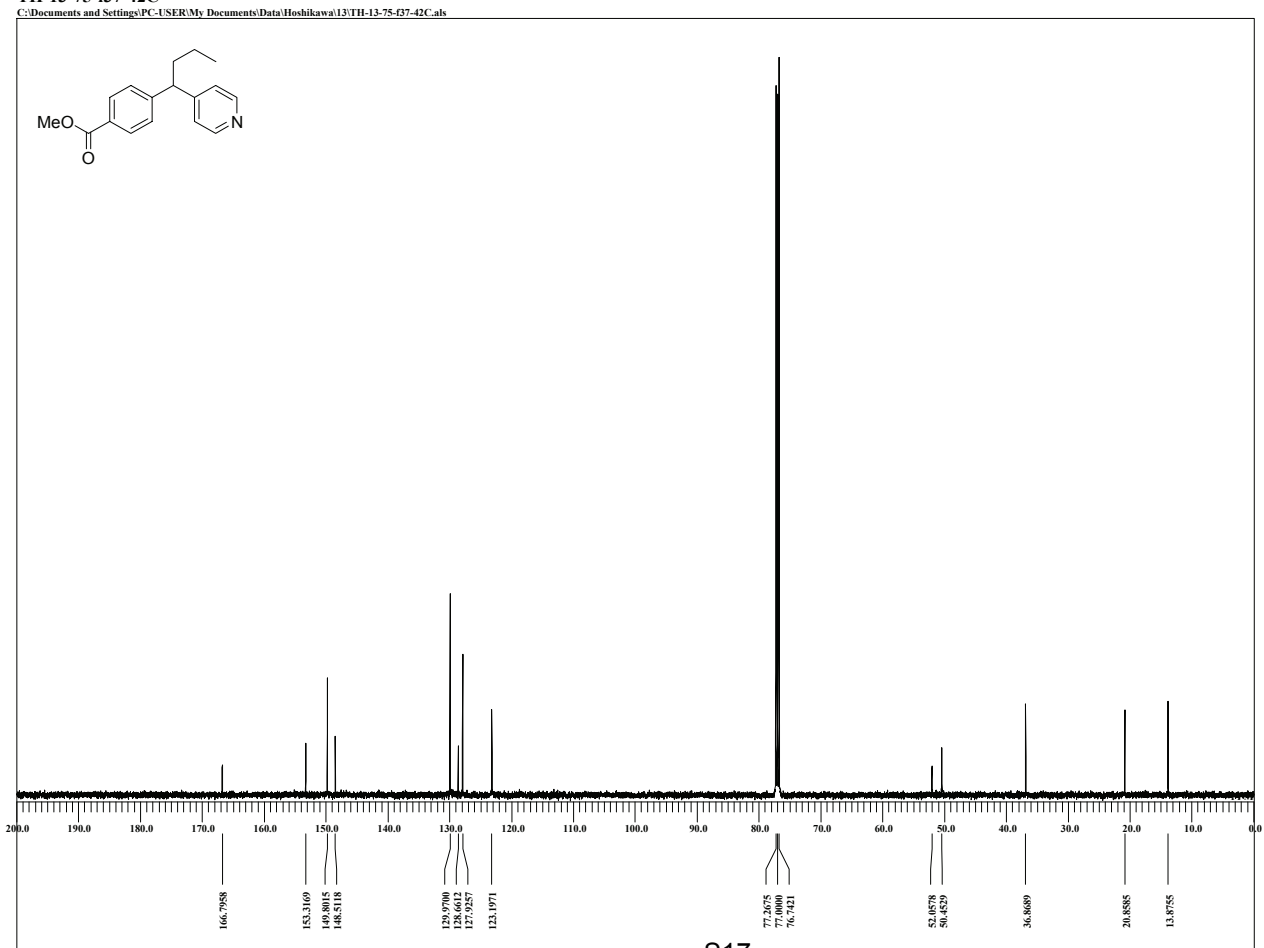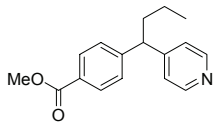|	
DFILE	TH-13-53-f24-35-1.jdf
COMNT	TH-13-53-f24-35
DATIM	11-09-2012 19:59:41
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	34
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRRPW	79
DFILE	TH-13-53-f24-35-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.5 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-53-f24-35C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-53-f24-35C-1.jdf
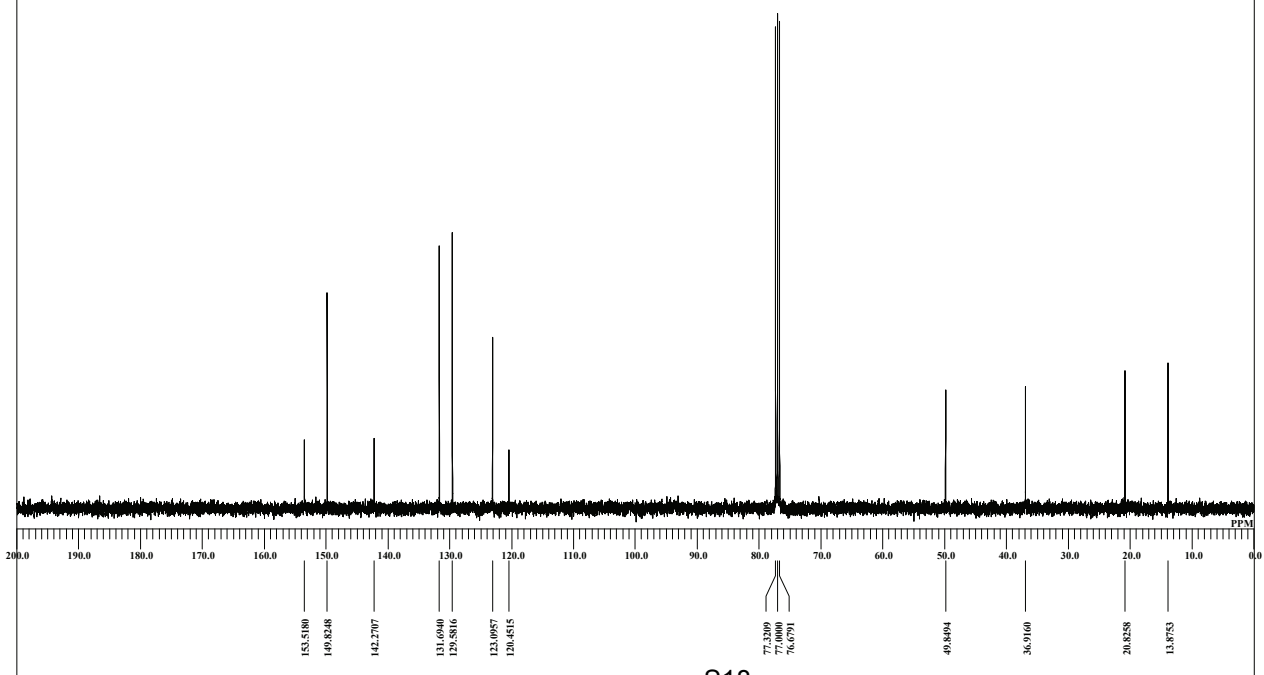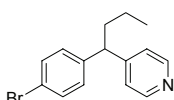
DFILE	TH-13-53-f24-35C-1.jdf
COMNT	TH-13-53-f24-35C
DATIM	11-09-2012 20:05:06
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	42
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	5.0000 sec
SCANS	42
ADBIT	16
RGAIN	58
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-53-f24-35C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.7 c
SLVNT	CDCL3
EXREF	77.00 ppm

S18

TH-13-63-f22-32H

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-63-f22-32H-1.jdf

3h

DFILE	TH-13-63-f22-32H-1.jdf
COMNT	TH-13-63-f22-32H
DATIM	25-09-2012 15:27:45
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	34
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-63-f22-32H-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.3 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-63-f22-32C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-63-f22-32C-1.jdf
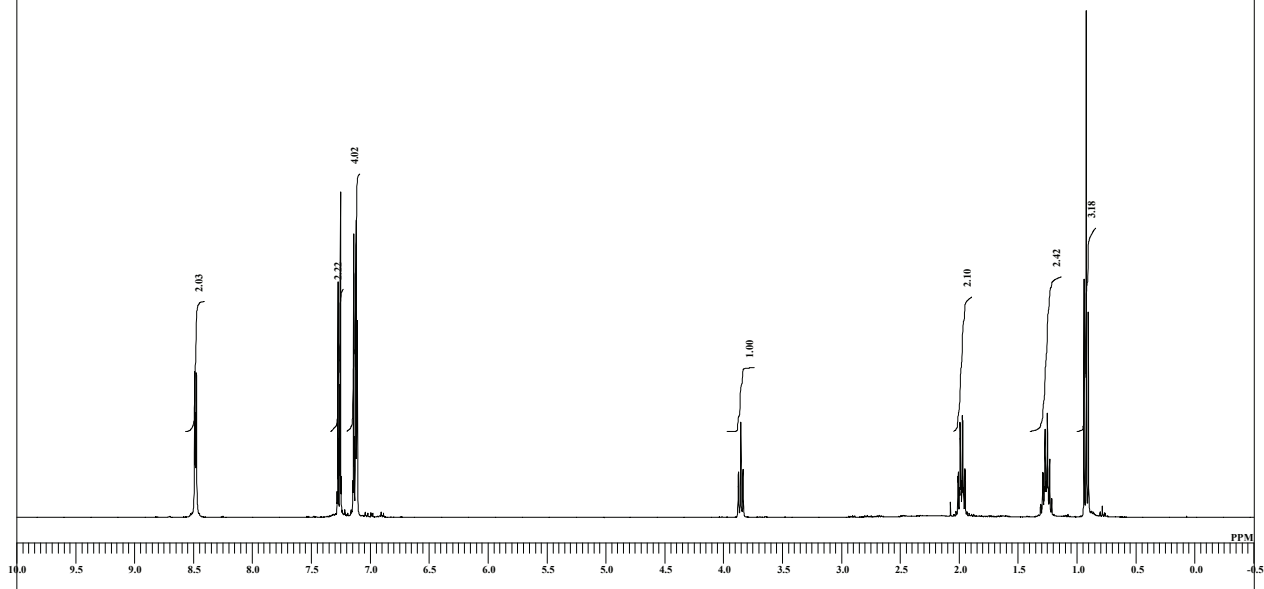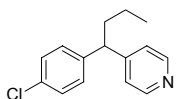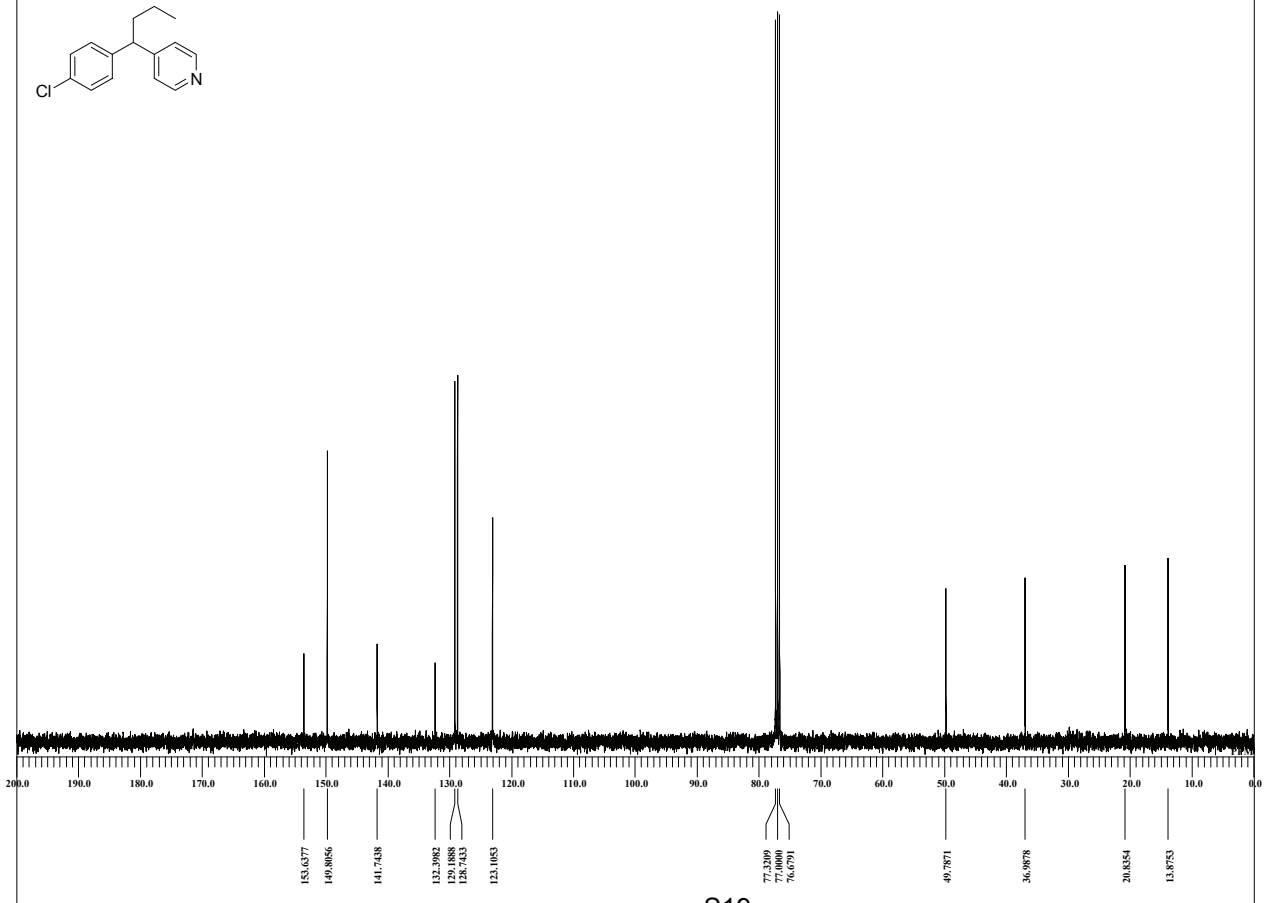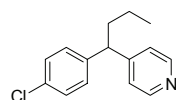

DFILE	TH-13-63-f22-32C-1.jdf
COMNT	TH-13-63-f22-32C
DATIM	25-09-2012 15:35:31
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	42
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	42
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-63-f22-32C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.6 c
SLVNT	CDCL3
EXREF	77.00 ppm

153.6377
149.8056
141.7438
132.3982
129.1888
128.7433
123.1053
77.3209
77.0000
76.6791
49.7871
36.9878
20.8354
13.8753

S19

TH-13-87-f48-55H

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-87-f48-55H-1.jdf

3i
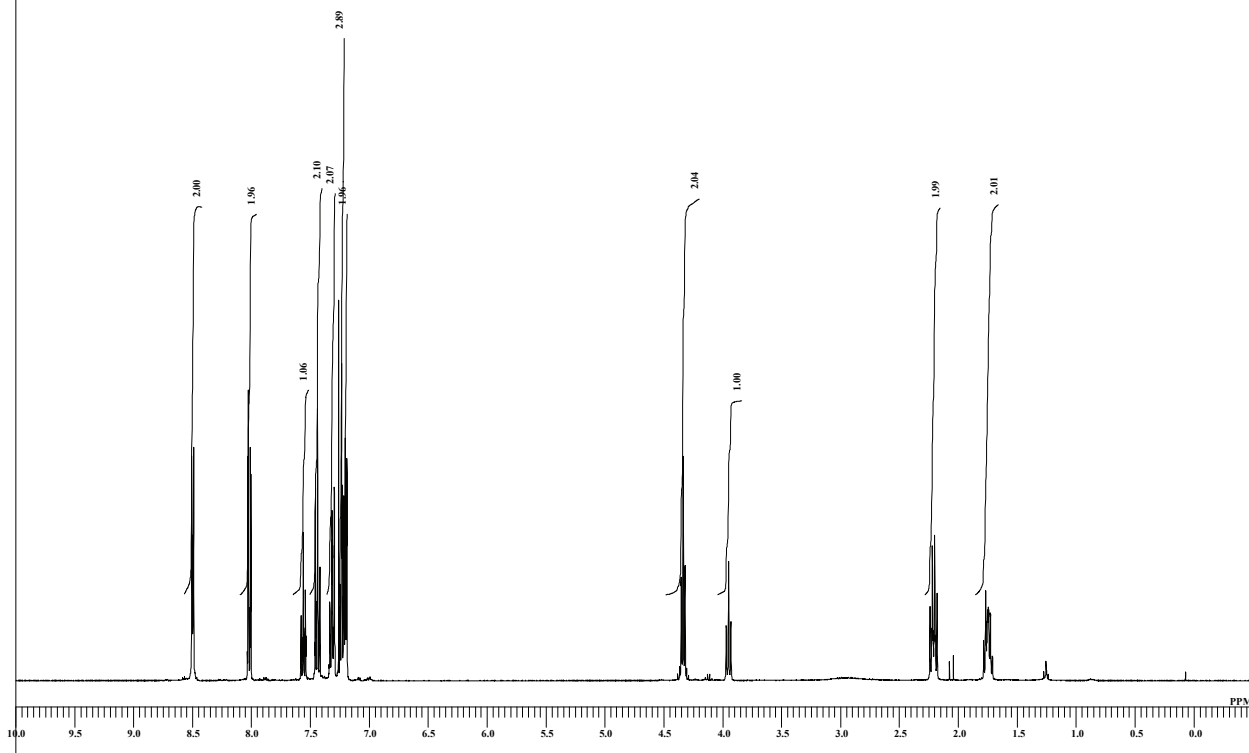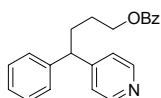
DFILE	TH-13-87-f48-55H-1.jdf
COMNT	TH-13-87-f48-55H
DATIM	09-10-2012 13:05:43
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	40
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-87-f48-55H-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.4 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-87-f48-55C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-87-f48-55C-1.jdf
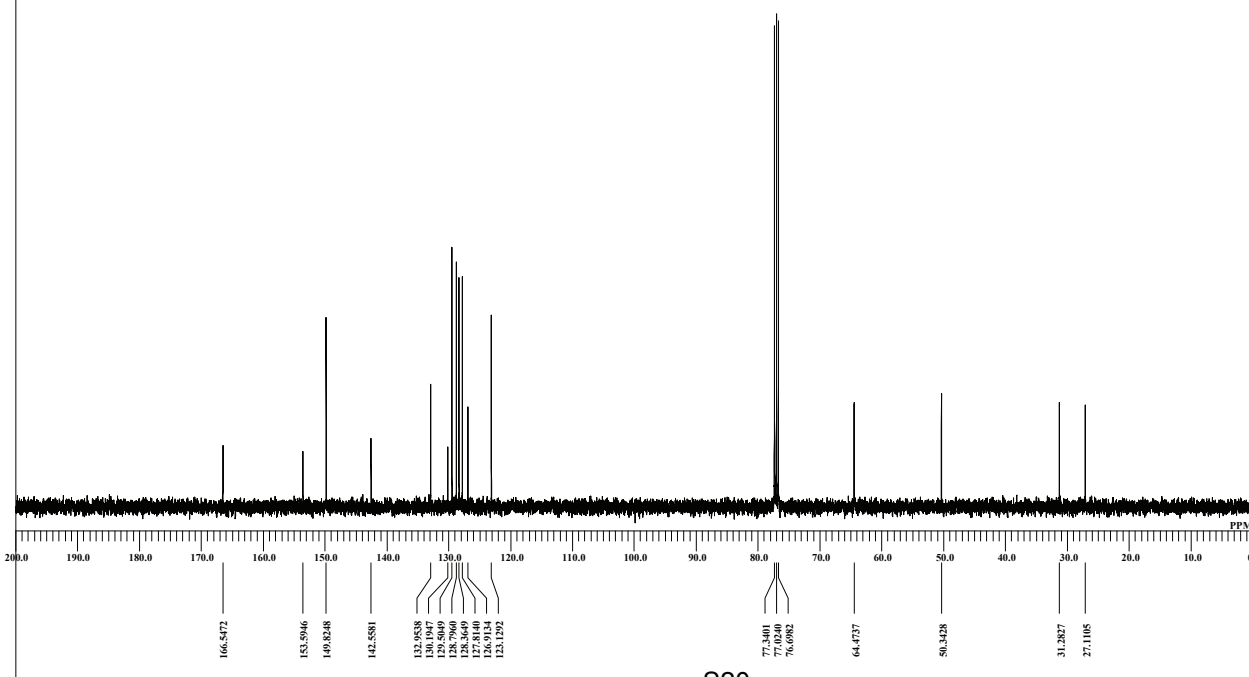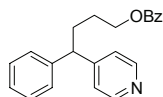

DFILE	TH-13-87-f48-55C-1.jdf
COMNT	TH-13-87-f48-55C
DATIM	09-10-2012 09:17:11
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	26
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	26
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-87-f48-55C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	22.9 c
SLVNT	CDCL3
EXREF	77.00 ppm

S20

TH-13-107-f42-52

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-107-f42-52-1.als

3j

DFILE	TH-13-107-f42-52-1.als
COMNT	TH-13-107-f42-52
DATIM	16-10-2012 09:39:10
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	36
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-107-f42-52-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	22.9 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-107-f42-52C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-107-f42-52C-1.jdf
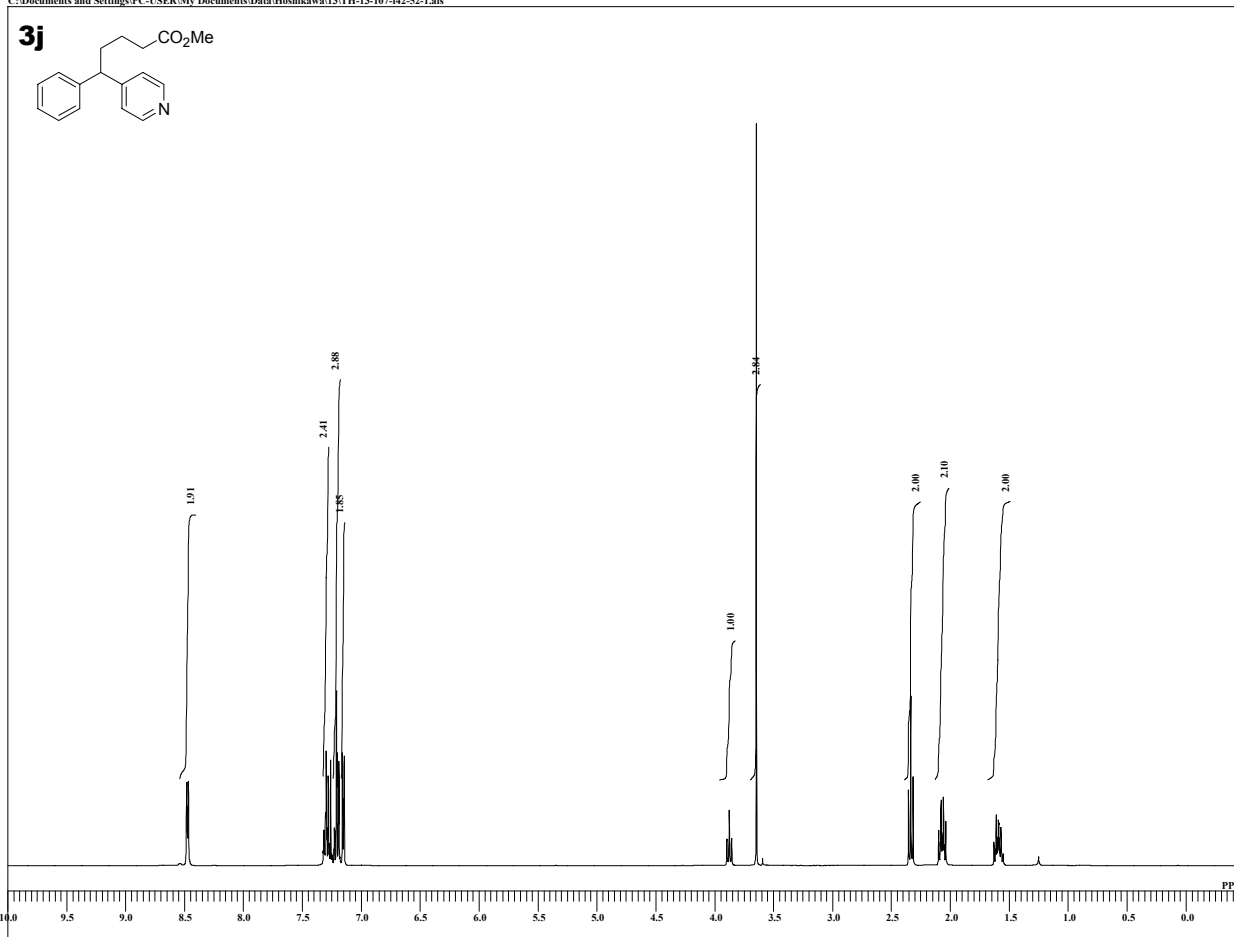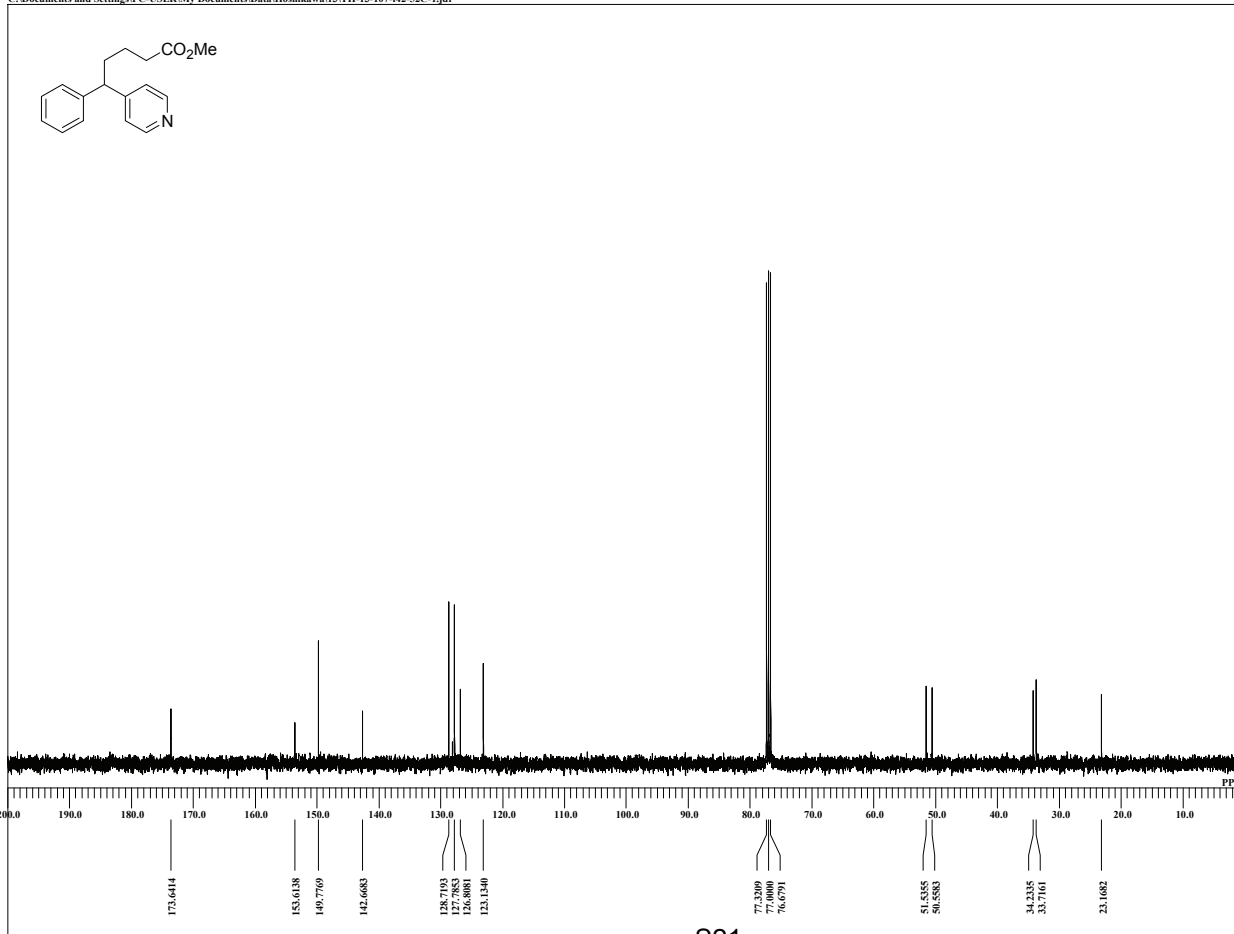

DFILE	TH-13-107-f42-52C-1.jdf
COMNT	TH-13-107-f42-52C
DATIM	16-10-2012 09:43:56
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	22
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	22
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-107-f42-52C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.1 c
SLVNT	CDCL3
EXREF	77.00 ppm

S21

TH-13-103-f31-42

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-103-f31-42-1.als

3k
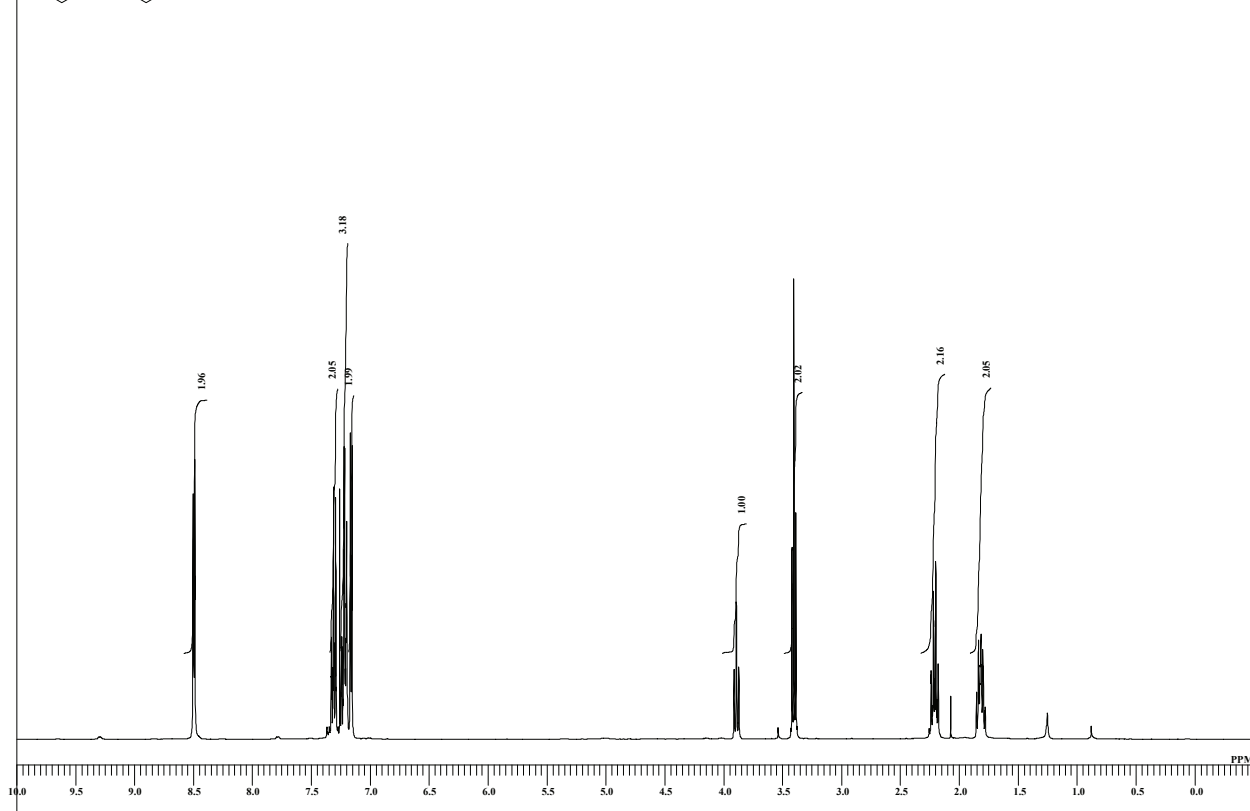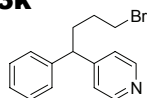
DFILE	TH-13-103-f31-42-1.als
COMNT	TH-13-103-f31-42
DATIM	12-10-2012 20:51:24
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	36
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-103-f31-42-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.8 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-103-f31-42C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-103-f31-42C-1.jdf
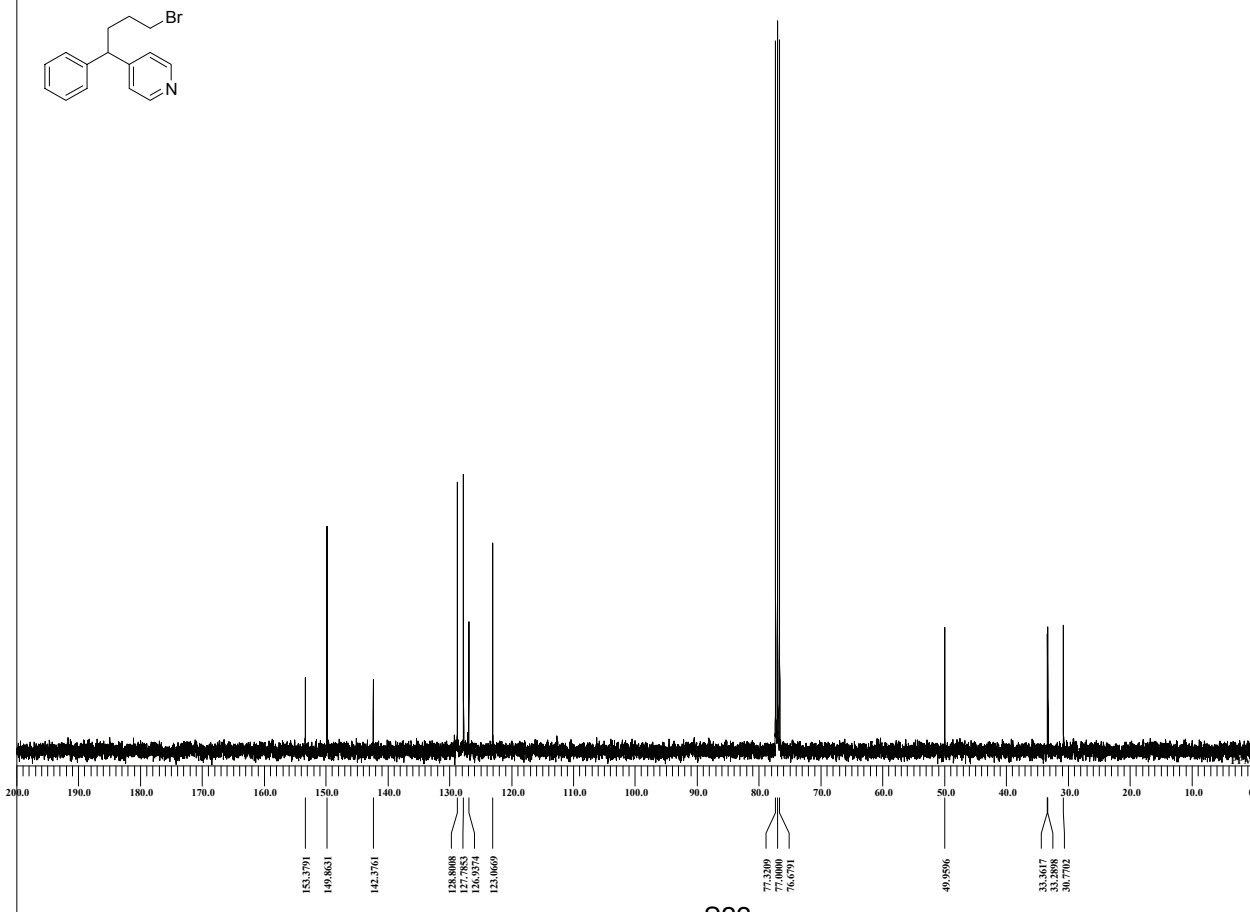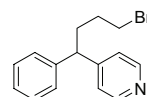
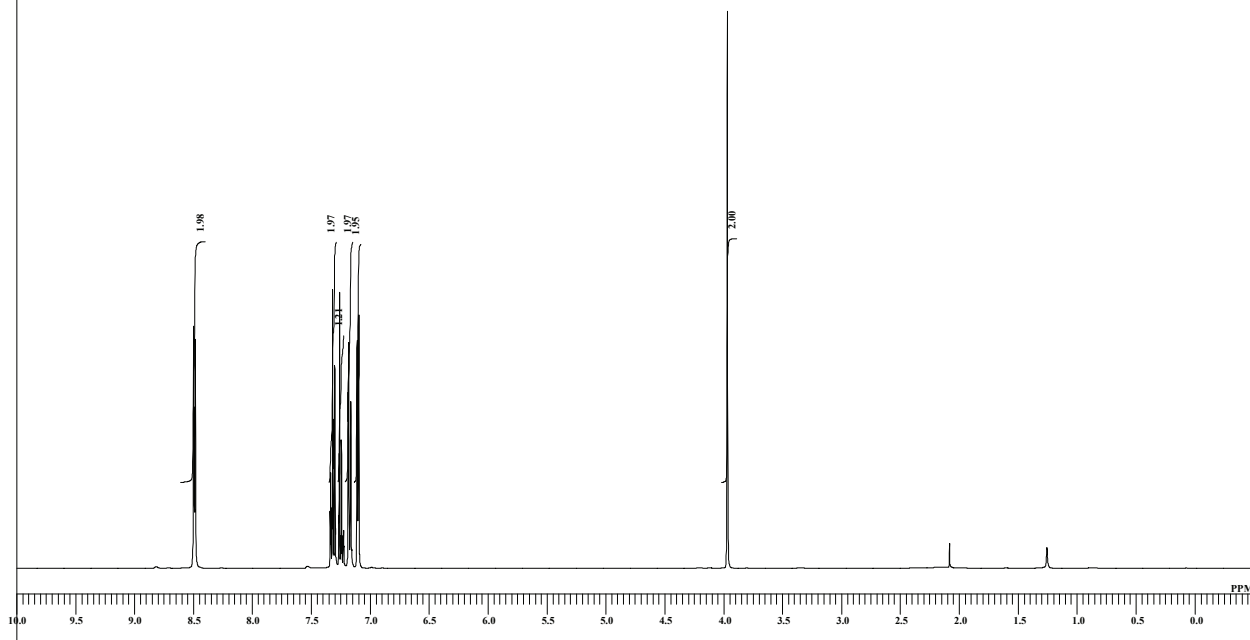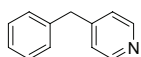|	
DFILE	TH-13-103-f31-42C-1.jdf
COMNT	TH-13-103-f31-42C
DATIM	12-10-2012 20:59:22
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	42
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	42
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-103-f31-42C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.1 c
SLVNT	CDCL3
EXREF	77.00 ppm

153.3791
149.8631
142.3761
128.8008
127.7853
126.9374
123.0669
77.3209
77.0000
76.6791
49.9596
33.3617
33.2898
30.7702

S22

TH-13-31-f38-46

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-31-f38-46-1.als

3l

DFILE	TH-13-31-f38-46-1.als
COMNT	TH-13-31-f38-46
DATIM	10-09-2012 19:33:11
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	38
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-31-f38-46-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	22.8 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-31-f38-46C

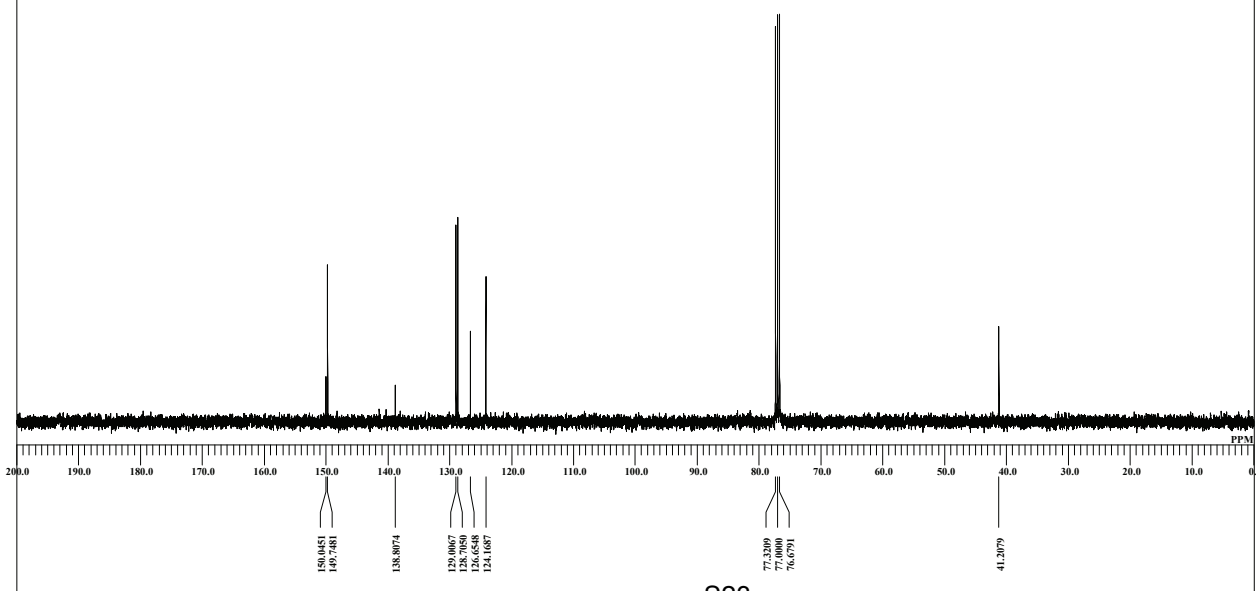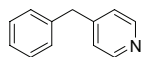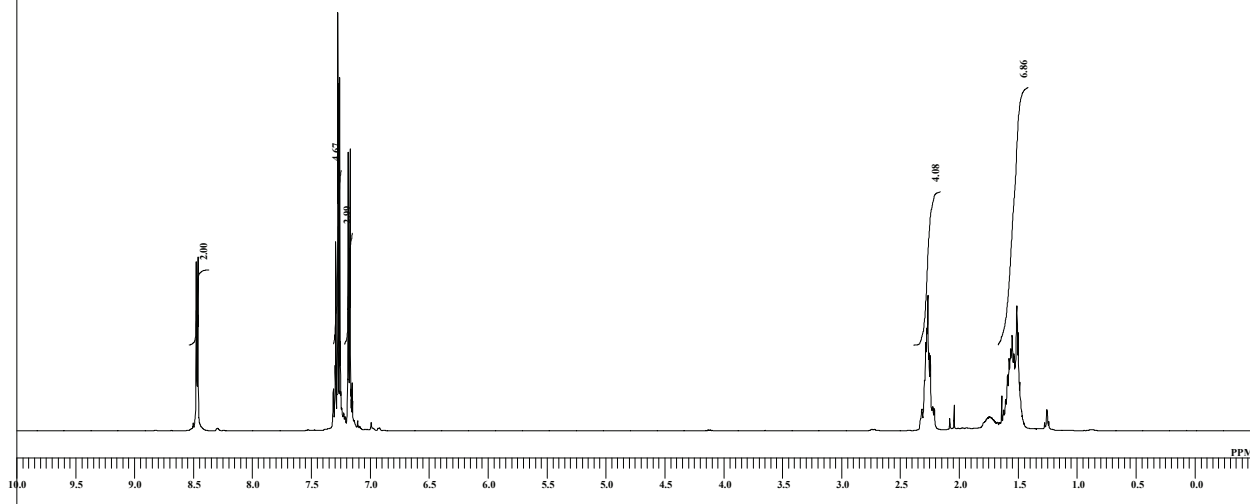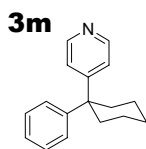C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-31-f38-46C-1.als

DFILE	TH-13-31-f38-46C-1.als
COMNT	TH-13-31-f38-46C
DATIM	10-09-2012 19:36:47
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	26
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	5.0000 sec
SCANS	26
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-31-f38-46C-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.0 c
SLVNT	CDCL3
EXREF	77.00 ppm

150.0451
149.7481
138.8074
129.0067
128.7050
126.6548
124.1687
77.3209
77.0000
76.6791
41.2079

S23

TH-13-17-f15-29-conc

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-17-f15-29-conc-1.jdf

3m

DFILE   TH-13-17-f15-29-conc-1.jdf
COMNT   TH-13-17-f15-29-conc
DATIM   31-08-2012 10:56:11
MENUF
OBNUC   1H
OFR   395.88 MHz
OBFRQ   395.88 MHz
OBSET   6.28 KHz
OBFIN   0.87 Hz
PW1   6.38 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   16384
SPO   16384
TIMES   8
DUMMY   1
FREQU   7422.80 Hz
FLT   30000 Hz
DELAY   16.68 usec
ACQTM   2.2073 sec
PD   5.0000 sec
SCANS   8
ADBIT   16
RGAIN   46
BF   0.01 Hz
T1   0.00
T2   0.00
T3   100.00
T4   100.00
EXMOD   single_pulse.ex2
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-17-f15-29-conc-1.jdf
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   24.5 c
SLVNT   CDCL3
EXREF   7.26 ppm

TH-13-17-f15-29

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-17-f15-29C-1.jdf
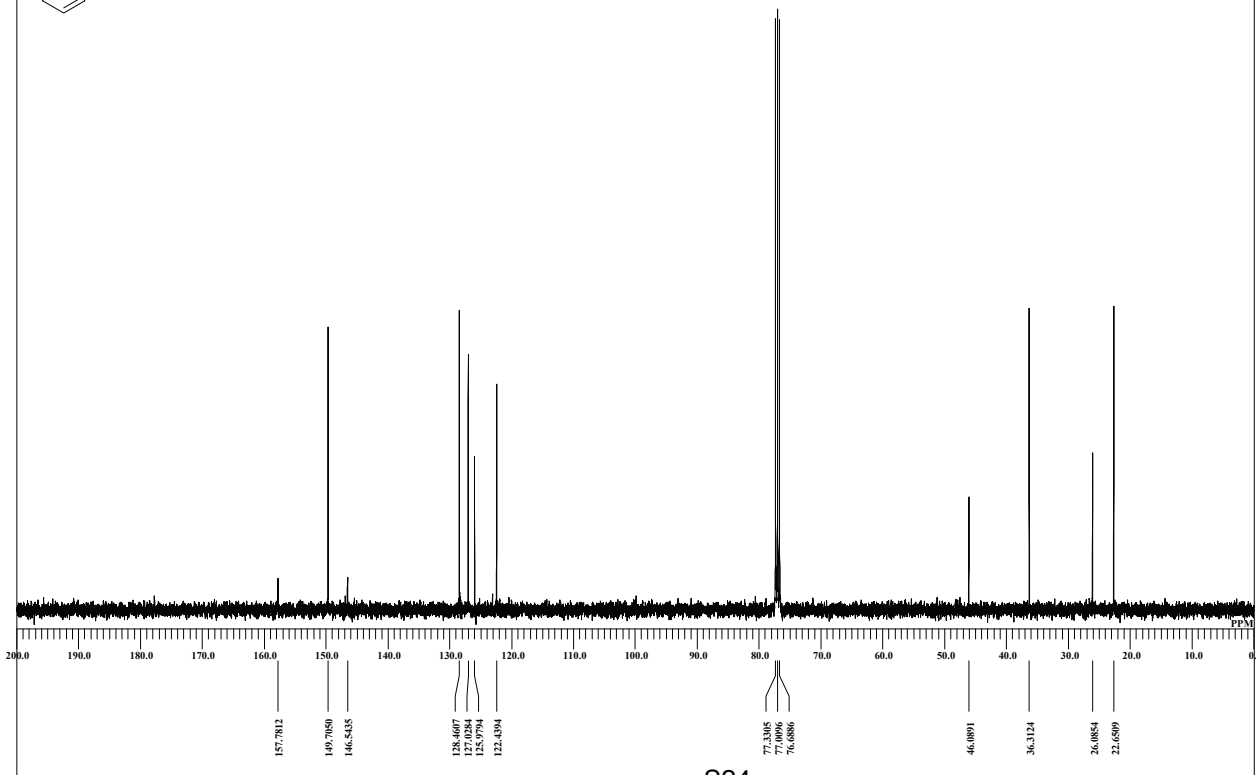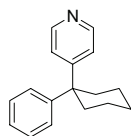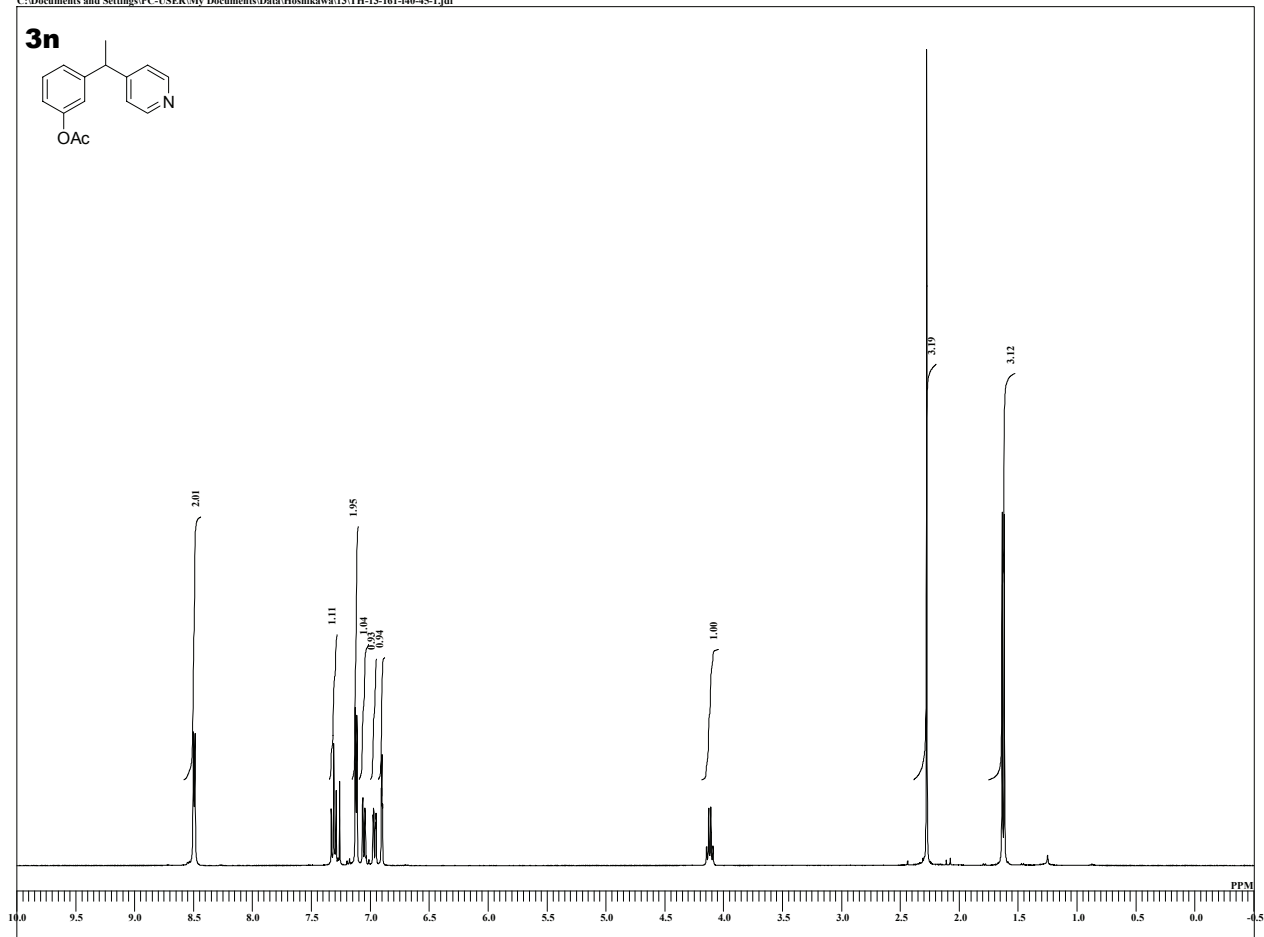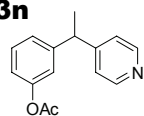
DFILE   TH-13-17-f15-29C-1.jdf
COMNT   TH-13-17-f15-29
DATIM   30-08-2012 10:08:35
MENUF
OBNUC   13C
OFR   99.55 MHz
OBFRQ   99.55 MHz
OBSET   5.13 KHz
OBFIN   0.98 Hz
PW1   3.25 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   65536
SPO   65536
TIMES   42
DUMMY   4
FREQU   31250.00 Hz
FLT   125000 Hz
DELAY   20.50 usec
ACQTM   1.0486 sec
PD   8.0000 sec
SCANS   42
ADBIT   16
RGAIN   60
BF   1.00 Hz
T1   0.00
T2   0.00
T3   100.00
T4   100.00
EXMOD   single_pulse_dec
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-17-f15-29C-1.jdf
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   23.3 c
SLVNT   CDCL3
EXREF   77.00 ppm

157.7812 149.7050 146.5435 128.4607 127.0284 125.9794 122.4394 77.3305 77.0096 76.6886 46.0891 36.3124 26.0854 22.6509

S24

TH-13-161-f40-45

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-161-f40-45-1.jdf

3n

DFILE	TH-13-161-f40-45-1.jdf
COMNT	TH-13-161-f40-45
DATIM	09-11-2012 13:23:05
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	36
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-161-f40-45-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	22.5 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-161-f40-45C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-161-f40-45C-1.jdf
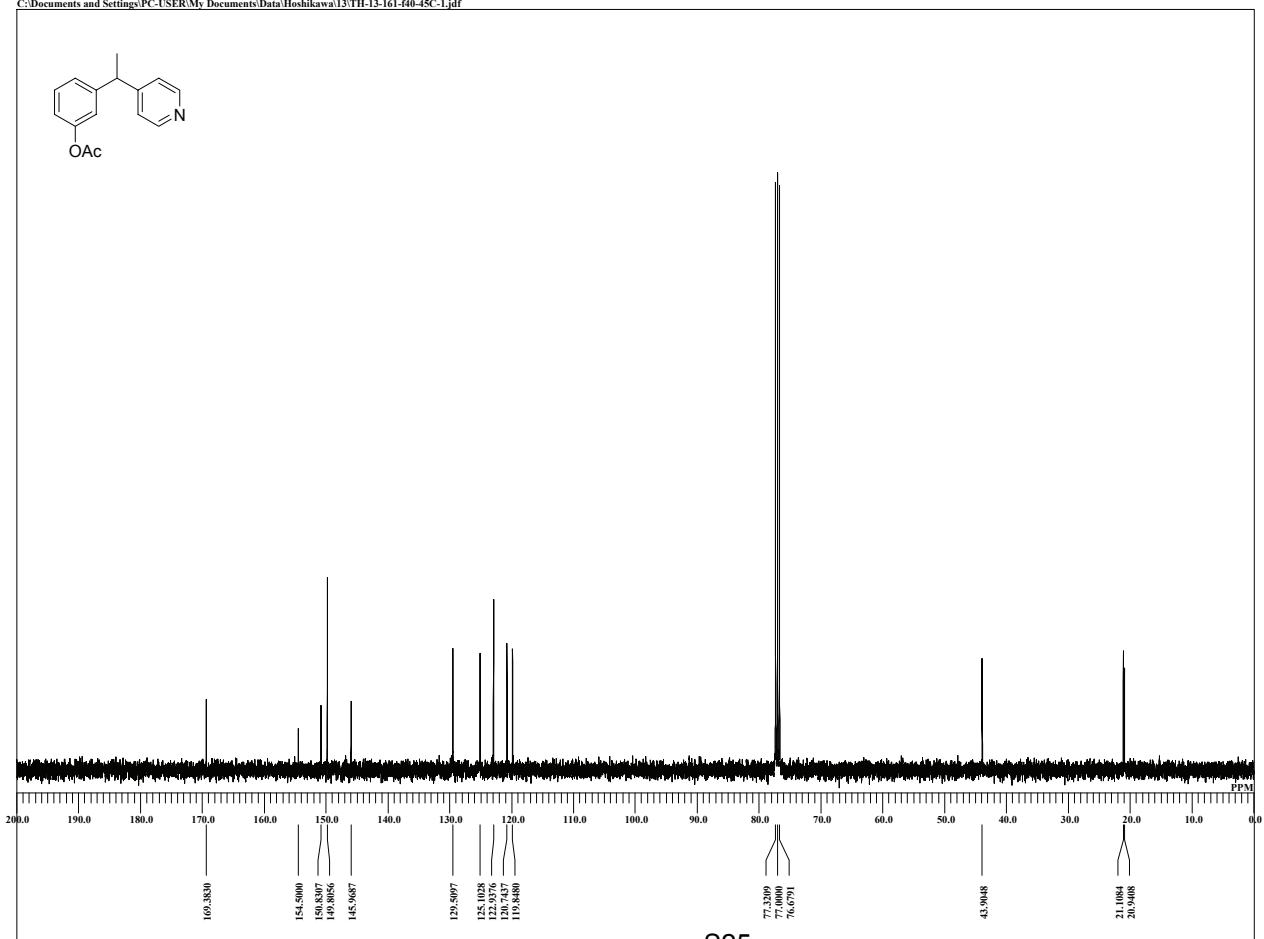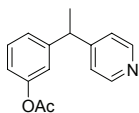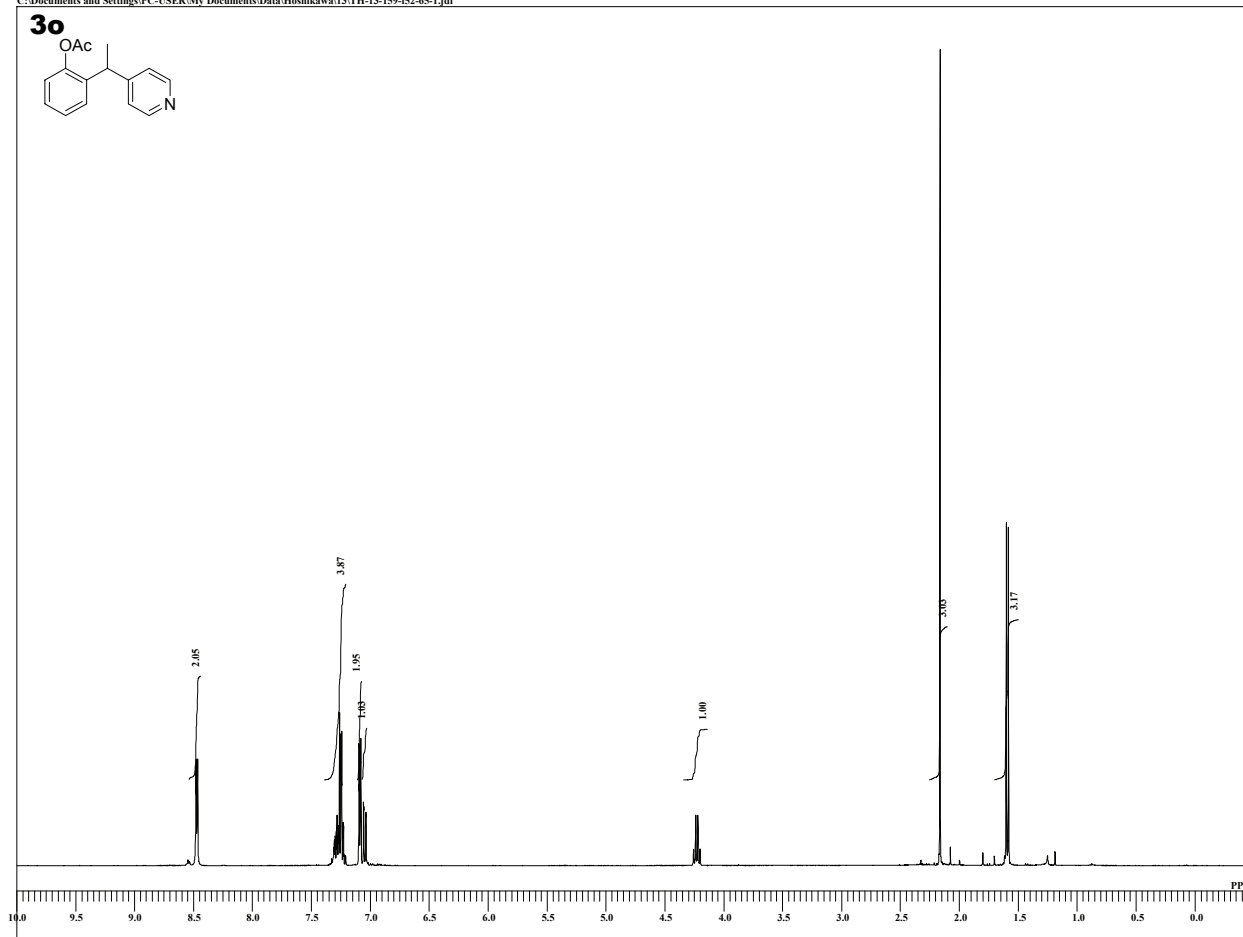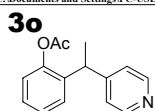
DFILE	TH-13-161-f40-45C-1.jdf
COMNT	TH-13-161-f40-45C
DATIM	09-11-2012 13:28:52
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	26
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	26
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-161-f40-45C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	22.7 c
SLVNT	CDCL3
EXREF	77.00 ppm

169.3830

154.5000
150.8307
149.8056
145.9687

129.5097

125.1028
122.9376
120.7437
119.8480

77.3209
77.0000
76.6791

43.9048

21.1084
20.9408

S25

TH-13-159-f52-65

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-159-f52-65-1.jdf

3o

DFILE   TH-13-159-f52-65-1.jdf
COMNT   TH-13-159-f52-65
DATIM   13-11-2012 10:46:37
MENUF
OBNUC   1H
OFR   395.88 MHz
OBFRQ   395.88 MHz
OBSET   6.28 KHz
OBFIN   0.87 Hz
PW1   6.38 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   16384
SPO   16384
TIMES   8
DUMMY   1
FREQU   7422.80 Hz
FLT   30000 Hz
DELAY   16.68 usec
ACQTM   2.2073 sec
PD   5.0000 sec
SCANS   8
ADBIT   16
RGAIN   36
BF   0.01 Hz
T1   0.00
T2   0.00
T3   100.00
T4   100.00
EXMOD   single_pulse.ex2
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-159-f52-65-1.jdf
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   22.5 c
SLVNT   CDCL3
EXREF   7.26 ppm

TH-13-159-f52-65C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-159-f52-65C-1.jdf
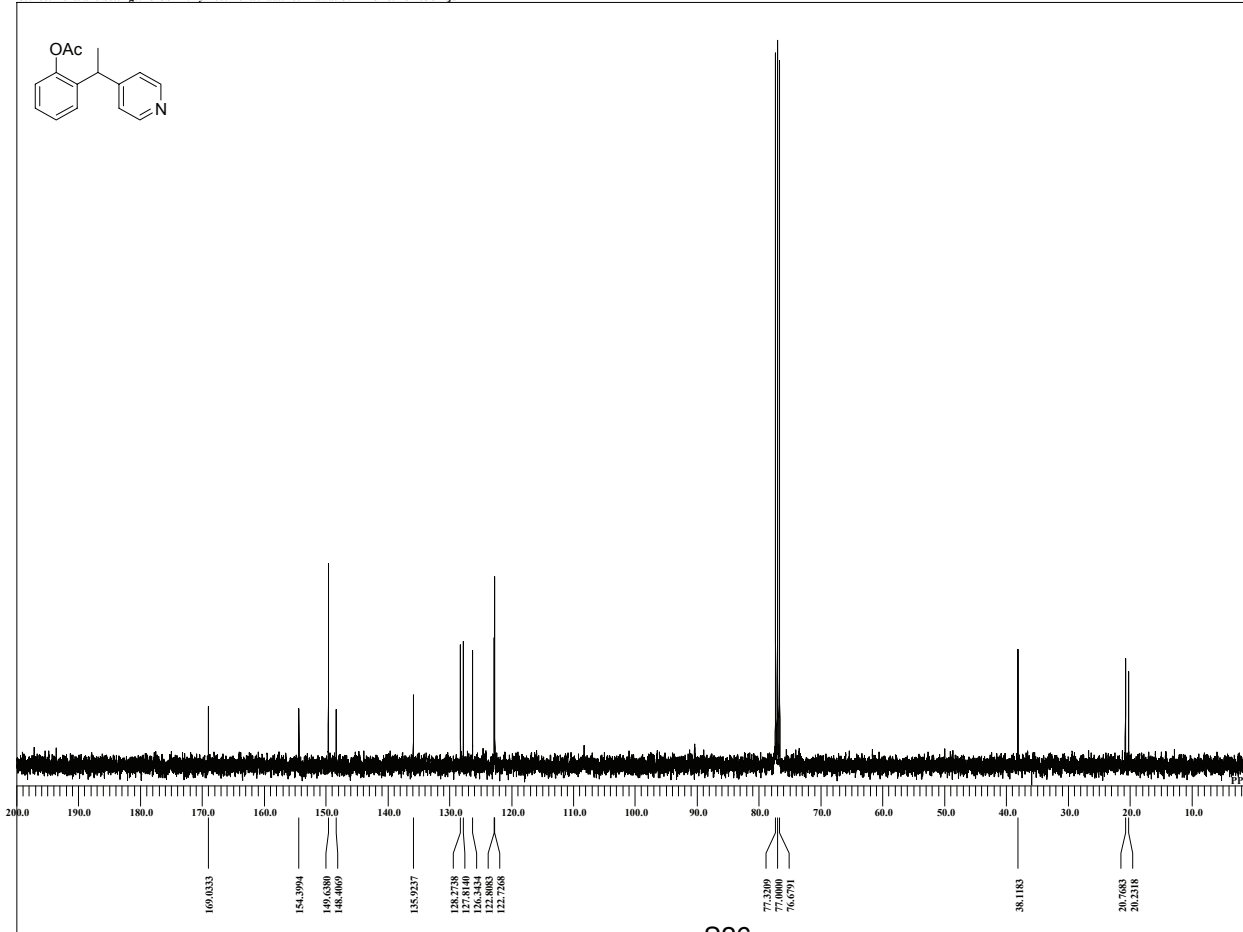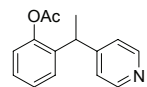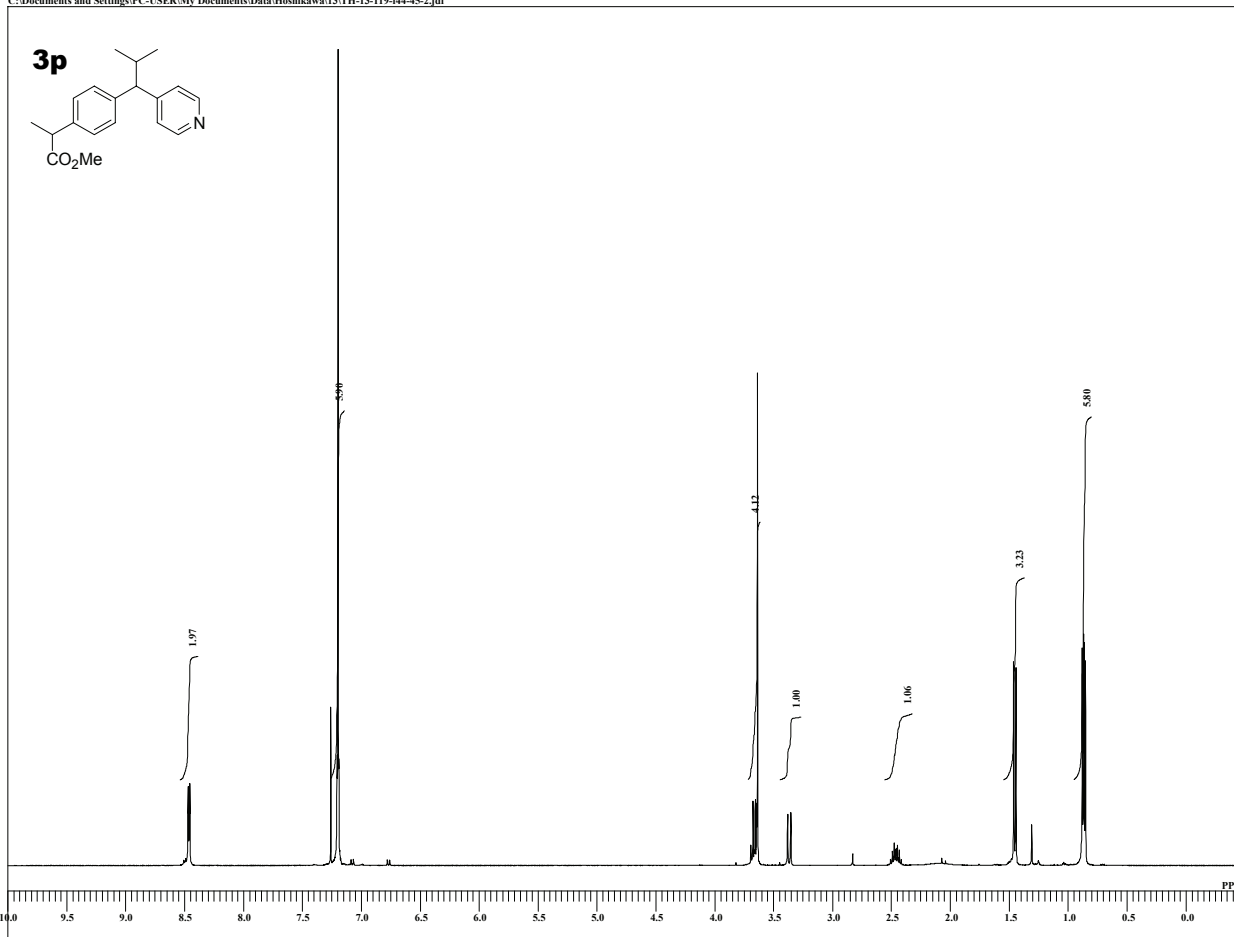
DFILE   TH-13-159-f52-65C-1.jdf
COMNT   TH-13-159-f52-65C
DATIM   13-11-2012 10:51:59
MENUF
OBNUC   13C
OFR   99.55 MHz
OBFRQ   99.55 MHz
OBSET   5.13 KHz
OBFIN   0.98 Hz
PW1   3.25 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   65536
SPO   65536
TIMES   26
DUMMY   4
FREQU   31250.00 Hz
FLT   125000 Hz
DELAY   20.50 usec
ACQTM   1.0486 sec
PD   8.0000 sec
SCANS   26
ADBIT   16
RGAIN   60
BF   1.00 Hz
T1   0.00
T2   0.00
T3   100.00
T4   100.00
EXMOD   single_pulse_dec
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-159-f52-65C-1.jdf
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   22.8 c
SLVNT   CDCL3
EXREF   77.00 ppm

S26

TH-13-119-f44-45

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-119-f44-45-2.jdf
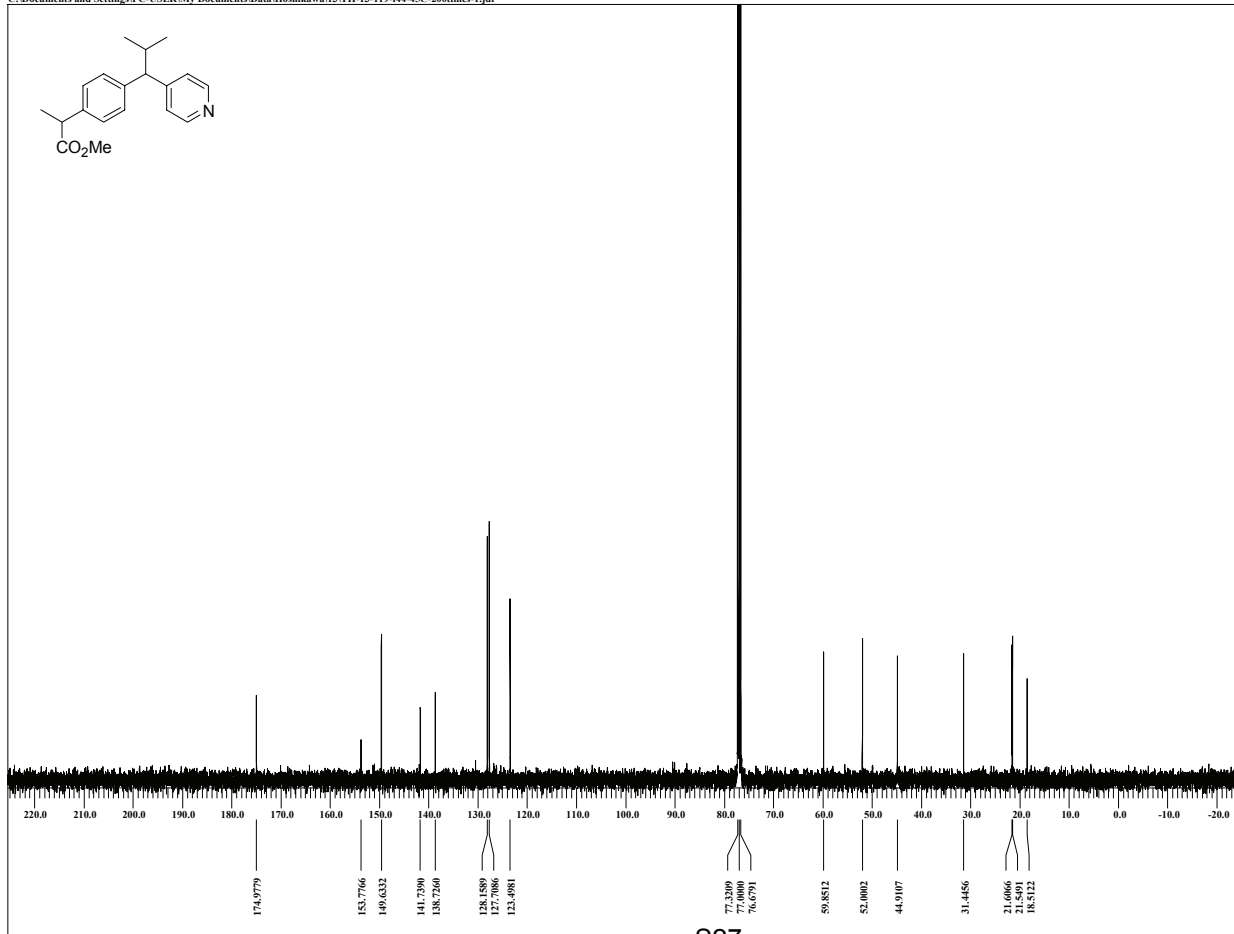
3p

TH-13-119-f44-45C-200times

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-119-f44-45C-200times-1.jdf

S27

TH-13-99-2nd-f17-24
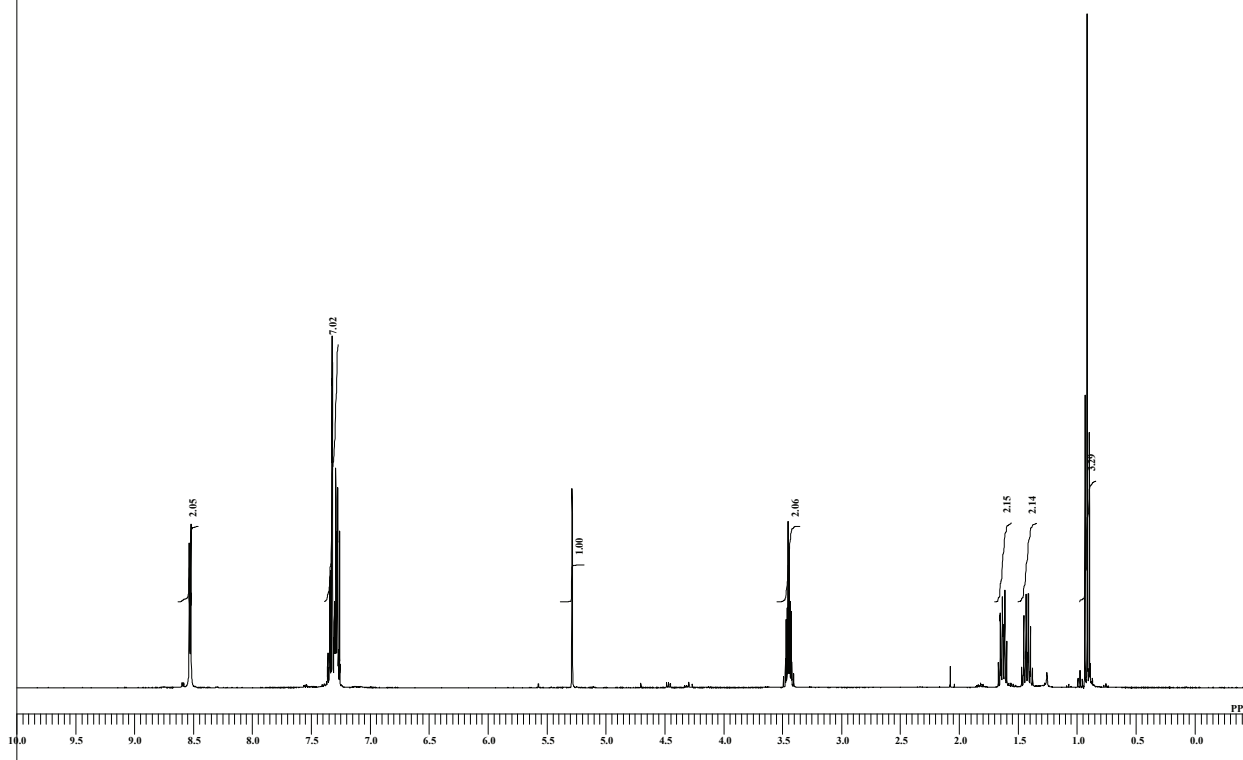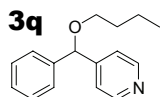
C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-99-2nd-f17-24-1.jdf

3q

DFILE	TH-13-99-2nd-f17-24-1.jdf
COMNT	TH-13-99-2nd-f17-24
DATIM	12-10-2012 13:41:25
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	34
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	147 usec
IRATN	79
DFILE	TH-13-99-2nd-f17-24-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.6 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-99-2nd-f17-24C

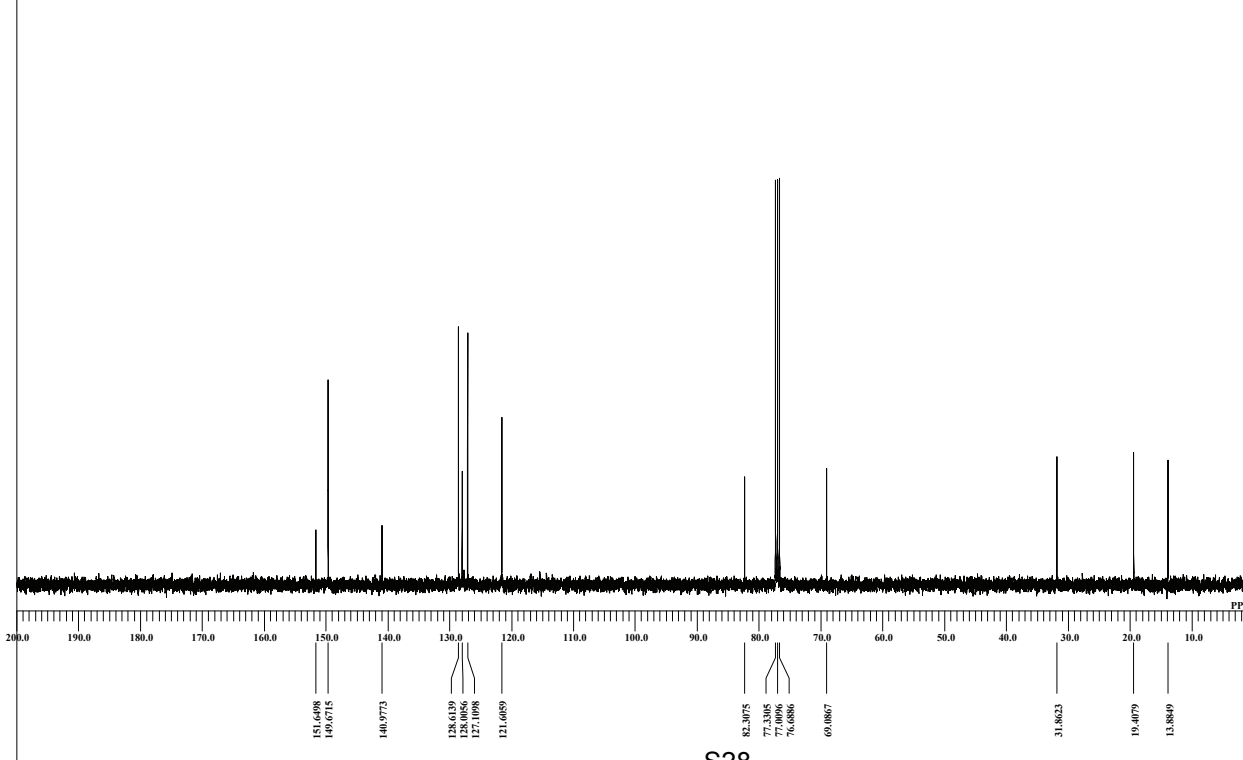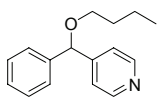C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-99-2nd-f17-24C-1.jdf

DFILE	TH-13-99-2nd-f17-24C-1.jdf
COMNT	TH-13-99-2nd-f17-24C
DATIM	12-10-2012 13:45:26
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	30
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	5.0000 sec
SCANS	30
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-99-2nd-f17-24C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.8 c
SLVNT	CDCL3
EXREF	77.00 ppm

13C peaks: 151.6498, 149.6715, 140.9773, 128.6139, 128.0056, 127.1098, 121.6089, 82.3075, 77.3305, 77.0096, 76.6886, 69.0867, 31.8623, 19.4079, 13.8849

S28

TH-13-57-f24-37-crystal

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-57-f24-37-crystal-H.jdf

3r
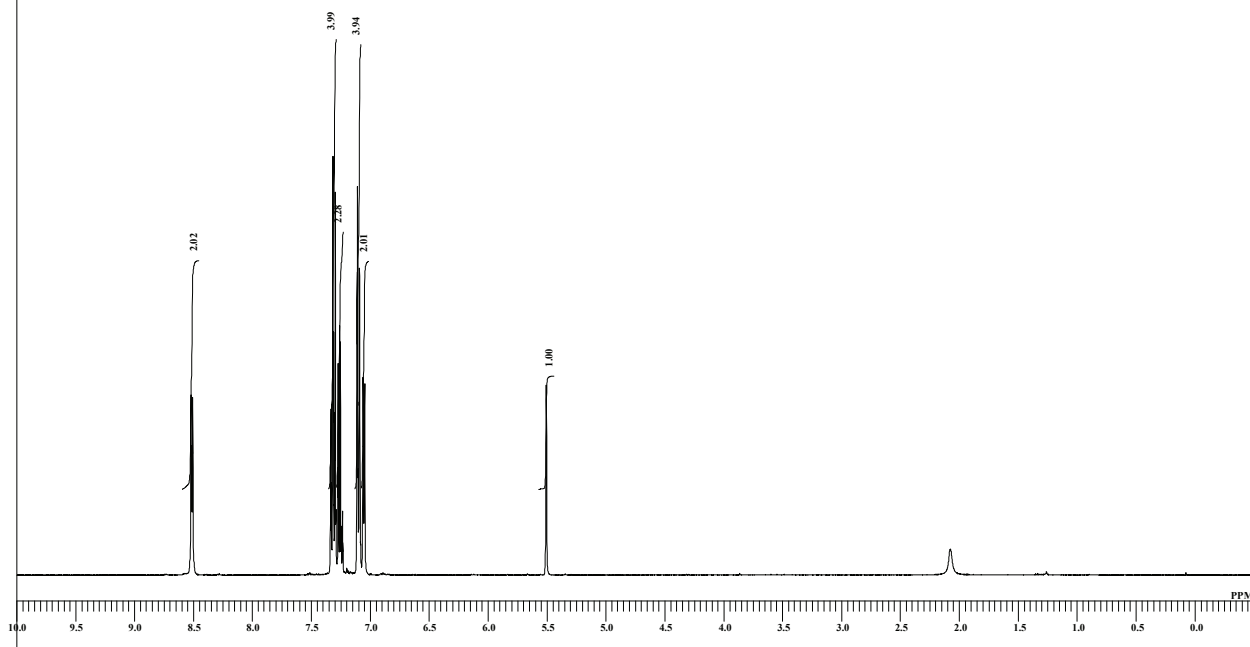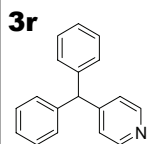
DFILE	TH-13-57-f24-37-crystal-H.jdf
COMNT	TH-13-57-f24-37-crystal
DATIM	21-09-2012 21:30:44
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	40
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-57-f24-37-crystal-H.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	25.5 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-57-f24-37-crystal

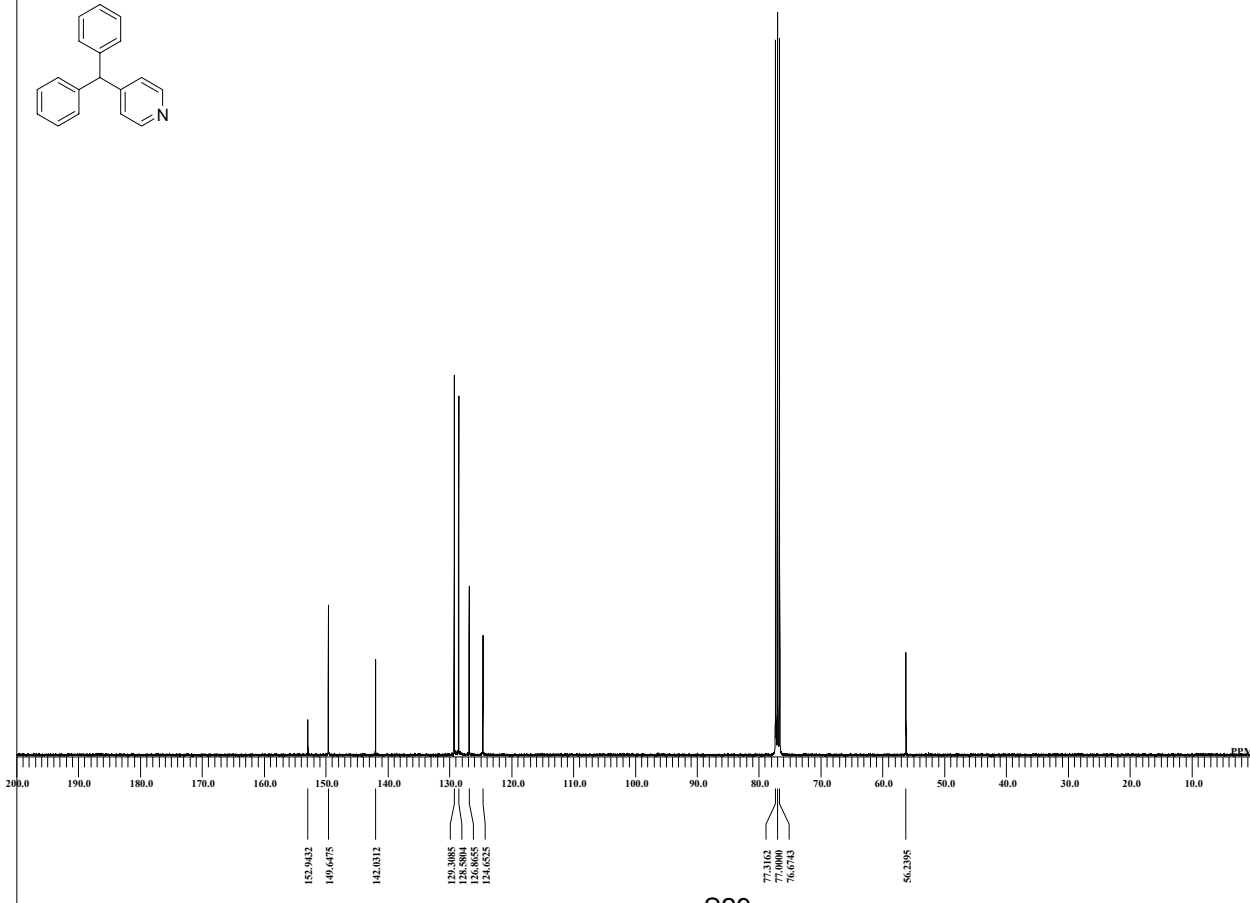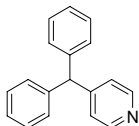C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-57-f24-37-crystal-C.jdf

DFILE	TH-13-57-f24-37-crystal-C.jdf
COMNT	TH-13-57-f24-37-crystal
DATIM	22-09-2012 05:35:59
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	32768
SPO	32768
TIMES	3200
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	3200
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-57-f24-37-crystal-C.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	25.2 c
SLVNT	CDCL3
EXREF	77.00 ppm

TH-13-61-f19-33

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-61-f19-33-1.jdf

3s
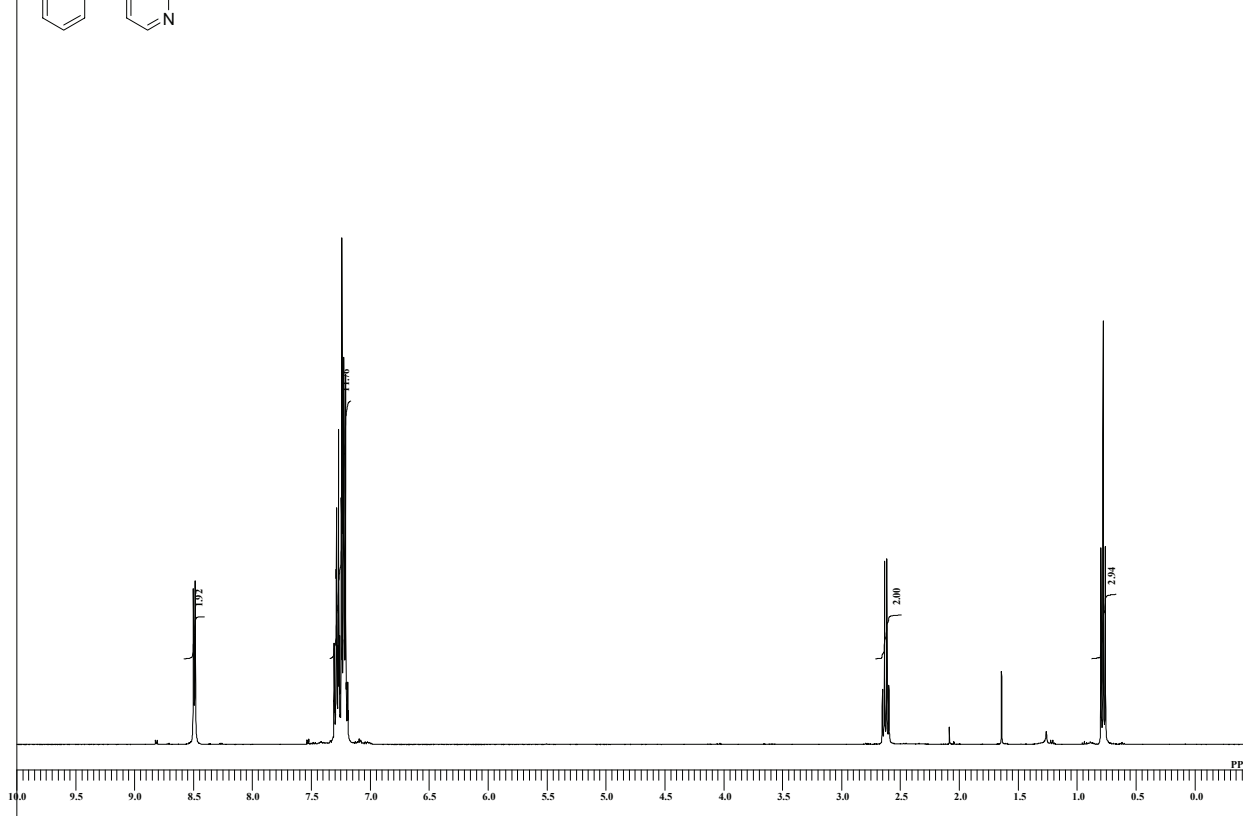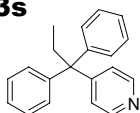
DFILE	TH-13-61-f19-33-1.jdf
COMNT	TH-13-61-f19-33
DATIM	26-09-2012 13:46:45
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	34
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-61-f19-33-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.3 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-61-f19-33C

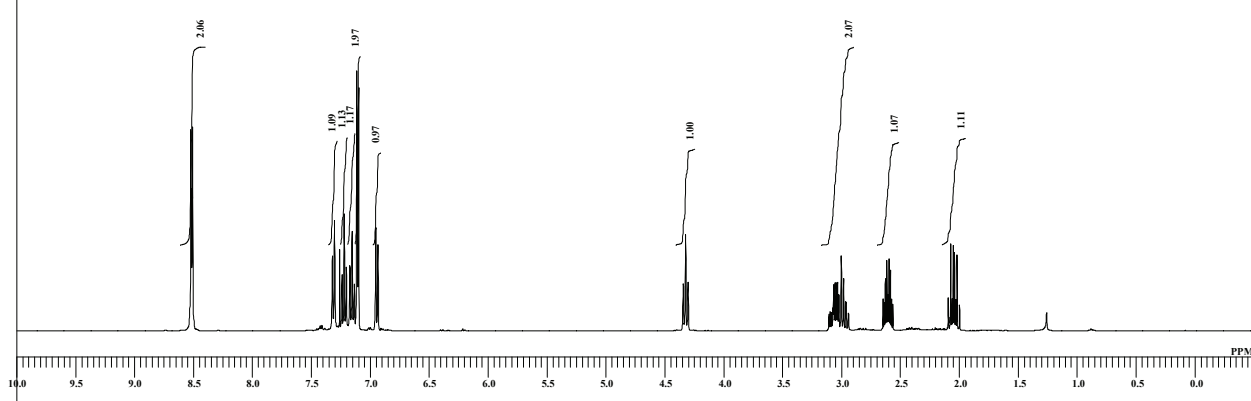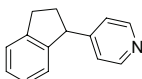C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-61-f19-33C-1.jdf
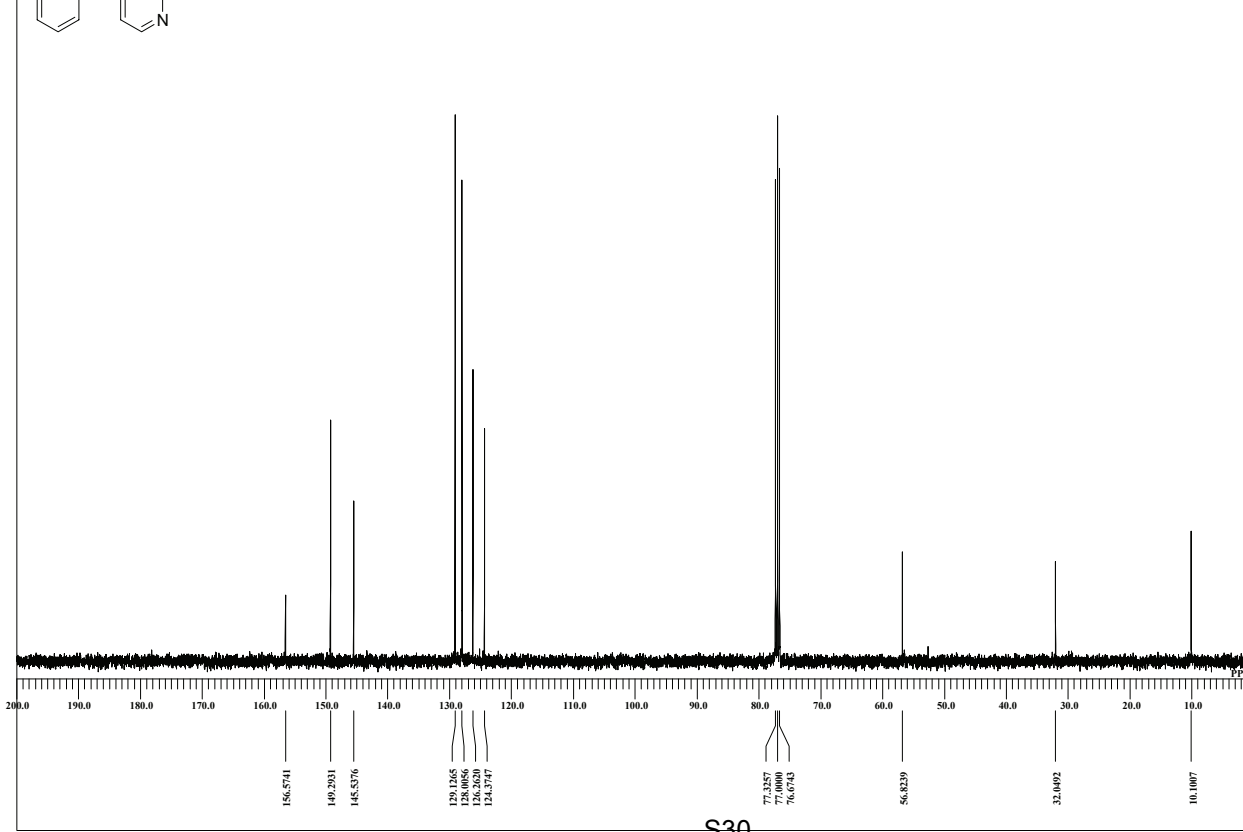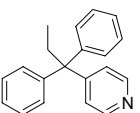
DFILE	TH-13-61-f19-33C-1.jdf
COMNT	TH-13-61-f19-33C
DATIM	26-09-2012 13:54:39
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	32768
SPO	32768
TIMES	42
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	42
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-61-f19-33C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.6 c
SLVNT	CDCL3
EXREF	77.00 ppm

156.5741
149.2931
145.5376
129.1265
128.0056
126.2620
124.3747
77.3257
77.0000
76.6743
56.8239
32.0492
10.1007

S30

TH-13-49-f20-33

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-49-f20-33-1.als

3t

TH-13-49-f20-33C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-49-f20-33C-1.jdf

S31

TH-13-45-f20-33

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-45-f20-33-1.jdf

3u

DFILE   TH-13-45-f20-33-1.jdf
COMNT   TH-13-45-f20-33
DATIM   07-09-2012 13:07:32
MENUF
OBNUC   1H
OBFR   395.88 MHz
OBFRQ   395.88 MHz
OBSET   6.28 KHz
OBFIN   0.87 Hz
PW1   6.38 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   16384
SPO   16384
TIMES   8
DUMMY   1
FREQU   7422.80 Hz
FLT   30000 Hz
DELAY   16.68 usec
ACQTM   2.2073 sec
PD   5.0000 sec
SCANS   8
ADBIT   16
RGAIN   34
BF   0.01 Hz
T1   0.00
T2   0.00
T3   90.00
T4   100.00
EXMOD   single_pulse.ex2
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-45-f20-33-1.jdf
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   24.4 c
SLVNT   CDCL3
EXREF   7.26 ppm

TH-13-45-f20-33C

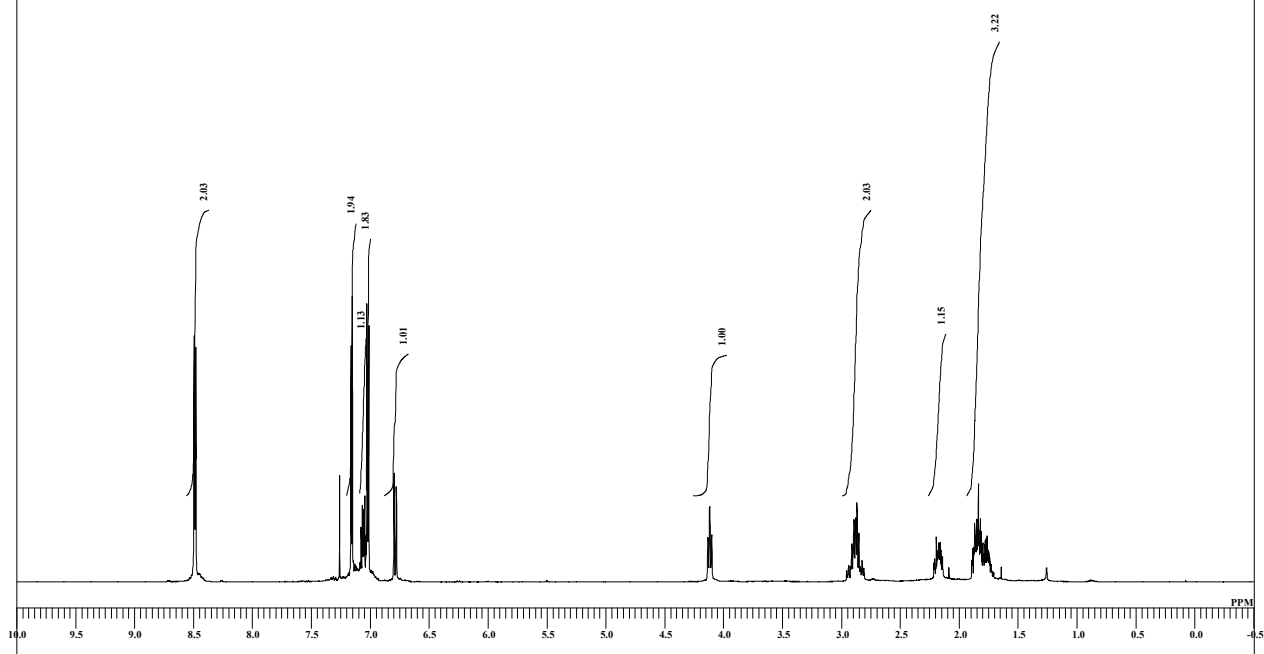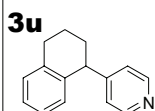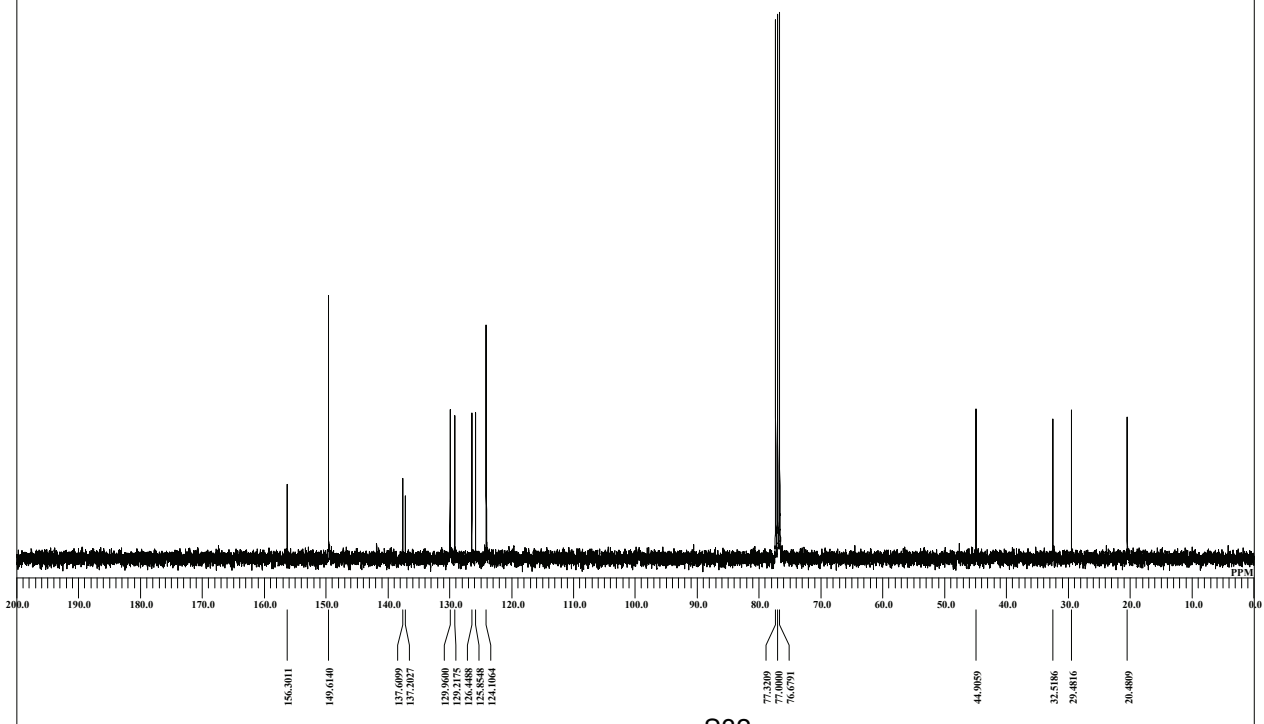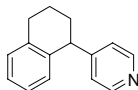C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-45-f20-33C-1.jdf

DFILE   TH-13-45-f20-33C-1.jdf
COMNT   TH-13-45-f20-33C
DATIM   07-09-2012 13:14:25
MENUF
OBNUC   13C
OFR   99.55 MHz
OBFRQ   99.55 MHz
OBSET   5.13 KHz
OBFIN   0.98 Hz
PW1   3.25 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   65536
SPO   65536
TIMES   34
DUMMY   4
FREQU   31250.00 Hz
FLT   125000 Hz
DELAY   20.50 usec
ACQTM   1.0486 sec
PD   8.0000 sec
SCANS   34
ADBIT   16
RGAIN   60
BF   1.00 Hz
T1   0.00
T2   0.00
T3   90.00
T4   100.00
EXMOD   single_pulse_dec
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-45-f20-33C-1.jdf
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   24.6 c
SLVNT   CDCL3
EXREF   77.00 ppm

S32

TH-13-89-f32-35

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-89-f32-35-1.als

3v
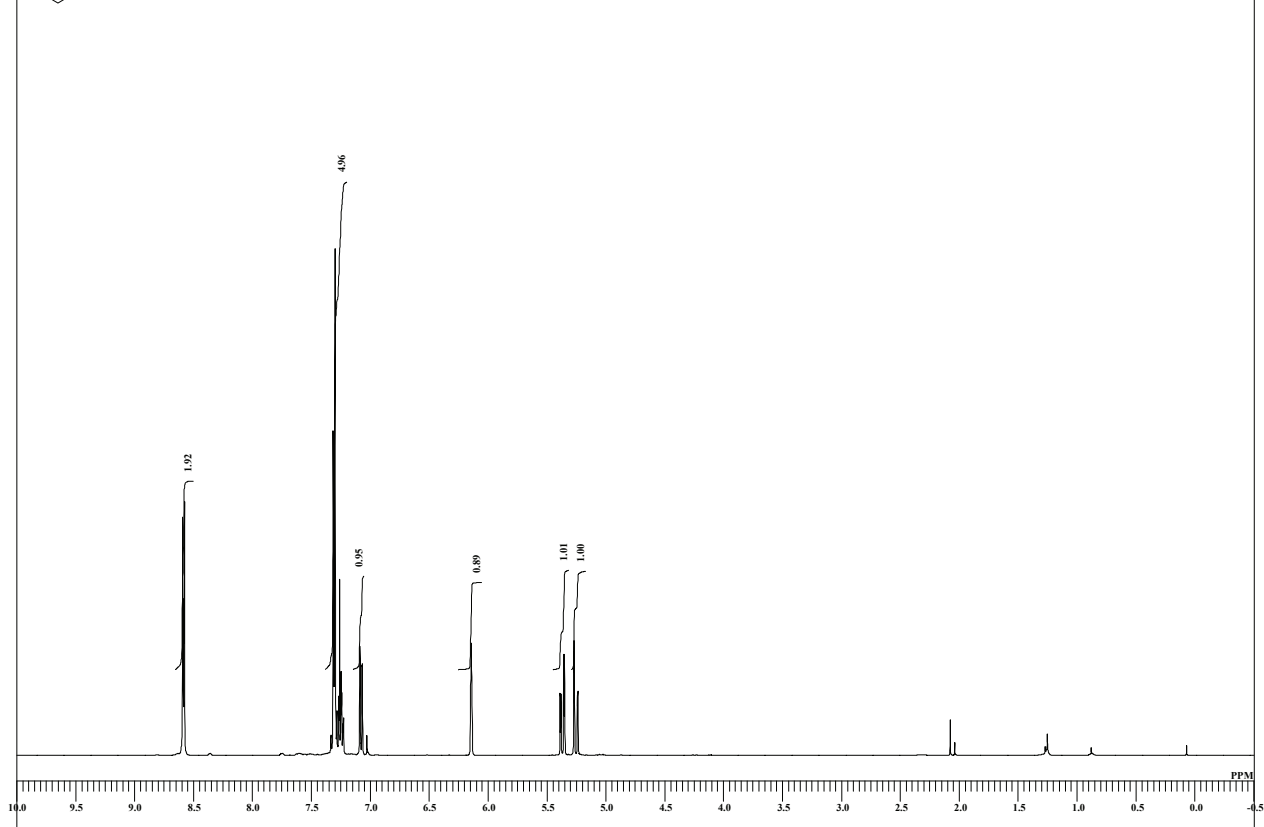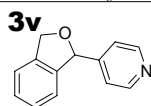
DFILE	TH-13-89-f32-35-1.als
COMNT	TH-13-89-f32-35
DATIM	05-10-2012 16:25:28
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	38
BF	0.01 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	147 usec
IRATN	79
DFILE	TH-13-89-f32-35-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.3 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-89-f32-35C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-89-f32-35C-1.jdf
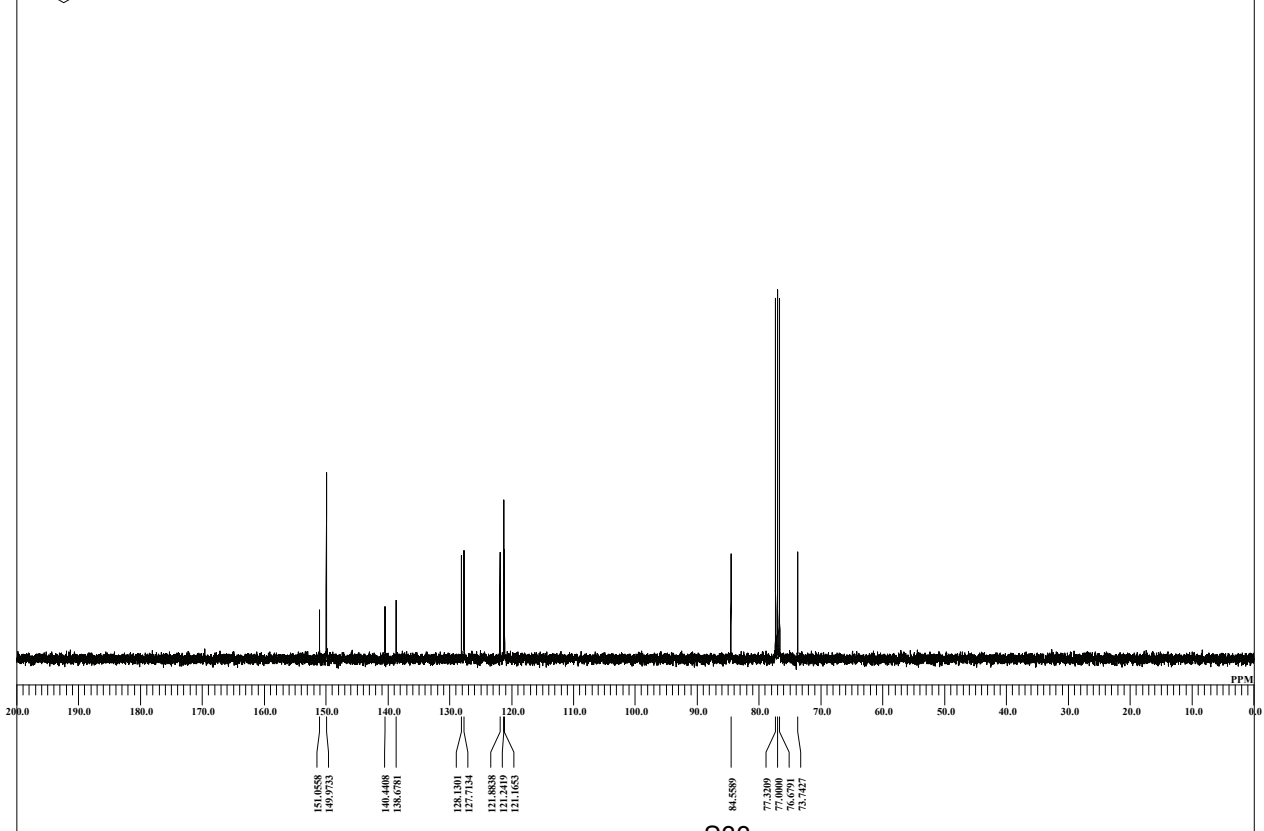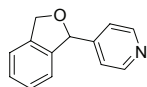

DFILE	TH-13-89-f32-35C-1.jdf
COMNT	TH-13-89-f32-35C
DATIM	05-10-2012 16:32:11
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	34
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	34
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	100.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-89-f32-35C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.5 c
SLVNT	CDCL3
EXREF	77.00 ppm

S33

TH-13-117-PTLC-major-H

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-117\TH-13-117-PTLC-major-H-1.als

3w

TH-13-117-PTLC-major-C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-117\TH-13-117-PTLC-major-C-1.als

153.9587
153.8569
149.8296
139.9810
135.6890
128.1780
127.8332
123.3496
123.2442
122.9664
122.7077
122.5293
121.4143
80.4489
77.3257
77.0000
76.6838
66.5000
66.2317
52.9726
52.6564
28.4086
28.1117

S34

TH-13-109-f57-64H

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-109\TH-13-109-f57-64H-1.als

3x

DFILE	TH-13-109-f57-64H-1.als
COMNT	TH-13-109-f57-64H
DATIM	17-10-2012 20:46:05
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	13107
SPO	13107
TIMES	8
DUMMY	1
FREQU	5938.15 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	30
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-109-f57-64H-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.6 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-109-f57-64C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-109\TH-13-109-f57-64C-1.als

3x
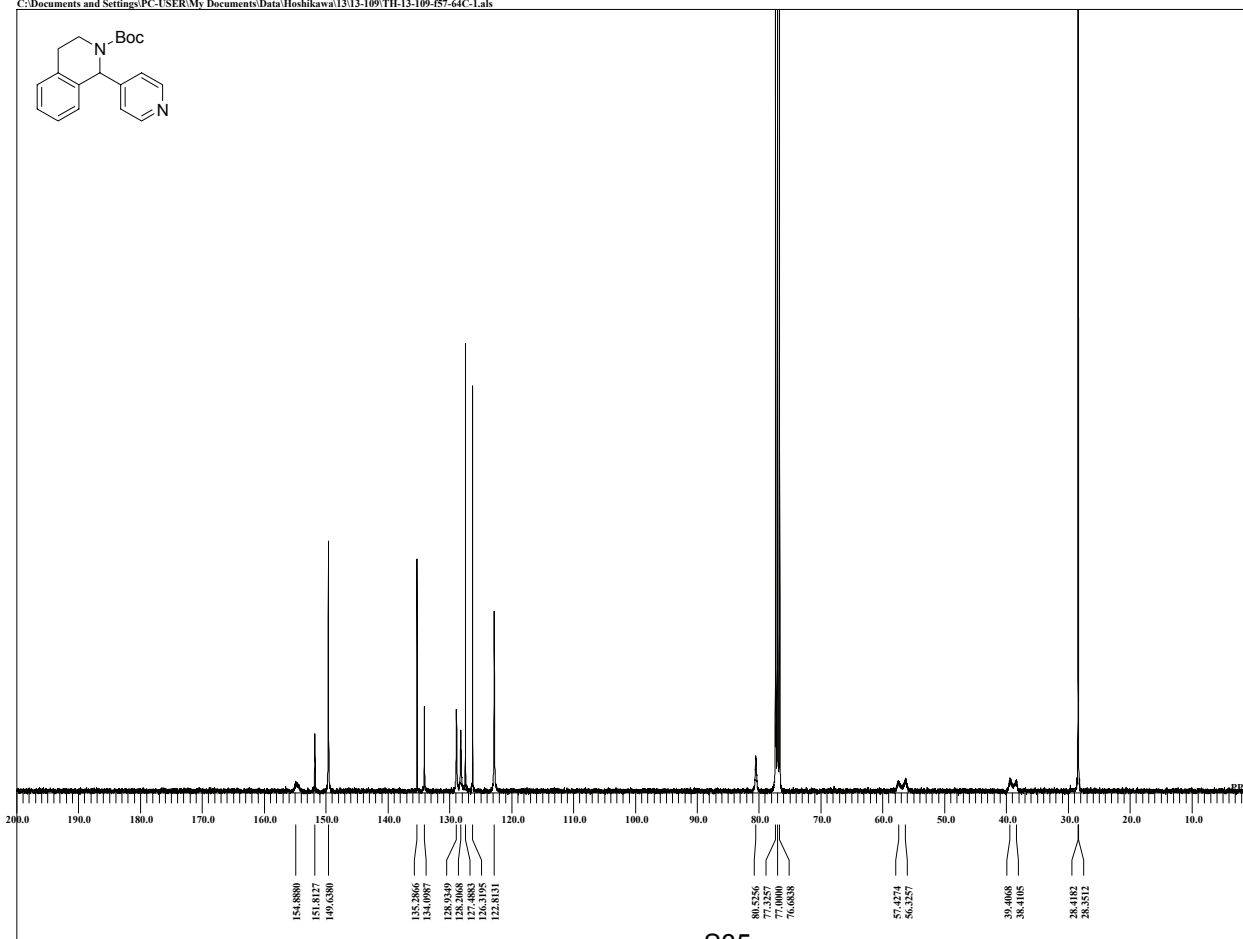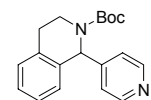
DFILE	TH-13-109-f57-64C-1.als
COMNT	TH-13-109-f57-64C
DATIM	18-10-2012 05:23:45
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	26214
SPO	26214
TIMES	3200
DUMMY	4
FREQU	24999.62 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	3200
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-109-f57-64C-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.8 c
SLVNT	CDCL3
EXREF	77.00 ppm

S35

TH-13-127-f59-67

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-127-f59-67-1.jdf

3y
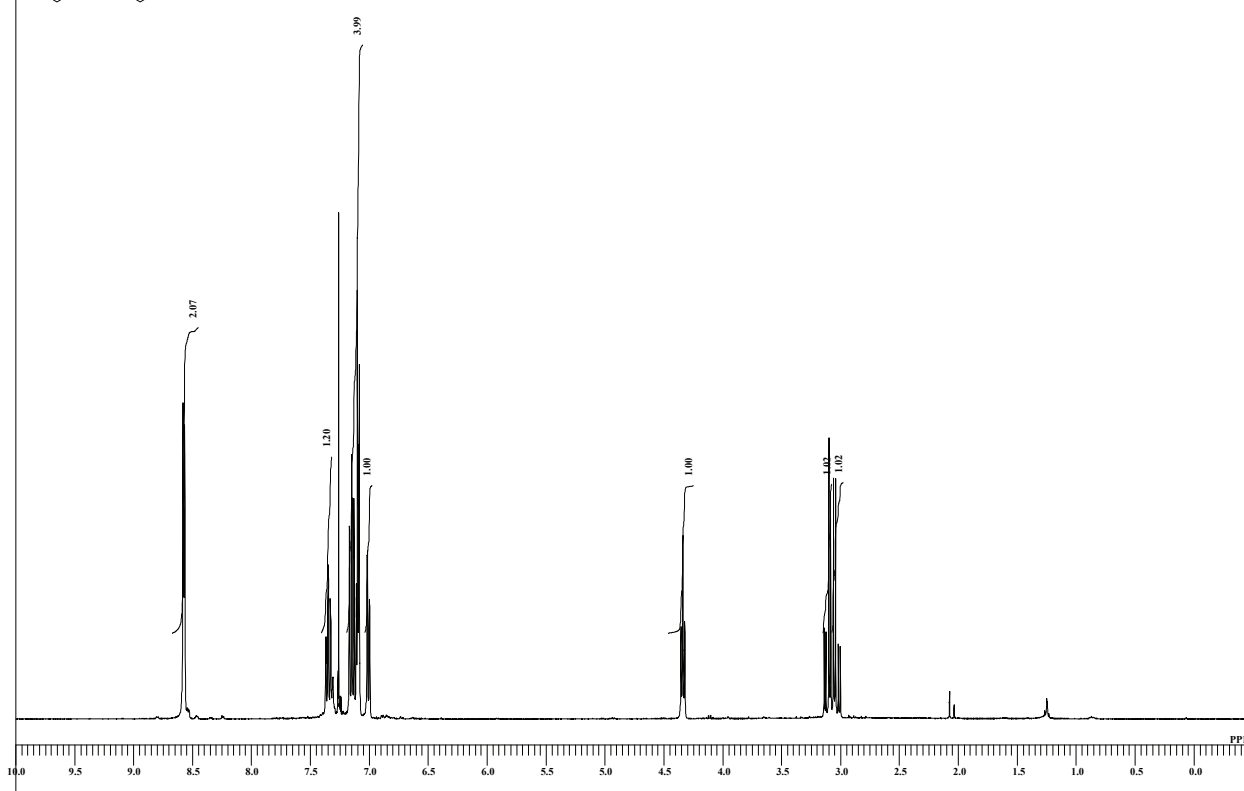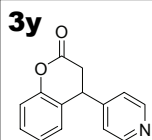
DFILE	TH-13-127-f59-67-1.jdf
COMNT	TH-13-127-f59-67
DATIM	24-10-2012 09:18:58
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	38
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-127-f59-67-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	22.9 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-127-f59-67C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-127-f59-67C-1.jdf
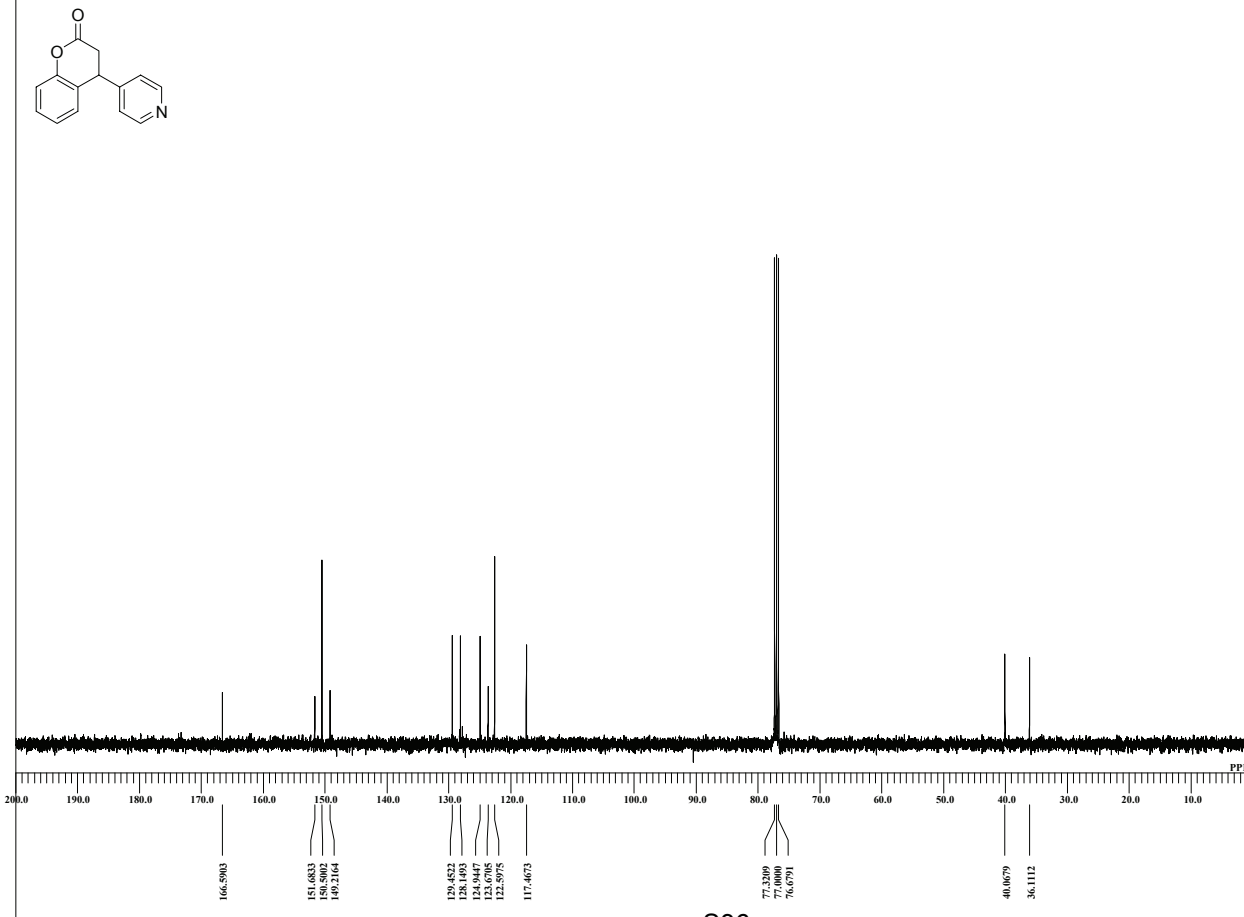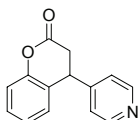
DFILE	TH-13-127-f59-67C-1.jdf
COMNT	TH-13-127-f59-67C
DATIM	24-10-2012 09:25:03
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	42
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	6.0000 sec
SCANS	42
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-127-f59-67C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.2 c
SLVNT	CDCL3
EXREF	77.00 ppm

166.5903

151.6833
150.5002
149.2164

129.4522
128.1493
124.9447
123.6705
122.5975

117.4673

77.3209
77.0000
76.6791

40.0679

36.1112

S36

TH-13-167-f44-54-2nd

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-167\TH-13-167-f44-54-2nd-1.als

3z
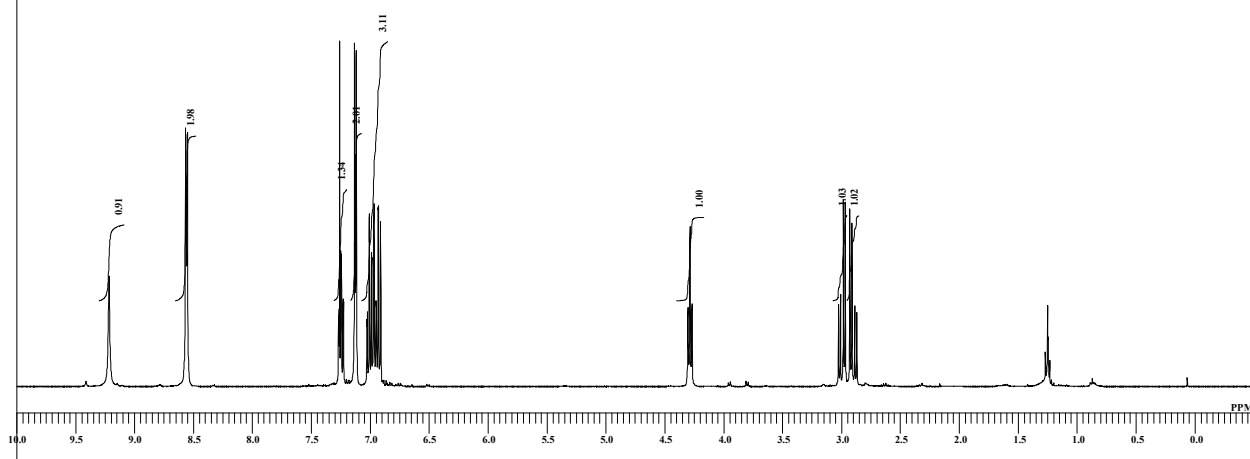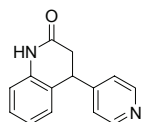
DFILE	TH-13-167-f44-54-2nd-1.als
COMNT	TH-13-167-f44-54-2nd
DATIM	16-11-2012 20:28:03
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	13107
SPO	13107
TIMES	8
DUMMY	1
FREQU	5938.15 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	38
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	147 usec
IRATN	79
DFILE	TH-13-167-f44-54-2nd-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	22.9 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-167-f44-54C

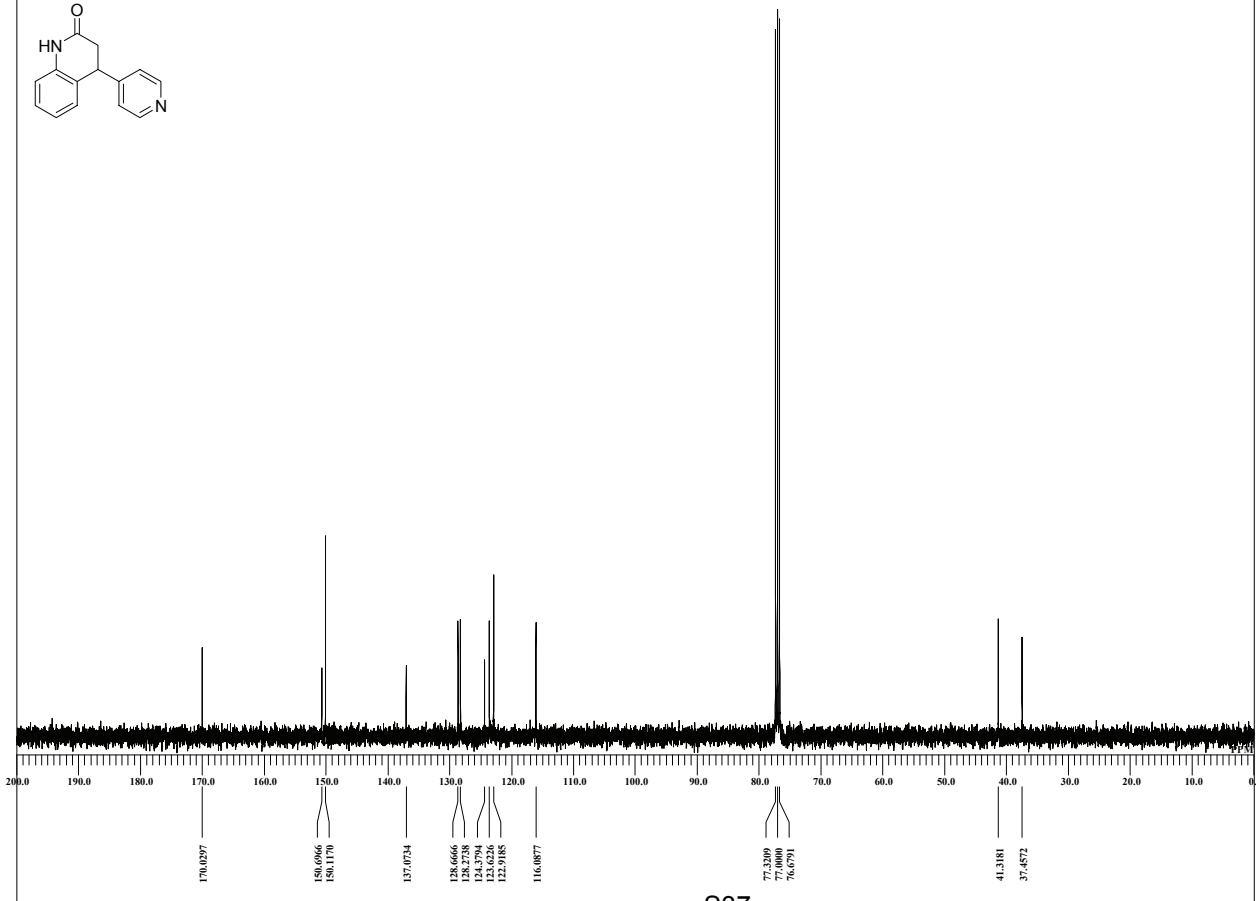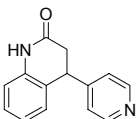C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-167\TH-13-167-f44-54C-1.jdf

DFILE	TH-13-167-f44-54C-1.jdf
COMNT	TH-13-167-f44-54C
DATIM	16-11-2012 20:35:27
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	42
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	6.0000 sec
SCANS	42
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-167-f44-54C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.0 c
SLVNT	CDCL3
EXREF	77.00 ppm

170.0297

150.6966
150.1170

137.0734

128.6666
128.2738
124.3794
123.6226
122.9185

116.0877

77.3209
77.0000
76.6791

41.3181
37.4572

S37

TH-14-1-3rd-f28-38

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\14\14-1\TH-14-1-3rd-f28-38-1.als

3aa
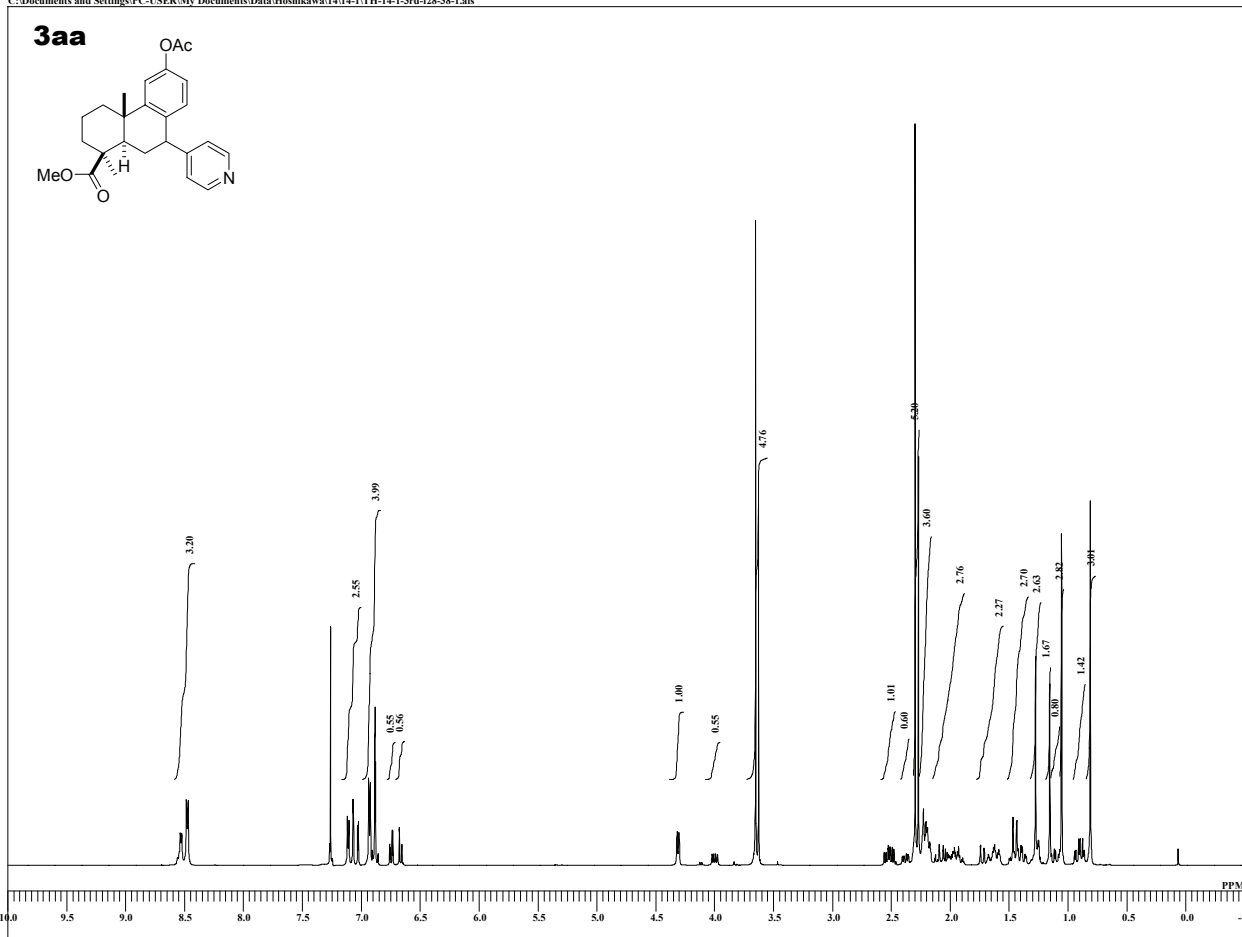
DFILE   TH-14-1-3rd-f28-38-1.als
COMNT   TH-14-1-3rd-f28-38
DATIM   06-03-2013 21:21:37
MENUF
OBNUC   1H
OFR   395.88 MHz
OBFRQ   395.88 MHz
OBSET   6.28 KHz
OBFIN   0.87 Hz
PW1   6.38 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   13107
SPO   13107
TIMES   8
DUMMY   1
FREQU   5938.15 Hz
FLT   30000 Hz
DELAY   16.68 usec
ACQTM   2.2073 sec
PD   5.0000 sec
SCANS   8
ADBIT   16
RGAIN   38
BF   0.01 Hz
T1   0.00
T2   0.00
T3   100.00
T4   100.00
EXMOD   single_pulse.ex2
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-14-1-3rd-f28-38-1.als
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   20.4 c
SLVNT   CDCL3
EXREF   7.26 ppm

TH-41-1-3rd-f28-38C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\14\14-1\TH-41-1-3rd-f28-38C-1.als
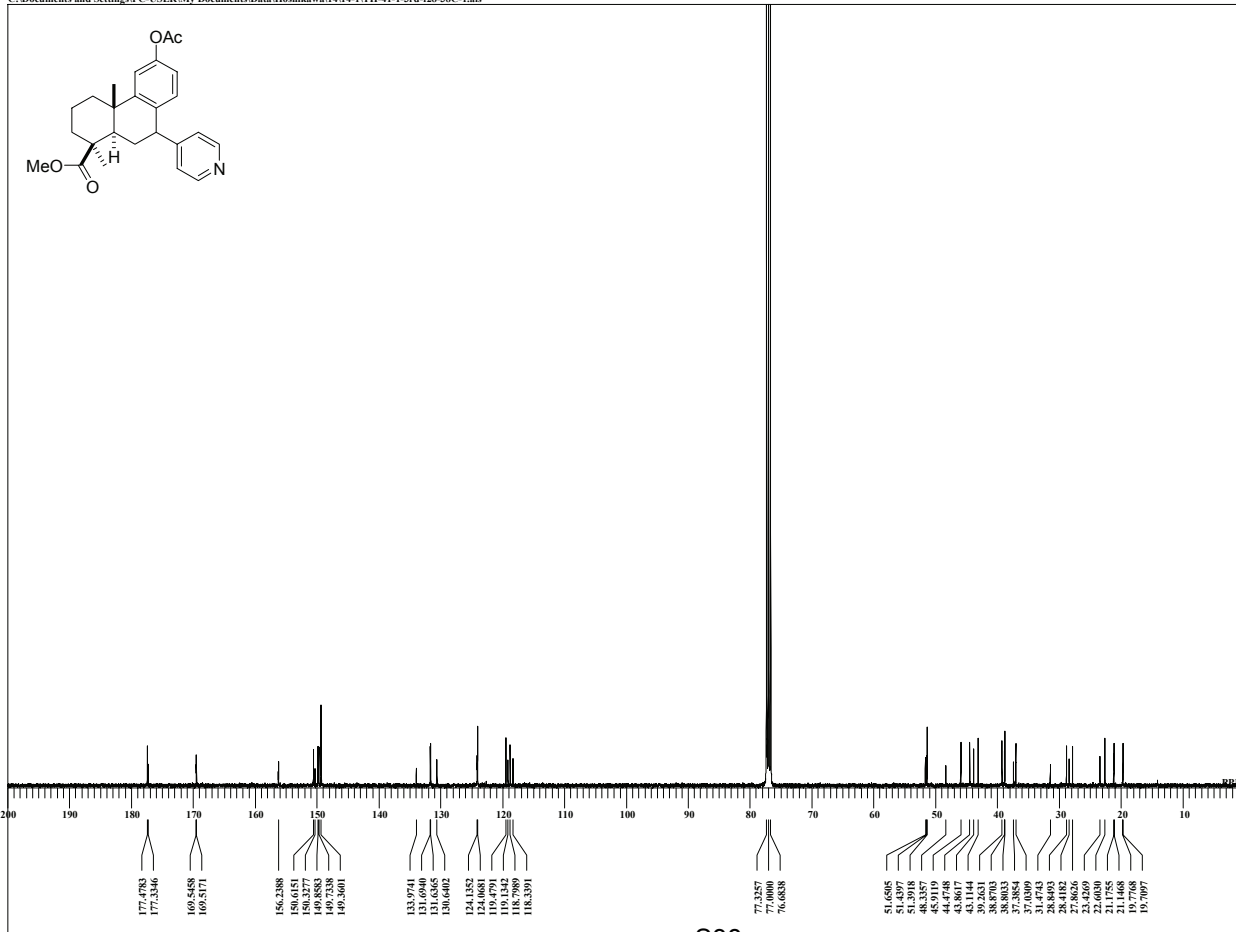
DFILE   TH-41-1-3rd-f28-38C-1.als
COMNT   TH-41-1-3rd-f28-38C
DATIM   07-03-2013 06:26:25
MENUF
OBNUC   13C
OFR   99.55 MHz
OBFRQ   99.55 MHz
OBSET   5.13 KHz
OBFIN   0.98 Hz
PW1   3.25 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   32768
SPO   32768
TIMES   3600
DUMMY   4
FREQU   31250.00 Hz
FLT   125000 Hz
DELAY   20.50 usec
ACQTM   1.0486 sec
PD   8.0000 sec
SCANS   3600
ADBIT   16
RGAIN   60
BF   1.00 Hz
T1   0.00
T2   0.00
T3   100.00
T4   100.00
EXMOD   single_pulse_dec
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-41-1-3rd-f28-38C-1.als
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   20.4 c
SLVNT   CDCL3
EXREF   77.00 ppm

S38

TH-13-193-2nd-f2-8

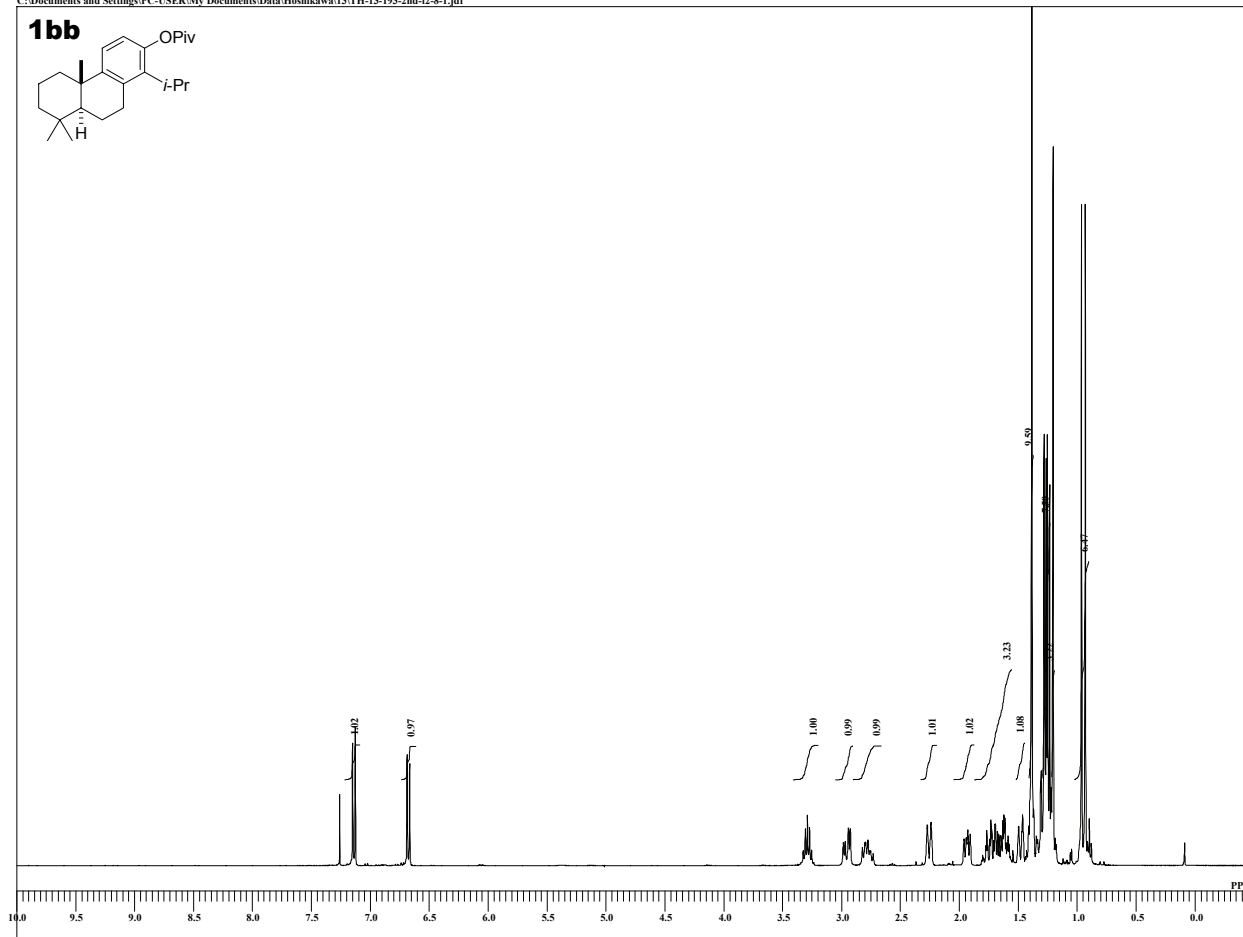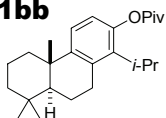C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-193-2nd-f2-8-1.jdf

1bb

DFILE   TH-13-193-2nd-f2-8-1.jdf
COMNT   TH-13-193-2nd-f2-8
DATIM   29-01-2013 14:22:33
MENUF
OBNUC   1H
OFR   395.88 MHz
OBFRQ   395.88 MHz
OBSET   6.28 KHz
OBFIN   0.87 Hz
PW1   6.38 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   16384
SPO   16384
TIMES   8
DUMMY   1
FREQU   7422.80 Hz
FLT   30000 Hz
DELAY   16.68 usec
ACQTM   2.2073 sec
PD   5.0000 sec
SCANS   8
ADBIT   16
RGAIN   24
BF   0.01 Hz
T1   0.00
T2   0.00
T3   90.00
T4   100.00
EXMOD   single_pulse.ex2
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-193-2nd-f2-8-1.jdf
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   20.3 c
SLVNT   CDCL3
EXREF   7.26 ppm

TH-13-193-2nd-f2-8C

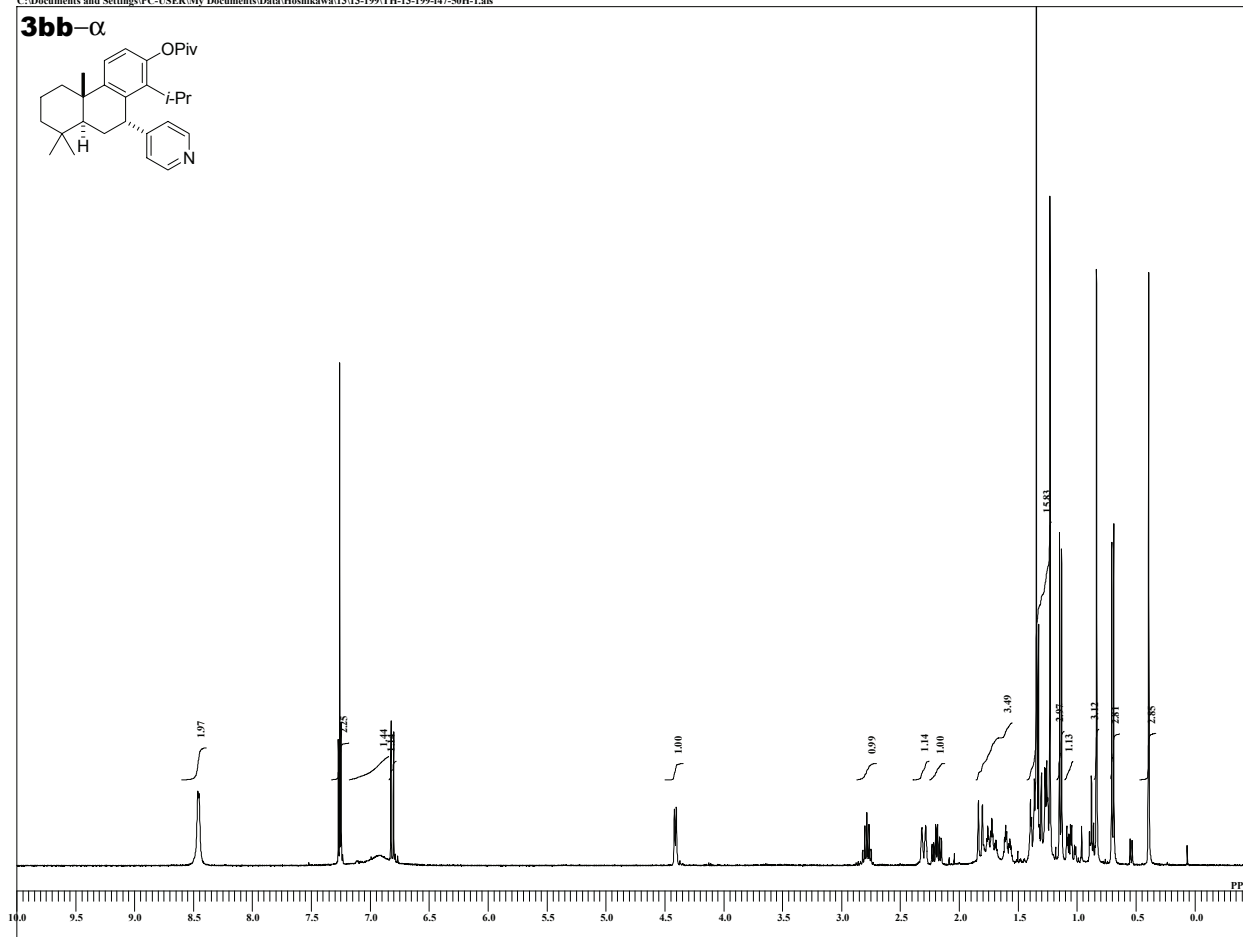C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-193-2nd-f2-8C-1.als
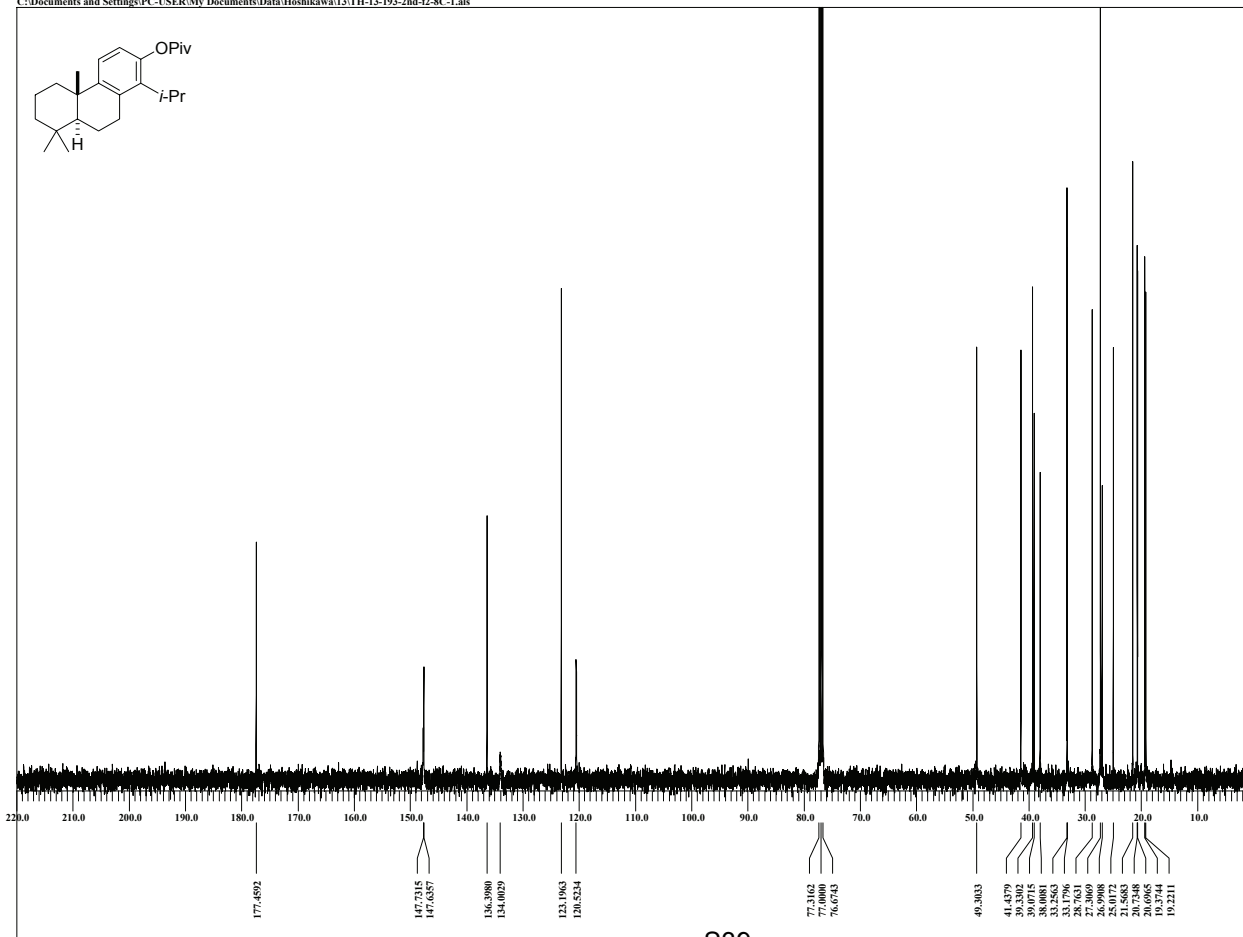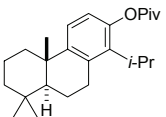
DFILE   TH-13-193-2nd-f2-8C-1.als
COMNT   TH-13-193-2nd-f2-8C
DATIM   29-01-2013 14:39:22
MENUF
OBNUC   13C
OFR   99.55 MHz
OBFRQ   99.55 MHz
OBSET   5.13 KHz
OBFIN   0.98 Hz
PW1   3.25 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   26214
SPO   26214
TIMES   102
DUMMY   4
FREQU   24999.62 Hz
FLT   125000 Hz
DELAY   20.50 usec
ACQTM   1.0486 sec
PD   8.0000 sec
SCANS   102
ADBIT   16
RGAIN   60
BF   1.00 Hz
T1   0.00
T2   0.00
T3   90.00
T4   100.00
EXMOD   single_pulse_dec
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-193-2nd-f2-8C-1.als
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   20.6 c
SLVNT   CDCL3
EXREF   77.00 ppm

TH-13-199-f47-50H

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-199\TH-13-199-f47-50H-1.als
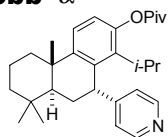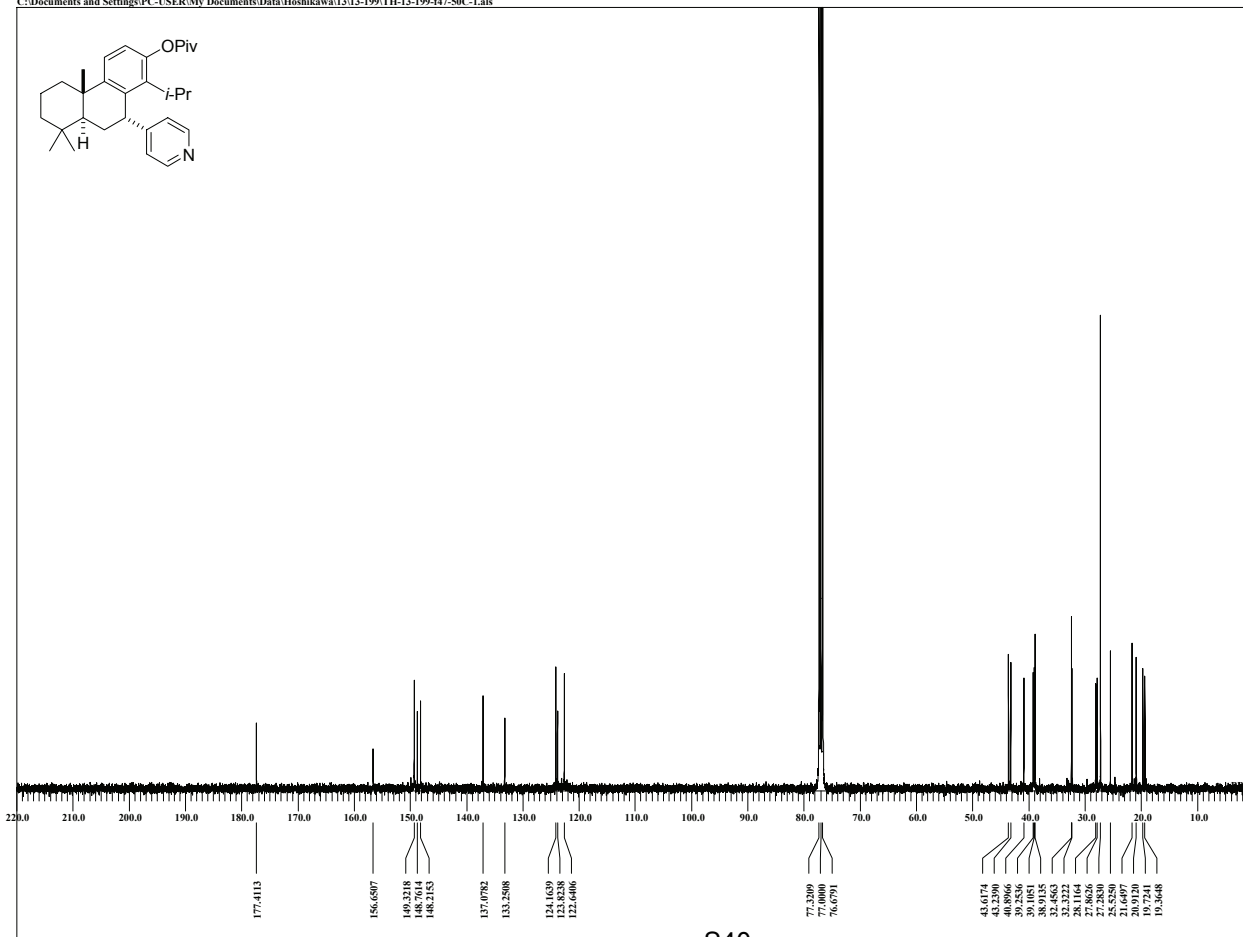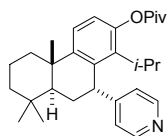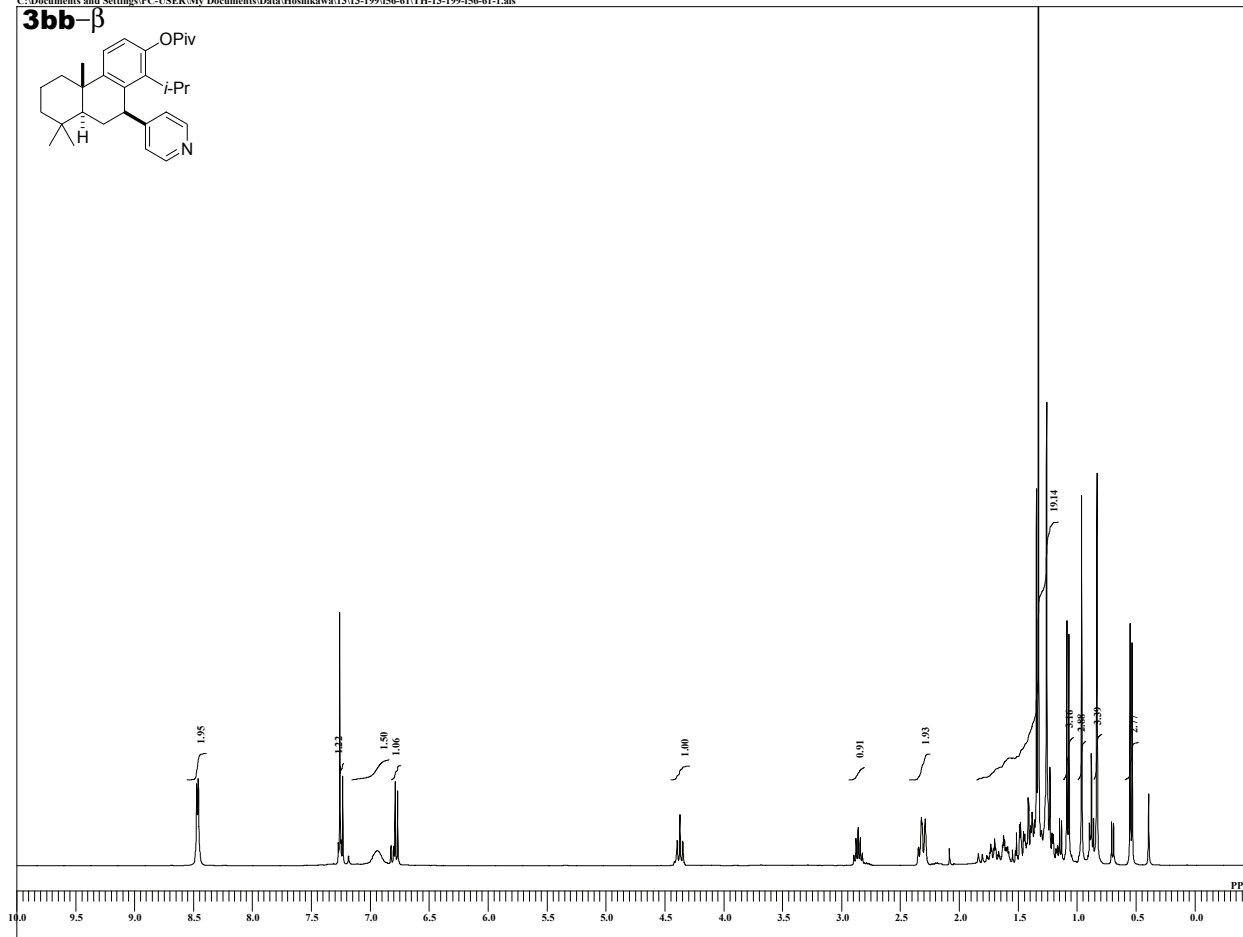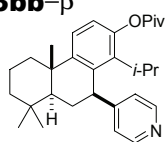
3bb−α

TH-13-199-f47-50C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-199\TH-13-199-f47-50C-1.als

S40

TH-13-199-f56-61

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\13-199\f56-61\TH-13-199-f56-61-1.als

3bb–β

DFILE	TH-13-199-f56-61-1.als
COMNT	TH-13-199-f56-61
DATIM	02-02-2013 13:12:47
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	13107
SPO	13107
TIMES	8
DUMMY	1
FREQU	5938.15 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	36
BF	0.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-199-f56-61-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	20.7 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-199-f56-61C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-199-f56-61C-2.als

3bb–β
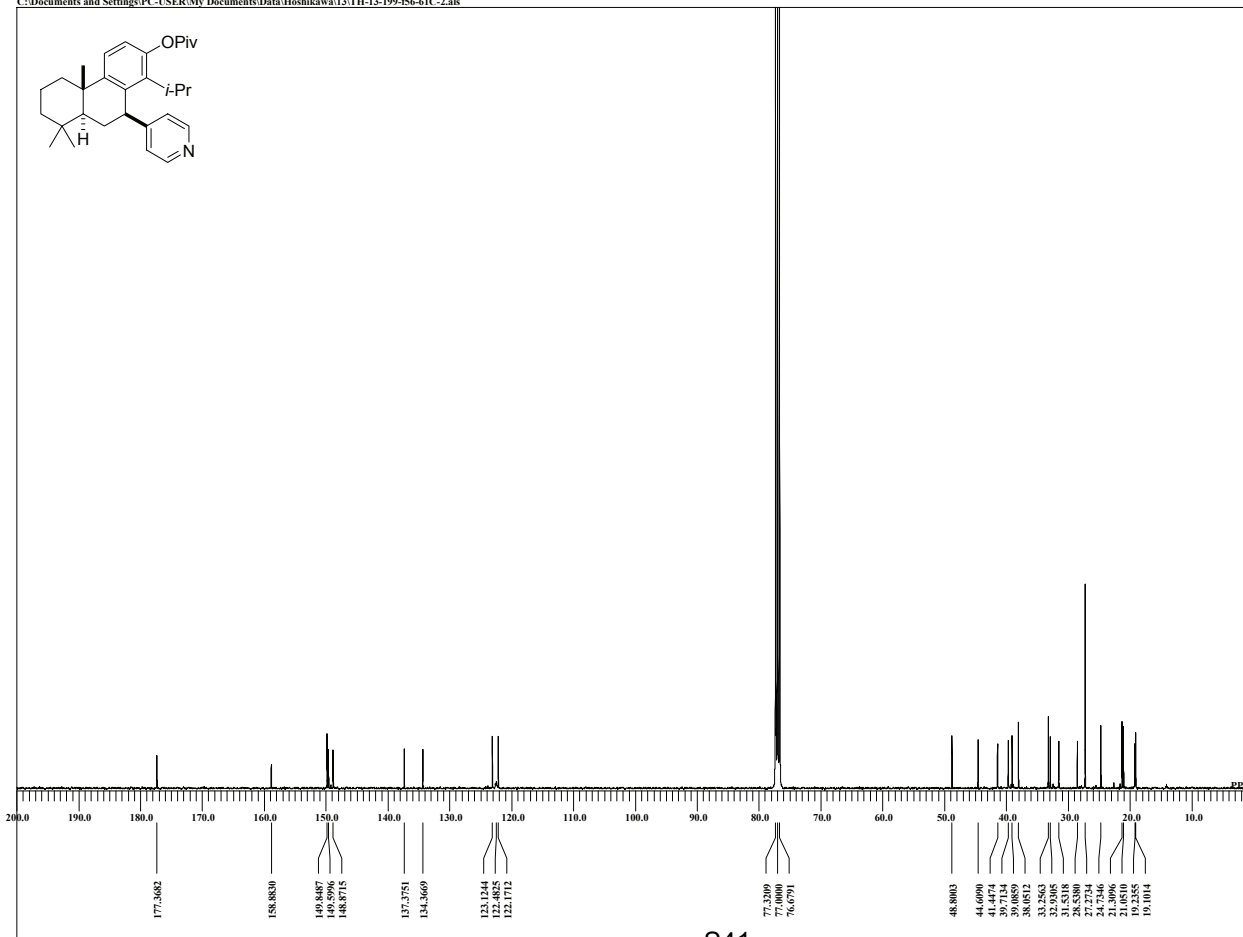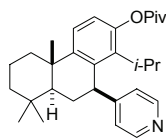
DFILE	TH-13-199-f56-61C-2.als
COMNT	TH-13-199-f56-61C
DATIM	05-02-2013 04:01:28
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	52428
SPO	52428
TIMES	2400
DUMMY	4
FREQU	24999.62 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	2400
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-199-f56-61C-2.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	20.5 c
SLVNT	CDCL3
EXREF	77.00 ppm

S41

TH-13-93-f20-30

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-93-f20-30.1

3cc
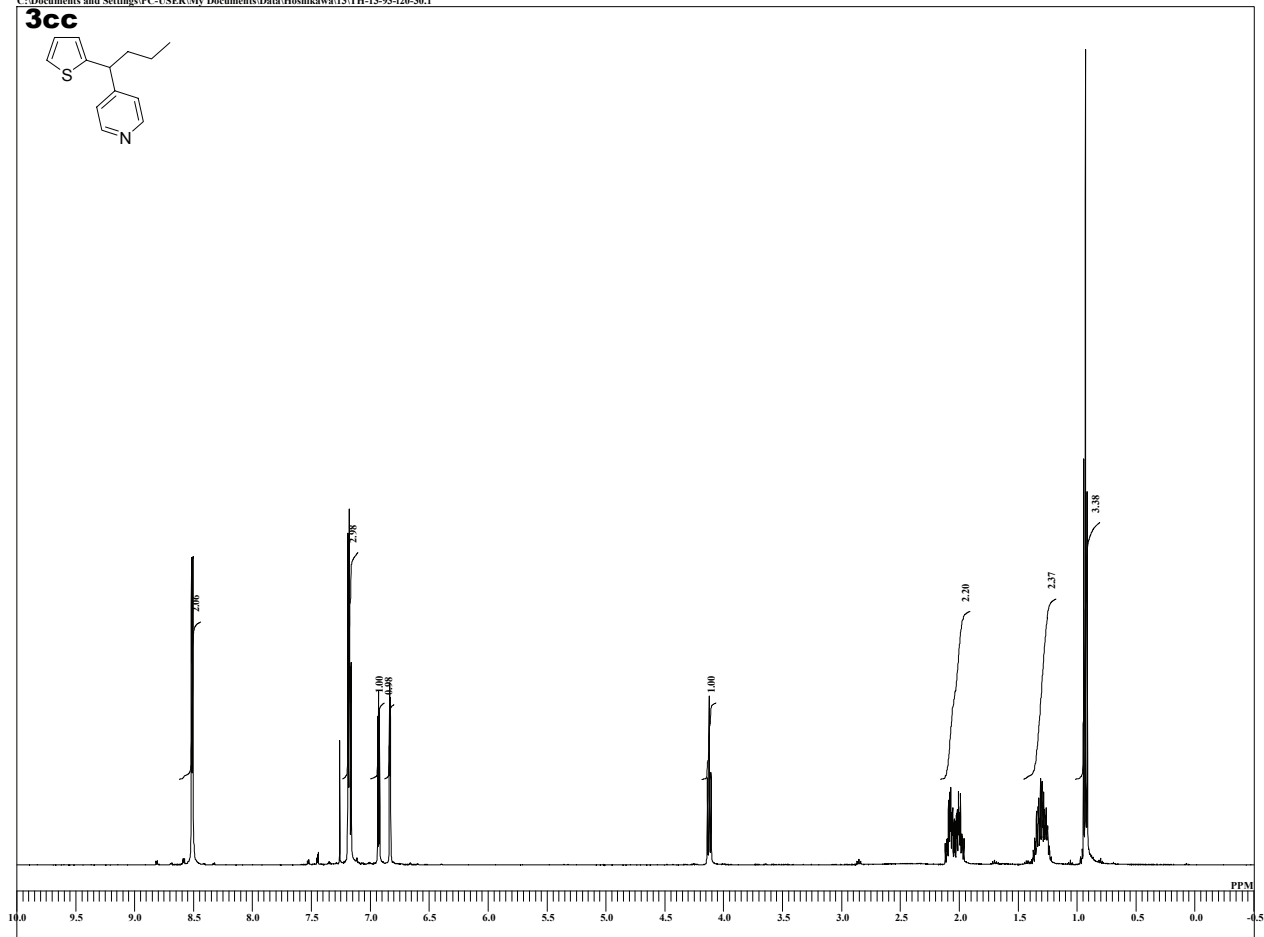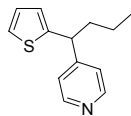
DFILE   TH-13-93-f20-30.1
COMNT   TH-13-93-f20-30
DATIM   07-10-2012 21:19:45
MENUF
OBNUC   1H
OFR   490.15 MHz
OBFRQ   490.15 MHz
OBSET   9.16 KHz
OBFIN   7.60 Hz
PW1   6.50 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   16384
SPO   16384
TIMES   8
DUMMY   1
FREQU   9191.18 Hz
FLT   37000 Hz
DELAY   13.52 usec
ACQTM   1.7826 sec
PD   5.0000 sec
SCANS   8
ADBIT   16
RGAIN   36
BF   0.01 Hz
T1   0.00
T2   0.00
T3   90.00
T4   100.00
EXMOD   single_pulse.ex2
EXPCM
IRNUC   1H
IFR   490.15 MHz
IRSET   9.16 KHz
IRFIN   7.60 Hz
IRRPW   92 usec
IRATN   79
DFILE   TH-13-93-f20-30.1
SF
LKSET   70.30 KHz
LKFIN   32.5 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   25.3 c
SLVNT   CDCL3
EXREF   7.26 ppm

TH-13-93-f20-30C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-93-f20-30C.1
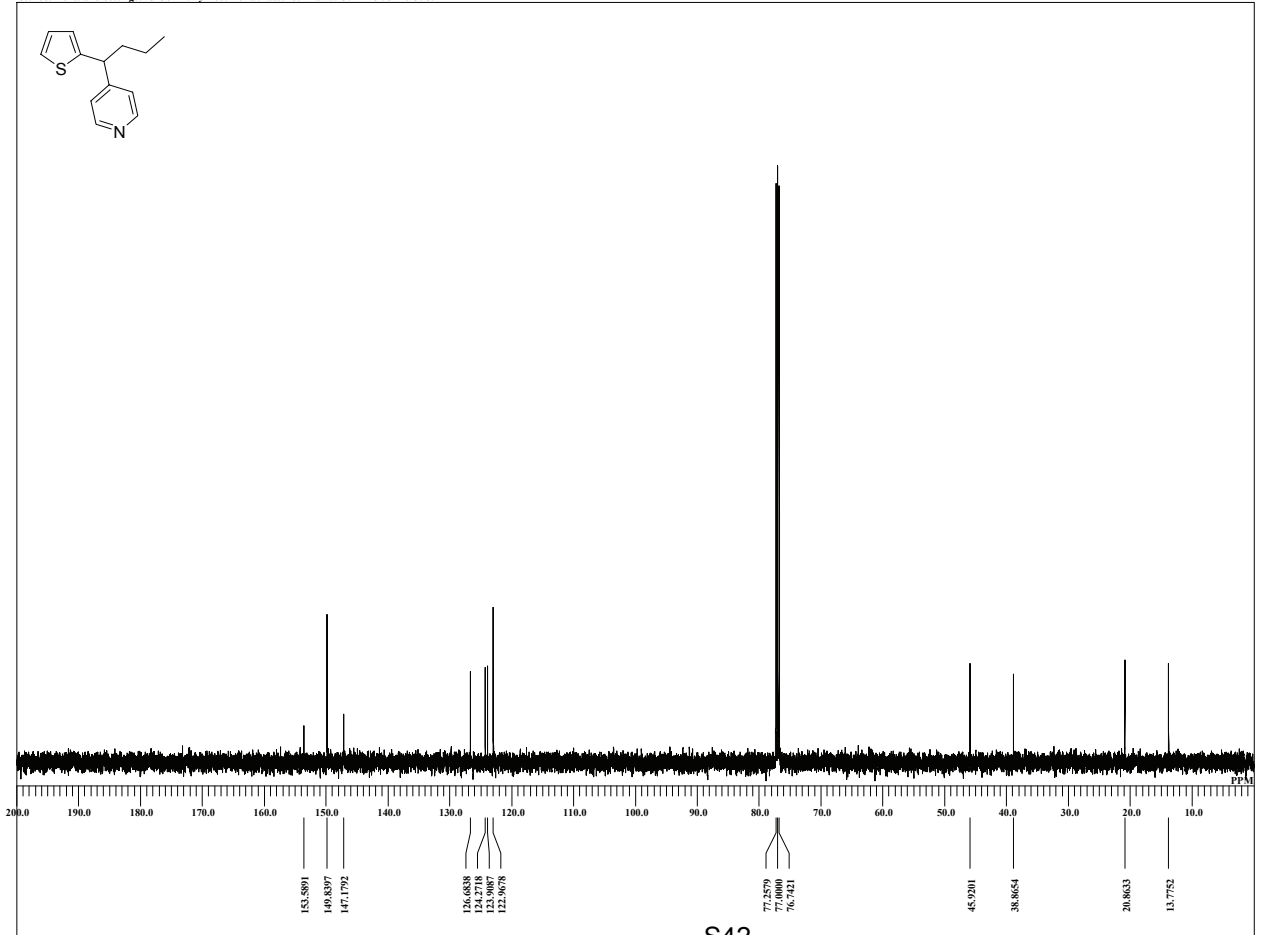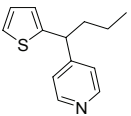
DFILE   TH-13-93-f20-30C.1
COMNT   TH-13-93-f20-30C
DATIM   07-10-2012 21:26:57
MENUF
OBNUC   13C
OFR   123.26 MHz
OBFRQ   123.26 MHz
OBSET   2.31 KHz
OBFIN   6.71 Hz
PW1   3.23 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   65536
SPO   65536
TIMES   34
DUMMY   4
FREQU   38580.25 Hz
FLT   155000 Hz
DELAY   21.06 usec
ACQTM   0.8493 sec
PD   8.0000 sec
SCANS   34
ADBIT   16
RGAIN   60
BF   1.00 Hz
T1   0.00
T2   0.00
T3   90.00
T4   100.00
EXMOD   single_pulse_dec
EXPCM
IRNUC   1H
IFR   490.15 MHz
IRSET   9.16 KHz
IRFIN   7.60 Hz
IRRPW   92 usec
IRATN   79
DFILE   TH-13-93-f20-30C.1
SF
LKSET   70.30 KHz
LKFIN   32.5 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   25.9 c
SLVNT   CDCL3
EXREF   77.00 ppm

S42

TH-13-97-f24-31

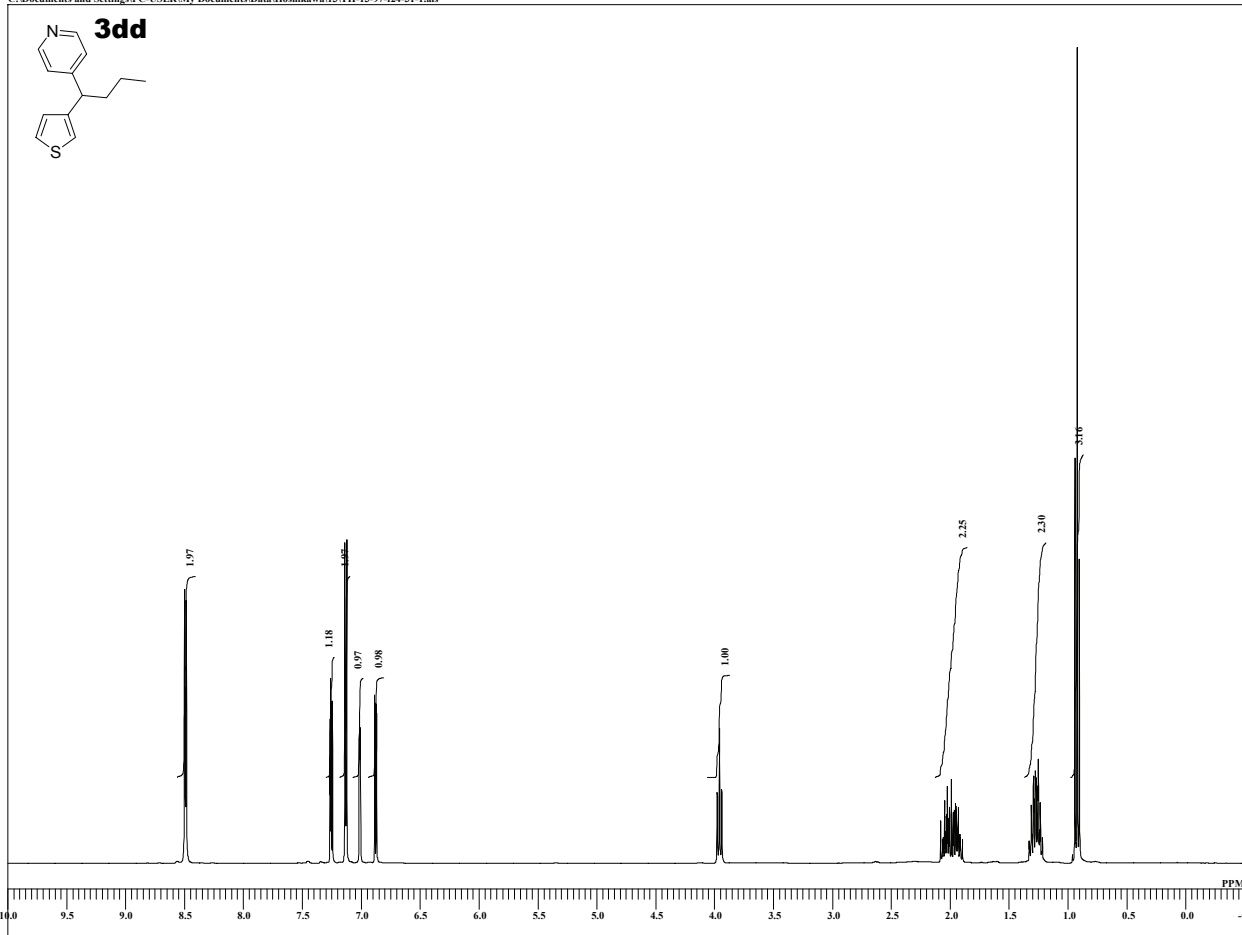C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-97-f24-31-1.als

3dd

DFILE	TH-13-97-f24-31-1.als
COMNT	TH-13-97-f24-31
DATIM	11-10-2012 16:58:16
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	36
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-97-f24-31-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.7 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-97-f24-31C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-97-f24-31C-1.jdf
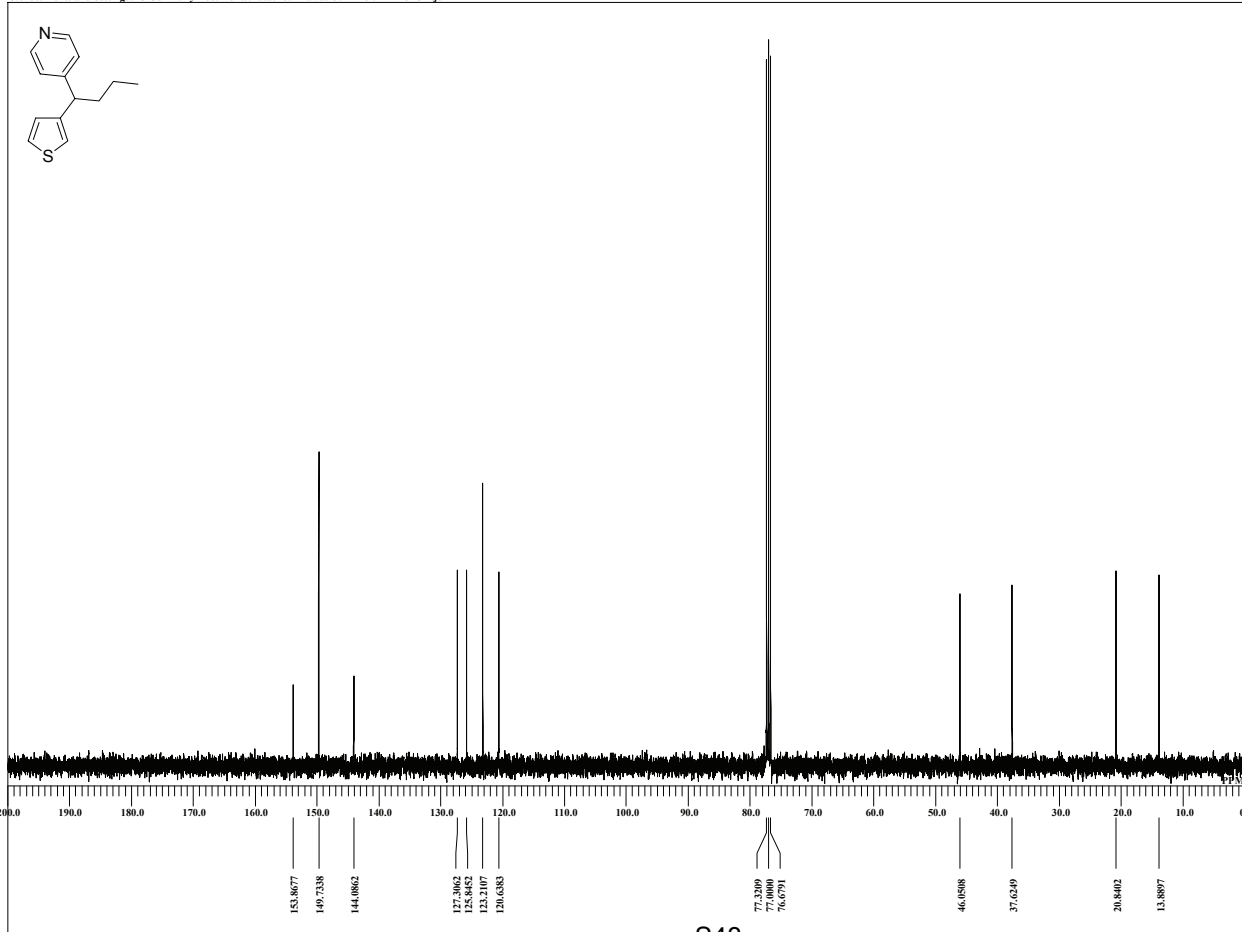
DFILE	TH-13-97-f24-31C-1.jdf
COMNT	TH-13-97-f24-31C
DATIM	11-10-2012 17:04:12
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	42
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	5.0000 sec
SCANS	42
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-97-f24-31C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	23.9 c
SLVNT	CDCL3
EXREF	77.00 ppm

S43

TH-14-7-f41-50

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\14\TH-14-7-f41-50-1.jdf

3ee
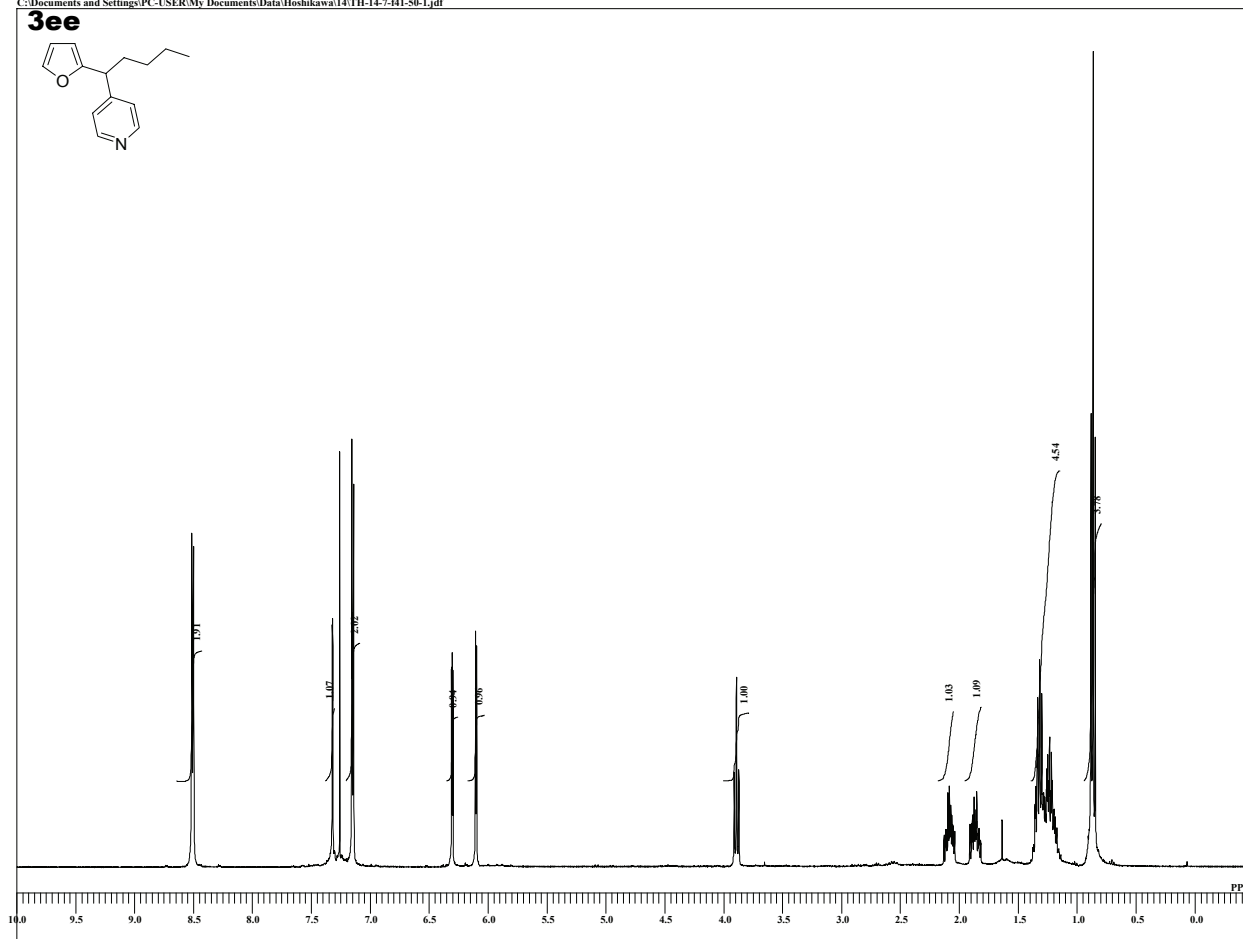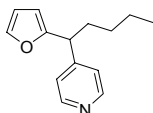
DFILE	TH-14-7-f41-50-1.jdf
COMNT	TH-14-7-f41-50
DATIM	12-02-2013 19:00:16
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	38
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-14-7-f41-50-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	20.6 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-14-7-f41-50C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\14\TH-14-7-f41-50C-1.jdf
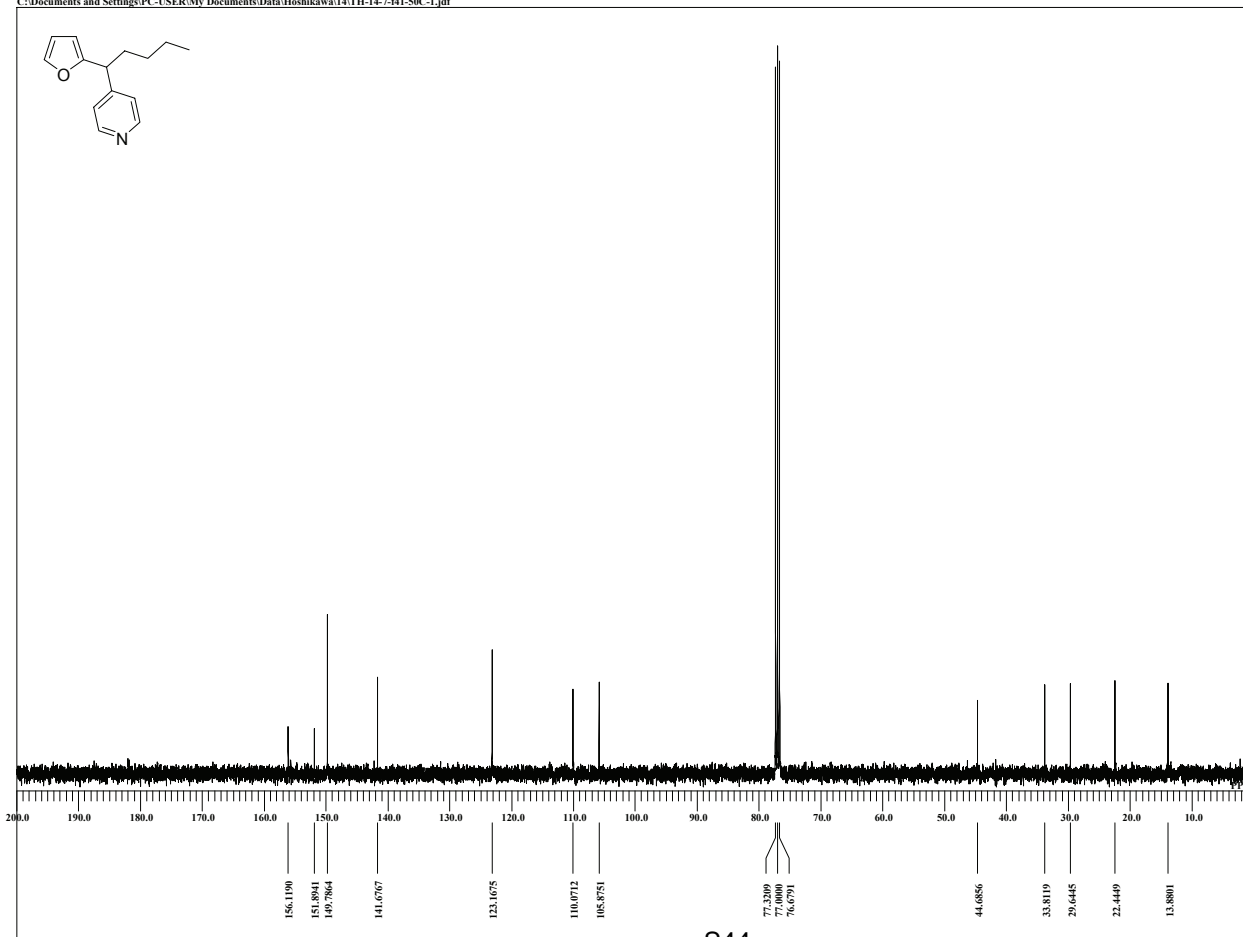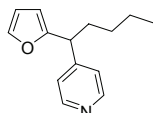
DFILE	TH-14-7-f41-50C-1.jdf
COMNT	TH-14-7-f41-50C
DATIM	12-02-2013 19:08:37
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	42
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	42
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-14-7-f41-50C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	20.8 c
SLVNT	CDCL3
EXREF	77.00 ppm

S44

TH-13-189-f47-54

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-189-f47-54-1.als

3ff
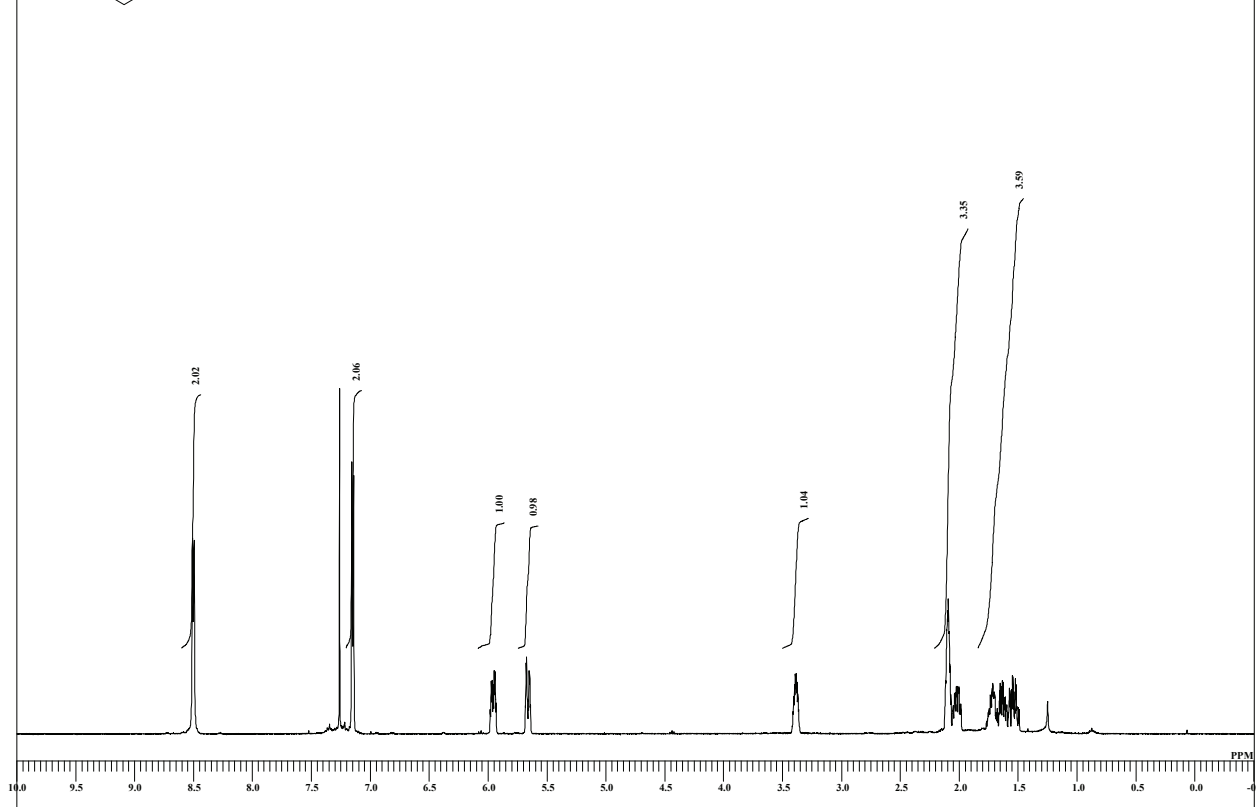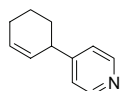
DFILE	TH-13-189-f47-54-1.als
COMNT	TH-13-189-f47-54
DATIM	13-02-2013 20:40:30
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	42
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-189-f47-54-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	20.4 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-13-189-f47-54C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-189-f47-54C-1.als
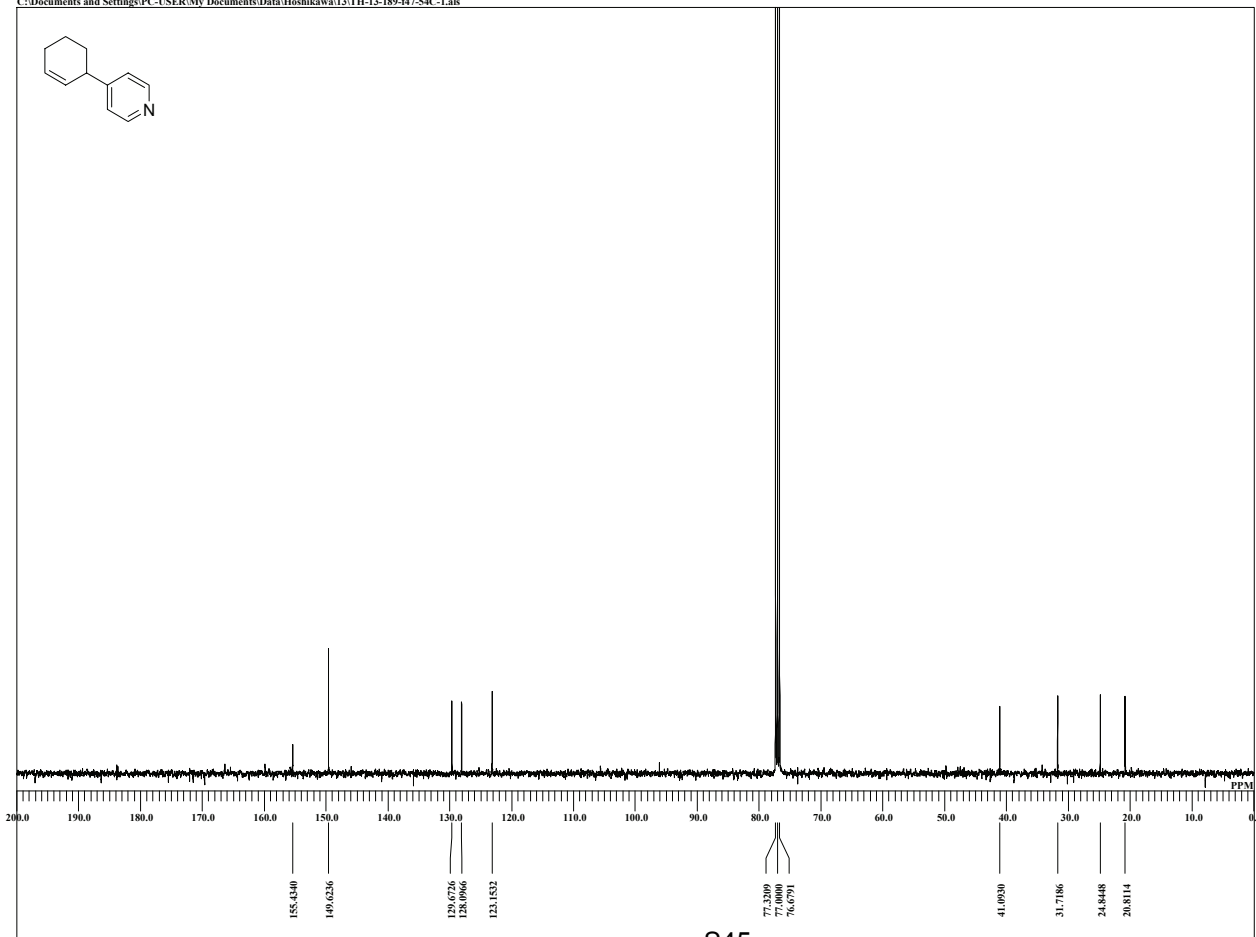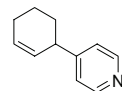

DFILE	TH-13-189-f47-54C-1.als
COMNT	TH-13-189-f47-54C
DATIM	13-02-2013 20:49:03
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	52428
SPO	52428
TIMES	42
DUMMY	4
FREQU	24999.62 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	8.0000 sec
SCANS	42
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-13-189-f47-54C-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	20.7 c
SLVNT	CDCL3
EXREF	77.00 ppm

S45

TH-12-37-f20-28

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\12\TH-12-37-f20-28-1.als

3gg
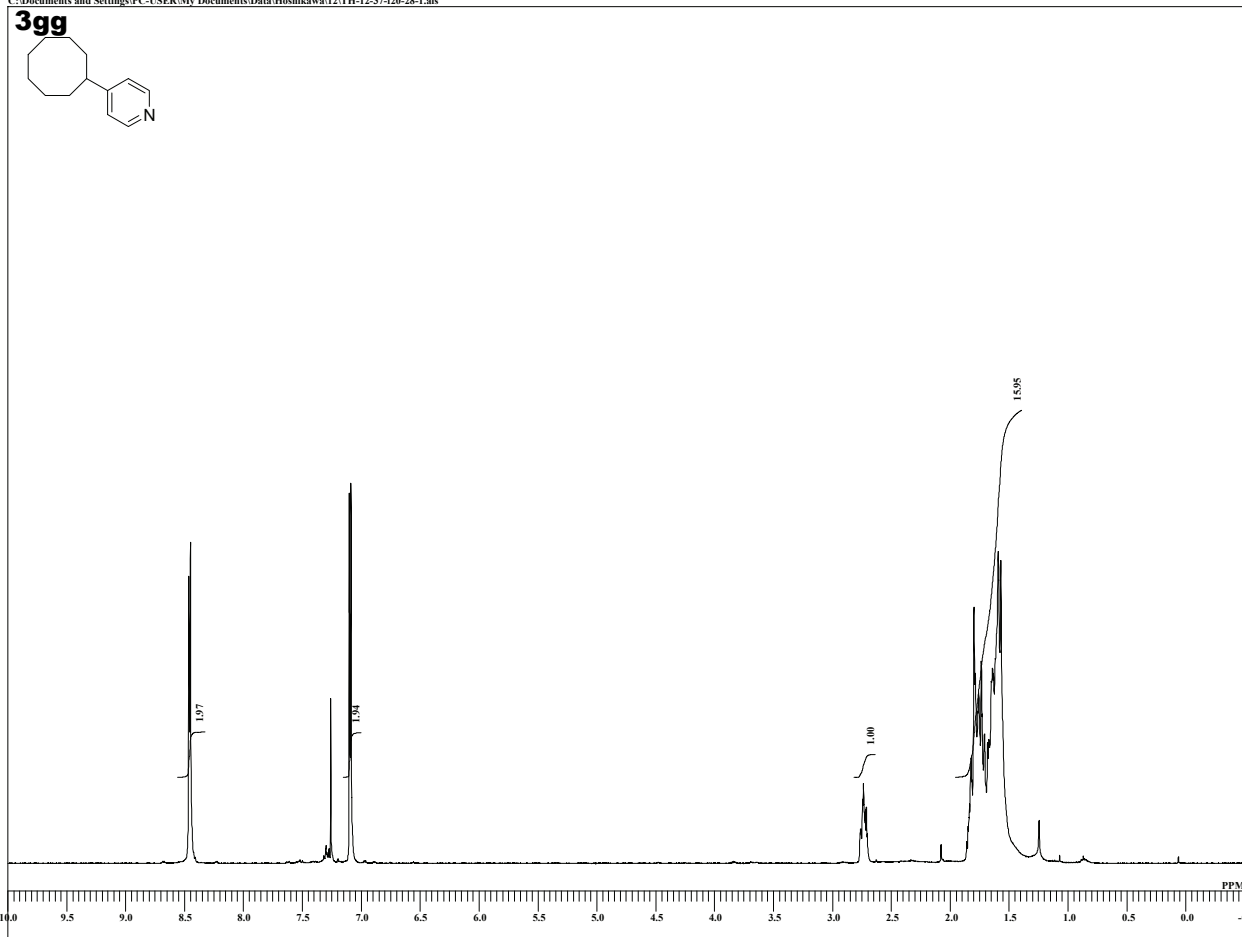
DFILE	TH-12-37-f20-28-1.als
COMNT	TH-12-37-f20-28
DATIM	26-06-2012 18:59:27
MENUF	
OBNUC	1H
OFR	395.88 MHz
OBFRQ	395.88 MHz
OBSET	6.28 KHz
OBFIN	0.87 Hz
PW1	6.38 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	16384
SPO	16384
TIMES	8
DUMMY	1
FREQU	7422.80 Hz
FLT	30000 Hz
DELAY	16.68 usec
ACQTM	2.2073 sec
PD	5.0000 sec
SCANS	8
ADBIT	16
RGAIN	32
BF	0.01 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse.ex2
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	147 usec
IRATN	79
DFILE	TH-12-37-f20-28-1.als
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.1 c
SLVNT	CDCL3
EXREF	7.26 ppm

TH-12-37-f20-28C

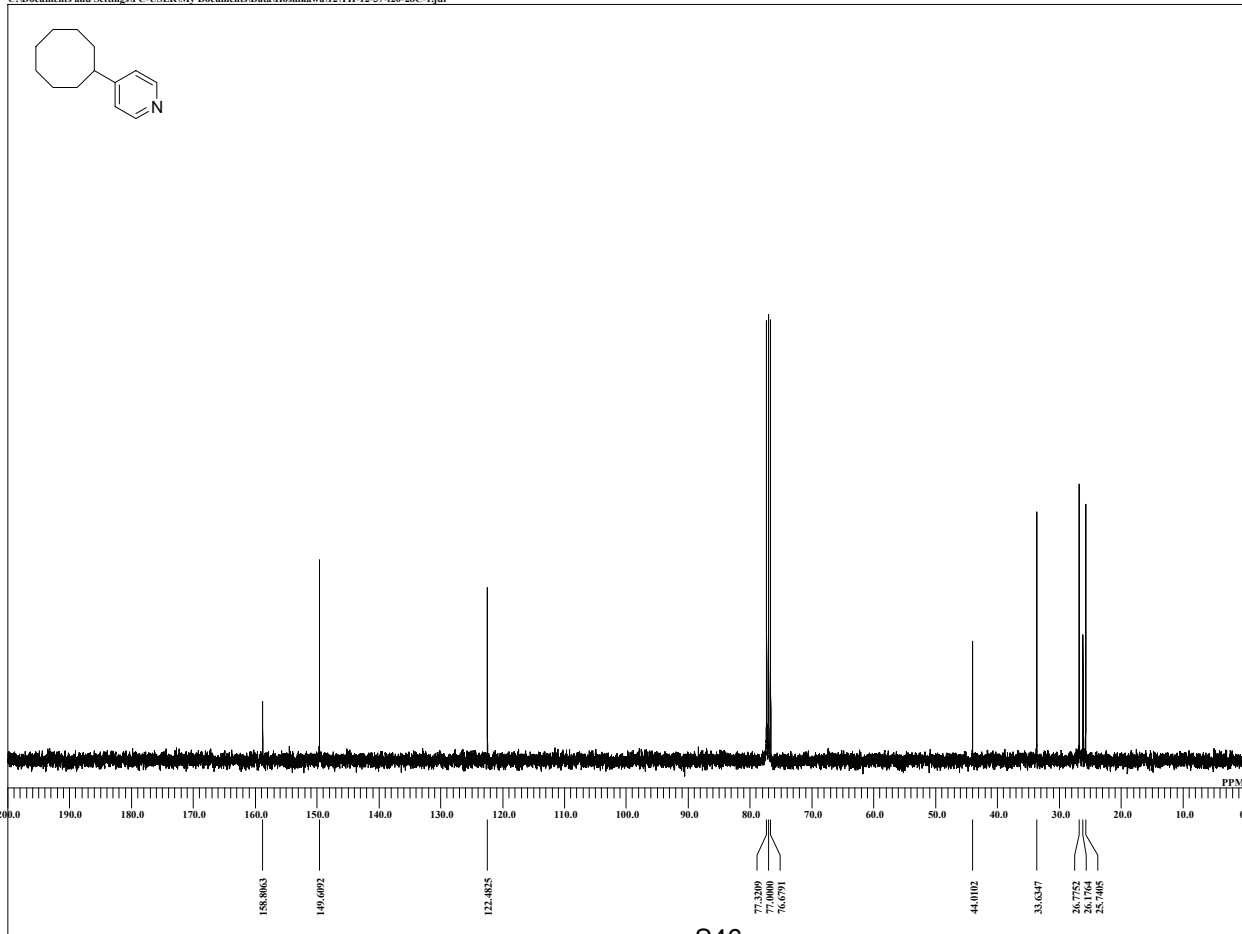C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\12\TH-12-37-f20-28C-1.jdf

DFILE	TH-12-37-f20-28C-1.jdf
COMNT	TH-12-37-f20-28C
DATIM	26-06-2012 19:03:52
MENUF	
OBNUC	13C
OFR	99.55 MHz
OBFRQ	99.55 MHz
OBSET	5.13 KHz
OBFIN	0.98 Hz
PW1	3.25 usec
DEADT	0.00 usec
PREDL	0.00000 msec
IWT	1.0000 sec
POINT	65536
SPO	65536
TIMES	34
DUMMY	4
FREQU	31250.00 Hz
FLT	125000 Hz
DELAY	20.50 usec
ACQTM	1.0486 sec
PD	5.0000 sec
SCANS	34
ADBIT	16
RGAIN	60
BF	1.00 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	single_pulse_dec
EXPCM	
IRNUC	1H
IFR	395.88 MHz
IRSET	6.28 KHz
IRFIN	0.87 Hz
IRRPW	115 usec
IRATN	79
DFILE	TH-12-37-f20-28C-1.jdf
SF	
LKSET	13.20 KHz
LKFIN	75.7 Hz
LKLEV	0
LGAIN	0
LKPHS	0
LKSIG	0
CSPED	0 Hz
FILDC	
FILDF	
CTEMP	24.3 c
SLVNT	CDCL3
EXREF	77.00 ppm

158.8063
149.6092
122.4825
77.3209
77.0000
76.6791
44.0102
33.6347
26.7762
26.1764
25.7405

S46

TH-13-187-f35-44-product-H

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-187-f35-44-product-H-1.als

3hh
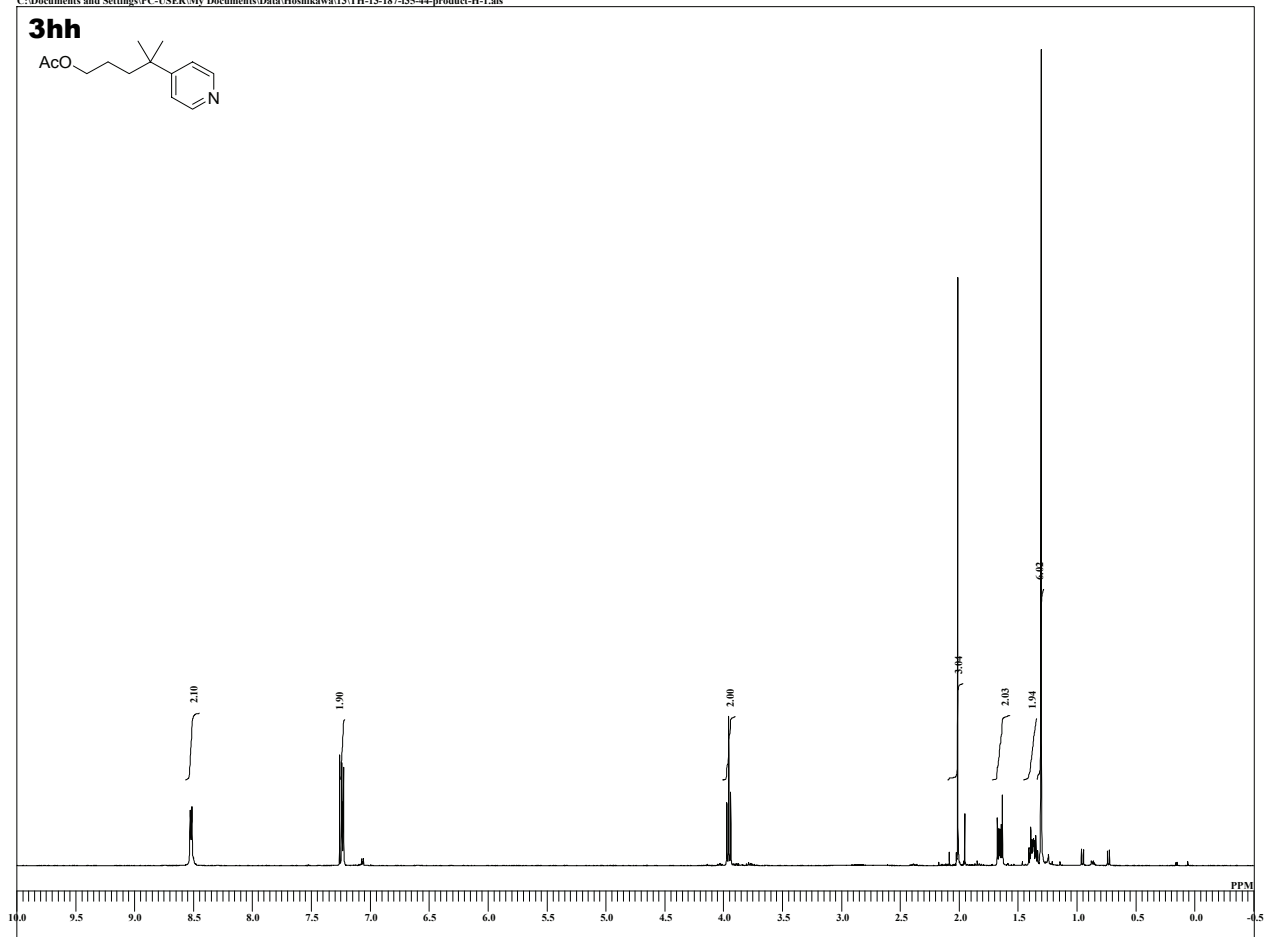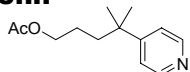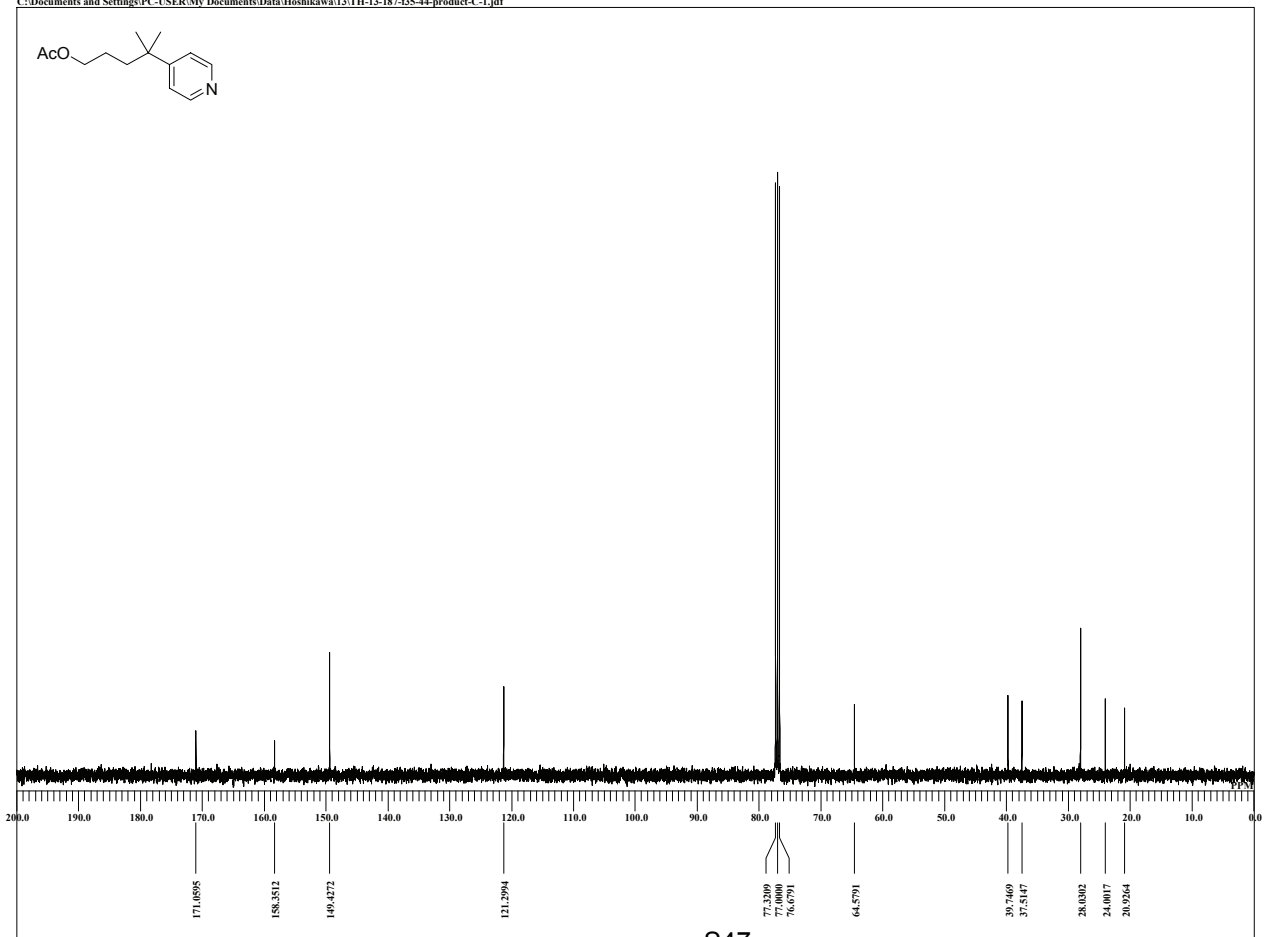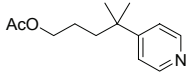
DFILE   TH-13-187-f35-44-product-H-1.als
COMNT   TH-13-187-f35-44-product-H
DATIM   30-11-2012 12:59:32
MENUF
OBNUC   1H
OFR   395.88 MHz
OBFRQ   395.88 MHz
OBSET   6.28 KHz
OBFIN   0.87 Hz
PW1   6.38 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   13107
SPO   13107
TIMES   8
DUMMY   1
FREQU   5938.15 Hz
FLT   30000 Hz
DELAY   16.68 usec
ACQTM   2.2073 sec
PD   5.0000 sec
SCANS   8
ADBIT   16
RGAIN   38
BF   0.01 Hz
T1   0.00
T2   0.00
T3   90.00
T4   100.00
EXMOD   single_pulse.ex2
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-187-f35-44-product-H-1.als
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   20.7 c
SLVNT   CDCL3
EXREF   7.26 ppm

TH-13-187-f35-44-product-C

C:\Documents and Settings\PC-USER\My Documents\Data\Hoshikawa\13\TH-13-187-f35-44-product-C-1.jdf

DFILE   TH-13-187-f35-44-product-C-1.jdf
COMNT   TH-13-187-f35-44-product-C
DATIM   30-11-2012 13:07:19
MENUF
OBNUC   13C
OFR   99.55 MHz
OBFRQ   99.55 MHz
OBSET   5.13 KHz
OBFIN   0.98 Hz
PW1   3.25 usec
DEADT   0.00 usec
PREDL   0.00000 msec
IWT   1.0000 sec
POINT   65536
SPO   65536
TIMES   42
DUMMY   4
FREQU   31250.00 Hz
FLT   125000 Hz
DELAY   20.50 usec
ACQTM   1.0486 sec
PD   8.0000 sec
SCANS   42
ADBIT   16
RGAIN   60
BF   1.00 Hz
T1   0.00
T2   0.00
T3   90.00
T4   100.00
EXMOD   single_pulse_dec
EXPCM
IRNUC   1H
IFR   395.88 MHz
IRSET   6.28 KHz
IRFIN   0.87 Hz
IRRPW   115 usec
IRATN   79
DFILE   TH-13-187-f35-44-product-C-1.jdf
SF
LKSET   13.20 KHz
LKFIN   75.7 Hz
LKLEV   0
LGAIN   0
LKPHS   0
LKSIG   0
CSPED   0 Hz
FILDC
FILDF
CTEMP   20.9 c
SLVNT   CDCL3
EXREF   77.00 ppm

S47