Electronic Supplementary Material (ESI) for Chemical Science.

Supplementary Information

Contents:

1. X-Ray Crystallographic Analyses

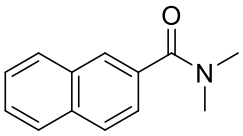
Table S1. Crystal data and data collection parameters.

	1c	**6c**
CCDC Reference No.	1865079	1865080
empirical formula	$C_{36}H_{72}O_{16}Mn_4$	$C_{52}H_{54}N_4O_6Mn_2$
formula weight	980.71	940.90
crystal system	*orthorhombic*	*monoclinic*
space group	*I*222 (#23)	$P2_1/c$ (#14)
a, Å	12.1248(13)	10.4733(10)
b, Å	14.1447(15)	20.948(2)
c, Å	14.1468(15)	10.6581(11)
α, deg.	-	-
β, deg.	-	94.542(2)
γ, deg.	-	-
V, Å^3	2426.2(4)	2331.0(4)
Z	2	2
*D*calcd, g/cm^3	1.342	1.340
μ [Mo-*K*α], cm^{-1}	10.761	5.957
T, K	113(1)	113(1)
crystal size, mm	0.23×0.23×0.23	0.10×0.10×0.05
θ range for data collection (deg.)	3.60 to 27.50	3.004 to 27.511
no. of reflections measured	24753	38145
unique data (*R*int)	2786 (0.0177)	5350 (0.0482)
data / restraints / parameters	2786/0/200	5350/0/367
*R*1 ($I > 2.0\sigma(I)$)	0.0249	0.0348
*wR*2 ($I > 2.0\sigma(I)$)	0.0716	0.0927
*R*1 (all data)	0.0255	0.0477
*wR*2 (all data)	0.0722	0.0969
GOF on F^2	1.090	1.071
Δρ, e Å^{-3}	0.52, -0.28	0.56, -0.26

a) $R1 = (\Sigma||Fo| - |Fc||)/(\Sigma|Fo|)$ b) $wR2 = [\{\Sigma w(Fo^2\text{-}Fc^2)^2\}/\{\Sigma w(Fo^4)\}]^{1/2}$

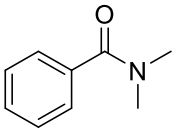
2. Spectral Data

N,*N*-Dimethyl-2-naphthamide (**2a**)



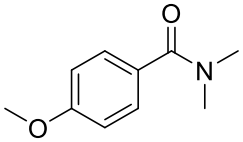
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.91 (d, *J* = 0.9 Hz, 1H), 7.88-7.84 (m, 3H), 7.54-7.50 (m, 3H), 3.16 (br s, 3H), 3.03 (br s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 171.7, 133.8, 133.7, 132.8, 128.5, 128.3, 127.9, 127.1, 127.0, 126.7, 124.6, 39.7, 35.6.

N,*N*-Dimethylbenzamide (**2b**)



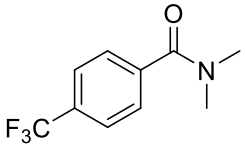
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.42-7.39 (m, 5H), 3.11 (br s, 3H), 2.97 (br s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 171.8, 136.5, 129.6, 128.5, 127.2, 39.7, 35.5.

4-Methoxy-*N*,*N*-dimethylbenzamide (**2c**)



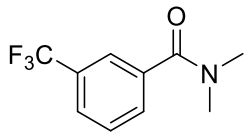
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.40 (d, *J* = 7.4 Hz, 2H), 6.90 (d, *J* = 7.4 Hz, 2H), 3.83 (s, 3H), 3.05 (br s, 6H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 171.6, 160.7, 129.2, 128.6, 113.7, 55.4, 39.9 (br s), 35.6 (br s).

N,*N*-Dimethyl-4-(trifluoromethyl)benzamide (**2d**)



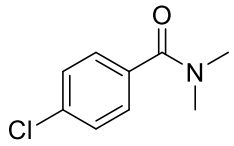
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.67 (d, *J* = 8.2 Hz, 2H), 7.53 (d, *J* = 8.1 Hz, 2H), 3.13 (s, 3H), 2.96 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 170.3, 140.1, 131.6 (q, $J_{C\text{-}F}$ = 32 Hz), 127.5, 125.6 (q, $J_{C\text{-}F}$ = 4 Hz), 123.9 (q, $J_{C\text{-}F}$ = 271 Hz), 39.5, 35.4; ^{19}F{^{1}H} NMR (376 MHz, $CDCl_3$, 30 °C): δ -64.1.

N,*N*-Dimethyl-3-(trifluoromethyl)benzamide (**2e**)



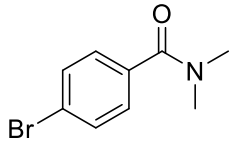
Pale yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.70 (s, 1H), 7.67 (d, *J* = 7.8 Hz, 1H), 7.61 (d, *J* = 7.7 Hz, 1H), 7.54 (t, *J* = 7.7 Hz, 1H), 3.13 (s, 3H), 2.98 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 170.1, 137.3, 131.0 (q, $J_{C\text{-}F}$ = 33 Hz), 130.5, 129.1, 126.4 (q, $J_{C\text{-}F}$ = 4 Hz), 124.2 (q, $J_{C\text{-}F}$ = 4 Hz), 123.8 (q, $J_{C\text{-}F}$ = 271 Hz), 39.5, 35.5; ^{19}F{^{1}H} NMR (376 MHz, $CDCl_3$, 30 °C): δ -64.0.

4-Chloro-*N*,*N*-dimethylbenzamide (**2f**)



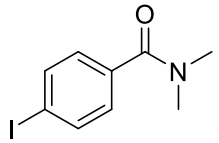
Colorless needle crystal. ^{1}H NMR (400 MHz, CD_2Cl_2, 30 °C): δ 7.37 (m, 4H), 3.04 (s, 3H), 2.94 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, CD_2Cl_2, 30 °C): δ 170.5, 135.6$_4$, 135.6$_2$, 129.0, 128.9, 39.7, 35.5.

4-Bromo-*N*,*N*-dimethylbenzamide (**2g**)



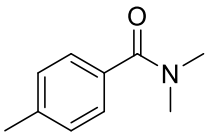
White powder. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.54 (d, *J* = 8.0 Hz, 2H), 7.30 (d, *J* = 7.8 Hz, 2H), 3.10 (s, 3H), 2.97 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 170.7, 135.3, 131.7, 129.0, 124.0, 39.6, 35.5.

4-Iodo-*N*,*N*-dimethylbenzamide (**2h**)



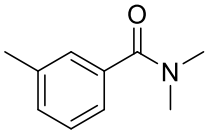
White powder. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.75 (d, *J* = 7.3 Hz, 2H), 7.16 (d, *J* = 7.3 Hz, 2H), 3.10 (br s, 3H), 2.97 (br s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 170.5, 137.4, 135.7, 128.8, 95.6, 39.5, 35.3.

N,*N*,4-Trimethylbenzamide (**2i**)



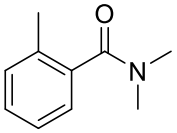
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.32 (d, *J* = 7.4 Hz, 2H), 7.19 (d, *J* = 7.4 Hz, 2H), 3.09 (br s, 3H), 2.99 (br s, 3H), 2.37 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 171.6, 139.4, 133.3, 128.8, 127.0, 39.5, 35.2, 21.2.

N,*N*,3-Trimethylbenzamide (**2j**)



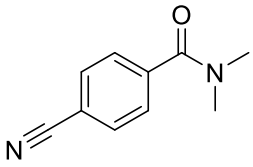
Pale yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.29-7.17 (m, 4H), 3.10 (br s, 3H), 2.97 (br s, 3H), 2.37 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 171.9, 138.3, 136.5, 130.3, 128.2, 127.7, 124.1, 39.7, 35.4, 21.4.

N,*N*,2-Trimethylbenzamide (**2k**)



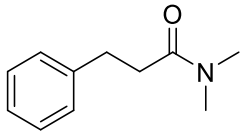
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.27-7.15 (m, 4H), 3.13 (s, 3H), 2.82 (s, 3H), 2.28 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 171.6, 136.9, 134.1, 130.4, 128.8, 126.0, 125.9, 38.4, 34.6, 19.0.

4-Cyano-*N*,*N*-dimethylbenzamide (**2l**)



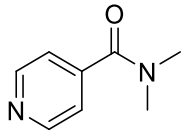
White powder. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.71 (d, *J* = 7.8 Hz, 2H), 7.52 (d, *J* = 7.7 Hz, 2H), 3.13 (s, 3H), 2.95 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 169.6, 140.9, 132.4, 127.9, 118.2, 113.5, 39.4, 35.5.

N,*N*-Dimethyl-3-phenylpropionamide (**2m**)



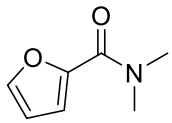
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.29-7.25 (m, 2H), 7.22-7.16 (m, 3H), 2.98-2.93 (m, 5H), 2.91 (s, 3H), 2.62-2.58 (m, 2H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 172.1, 141.5, 128.4_2, 128.3_8, 126.0, 37.1, 35.4, 35.2, 31.3.

N,*N*-Dimethylisonicotinamide (**2n**)



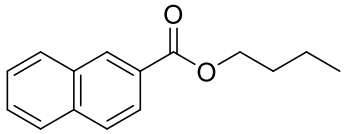
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.71-8.67 (m, 2H), 7.32-7.27 (m, 2H), 3.13 (s, 3H), 2.95 (s, 3H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 169.1, 150.4, 144.1, 121.4, 39.3, 35.3.

N,*N*-Dimethylfuran-2-carboxyamide (**2o**)



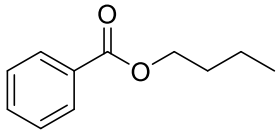
White powder. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.49 (dd, *J* = 1.8, 0.8 Hz, 1H), 6.99 (dd, *J* = 3.5, 0.8 Hz, 1H), 6.47 (dd, *J* = 3.5, 1.8 Hz, 1H), 3.26 (br s, 3H), 3.12 (br s, 3H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 160.4, 148.3, 143.8, 116.1, 111.2, 38.4 (br s), 36.7 (br s).

Butyl 2-napthoate (**3a**)



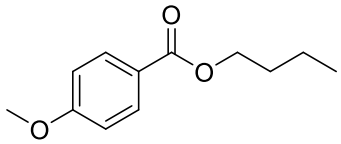
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.60 (s, 1H), 8.06 (dd, *J* = 8.5, 0.9 Hz, 1H), 7.96 (d, *J* = 8.0 Hz, 1H), 7.87 (d, *J* = 8.5 Hz, 2H), 7.60-7.52 (m, 2H), 4.39 (t, *J* = 6.6 Hz, 2H), 1.81 (quint, *J* = 7.1 Hz, 2H), 1.52 (sext, *J* = 7.4 Hz, 2H), 1.01 (t, *J* = 7.4 Hz, 3H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 167.0, 135.7, 132.7, 131.1, 129.5, 128.3, 128.2, 128.0, 127.9, 126.7, 125.4, 65.1, 31.0, 19.5, 13.9.

Butyl benzoate (**3b**)



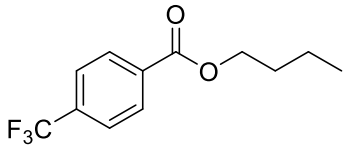
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.04 (d, *J* = 7.8 Hz, 2H), 7.54 (t, *J* = 7.4 Hz, 1H), 7.43 (t, *J* = 7.7 Hz, 2H), 4.33 (t, *J* = 6.6 Hz, 2H), 1.75 (quint, *J* = 7.1 Hz, 2H), 1.48 (sext, *J* = 7.4 Hz, 2H), 0.98 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.8, 132.9, 130.7, 129.7, 128.4, 64.9, 30.9, 19.4, 13.9.

Butyl 4-methoxylbenzoate (**3c**)



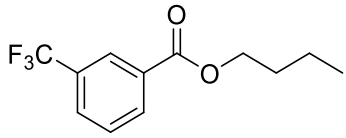
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.99 (d, *J* = 8.9 Hz, 2H), 6.91 (d, *J* = 8.8 Hz, 2H), 4.29 (t, *J* = 6.6 Hz, 2H), 3.85 (s, 3H), 1.74 (quint, *J* = 7.1 Hz, 2H), 1.47 (sext, *J* = 7.4 Hz, 2H), 0.98 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.6, 163.4, 131.7, 123.2, 113.7, 64.6, 55.5, 31.0, 19.4, 13.9.

Butyl 4-(trifluoromethyl)benzoate (**3d**)



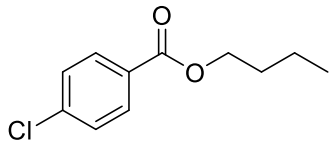
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.15 (d, *J* = 8.2 Hz, 2H), 7.70 (d, *J* = 8.3 Hz, 2H), 4.37 (t, *J* = 6.7 Hz, 2H), 1.77 (quint, *J* = 7.1 Hz, 2H), 1.49 (sext, *J* = 7.4 Hz, 2H), 0.99 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 165.6, 134.5 (q, $J_{C\text{-}F}$ = 32 Hz), 133.9 (app d, $J_{C\text{-}F}$ = 1 Hz), 130.1, 125.5 (q, $J_{C\text{-}F}$ = 4 Hz), 123.8 (q, $J_{C\text{-}F}$ = 271 Hz), 65.5, 30.8, 19.4, 13.8; ^{19}F{^{1}H} NMR (376 MHz, $CDCl_3$, 30 °C): δ -64.2.

Butyl 3-(trifluoromethyl)benzoate (**3e**)



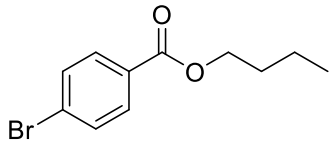
Pale yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.30 (s, 1H), 8.23 (d, *J* = 7.8 Hz, 1H), 7.81 (d, *J* = 7.8 Hz, 1H), 7.58 (t, *J* = 7.8 Hz, 1H), 4.37 (t, *J* = 6.7 Hz, 2H), 1.78 (quint, *J* = 7.1 Hz, 2H), 1.49 (sext, *J* = 7.4 Hz, 2H), 0.99 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 165.5, 132.9, 131.6, 131.2 (q, $J_{C\text{-}F}$ = 33 Hz), 129.4 (q, $J_{C\text{-}F}$ = 4 Hz), 129.1, 126.6 (q, $J_{C\text{-}F}$ = 4 Hz), 123.9 (q, $J_{C\text{-}F}$ = 271 Hz), 65.6, 30.9, 19.4, 13.8; ^{19}F{^{1}H} NMR (376 MHz, $CDCl_3$, 30 °C): δ -64.0.

Butyl 4-chlorobenzoate (**3f**)



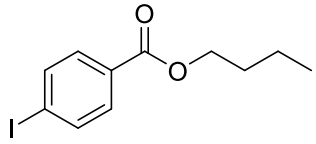
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.97 (d, *J* = 8.7 Hz, 2H), 7.40 (d, *J* = 8.7 Hz, 2H), 4.32 (t, *J* = 6.6 Hz, 2H), 1.75 (quint, *J* = 7.1 Hz, 2H), 1.47 (sext, *J* = 7.4 Hz, 2H), 0.98 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 165.9, 139.4, 131.1, 129.2, 128.8, 65.2, 30.9, 19.4, 13.9.

Butyl 4-bromobenzoate (**3g**)



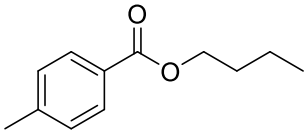
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.90 (d, *J* = 8.5 Hz, 2H), 7.57 (d, *J* = 8.4 Hz, 2H), 4.32 (t, *J* = 6.6 Hz, 2H), 1.75 (quint, *J* = 7.1 Hz, 2H), 1.47 (sext, *J* = 7.4 Hz, 2H), 0.98 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.1, 131.8, 131.2, 129.6, 128.0, 65.3, 30.9, 19.4, 13.9.

Butyl 4-iodobenzoate (**3h**)



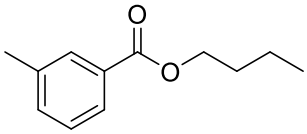
Pale yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.79 (d, *J* = 8.5 Hz, 2H), 7.73 (d, *J* = 8.4 Hz, 2H), 4.31 (t, *J* = 6.7 Hz, 2H), 1.74 (quint, *J* = 7.1 Hz, 2H), 1.46 (sext, *J* = 7.4 Hz, 2H), 0.97 (t, *J* = 7.5 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.2, 137.8, 131.1, 130.1, 100.6, 65.2, 30.8, 19.3, 13.8.

Butyl 4-methylbenzoate (**3i**)



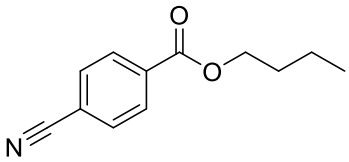
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.93 (d, *J* = 8.1 Hz, 2H), 7.22 (d, *J* = 8.0 Hz, 2H), 4.30 (t, *J* = 6.6 Hz, 2H), 2.39 (s, 3H), 1.74 (quint, *J* = 7.1Hz, 2H), 1.47 (sext, *J* = 7.4 Hz, 2H), 0.97 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.9, 143.5, 129.7, 129.1, 128.0, 64.7, 30.9, 21.7, 19.4, 13.9.

Butyl 3-methylbenzoate (**3j**)



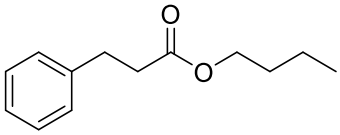
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.84-7.69 (m, 2H), 7.33-7.19 (m, 2H), 4.24 (t, *J* = 6.6 Hz, 2H), 2.33 (s, 3H), 1.68 (quint, *J* = 7.1 Hz, 2H), 1.41 (sext, *J* = 7.5 Hz, 2H), 0.91 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 167.0, 138.2, 133.7, 130.7, 130.2, 128.4, 126.8, 64.9, 31.0, 21.4, 19.4, 13.9.

Butyl 4-cyanobenzoate (**3l**)



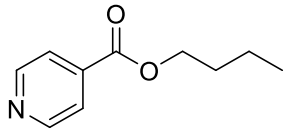
White powder. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.14 (d, *J* = 8.2 Hz, 2H), 7.74 (d, *J* = 8.2 Hz, 2H), 4.36 (t, *J* = 6.6 Hz, 2H), 1.77 (quint, *J* = 7.1 Hz, 2H), 1.48 (sext, *J* = 7.5 Hz, 2H), 0.99 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 165.2, 134.5, 132.3, 130.2, 118.2, 116.5, 65.8, 30.8, 19.4, 13.9.

Butyl 3-phenylpropionate (**3m**)



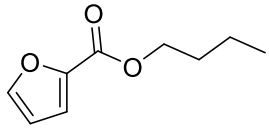
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.30-7.26 (m, 2H), 7.21-7.19 (m, 3H), 4.07 (t, *J* = 6.3 Hz, 2H), 2.95 (t, *J* = 7.6 Hz, 2H), 2.62 (t, *J* = 7.6 Hz, 2H), 1.61-1.55 (m, 2H), 1.39-1.30 (m, 2H), 0.91 (t, *J* = 7.2 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 173.1, 140.7, 128.6, 128.4, 126.4, 64.5, 36.1, 31.2, 30.8, 19.2, 13.8.

Butyl isonicotinate (**3n**)



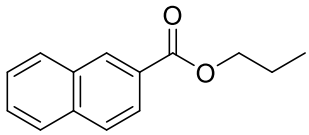
Colorless liquid. ^{1}H NMR ($CDCl_3$, 400 MHz, 30 ºC): δ 8.78-8.77 (m, 2H), 7.85-7.83 (m, 2H), 4.37 (t, *J* = 6.7 Hz, 2H), 1.77 (quint, *J* = 7.1 Hz, 2H), 1.48 (sext, *J* = 7.5 Hz, 2H), 0.99 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR ($CDCl_3$, 100 MHz, 30 ºC): δ 165.3, 150.7, 137.9, 123.0, 65.8, 30.8, 19.3, 13.8.

Butyl furan-2-carboxylate (**3o**)



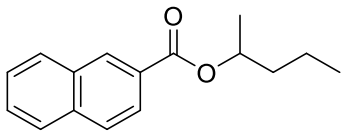
Colorless liquid. ^{1}H NMR ($CDCl_3$, 400 MHz, 30 ºC): δ 7.57 (dd, *J* = 0.8, 1.6 Hz, 1H), 7.16 (dd, *J* = 0.7, 3.5 Hz, 1H), 6.50 (dd, *J* = 1.7, 3.5 Hz, 1H), 4.31 (t, *J* = 6.7 Hz, 2H), 1.74 (quint, *J* = 7.5 Hz, 2H), 1.45 (sext, *J* = 7.1 Hz, 2H), 0.97 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR ($CDCl_3$, 100 MHz, 30 ºC): δ 159.0, 146.3, 145.1, 117.8, 111.9, 65.0, 30.9, 19.3, 13.8.

Propyl 2-naphthoate (**4a**)



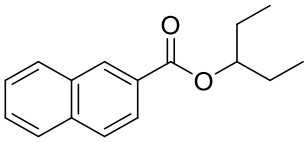
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 ºC): δ 8.60 (s, 1H), 8.06 (dd, *J* = 8.6, 1.4 Hz, 1H), 7.93 (d, *J* = 8.0 Hz, 1H), 7.85 (d, *J* = 8.8 Hz, 2H), 7.57-7.49 (m, 2H), 4.34 (t, *J* = 6.7 Hz, 2H), 1.83 (sext, *J* = 7.1 Hz, 2H), 1.06 (t, *J* = 7.4 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 ºC) δ 166.9, 135.6, 132.6, 131.0, 129.4, 128.2$_3$, 128.1$_8$, 127.9, 127.8, 126.7, 125.4, 66.8, 22.3, 10.7.

Pentan-2-yl 2-naphthoate (**4b**)



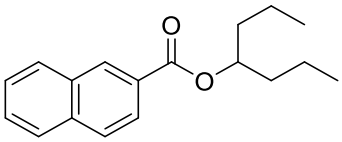
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.59 (s, 1H), 8.06 (dd, *J* = 8.6, 1.4 Hz, 1H), 7.94 (d, *J* = 7.9 Hz, 1H), 7.6 (d, *J* = 8.5 Hz, 2H), 7.58-7.50 (m, 2H), 5.24 (sext, *J* = 6.3 Hz, 1H), 1.84-1.75 (m, 1H), 1.67-1.59 (m, 1H), 1.52-1.42 (m, 1H), 1.39 (d, *J* = 6.3 Hz, 2H), 0.97 (t, *J* = 7.3 Hz, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.5, 135.6, 132.7, 131.0, 129.5, 128.3, 128.2, 128.1, 127.9, 126.7, 125.4, 71.8, 38.4, 20.3, 18.9, 14.1.

Pentan-3-yl 2-naphthoate (**4c**)



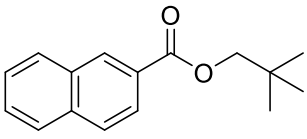
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.61 (s, 1H), 8.08 (d, *J* = 8.6, 1H), 7.96 (d, *J* = 8.0 Hz, 1H), 7.87 (d, *J* = 8.6 Hz, 2H), 7.59-7.51 (m, 2H), 5.09 (quint, *J* = 6.1 Hz, 1H), 1.76 (quint, 4H), 0.99 (t, *J* = 7.4 Hz, 6H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.8, 135.6, 132.7, 131.0, 129.5, 128.3, 128.2_1, 128.1_9, 127.9, 126.7, 125.5, 77.6, 26.8, 9.8; IR (neat NaCl, ν/cm^{-1}) 3060 m, 2969 s, 2937 s, 2878 s, 1714 s, 1631 m, 1600 w, 1578 w, 1508 w, 1464 s, 1387 s, 1354 s, 1284 s, 1228 s, 1197 s, 1170 m, 1131 s, 1092 s, 1033 w, 957 s, 923 s, 894 m, 866 m, 827 m, 779 s, 762 s, 733 w; HRMS (FAB$^+$) *m/z* calcd. for $C_{16}H_{18}O_2$ 242.1307 ([M]$^+$) found 242.1302.

Heptan-4-yl 2-naphthoate (**4d**)



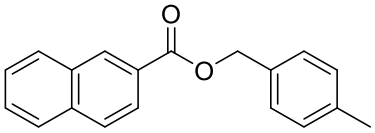
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.60 (s, 1H), 8.08 (app d, *J* = 8.6 Hz, 1H), 7.94 (d, *J* = 7.9 Hz, 1H), 7.86-7.83 (m, 2H), 7.56-7.48 (m, 2H), 5.28-5.21 (m, 1H), 1.79-1.60 (m, 4H), 1.51-1.36 (m, 4H), 0.95 (t, *J* = 7.4 Hz, 6H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.6, 135.6, 132.7, 130.9, 129.4, 128.2, 128.1_5, 128.1_3, 127.8, 126.6, 125.5, 74.8, 36.6, 18.8, 14.1; IR (neat NaCl, ν/cm^{-1}) 3060 m, 2959 s, 2872 s, 1714 s, 1632 m, 1600 w, 1578 w, 1508 w, 1466 s, 1437 m, 1354 s, 1284 s, 1228 s, 1197 s, 1128 s, 1093 s, 1007 w, 984 m, 955 m, 934 m, 912 m, 866 m, 826 m, 779 s, 763 s; HRMS (FAB$^+$) *m/z* calcd. for $C_{18}H_{22}O_2$ 270.1620 ([M]$^+$) found 270.1615.

2,2-Dimethylpropyl 2-naphthoate (**4e**)



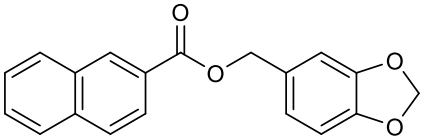
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.61 (s, 1H), 8.08 (d, *J* = 8.6 Hz, 1H), 7.96 (d, *J* = 8.0 Hz, 1H), 7.88 (d, *J* = 8.7 Hz, 2H), 7.60-7.52 (m, 2H), 4.09 (s, 2H), 1.09 (s, 9H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.9, 135.7, 132.7, 131.1, 129.5, 128.3_1, 128.2_9, 128.0, 127.9, 126.8, 125.4, 74.5, 31.8, 26.8; IR (neat NaCl, ν/cm^{-1}) 3060 m, 2958 s, 2870 s, 1715 s, 1631 m, 1600 m, 1578 w, 1508 w, 1467 s, 1400 m, 1388 s, 1370 s, 1353 s, 1285 s, 1228 s, 1196 s, 1131 s, 1096 s, 1060 w, 1038 w, 986 s, 953 m, 938 w, 911 m, 866 m, 826 m, 805 w, 778 s, 763 s; HRMS (FAB$^+$) *m/z* calcd. for $C_{16}H_{18}O_2$ 242.1307 ([M]$^+$) found 242.1302; m.p.: 49-51 °C.

4-Methylbenzyl 2-naphthoate (**4f**)



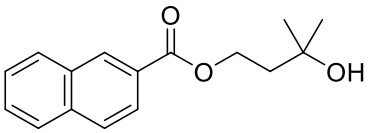
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.63 (s, 1H), 8.09 (d, *J* = 8.6 Hz, 1H), 7.94 (d, *J* = 8.0 Hz, 1H), 7.87 (d, *J* = 8.2 Hz, 2H), 7.59 (t, *J* = 7.3 Hz, 1H), 7.53 (t, *J* = 7.4 Hz, 1H), 7.40 (d, *J* = 7.5 Hz, 2H), 7.23 (d, *J* = 7.5 Hz, 2H), 5.39 (s, 2H), 2.38 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.8, 138.3, 135.7, 133.3, 132.7, 131.3, 129.5$_2$, 129.4$_7$, 128.6, 128.4, 128.3, 127.9, 127.6, 126.8, 125.5, 67.0, 21.4.

Benzo[*d*][1,3]dioxol-5-ylmethyl 2-naphthoate (**4g**)



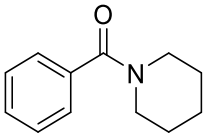
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.62 (s, 1H), 8.08 (d, *J* = 8.6 Hz, 1H), 7.95 (d, *J* = 7.8, 1H), 7.88 (d, *J* = 8.5, 2H), 7.56 (dt, *J* = 6.6, 7.2 Hz, 2H), 7.00-6.96 (m, 2H), 6.83 (d, *J* = 7.8 Hz, 1H), 5.98 (s, 2H), 5.33 (s, 2H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.7, 148.0, 147.9, 135.7, 132.6, 131.3, 130.0, 129.5, 128.4, 128.3, 127.9, 127.6, 126.8, 125.4, 122.5, 109.2, 108.5, 101.3, 67.0; IR (neat KBr, ν/cm-1) 2965 w, 2916 w, 1711 s, 1651 w, 1634 w, 1501 s, 1487 m, 1442 m, 1372 w, 1362 w, 1261 m, 1243 m, 1223 w, 1198 m, 1135 m, 1087 m, 1038 m 965 w, 954 w, 929 w, 867 w, 814 w, 780 m, 766 w; HRMS (FAB$^+$) *m/z* calcd. for $C_{19}H_{14}O_4$ 306.0892 (M^+) found 306.0891; m.p.: 74-76 °C.

3-Hydroxy-3-methylbutyl 2-naphthoate (**4h**)



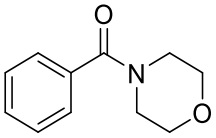
Colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 8.58 (s, 1H), 8.04 (d, *J* = 8.6 Hz, 1H), 7.94 (d, *J* = 8.0 Hz, 1H), 7.86 (d, *J* = 8.5 Hz, 2H), 7.59-7.51 (m, 2H), 4.57 (t, *J* = 6.8 Hz, 2H), 2.04 (t, *J* = 6.8 Hz, 2H), 1.82 (s, 1H), 1.35 (s, 6H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 30 °C): δ 166.9, 135.7, 132.6, 131.1, 129.5, 128.4, 128.3, 127.9, 127.6, 126.8, 125.3, 70.2, 62.2, 42.0, 29.9; IR (neat NaCl, □/cm^{-1}) 3420 m, 3060 w, 2970 m, 1714 s, 1631 m, 1600 w, 1469 m, 1355 m, 1285 s, 1229 s, 1197 s, 1131 m, 1098 m, 994 w, 970 w, 940 w, 913 w, 867 w, 826 w, 779 s, 763 m; HRMS (FAB$^+$) *m/z* calcd. for $C_{16}H_{18}O_3$ 258.1256 ([M]$^+$) found 258.1252.

N-Benzoyl piperidine (**5a**)



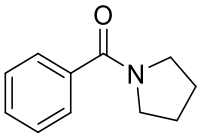
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.38 (app s, 5H), 3.70 (br s, 2H), 3.33 (br s, 2H), 1.66 (br s, 4H), 1.51 (br s, 2H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 170.4, 136.7, 129.4, 128.5, 126.9, 48.9, 43.2, 26.6, 25.8, 24.7.

N-Benzoyl morpholine (**5b**)



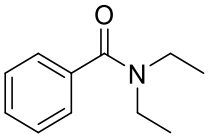
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.41-7.38 (m, 5H), 3.68-3.47 (m, 8H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 170.5, 135.5, 129.9, 128.6, 127.2, 67.0, 48.3, 42.7.

N-Benzoyl pyrrolidine (**5c**)



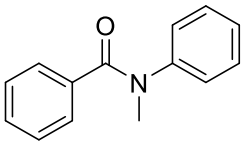
White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.51-7.49 (m, 2H), 7.39-7.38 (m, 3H), 3.64 (t, *J* = 6.9 Hz, 2H), 3.41 (t, *J* = 6.5 Hz, 2H), 1.95 (quint, *J* = 6.7 Hz, 2H), 1.86 (quint, *J* = 6.5 Hz, 2H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 169.8, 137.3, 129.9, 128.3, 127.2, 49.7, 46.3, 26.5, 24.6.

N,*N*-Diethylbenzamide (**5d**)



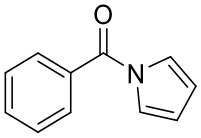
Colorless liquid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.39-7.34 (m, 5H), 3.54 (br s, 2H), 3.25 (br s, 2H), 1.23 (br s, 3H), 1.10 (br s, 3H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 171.4, 137.5, 129.2, 128.5, 126.4, 43.4, 39.4, 14.3, 13.1.

N-Methyl-*N*-phenylbenzamide (**5e**)



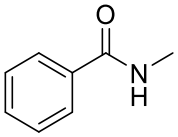
Pale yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.30-7.28 (m, 2H), 7.23-7.19 (m, 3H), 7.16-7.10 (m, 3H), 7.04-7.02 (m, 2H), 3.49 (s, 3H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 170.7, 145.0, 136.0, 129.6, 129.2, 128.8, 127.8, 127.0, 126.6, 38.5.

1-Benzoyl pyrrole (**5f**)



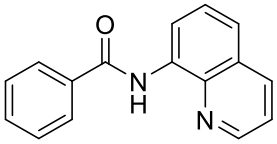
Colorless liquid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.75 (d, *J* = 7.5 Hz, 2H), 7.61 (t, *J* = 7.3 Hz, 1H), 7.51 (t, *J* = 7.4 Hz, 2H), 7.29 (app s, 2H), 6.35 (app s, 2H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 167.8, 133.4, 132.4, 129.6, 128.6, 121.4, 113.3.

N-Methylbenzamide (**5g**)



White solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 7.75 (d, *J* = 7.4 Hz, 2H), 7.48 (t, *J* = 7.2 Hz, 1H), 7.41 (t, *J* = 7.3 Hz, 2H), 6.26 (br s, 1H), 3.00 (d, *J* = 4.4 Hz, 3H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 168.4, 134.8, 131.5, 128.7, 127.0, 27.0.

N-(Quinolin-8-yl)benzamide (**5h**)



Pale yellow solid. ^{1}H NMR (400 MHz, $CDCl_3$, 30 °C): δ 10.74 (s, 1H), 8.95 (dd, *J* = 7.5, 1.3 Hz, 1H), 8.84 (dd, *J* = 4.2, 1.6 Hz, 1H), 8.17 (dd, *J* = 8.3, 1.5 Hz, 1H), 8.09 (dd, *J* = 7.8, 1.6 Hz, 2H), 7.61-7.53 (m, 5H), 7.46 (dd, *J* = 8.2, 4.2 Hz, 1H); $^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 30 °C): δ 165.6, 148.4, 138.9, 136.5, 135.3, 134.7, 131.9, 128.9, 128.1, 127.6, 127.4, 121.8, 116.7. One carbon signal was overlapped.

3. ^{1}H, $^{13}C\{^{1}H\}$, and $^{19}F\{^{1}H\}$ NMR Chart of Substrates, Products, and Me_2N-Phen

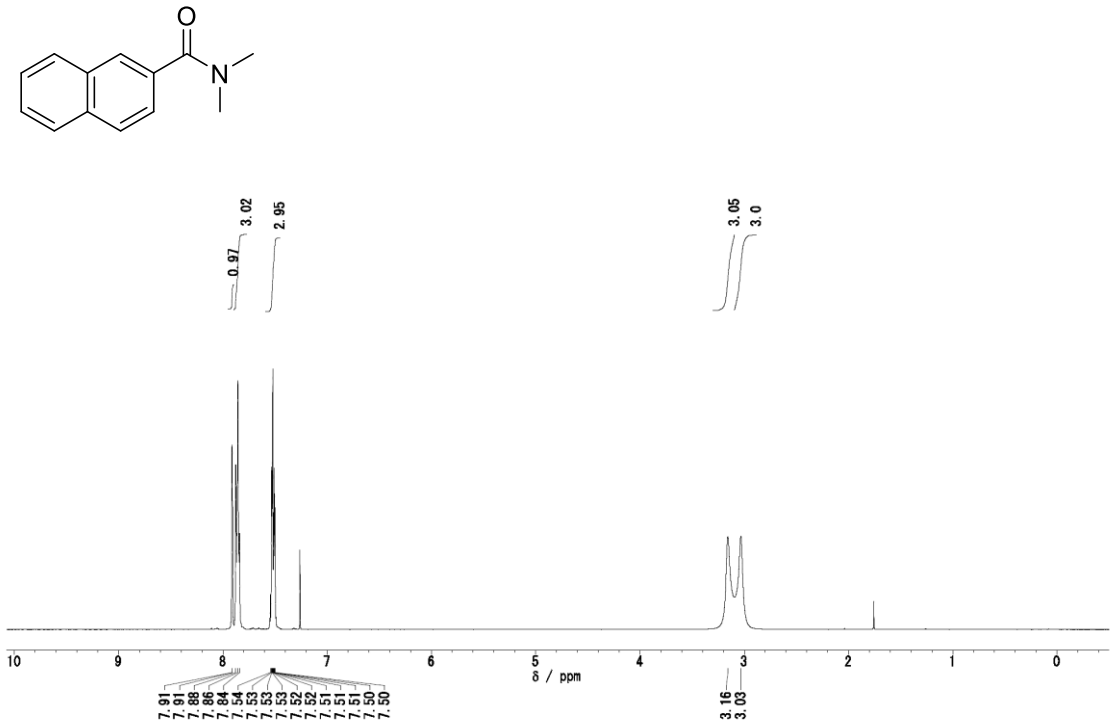


Figure S1. ^{1}H NMR spectrum of **2a**.

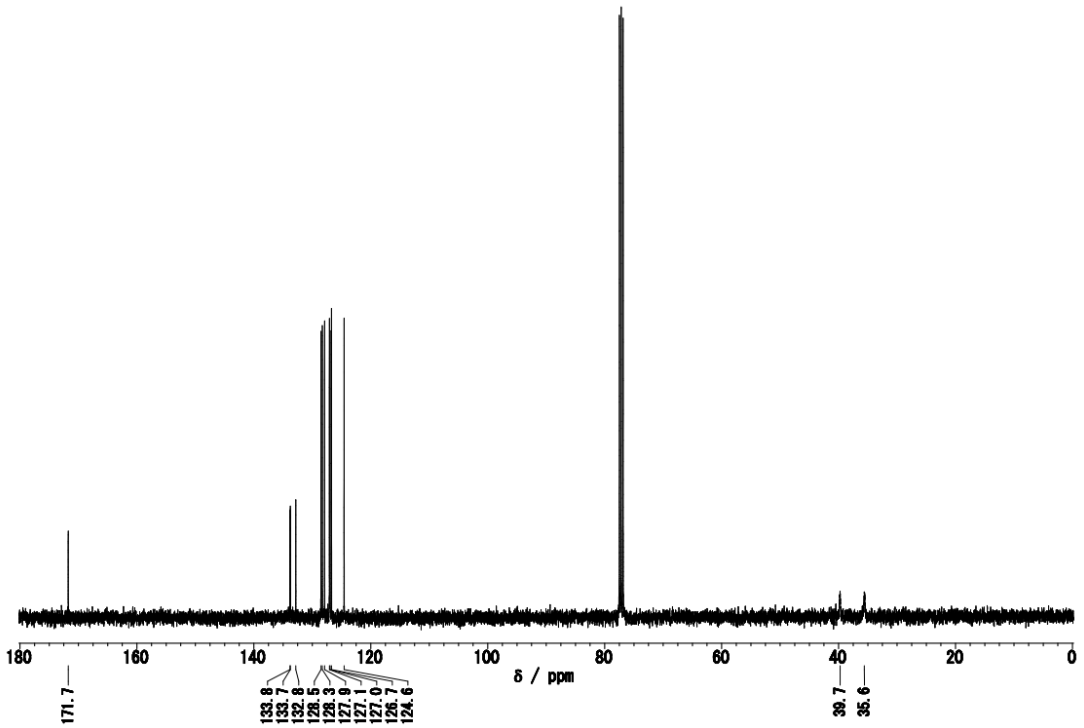


Figure S2. $^{13}C\{^{1}H\}$ NMR spectrum of **2a**.

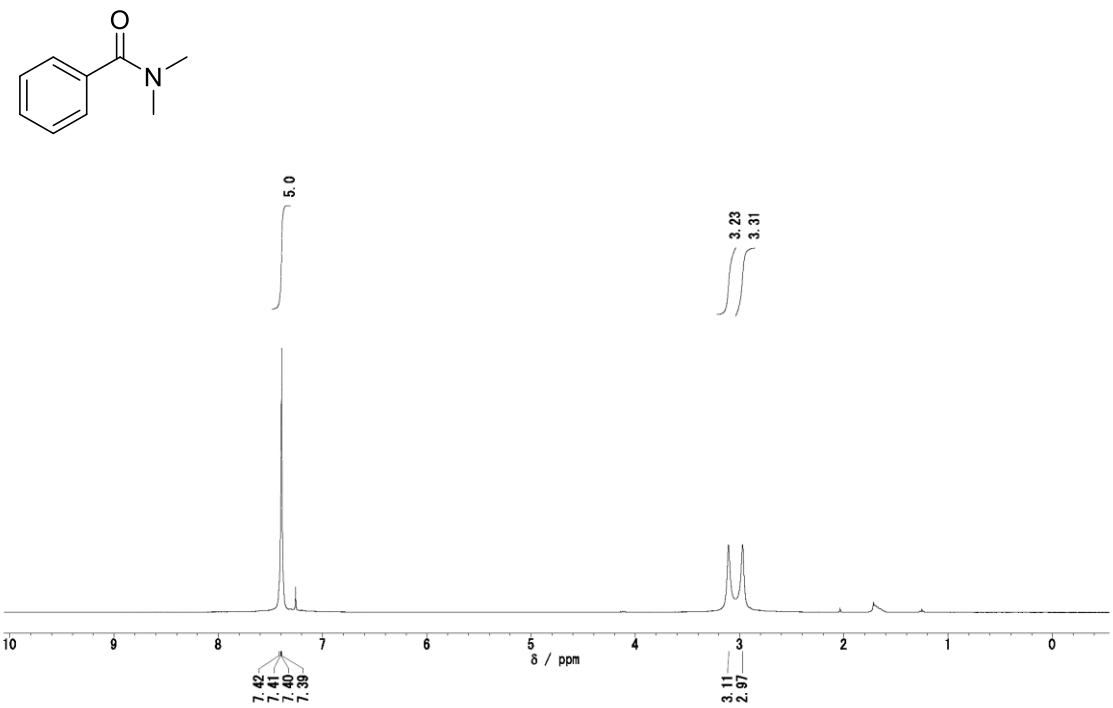


Figure S3. ^{1}H NMR spectrum of **2b**.

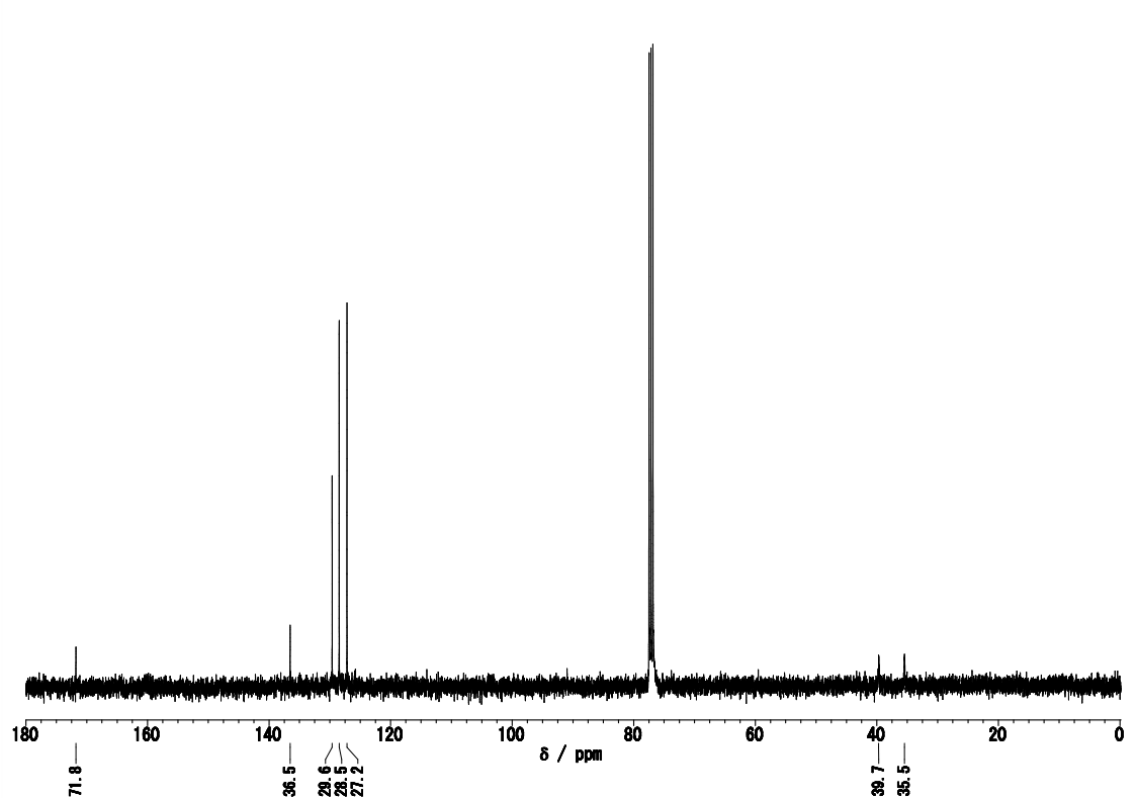


Figure S4. ^{13}C{^{1}H} NMR spectrum of **2b**.

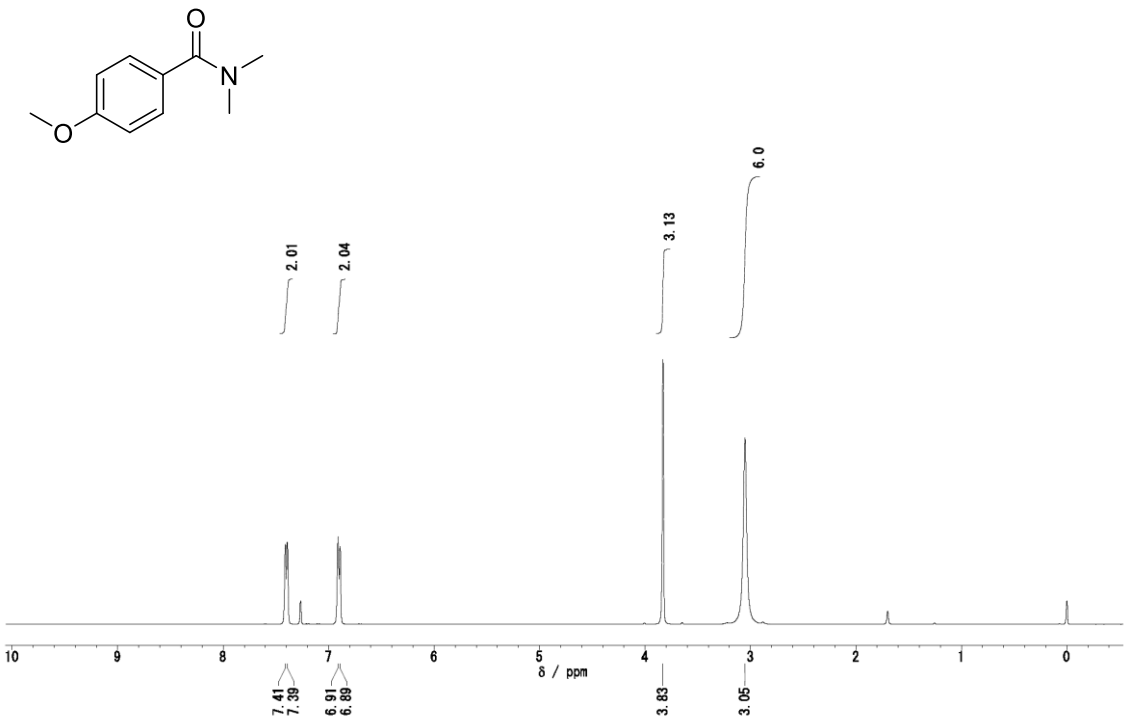


Figure S5. ^{1}H NMR spectrum of **2c**.

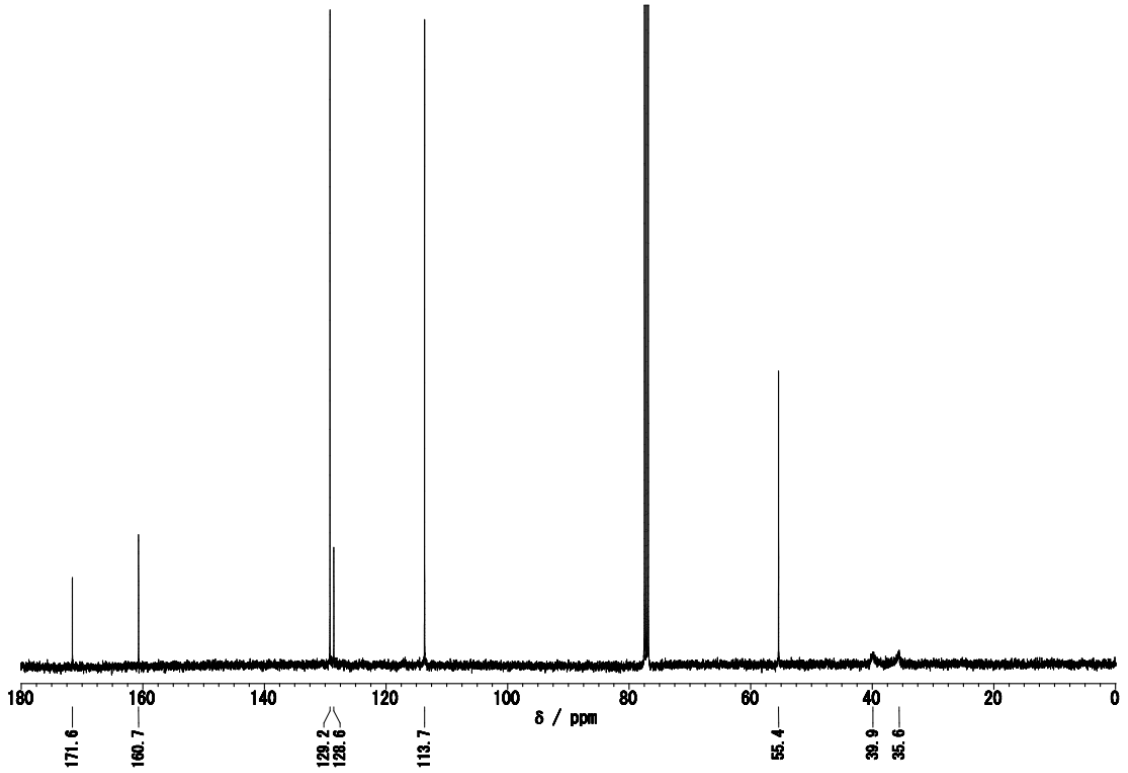


Figure S6. ^{13}C{^{1}H} NMR spectrum of **2c**.

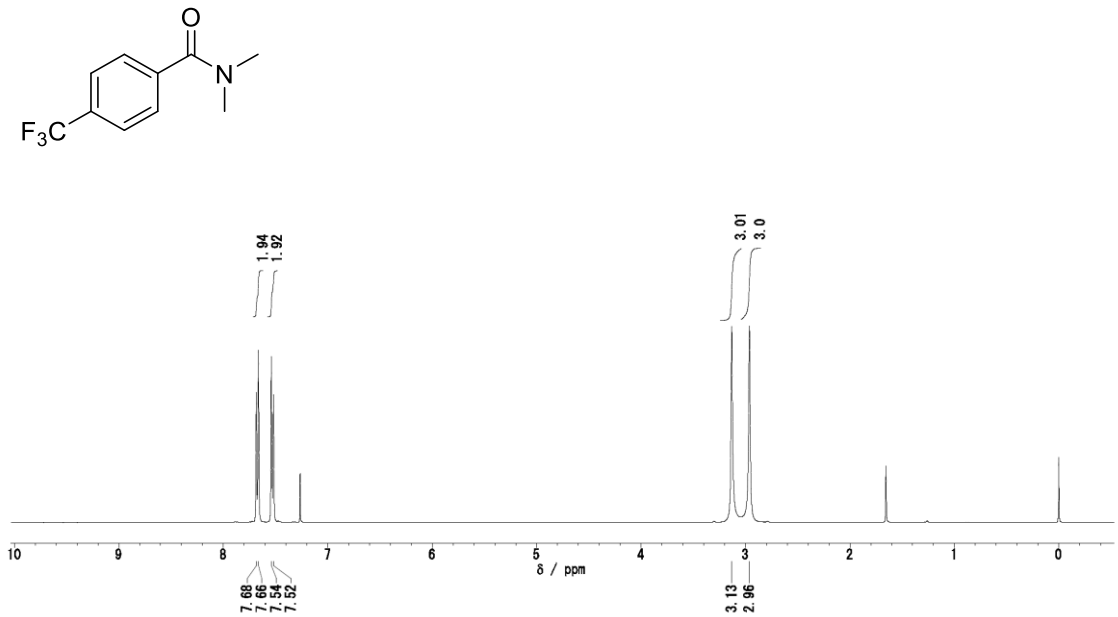


Figure S7. ^{1}H NMR spectrum of **2d**.

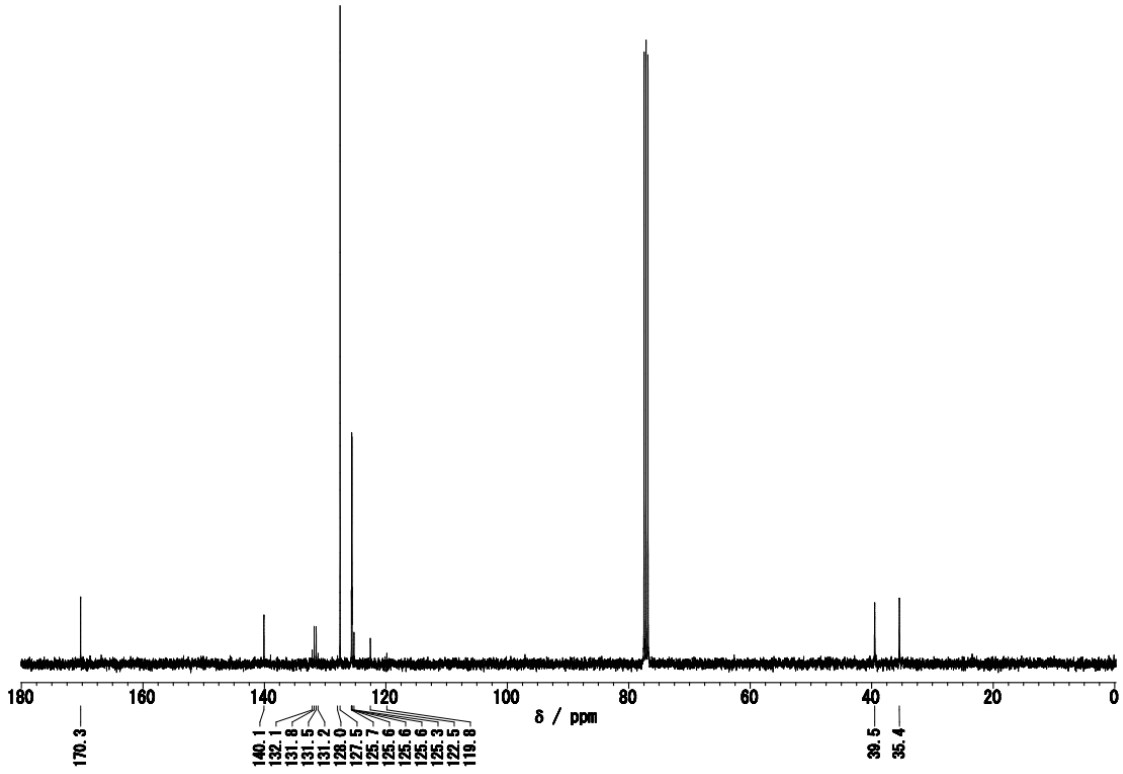


Figure S8. ^{13}C{^{1}H} NMR spectrum of **2d**.

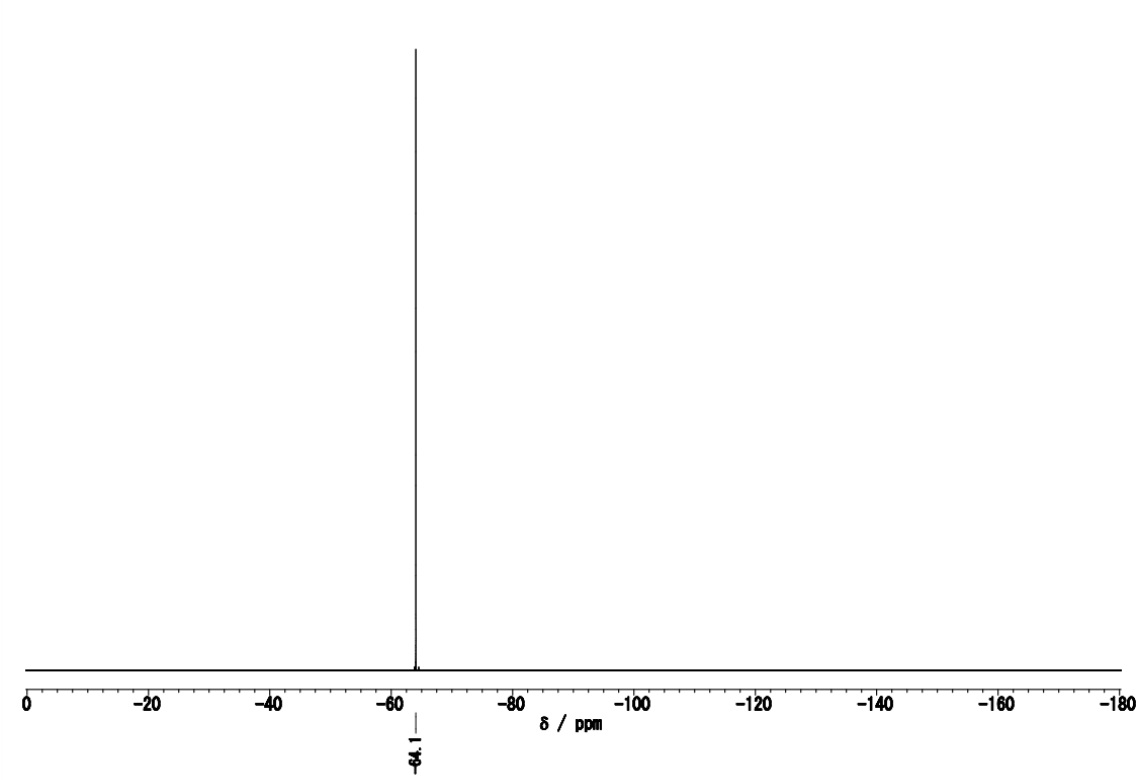


Figure S9. $^{19}F\{^{1}H\}$ NMR spectrum of **2d**.

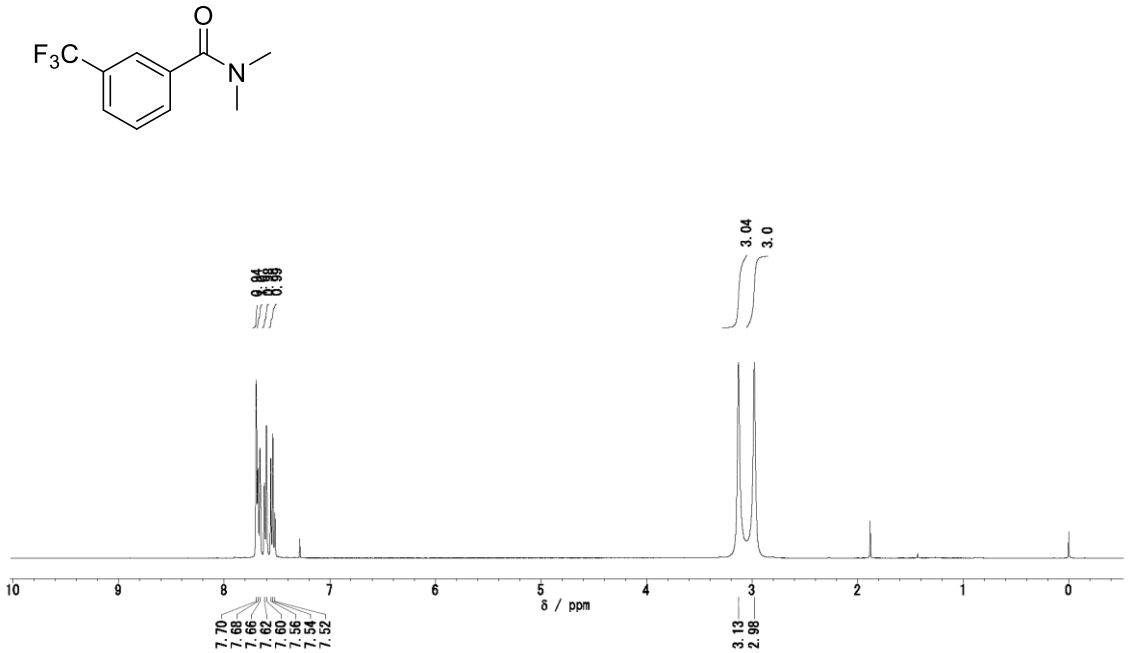


Figure S10. ^{1}H NMR spectrum of **2e**.

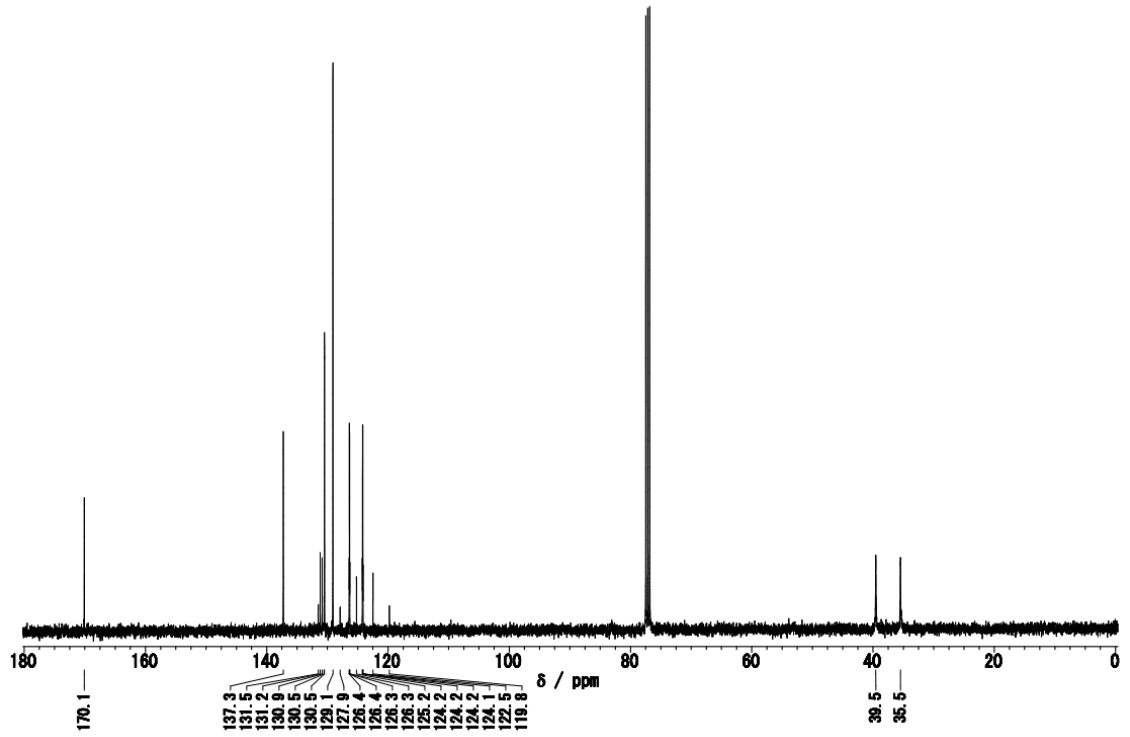


Figure S11. ^{13}C{^{1}H} NMR spectrum of **2e**.

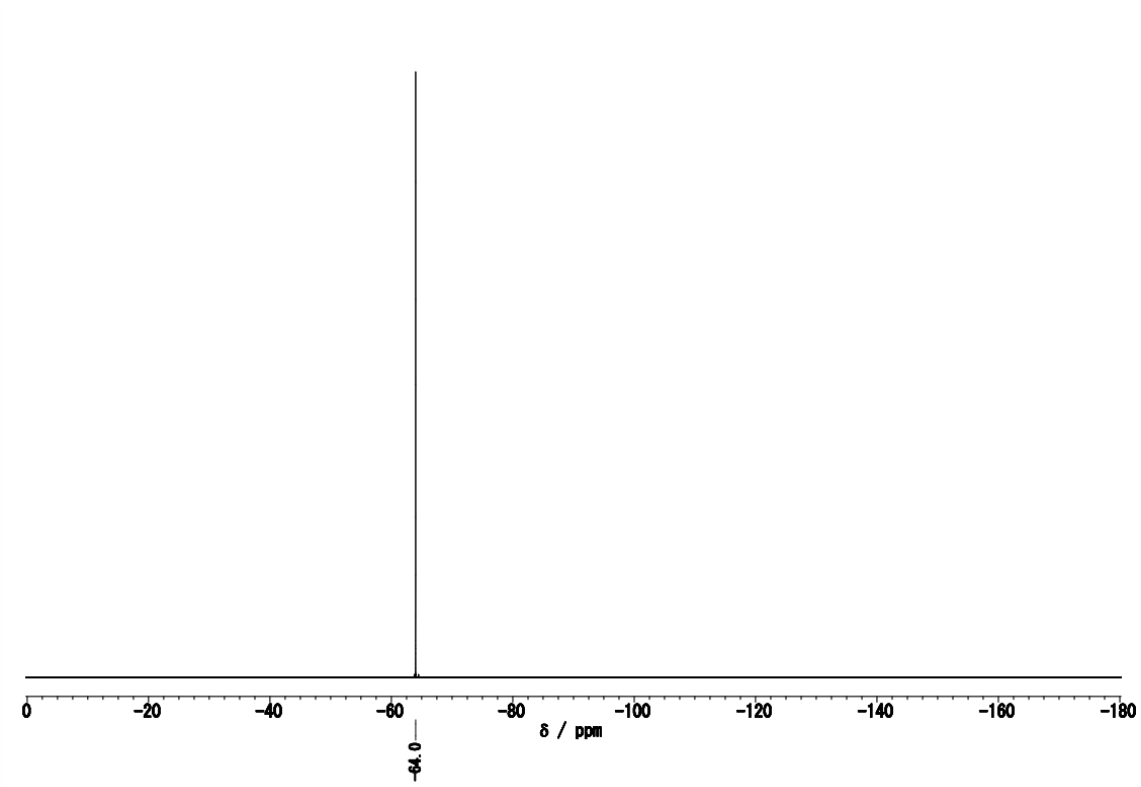


Figure S12. $^{19}F\{^{1}H\}$ NMR spectrum of **2e**.

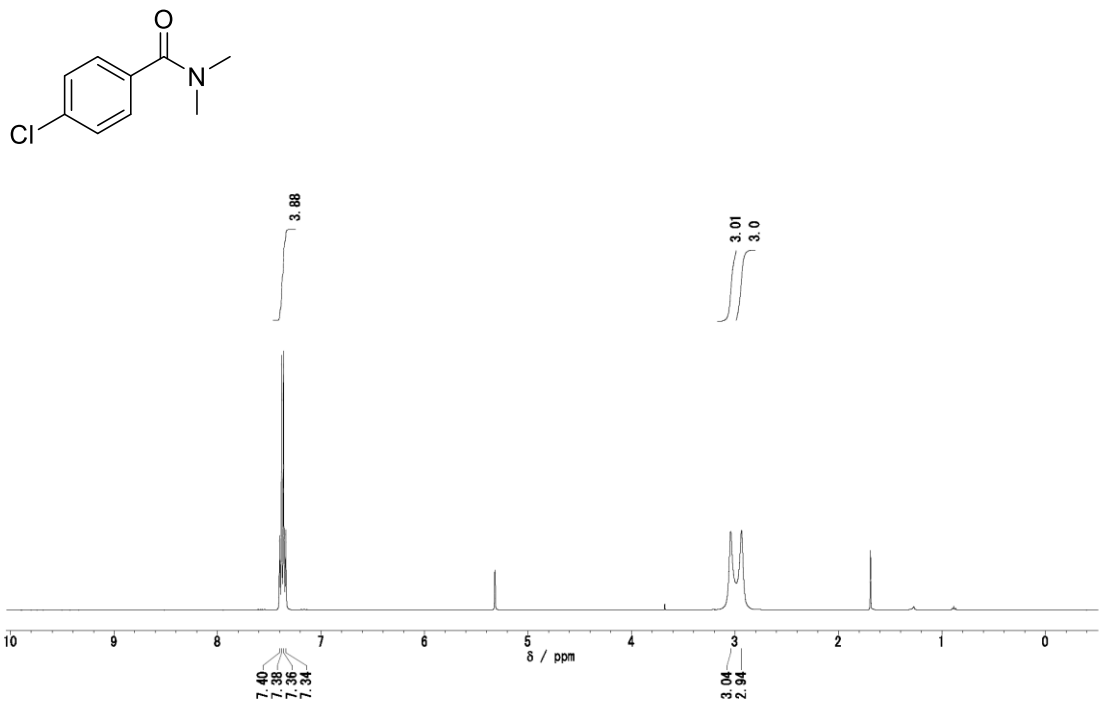


Figure S13. ^{1}H NMR spectrum of **2f**.

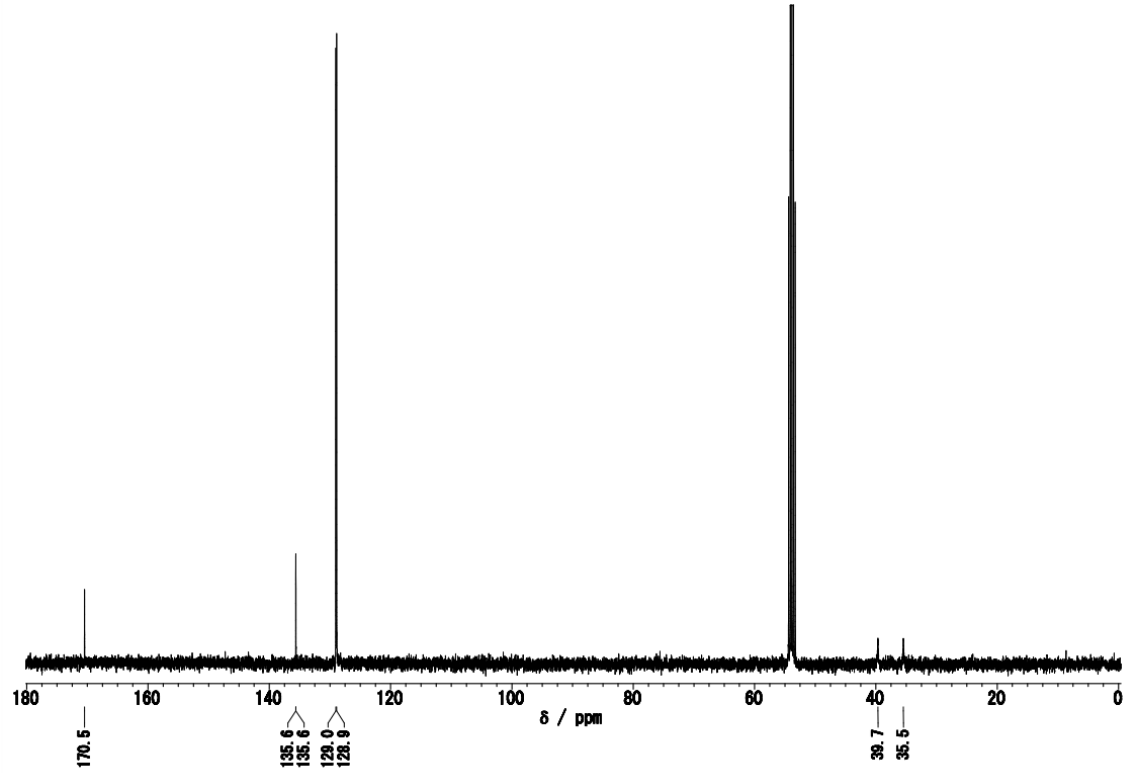


Figure S14. ^{13}C{^{1}H} NMR spectrum of **2f**.

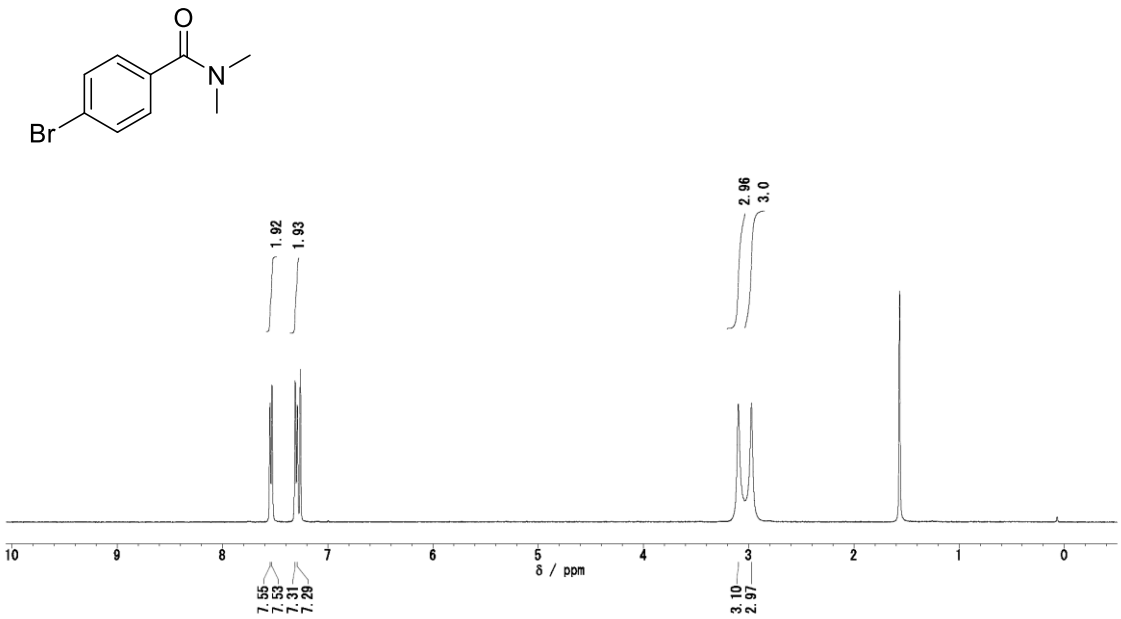


Figure S15. ^{1}H NMR spectrum of **2g**.

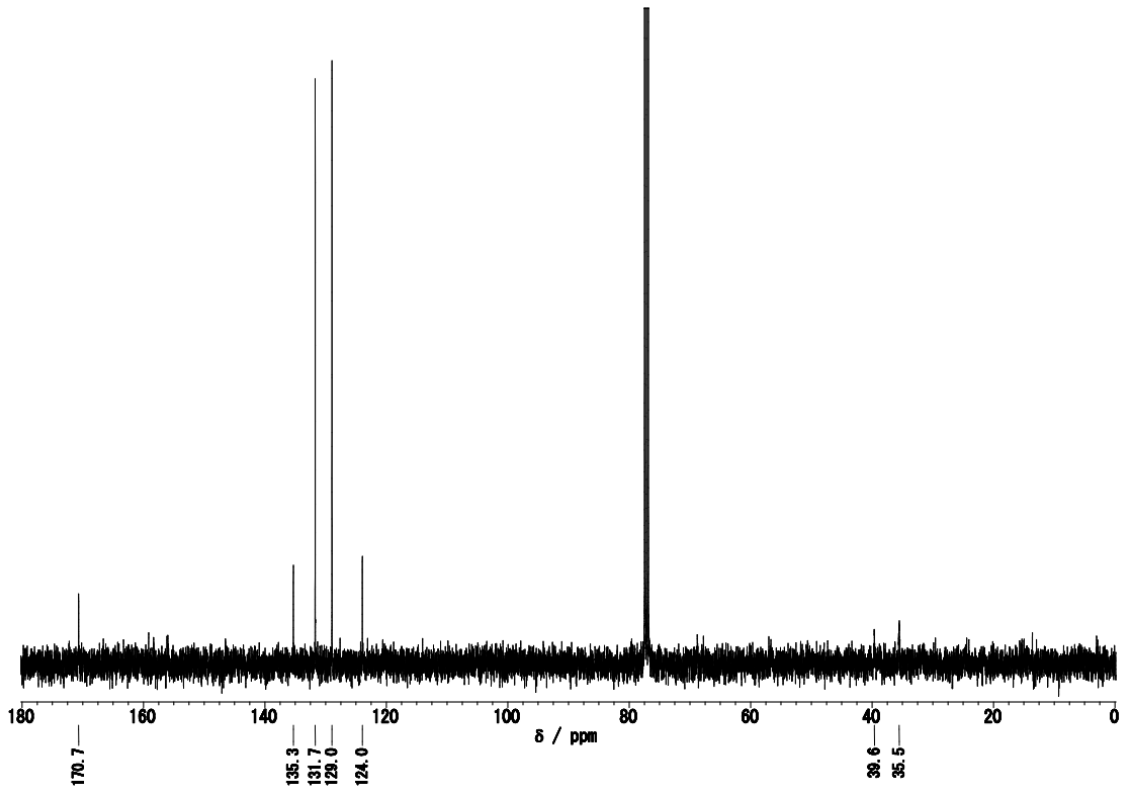


Figure S16. ^{13}C{^{1}H} NMR spectrum of **2g**.

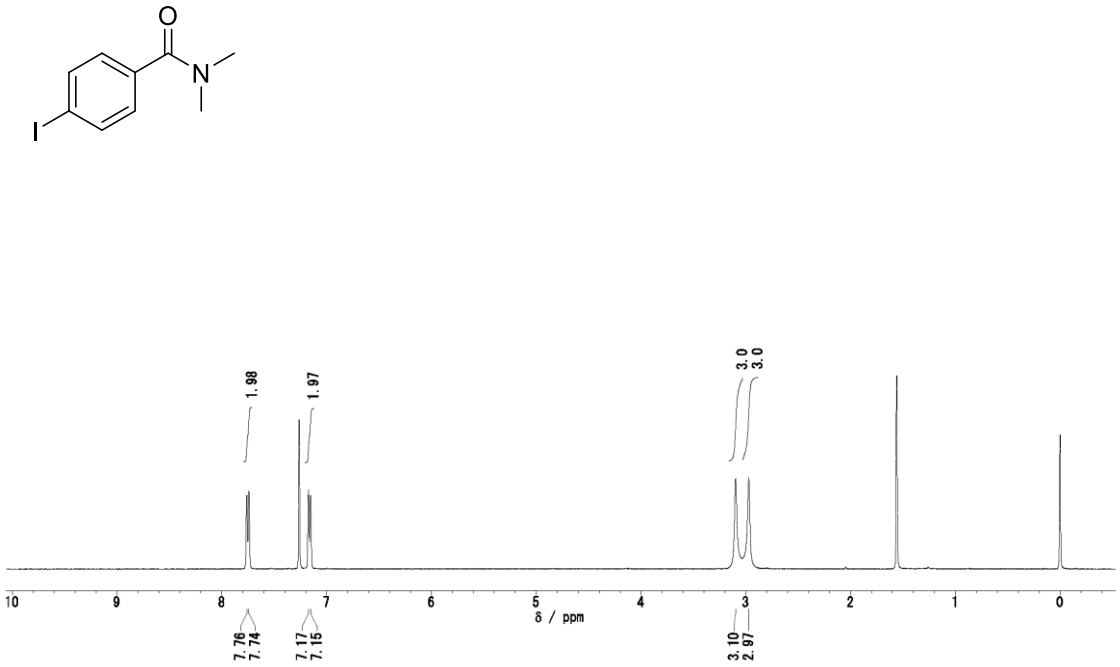


Figure S17. ^{1}H NMR spectrum of **2h**.

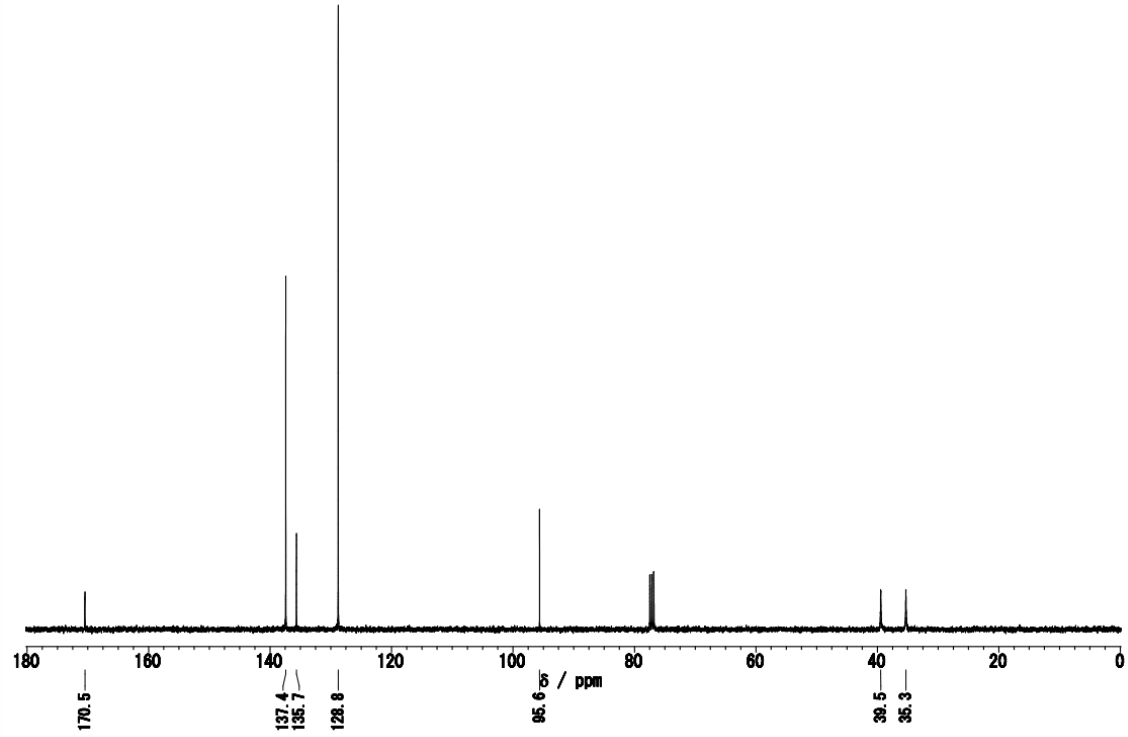


Figure S18. ^{13}C{^{1}H} NMR spectrum of **2h**.

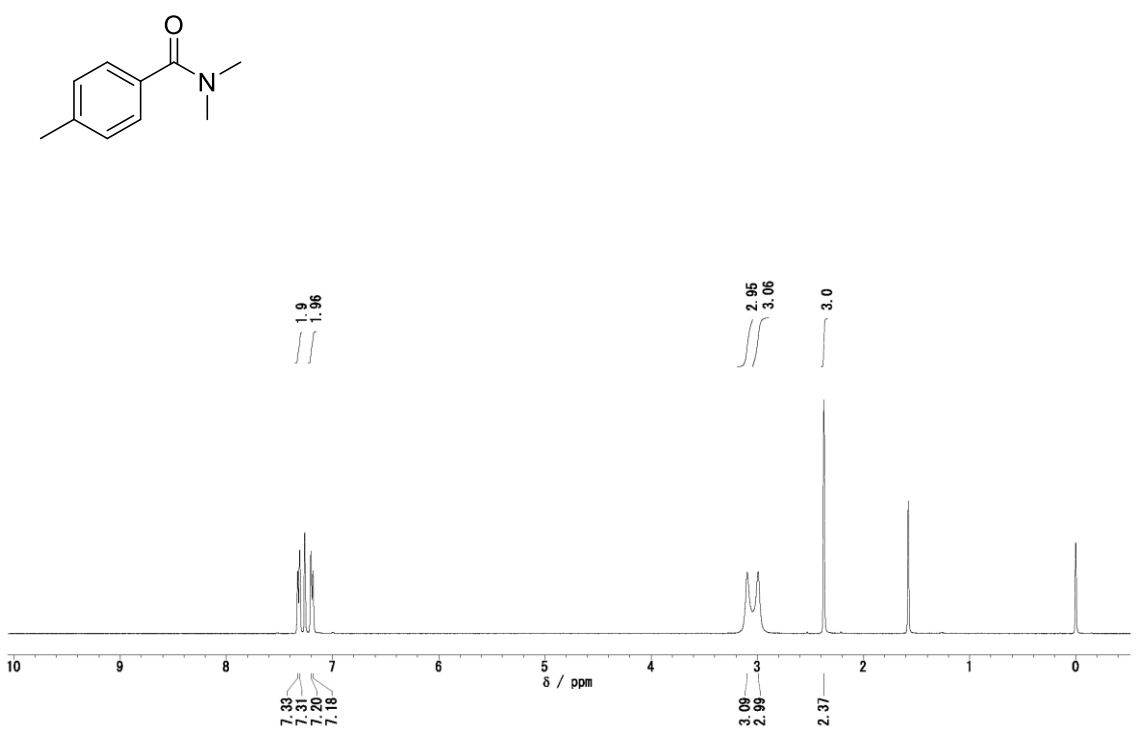


Figure S19. ^{1}H NMR spectrum of **2i**.

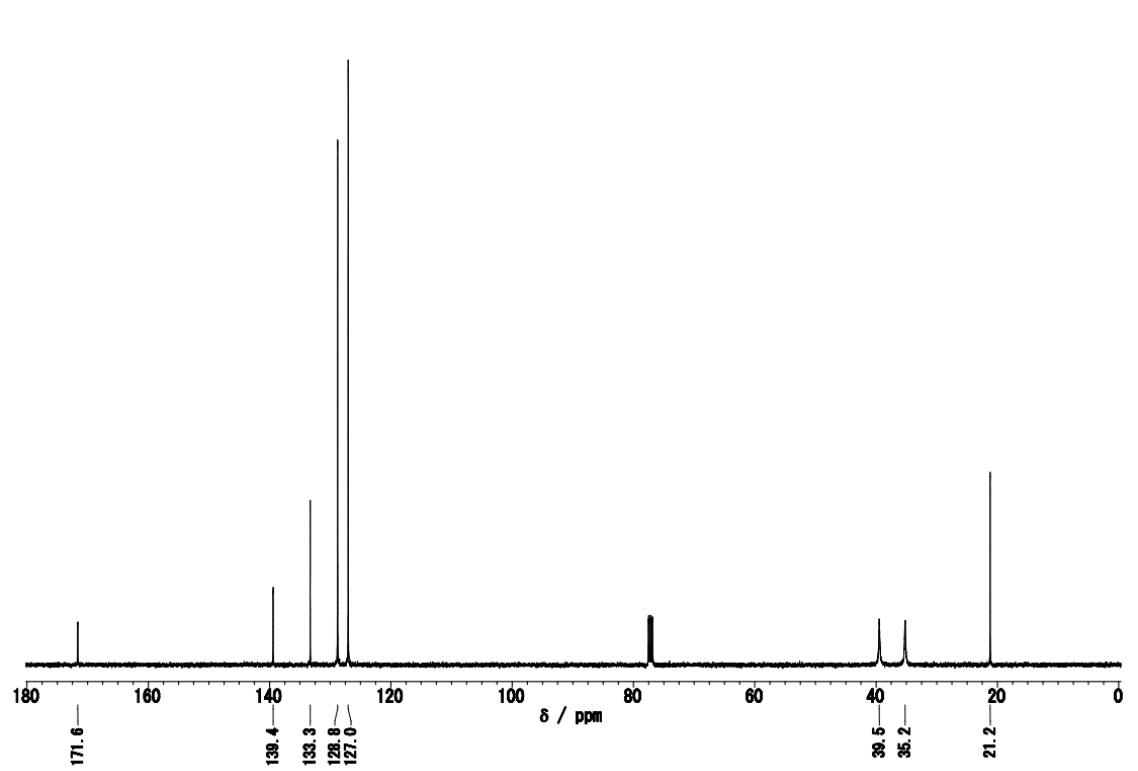


Figure S20. ^{1}H NMR spectrum of **2i**.

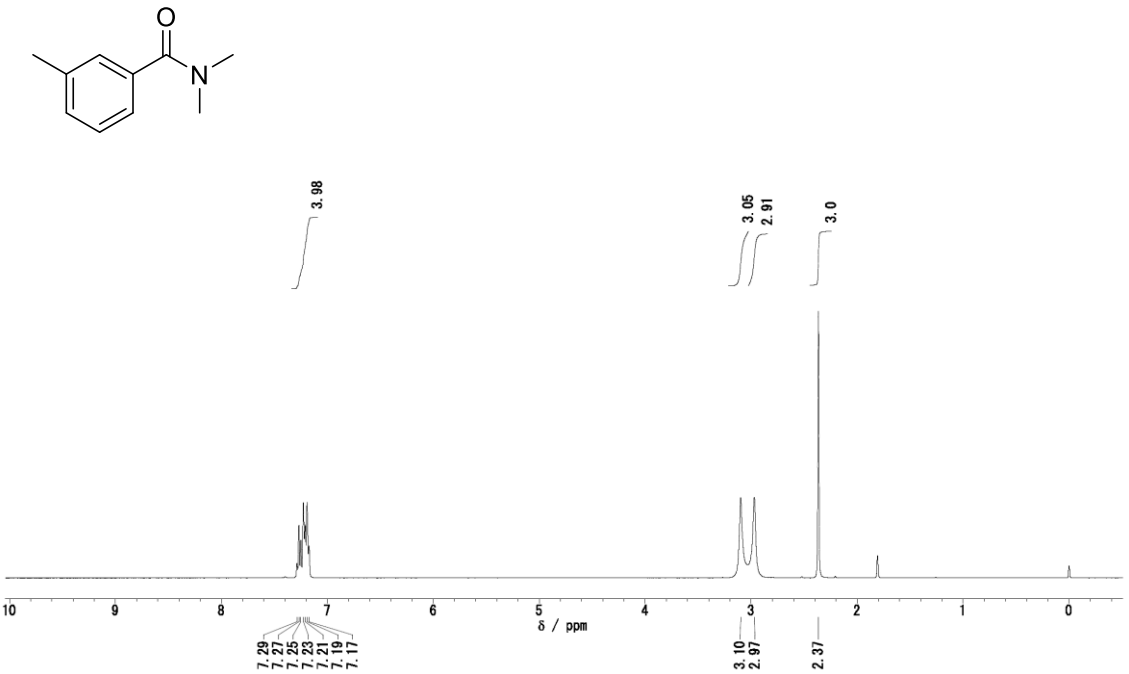


Figure S21. ^{1}H NMR spectrum of **2j**.

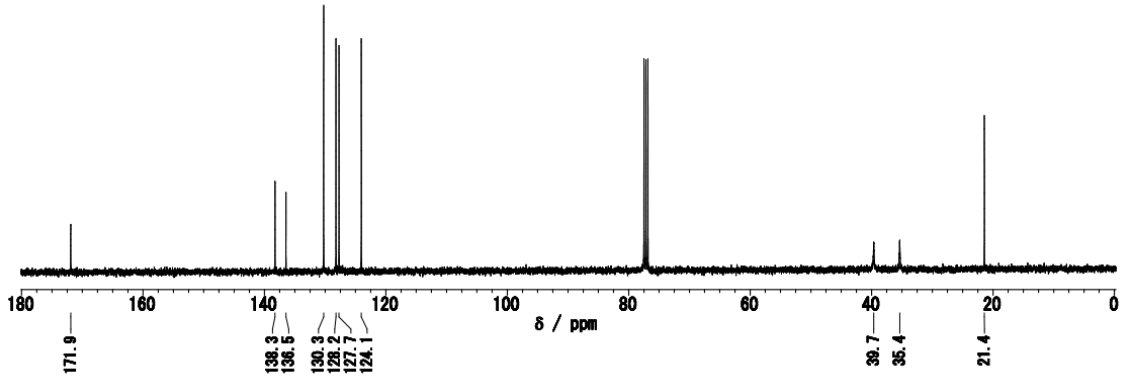


Figure S22. ^{13}C{^{1}H} NMR spectrum of **2j**.

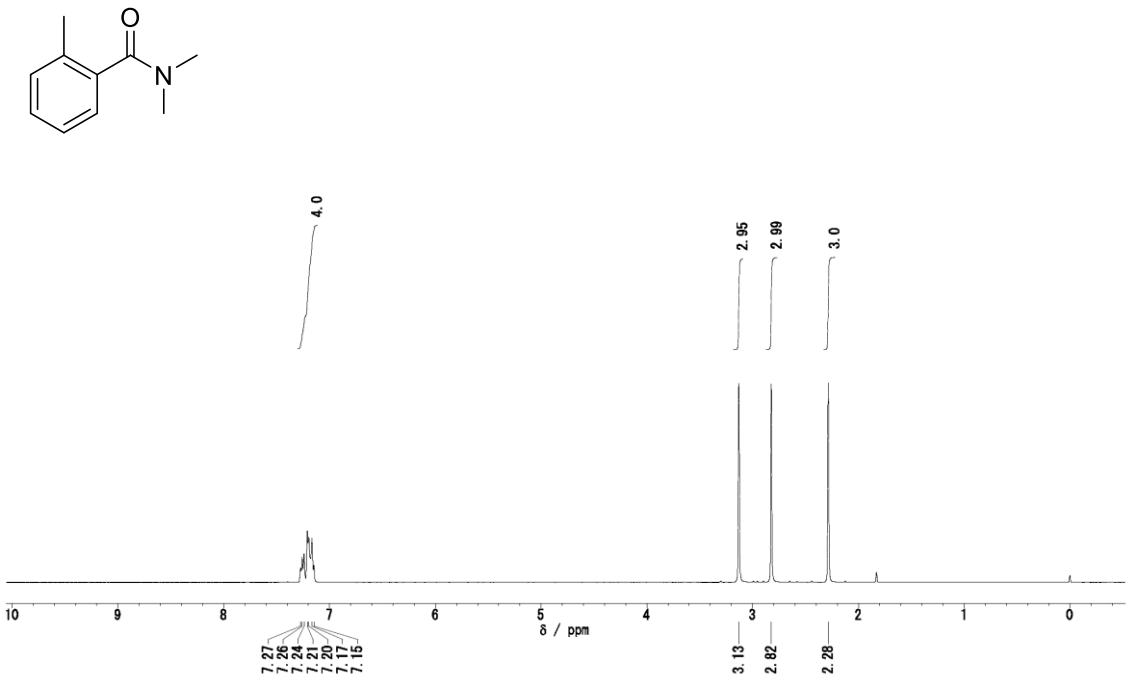


Figure S23. ^{1}H NMR spectrum of **2k**.

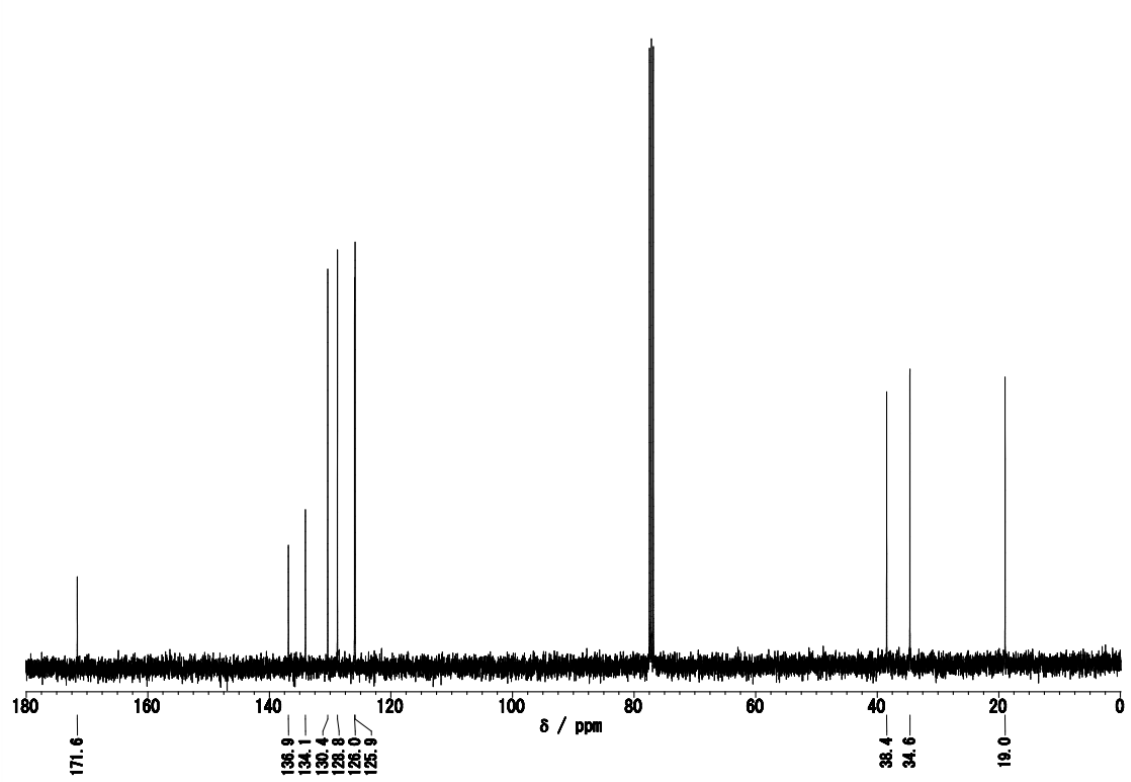


Figure S24. ^{13}C{^{1}H} NMR spectrum of **2k**.

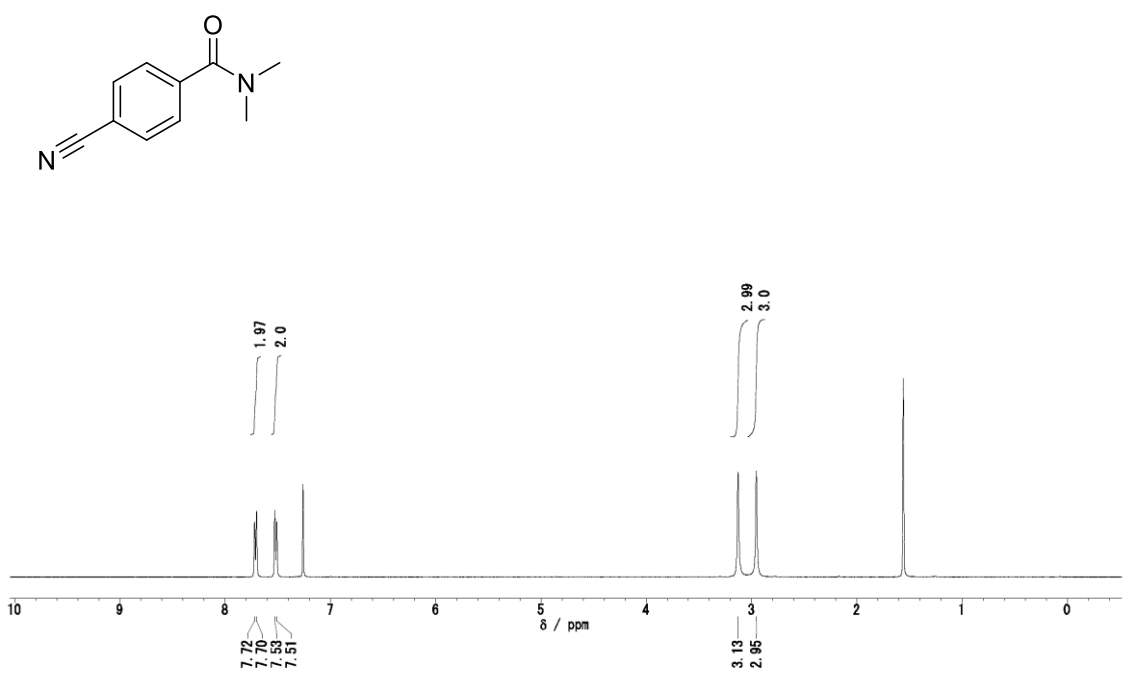


Figure S25. ^{1}H NMR spectrum of **2l**.

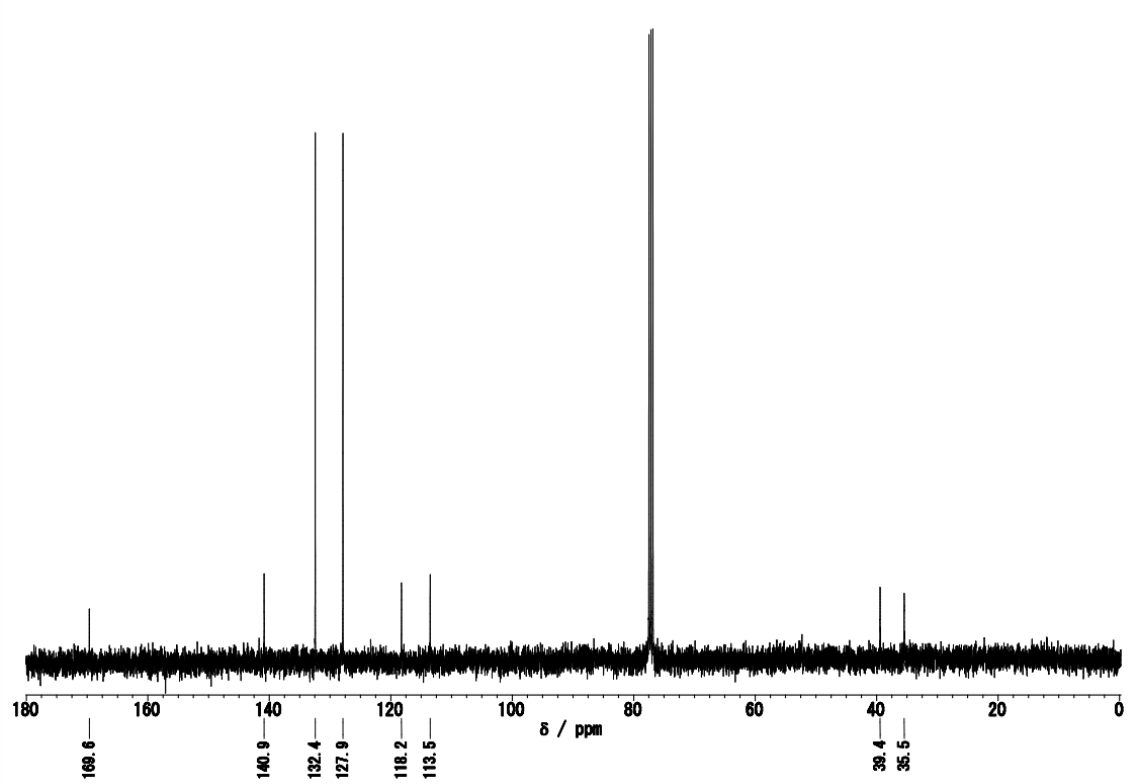


Figure S26. ^{13}C{^{1}H} NMR spectrum of **2l**.

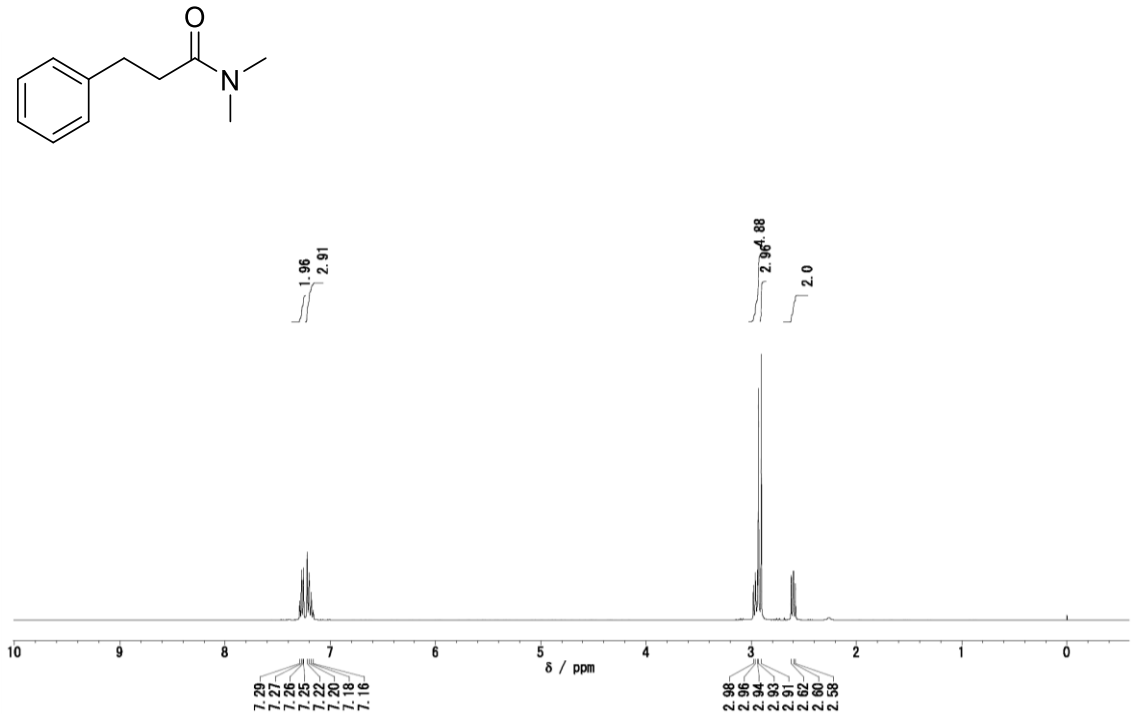


Figure S27. ^{1}H NMR spectrum of **2m**.

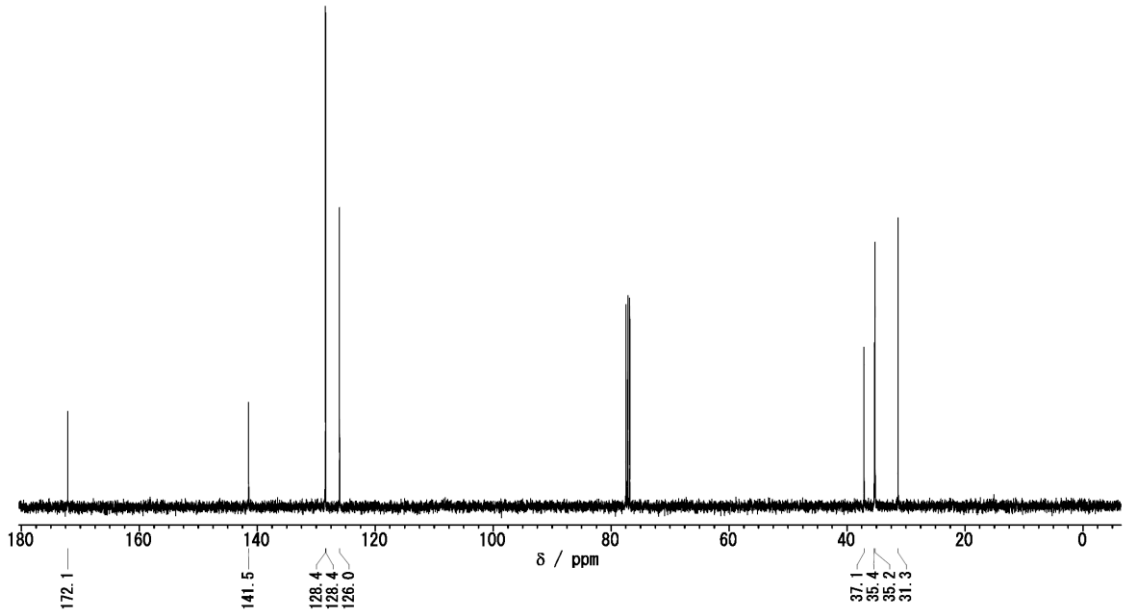


Figure S28. ^{13}C{^{1}H} NMR spectrum of **2m**.

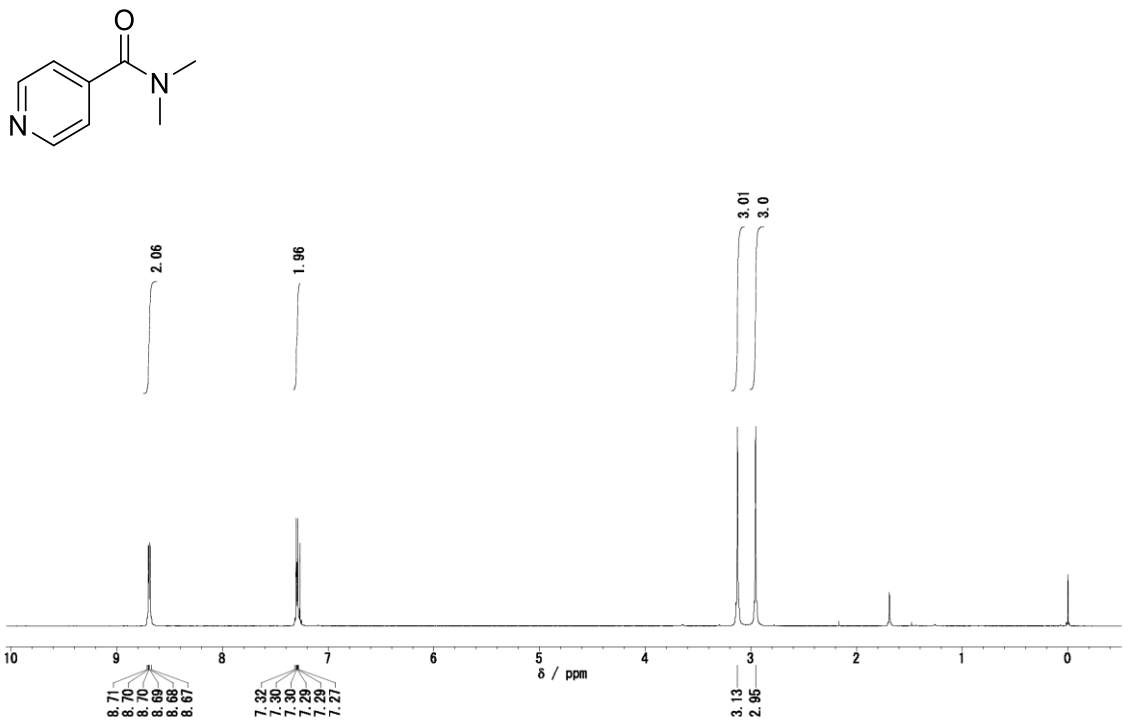


Figure S29. ^{1}H NMR spectrum of **2n**.

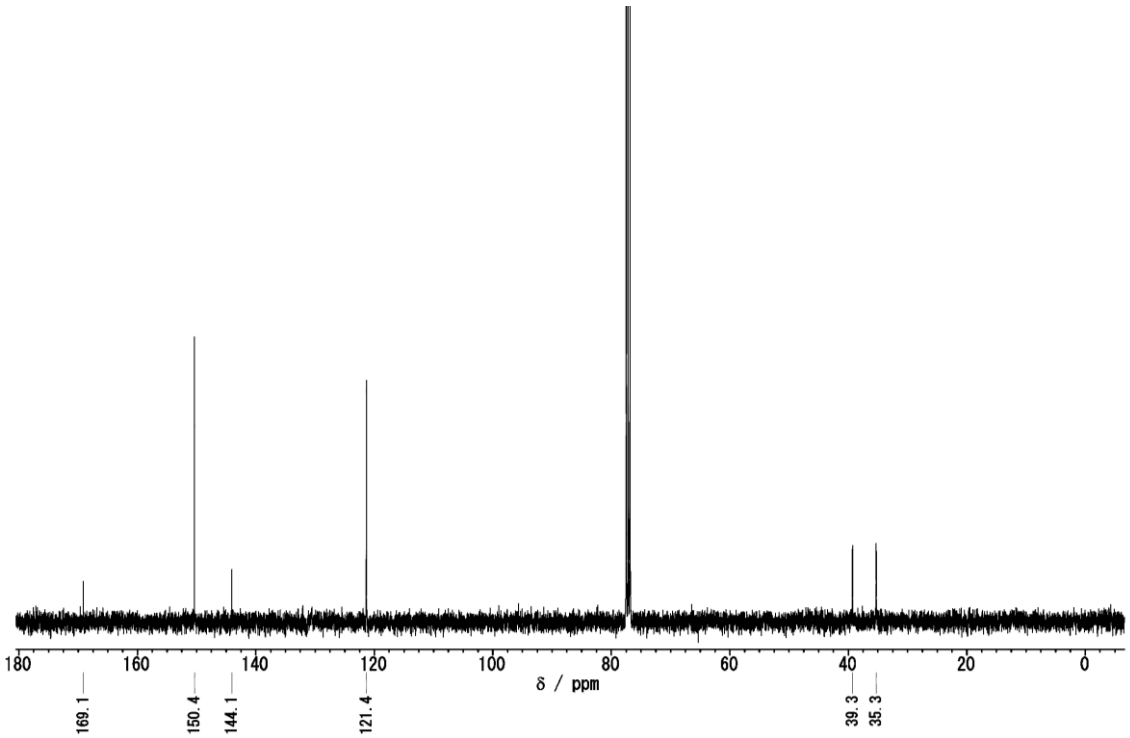


Figure S30. ^{13}C{^{1}H} NMR spectrum of **2n**.

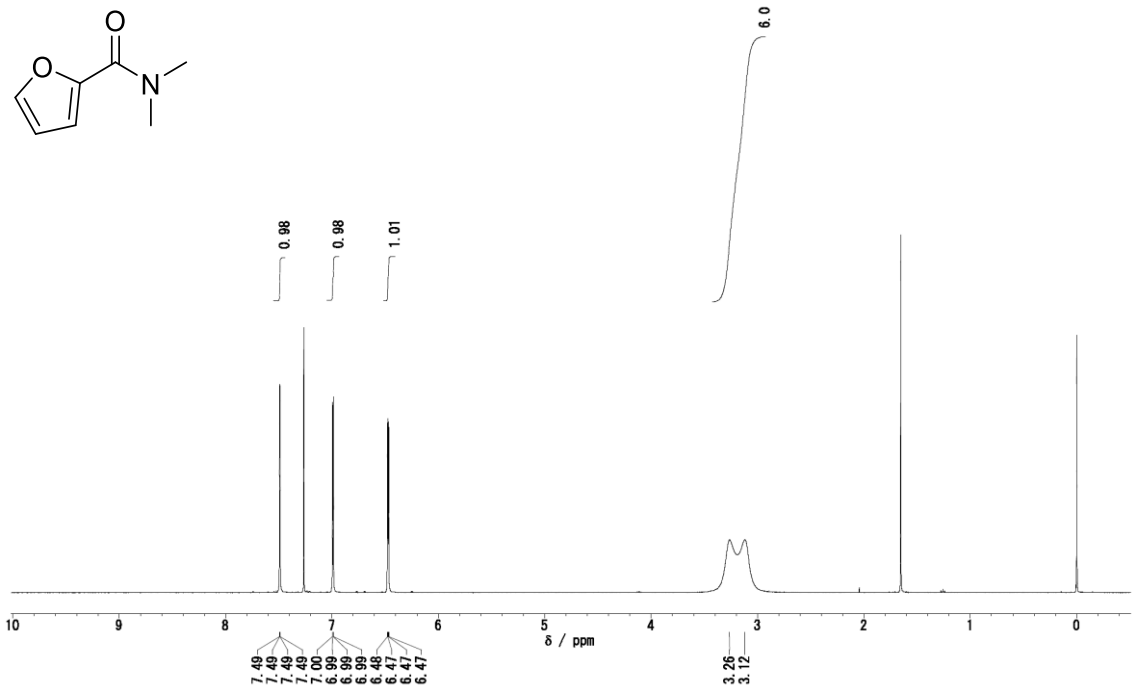


Figure S31. ^{1}H NMR spectrum of **2o**.

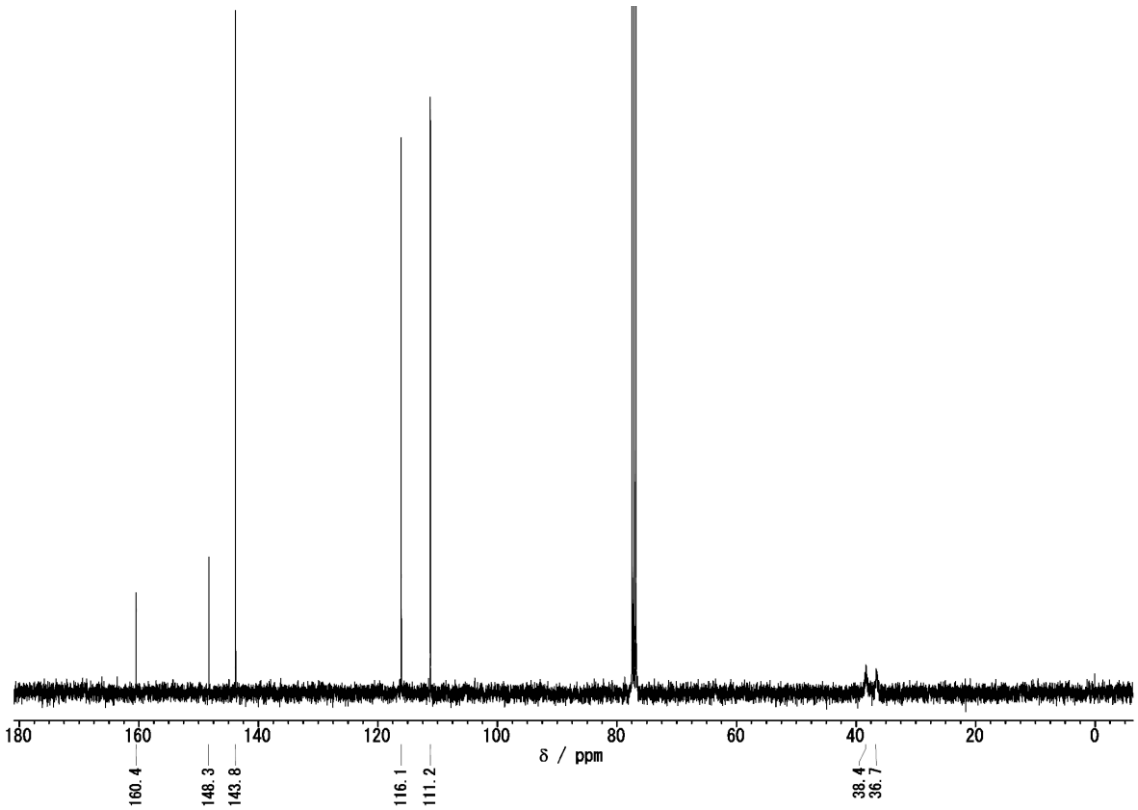


Figure S32. ^{13}C{^{1}H} NMR spectrum of **2o**.

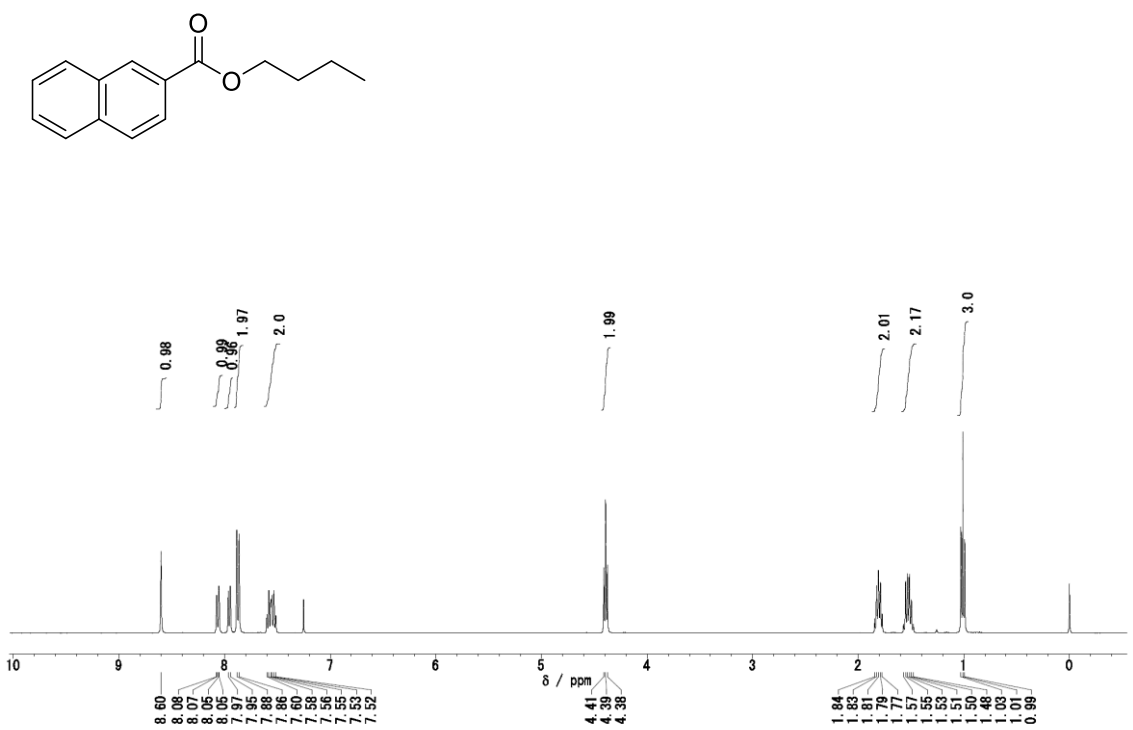


Figure S33. ^{1}H NMR spectrum of **3a**.

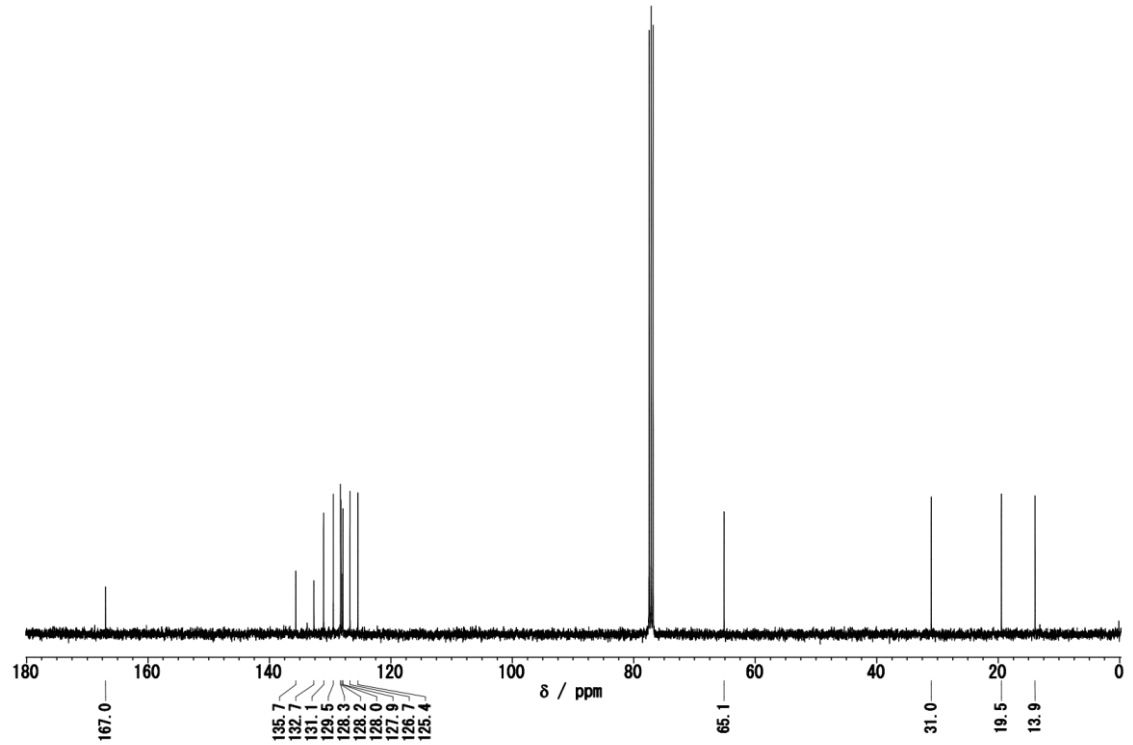


Figure S34. ^{13}C{^{1}H} NMR spectrum of **3a**.

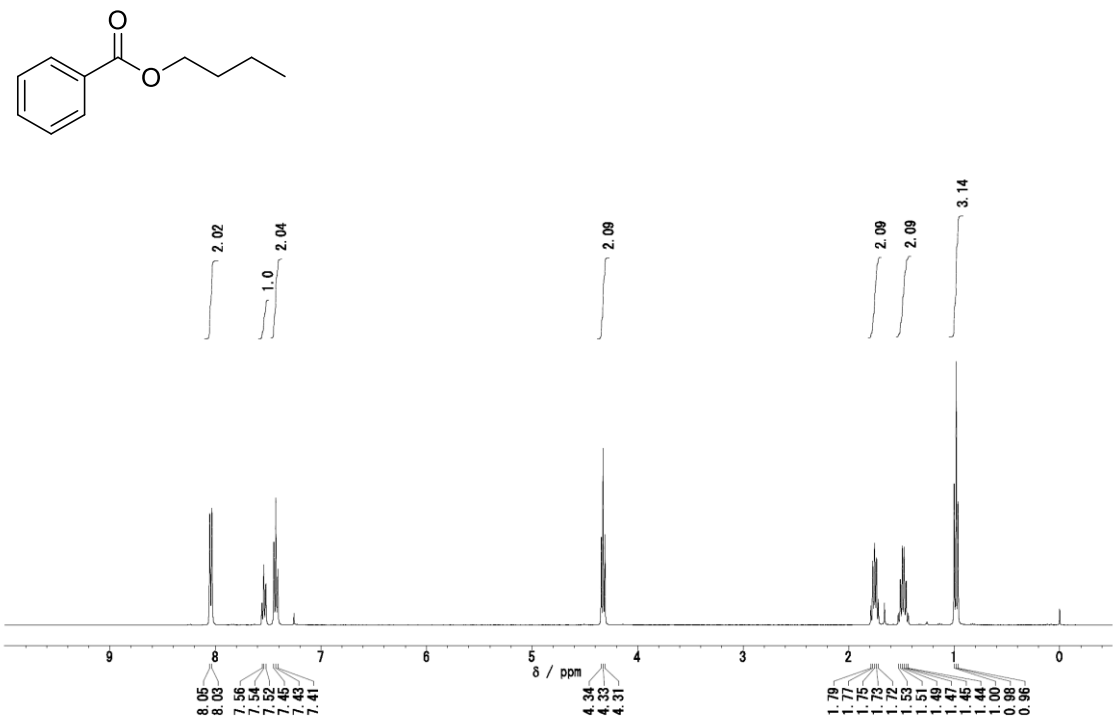


Figure S35. ^{1}H NMR spectrum of **3b**.

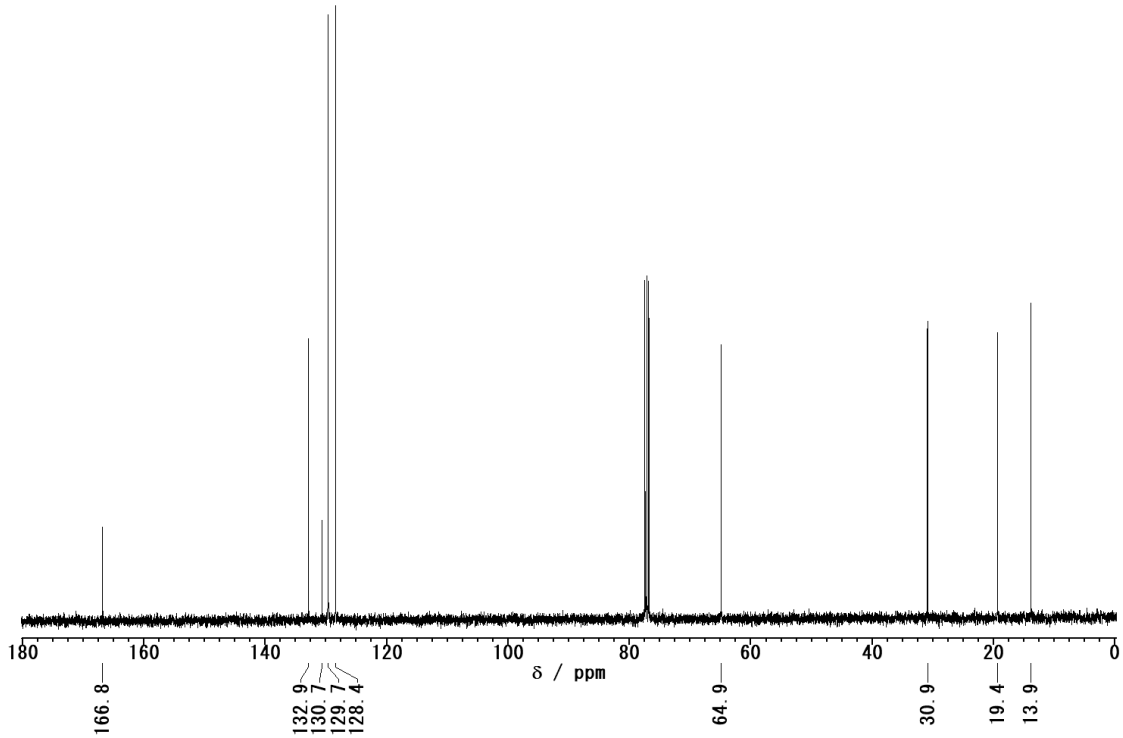


Figure S36. ^{13}C{^{1}H} NMR spectrum of **3b**.

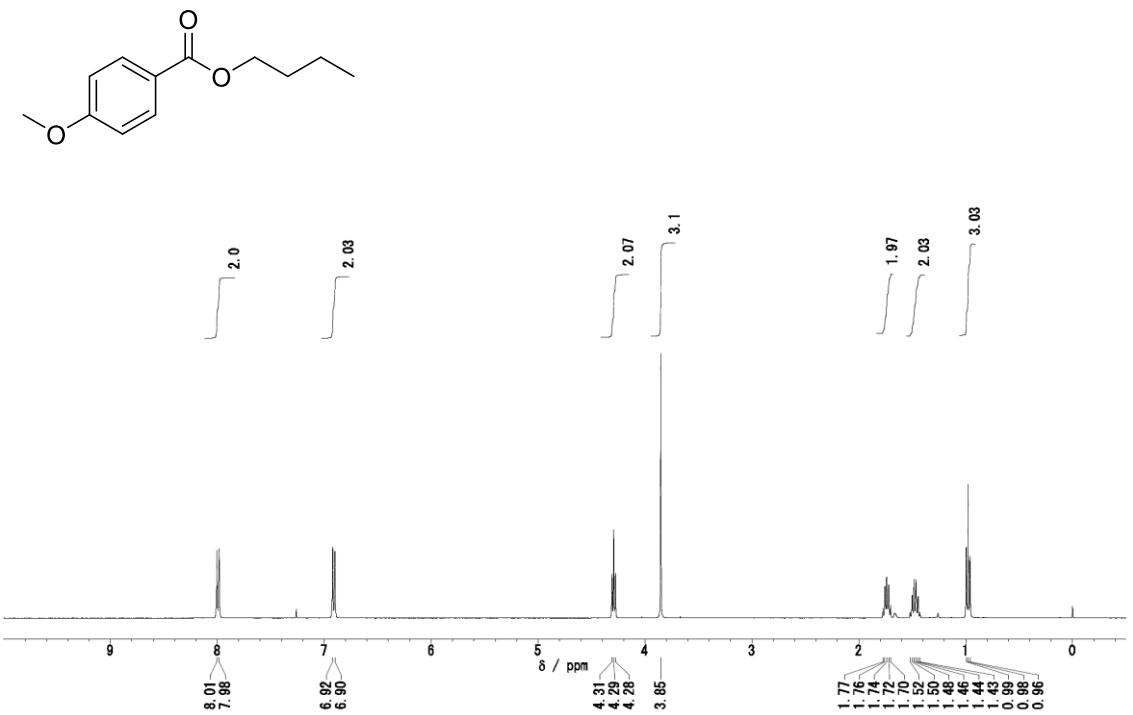


Figure S37. ^{1}H NMR spectrum of **3c**.

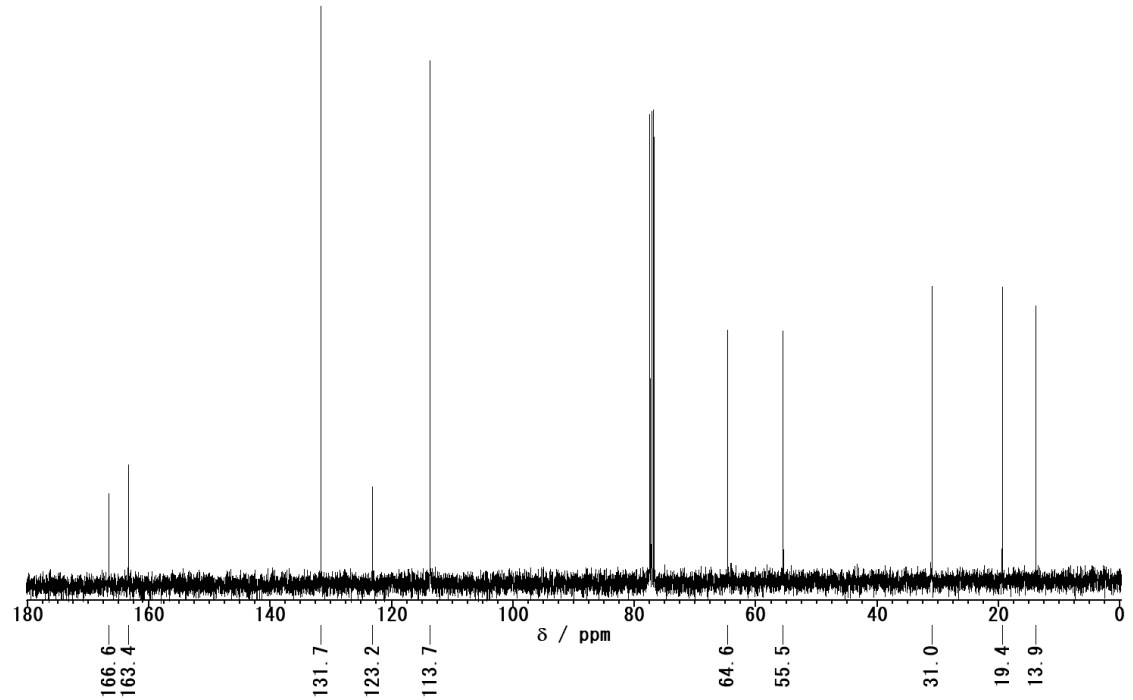


Figure S38. ^{13}C{^{1}H} NMR spectrum of **3c**.

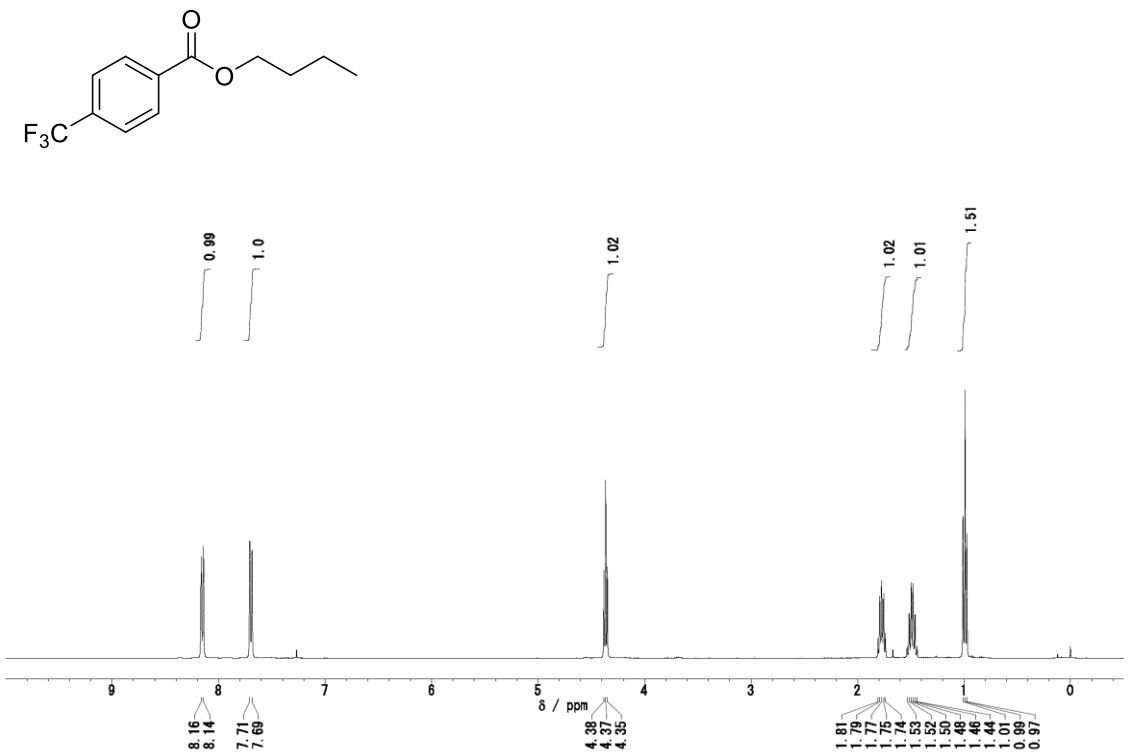


Figure S39. ^{1}H NMR spectrum of **3d**.

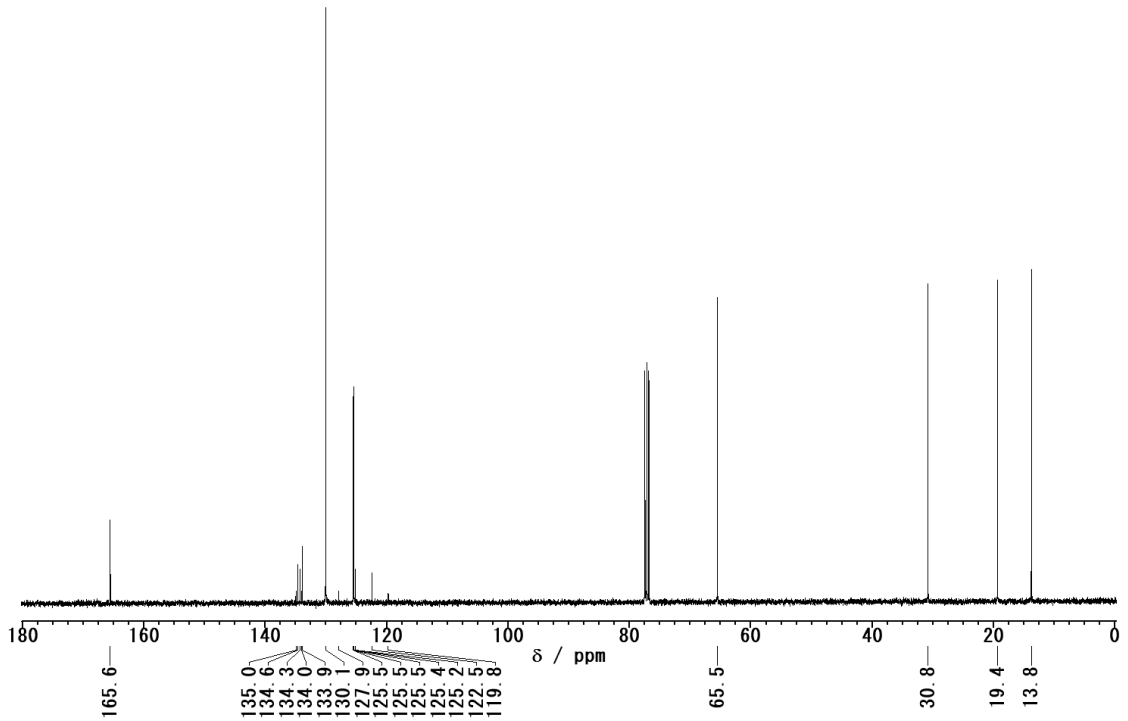


Figure S40. ^{13}C{^{1}H} NMR spectrum of **3d**.

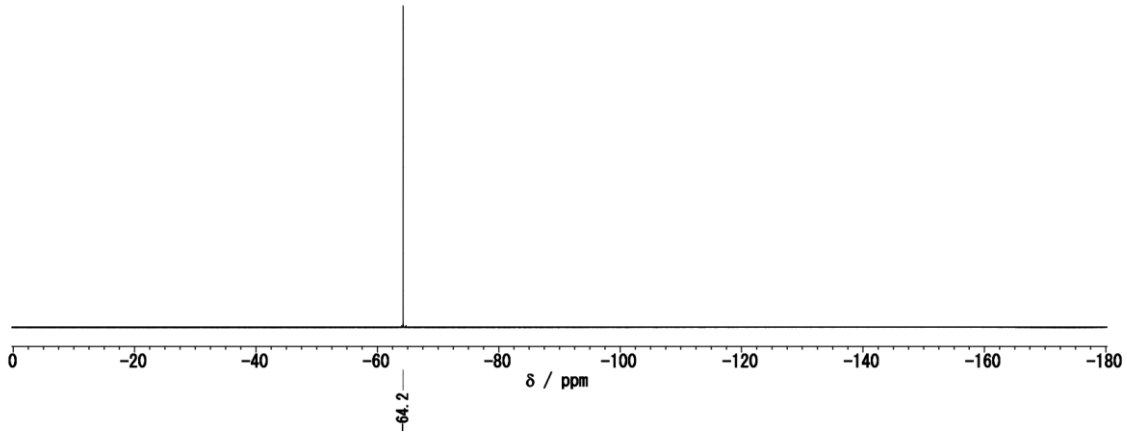


Figure S41. $^{19}F\{^{1}H\}$ NMR spectrum of **3d**.

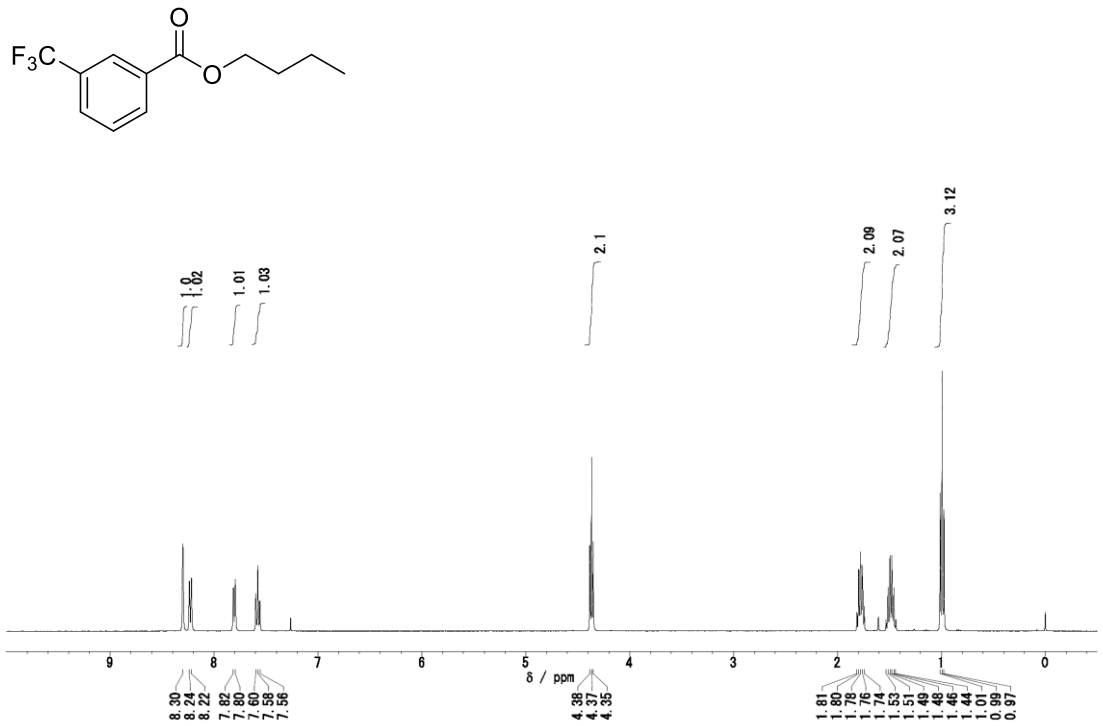


Figure S42. ^{1}H NMR spectrum of **3e**.

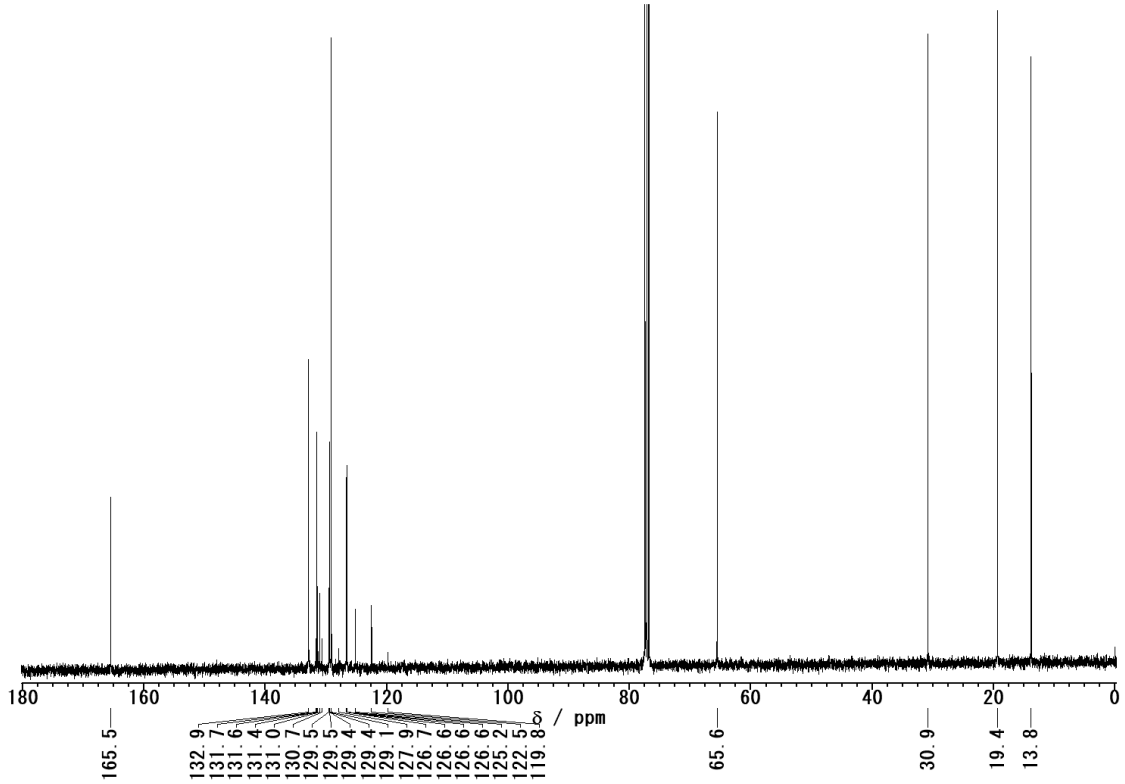


Figure S43. ^{13}C{^{1}H} NMR spectrum of **3e**.

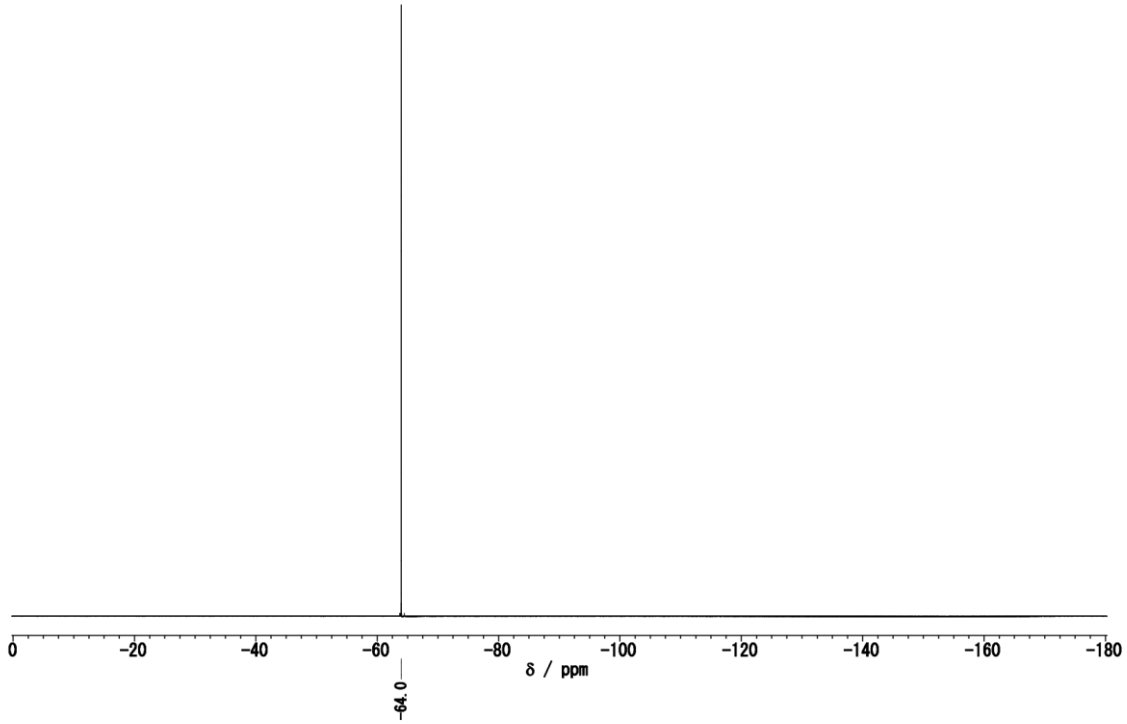


Figure S44. $^{19}F\{^{1}H\}$ NMR spectrum of **3e**.

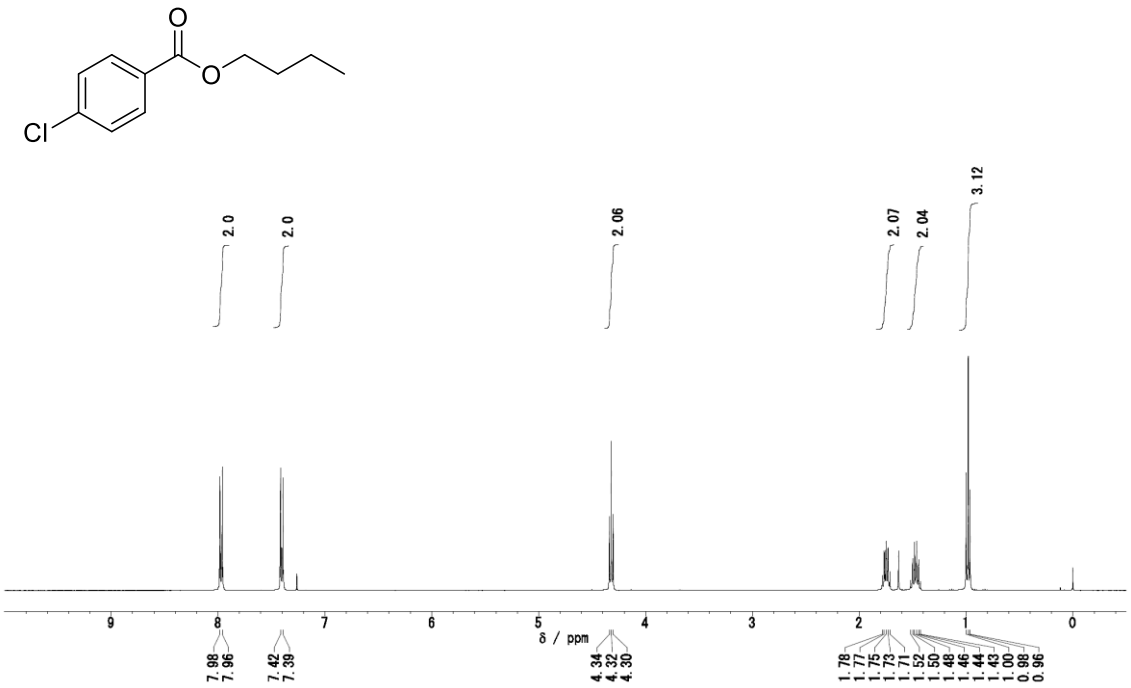


Figure S45. ^{1}H NMR spectrum of **3f**.

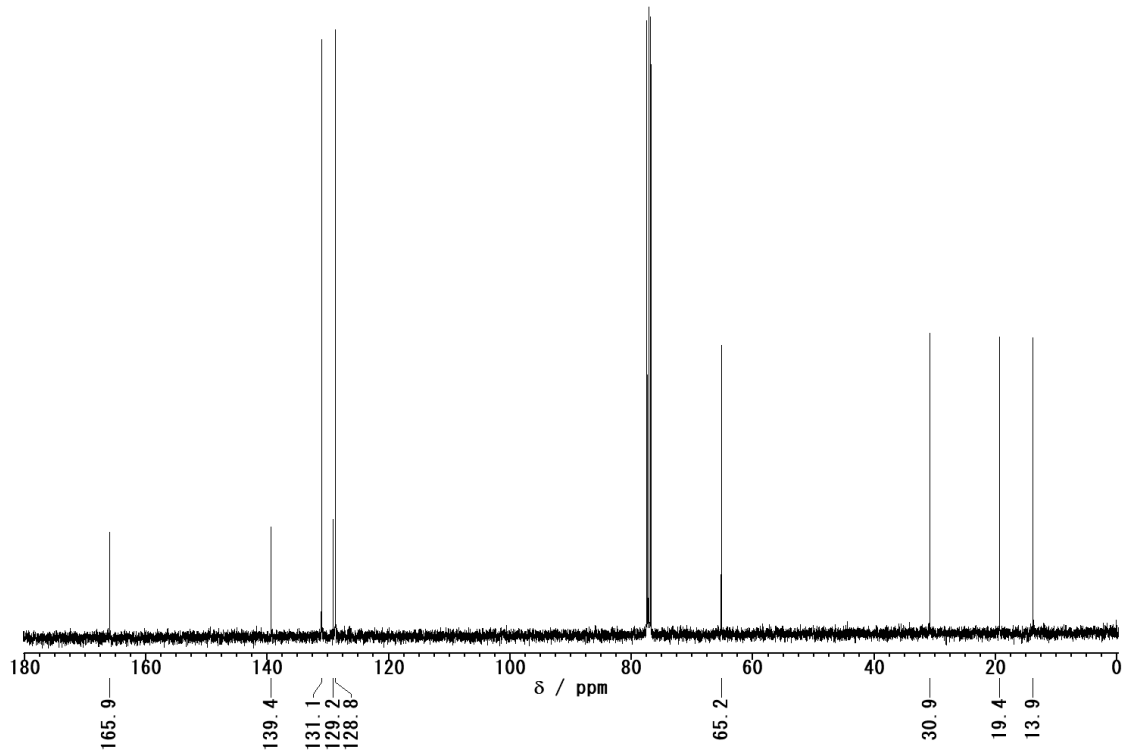


Figure S46. ^{13}C{^{1}H} NMR spectrum of **3f**.

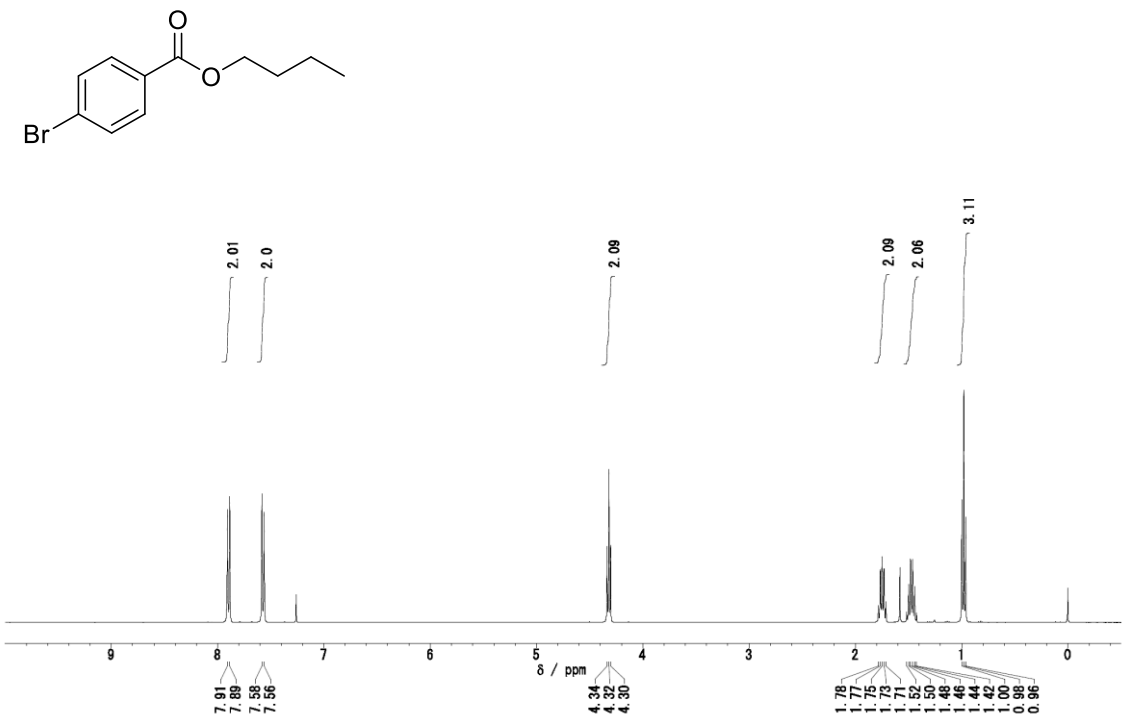


Figure S47. ^{1}H NMR spectrum of **3g**.

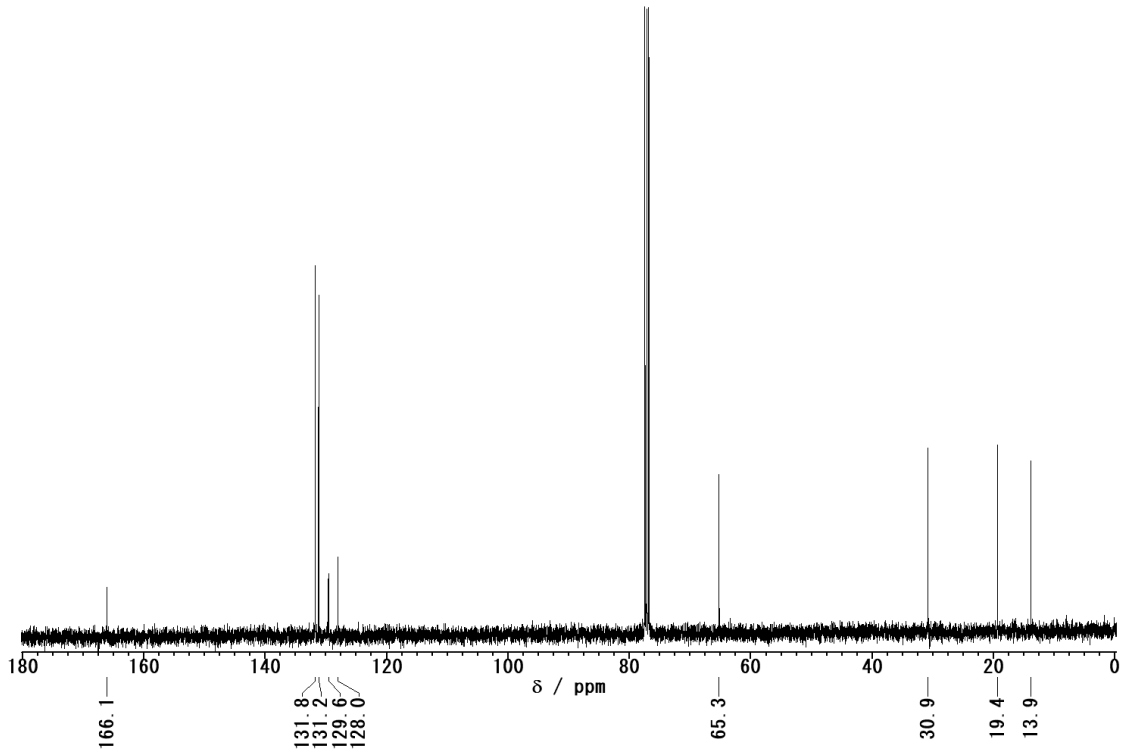


Figure S48. ^{13}C{^{1}H} NMR spectrum of **3g**.

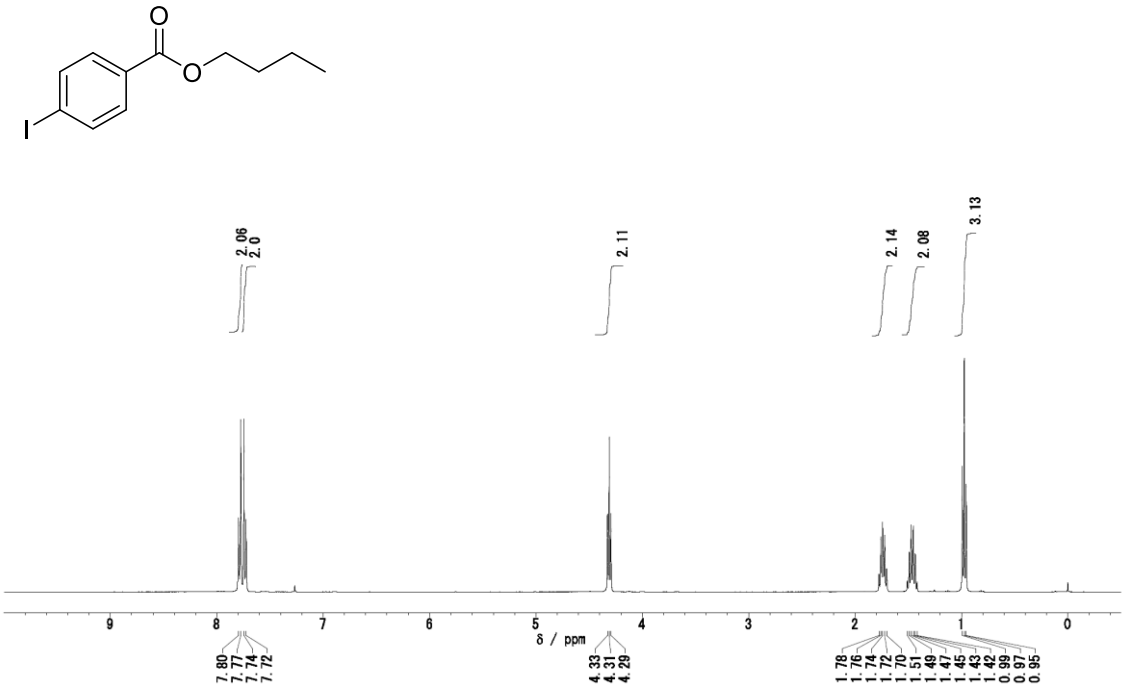


Figure S49. ^{1}H NMR spectrum of **3h**.

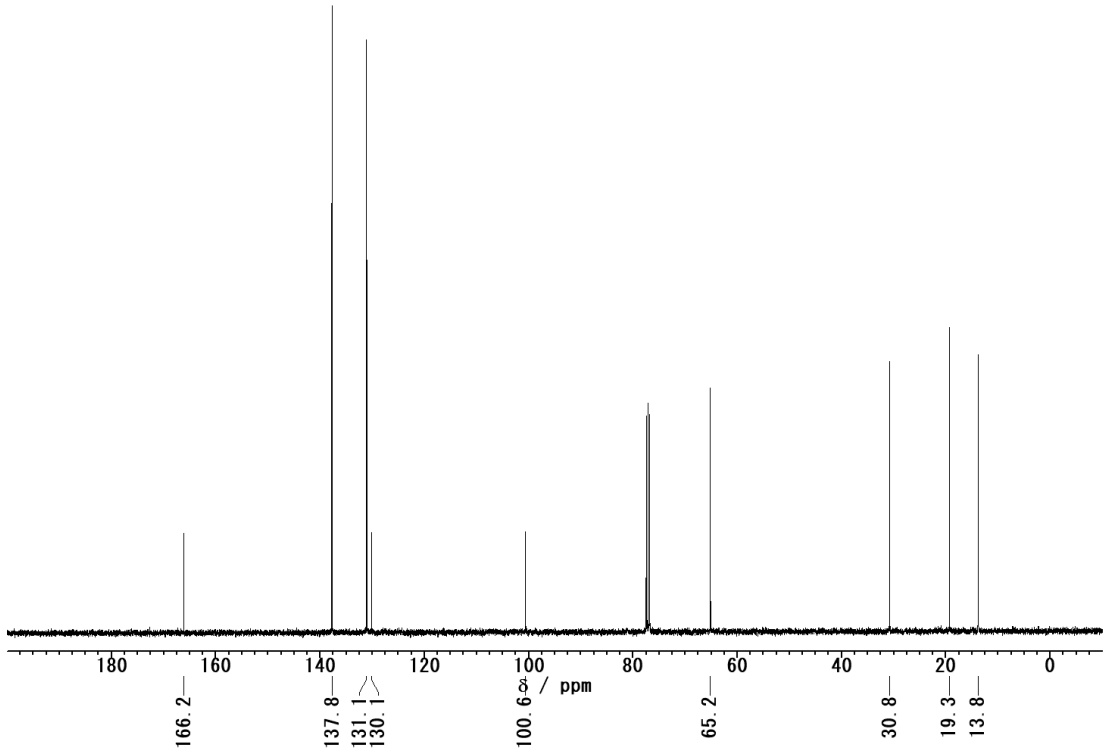


Figure S50. ^{13}C{^{1}H} NMR spectrum of **3h**.

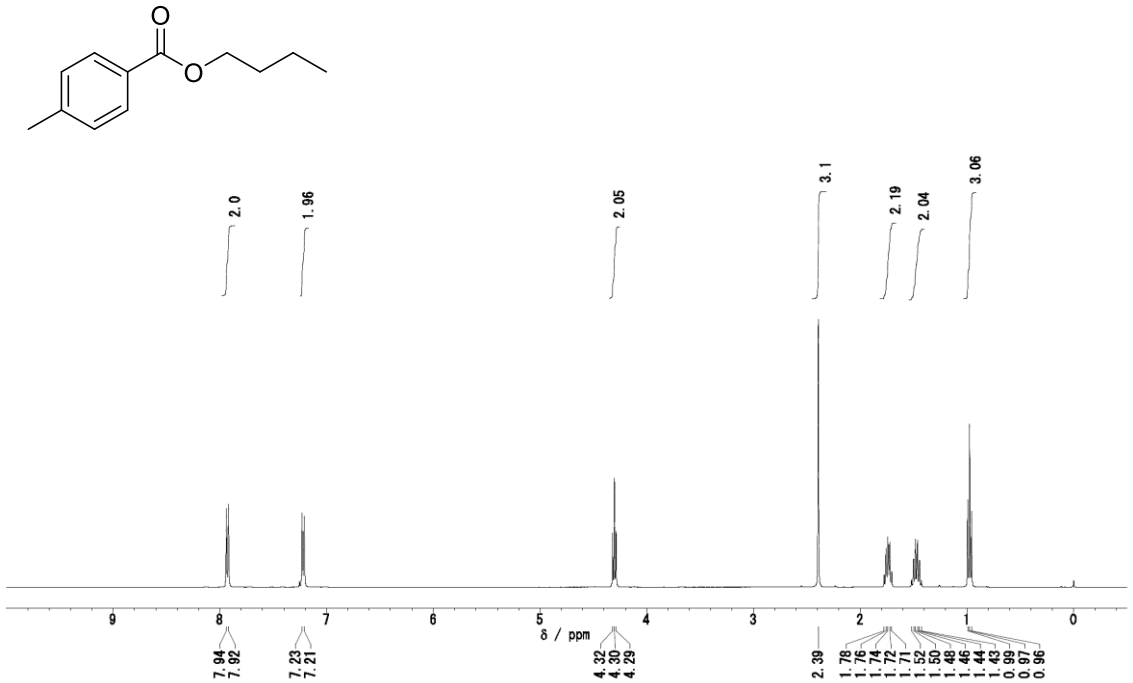


Figure S51. ^{1}H NMR spectrum of **3i**.

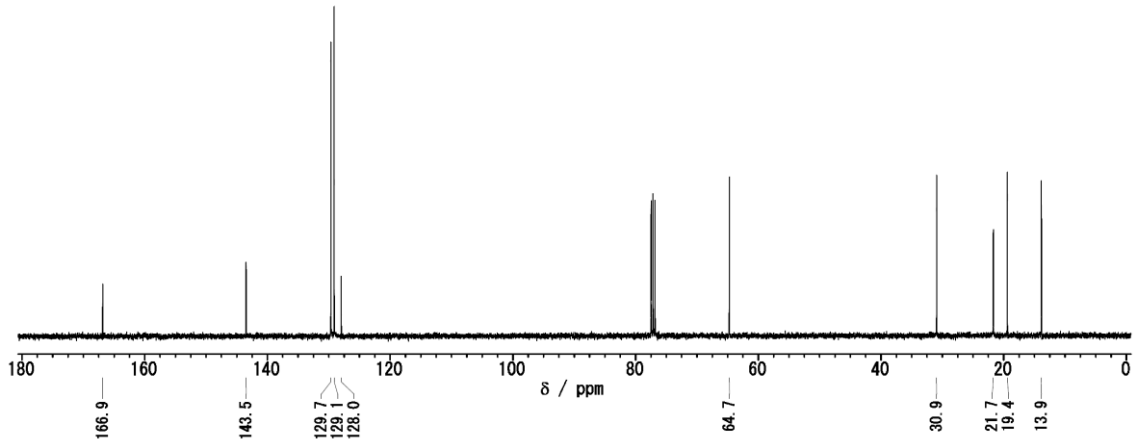


Figure S52. ^{13}C{^{1}H} NMR spectrum of **3i**.

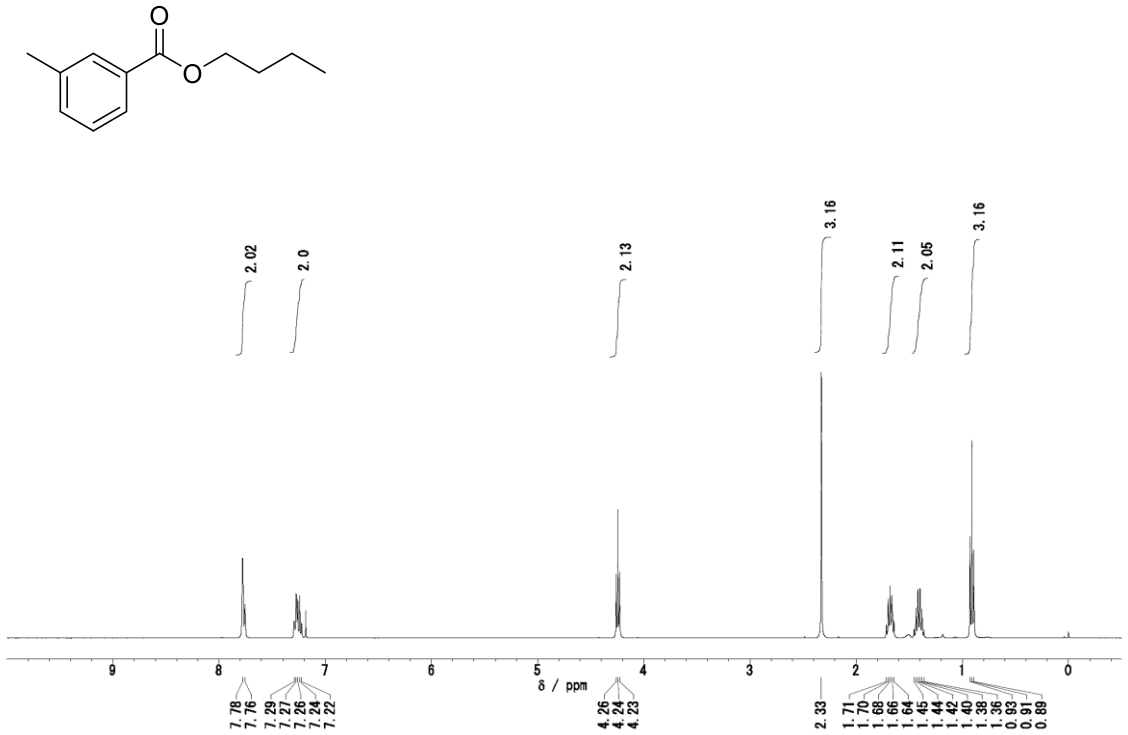


Figure S53. ^{1}H NMR spectrum of **3j**.

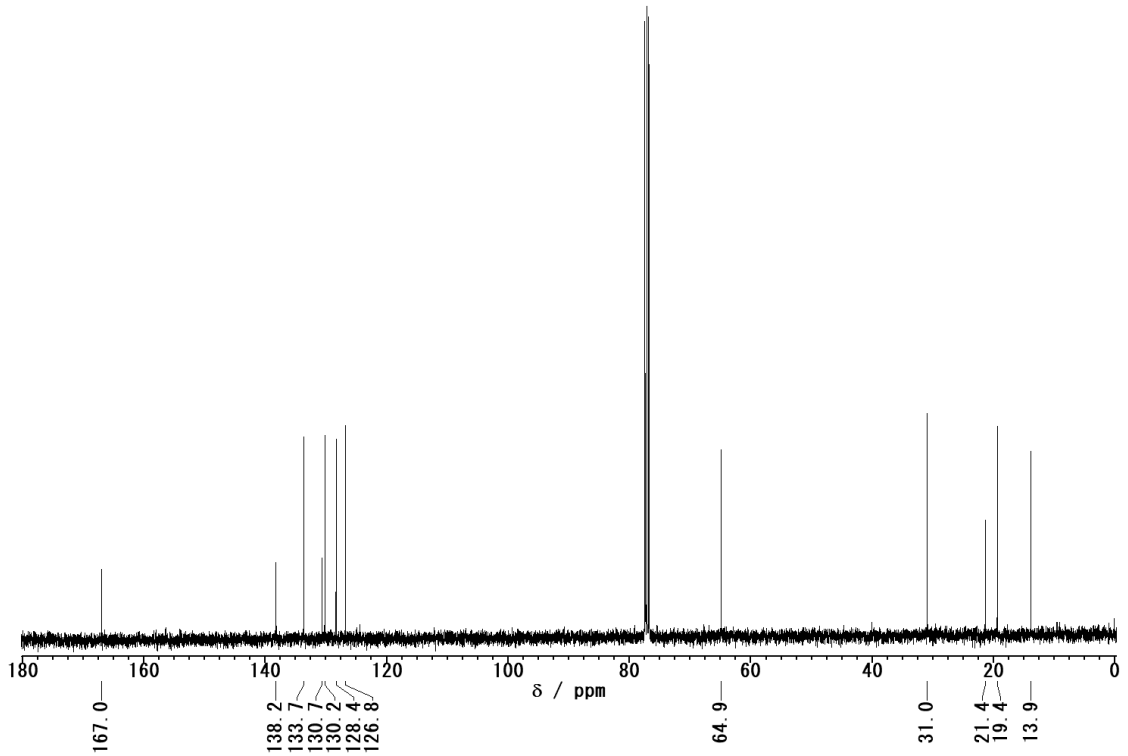


Figure S54. ^{13}C{^{1}H} NMR spectrum of **3j**.

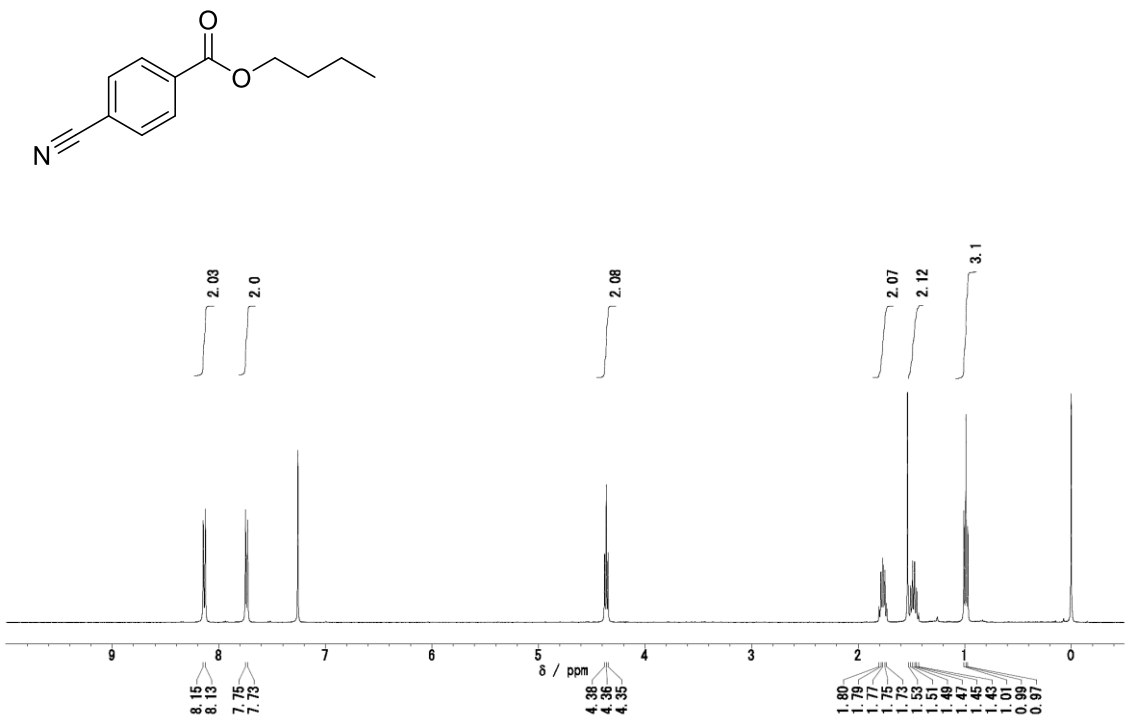


Figure S55. ^{1}H NMR spectrum of **3l**.

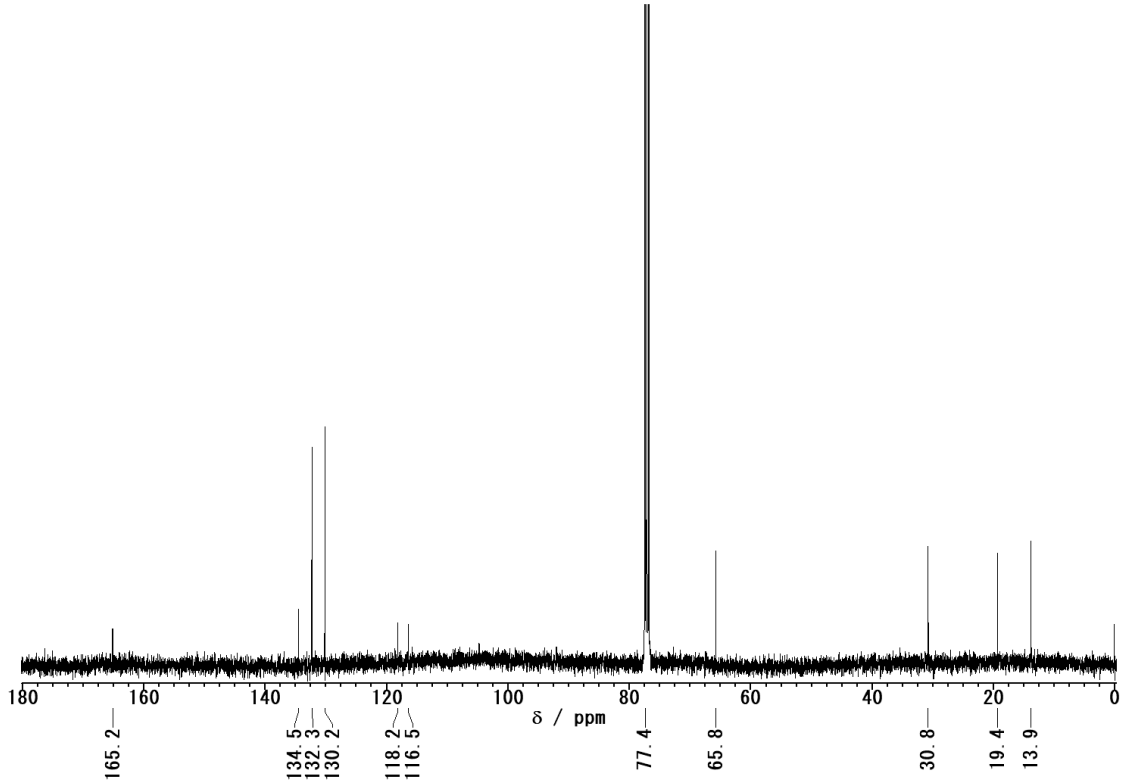
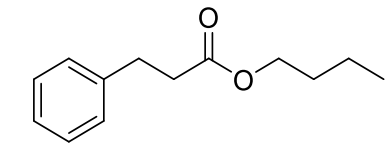


Figure S56. ^{13}C{^{1}H} NMR spectrum of **3l**.



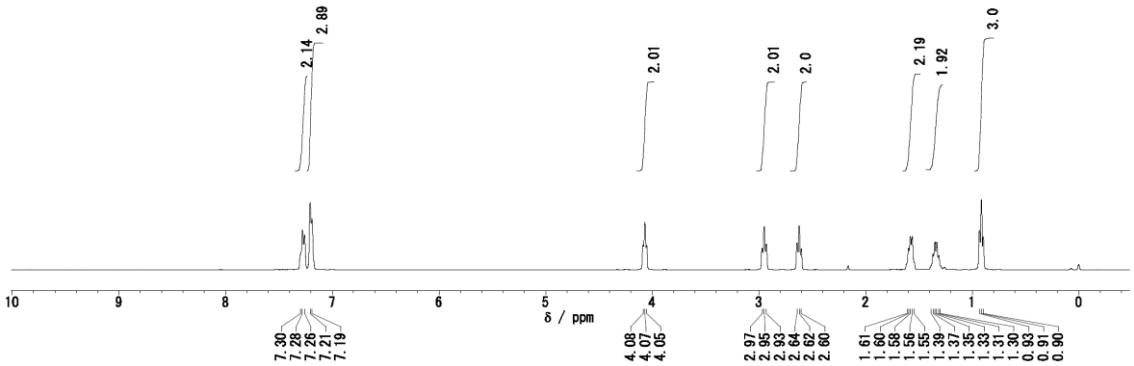


Figure S57. ^{1}H NMR spectrum of **3m**.

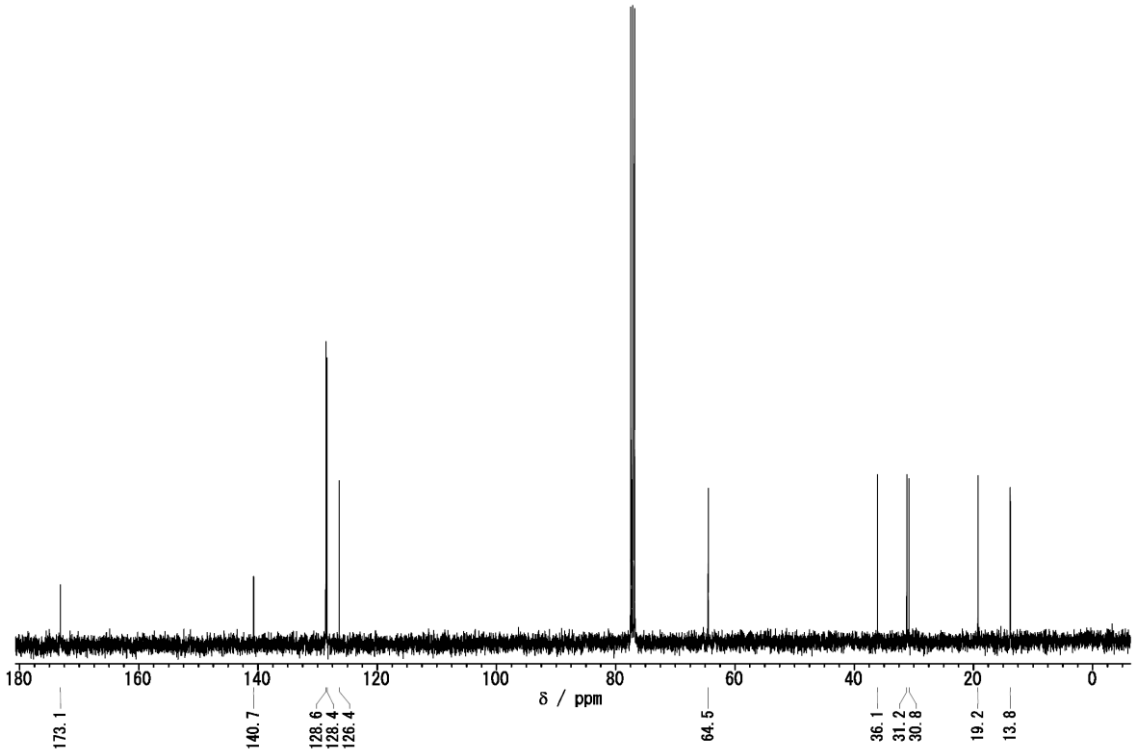


Figure S58. ^{13}C{^{1}H} NMR spectrum of **3m**.

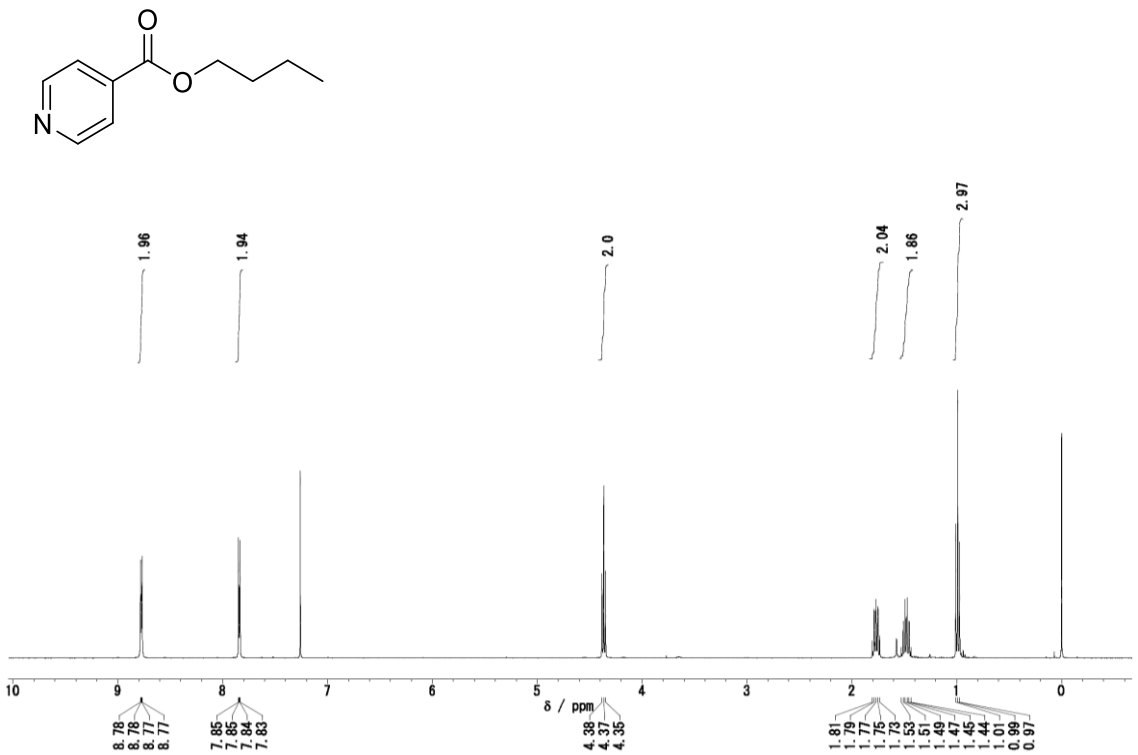


Figure S59. ^{1}H NMR spectrum of **3n**.

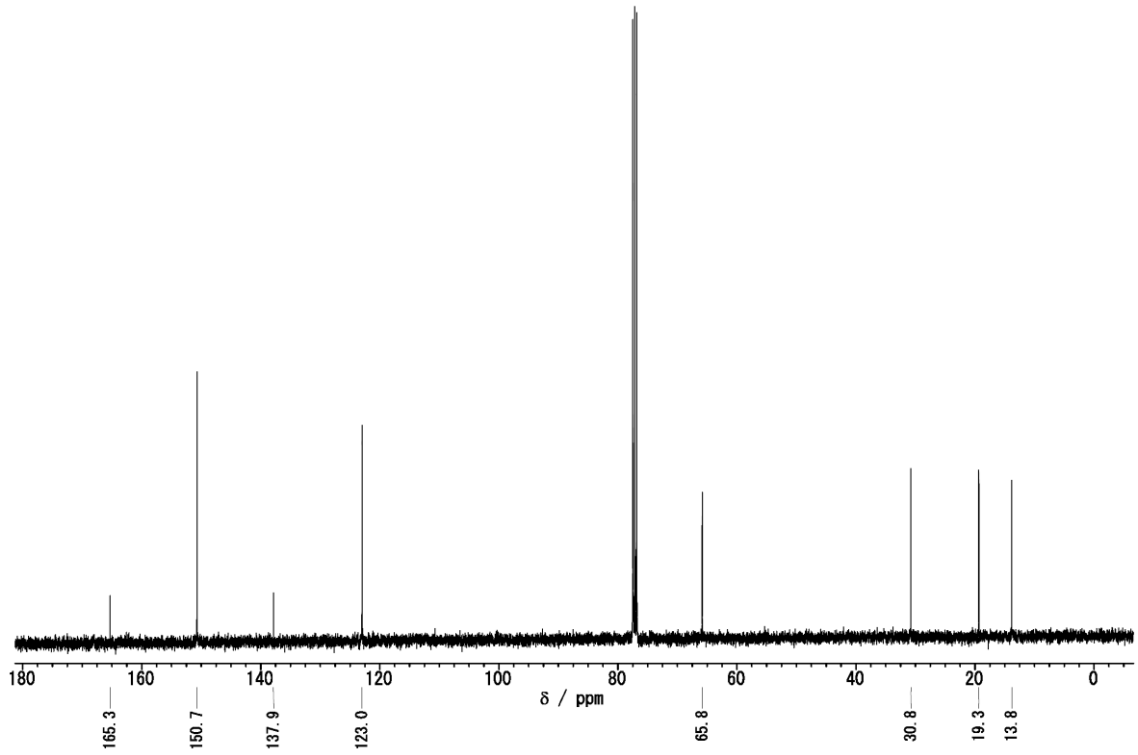


Figure S60. ^{13}C{^{1}H} NMR spectrum of **3n**.

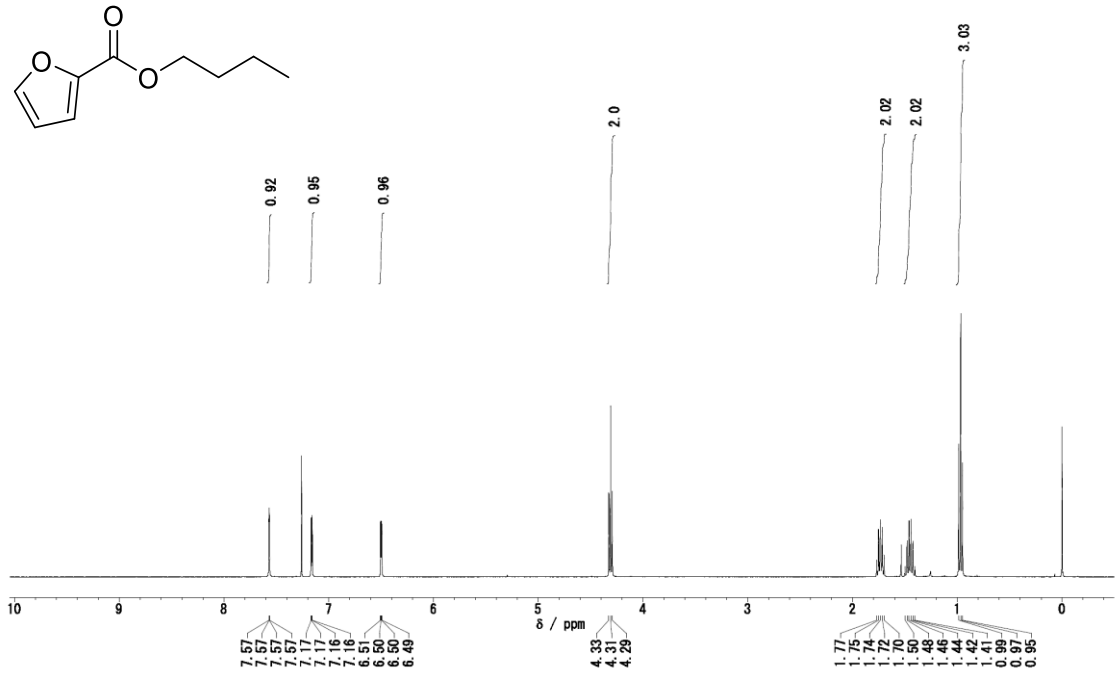


Figure S61. ^{1}H NMR spectrum of **3o**.

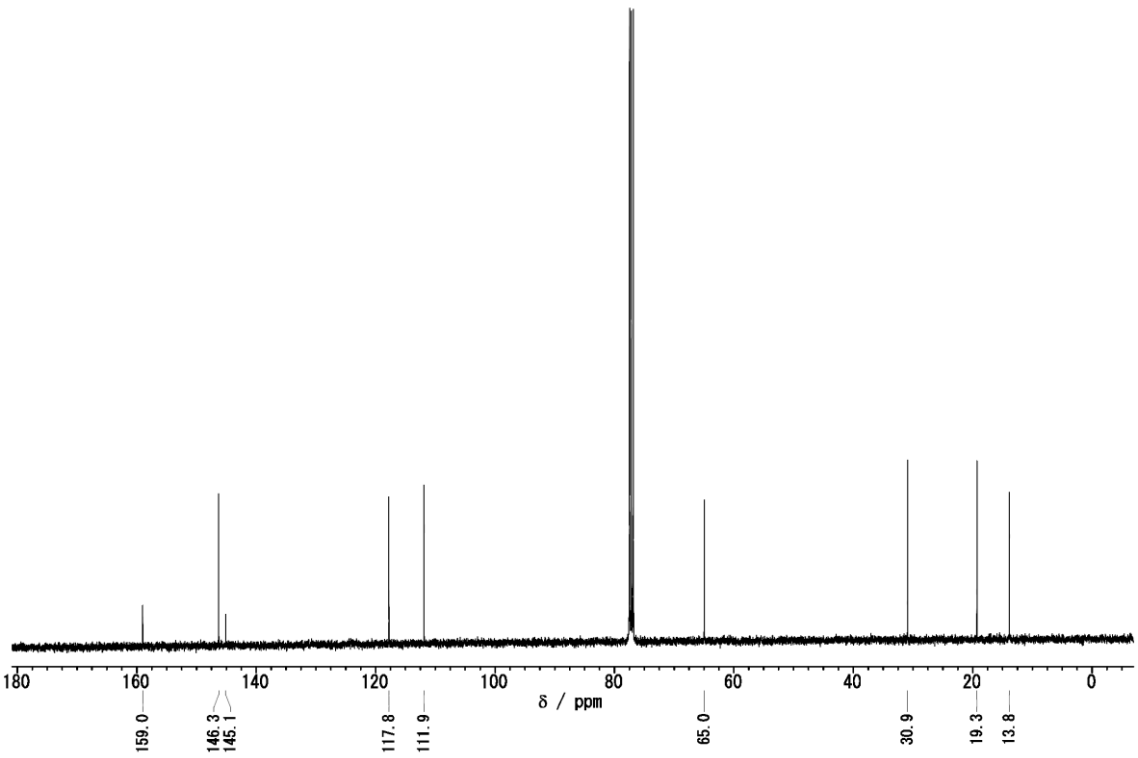


Figure S62. ^{13}C{^{1}H} NMR spectrum of **3o**.

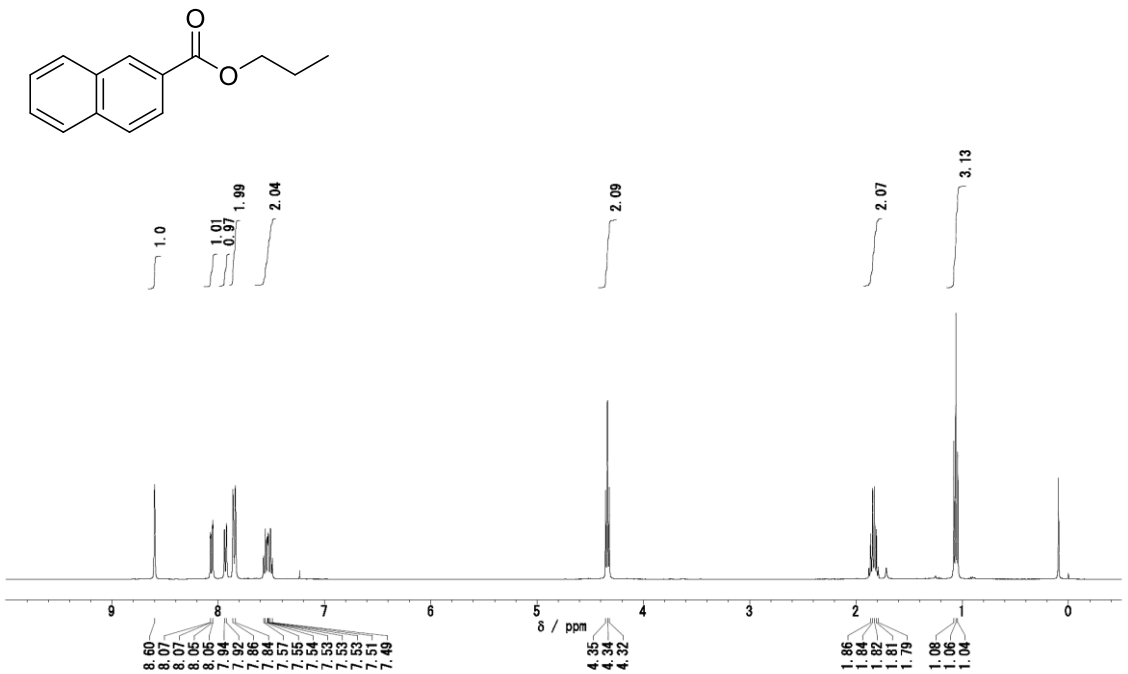


Figure S63. ^{1}H NMR spectrum of **4a**.

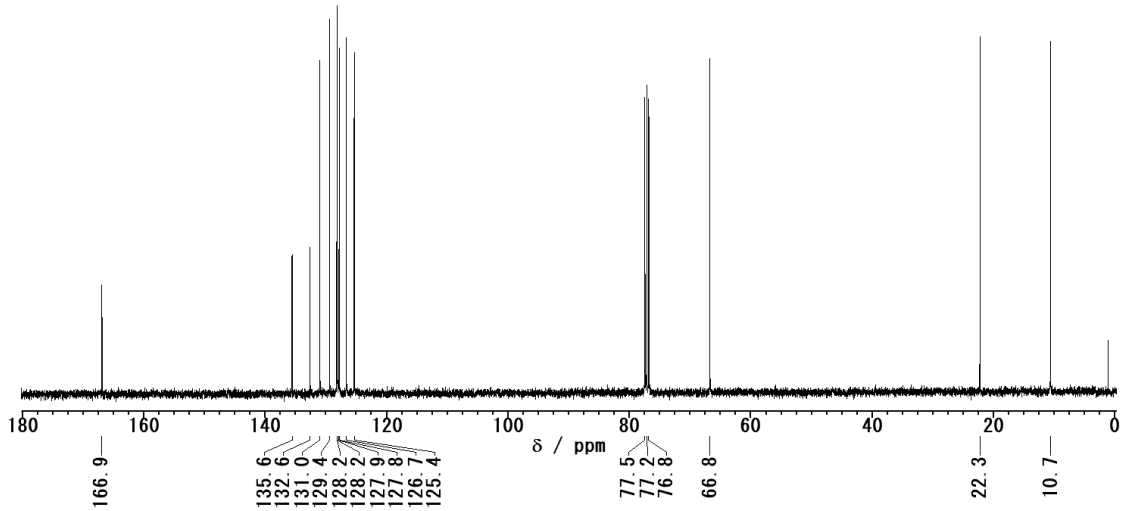


Figure S64. ^{13}C{^{1}H} NMR spectrum of **4a**.

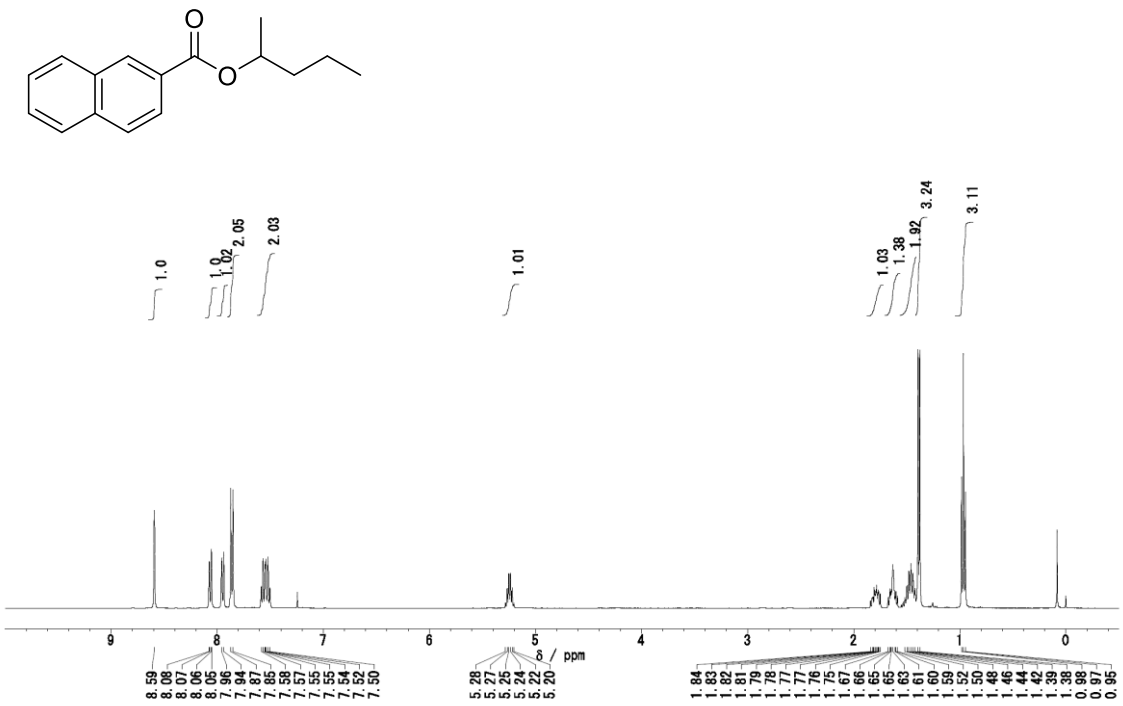


Figure S65. ^{1}H NMR spectrum of **4b**.

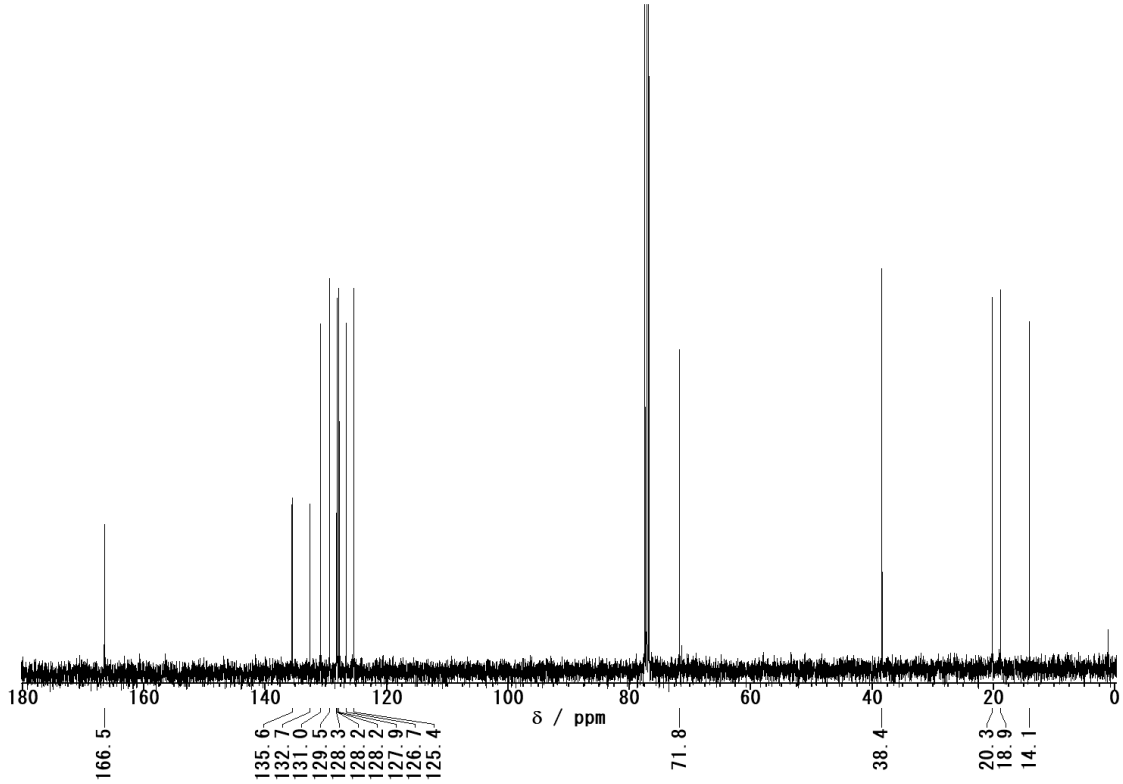


Figure S66. ^{13}C{^{1}H} NMR spectrum of **4b**.

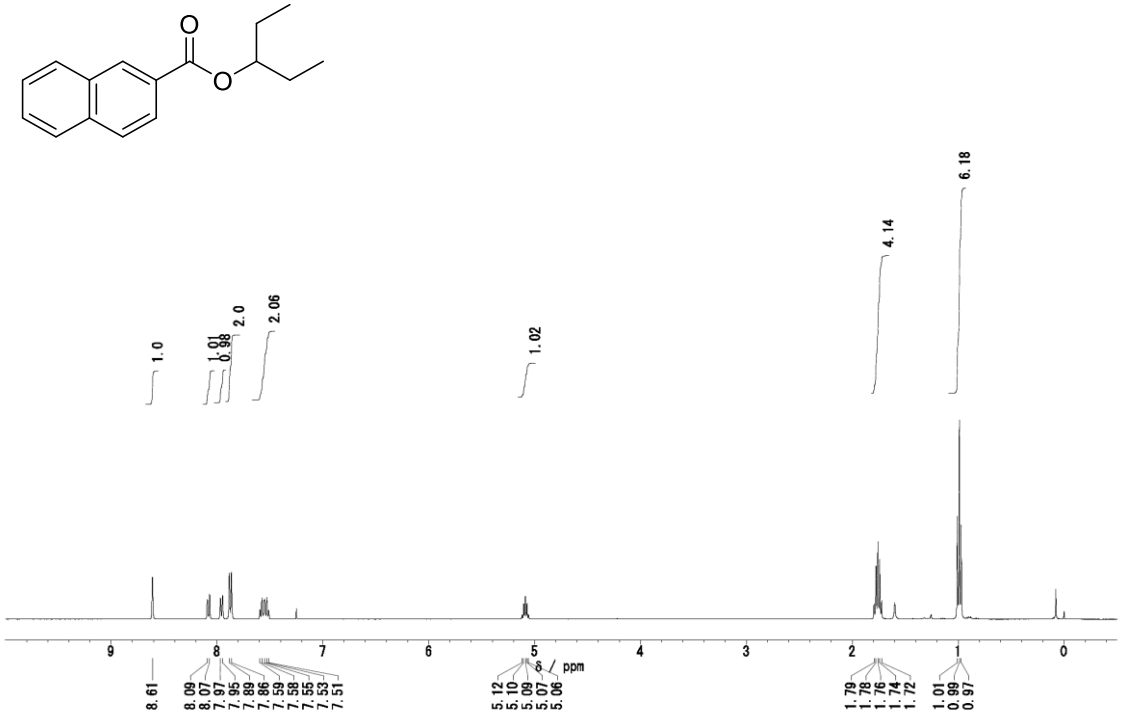


Figure S67. ^{1}H NMR spectrum of **4c**.

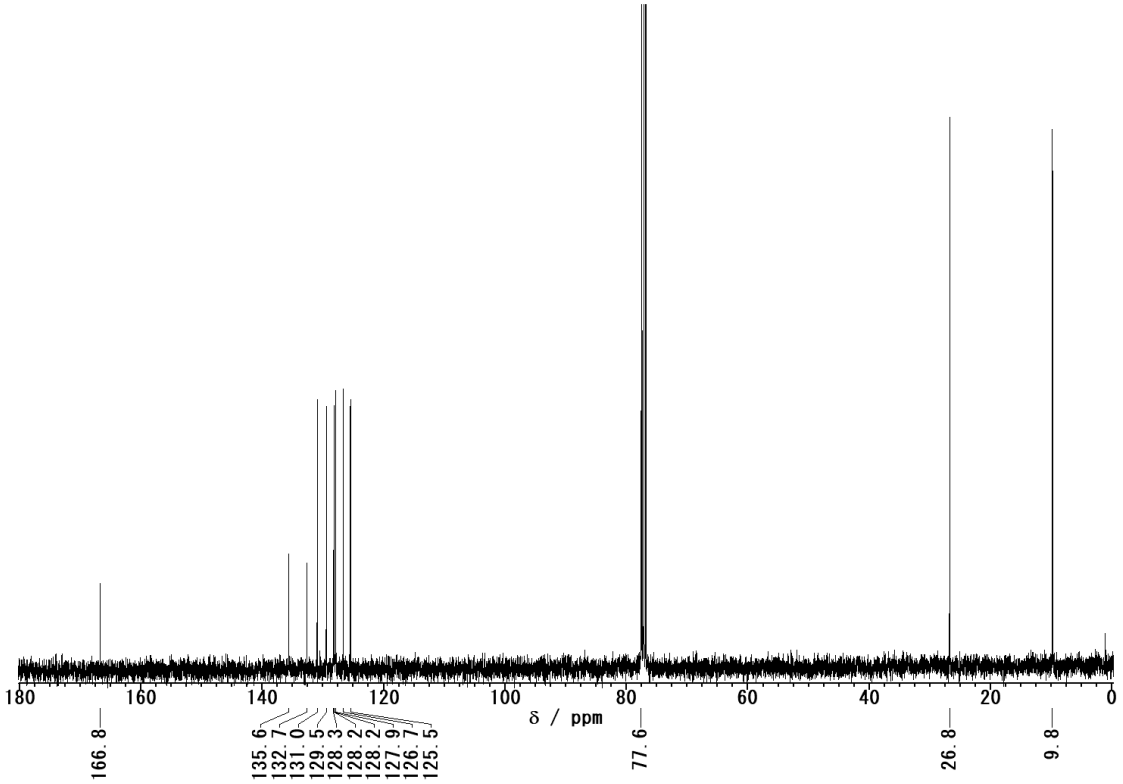


Figure S68. ^{13}C{^{1}H} NMR spectrum of **4c**.

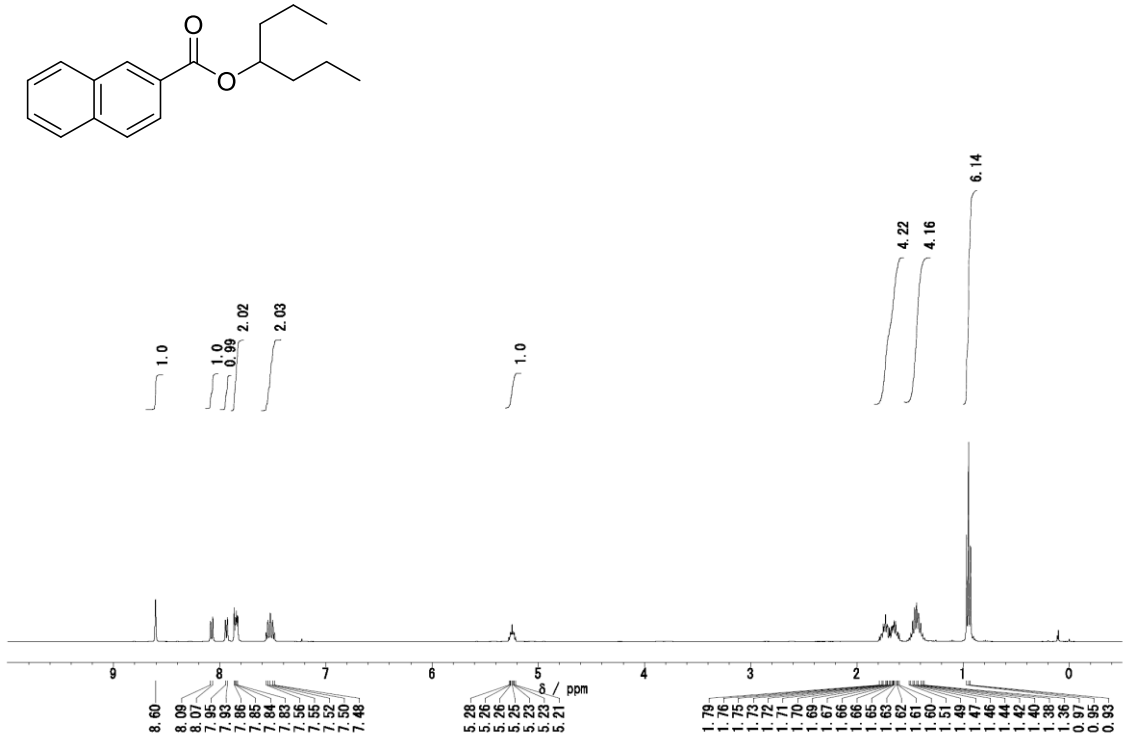


Figure S69. ^{1}H NMR spectrum of **4d**.

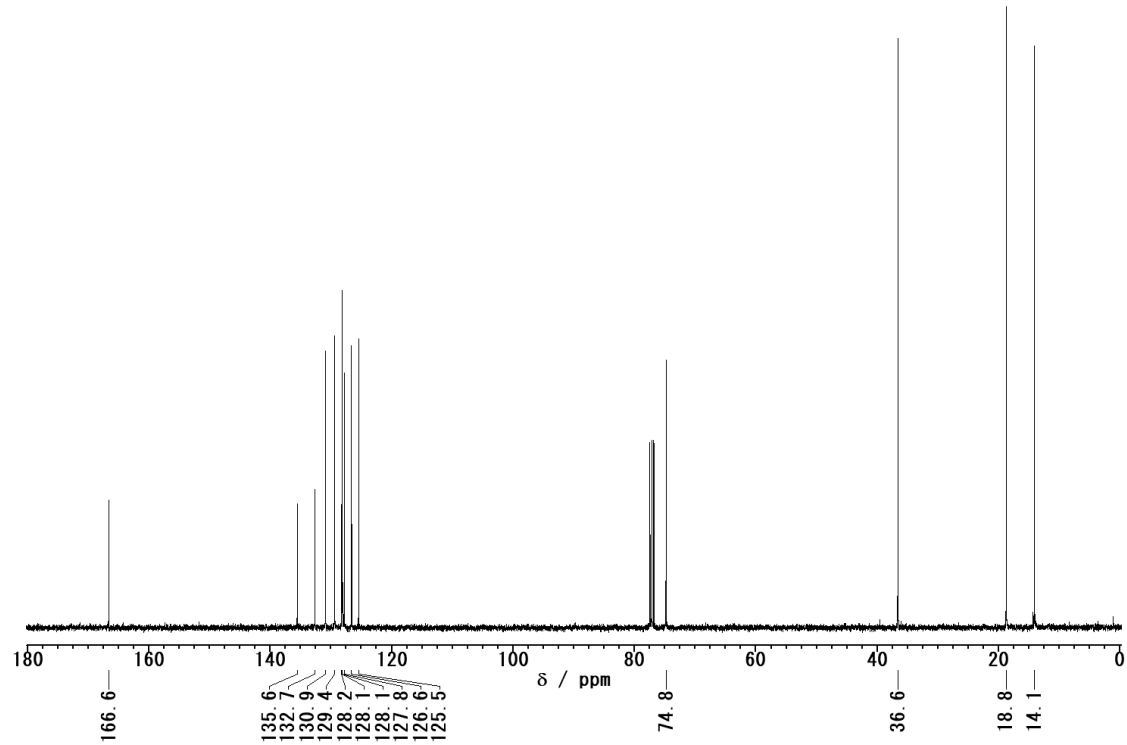


Figure S70. ^{13}C{^{1}H} NMR spectrum of **4d**.

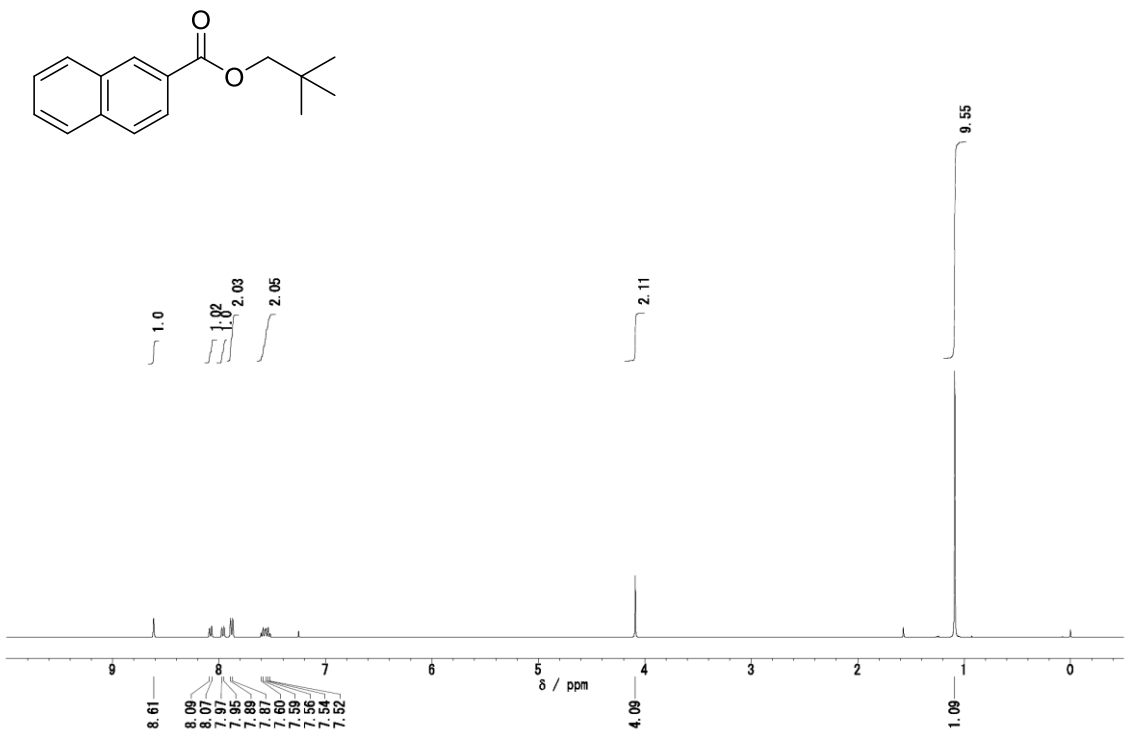


Figure S71. ^{1}H NMR spectrum of **4e**.

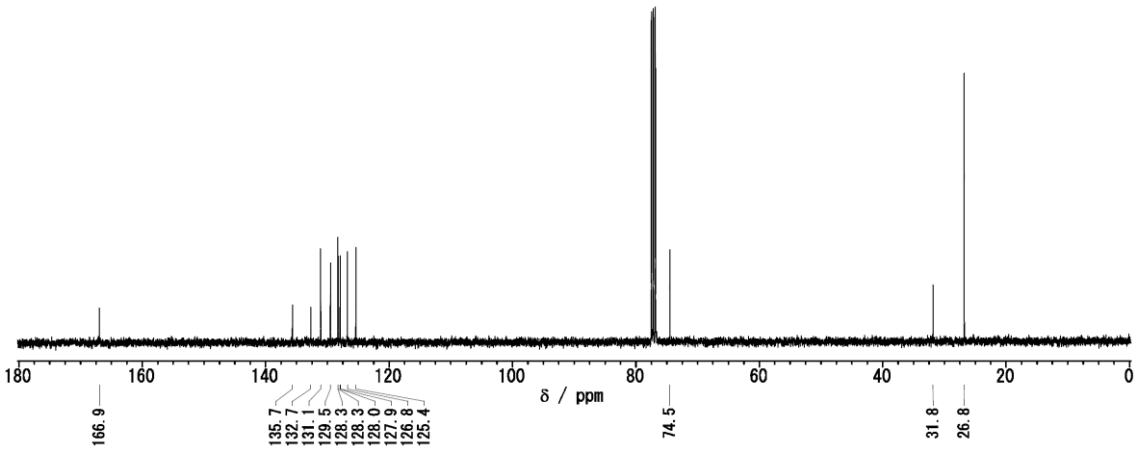


Figure S72. ^{13}C{^{1}H} NMR spectrum of **4e**.

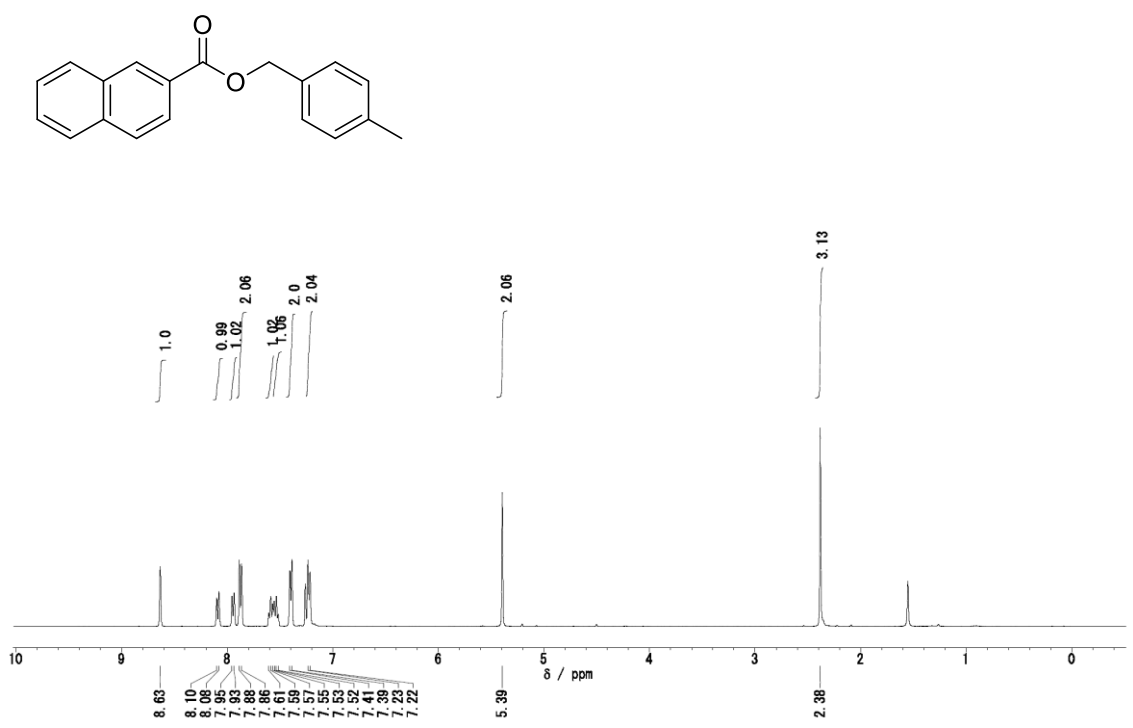


Figure S73. ^{1}H NMR spectrum of **4f**.

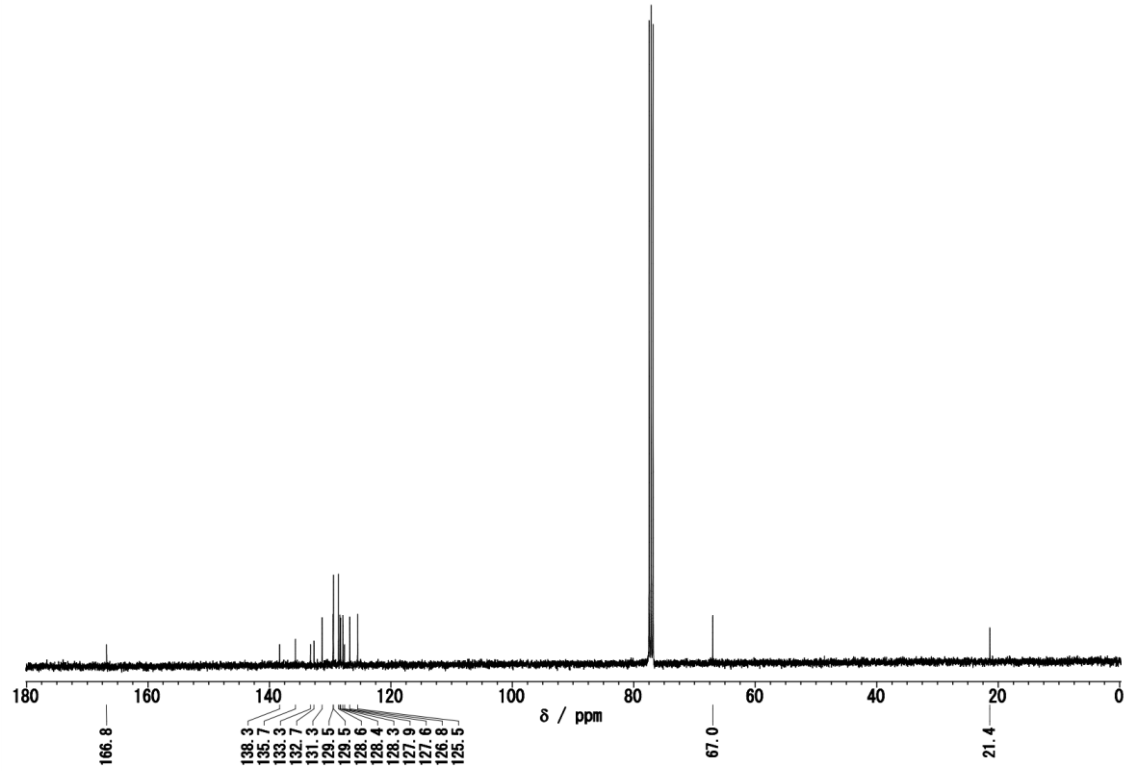


Figure S74. ^{13}C{^{1}H} NMR spectrum of **4f**.

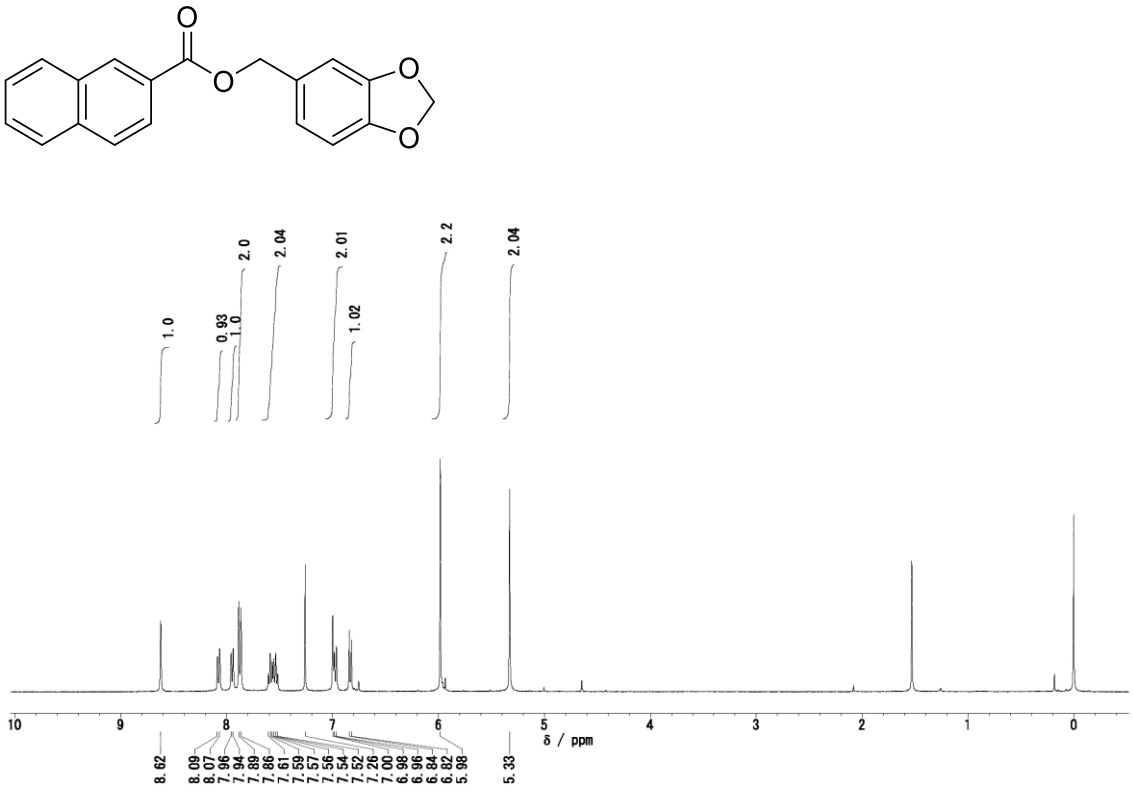


Figure S75. ^{1}H NMR spectrum of **4g**.

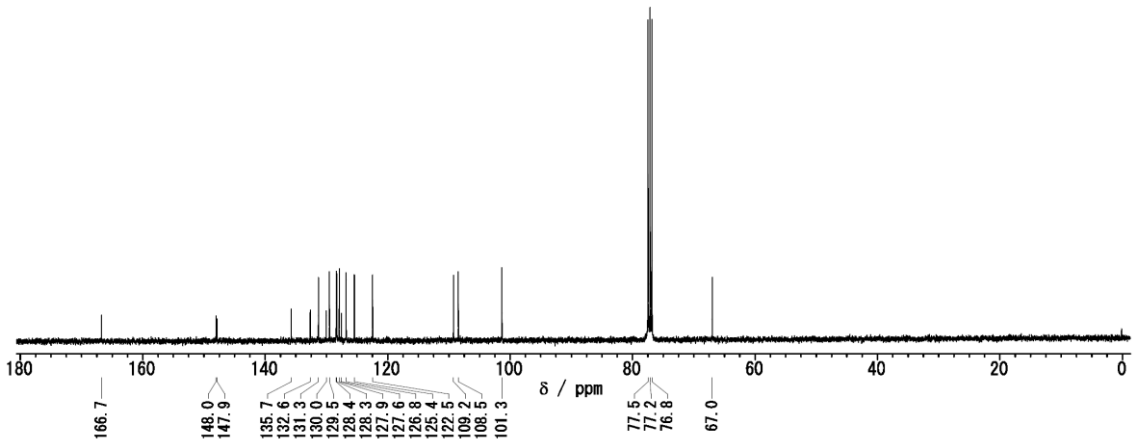


Figure S76. ^{13}C{^{1}H} NMR spectrum of **4g**.

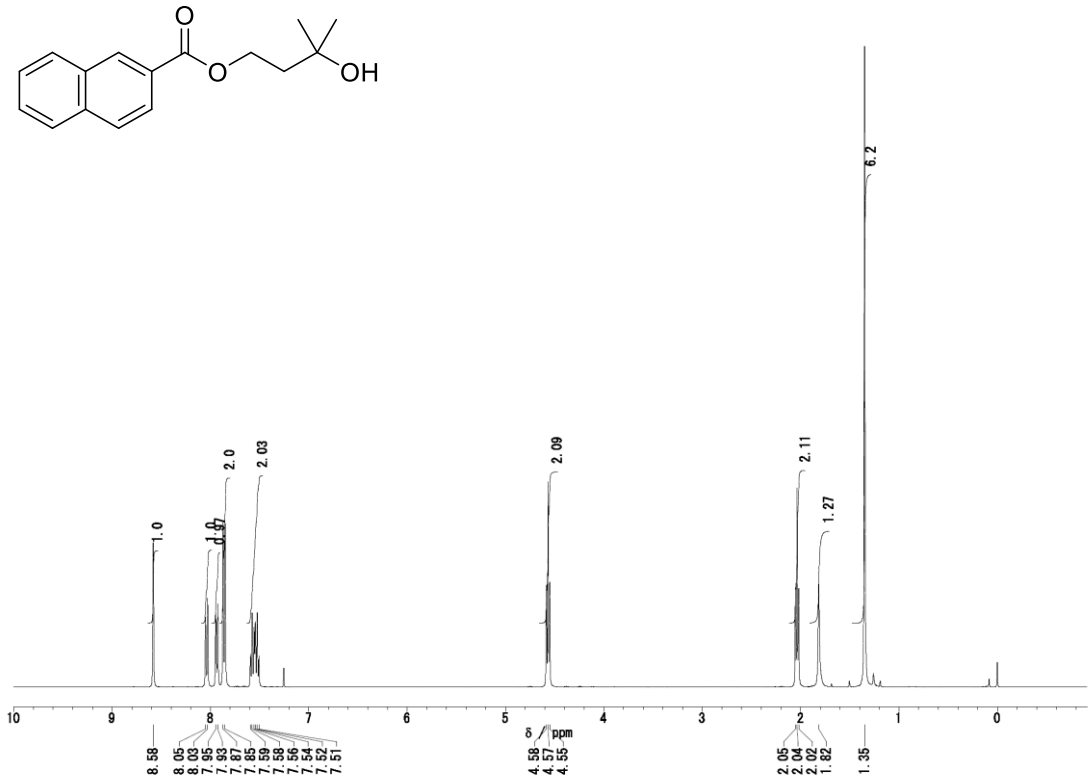


Figure S77. ^{1}H NMR spectrum of **4h.**

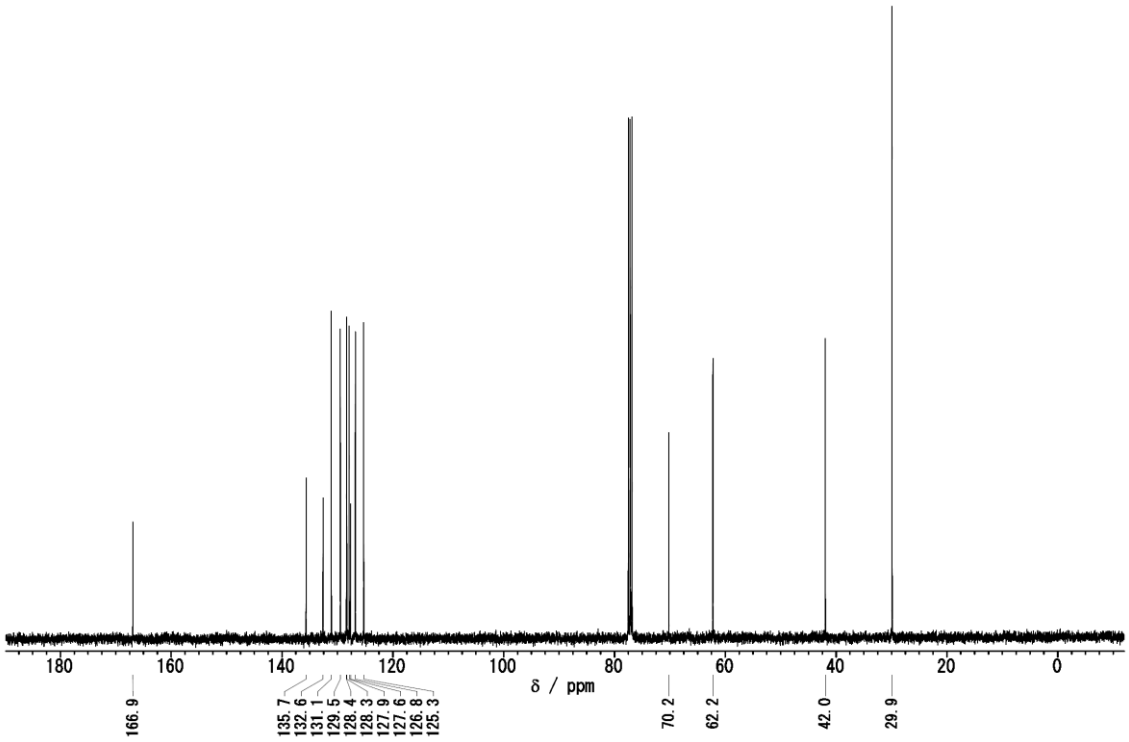


Figure S78. ^{1}H NMR spectrum of **4h.**

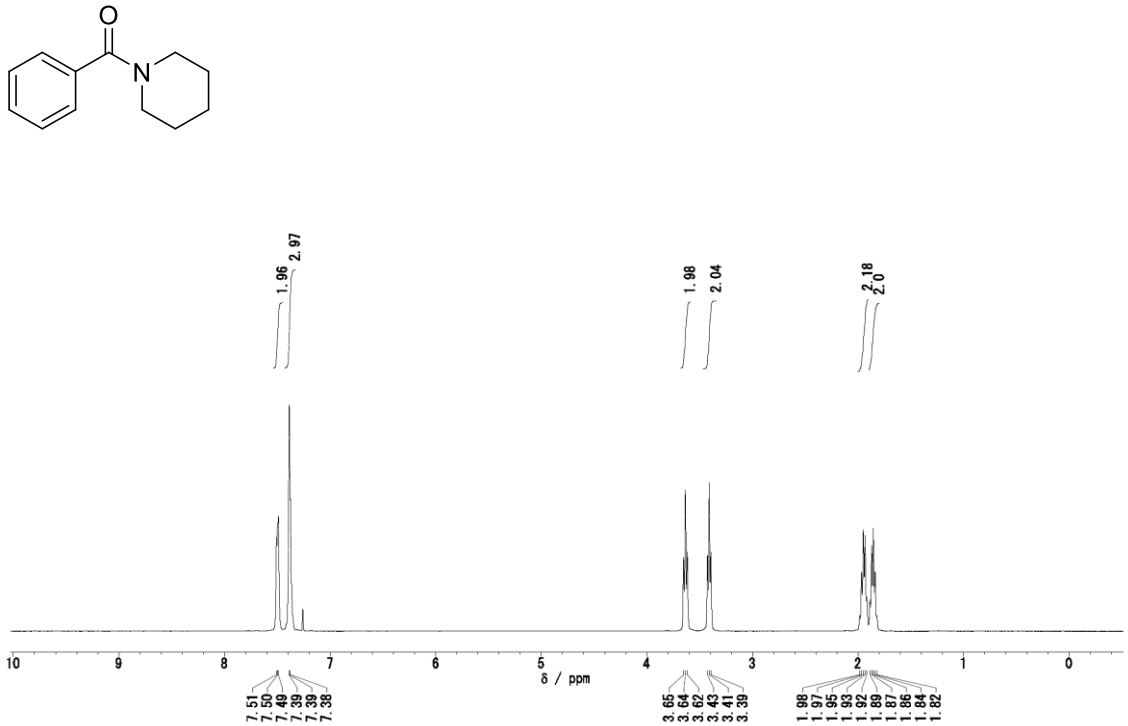


Figure S79. ^{1}H NMR spectrum of **5a**.

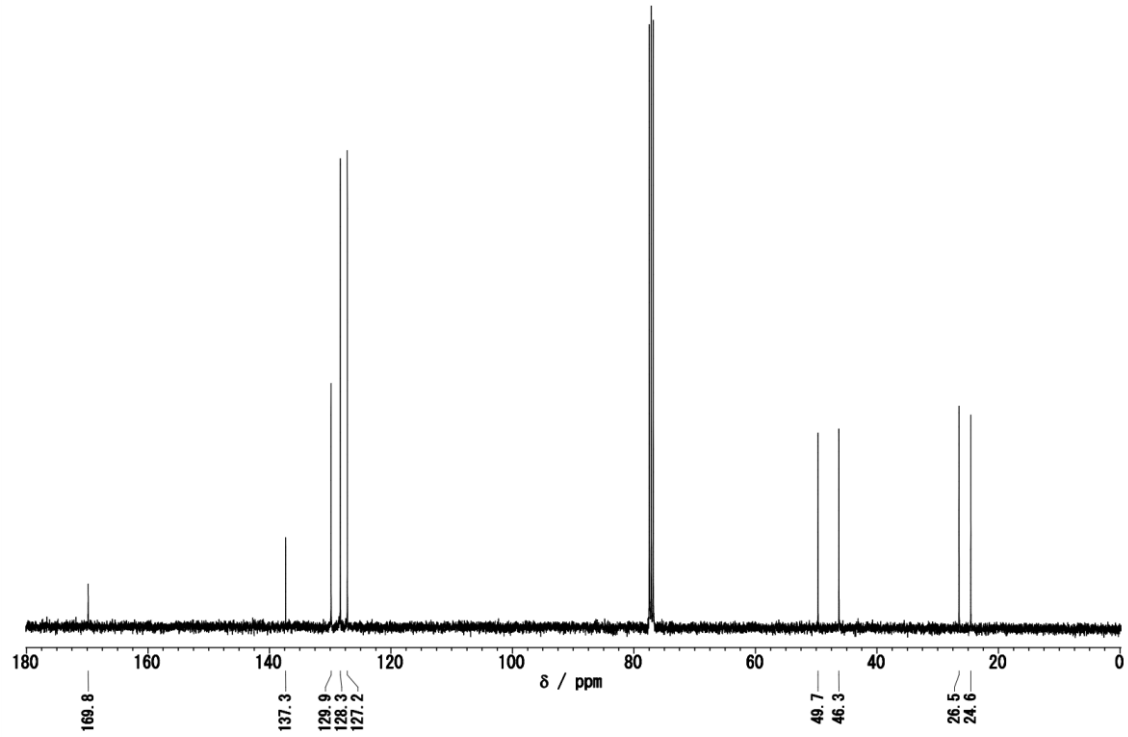


Figure S80. ^{13}C{^{1}H} NMR spectrum of **5a**.

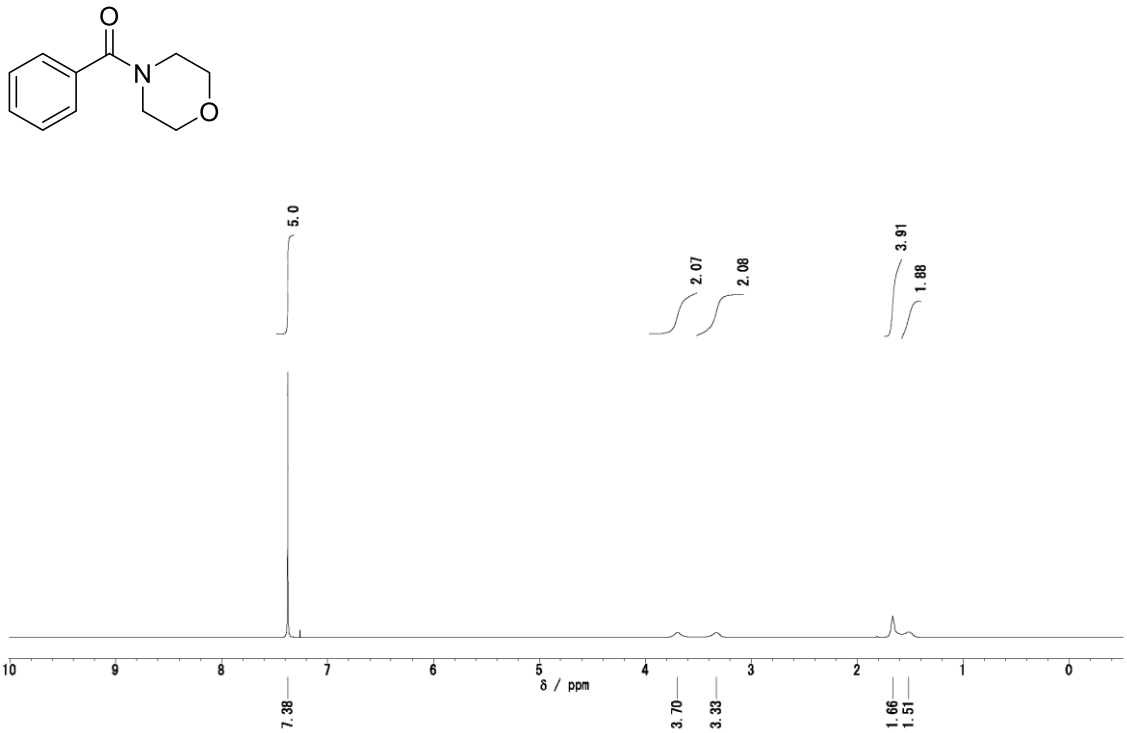


Figure S81. ^{1}H NMR spectrum of **5b**.

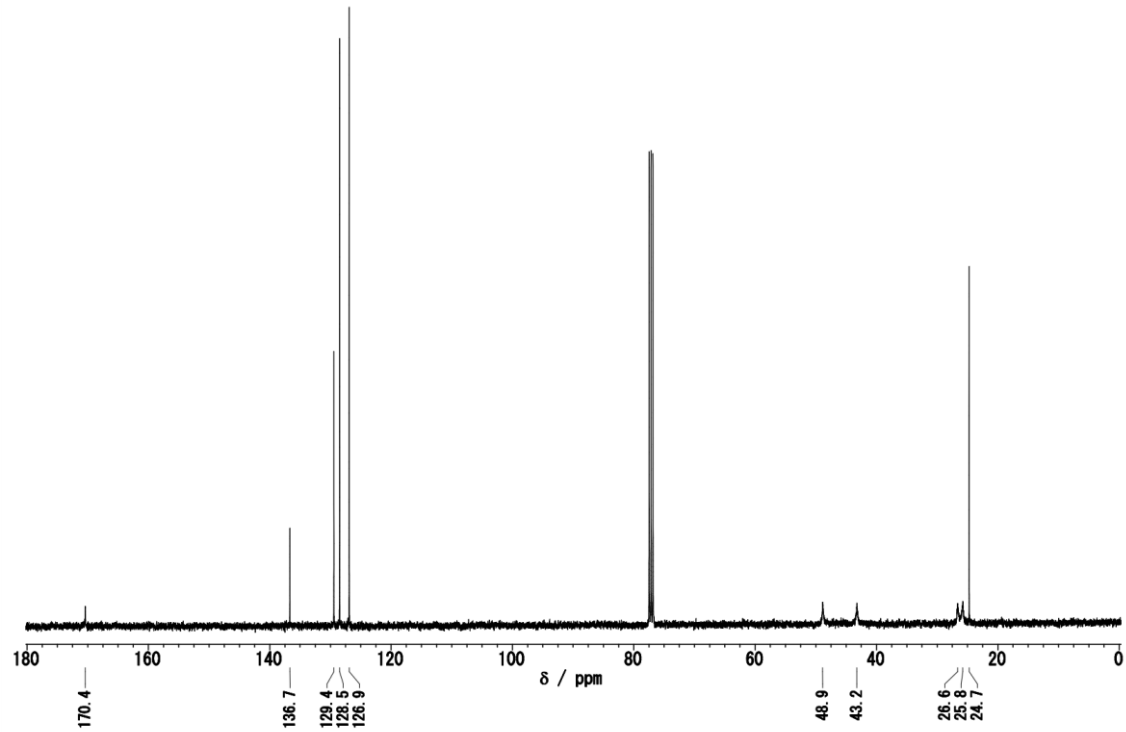


Figure S82. ^{13}C{^{1}H} NMR spectrum of **5b**.

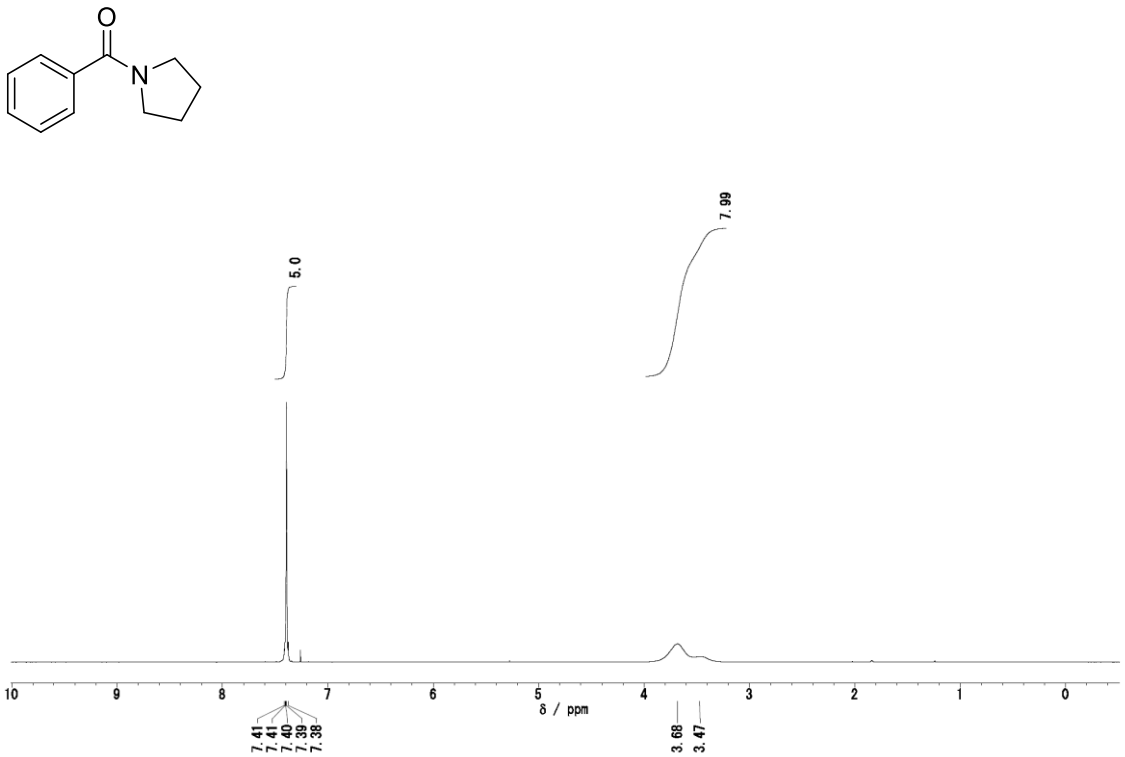


Figure S83. ^{1}H NMR spectrum of **5c**.

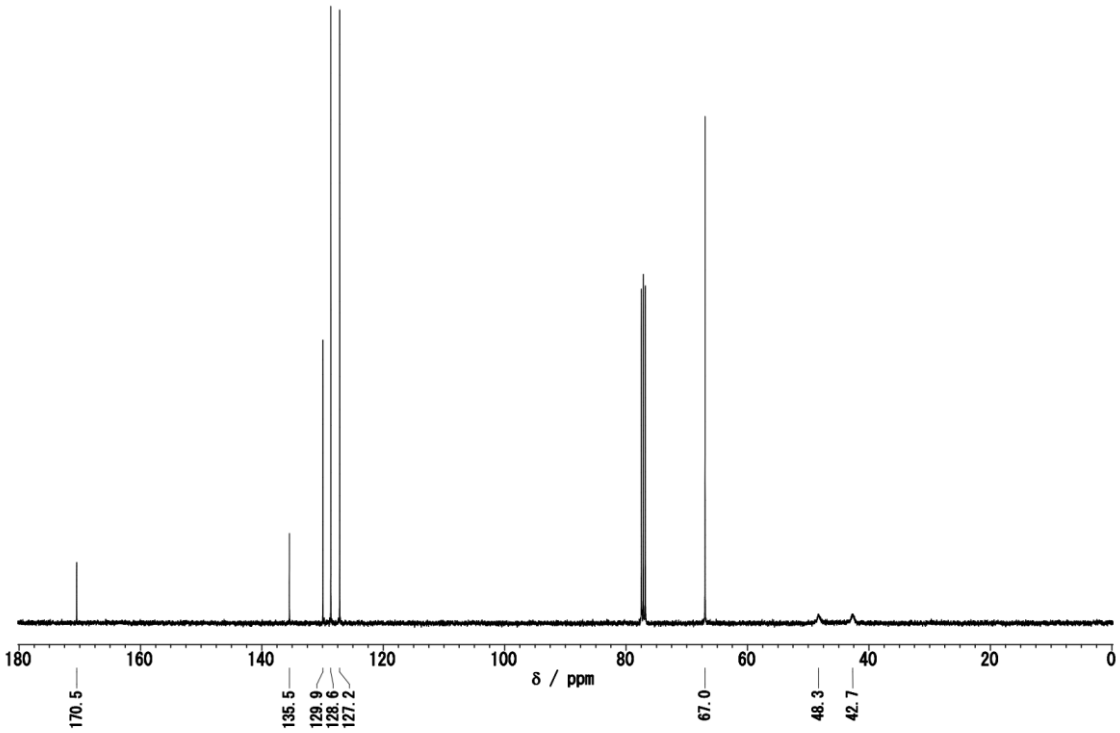


Figure S84. ^{13}C{^{1}H} NMR spectrum of **5c**.

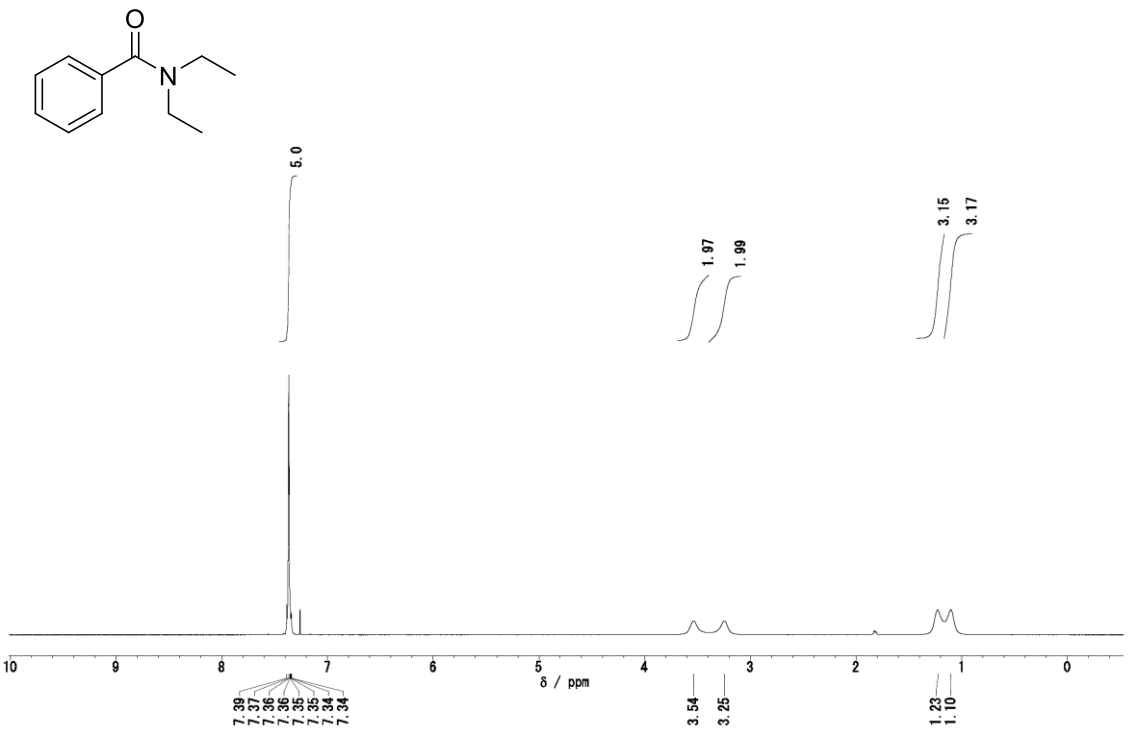


Figure S85. ^{1}H NMR spectrum of **5d**.

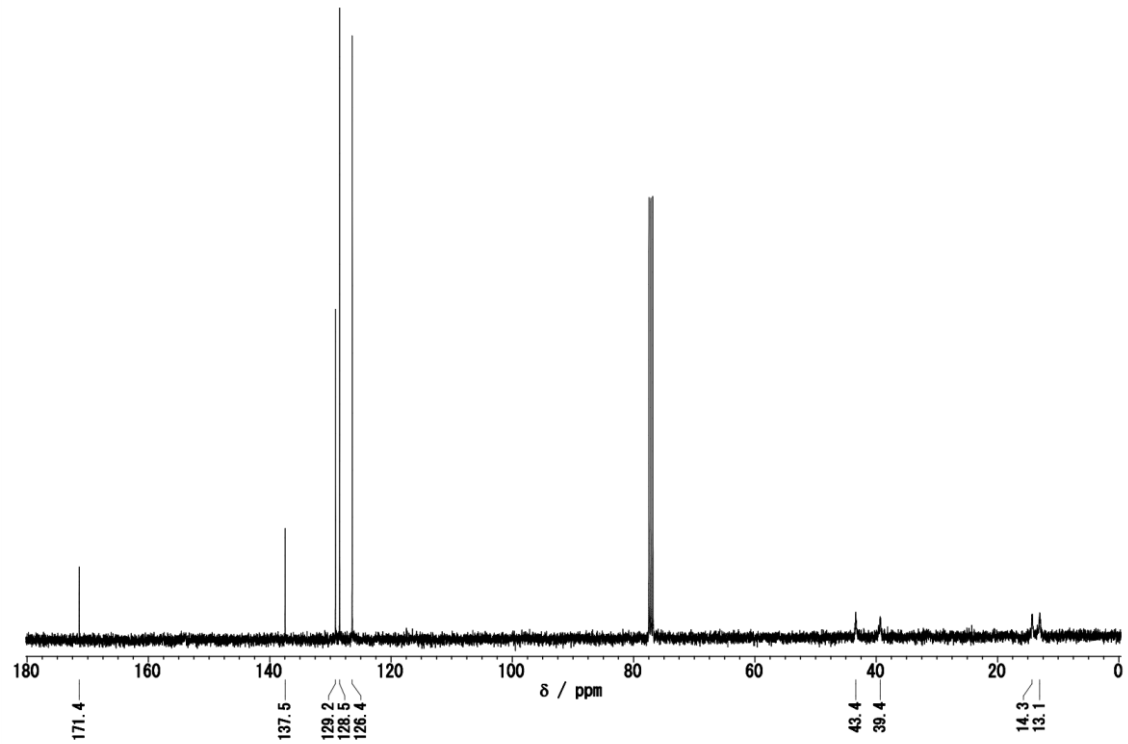


Figure S86. ^{13}C{^{1}H} NMR spectrum of **5d**.

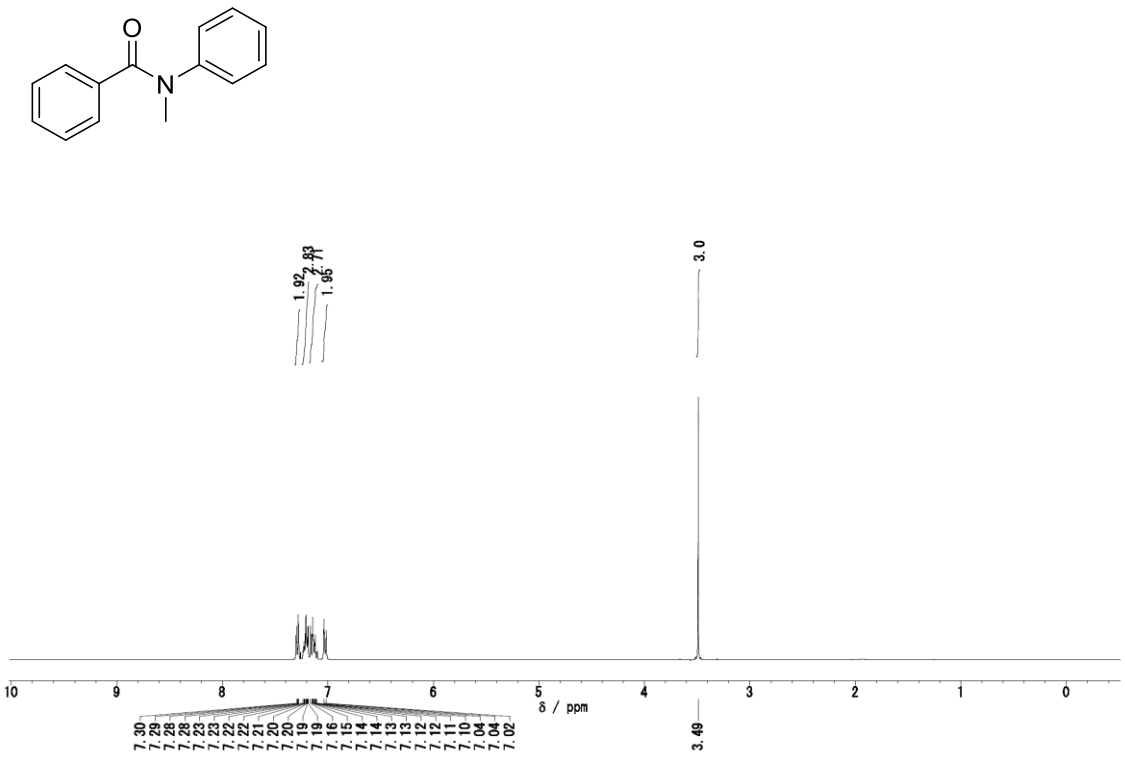


Figure S87. ^{1}H NMR spectrum of **5e**.

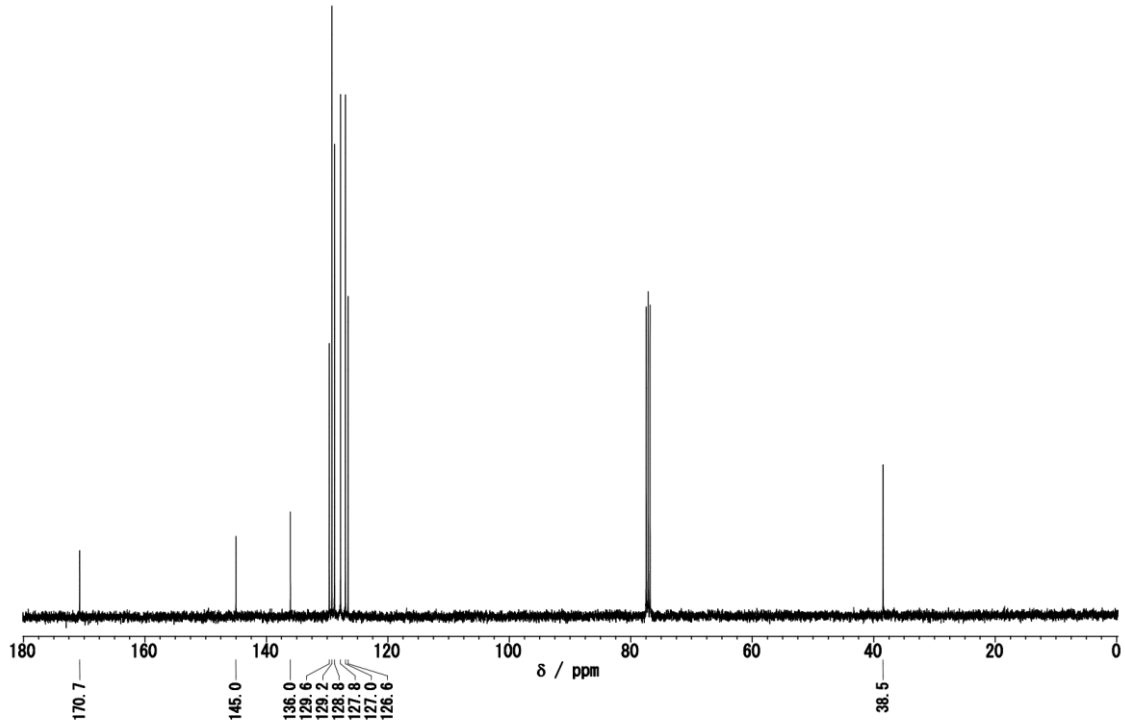


Figure S88. ^{13}C{^{1}H} NMR spectrum of **5e**.

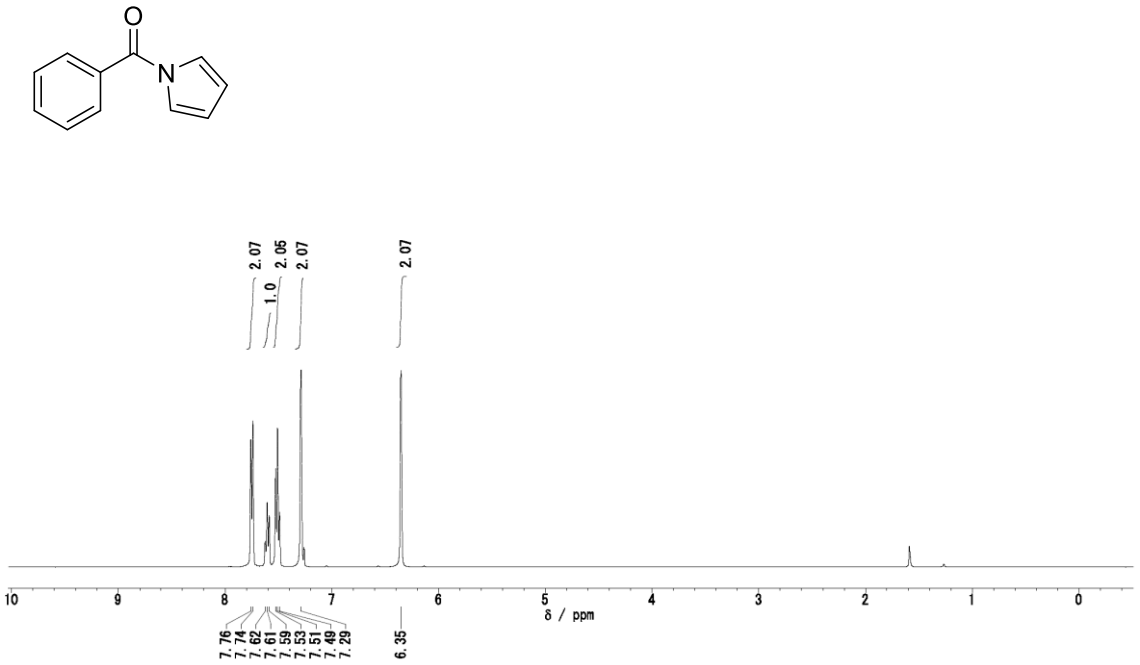


Figure S89. ^{1}H NMR spectrum of **5f**.

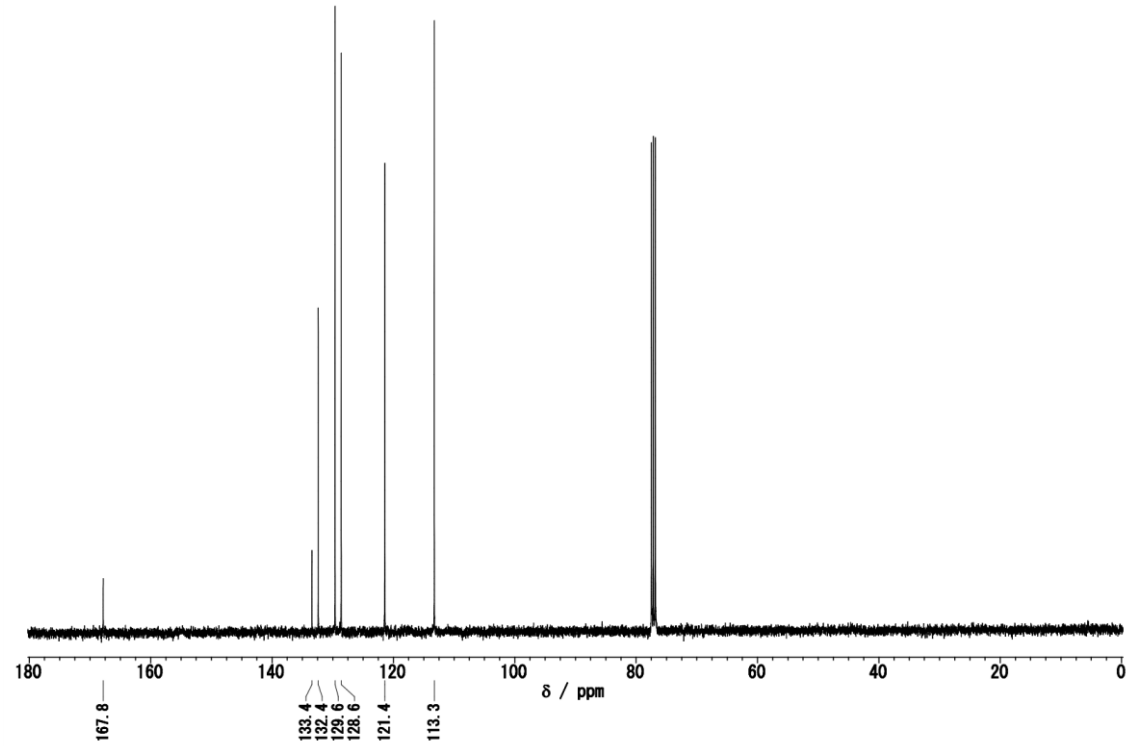


Figure S90. ^{13}C{^{1}H} NMR spectrum of **5f**.

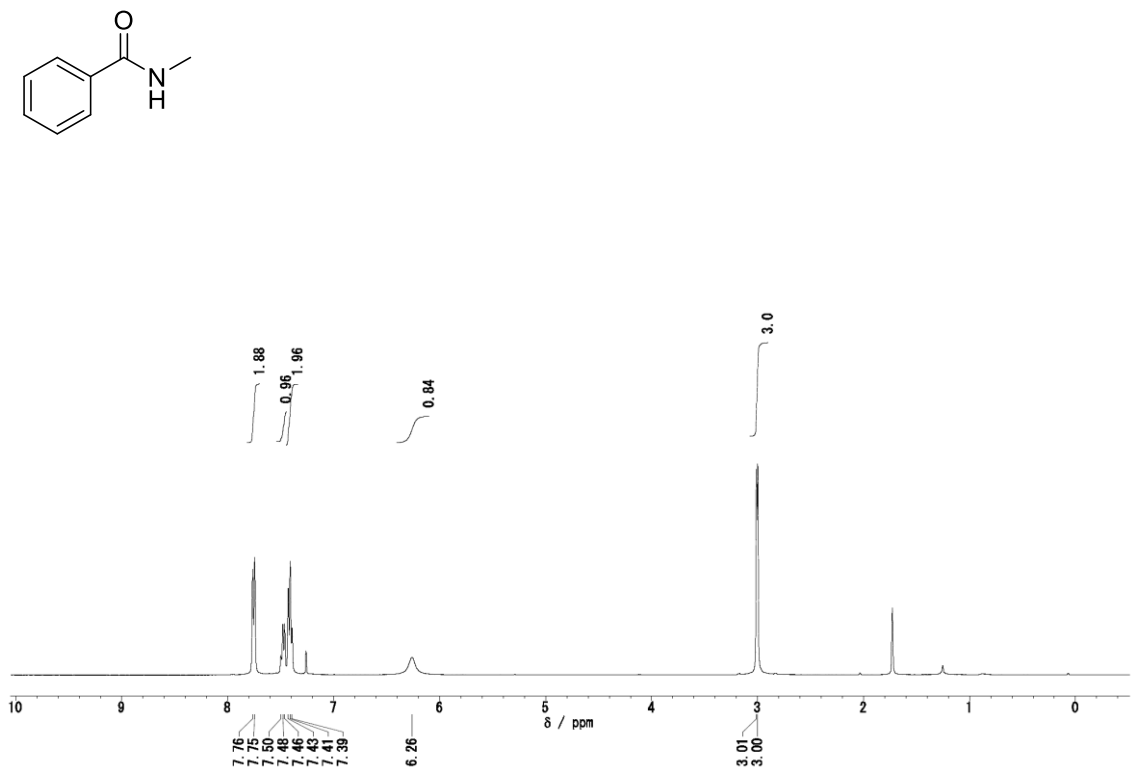


Figure S91. ^{1}H NMR spectrum of **5g**.

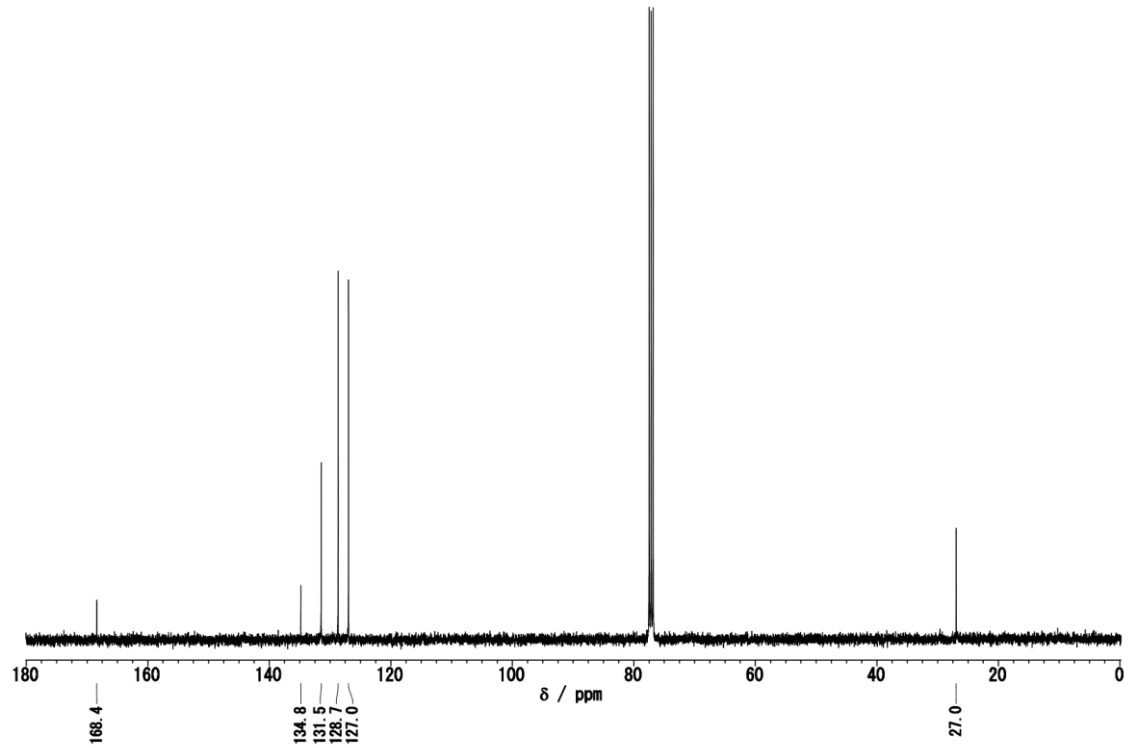


Figure 92. ^{13}C{^{1}H} NMR spectrum of **5g**.

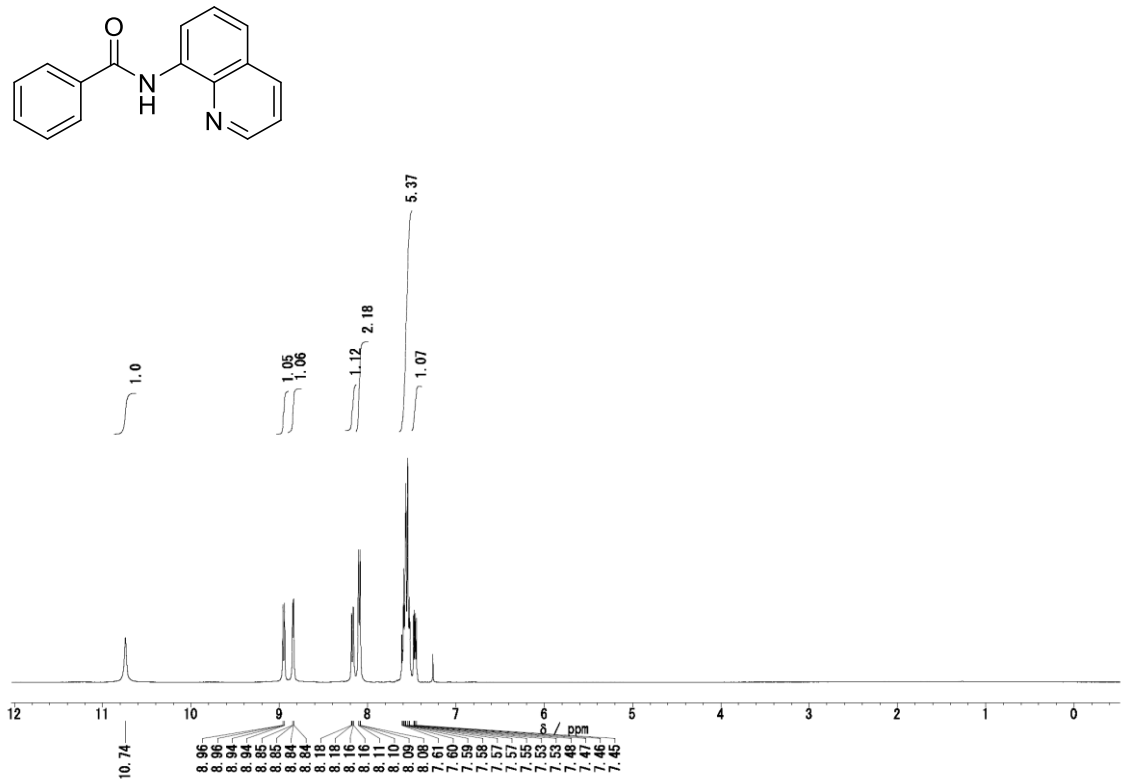


Figure S93. ^{1}H NMR spectrum of **5h**.

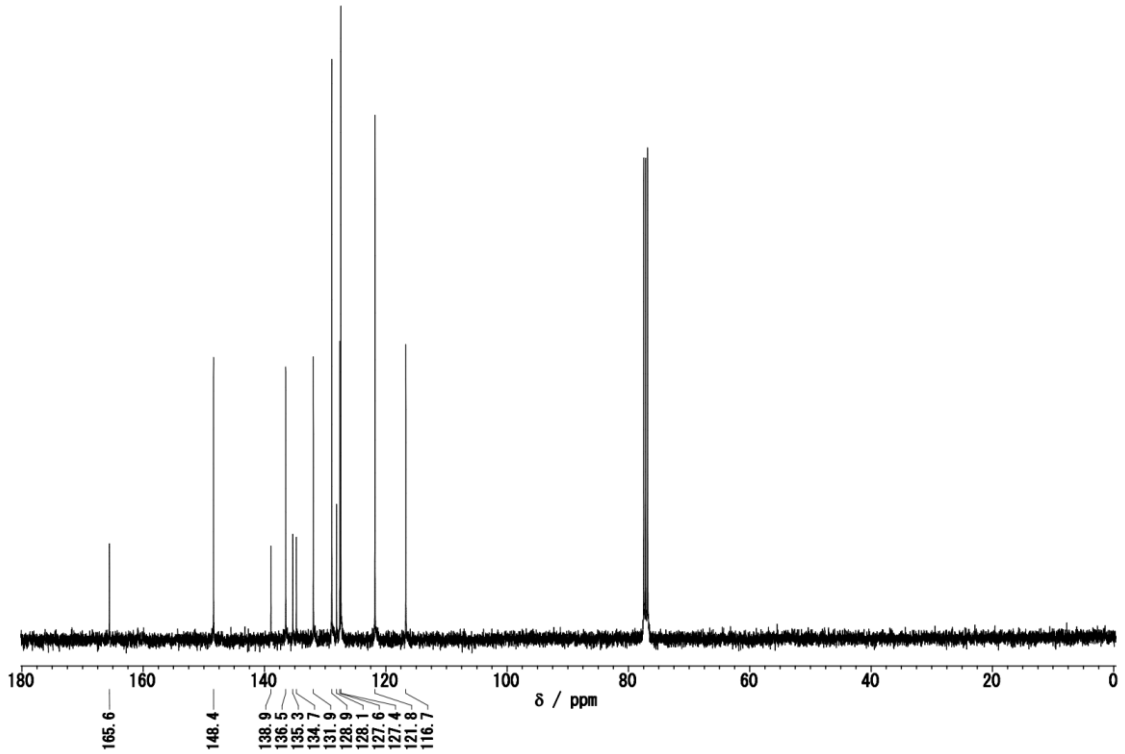


Figure S94. ^{13}C{^{1}H} NMR spectrum of **5h**.

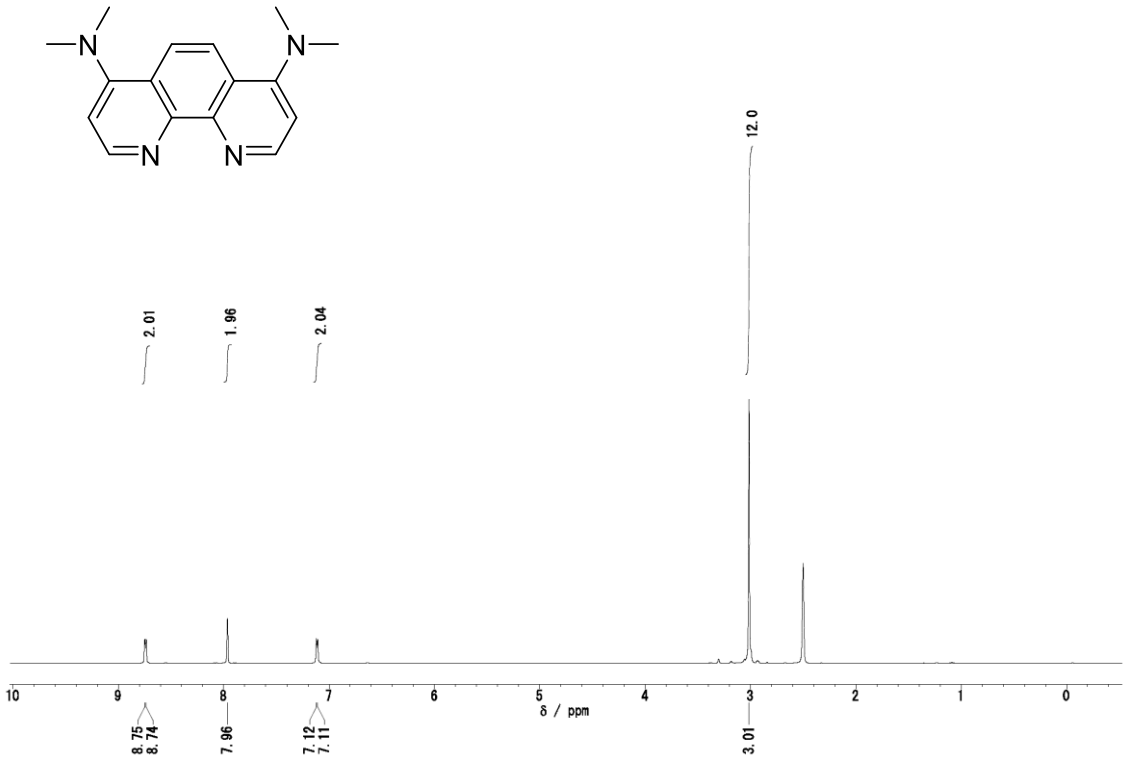


Figure S95. ^{1}H NMR spectrum of Me_2N-Phen.

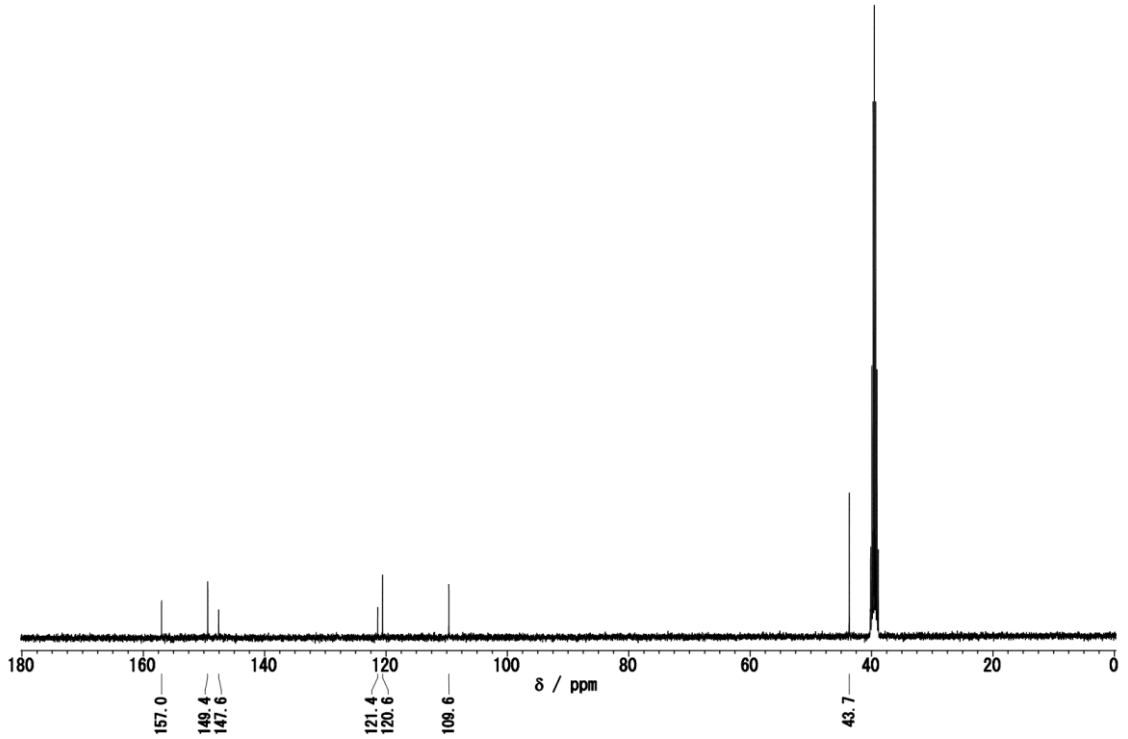


Figure S96. $^{13}C\{^{1}H\}$ NMR spectrum of Me_2N-Phen.