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Supplementary Information

Green and Selective Synthesis of *N*-Substituted Amides using Water Soluble Porphyrazinato Copper(II) Catalyst

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Experimental

General

The products were purified by column chromatography. The purity determinations of the products were accomplished by thin layer chromatography (TLC) on silica gel polygram STL G/UV 254 plates. The melting points of products were determined with an Electrothermal Type 9100 melting point apparatus. The Fourier transform infrared (FTIR) spectra were recorded on an Avatar 370 FTIR Therma Nicolet spectrometer. The nuclear magnetic resonance (NMR) spectra were provided on Brucker Avance 100 and 400 MHz instruments in $CDCl_3$. Elemental analyses were performed using an Elementar, Vario EL V5.19.1121 and Thermofinnigan Flash EA 1112 Series instruments. Mass spectra (MS) were recorded with a Shimadzu GC-MS-QP5050 and CH7AV arianmat Bremem instruments at 70 eV.

Preparation of *N*-benzyl-2-phenylacetamide from phenyl acetonitrile and benzylamine (**1**)

To a solution of phenylacetonitrile (0.1171 g, 1 mmol) in H_2O (1 mL), $[Cu(2,3\text{-tmtppa})](MeSO_4)_4$ (0.0054 g, 0.5 mol%) was added at room temperature with continuous stirring. Benzylamine (0.2143 g, 2 mmol) was added with stirring at room temperature. The temperature was raised up to 100 °C. The progress of the reaction was followed by TLC. Upon completion of the reaction, the reaction mixture was extracted with 3 × 5 mL CH_2Cl_2. The organic layer was dried with anhydrous Na_2SO_4 and concentrated under reduced pressure. The resultant crude viscous product was recrystallized from *n*-hexane:dichloromethane (4:1) obtaining 0.2207 g of pale yellow crystals (98% yield).

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Characterization data of spectra for representative compounds

N-Benzyl-2-phenylacetamide (**1**)

mp 118-120 °C (lit. 118-120 °C);[1] FTIR (KBr) ν_{max}/cm^{-1} 3289 (N–H), 3080, 3062, 3030, 2917, 1638 (C=O), 1551, 1493, 1453, 1028, 771, 694; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 7.34-7.24 (m, 9H, ArH), 7.17 (d, 1H, *J* 4.76 Hz, ArH), 6.06 (br, 1H, NH), 4.42 (d, 2H, *J* 5.6 Hz, $\underline{CH_2}NH$), 3.61 (s, 2H, $\underline{CH_2}CO$); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 170.6, 137.5, 135.0, 129.6, 129.6, 128.9, 128.8, 127.3, 126.7, 43.9, 42.9.

N-(2-Methoxybenzyl)-2-phenylacetamide (**2**)

mp 88-90 °C; FTIR (KBr) ν_{max}/cm^{-1} 3281(N–H), 3076, 3027, 2917, 1645 (C=O), 1603, 1550, 1491, 1455, 1242, 1028, 753, 699; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 7.35-7.21 (m, 7H, ArH), 6.91 (t, 1H, *J* 7.6 Hz, ArH), 6.83 (d, 1H, *J* 8.4 Hz, ArH), 6.05 (br, 1H, NH), 4.42 (d, 2H, *J* 5.6 Hz, $\underline{CH_2}NH$), 3.69 (s, 3H, $O\underline{CH_3}$), 3.61 (s, 2H, $\underline{CH_2}CO$); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 170.6, 157.5, 135.0, 129.6, 129.6, 128.9, 128.8, 127.3, 126.0, 120.7, 110.2, 55.1 , 43.9, 39.9; MS (EI) *m/z* (%) 255 [M^+], 254 (100) [$M^+ - H$], 253 (100) [$M^+ - 2H$], 136 [$M^+ - C_7H_8O$], 121 (100) [$M^+ - C_8H_8NO$], 91 [$C_7H_7^+$]; CHN ($C_{16}H_{17}NO_2$) calc. (%) C (75.27), H (6.71), N (5.49); found (%) C (74.99), H (6.78), N (5.52).

N-Butyl-2-phenylacetamide (**3**)

mp 35-37 °C (Lit. 37-38 °C);[2] FTIR (Neat) ν_{max}/cm^{-1} 3354 (N–H), 3178, 3080, 3064, 3027, 2802, 1638 (C=O), 1491, 1416, 1286, 1180, 747, 698; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 7.40-7.29 (m, 5H, ArH), 5.61 (br, 1H, NH), 3.56 (s, 2H, $\underline{CH_2}CO$), 3.18 (q, 2H, *J* 6.8 Hz, $NH\underline{CH_2}CH_2$), 1.38 (qn, 2H, *J* 6.8 Hz, $CH_2\underline{CH_2}Et$), 1.23 (sx, 2H, *J* 7.2 Hz, $CH_2\underline{CH_2}CH_3$), 0.85 (t, 3H, *J* 7.2 Hz, CH_2CH_3); ^{13}C NMR

(100 MHz, $CDCl_3$) δ/ppm 173.5, 134.9, 129.5, 129.1, 127.5, 43.6, 39.5, 31.2, 19.7, 13.4.

N-(3-Ethoxypropyl)-2-phenylacetamide (**4**)

mp 136-138 °C; FTIR (KBr) ν_{max}/cm^{-1} 3352 (N–H), 3180, 3062, 3028, 2974, 2867, 1647 (C=O), 1550, 1496, 1453, 1416, 1289, 1114, 747, 700; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 7.41-7.29 (m, 5H, ArH),5.85 (br, 1H, NH), 3.81 (s, 2H, CH_2CO), 3.64-3.59 (m, 4H, NH$\underline{CH_2}CH_2\underline{CH_2}O$), 3.542 (q, 2H, *J* 7.2 Hz, OCH_2CH_3), 1.95 (qn, 2H, *J* 6.4 Hz, $CH_2\underline{CH_2}CH_2O$), 1.29 (t, 3H, *J* 7.2 Hz, $CH_2\underline{CH_3}$); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 171.1, 135.1, 129.5, 129.1, 127.5, 69.4, 66.3, 41.8, 38.5, 29, 15.1; MS (EI) *m/z* (%) 221 [M^+], 219 [$M^+ - 2H$], 191 [$M^+ - C_2H_5$], 134 (100) [$M^+ - C_5H_{11}O$], 91 [$C_7H_7^+$]; CHN ($C_{13}H_{19}NO_2$) calc. (%) C (70.56), H (8.65), N (6.33); found (%) C (69.94), H (8.26), N (6.24).

N-Benzyl-2-(4-chlorophenyl)acetamide (**5**)

mp 150-151 °C (Lit. 151-153 °C);[3] FTIR (KBr) ν_{max}/cm^{-1} 3279 (N–H), 3056, 3027, 2913, 2872, 1644 (C=O), 1594, 1542, 1492, 1453, 1417, 1086, 1013, 800, 742, 692: ^{1}H NMR (100 MHz, $CDCl_3$) δ/ppm 7.52–6.97 (m, 9H, ArH), 5.74 (br, 1H, NH), 4.44 (d, 2H, *J* 6 Hz, $\underline{CH_2}NH$), 3.56 (s, 2H, $\underline{CH_2}CO$).

N-Butyl-2-(4-chlorophenyl)acetamide (**6**)

mp 80-81 °C; FTIR (KBr) ν_{max}/cm^{-1} 3301 (N–H), 3066, 2959, 2931, 2872, 1649 (C=O), 1595, 1543, 1492, 1417, 1089, 804, 740; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 7.36 (d, 2H, *J* 8 Hz, ArH), 7.21(d, 2H, *J* 8.4 Hz, ArH), 5.47 (br, 1H, NH), 3.53 (s, 2H, *J* 6 Hz, $\underline{CH_2}CO$), 3.22 (q, 2H, *J* 6.8 Hz, NH$\underline{CH_2}CH_2$), 1.43 (qn, 2H, *J* 6.8 Hz, $CH_2\underline{CH_2}Et$), 1.29 (sx, 2H, *J* 7.2 Hz, $CH_2\underline{CH_2}CH_3$), 0.90 (t, 3H, *J* 7.2 Hz, $CH_2\underline{CH_3}$); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 170.3, 133.5, 133.3, 130.8, 129.1, 43.1, 39.5, 31.6, 20.0, 13.7; MS (EI) *m/z* (%) 227 [$M^+ + 2$], 225 [M^+], 190 [$M^+ - Cl$], 125 [$M^+ - C_5H_{10}NO$], 100 [$M^+ - C_7H_6Cl$], 57 (100) [$C_4H_9^+$]; CHN ($C_{12}H_{16}ClNO$) calc. (%) C (63.85), H (7.14), N (6.21); found (%) C (64.32), H (7.49), N (6.63).

N-Benzylbenzamide (**7**)

mp 89-90 °C (Lit. 90-91 °C);[4] FTIR (KBr) ν_{max}/cm^{-1} 3342(N–H), 3088, 3063, 3029, 2861,1643(C=O), 1603, 1540, 1494, 1453,1361, 1207, 1071, 1027, 736, 697; ^{1}H NMR (100 MHz, $CDCl_3$) δ/ppm 7.92-7.18 (m, 10H, ArH), 6.46 (br, 1H, NH), 4.68 (d, 2H, *J* 5.56 Hz, $\underline{CH_2}NH$).

N-Benzylpicolinamide (**8**)

mp 84-85 °C (Lit. 85 °C);[5] FTIR (KBr) ν_{max}/cm^{-1} 3305 (N–H), 3080, 3031, 2920, 1660(C=O), 1527, 1457, 1433, 1355, 1251, 1081, 999, 744, 702, 689; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 8.55 (d, 1H, Pyr), 8.42 (br, 1H, NH), 8.26 (d, 1H, Pyr), 7.88 (td, 1H, J_1 7.6 Hz, J_2 1.2 Hz, Pyr), 7.46-7.43 (m, 1H, Pyr), 7.41-7.29 (m, 5 H, ArH) 4.70 (d, 2H, *J* 6.0 Hz, $\underline{CH_2}NH$); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 164.3, 149.8, 148.1, 138.2, 137.4, 128.7, 127.9, 127.5, 126.3, 122.4, 43.5; CHN ($C_{13}H_{12}N_2O$) calc. (%) C (73.56), H (5.7), N (13.2); found (%) C (73.15), H (5.7), N (3.16).

N-(2-Methoxybenzyl)picolinamide (**9**)

mp 89-91°C; FTIR (KBr) ν_{max}/cm^{-1} 3396 (N–H), 3072, 2966, 2835, 1665 (C=O), 1593, 1524, 1493,1462, 1437,1247, 1119, 997, 816, 755, 616; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 8.56 (d, 1H, *J* 4.4 Hz, Pyr), 8.49 (br, 1H, NH), 8.24 (d, 1H, *J* 8 Hz, Pyr), 7.82 (td, 1H, J_1 7.6 Hz, J_2 1.6 Hz, Pyr), 7.44-7.41 (m, 1H, Pyr), 7.39-7.27 (m, 2H, ArH), 6.97-6.91 (m, 2H, ArH), 4.70 (d, 2H, *J* 6 Hz, $\underline{CH_2}NH$), 3.92 (s, 3H,CH_3); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 164.1, 157.7, 150.2, 148.1, 137.3, 129.6, 128.8, 126.3, 126.0, 122.4, 120.6, 110.3, 55.4, 39.1.

N-(2-Chlorobenzyl)picolinamide (**10**)

mp 84-85 °C (Lit. 84-85 °C);[6] FTIR (KBr) ν_{max}/cm^{-1} 3321 (N–H), 3076, 3056, 2913, 1663(C=O), 1593, 1564, 1528, 1464, 1444, 1432, 1286, 1041, 1004, 745, 686; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 8.56 (d, *J* 4.4 Hz, 1H, Pyr), 8.53 (br, 1H, NH), 8.23 (d, 1H, *J* 7.6 Hz, Pyr), 7.86 (td, 1H, J_1 7.6 Hz, J_2 1.2 Hz, Pyr), 7.48-7.24 (m, 5H, Pyr, ArH), 4.78 (d, 2H, *J* 6 Hz, $\underline{CH_2}NH$); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 164.4, 149.7, 148.2, 137.4, 135.7, 133.7, 130.0, 129.6, 128.9, 127.1, 126.3, 122.4, 41.4; CHN ($C_{13}H_{11}ClN_2O$) calc. (%) C (63.29), H (4.49), N (11.36); found (%). C (62.86), H (4.22), N (10.93).

N-(3-Ethoxypropyl)picolinamide (**11**)

Oil; FTIR (neat) ν_{max}/cm^{-1} 3350 (N–H), 3060, 2974, 2930, 2867, 2798, 1675 (C=O), 1569, 1527, 1464, 1434, 1377, 1282, 1112, 997, 824, 751, 691; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 8.56 (*d*, 1H, *J* 4 Hz, Pyr), 8.50 (br, 1H, NH), 8.21 (d, 1H, *J* 8 Hz, Pyr), 7.86 (td, 1H, J_1 7.6 Hz, J_2 1.6 Hz, Pyr), 7.44 -7.41 (m, 1H, Pyr), 3.64-3.59 (m, 2H, $CH_2\underline{CH_2}OEt$, 2H, $O\underline{CH_2}CH_3$), 3.54 (q, 2H, *J* 7.2 Hz, NH$\underline{CH_2}CH_2$), 1.93 (qn, 2H, *J* 6.4 Hz, $CH_2\underline{CH_2}CH_2$), 1.28 (t, 3H, *J* 6.8 Hz, $OCH_2\underline{CH_3}$); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 164.3, 150.9, 148.1, 137.3, 126.00, 122.1, 69.3, 66.5, 37.8, 29.3, 15.2; MS (EI) *m/z* (%) 208 [M^+], 179 [$M^+ - C_2H_5$], 163 [$M^+ - C_2H_5O$], 149 [$M^+ - C_3H_7O$], 135 [$M^+ - C_4H_9O$], 106 [$C_6H_4NO^+$], 78 [$C_5H_4N^+$]; CHN ($C_{11}H_{16}N_2O_2$) calc. (%) C (63.44), H (7.74), N (13.45). found (%) C (63.04), H (7.65), N (13.67).

N-Cyclohexylpicolinamide (**12**)

mp 50-51 °C; FTIR (KBr) ν_{max}/cm^{-1} 3345 (N–H), 3064, 2931, 2850, 2965, 1677 (C=O), 1568, 1525, 1462, 1425, 1323, 1278, 1164, 1084, 996, 976, 891, 821, 753, 651, 619; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 8.56 (d, 1H, *J* 4.4 Hz, Pyr), 8.22 (d, 1H, *J* 7.6 Hz, Pyr), 7.98 (br, 1H, NH), 7.85 (td, 1H, J_1 7.8 Hz, J_2 2 Hz, Pyr), 7.44-7.42 (m, 1H, Pyr), 4.04-3.94 (m, 1H, CHNH), 2.05-2.01 (m, 2H, CH_2CH_2CH), 1.82-1.76 (m, 2H, CH_2CH_2CH), 1.70-1.20 (m, 6H, $CH_2CH_2CH_2$); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 163.3, 150.3, 147.9, 137.3, 126.0, 122.2, 48.2, 33.1, 30.4, 25.6, 24.9, 23.0.

N-Butylpicolinamide (**13**)

Oil; FTIR (Neat) ν_{max}/cm^{-1} 3391 (N–H), 3056, 2958, 2930, 2871, 1670 (C=O), 1590, 1568, 1527, 1464, 1434, 1275, 1261, 997, 765, 749, 691; ^{1}H NMR (100 MHz, $CDCl_3$) δ/ppm 8.54-8.43 (d, 1H, *J* 3.5 Hz, Pyr), 8.25-8.15 (d, 1H, *J* 7.5 z, Pyr), 8.05 (br, 1H, NH), 7.93-7.7 (t, 1H, *J* 7.6 Hz, Pyr), 7.5-7.3 (m, 1H, Pyr), 3.49 (q, 2H, $NHCH_2CH_2$), 1.84-1.19 (m, 4H, $CH_2CH_2CH_2CH_3$), 1.12-0.79 (t, 3H, *J* 7.3 Hz, CH_2CH_3).

N-(Furan-2-ylmethyl)picolinamide (**14**)

mp 100-102 °C; FTIR (KBr) ν_{max}/cm^{-1} 3344 (N–H), 3133, 3105, 3047, 2925, 1661 (C=O), 1525, 1464, 1352, 1306, 1212, 1148, 1014, 927, 745, 664, 600; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 8.56 (d, 1H, *J* 3.6 Hz, Pyr), 8.37 (br, 1H, NH), 8.24 (d, 1H, *J* 7.6 Hz, Pyr), 7.87 (td, 1H, J_1 7.6 Hz, J_2 1.2 Hz, Pyr), 7.40 (t, 1H, *J* 6.4 Hz, Pyr), 6.52 (d, 1H, *J* 0.8 Hz, furan), 6.36-6.31 (m, 2H, furan), 4.68 (d, 2H, *J* 6 Hz, CH_2NH); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 164.2, 151.3, 149.7, 148.1, 142.3, 137.4, 126.3, 122.4, 110.4, 107.5, 36.5; MS (EI) *m/z* (%) 202 [M$^+$], 106 [M$^+$ – C_5H_6NO], 96 (100) [M$^+$ – C_6H_4NO], 81 [M$^+$ – $C_6H_5N_2O$]; CHN ($C_{11}H_{10}N_2O_2$) calc. (%) C (65.34), H (4.98), N (13.85); found (%) C (66.09), H (4.93), N (13.91).

N-Benzylnicotinamide (**15**)

mp 72-74 °C (Lit. 73-74 °C);[7] FTIR (KBr) ν_{max}/cm^{-1} 3295, 3088, 3055, 3038, 2930, 1634, 1592, 1547, 1482, 1457, 1453, 1420, 1306, 1233, 1157, 1081, 1024, 750, 704 , 670; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 9.01 (s, 1H, Pyr), 8.75 (d, 1H, *J* 4 Hz, Pyr), 8.17 (d, 1H, *J* 8 Hz, Pyr), 7.44-7.29 (m, 5H, ArH ,1H, Pyr); 6.50 (br, 1H, NH); 4.70 (d, 2H, *J* 5.6 Hz, CH_2NH); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 165.55, 152.23, 147.9, 137.78, 135.32, 130.13, 128.87, 127.99, 127.80, 123.57, 44.21; CHN ($C_{13}H_{12}N_2O$) calc. (%) C (73.56), H (5.7), N (13.2); found (%) C (73.08), H (5.64), N (13.52).

N-Benzylisonicotinamide (**16**)

mp 81-83 °C (Lit. 83-85 °C);[7] FTIR (KBr) ν_{max}/cm^{-1} 3313 (N–H), 3060, 3027, 2880, 2843, 1646 (C=O), 1599, 1543, 1494, 1452, 1413, 1300, 845, 735, 697; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 8.91 (d, 2H, *J* 4.4 Hz, Pyr), 7.77 (d, 2H, *J* 4.8 Hz, Pyr), 7.45-7.29 (m, 5H, ArH), 6.95 (br, 1H, NH), 4.64 (d, 2H, *J* 5.2 Hz, CH_2NH); ^{13}C NMR (100 MHz, $CDCl_3$) δ/ppm 165.6, 150.4, 141.3, 137.5, 128.9, 128.0, 127.7, 122.0, 44.3.

N-Butylisonicotinamide (**17**)

mp 41-42 °C (Lit. 41-42 °C);[4] FTIR (KBr) ν_{max}/cm^{-1} 3312 (N–H), 2958, 2931, 2872, 1650 (C=O), 1600, 1552, 1491, 1409, 1308, 1218, 1066, 998, 847, 758, 670; ^{1}H NMR (100 MHz, $CDCl_3$) δ/ppm 8.67 (d, 2H, *J* 4.7 Hz, Pyr), 7.63 (d, 2H, *J* 3.09 Hz, Pyr), 6.95 (br, 1H, NH), 3.43 (q, 2H, *J* 4 Hz, CH_2CH_2NH), 1.85-1.17 (m, 4H, $CH_2CH_2CH_2CH_3$), 0.91 (t, 3H, *J* 4.5 Hz, CH_2CH_3).

N-Benzylthiophene-2-carboxamide (**18**)

mp 116-118 °C (Lit. 119.5-120.5 °C);[8] FTIR (KBr) ν_{max}/cm^{-1} 3351 (N–H), 3109, 3088, 3064, 3031, 2929, 1622 (C=O), 1545, 1511, 1422, 1303, 1246, 861, 772, 718, 696; ^{1}H NMR (100 MHz, $CDCl_3$) δ/ppm 7.62-7.45 (m, 2H, thiophene), 7.4-7.2 (m, 1H, thiophene, 4H, ArH), 7.04 (t, 1H, *J* 4 Hz, ArH), 6.36 (br, 1H, NH), 4.61 (d, 2H, *J* 6 Hz, CH_2NH); CHN ($C_{12}H_{11}NOS$) calc. (%) C (66.33), H (5.10), N (6.45), S (14.76); found (%) C (66.8), H (5.33), N (6.95), S (13.99).

N-Butylthiophene-2-carboxamide (**19**)

mp 64-66 °C (Lit. 67-68 °C);[9] FTIR (KBr) ν_{max}/cm^{-1} 3280 (N–H), 3105, 3084, 2953, 2924, 2876, 1612 (C=O), 1557, 1421, 1356, 1307, 1247, 1220, 1139, 980, 869, 772, 735; ^{1}H NMR (100 MHz, $CDCl_3$) δ/ppm 7.65-7.38 (m, 2H, thiophene), 7.05 (t, 1H, *J* 3.8 Hz, thiophene), 6.11(br, 1H, NH), 3.4 (q, 2H, *J* 4.8 Hz, $NHCH_2CH_2$), 1.75-1.13 (m, 4H, $CH_2CH_2CH_2CH_3$), 0.94 (t, 3H, *J* 6 Hz, CH_2CH_3); CHN ($C_9H_{13}NOS$) calc. (%) C (58.98), H (7.15), N (7.64), S (17.50); found (%) C (59.02), H (7.38), N (7.66), S (17.28).

N-(2-Methoxybenzyl)thiophene-2-carboxamide (**20**)

mp 154-156 °C (Lit. 157-159 °C);[9] FTIR (KBr) ν_{max}/cm^{-1} 3311 (N–H), 3084, 3015, 2831, 1618 (C=O), 1553, 1461, 1295, 1247, 1106, 1026, 771, 732; ^{1}H NMR (100 MHz, $CDCl_3$) δ/ppm 7.58-7.12 (m, 3H, thiophene, 1H, ArH), 7.12-6.85 (m, 3H, ArH), 6.69 (br, 1H, NH), 4.6 (d, 2H, *J* 4.5 Hz, CH_2NH), 3.83 (s, 3H, OCH_3); CHN ($C_{13}H_{13}NO_2S$) calc. (%) C (63.13), H (5.3), N (5.66), S (12.9); found (%) C (62.93), H (5.57), N (6.19), S (12.7).

N-(2-Chlorobenzyl)thiophene-2-carboxamide (**21**)

mp 116-118 °C; FTIR (KBr) ν_{max}/cm^{-1} 3306 (N–H), 3080, 2958, 2908, 2851, 1620 (C=O), 1553, 1442, 1417, 1301, 1246, 1147, 1037, 755, 724, 681; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 7.55 (dd, 1H, J_1 3.8 Hz, J_2 2.8 Hz, thiophene); 7.51-7.47 (m, 2H, thiophene), 7.42-7.37 (m, 1H, ArH), 7.32-7.23 (m, 2H, ArH), 7.09 (dd, 1H, J_1 5 Hz, J_2 1.2 Hz, ArH), 6.56 (br, 1H, NH), 4.72 (d, 2H, J 6.4 Hz, $\underline{CH_2}NH$); ^{13}C NMR ($CDCl_3$, 100 MHz) δ/ppm 162.1, 138.7, 135.5, 133.5, 130.3, 129.5, 129.0, 128.4, 127.7, 127.4, 127.1, 41.8; MS (EI) *m/z* (%) 253 [M$^+$+2], 251 [M$^+$], 216 [M$^+$ – Cl], 139 [M$^+$ – C_5H_4OS], 126 [$C_7H_6C^+$l], 111 [M$^+$ – C_7H_7ClN], 57 [$C_2H_3NO^{2+}$]; CHN ($C_{12}H_{10}ClNOS$) calc. (%) C (57.25), H (4.00), N (5.56), S (12.74); found (%) C (57.41), H (4.25), N (5.75), S (12.55).

N-(Furan-2-ylmethyl)thiophene-2-carboxamide (**22**)

mp 97-100 °C (Lit. 100-102 °C);[10] FTIR (KBr) ν_{max}/cm^{-1} 3284 (N–H), 3076, 2933, 2835, 1620 (C=O), 1550, 1515, 1413, 1308, 1200, 1148, 1003, 859, 711, 668; ^{1}H NMR (100 MHz, $CDCl_3$) δ/ppm 7.67-7.22 (m, 3H, thiophene), 7.02 (t, 1H, J 3.2 Hz, furan), 6.65 (br, 1H, NH), 6.42-6.18 (m, 2H, furan), 4.6 (d, 2H, J 5.5 Hz, $\underline{CH_2}NH$); CHN ($C_{10}H_9NO_2S$) calc. (%) C (57.95), H (4.38), N (6.76), S (15.47); found (%) C (8.35), H (4.63), N (7.04), S (15.43).

N-(3-Ethoxypropyl)thiophene-2-carboxamide (**23**)

mp 56-58 °C; FTIR (KBr) ν_{max}/cm^{-1} 3309 (N–H), 3084, 2979, 2872, 2796, 1615 (C=O), 1555, 1515, 1354, 1221, 1105, 1053, 953, 861, 812, 719; ^{1}H NMR (400 MHz, $CDCl_3$) δ/ppm 7.48 (dd, 1H, J_1 3.6 Hz, J_2 1.2 Hz, thiophene), 7.46 (dd, 1H, J_1 4.8 Hz, J_2 1.2 Hz, thiophene), 7.08 (t, 1H, J 2.4 Hz, thiophene), 6.21 (br, 1H, NH), 3.63 (t, 2H, J 5.6 Hz, $CH_2\underline{CH_2}OEt$), 3.60-3.51 (m, 4H, $\underline{CH_2}CH_3$,$\underline{CH_2}NH$), 1.89 (qn, 2H, J 5.6 Hz, $CH_2\underline{CH_2}CH_2$), 1.27 (t, 3H, J 7.2 Hz, $CH_2\underline{CH_3}$); ^{13}C NMR ($CDCl_3$, 100 MHz) δ/ppm 161.8, 139.5, 129.5, 127.7, 127.5, 70.3, 66.6, 39.2, 28.9, 15.4; MS (EI) *m/z* (%) 213 [M$^+$], 183 [M$^+$ – C_2H_6], 168 [M$^+$ – C_2H_5O], 140 [M$^+$ – C_4H_9O], 111 (100) [$C_5H_3OS^+$]; CHN ($C_{10}H_{15}NO_2S$) calc. (%) C (56.31), H (7.09), N (6.57), S (15.03); found (%) C (56.86), H (7.64), N (6.88), S (14.79).

N-Benzyl-3-methylbutanamide (**24**)

mp 56-58 °C (Lit. 58-59 °C);[11] FTIR (KBr) ν_{max}/cm^{-1} 3275 (N–H), 3062, 3028, 2960, 2949, 2873, 1643 (C=O), 1578, 1495, 1425, 1336, 737, 695.

N-Benzylpropionamide (**25**)

mp 40-42 °C (Lit. 42-43 °C);[12] FTIR (KBr) ν_{max}/cm^{-1} 3266 (N–H), 3130, 3063, 3032, 2975, 2937, 1658 (C=O), 1463, 1278, 1172, 1075, 997, 813, 700.

References

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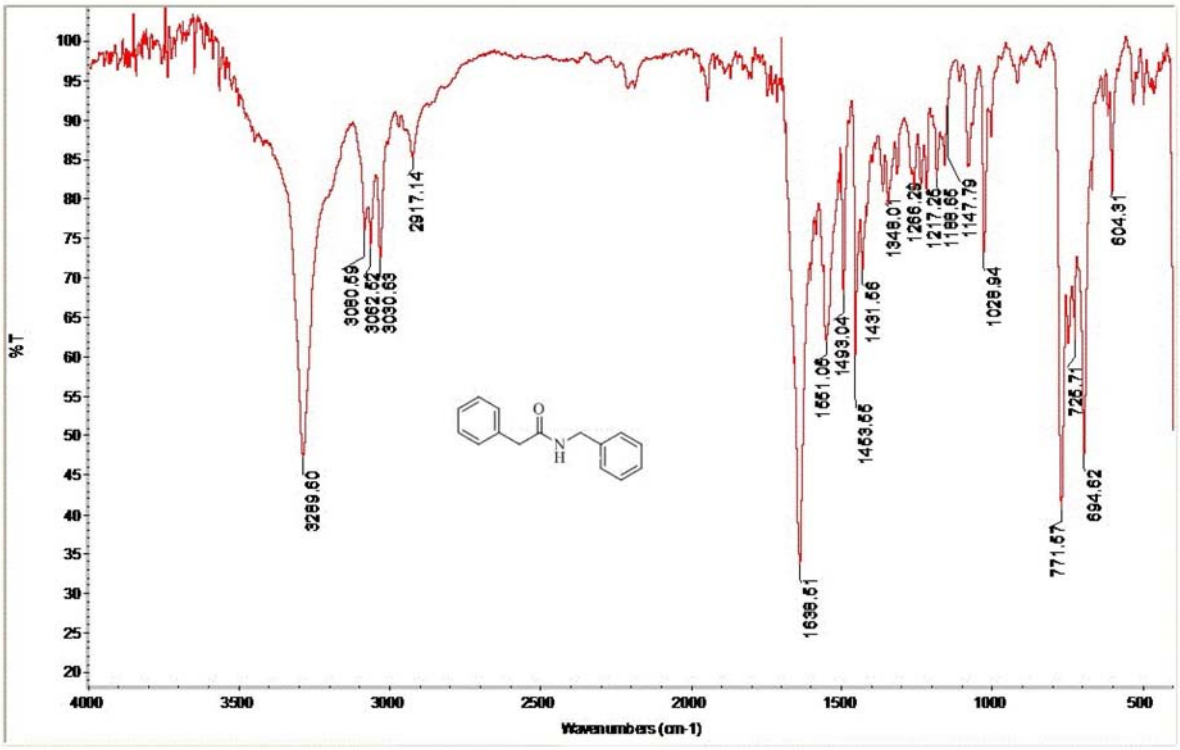

Figure S1. FTIR spectrum of *N*-benzyl-2-phenylacetamide (**1**).

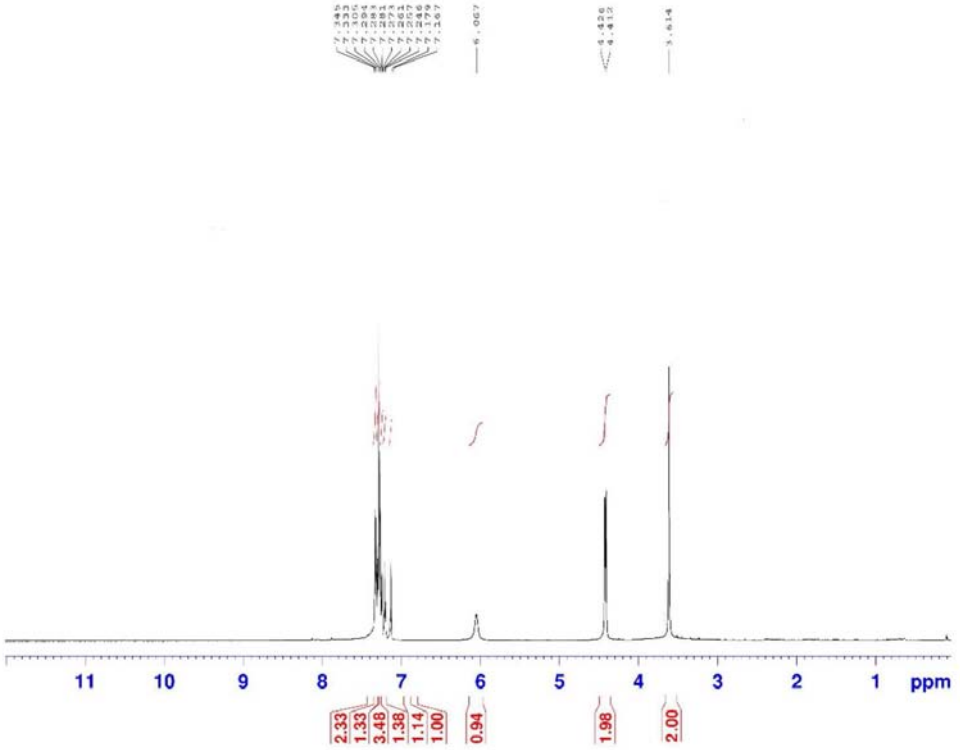

Figure S2. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzyl-2-phenylacetamide (**1**).

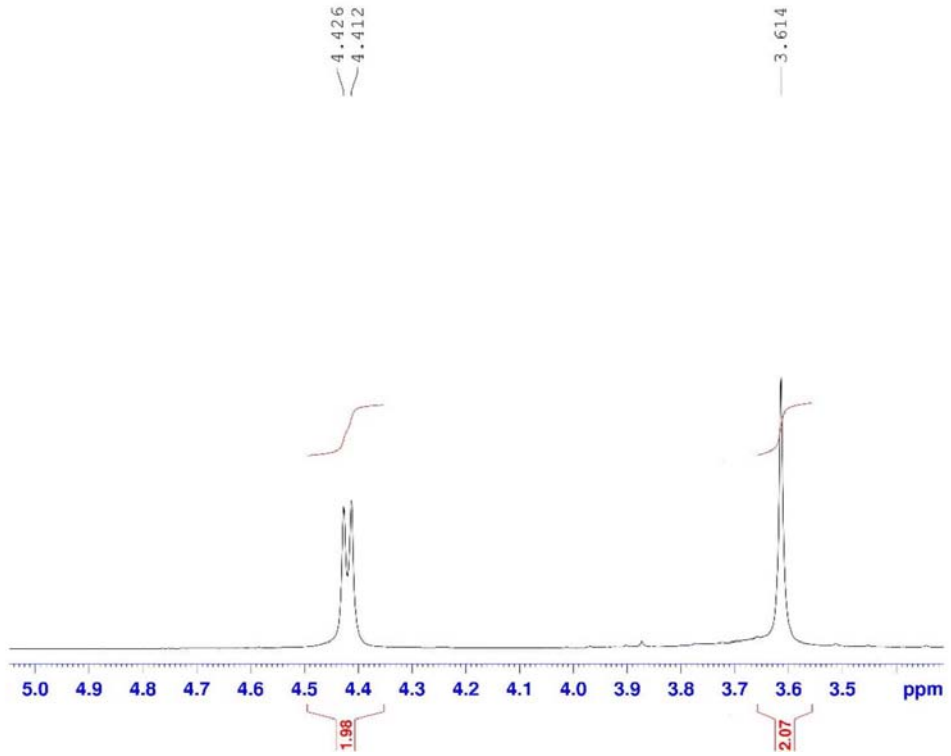

Figure S3. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzyl-2-phenylacetamide (**1**) expanded.

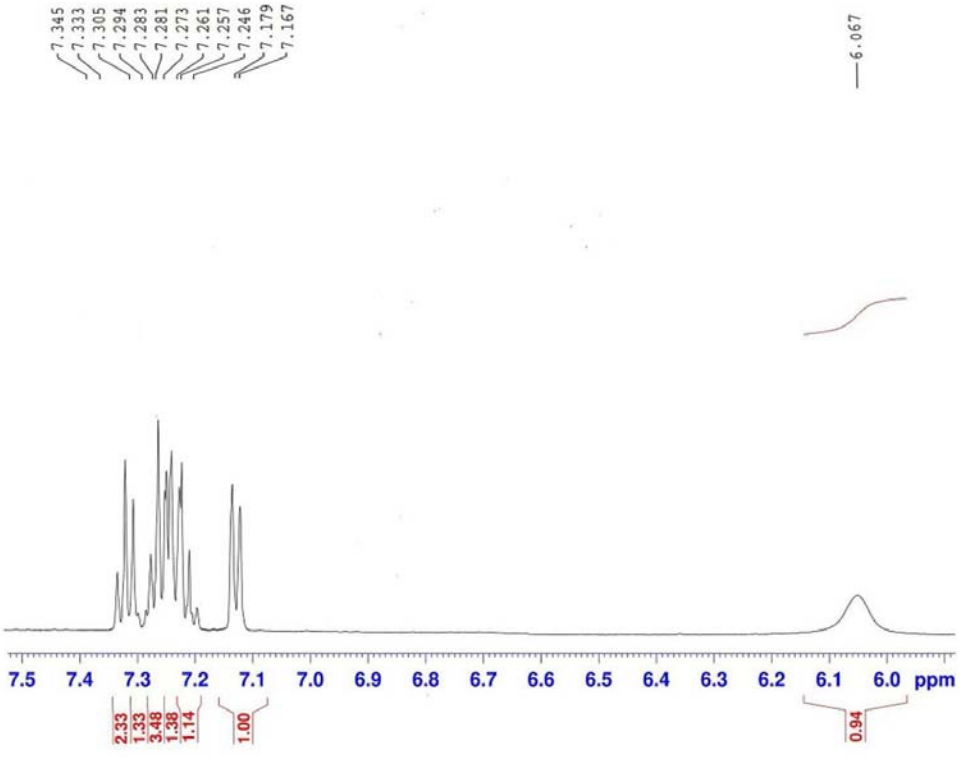

Figure S4. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzyl-2-phenylacetamide (**1**) expanded.

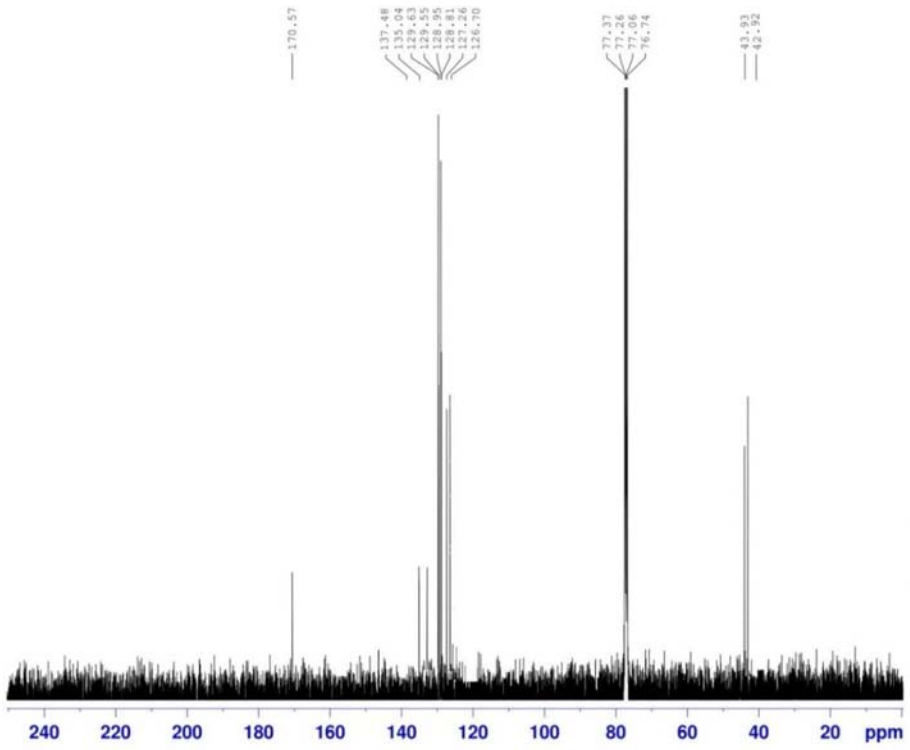

Figure S5. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzyl-2-phenylacetamide (**1**).

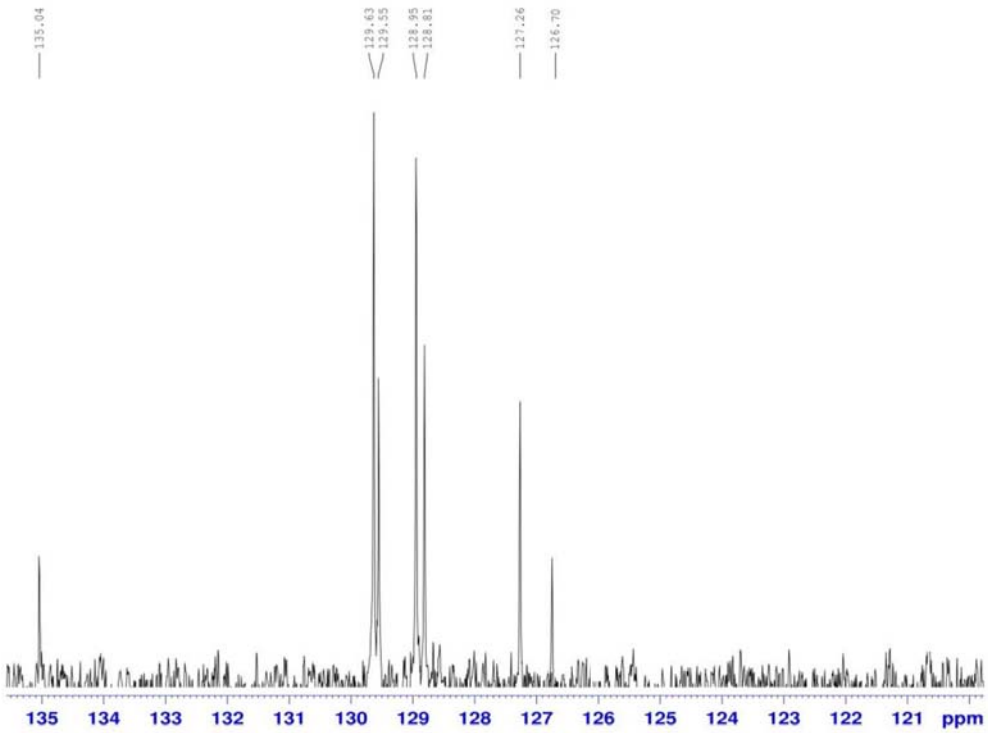

Figure S6. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzyl-2-phenylacetamide (**1**) expanded.

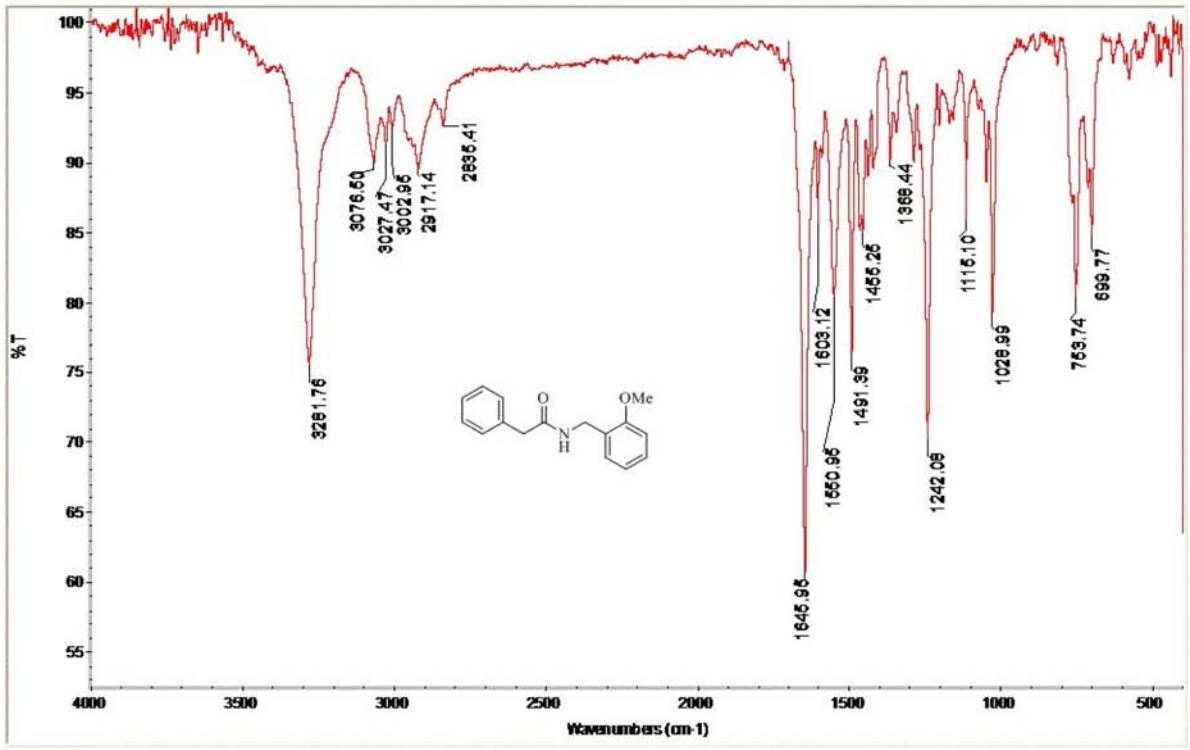

Figure S7. FTIR spectrum of *N*-(2-methoxybenzyl)-2-phenylacetamide (**2**).

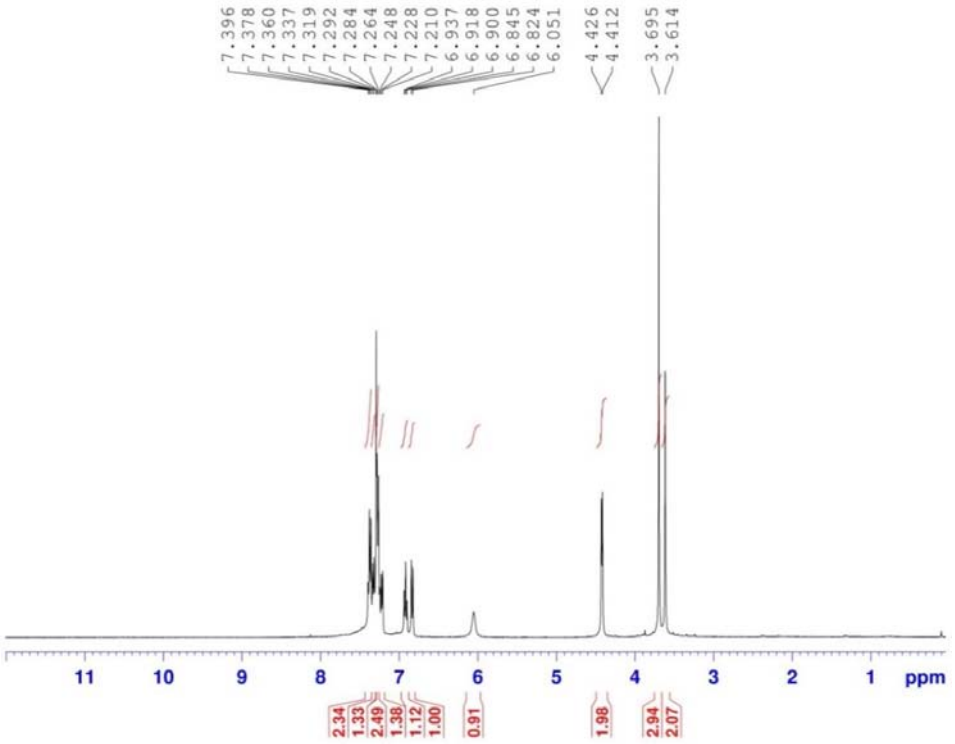

Figure S8. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)-2-phenylacetamide (**2**).

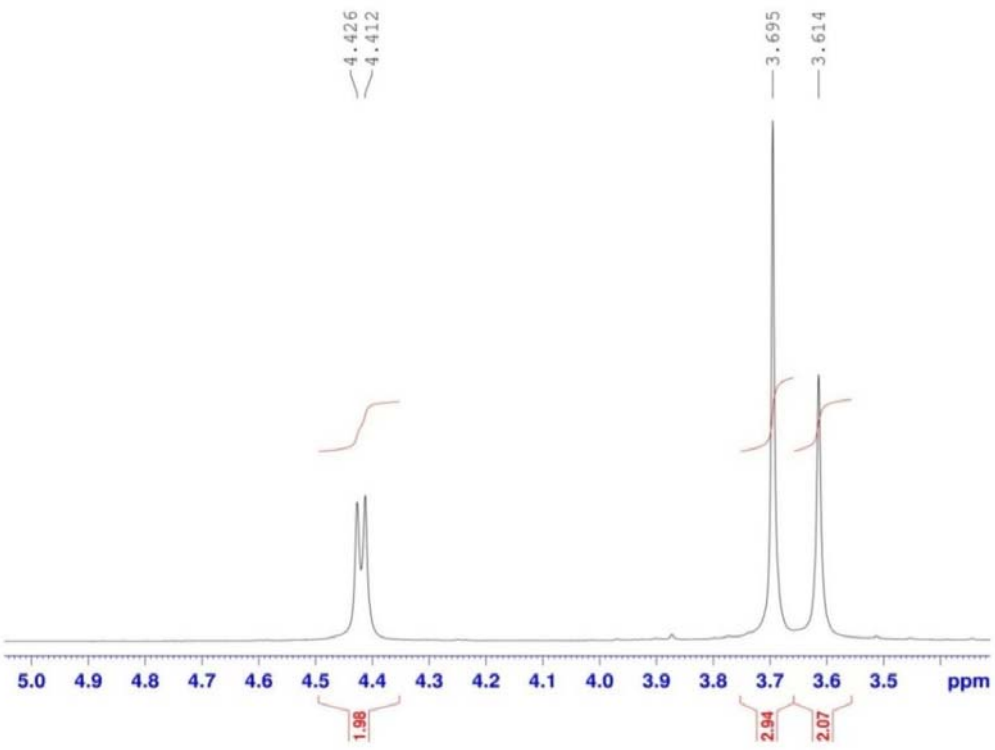

Figure S9. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)-2-phenylacetamide (**2**) expanded.

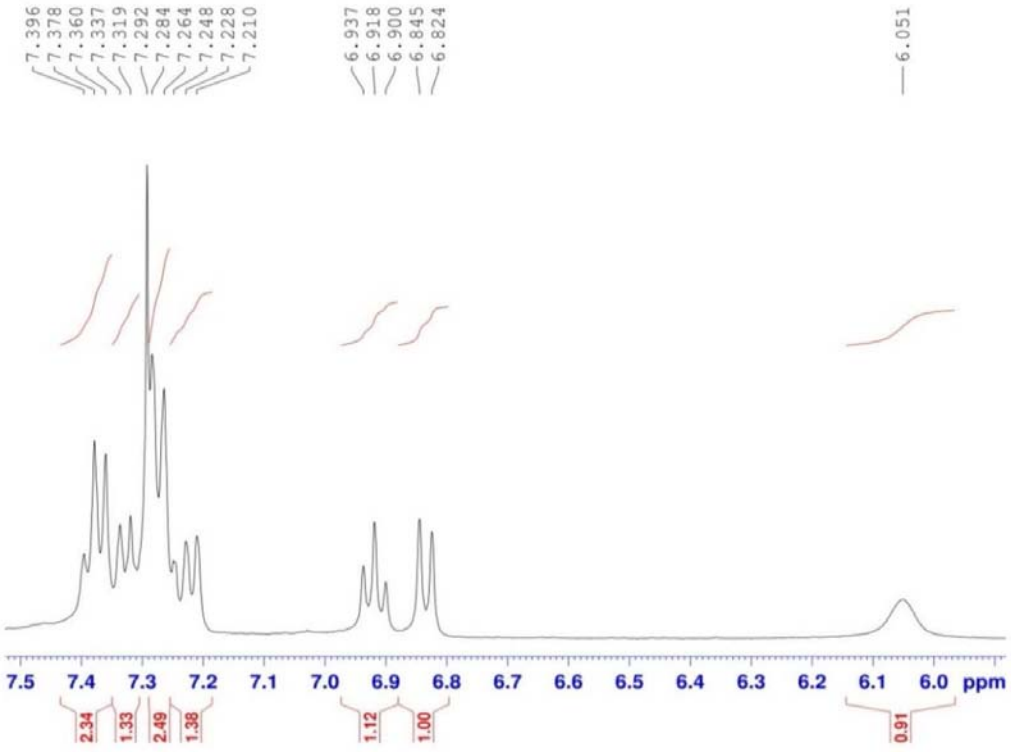

Figure S10. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)-2-phenylacetamide (**2**) expanded.

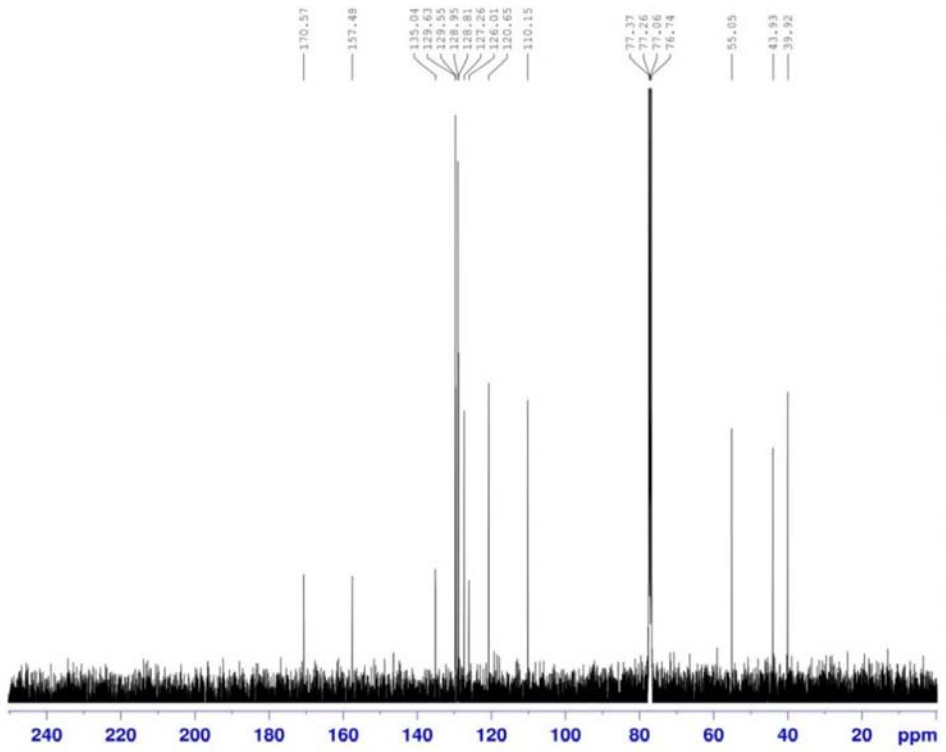

Figure S11. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)-2-phenylacetamide (**2**).

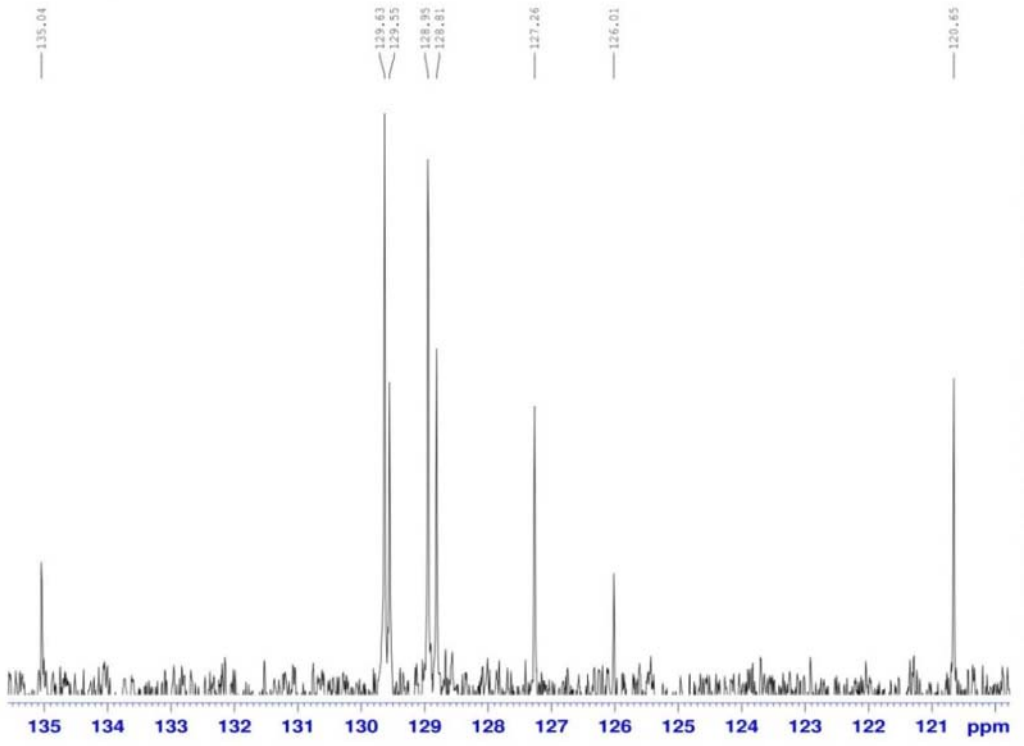

Figure S12. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)-2-phenylacetamide (**2**) expanded.

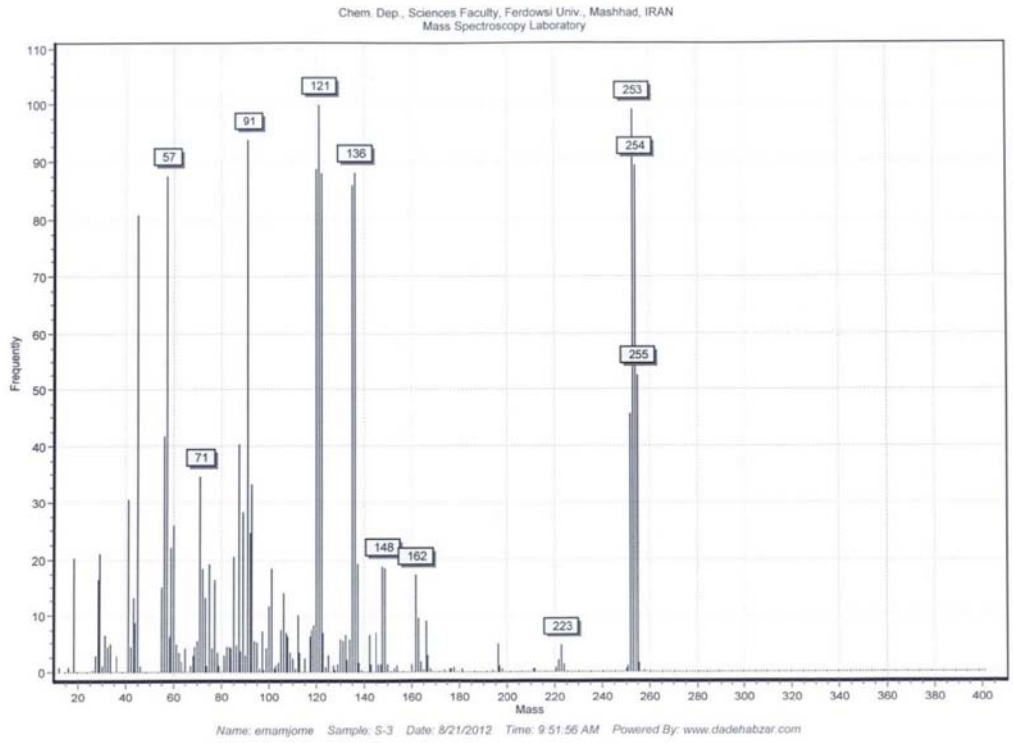

Figure S13. MS spectrum (EI, 70 eV) of *N*-(2-methoxybenzyl)-2-phenylacetamide (**2**).

Eager 300 Summarize Results

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emamjomeh-130		

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Carbon%	74.99708557
Hydrogen%	6.786919594
Sulphur%	0

Calcd for $C_{16}H_{17}NO_2$

Nitrogen%	5.49
Carbon%	75.27
Hydrogen%	6.71
Suphur%	0

1 Sample(s) in Group No : 1

Component Name	Average
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Hydrogen%	6.786919594
Sulphur%	0

Figure S14. Elemental analysis data of *N*-(2-methoxybenzyl)-2-phenylacetamide (**2**).

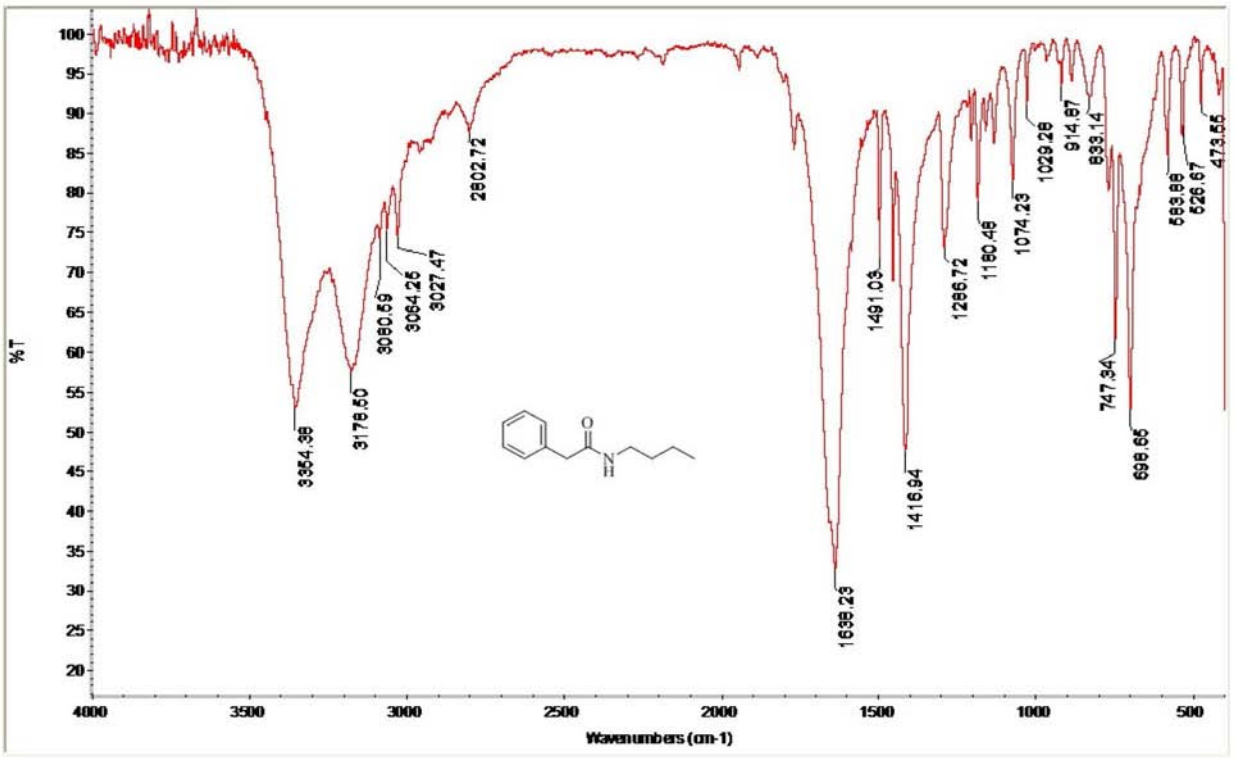

Figure S15. FTIR spectrum of *N*-butyl-2-phenylacetamide (**3**).

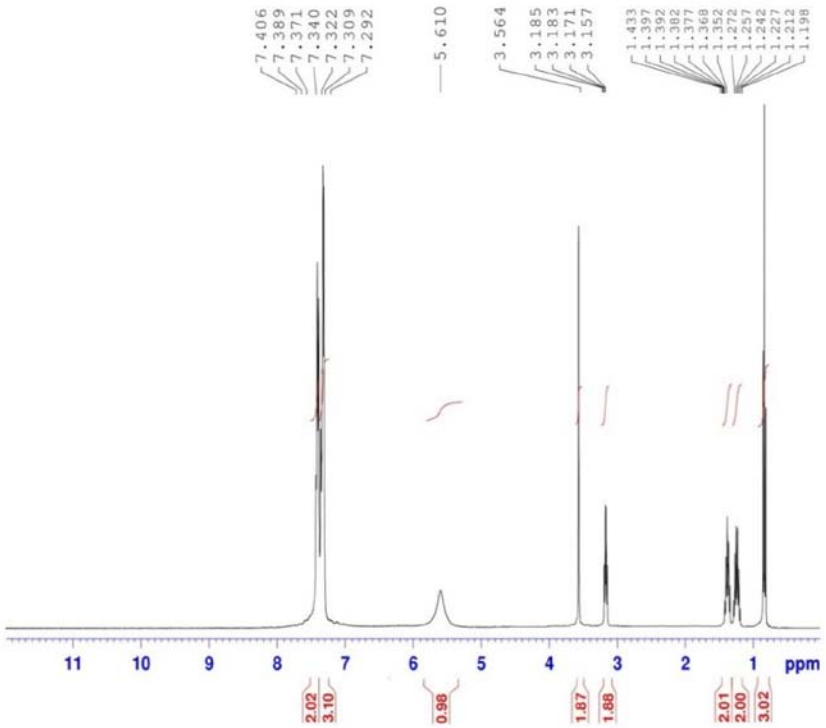

Figure S16. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-butyl-2-phenylacetamide (**3**).

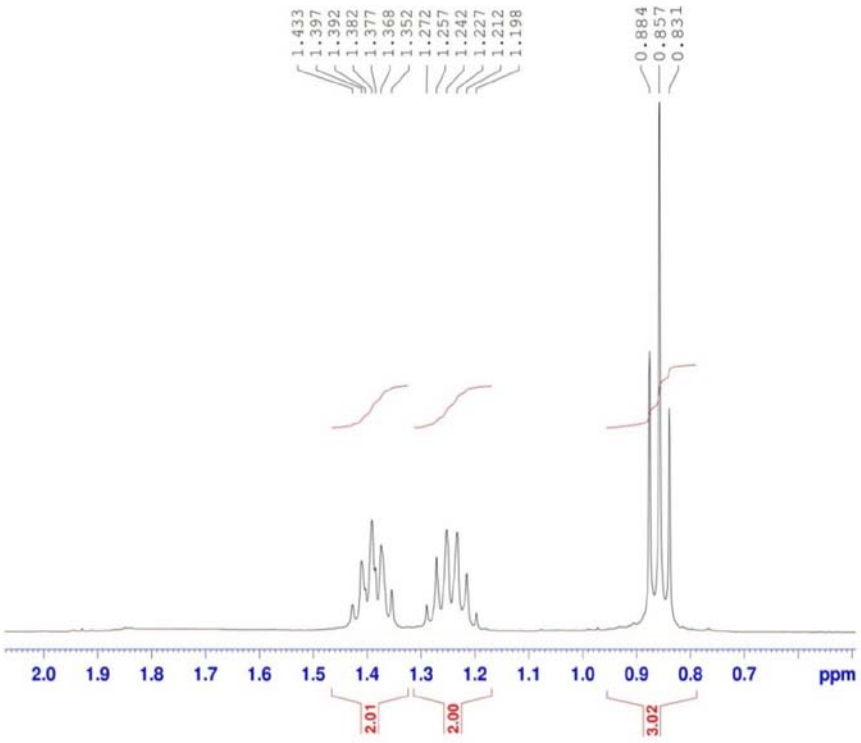

Figure S17. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-butyl-2-phenylacetamide (**3**) expanded.

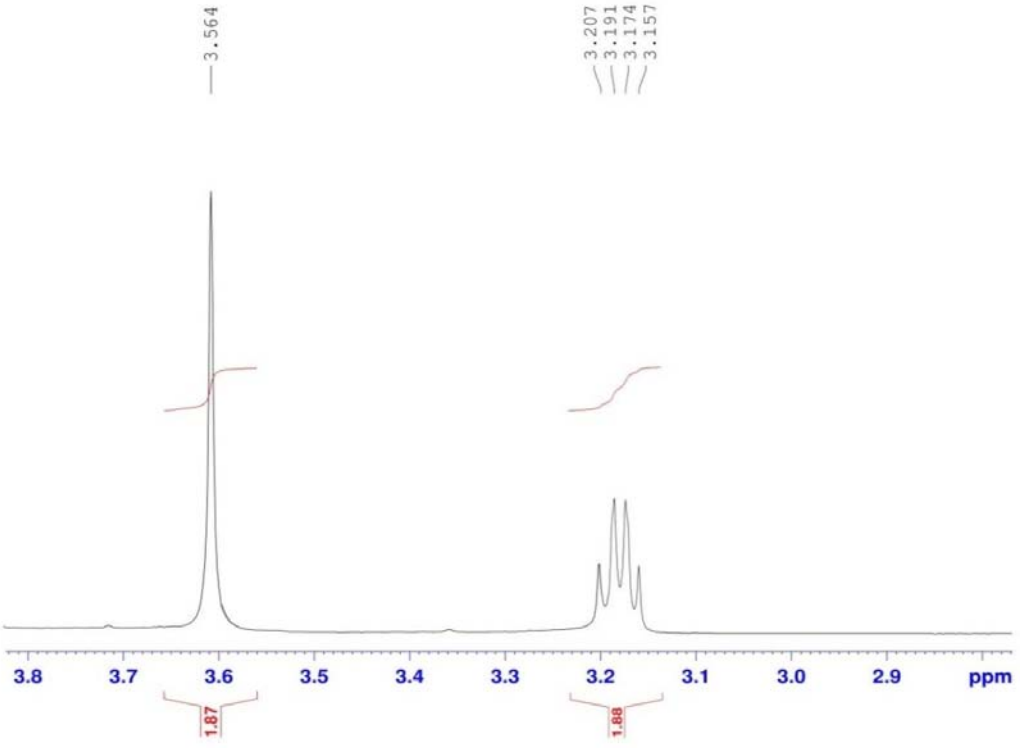

Figure S18. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-butyl-2-phenylacetamide (**3**) expanded.

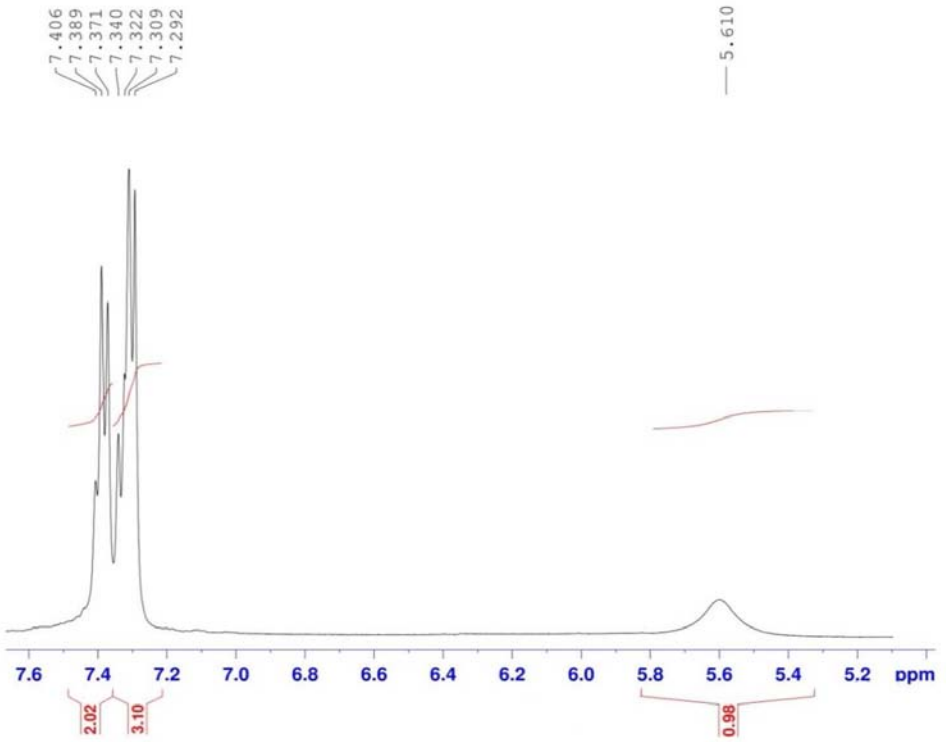

Figure S19. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-butyl-2-phenylacetamide (**3**) expanded.

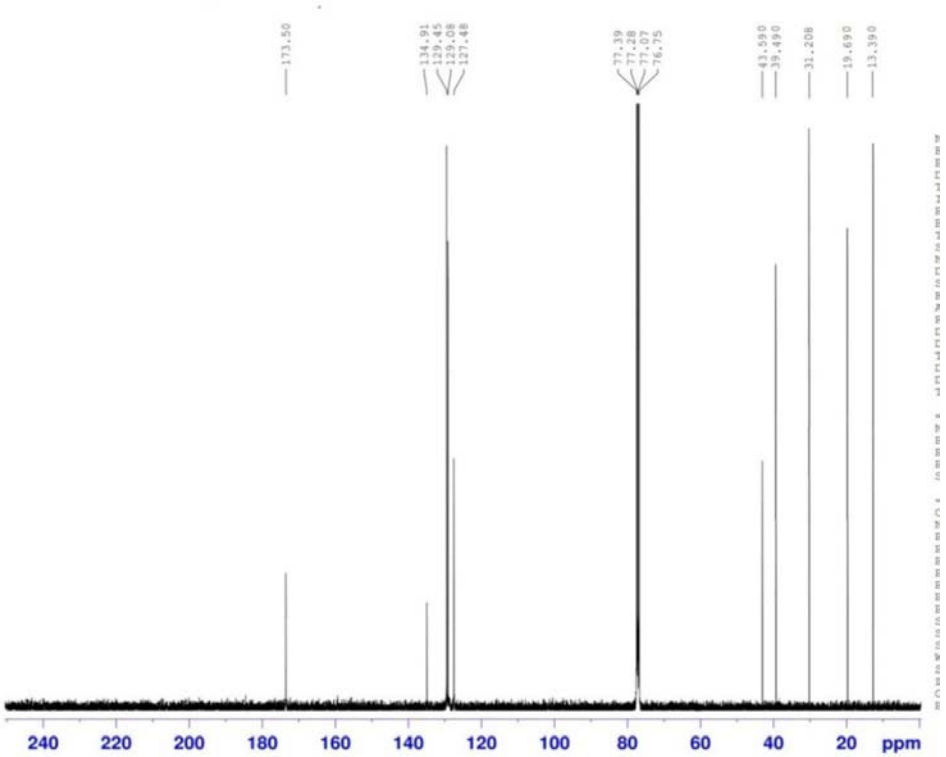

Figure S20. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-butyl-2-phenylacetamide (**3**).

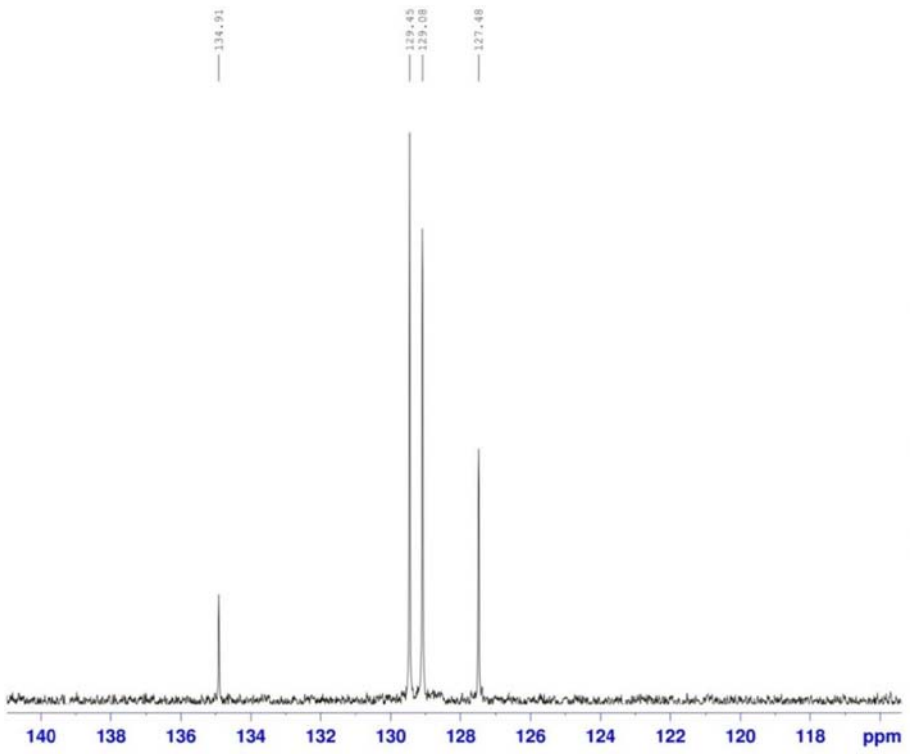

Figure S21. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-butyl-2-phenylacetamide (**3**) expanded.

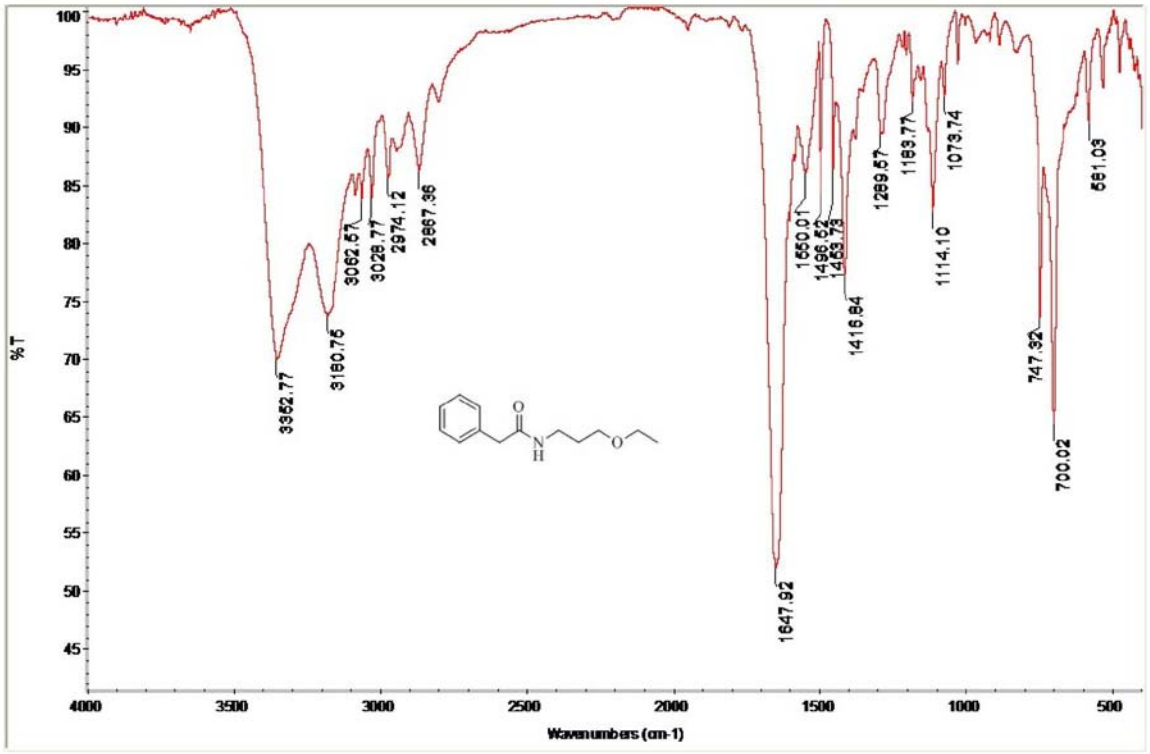

Figure S22. FTIR spectrum of *N*-(3-ethoxypropyl)-2-phenylacetamide (**4**).

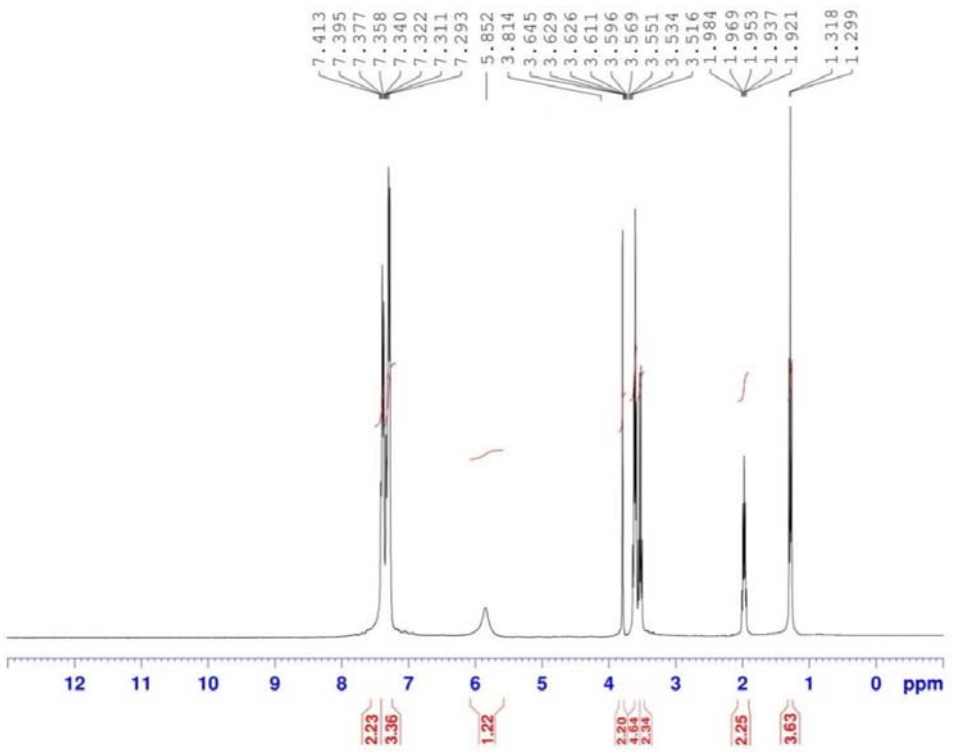

Figure S23. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)-2-phenylacetamide (**4**).

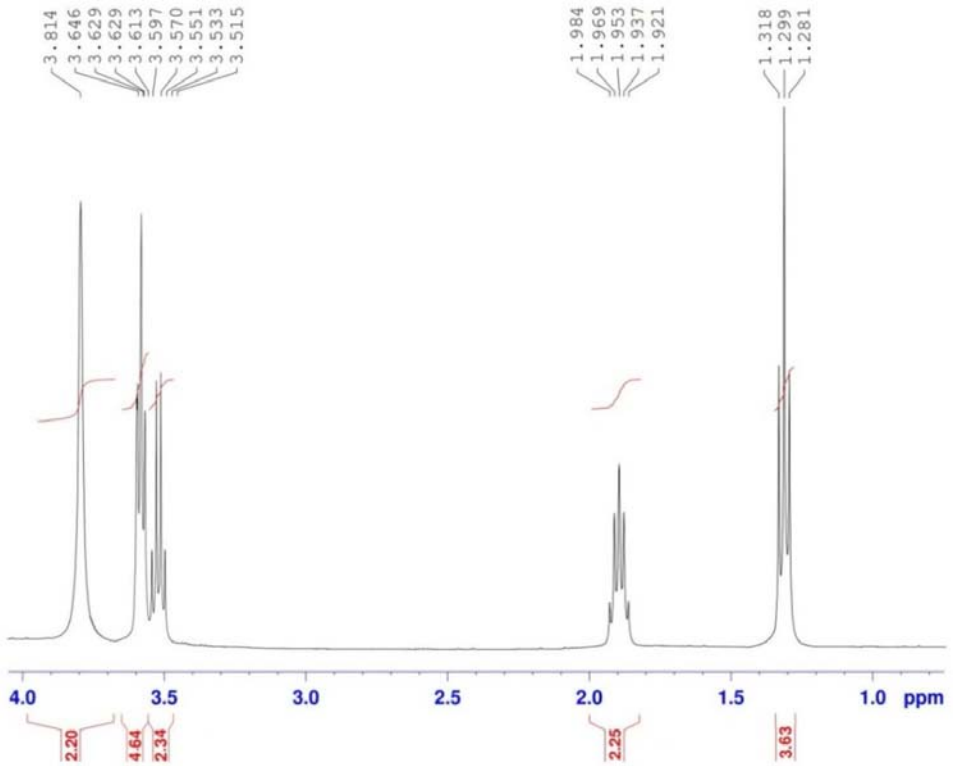

Figure S24. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)-2-phenylacetamide (**4**) expanded.

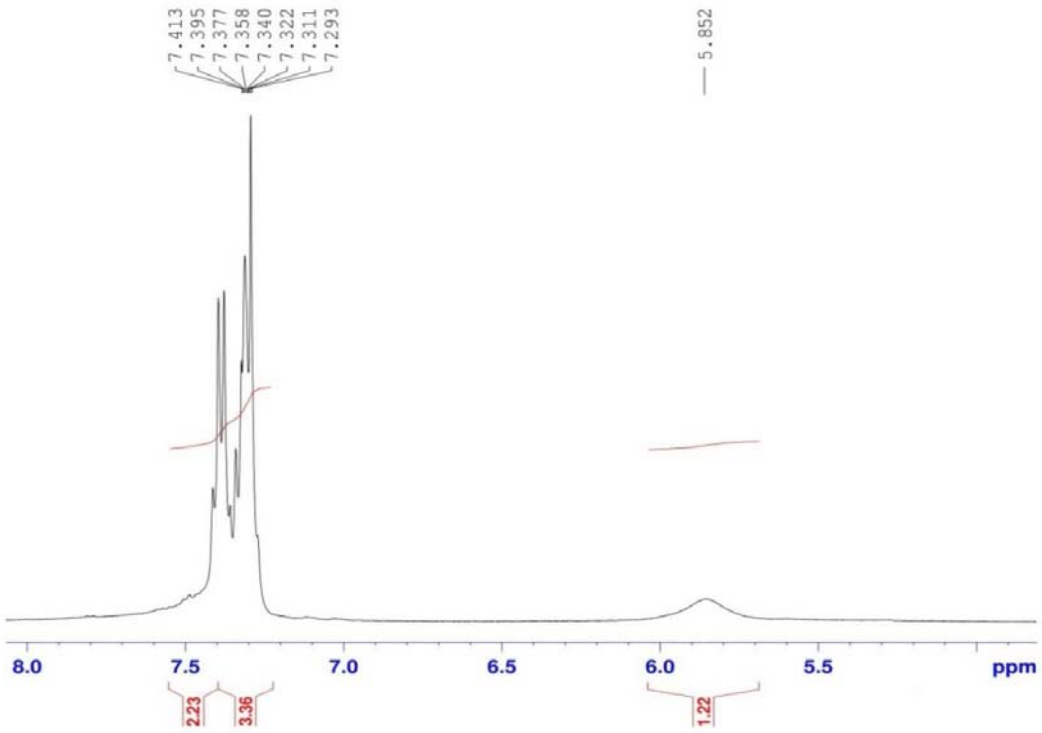

Figure S25. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)-2-phenylacetamide (**4**) expanded.

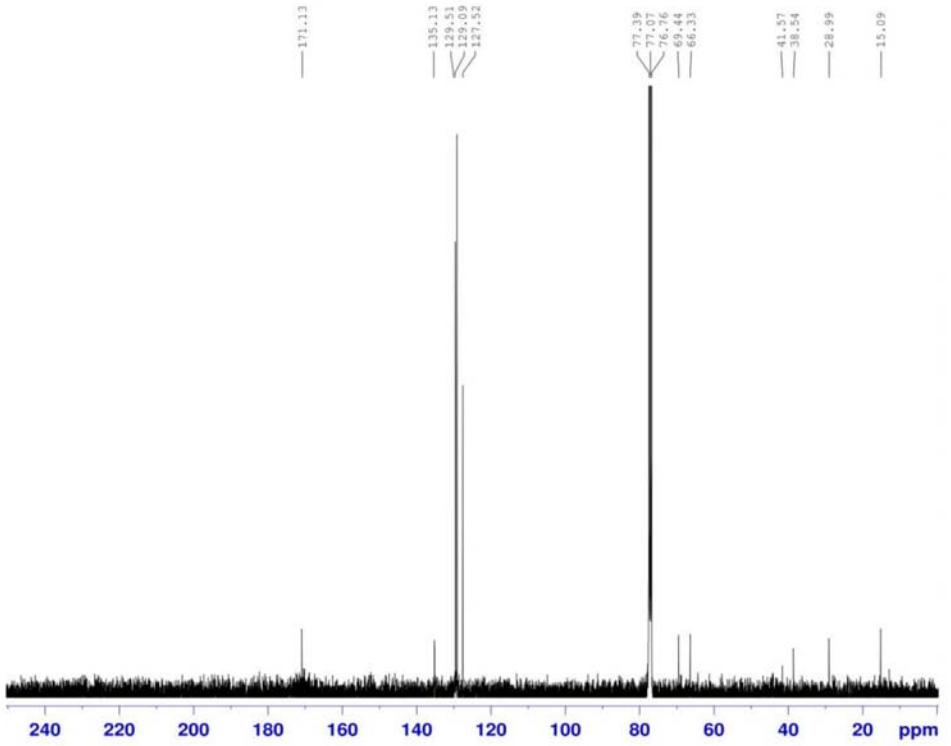

Figure S26. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)-2-phenylacetamide (**4**).

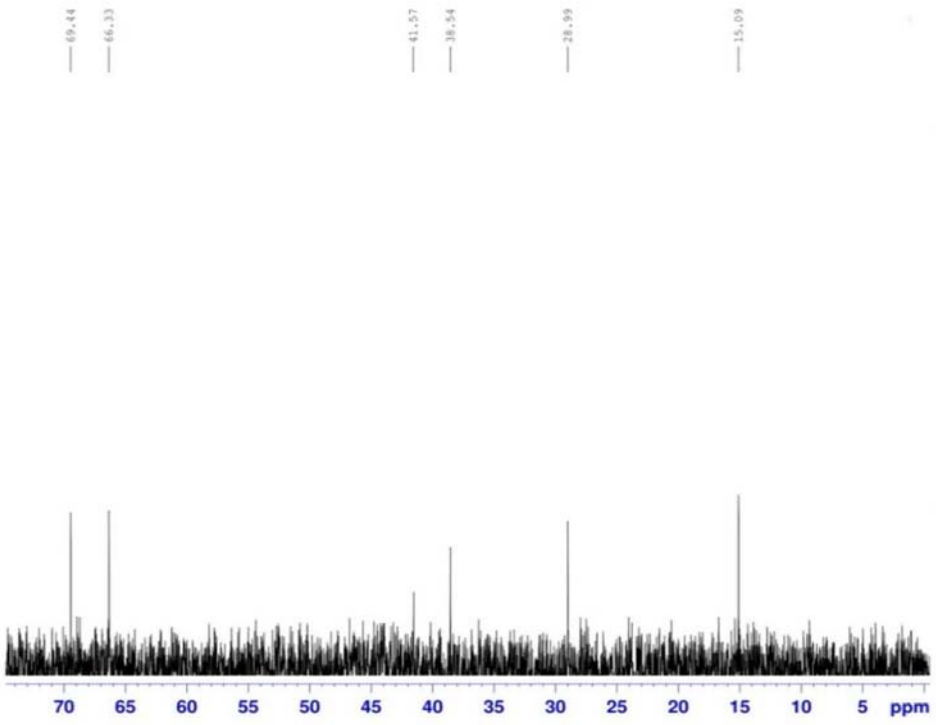

Figure S27. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)-2-phenylacetamide (**4**) expanded.

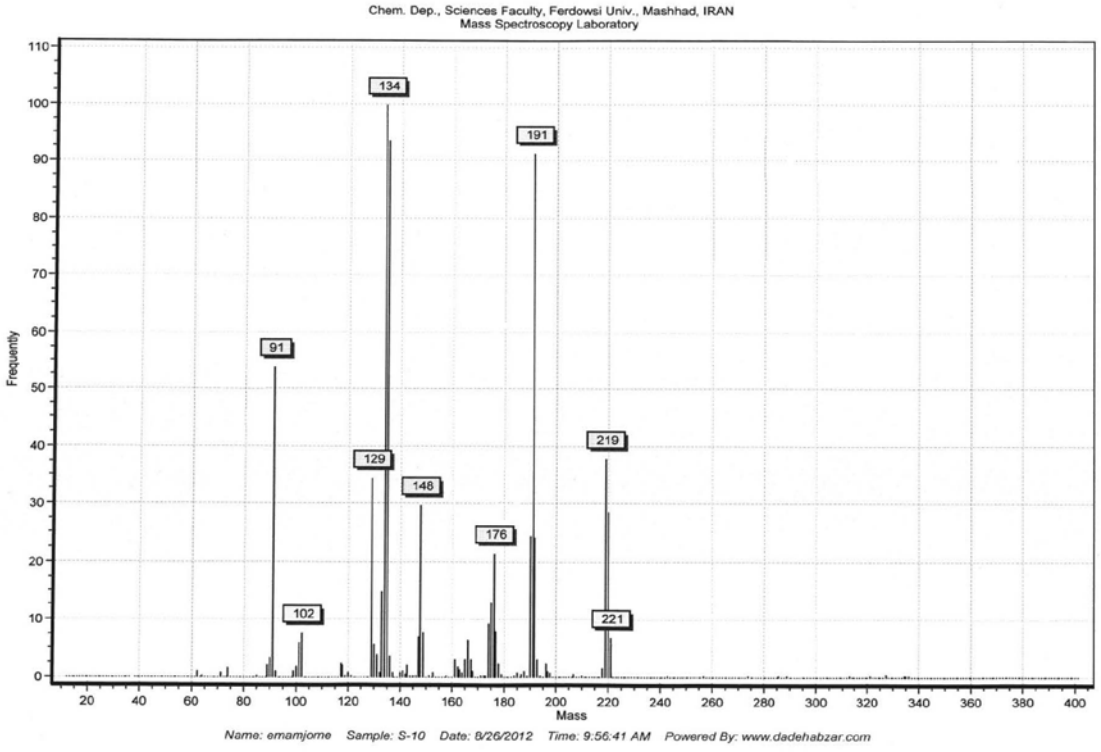

Figure S28. MS spectrum (EI, 70 eV) of *N*-(3-ethoxypropyl)-2-phenylacetamide (**4**).

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Component name  Element %
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Carbon%         69.9406662
Hydrogen%       8.260183811
Sulphur%        0

                1 Sample(s) in Group No : 1
Component Name  Average
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Carbon%         69.9406662
Hydrogen%       8.260183811
Sulphur%        0
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Calcd for $C_{13}H_{19}NO_2$

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Figure S29. Elemental analysis data of *N*-(3-ethoxypropyl)-2-phenylacetamide (**4**).

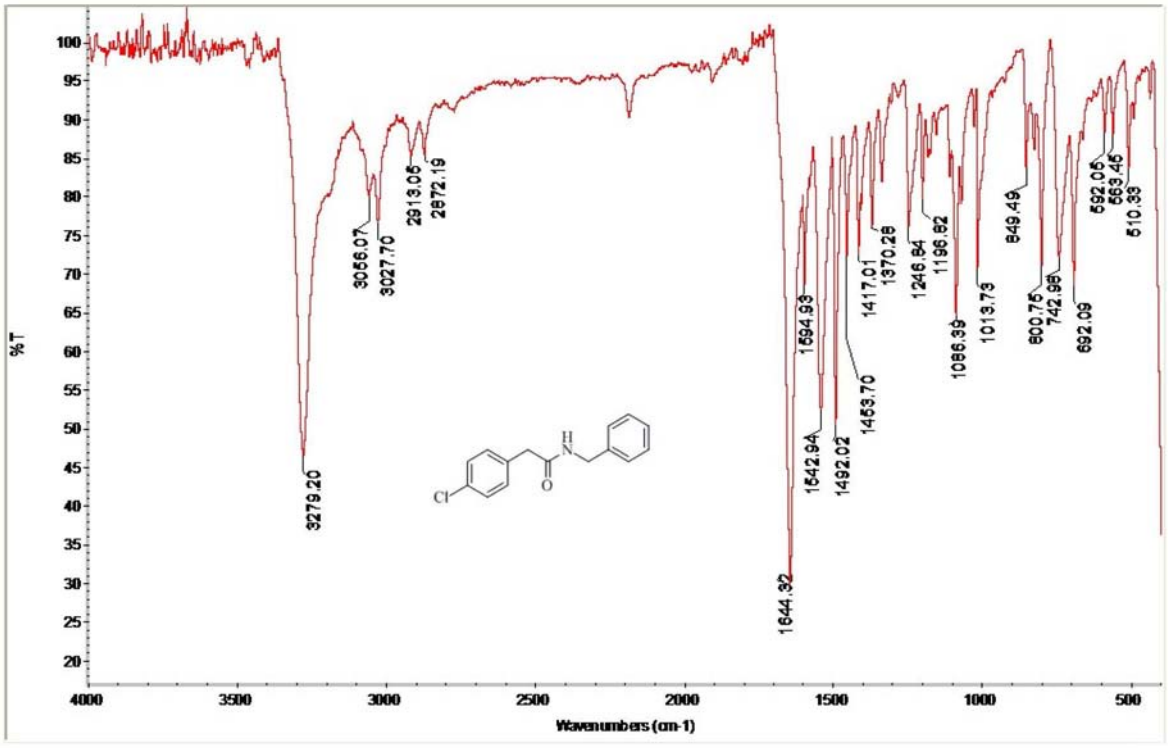

Figure S30. FTIR spectrum of *N*-benzyl-2-(4-chlorophenyl)acetamide (**5**).

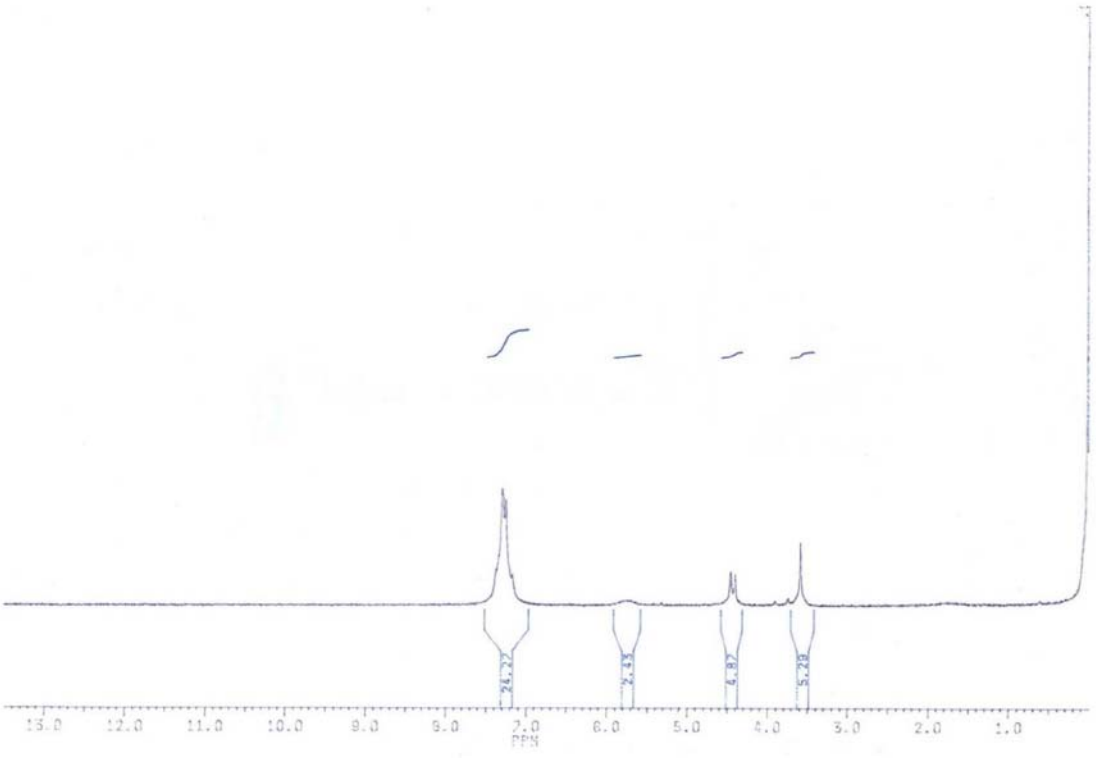

Figure S31. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzyl-2-(4-chlorophenyl)acetamide (**5**).

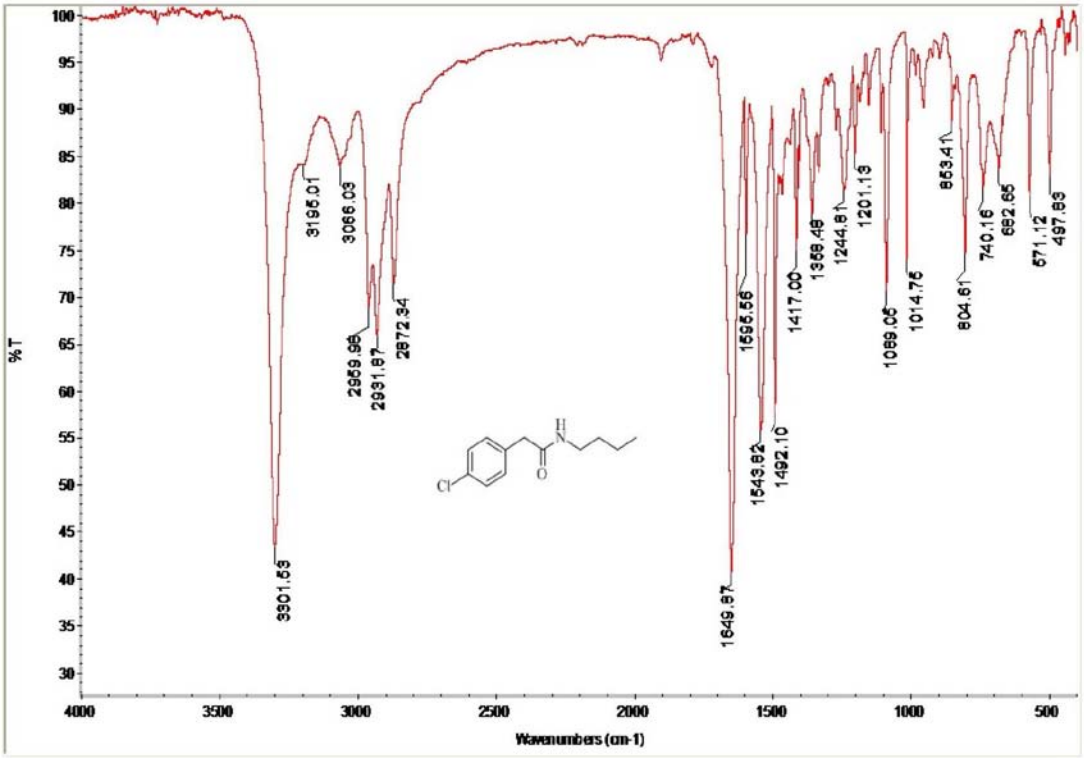

Figure S32. FTIR spectrum of *N*-butyl-2-(4-chlorophenyl)acetamide (**6**).

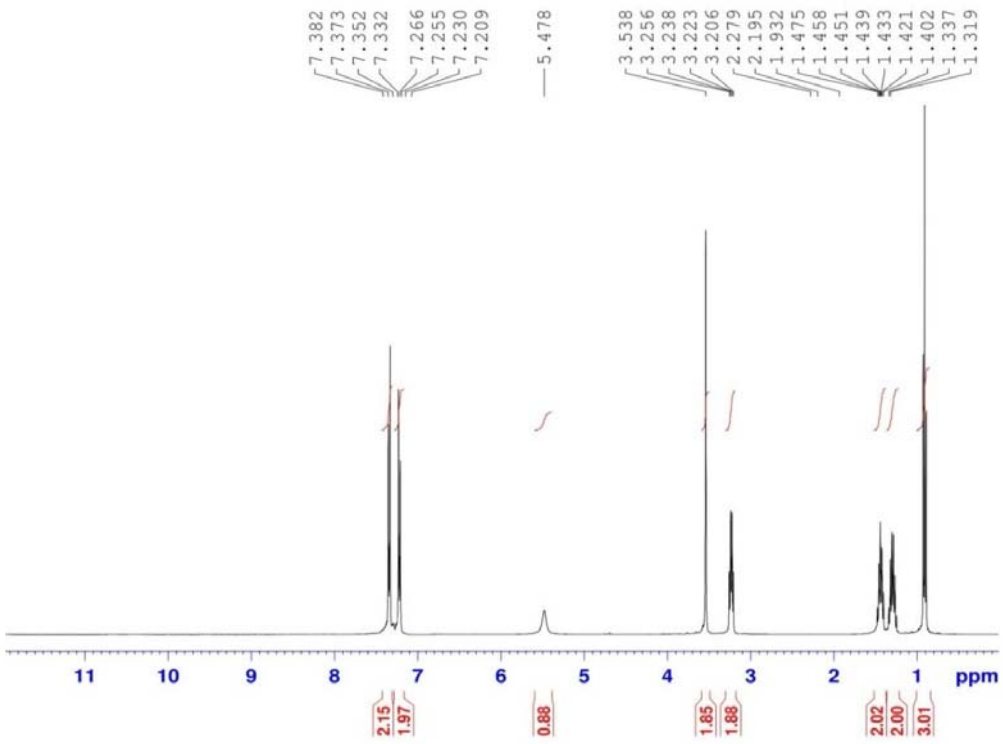

Figure S33. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-butyl-2-(4-chlorophenyl)acetamide (**6**).

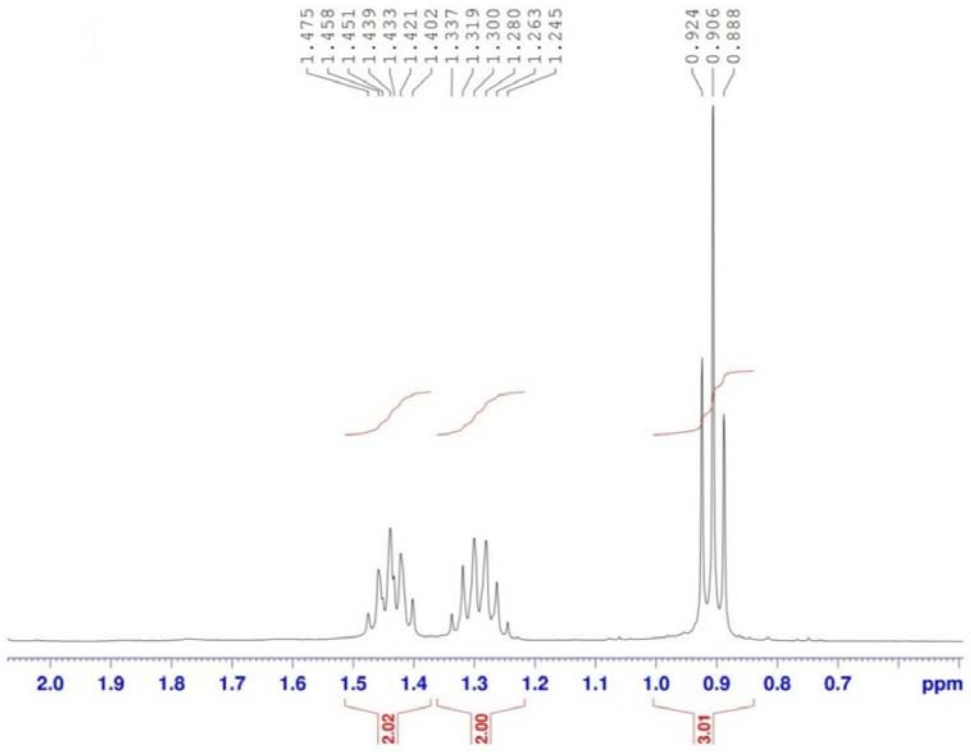

Figure S34. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-butyl-2-(4-chlorophenyl)acetamide (**6**) expanded.

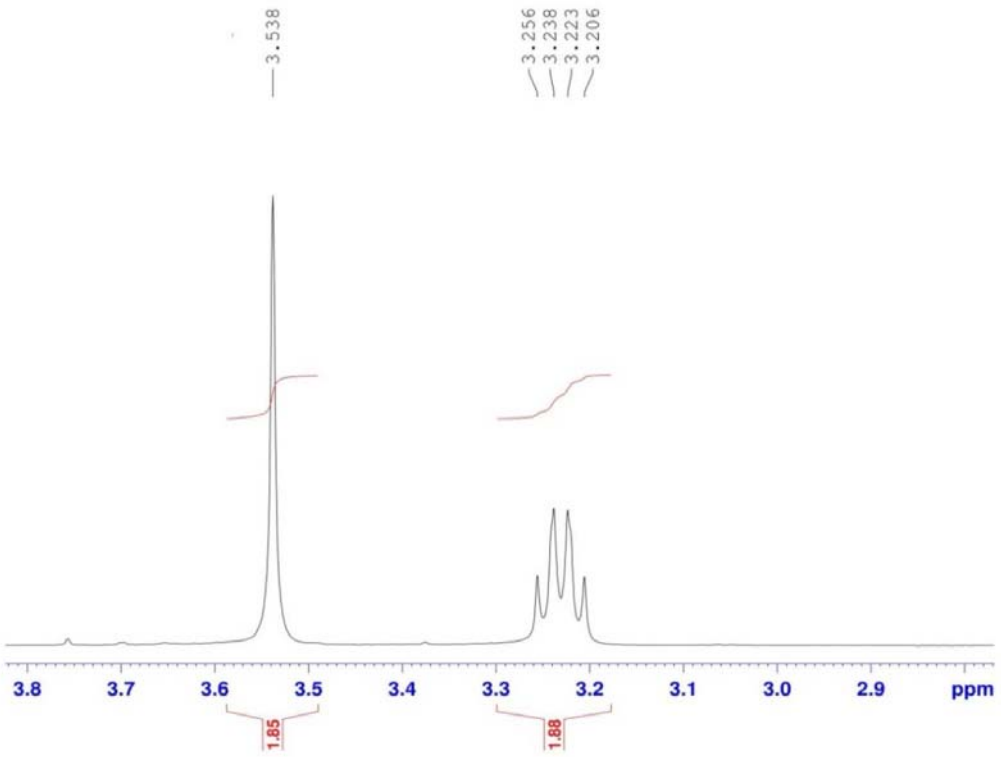

Figure S35. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-butyl-2-(4-chlorophenyl)acetamide (**6**) expanded.

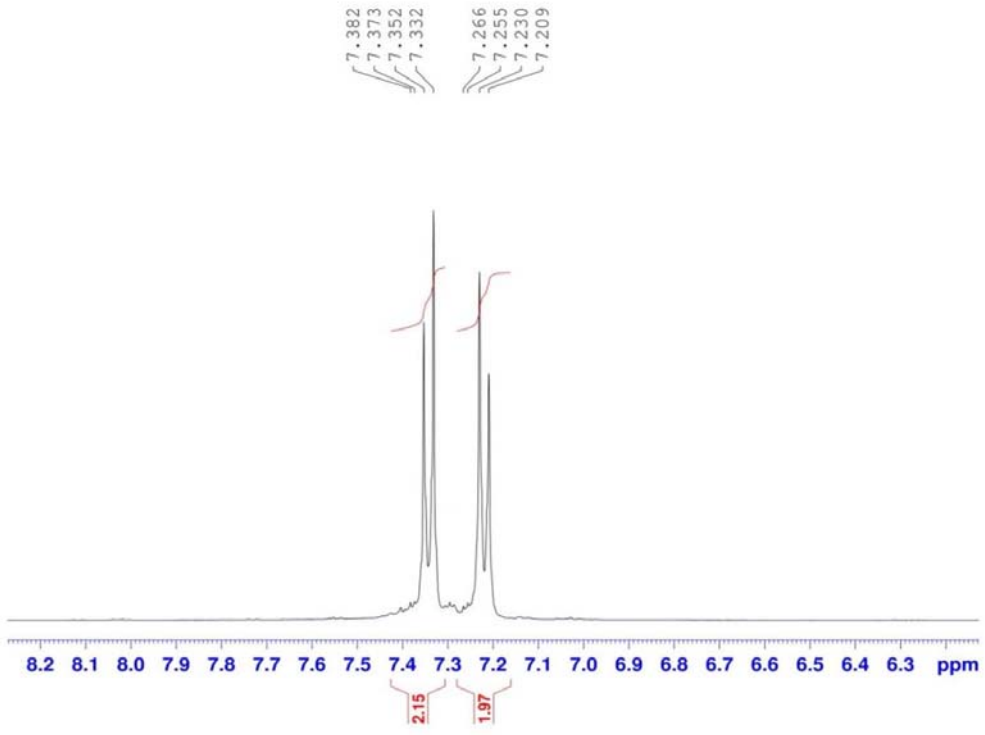

Figure S36. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-butyl-2-(4-chlorophenyl)acetamide.

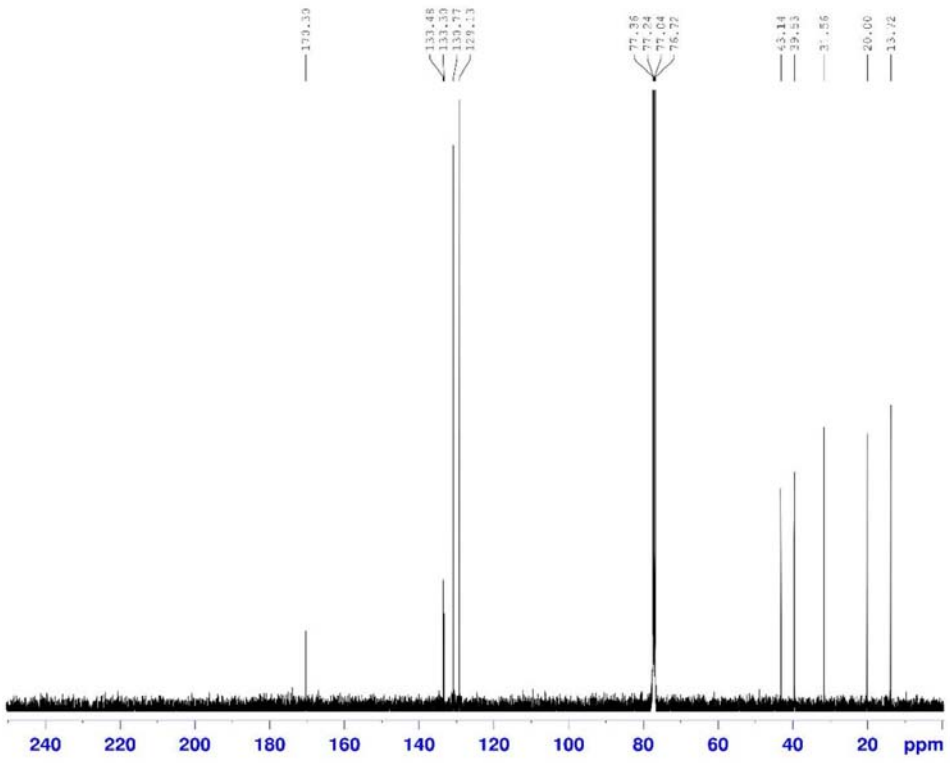

Figure S37. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-butyl-2-(4-chlorophenyl)acetamide (**6**).

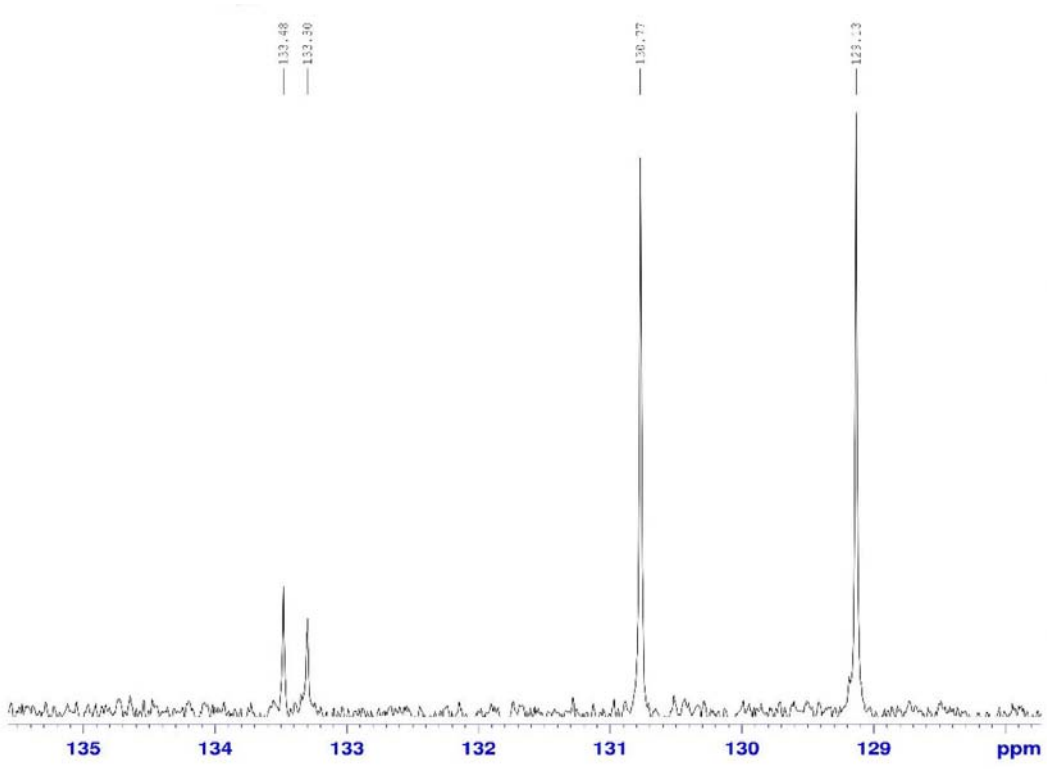

Figure S38. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-butyl-2-(4-chlorophenyl)acetamide (**6**) expanded.

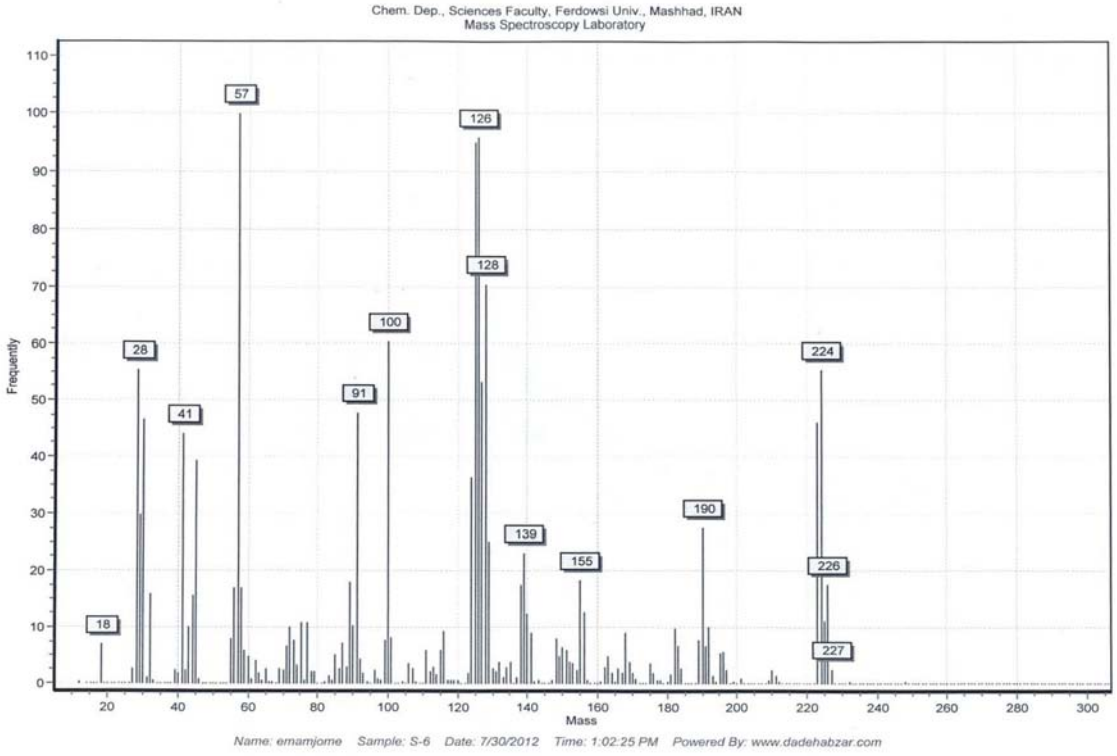

Figure S39. MS spectrum (EI, 70 eV) of *N*-butyl-2-(4-chlorophenyl)acetamide (**6**).

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                    Eager 300 Summarize Results

                            Date : 04/07/2012 at 11:01:53
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Sulphur%        0

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Component Name Average
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Nitrogen%      6.636153698
Carbon%        64.32457886
Hydrogen%      7.490045547
Sulphur%       0
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Calcd for $C_{12}H_{16}ClNO_2$

Nitrogen%	6.21
Carbon%	63.85
Hydrogen%	7.14
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Figure S40. Elemental analysis data of *N*-butyl-2-(4-chlorophenyl)acetamide (**6**).

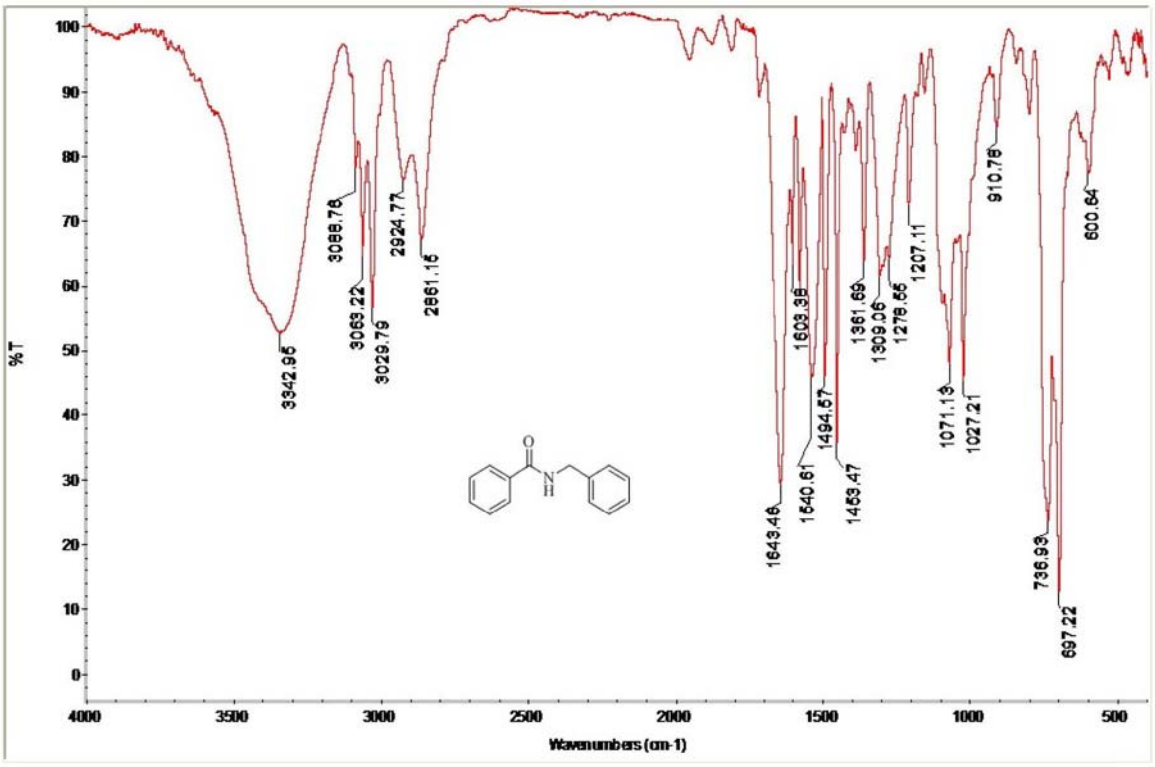

Figure S41. FTIR spectrum of *N*-benzylbenzamide (**7**).

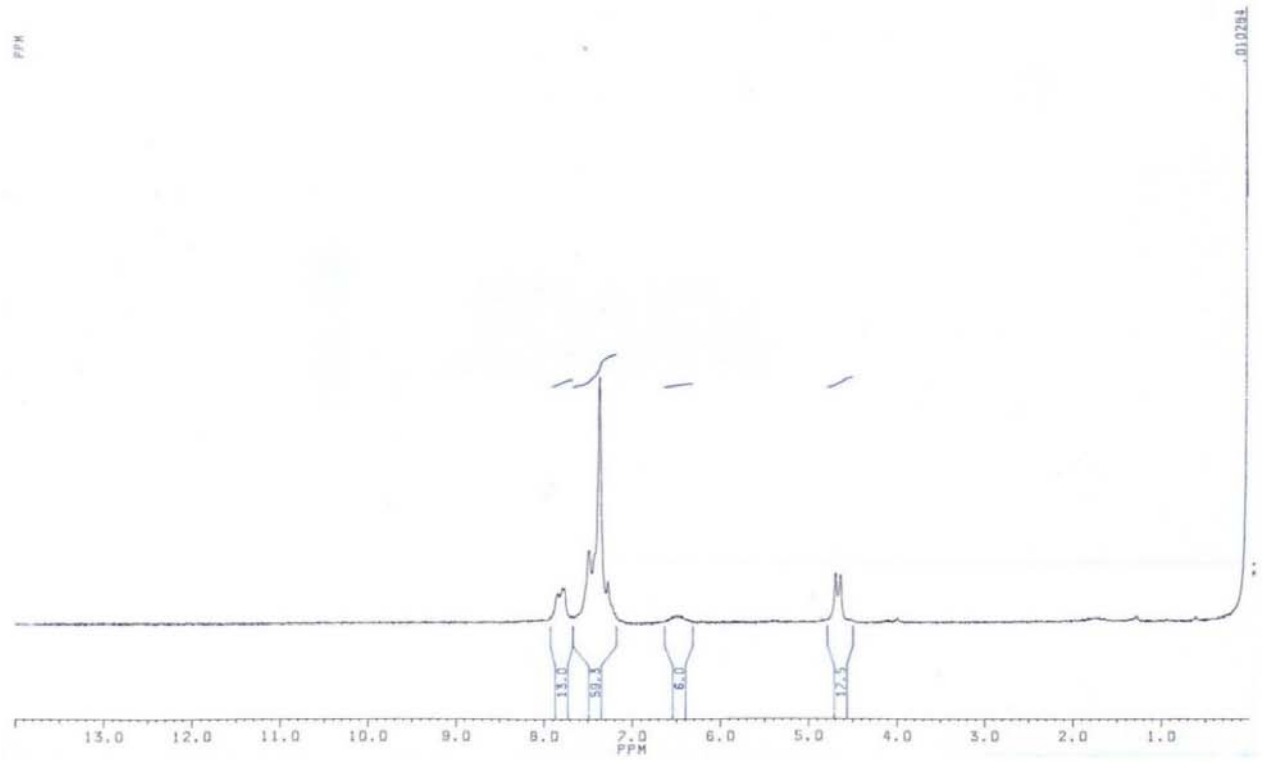

Figure S42. ^{1}H NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylbenzamide (**7**).

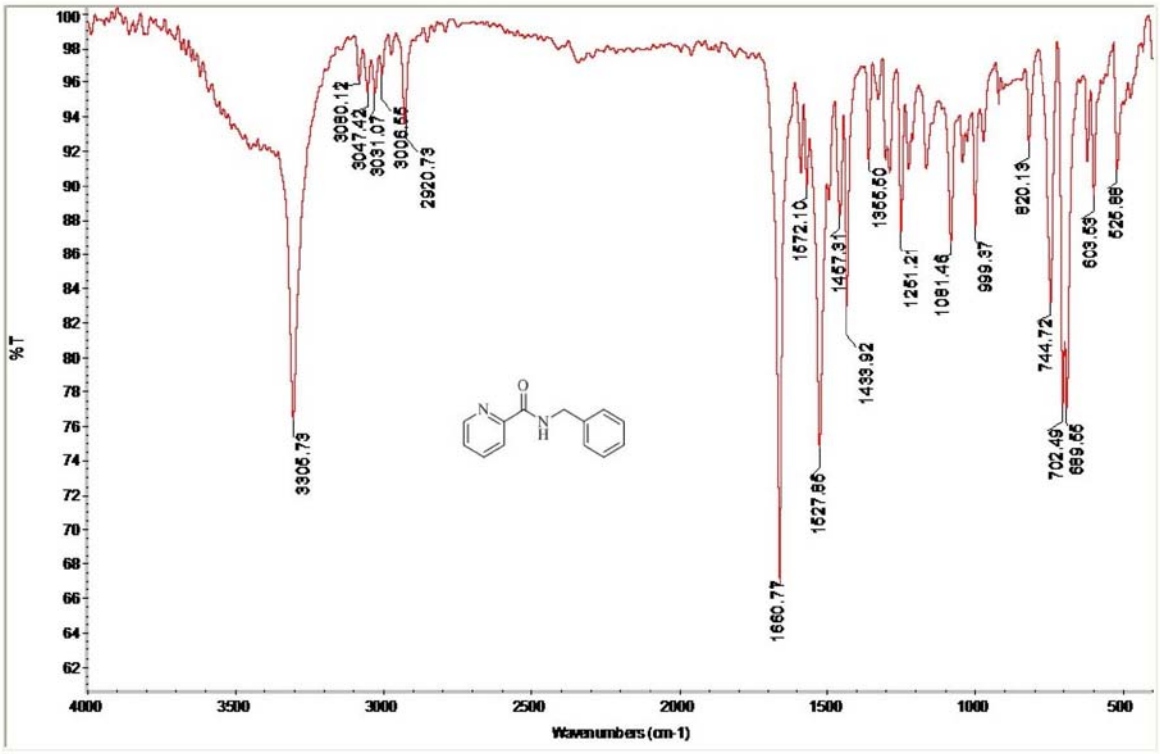

Figure S43. FTIR spectrum of *N*-benzylpicolinamide (**8**).

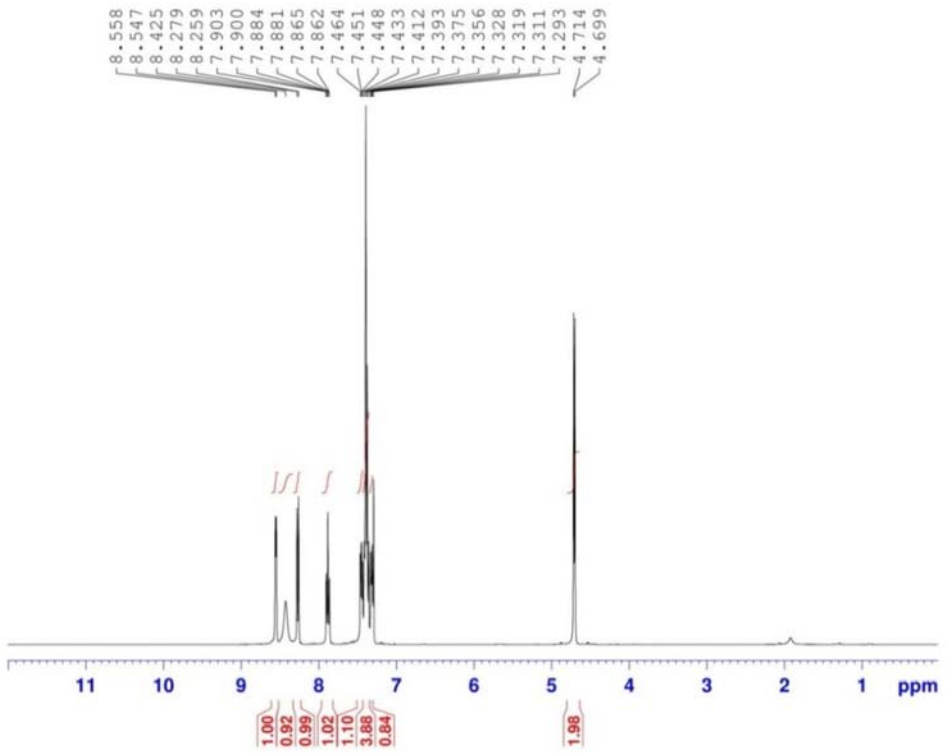

Figure S44. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzylpicolinamide (**8**).

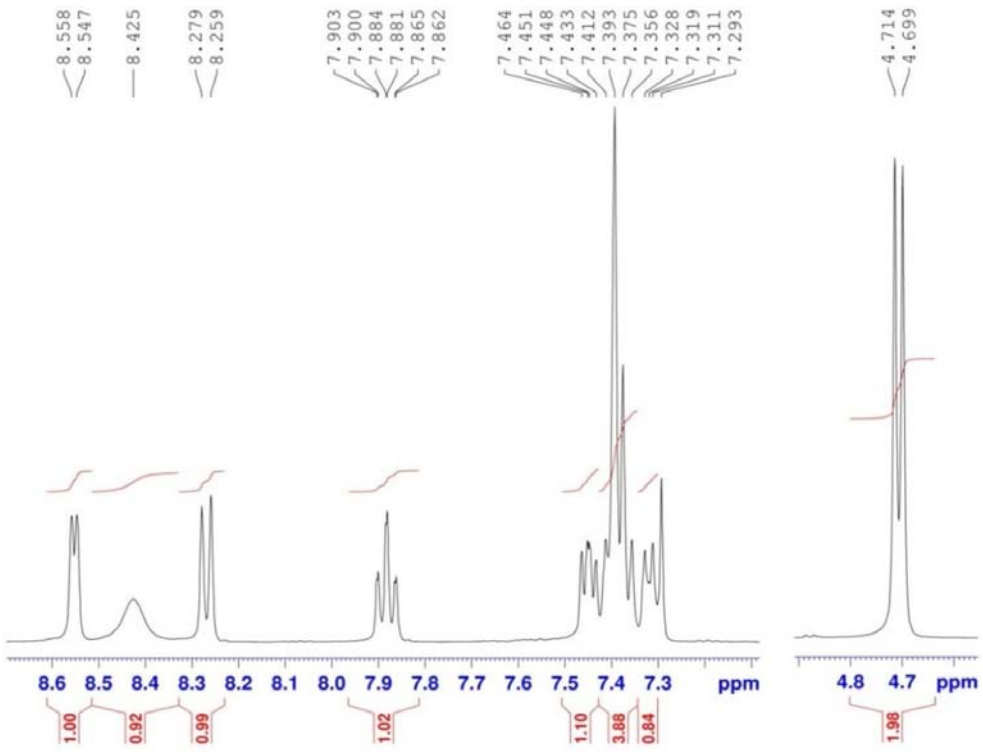

Figure S45. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzylpicolinamide (**8**) expanded.

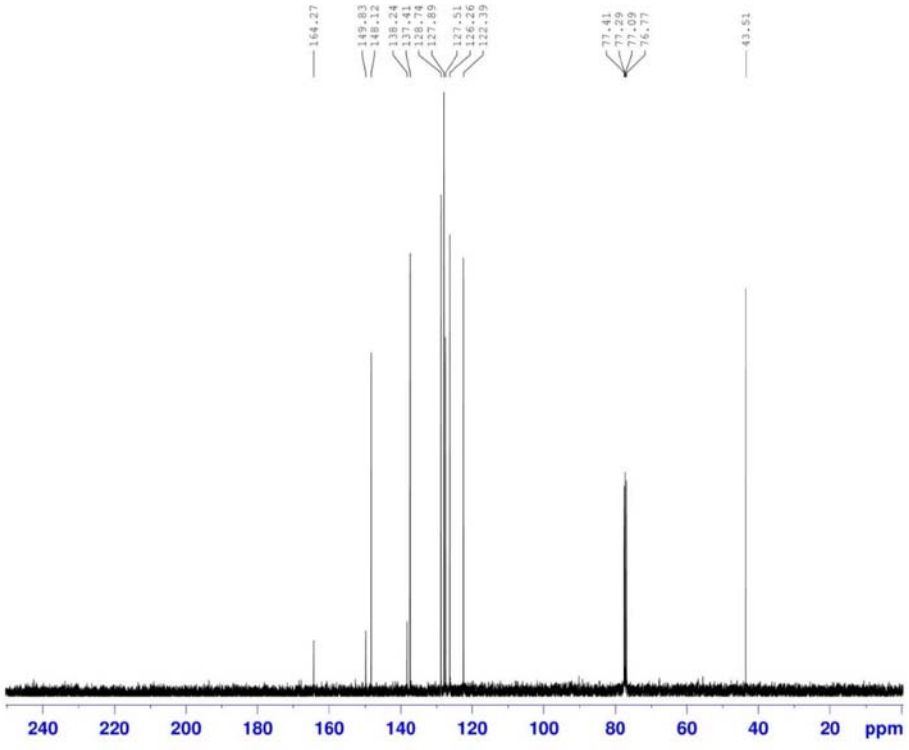

Figure S46. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylpicolinamide (**8**).

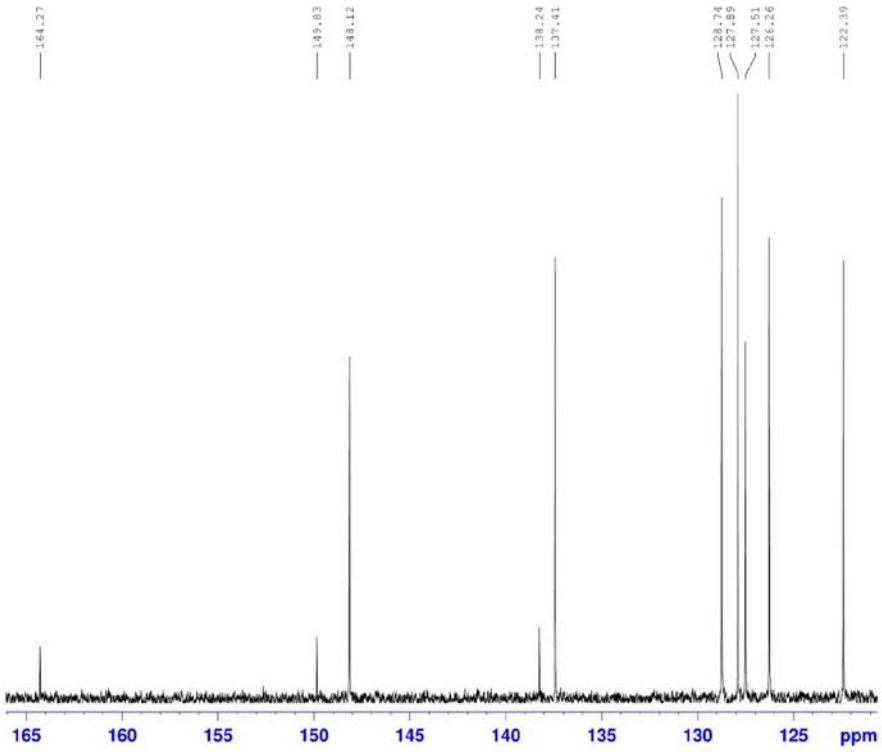

Figure S47. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylpicolinamide (**8**) expanded.

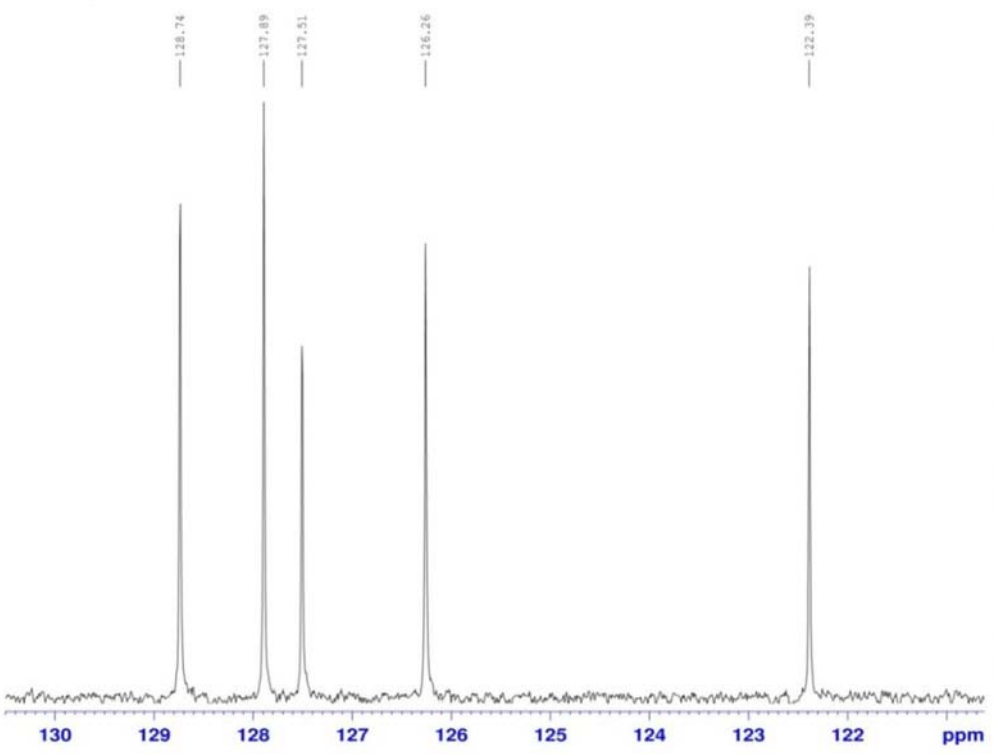

Figure S48. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylpicolinamide (**8**) expanded.

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Component name  Element %
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Carbon%         73.15912628
Hydrogen%       5.701982021
Sulphur%        0

            1 Sample(s) in Group No : 1
Component Name Average
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Nitrogen%      13.16875935
Carbon%        73.15912628
Hydrogen%      5.701982021
Sulphur%       0
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Caled for $C_{13}H_{12}N_2O$

Nitrogen%	13.20
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Hydrogen%	5.70
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Figure S49. Elemental analysis data of *N*-benzylpicolinamide (**8**).

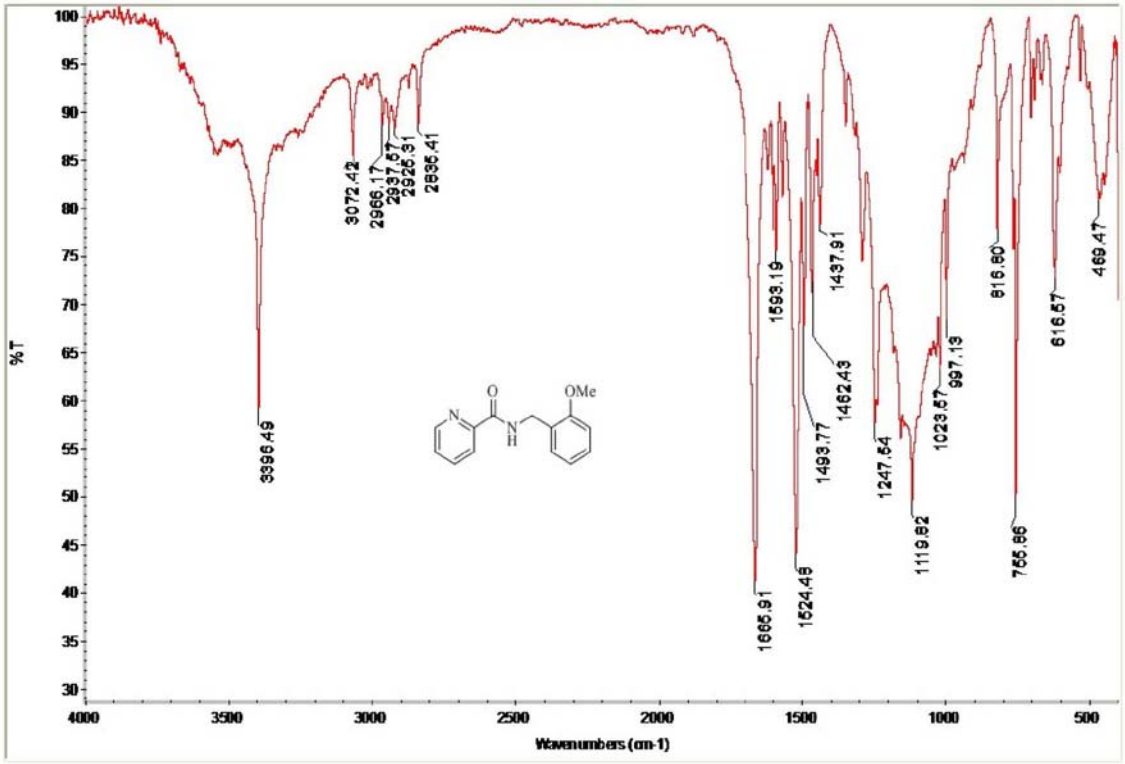

Figure S50. FTIR spectrum of *N*-(2-methoxybenzyl)picolinamide (**9**).

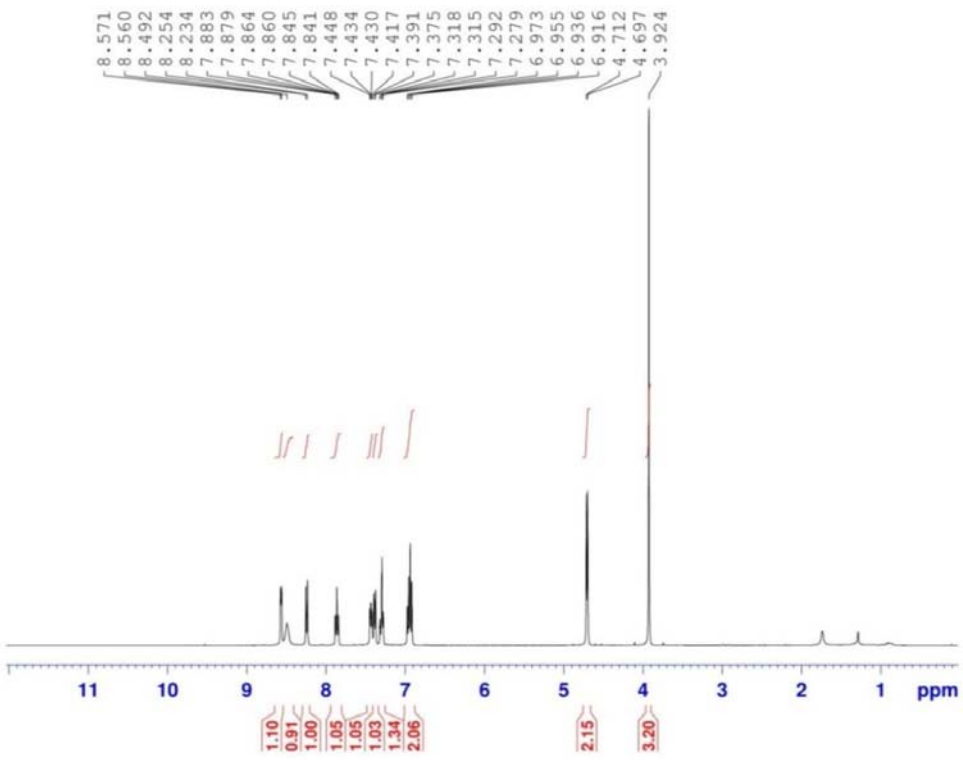

Figure S51. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)picolinamide (**9**).

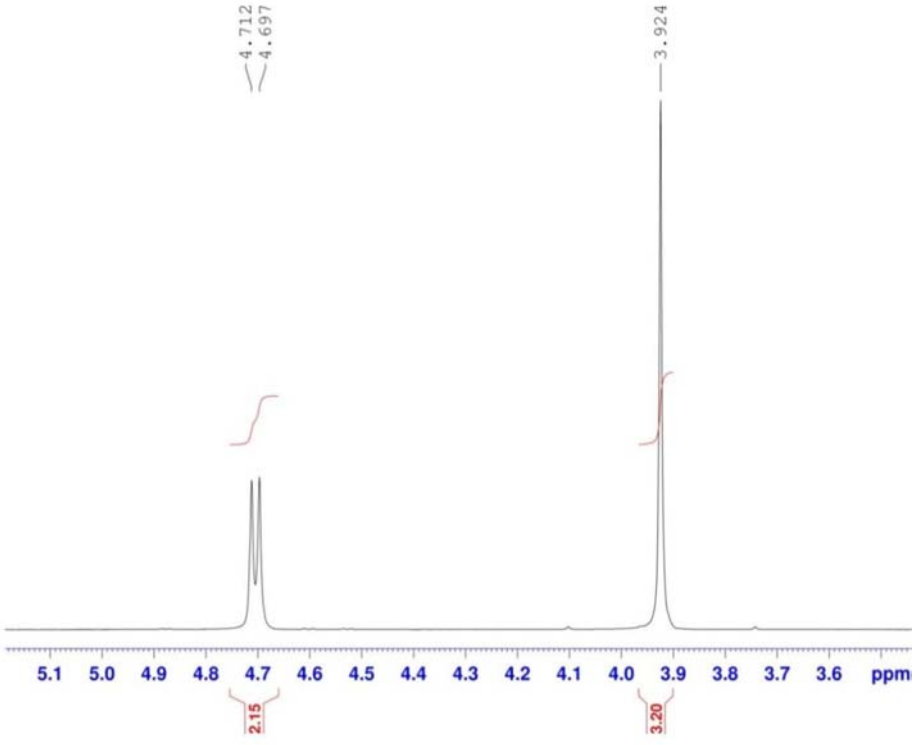

Figure S52. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)picolinamide (**9**) expanded.

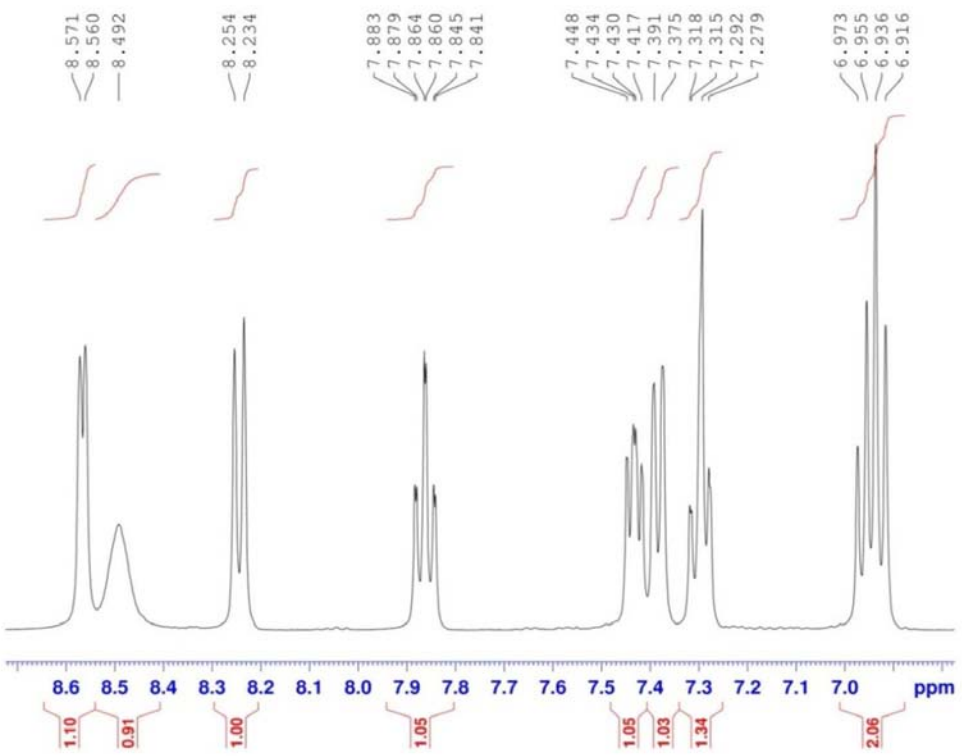

Figure S53. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl) picolinamide (**9**) expanded.

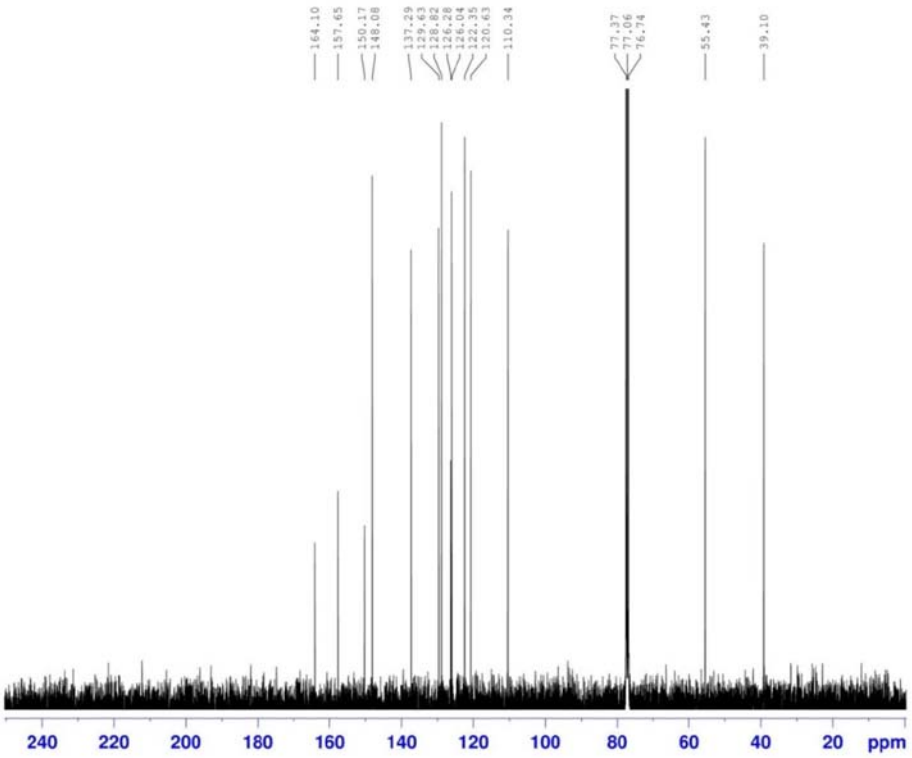

Figure S54. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)picolinamide (**9**).

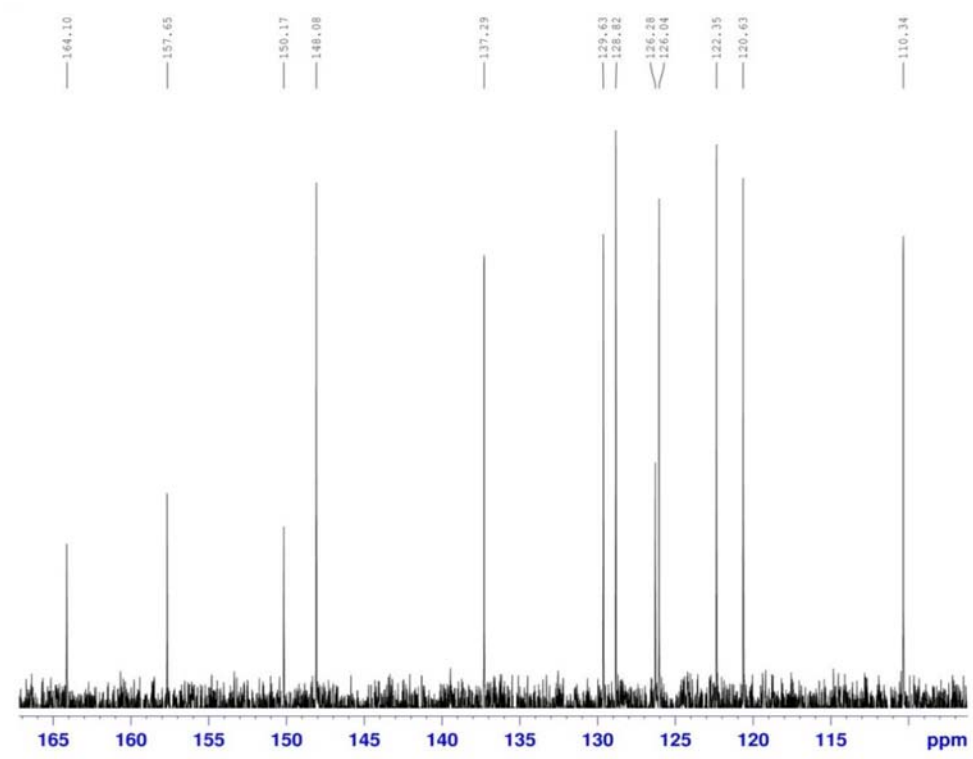

Figure S55. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)picolinamide (**9**) expanded.

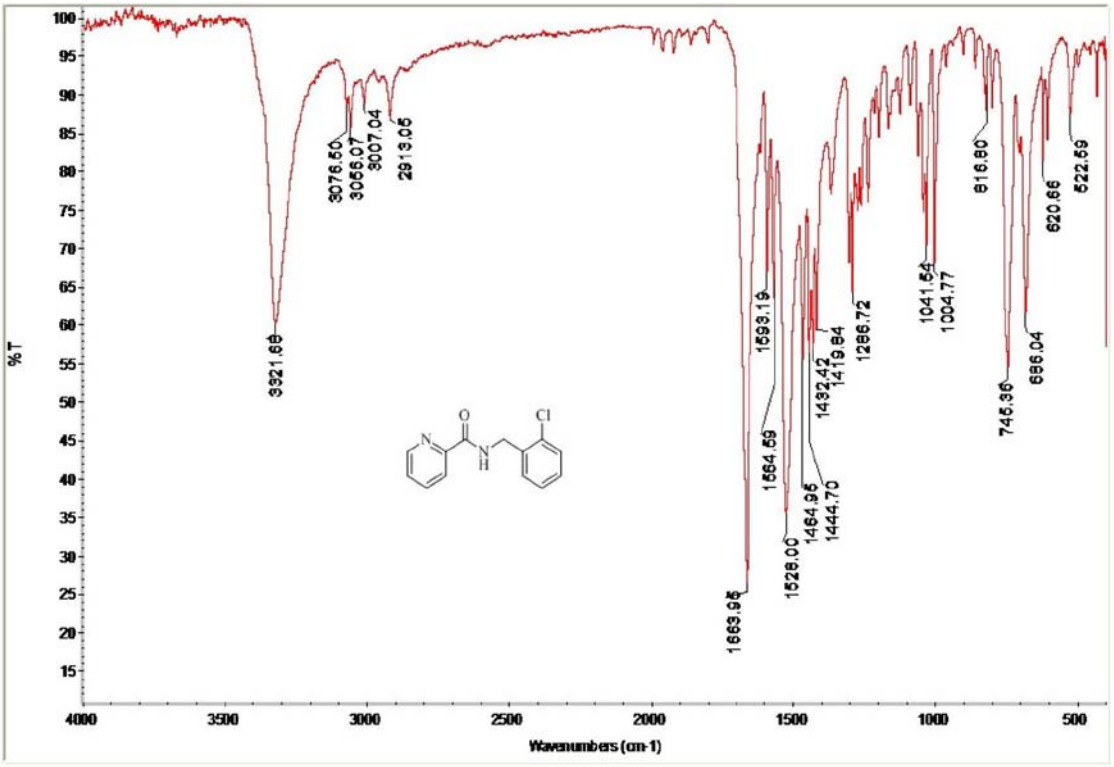

Figure S56. FTIR spectrum of *N*-(2-chlorobenzyl)picolinamide (**10**).

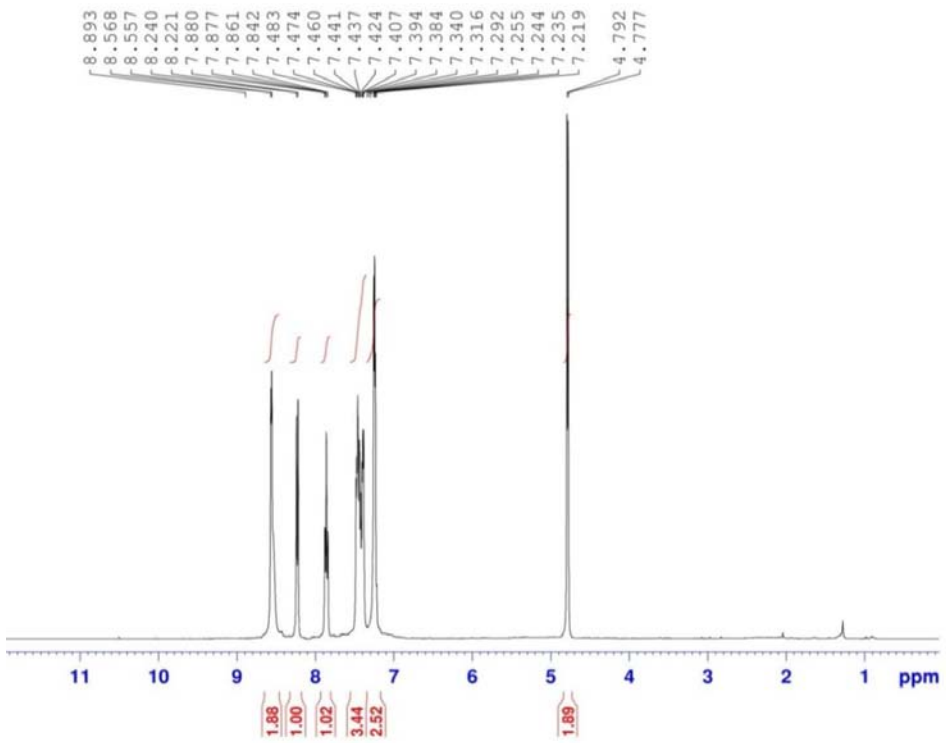

Figure S57. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)picolinamide (**10**).

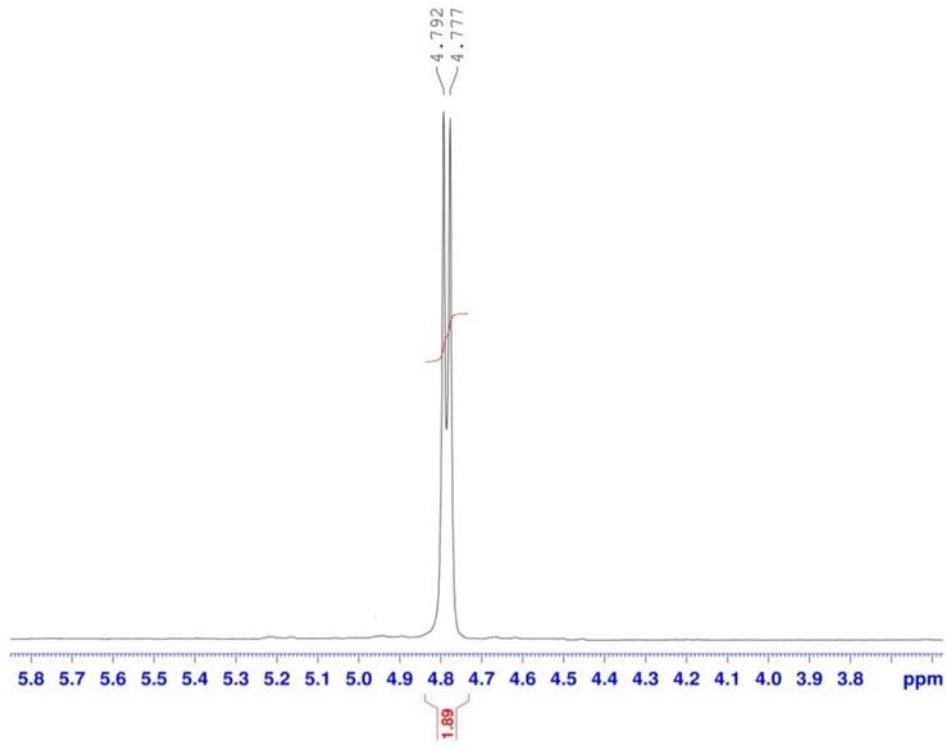

Figure S58. ^{1}H NMR (400 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)picolinamide (**10**) expanded.

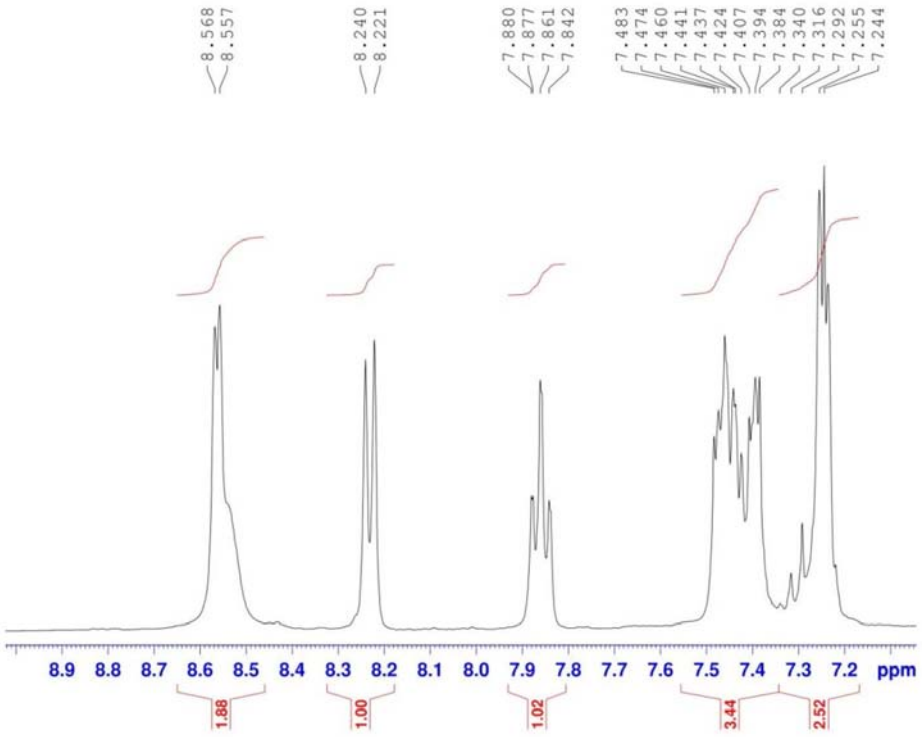

Figure S59. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)picolinamide (**10**) expanded.

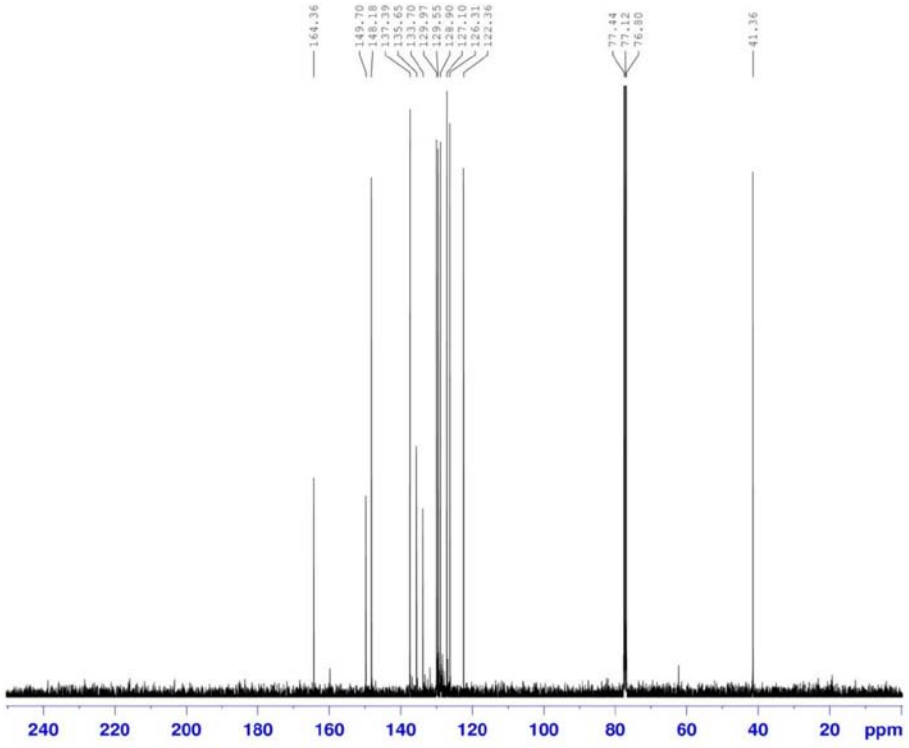

Figure S60. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)picolinamide (**10**).

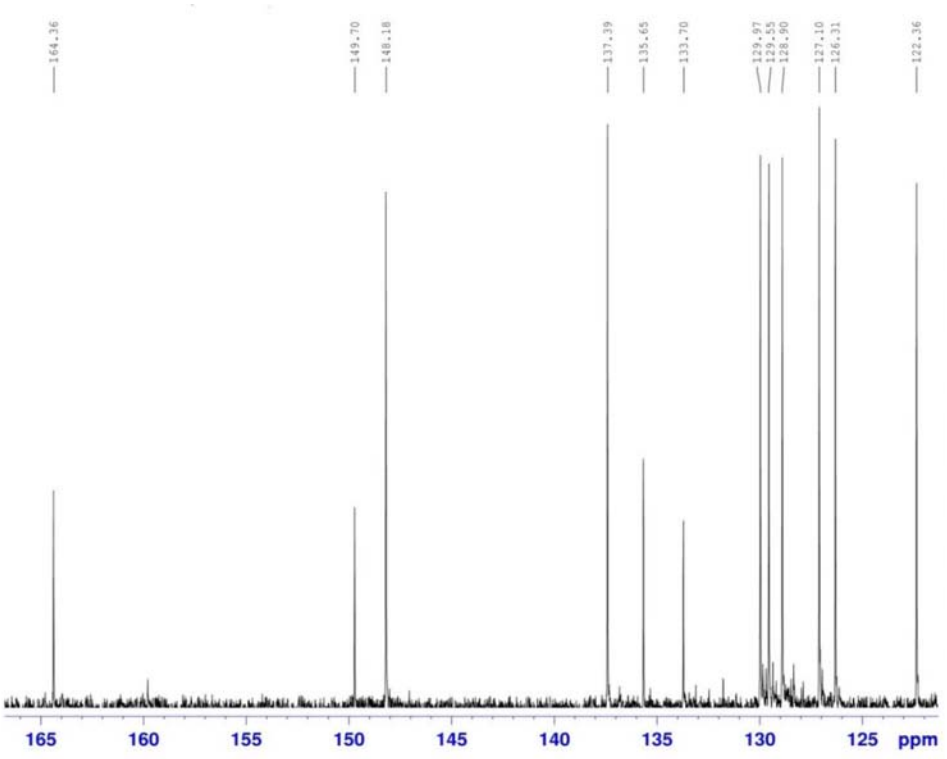

Figure S61. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)picolinamide (**10**) expanded.

Eager 300 Summarize Results

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emamjomeh-80		

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Carbon%	62.86192093
Hydrogen%	4.222644806
Sulphur%	0

Calcd for $C_{13}H_{11}ClN_2O$

Nitrogen%	11.36
Carbon%	63.29
Hydrogen%	4.49
Suphur%	0

1 Sample(s) in Group No : 1

Component Name	Average
Nitrogen%	10.93560867
Carbon%	62.86192093
Hydrogen%	4.222644806
Sulphur%	0

Figure S62. Elemental analysis data of *N*-(2-chlorobenzyl)picolinamide (**10**).

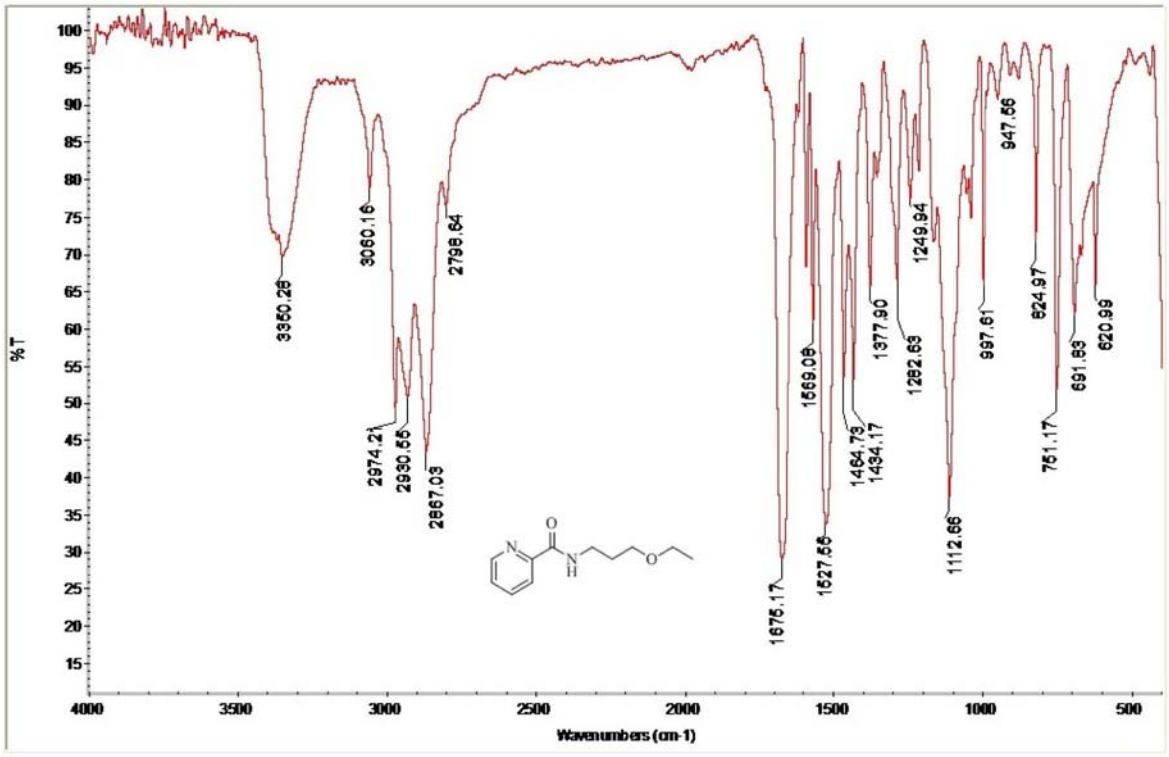

Figure S63. FTIR spectrum of *N*-(3-ethoxypropyl)picolinamide (**11**).

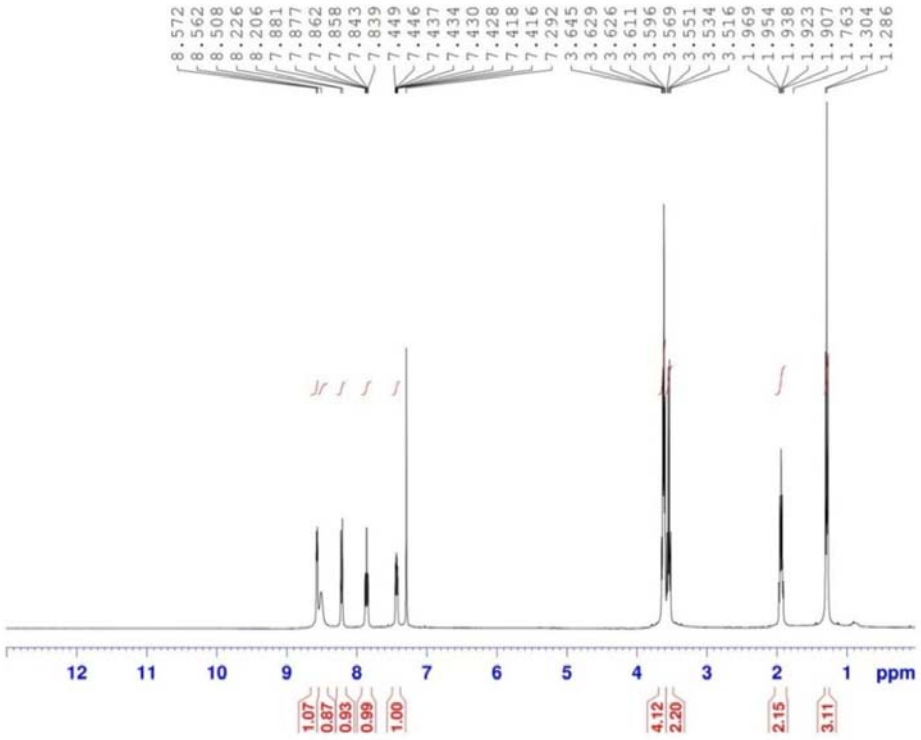

Figure S64. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)picolinamide (**11**).

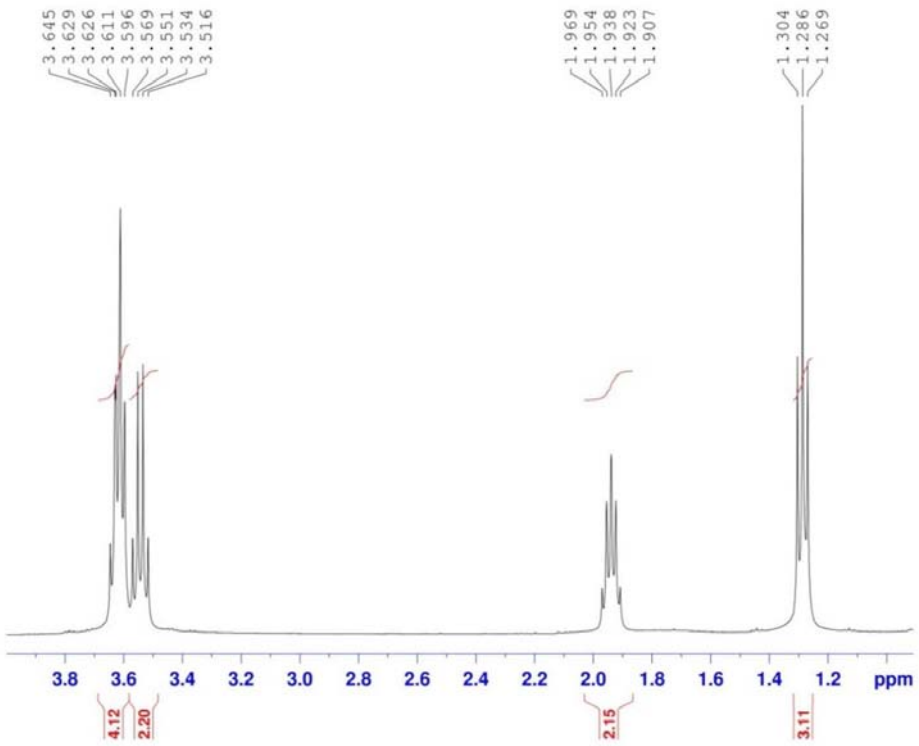

Figure S65. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)picolinamide (**11**) expanded.

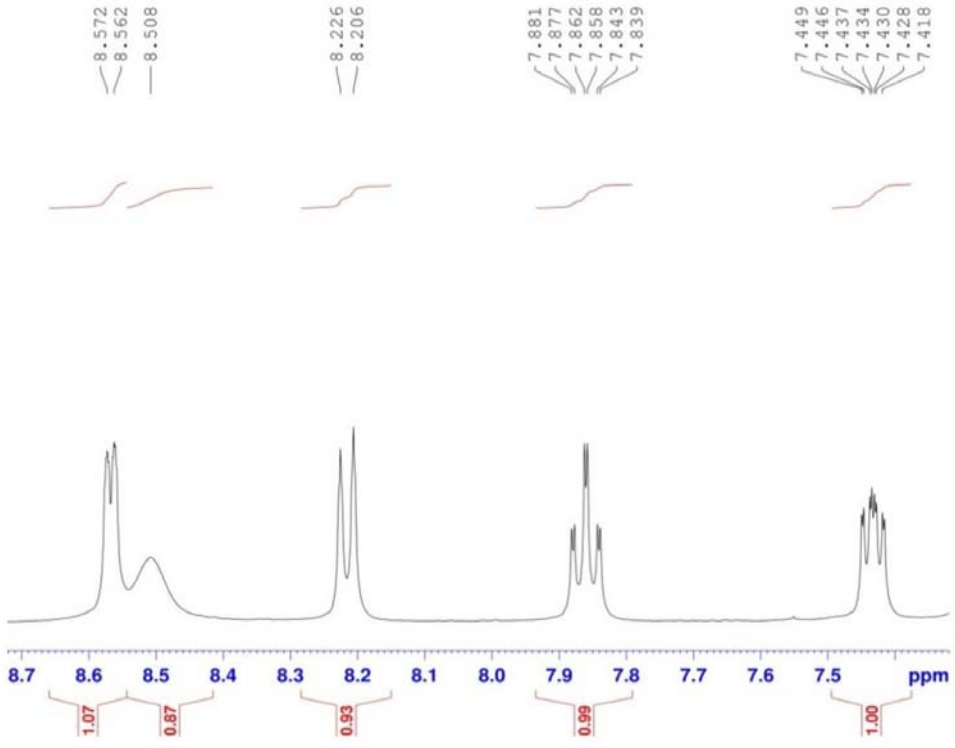

Figure S66. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)picolinamide (**11**) expanded.

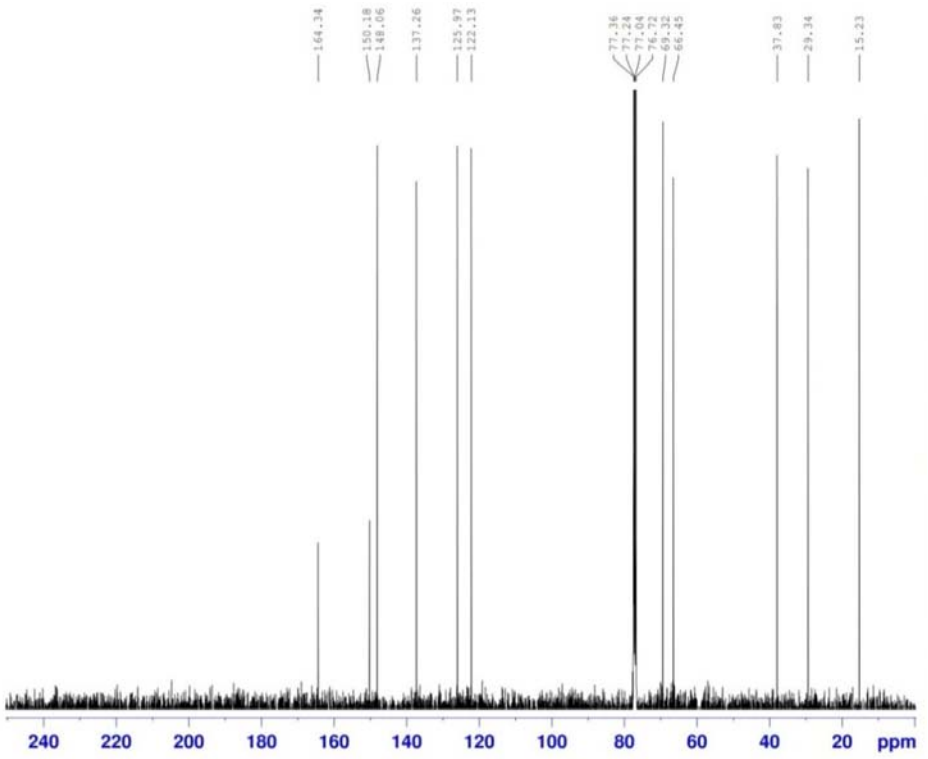

Figure S67. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)picolinamide (**11**).

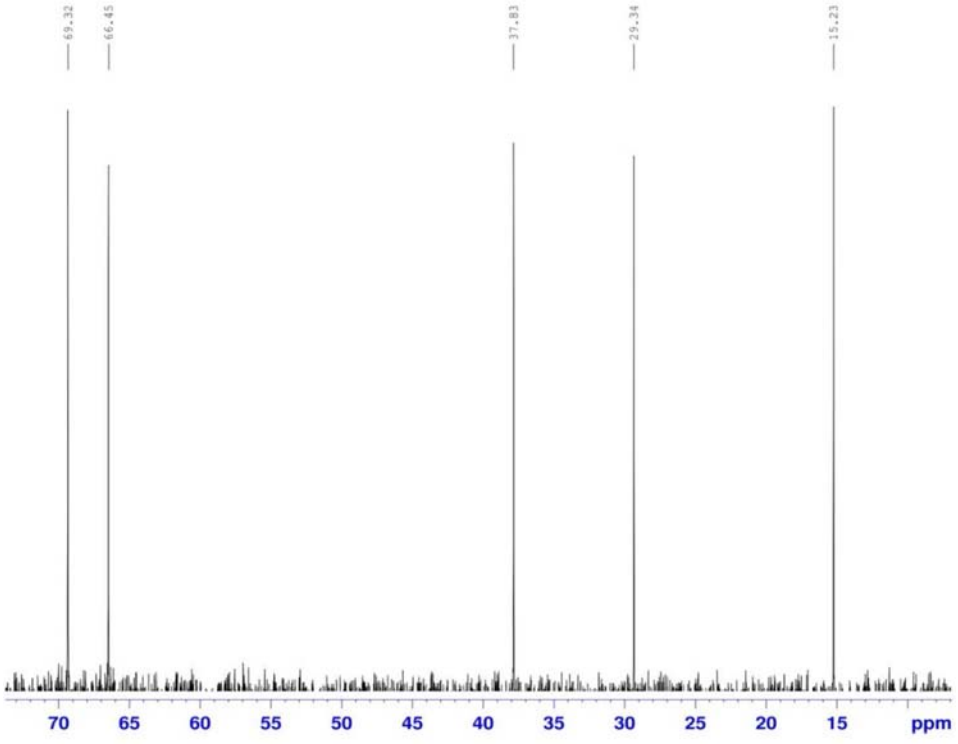

Figure S68. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)picolinamide (**11**).

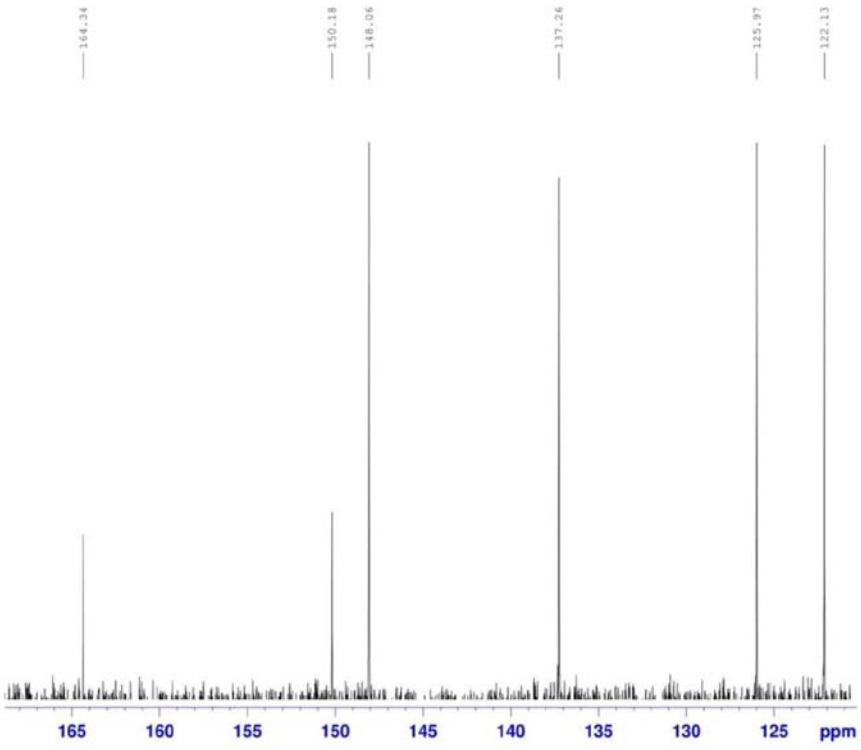

Figure S69. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)picolinamide (**11**) expanded.

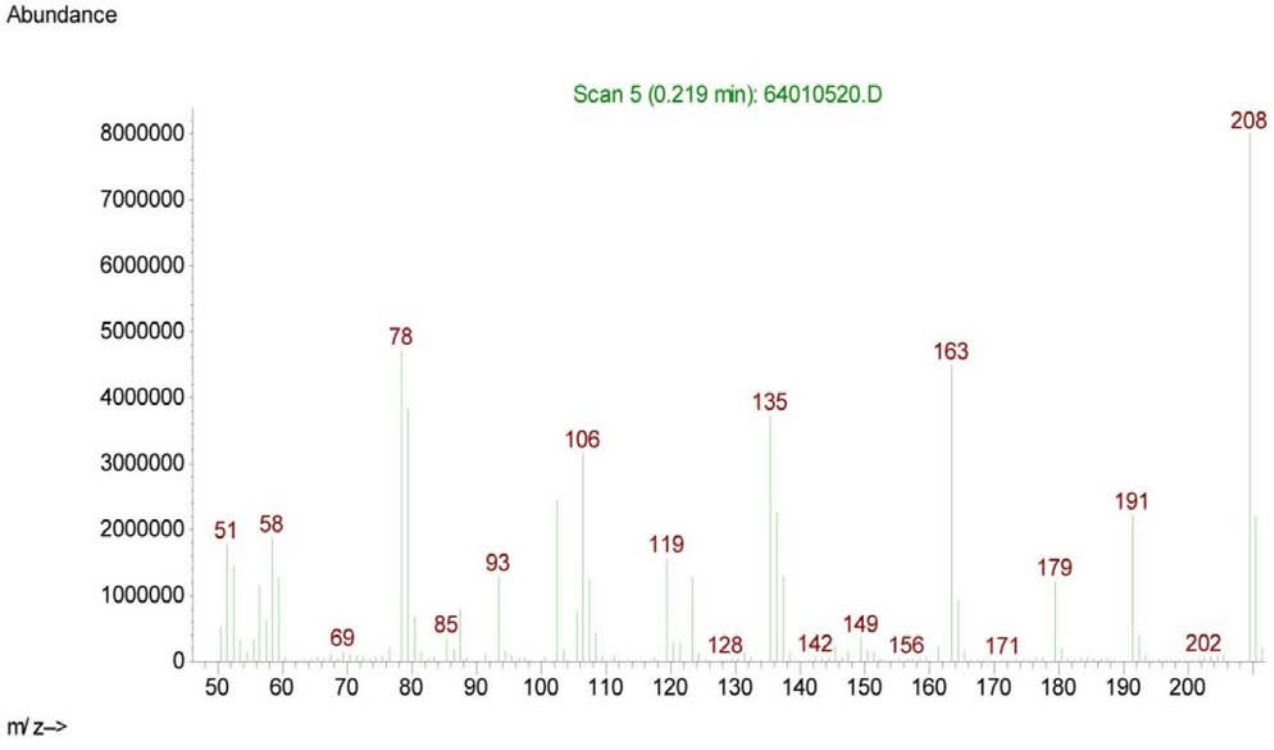

Figure S70. MS spectrum (EI, 70 eV) of *N*-(3-ethoxypropyl)picolinamide (**11**).

06.08.12 10:10

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Document: 900511 (varioEL), Name: eassuperuser, Access: varioEL superuser
Elementar Analysensysteme GmbH VarioEL V5.19.11 21. Oct. 09, CHNS Mode, S. No.: 11092035
Page 1/1

Figure S71. Elemental analysis data of *N*-(3-ethoxypropyl)picolinamide (**11**).

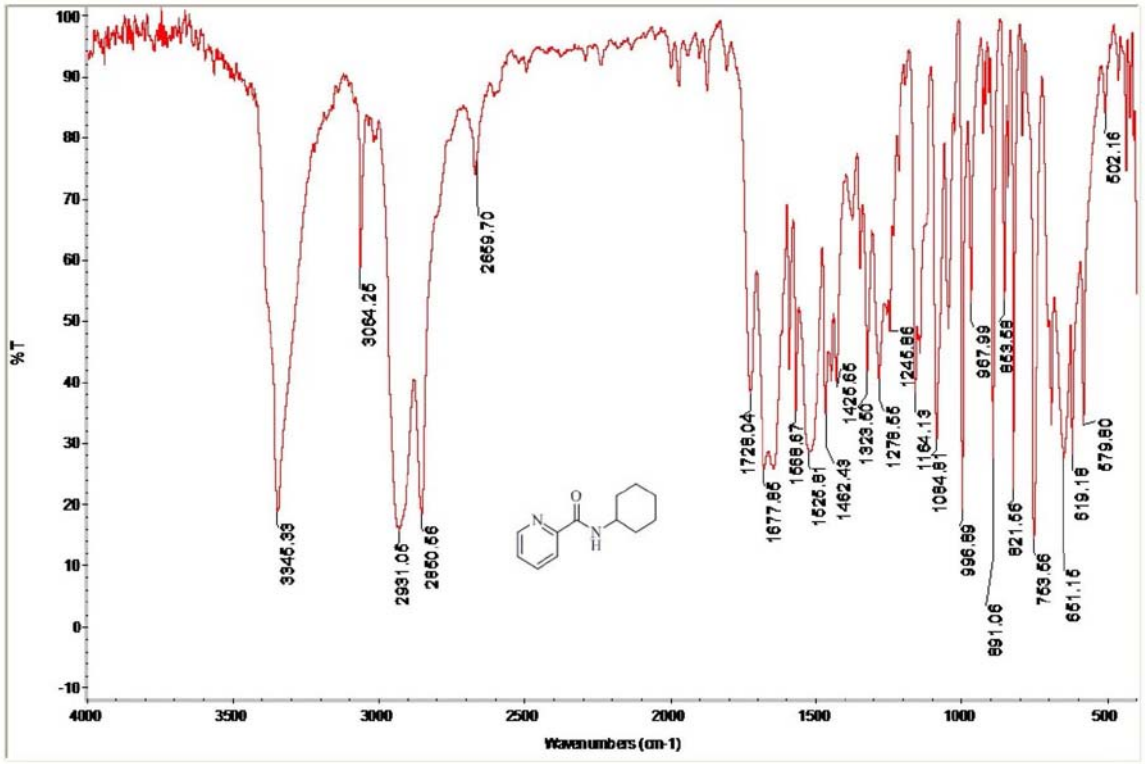

Figure S72. FTIR spectrum of *N*-cyclohexylpicolinamide (**12**).

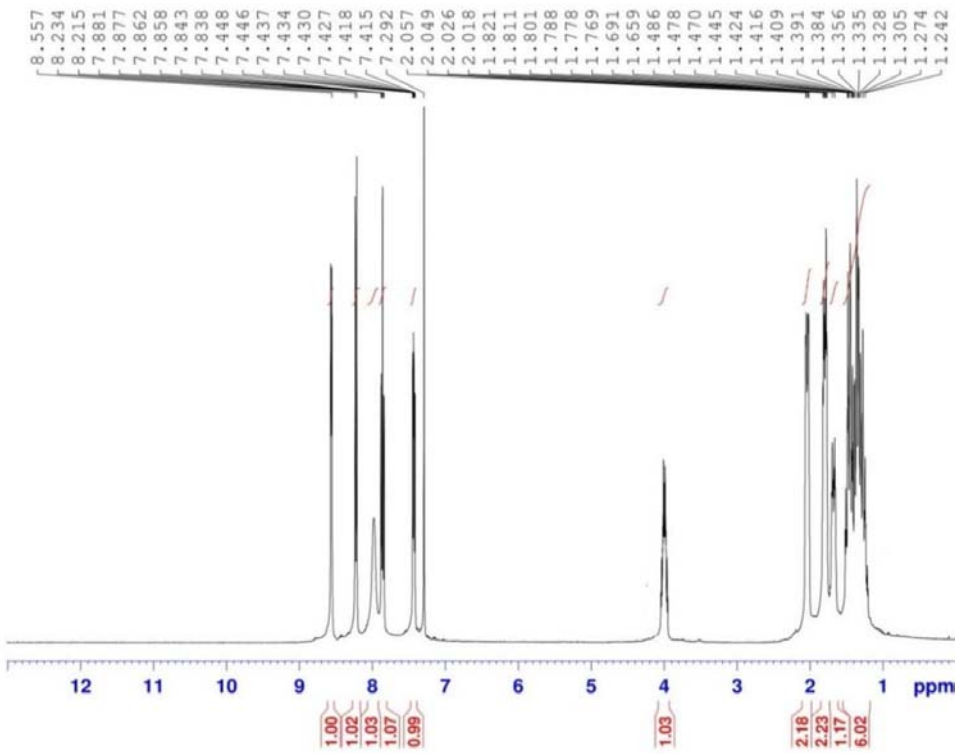

Figure S73. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-cyclohexylpicolinamide (**12**).

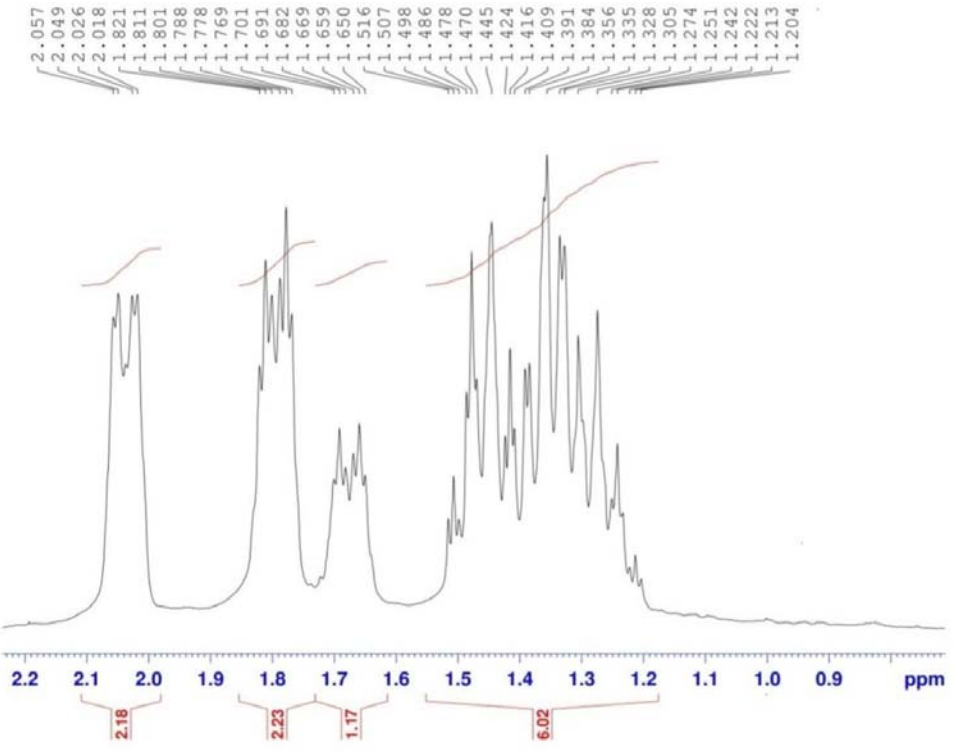

Figure S74. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-cyclohexylpicolinamide (**12**) expanded.

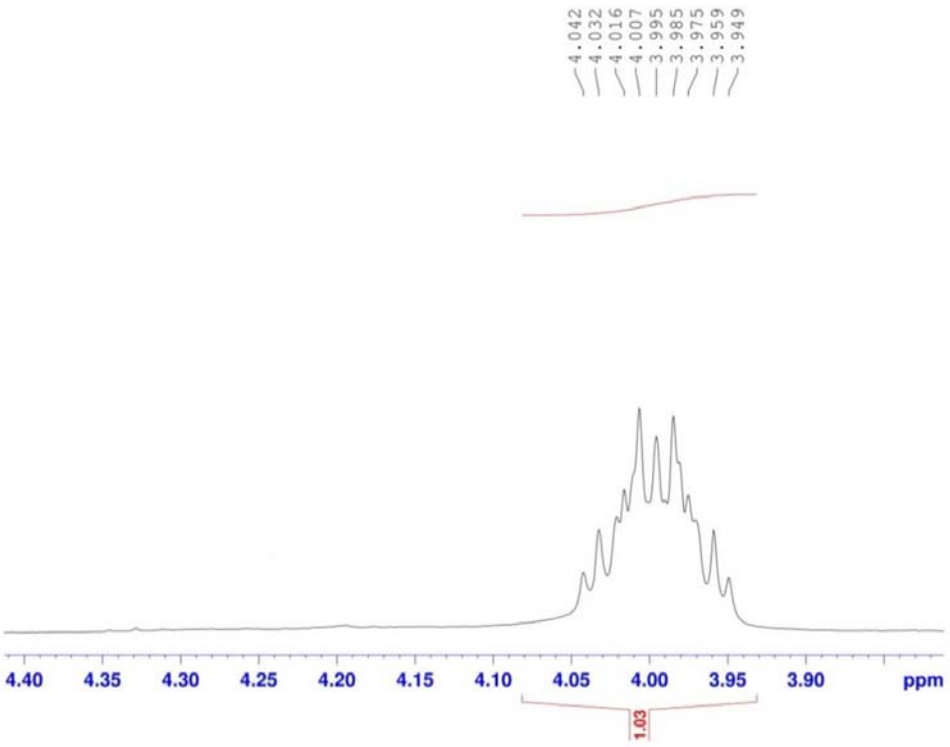

Figure S75. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-cyclohexylpicolinamide (**12**) expanded.

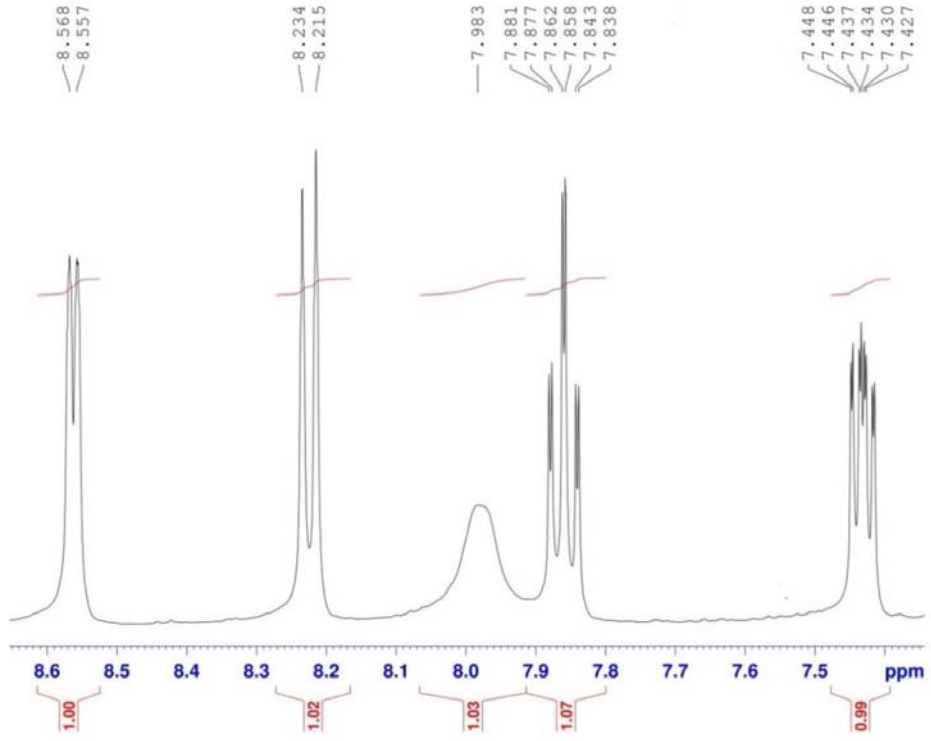

Figure S76. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-cyclohexylpicolinamide (**12**) expanded.

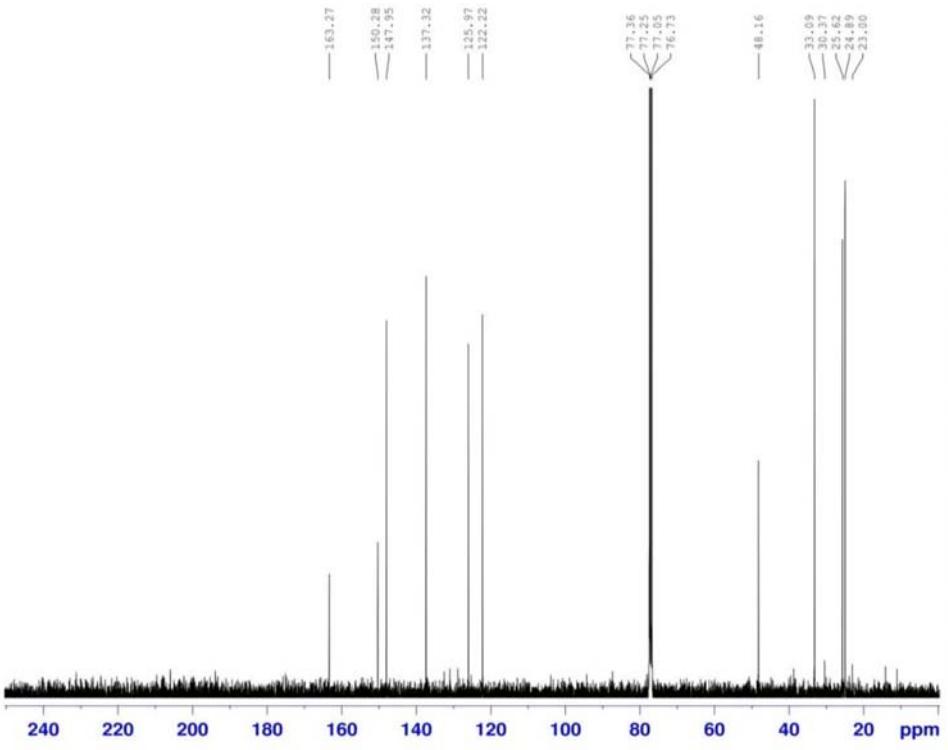

Figure S77. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-cyclohexylpicolinamide (**12**).

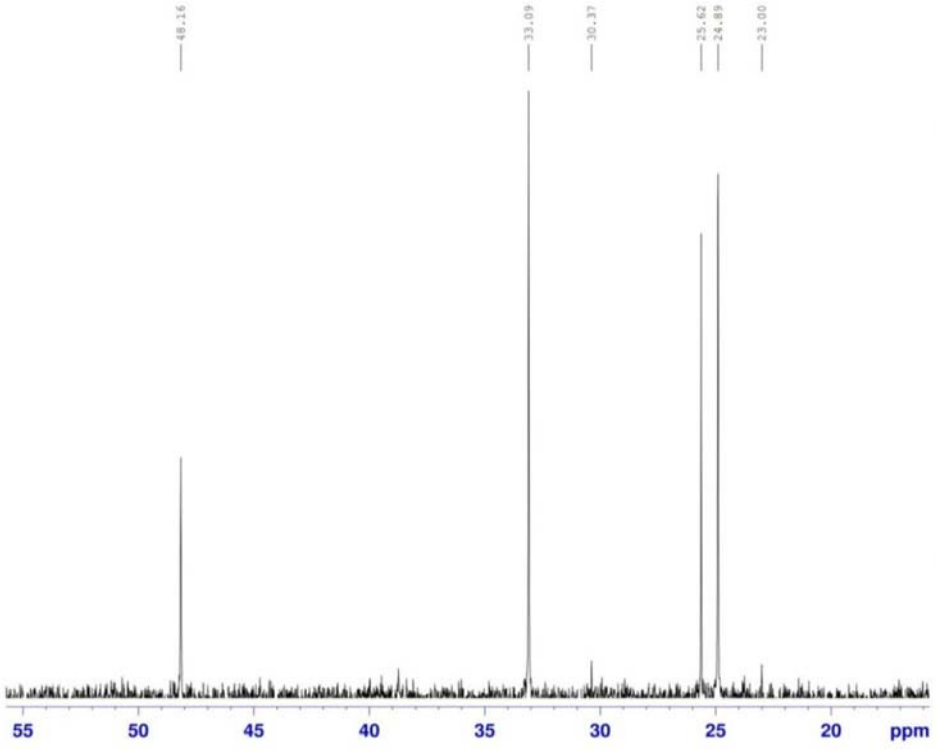

Figure S78. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-cyclohexylpicolinamide (**12**) expanded.

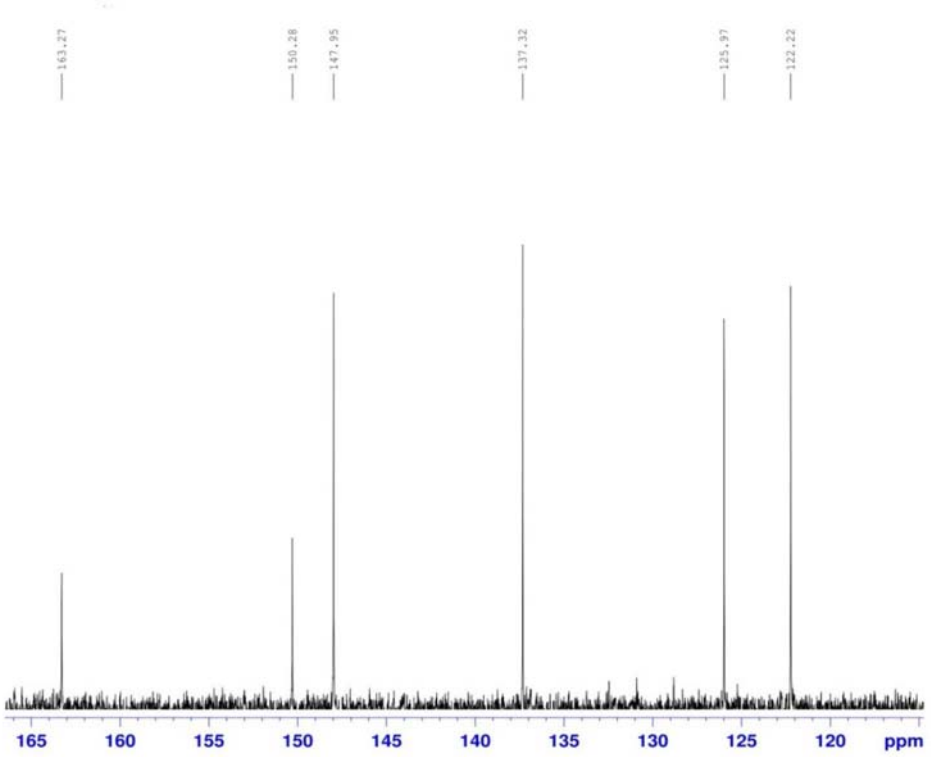

Figure S79. ^{13}C NMR (100 MHz, $CDCl_3$) of *N*-cyclohexylpicolinamide (**12**) expanded.

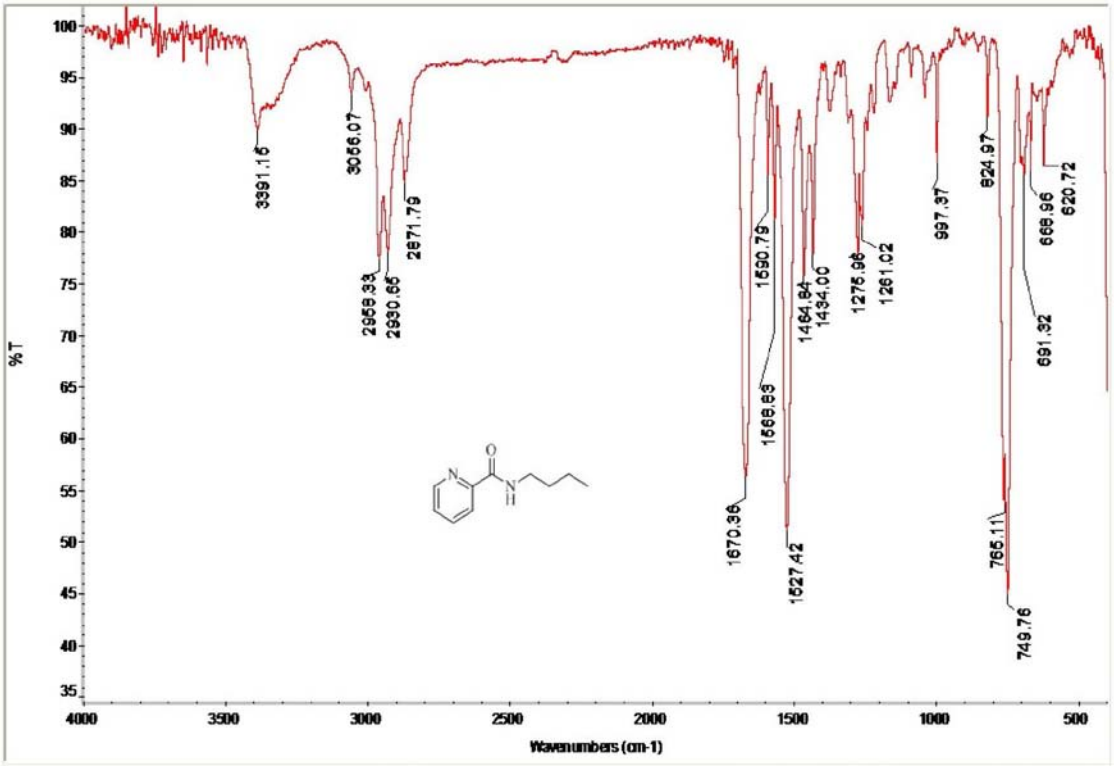

Figure S80. FTIR spectrum of *N*-butylpicolinamide (**13**).

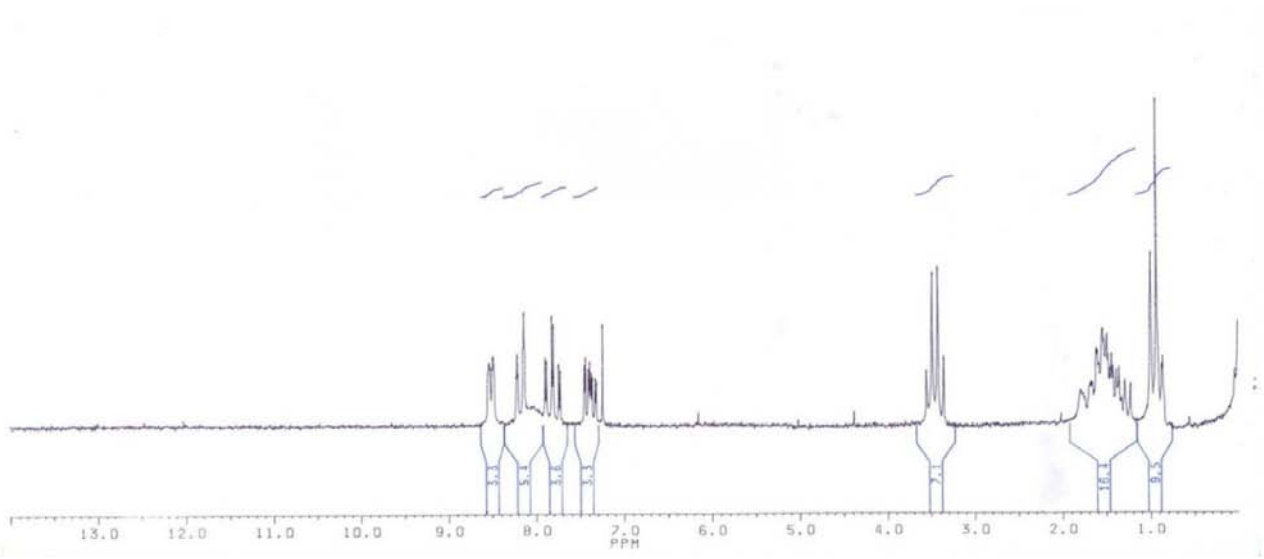

Figure S81. ^{1}H NMR spectrum (100 MHz, $CDCl_3$) of *N*-butylpicolinamide (**13**).

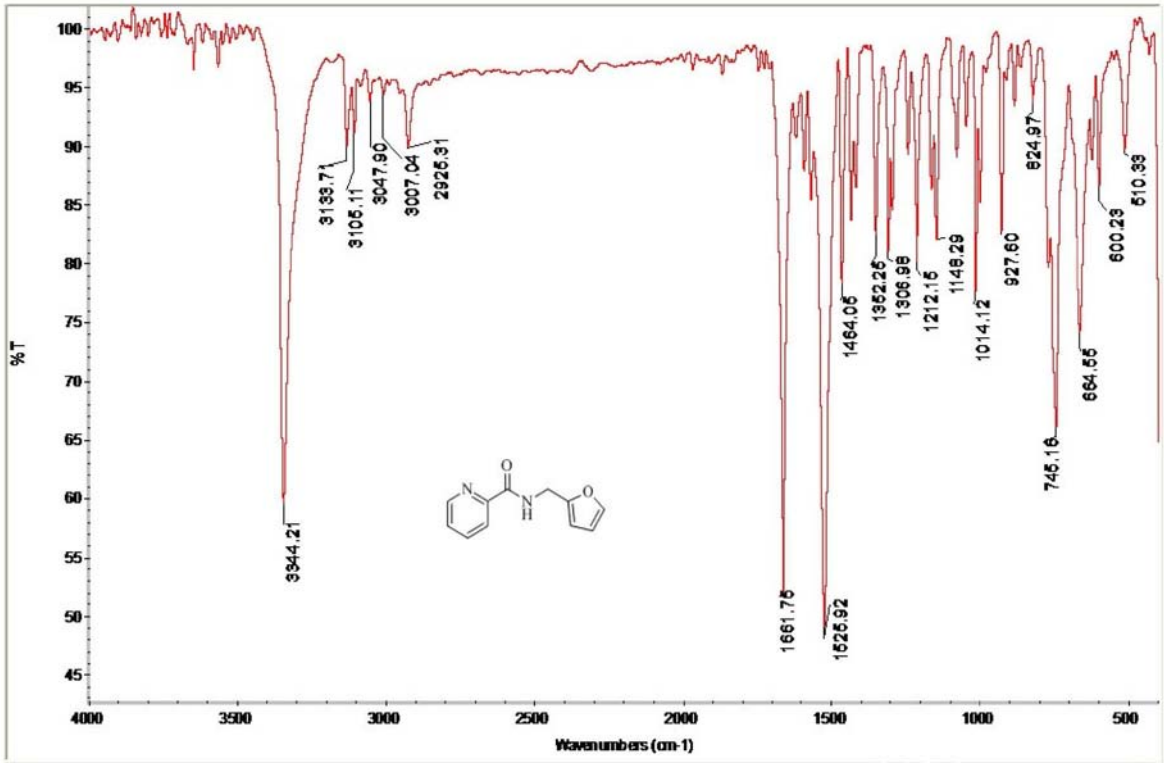

Figure S82. FTIR spectrum of *N*-(furan-2-ylmethyl)picolinamide (**14**).

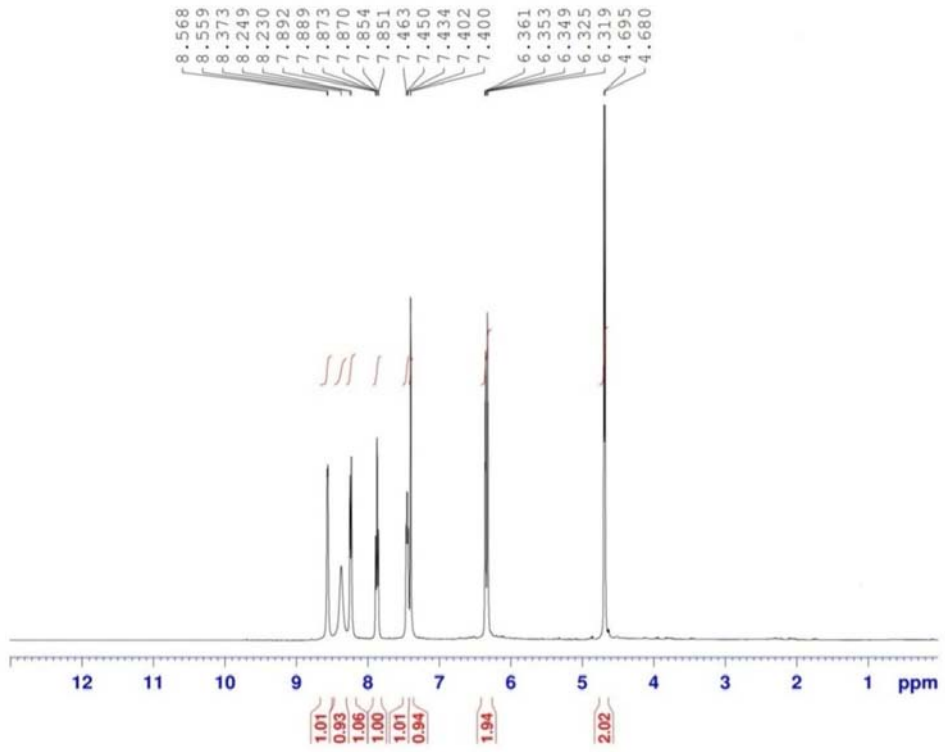

Figure S83. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(furan-2-ylmethyl)picolinamide (**14**).

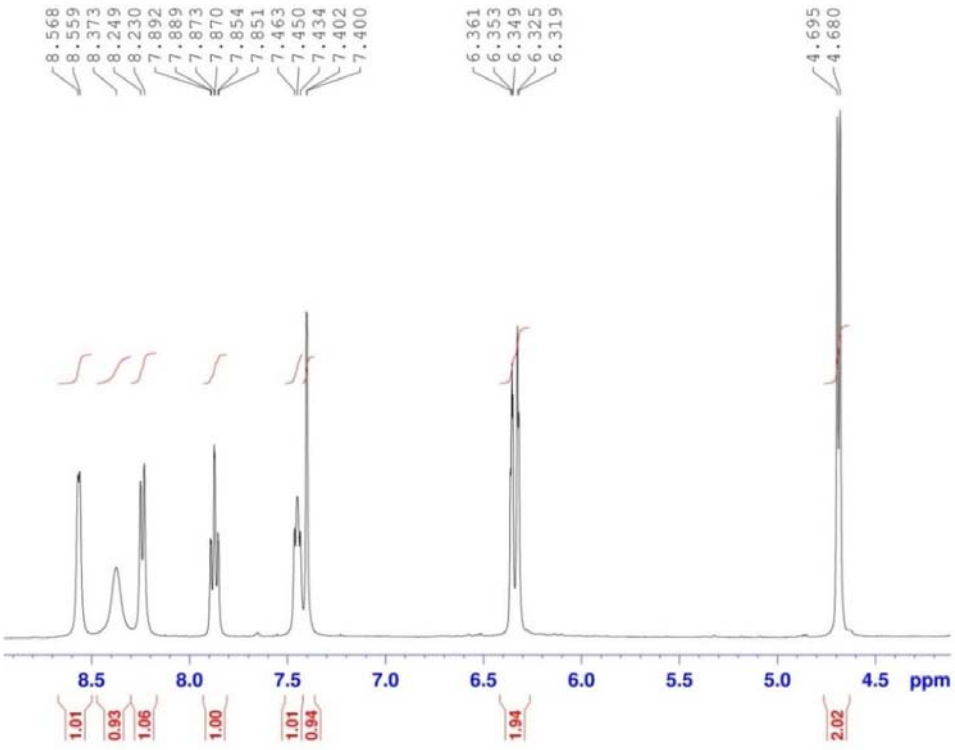

Figure S84. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(furan-2-ylmethyl)picolinamide (**14**) expanded.

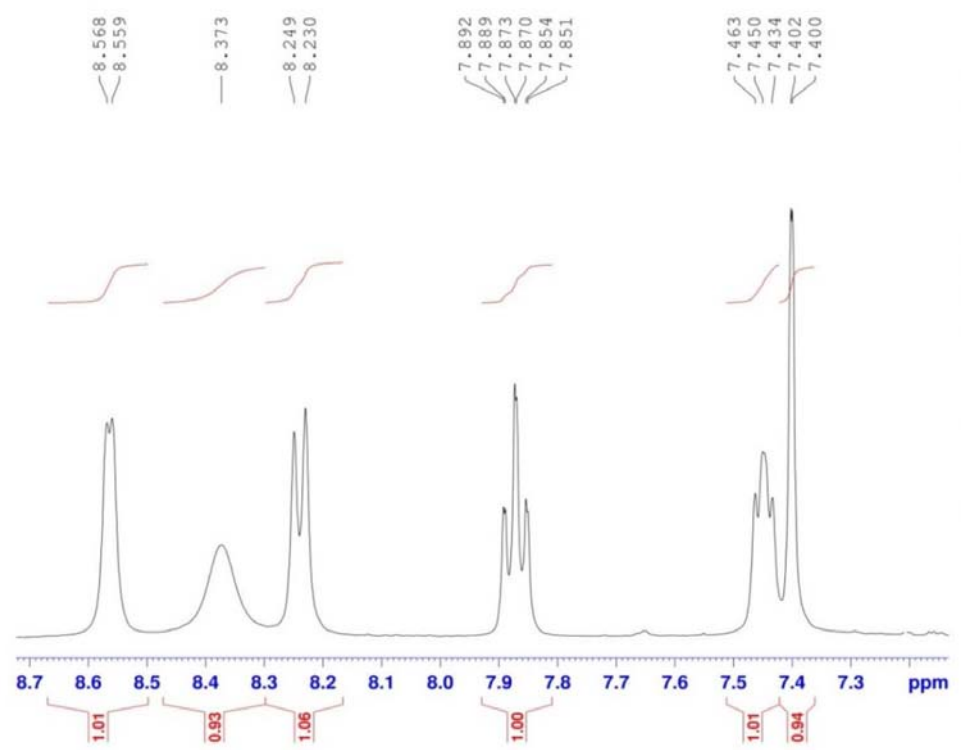

Figure S85. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(furan-2-ylmethyl)picolinamide (**14**) expanded.

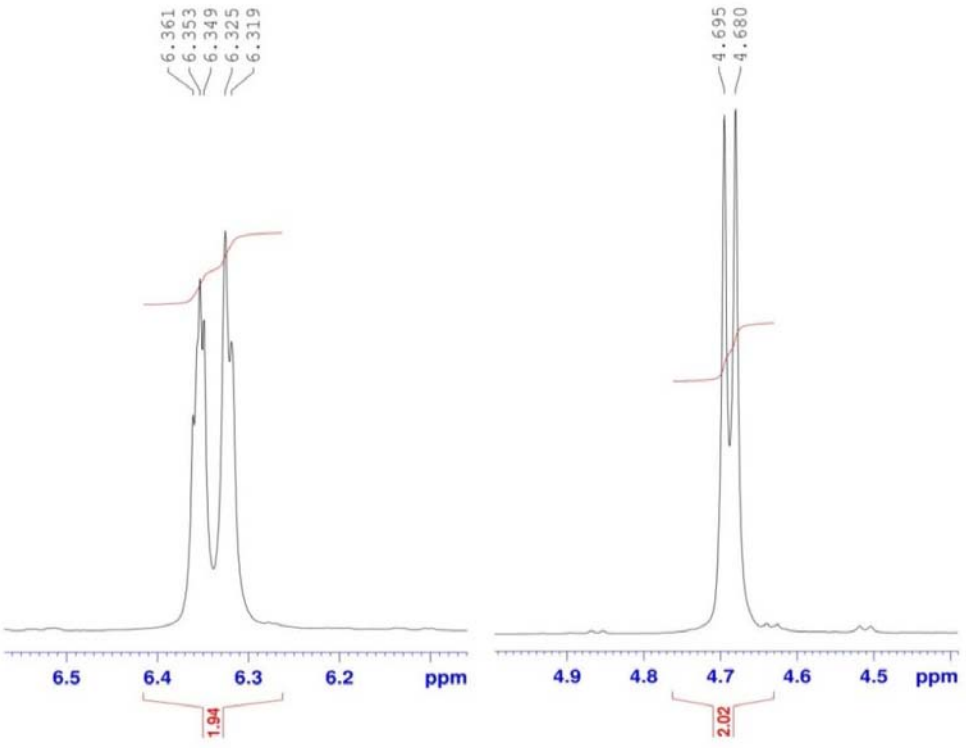

Figure S86. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(furan-2-ylmethyl)picolinamide (**14**) expanded.

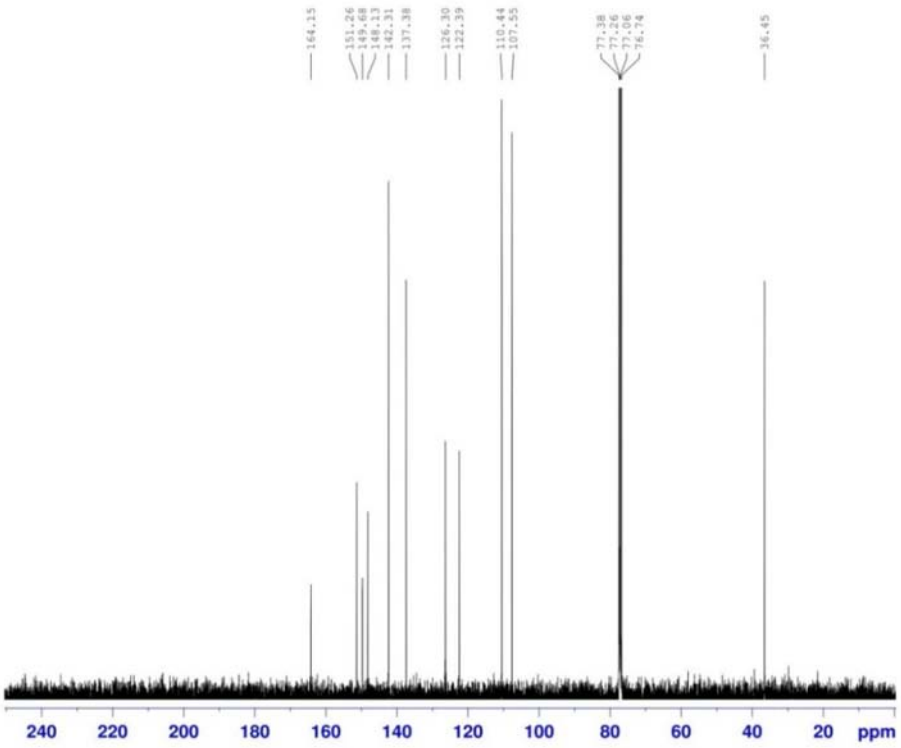

Figure S87. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(furan-2-ylmethyl)picolinamide (**14**).

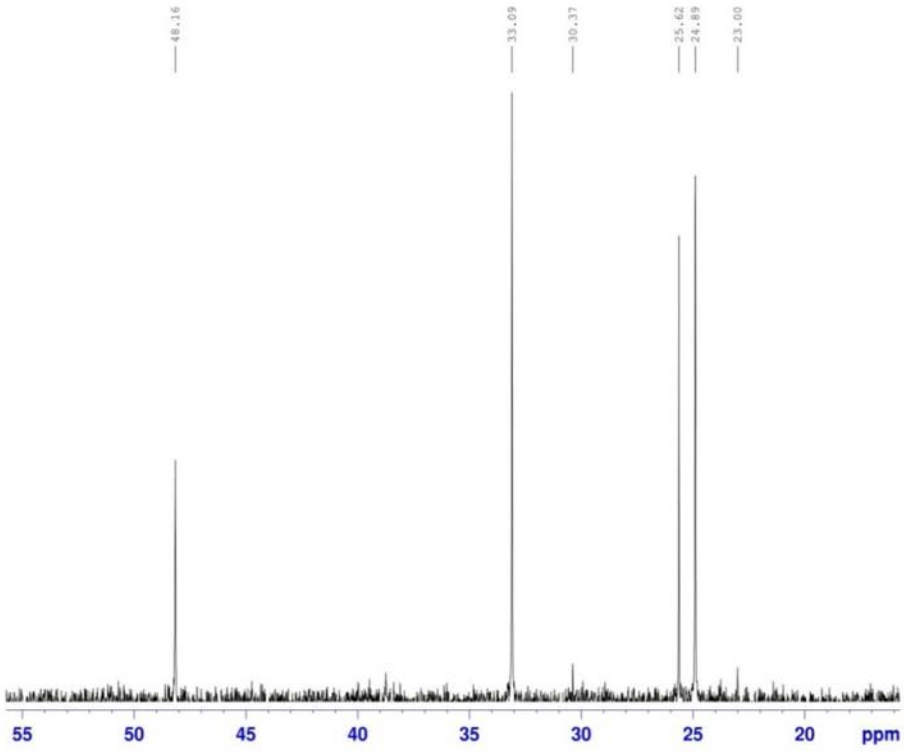

Figure S88. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(furan-2-ylmethyl)picolinamide (**14**) expanded.

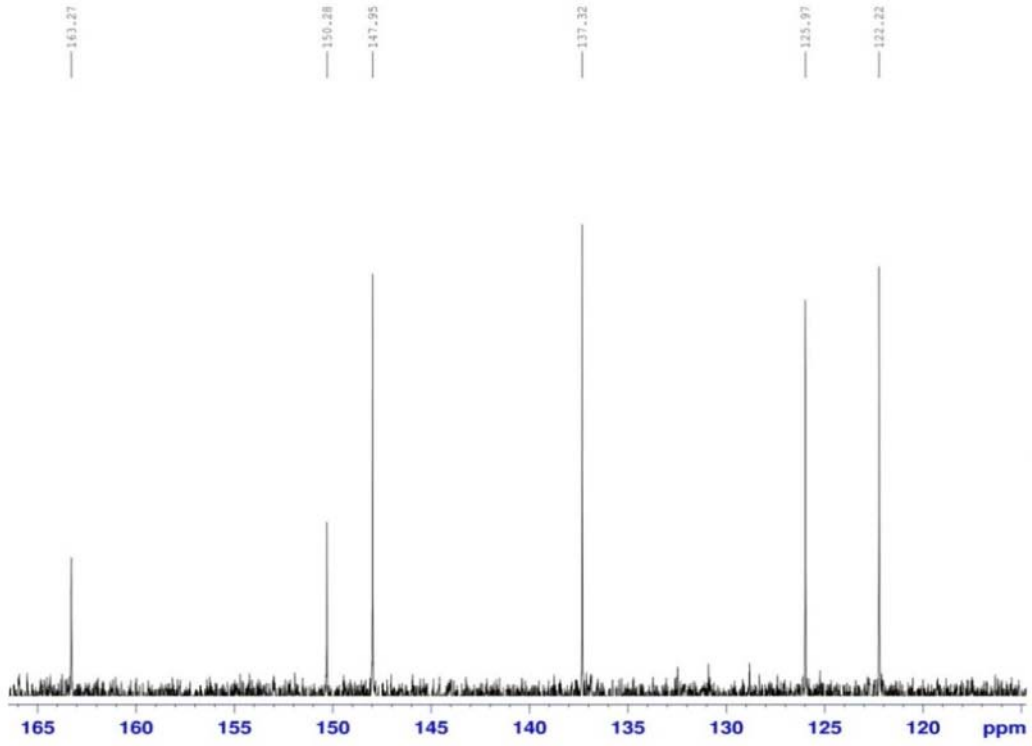

Figure S89. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(furan-2-ylmethyl)picolinamide (**14**) expanded.

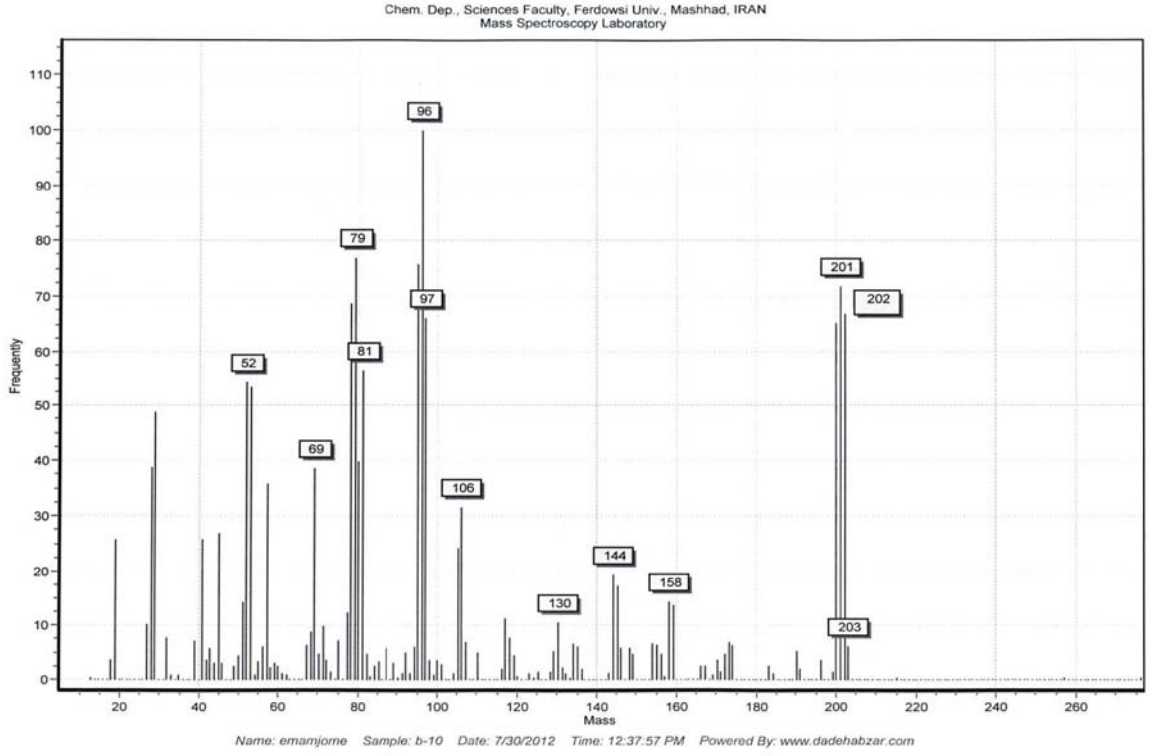

Figure S90. MS spectrum (EI, 70 eV) of *N*-(furan-2-ylmethyl)picolinamide (**14**).

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                    Eager 300 Summarize Results

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emamjome-50
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Component name  Element %
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Nitrogen%       13.91787334
Carbon%         66.09168976
Hydrogen%       4.931604862
Sulphur%        0
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Calcd for $C_{11}H_{10}N_2O_2$

Nitrogen%	13.85
Carbon%	65.34
Hydrogen%	4.98
Suphur%	0

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            1 Sample(s) in Group No : 1
Component Name  Average
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Nitrogen%       13.91787334
Carbon%         66.09168976
Hydrogen%       4.931604862
Sulphur%        0
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Figure S91. Elemental analysis data of *N*-(furan-2-ylmethyl)picolinamide (**14**).

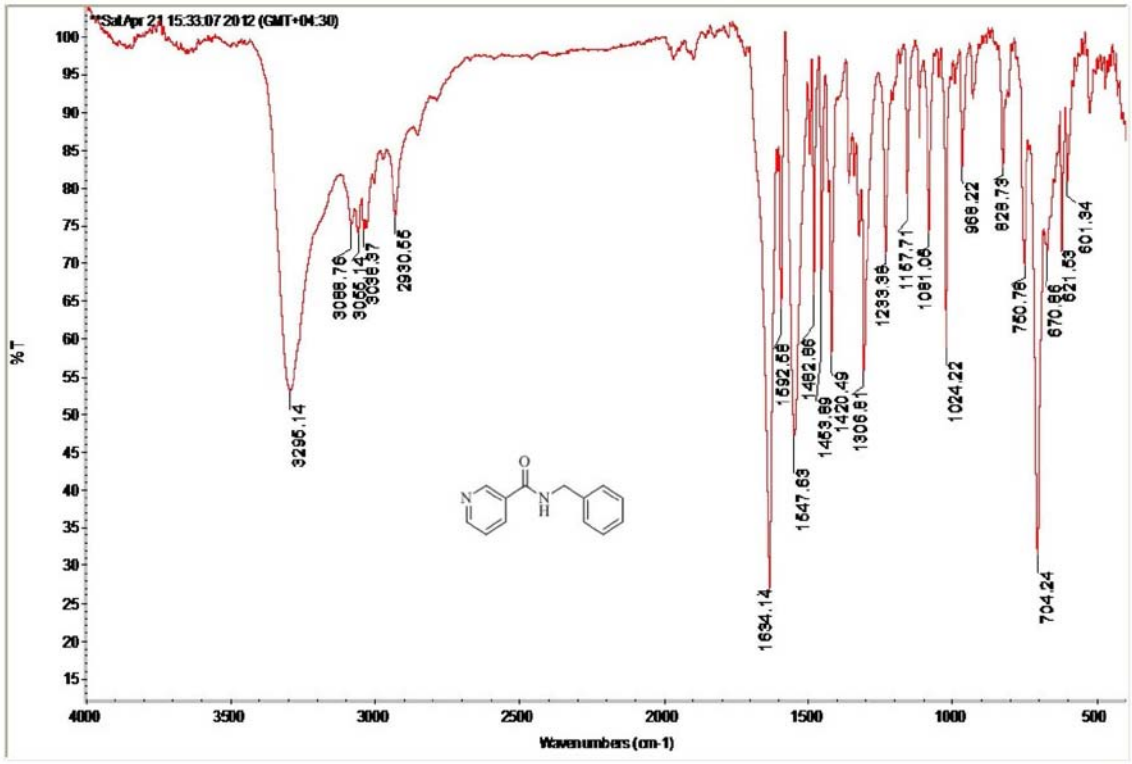

Figure S92. FTIR spectrum of *N*-benzylnicotinamide (**15**).

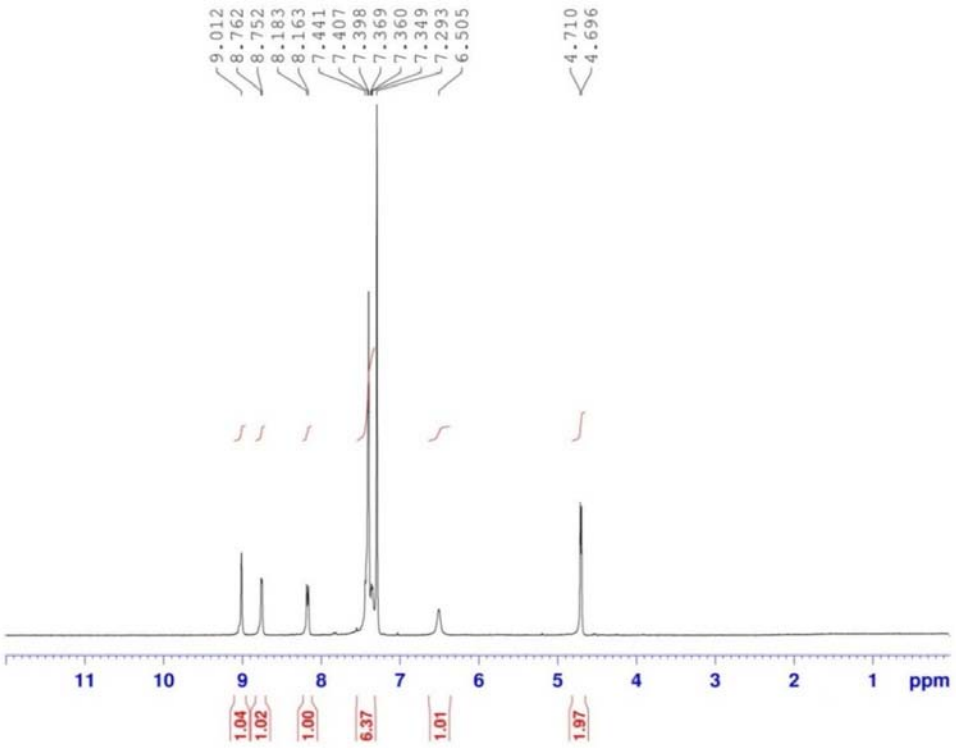

Figure S93. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzylnicotinamide (**15**).

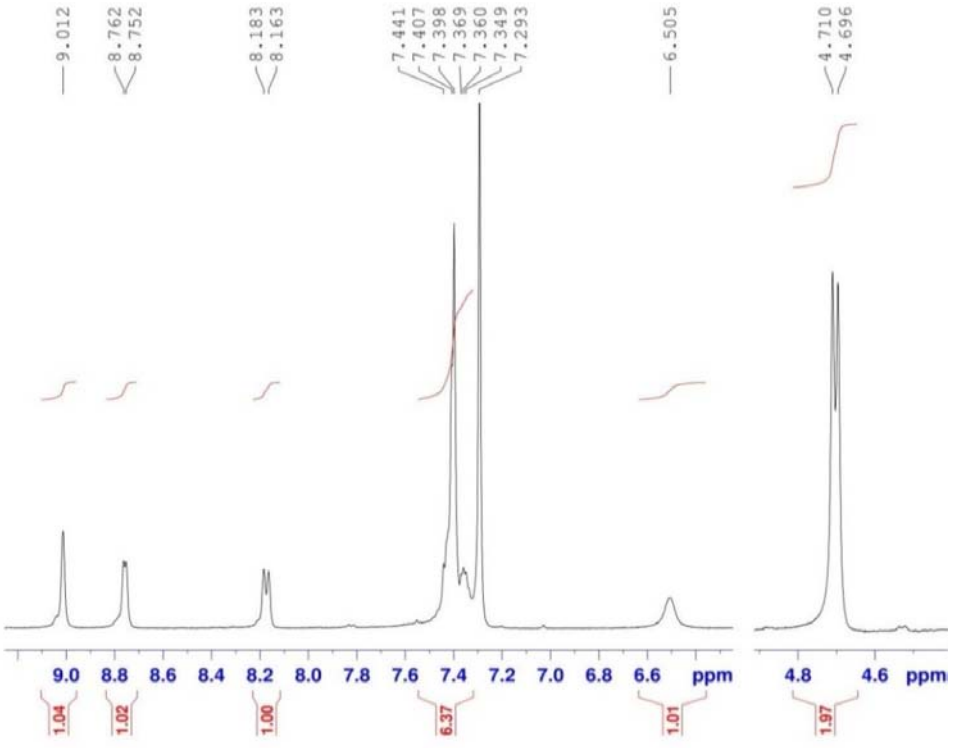

Figure S94. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzylnicotinamide (**15**) expanded.

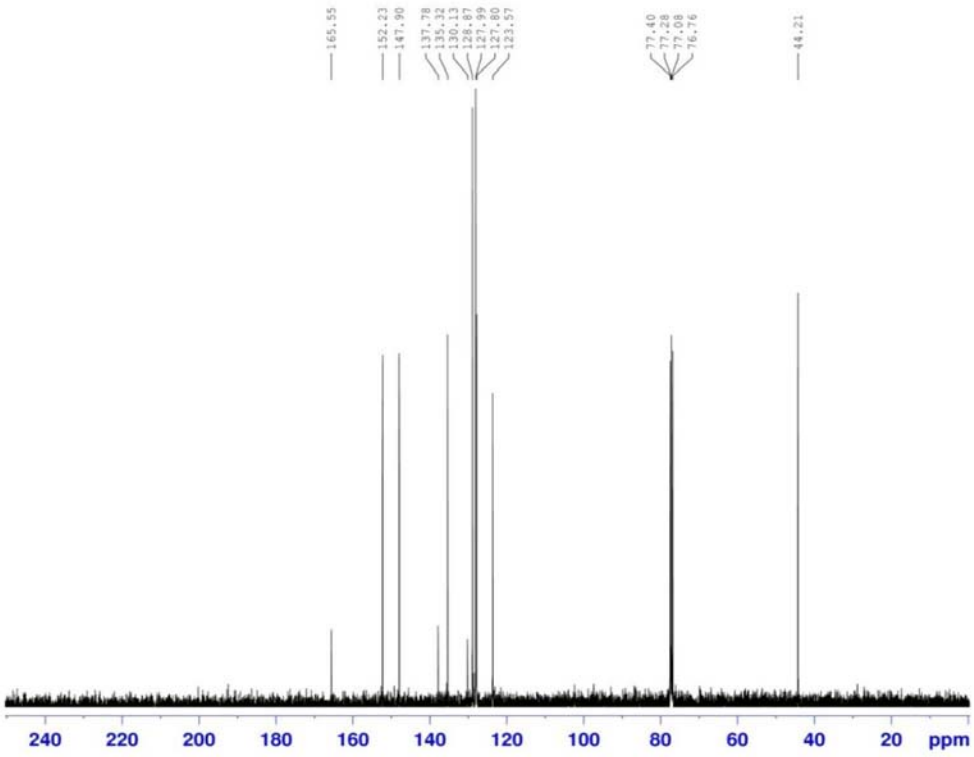

Figure S95. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylnicotinamide (**15**).

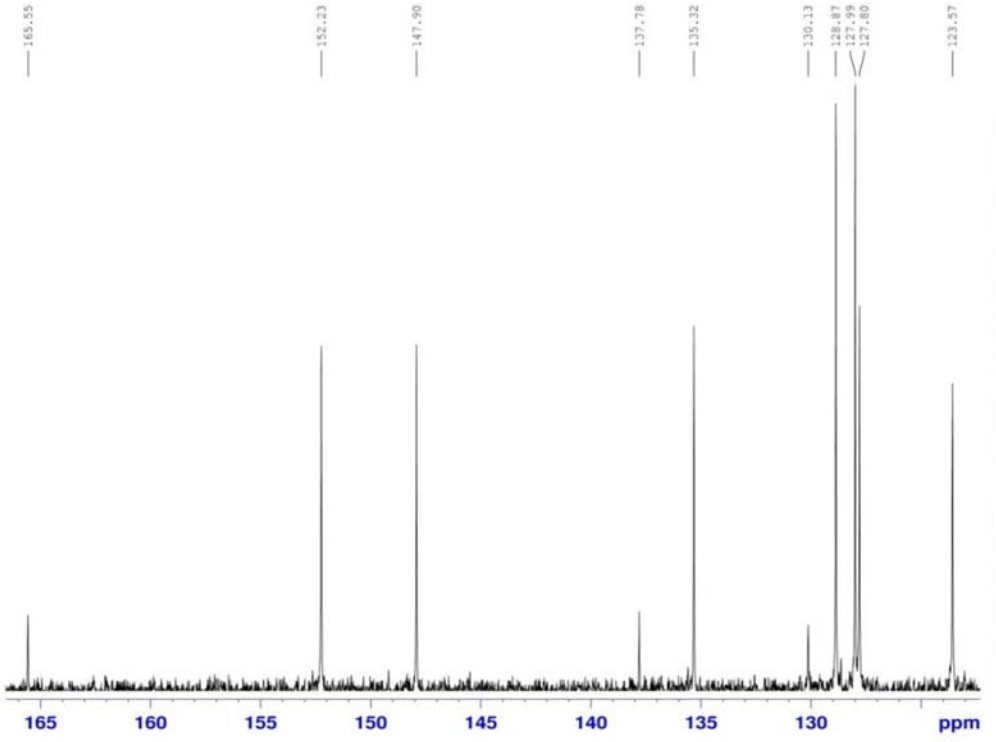

Figure S96. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylnicotinamide (**15**) expanded.

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zhaleh-116
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116 1     a1               UNK  1.042 6.25  ---
Component name  Element %
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Nitrogen%       13.52048206
Carbon%         73.0827713
Hydrogen%       5.643310547
Sulphur%        0

            1 Sample(s) in Group No : 1
Component Name Average
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Nitrogen%      13.52048206
Carbon%        73.0827713
Hydrogen%      5.643310547
Sulphur%       0
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Calcd for $C_{13}H_{12}N_2O$

Nitrogen%	13.20
Carbon%	73.56
Hydrogen%	5.70
Suphur%	0

Figure S97. Elemental analysis data of *N*-benzylnicotinamide (**15**).

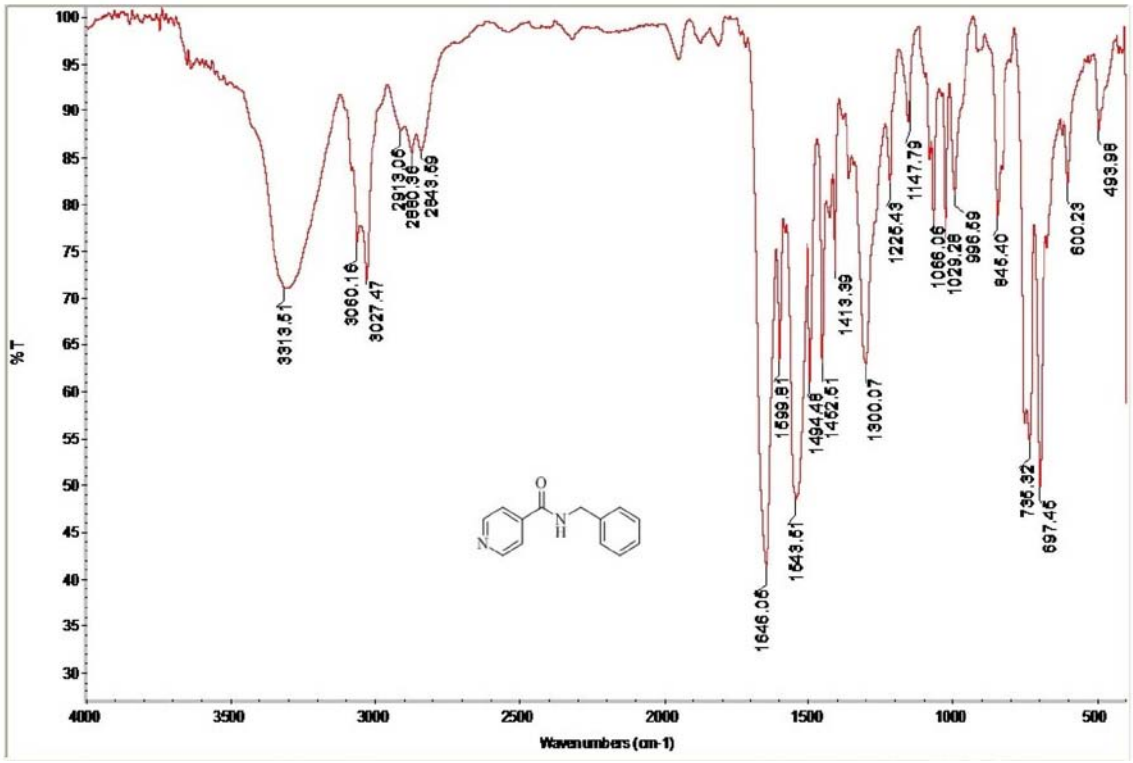

Figure S98. FTIR spectrum of *N*-benzylisonicotinamide (**16**).

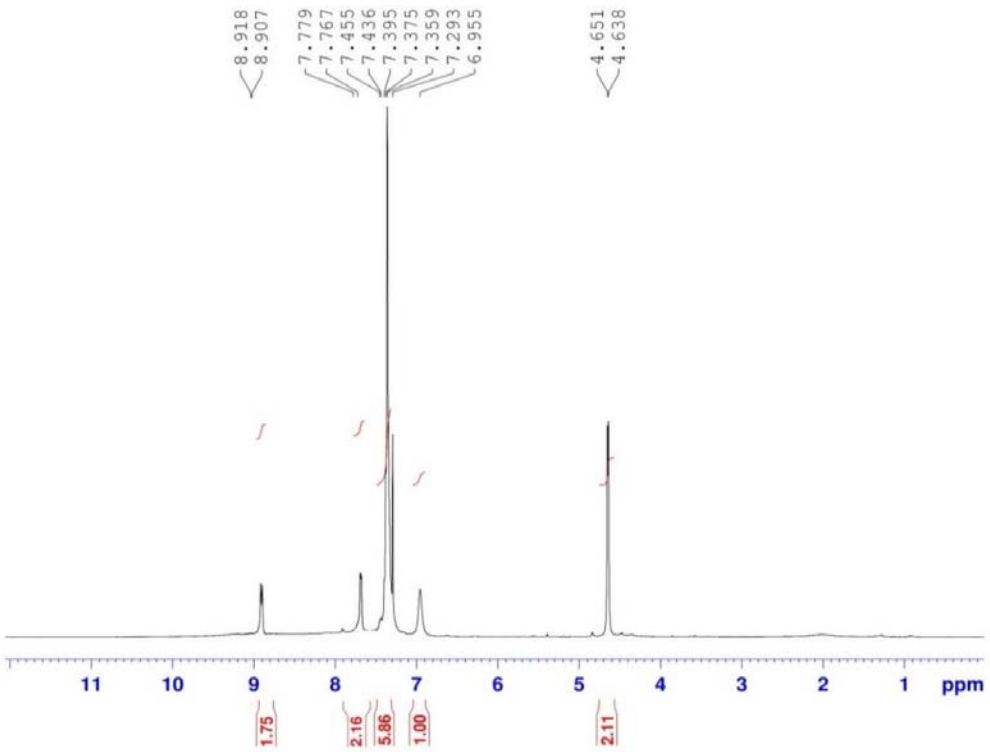

Figure S99. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzylisonicotinamide (**16**).

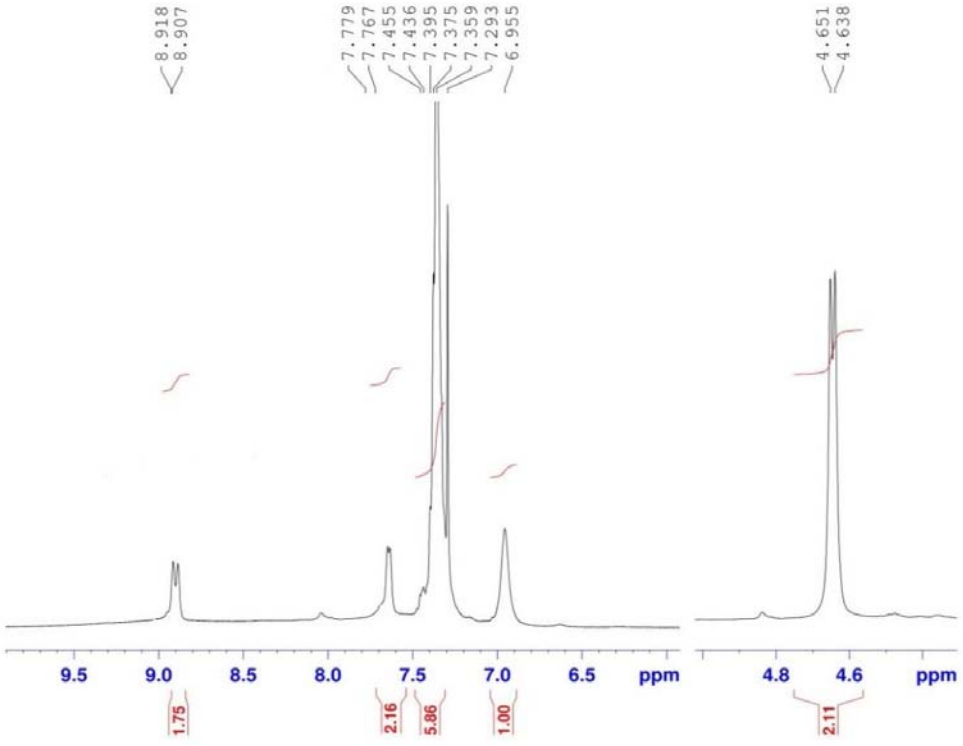

Figure S100. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-benzylisonicotinamide (**16**) expanded.

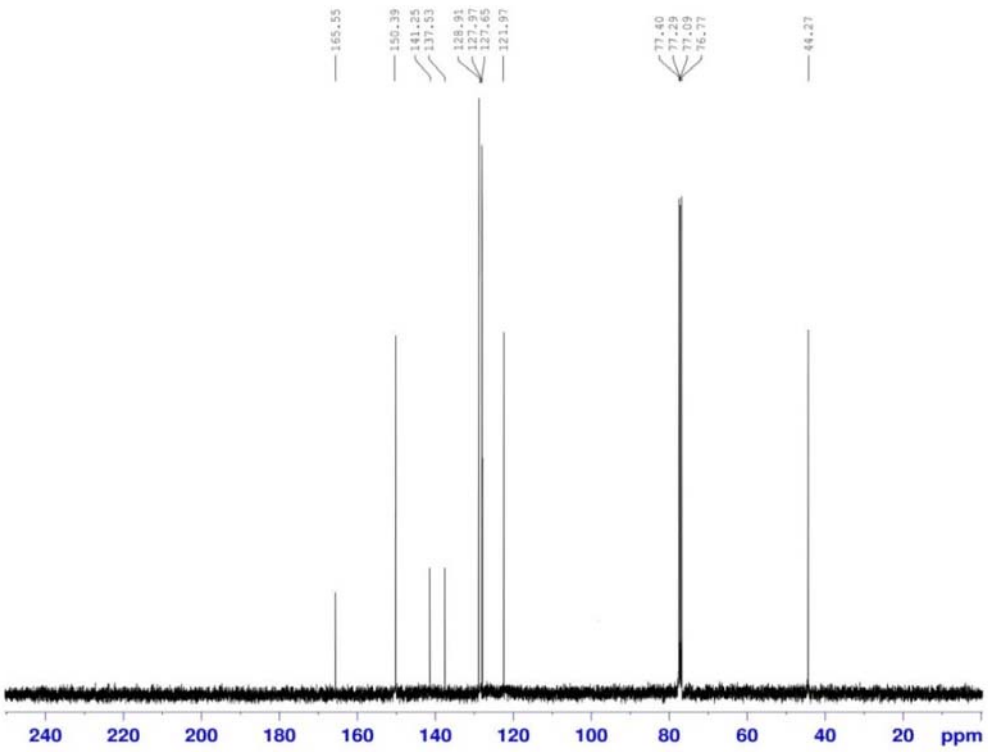

Figure S101. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylisonicotinamide (**16**).

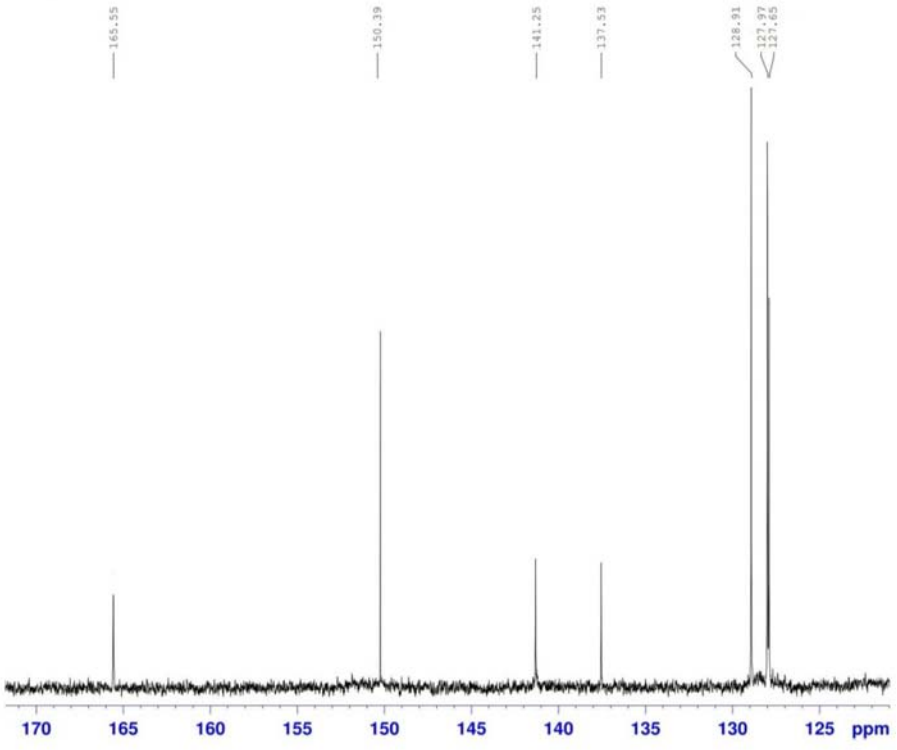

Figure S102. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylisonicotinamide (**16**) expanded.

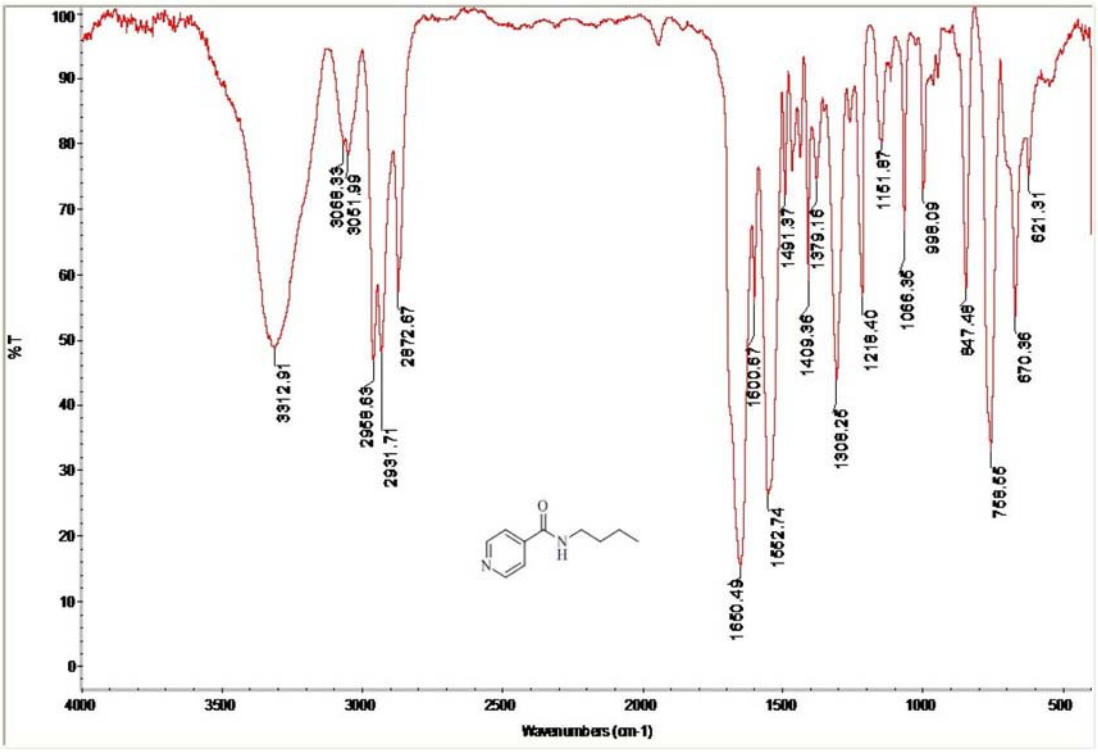

Figure S103. FTIR spectrum of *N*-butylisonicotinamid (**17**).

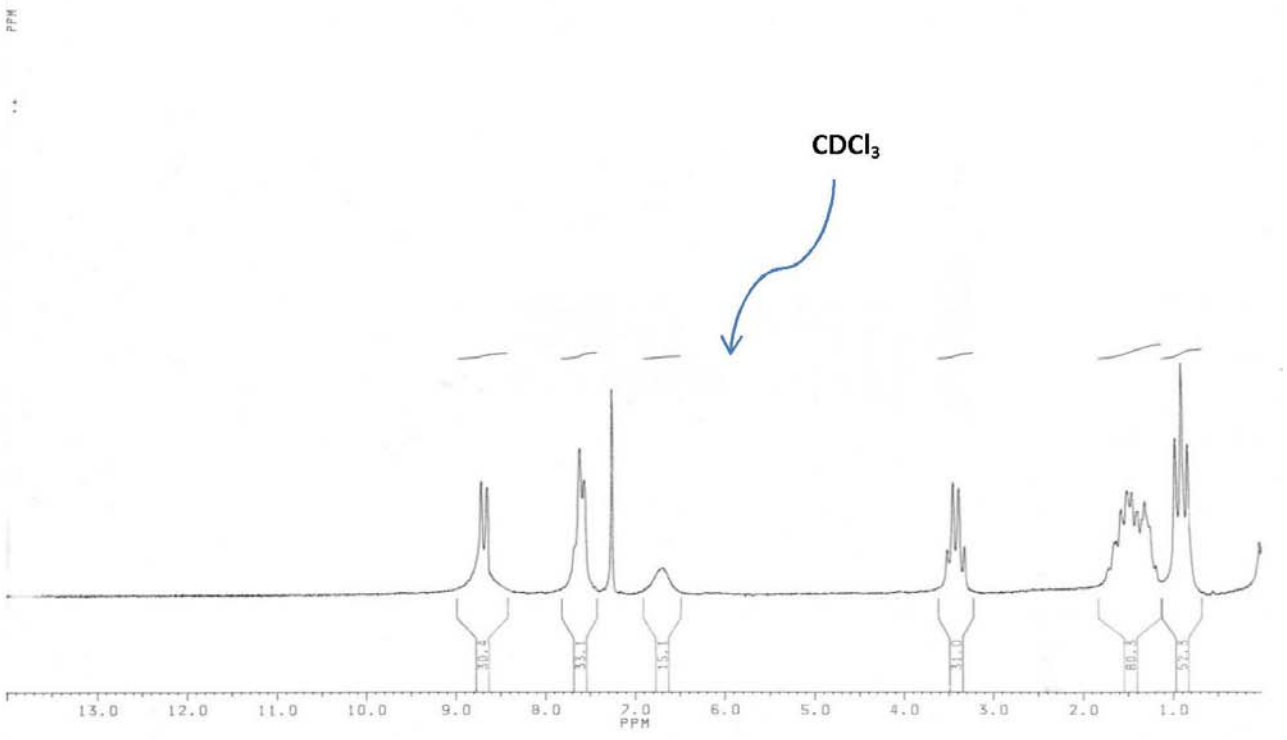

Figure S104. ^{1}H NMR spectrum (100 MHz, $CDCl_3$) of *N*-butylisonicotinamide (**17**).

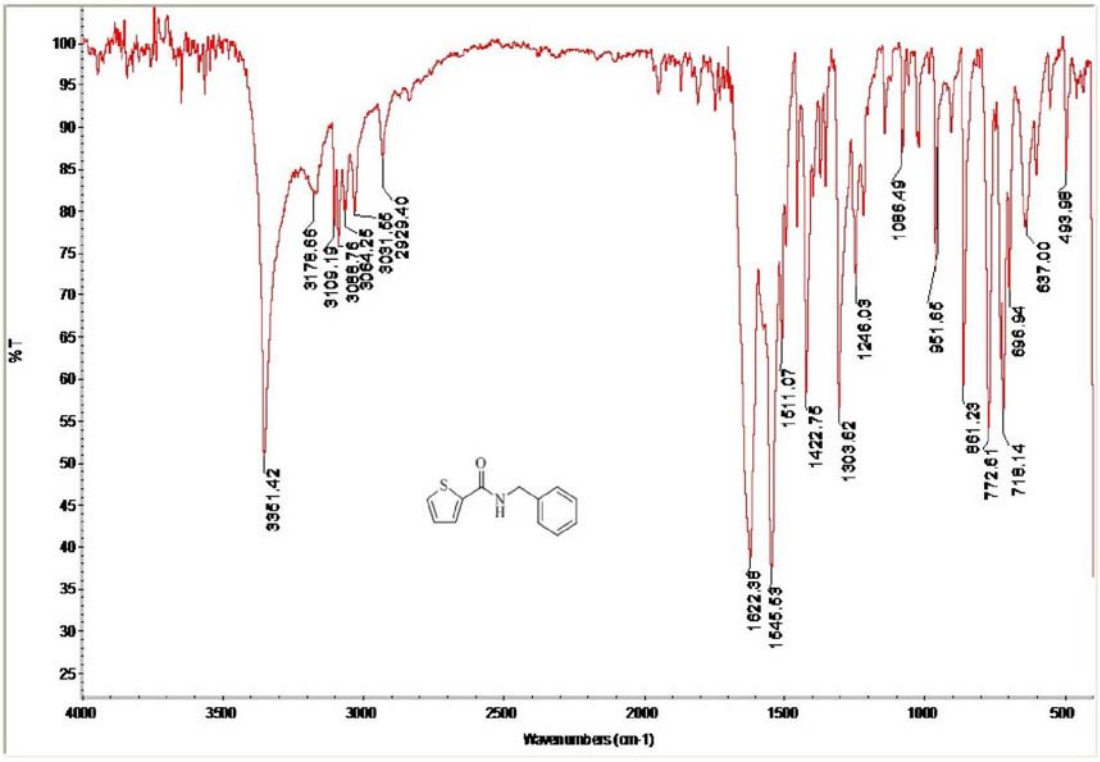

Figure S105. FTIR spectrum of *N*-benzylthiophene-2-carboxamide (**18**).

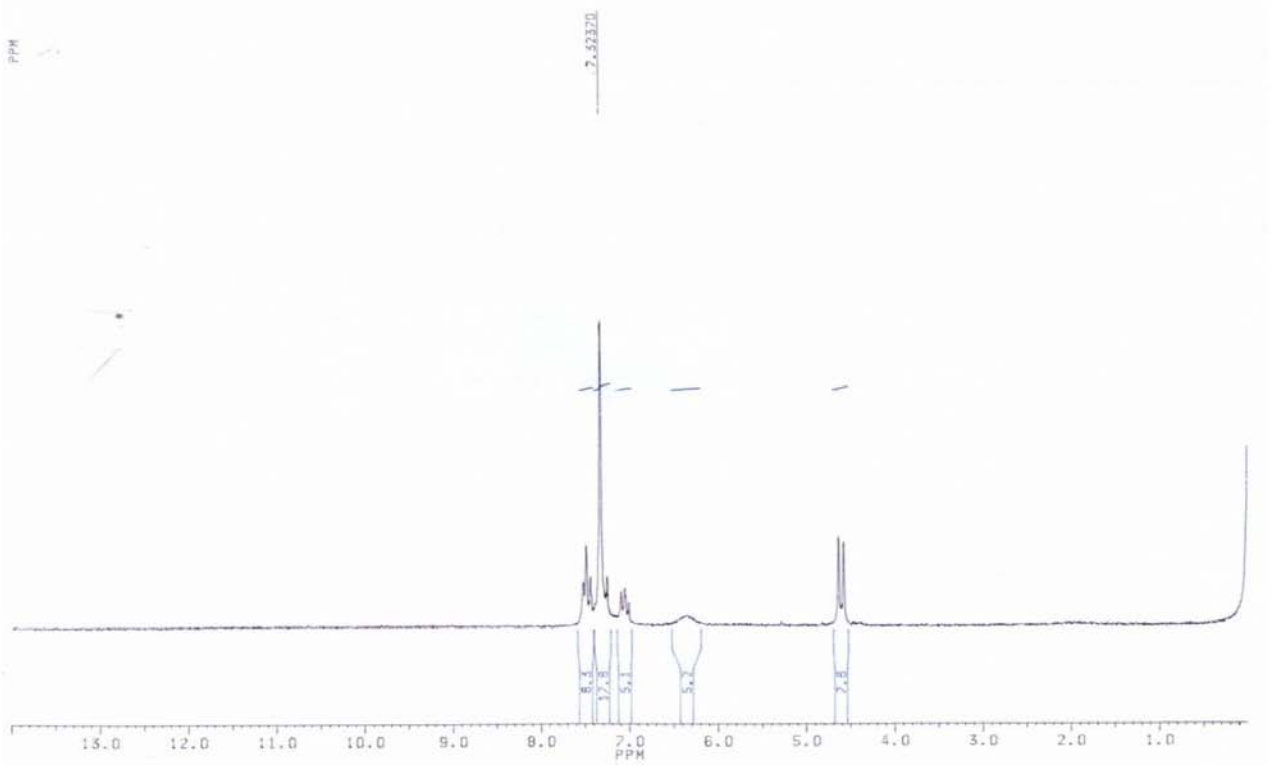

Figure S106. ^{1}H NMR spectrum (100 MHz, $CDCl_3$) of *N*-benzylthiophene-2-carboxamide(**18**).

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Component name  Element %
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Nitrogen%       6.957777405
Carbon%         66.81091003
Hydrogen%       5.336242676
Sulphur%        13.9931646

            1 Sample(s) in Group No : 1
Component Name Average
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Carbon%        66.81091003
Hydrogen%      5.336242676
Sulphur%       13.9931646
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Calcd for $C_{12}H_{11}NOS$

Nitrogen%	6.45
Carbon%	66.33
Hydrogen%	5.10
Suphur%	14.76

Figure S107. Elemental analysis data of *N*-benzylthiophene-2-carboxamide (**18**).

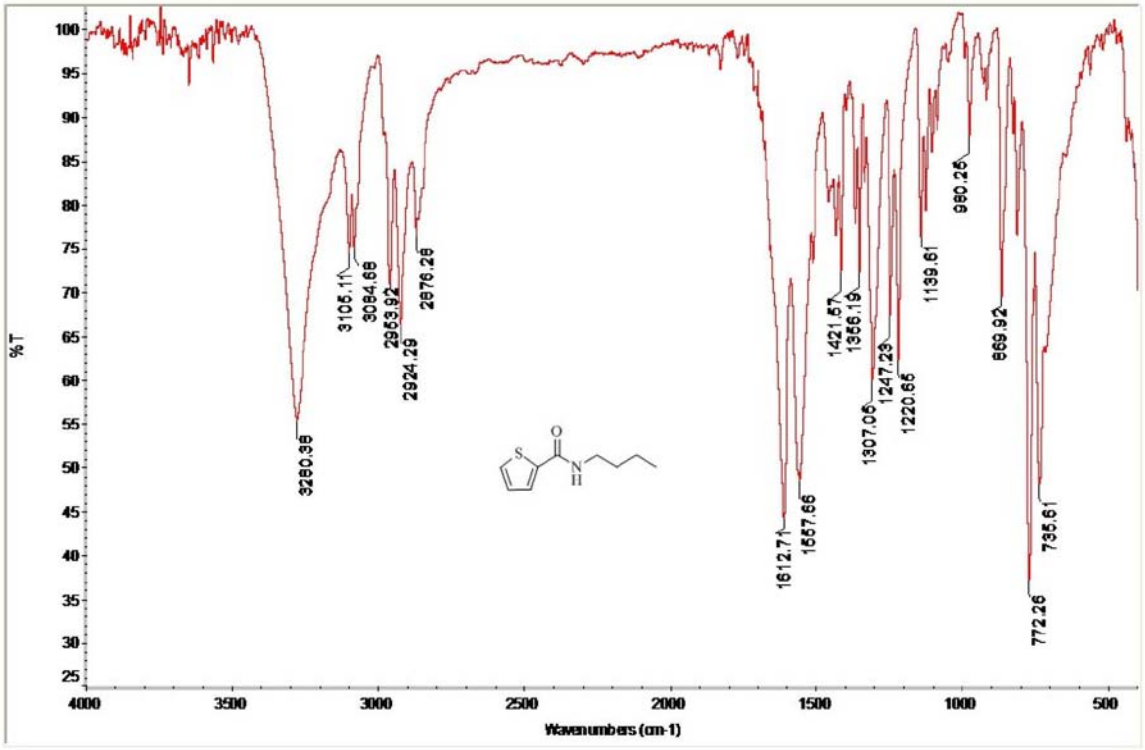

Figure S108. FTIR spectrum of *N*-butylthiophene-2-carboxamid (**19**).

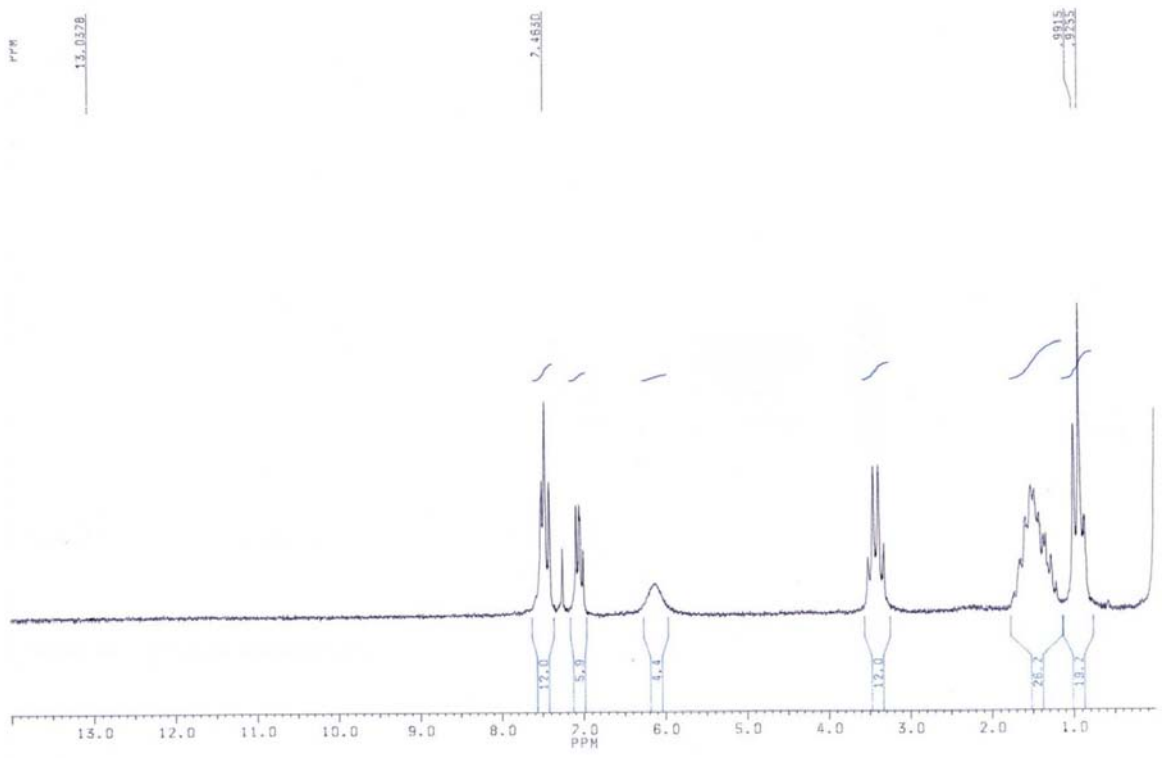

Figure S109. ^{1}H NMR spectrum (100 MHz, $CDCl_3$) of *N*-butylthiophene-2-carboxamid (**19**).

Eager 300 Summarize Results

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Filename AS Method Vial
emamjome-151

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151	1	h-2	UNK	1.083	6.25	---	

Component name	Element %
Nitrogen%	7.662646294
Carbon%	59.02895737
Hydrogen%	7.385498047
Sulphur%	17.28616905

Caled for C9H13NOS

Nitrogen%	7.64
Carbon%	58.98
Hydrogen%	7.15
Suphur%	17.50

1 Sample(s) in Group No : 1

Component Name	Average
Nitrogen%	7.662646294
Carbon%	59.02895737
Hydrogen%	7.385498047
Sulphur%	17.28616905

Figure S110. Elemental analysis data of *N*-butylthiophene-2-carboxamid (**19**).

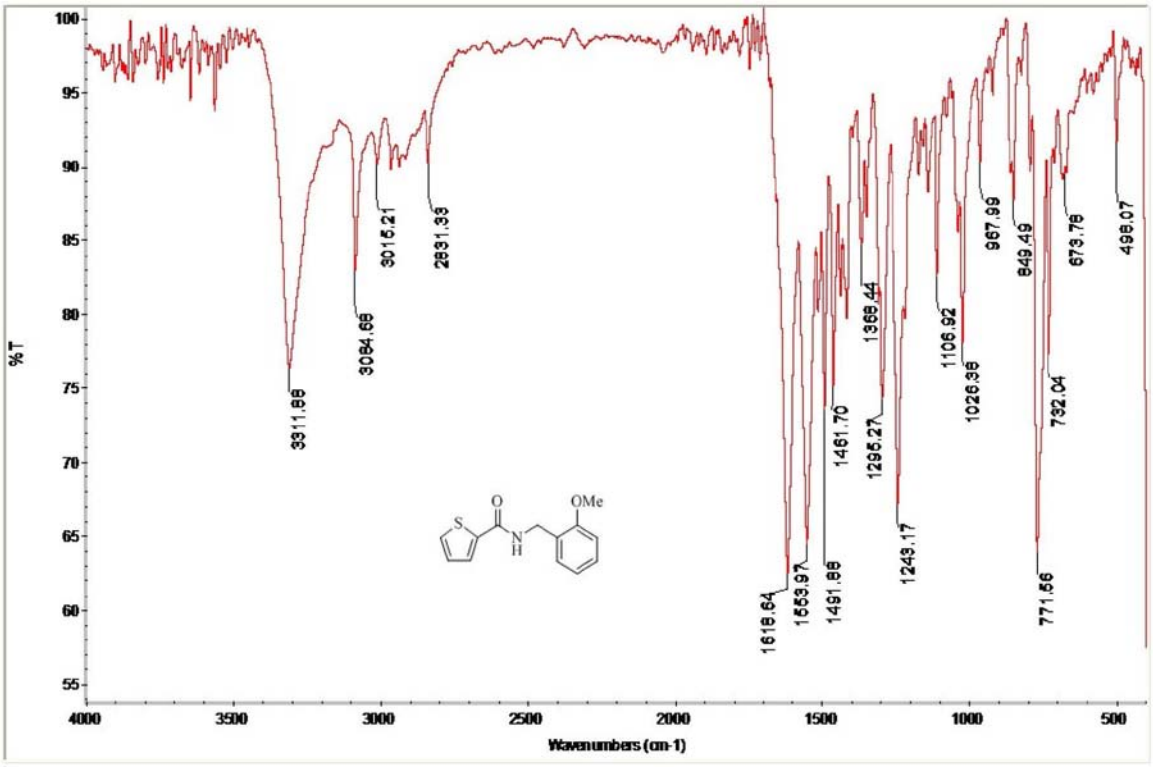

Figure S111. FTIR spectrum of *N*-(2-methoxybenzyl)thiophene-2-carboxamide (**20**).

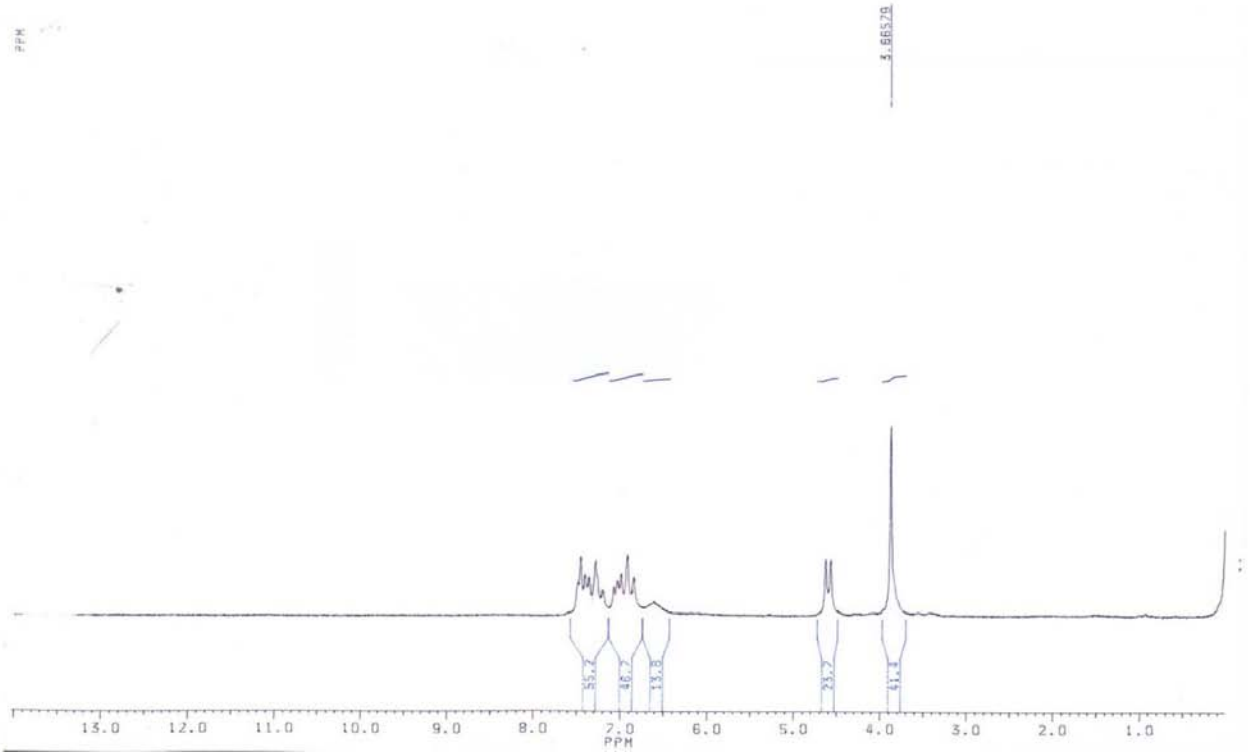

Figure S112. ^{1}H NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-methoxybenzyl)thiophene-2-carboxamide (**20**).

Eager 300 Summarize Results

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Method Filename : Copy of Copy of N C H S-bkp .mth

Filename AS Method Vial

emamjomeh-176

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Component name	Element %
Nitrogen%	6.198968601
Carbon%	62.93164902
Hydrogen%	5.579735756
Sulphur%	12.70624828

Calcd for $C_{13}H_{13}NO_2S$

Nitrogen%	5.66
Carbon%	63.13
Hydrogen%	5.30
Suphur%	12.97

1 Sample(s) in Group No : 1

Component Name	Average
Nitrogen%	6.198968601
Carbon%	62.93164902
Hydrogen%	5.579735756
Sulphur%	12.70624828

Figure S113. Elemental analysis data of *N*-(2-methoxybenzyl)thiophene-2-carboxamide (**20**).

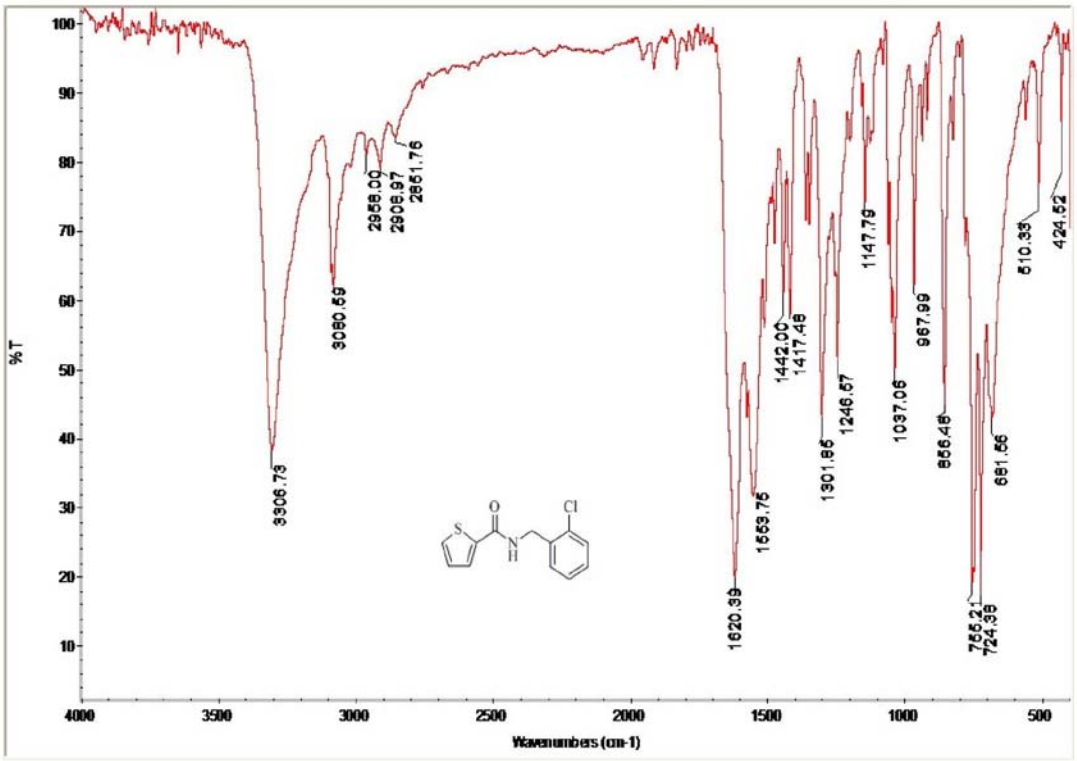

Figure S114. FTIR spectrum of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**).

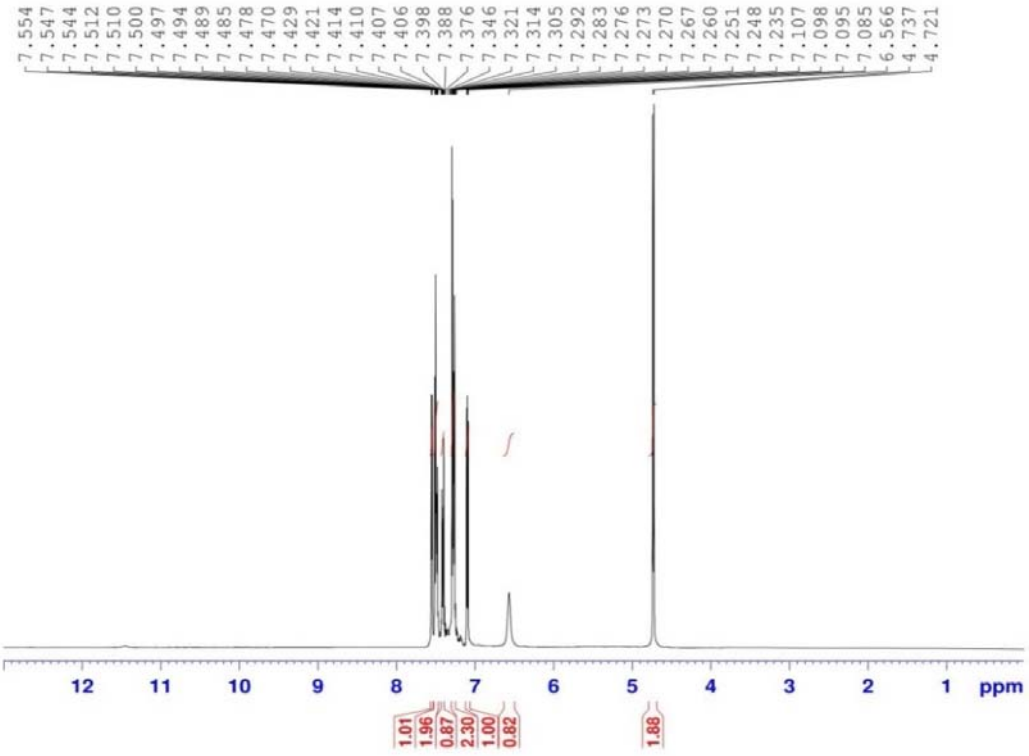

Figure S115. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**).

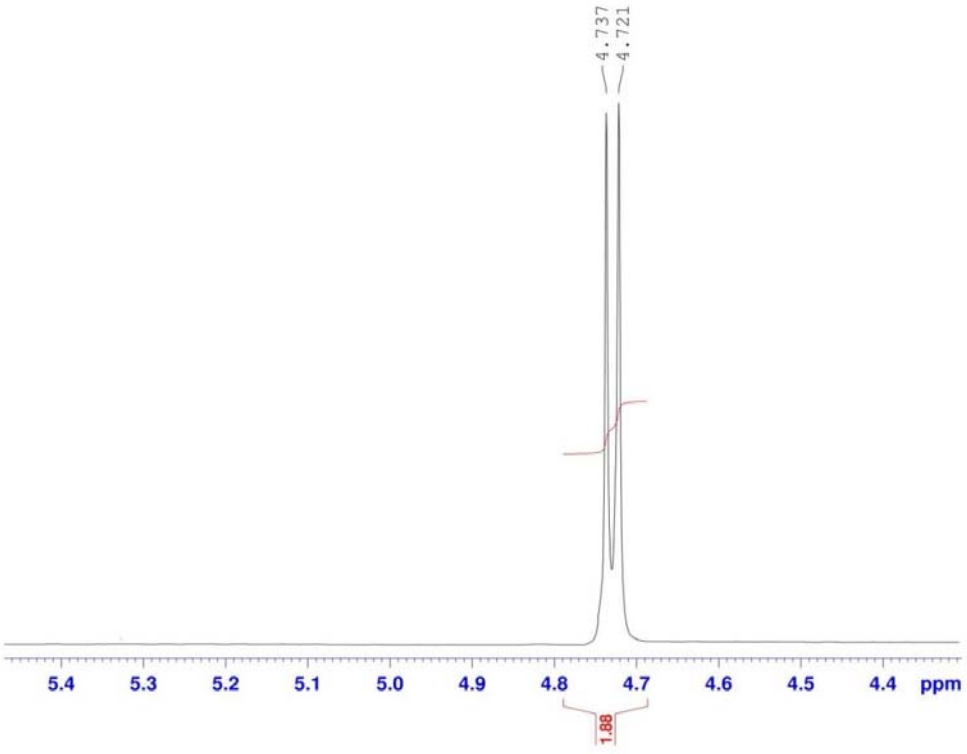

Figure S116. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**) expanded.

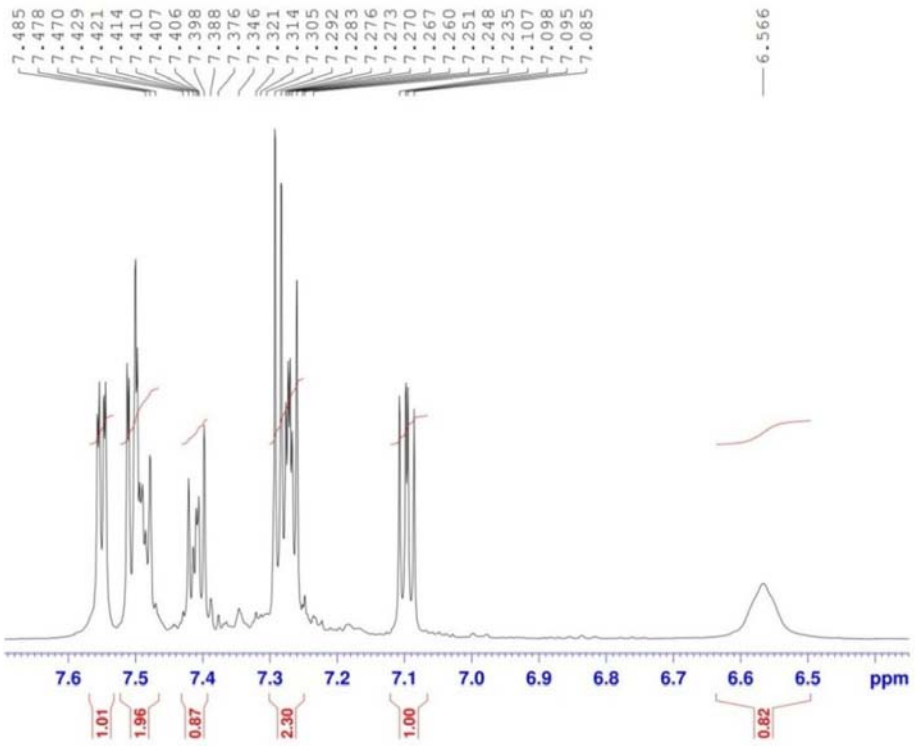

Figure S117. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**) expanded.

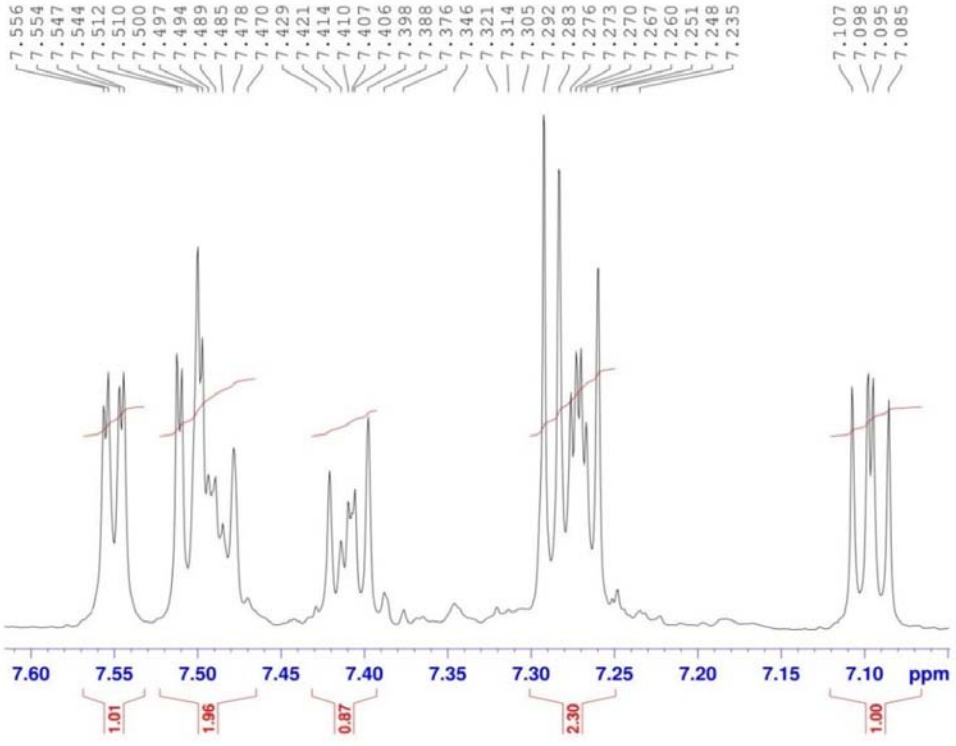

Figure S118. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**) expanded.

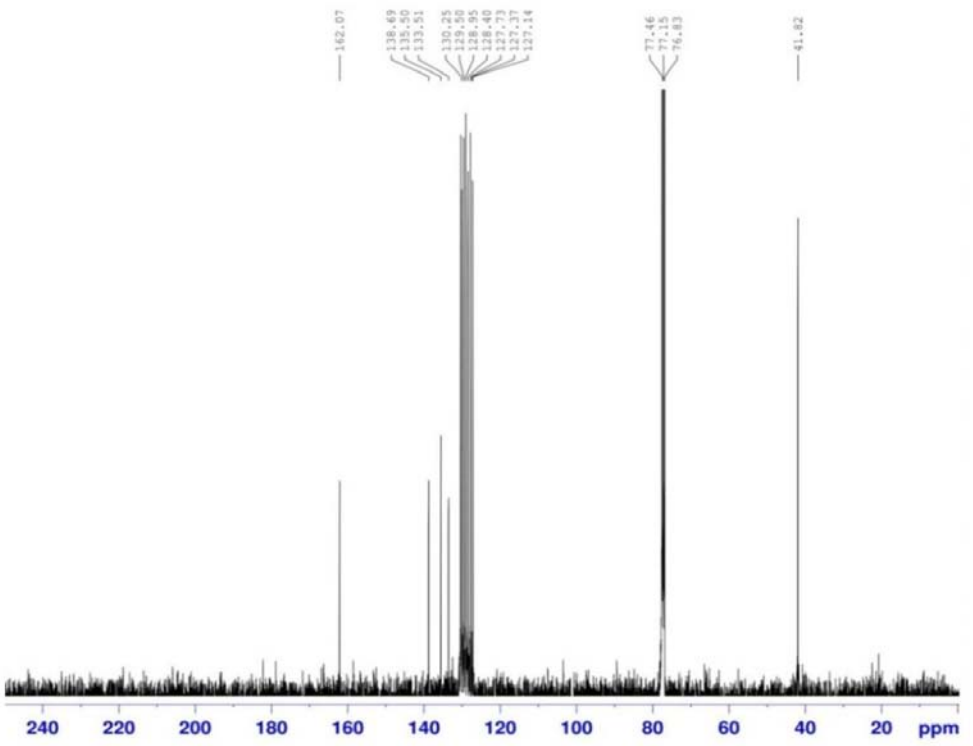

Figure S119. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**).

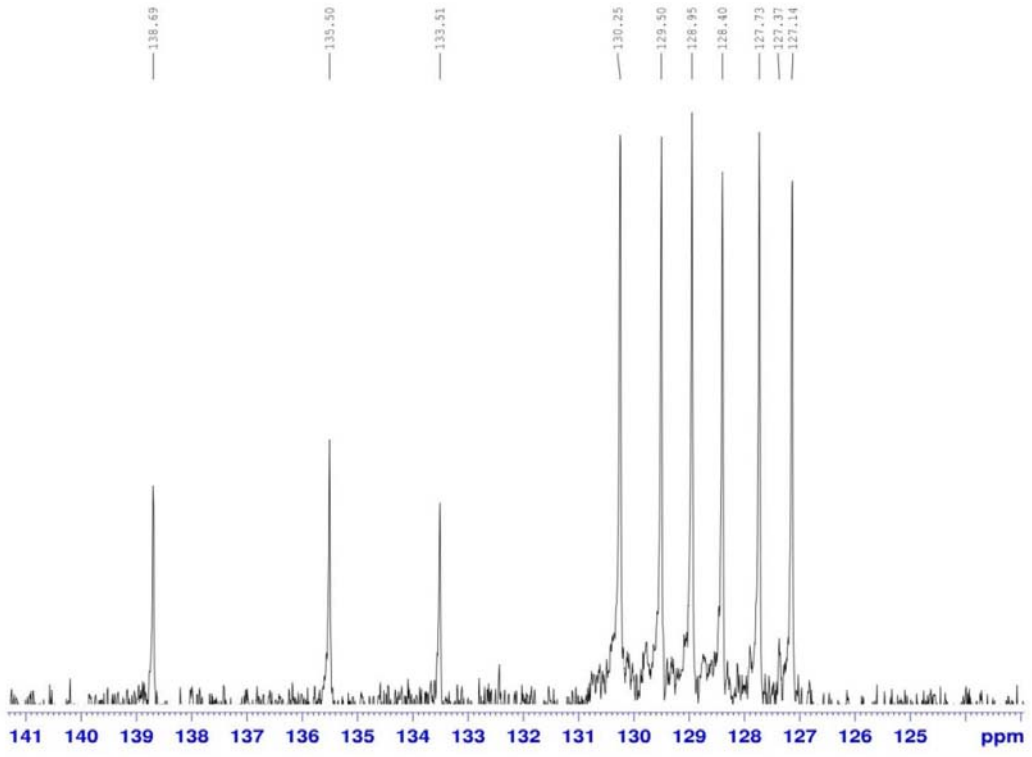

Figure S120. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**) expanded.

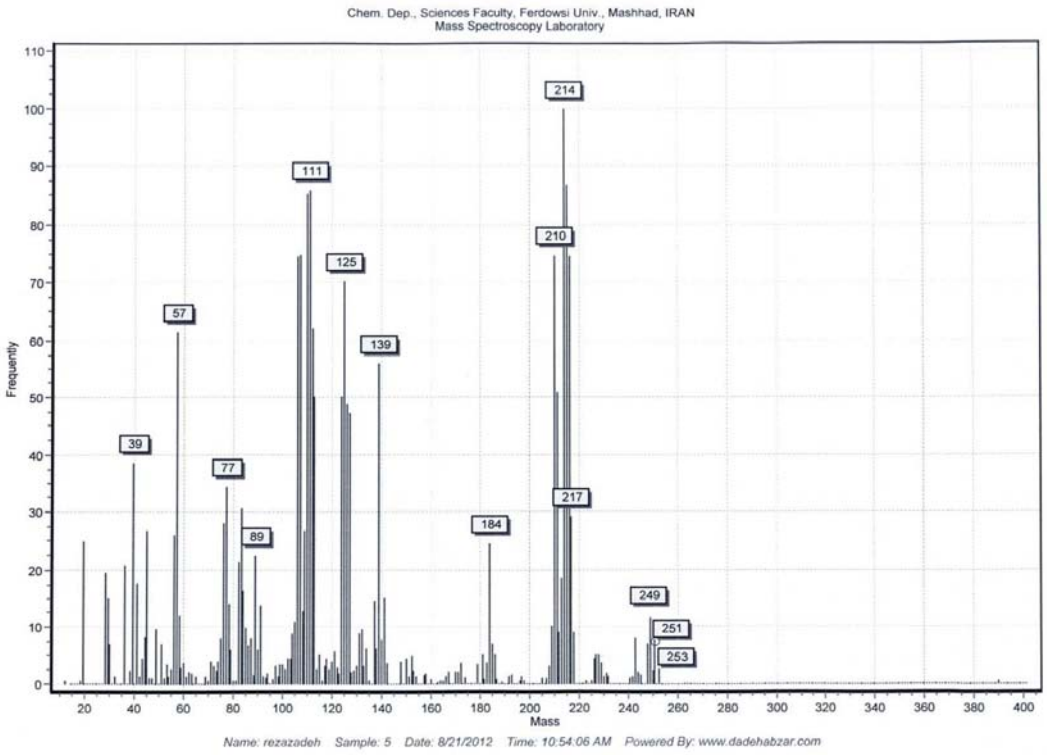

Figure S121. MS spectrum (EI, 70 eV) of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**).

Eager 300 Summarize Results

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Method Filename : Copy of Copy of N C H S-bkp .mth

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emamjome-19		

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Component name	Element %
Nitrogen%	5.756523228
Carbon%	57.4144783
Hydrogen%	4.259230137
Sulphur%	12.55812168

Calcd for $C_{12}H_{10}ClNOS$

Nitrogen%	5.56
Carbon%	57.25
Hydrogen%	4.00
Suphur%	12.74

1 Sample(s) in Group No : 1

Component Name	Average
Nitrogen%	5.756523228
Carbon%	57.4144783
Hydrogen%	4.259230137
Sulphur%	12.55812168

Figure S122. Elemental analysis data of *N*-(2-chlorobenzyl)thiophene-2-carboxamide (**21**).

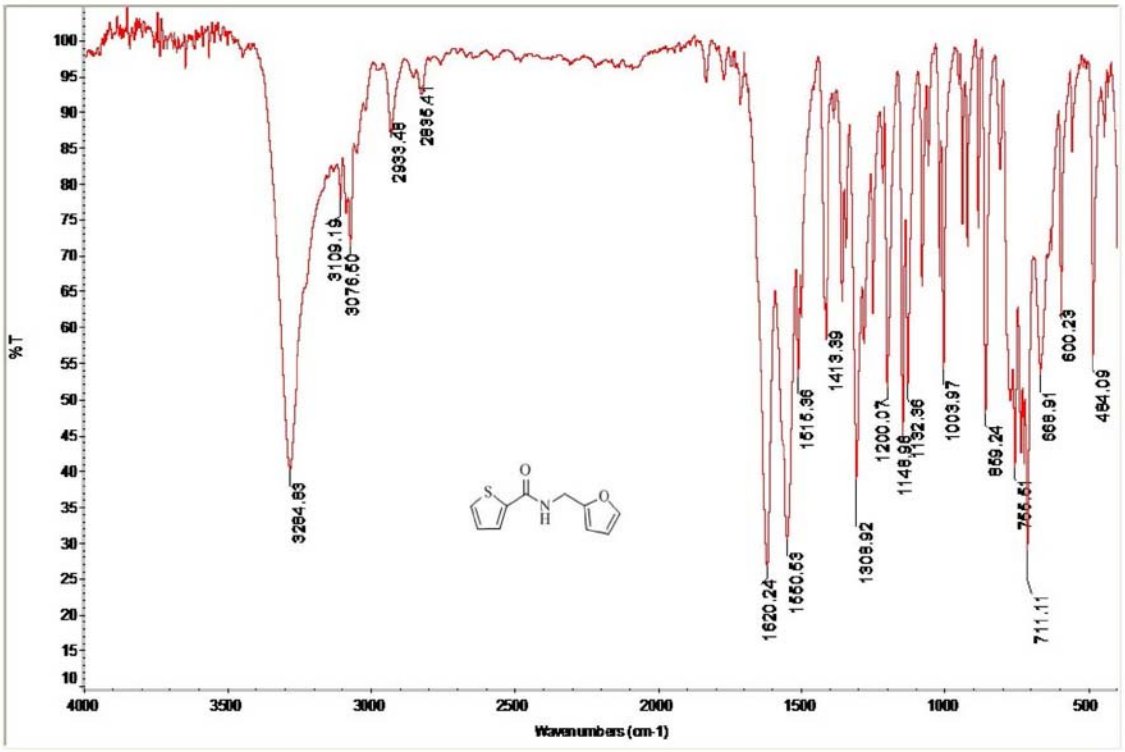

Figure S123. FTIR spectrum of *N*-(furan-2-ylmethyl)thiophene-2-carboxamide (**22**).

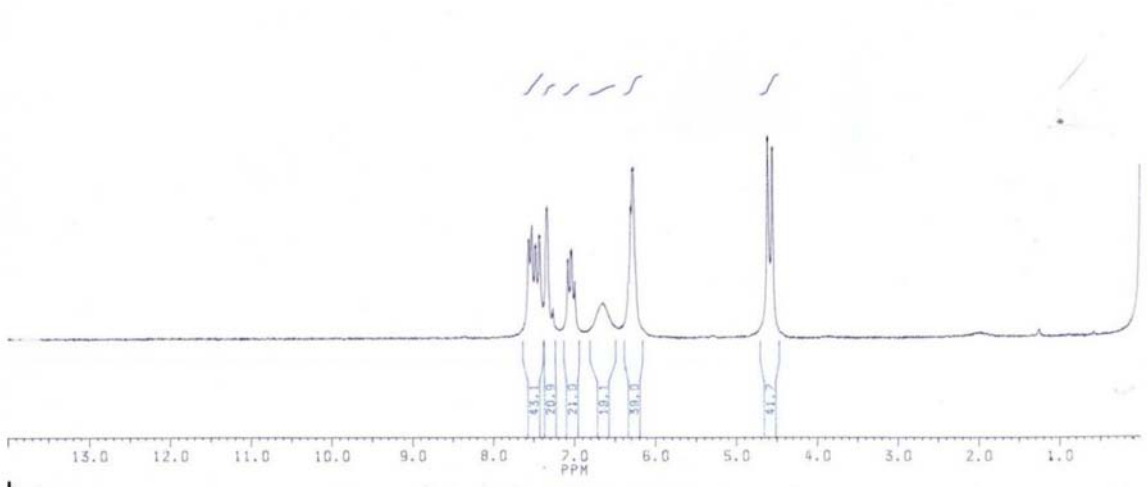

Figure S124. ^{1}H NMR spectrum (100 MHz, $CDCl_3$) of *N*-(furan-2-ylmethyl)thiophene-2-carboxamid (**22**).

Eager 300 Summarize Results

Date : 15/08/2012 at 12:08:16
Method Name : NCHS
Method Filename : Copy of Copy of N C H S-bkp .mth

Filename AS Method Vial

emamjome-70

#	Group	Sample Name	Type	Weig.	Pro.F	---	---
70	1	h-4	UNK	1.241	6.25	---	

Component name	Element %
Nitrogen%	7.040726185
Carbon%	58.35287476
Hydrogen%	4.636273861
Sulphur%	15.43068123

Calcd for $C_{10}H_9NO_2S$

Nitrogen%	6.76
Carbon%	57.95
Hydrogen%	4.38
Suphur%	15.47

1 Sample(s) in Group No : 1

Component Name	Average
Nitrogen%	7.040726185
Carbon%	58.35287476
Hydrogen%	4.636273861
Sulphur%	15.43068123

Figure S125. Elemental analysis data of *N*-(furan-2-ylmethyl)thiophene-2-carboxamide (**22**).

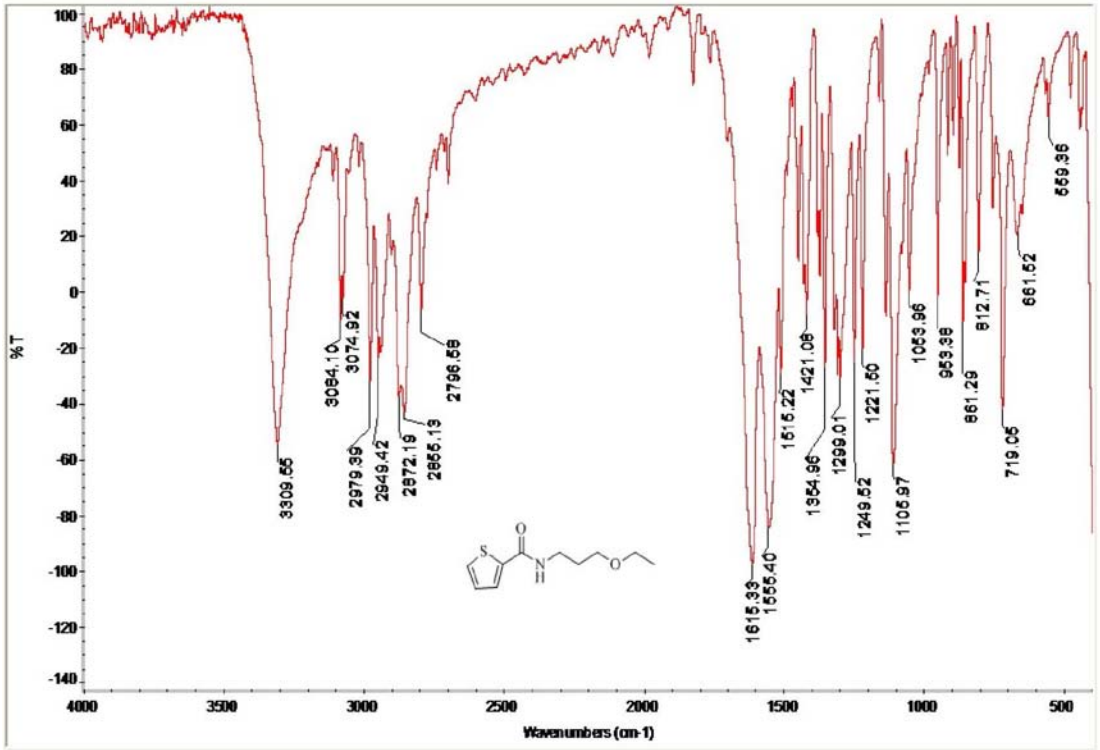

Figure S126. FTIR spectrum of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**).

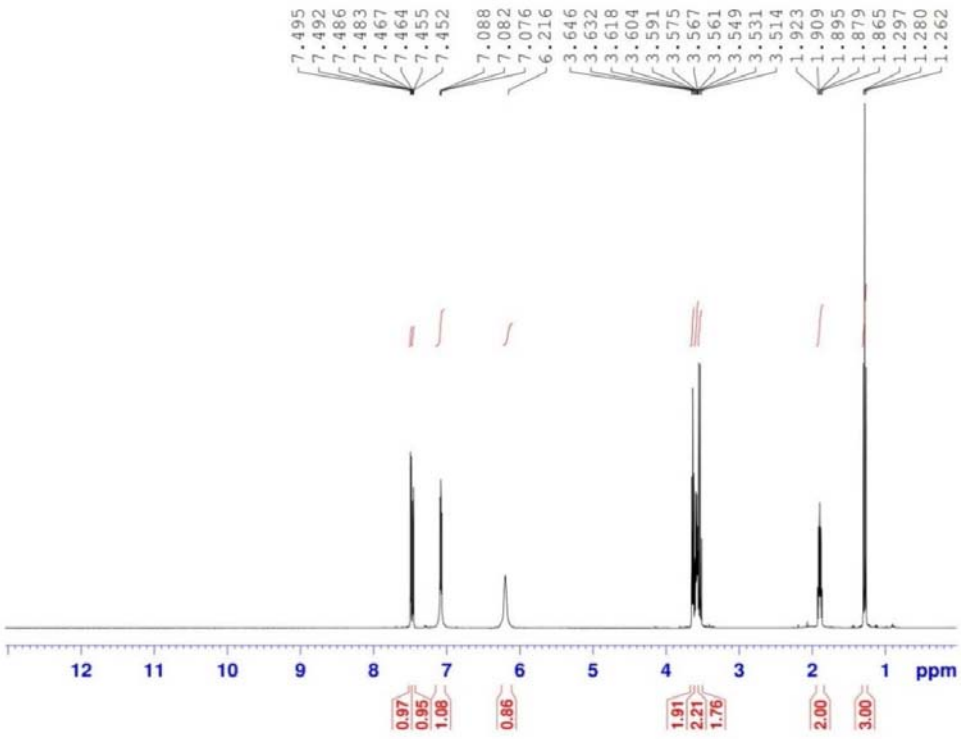

Figure S127. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**).

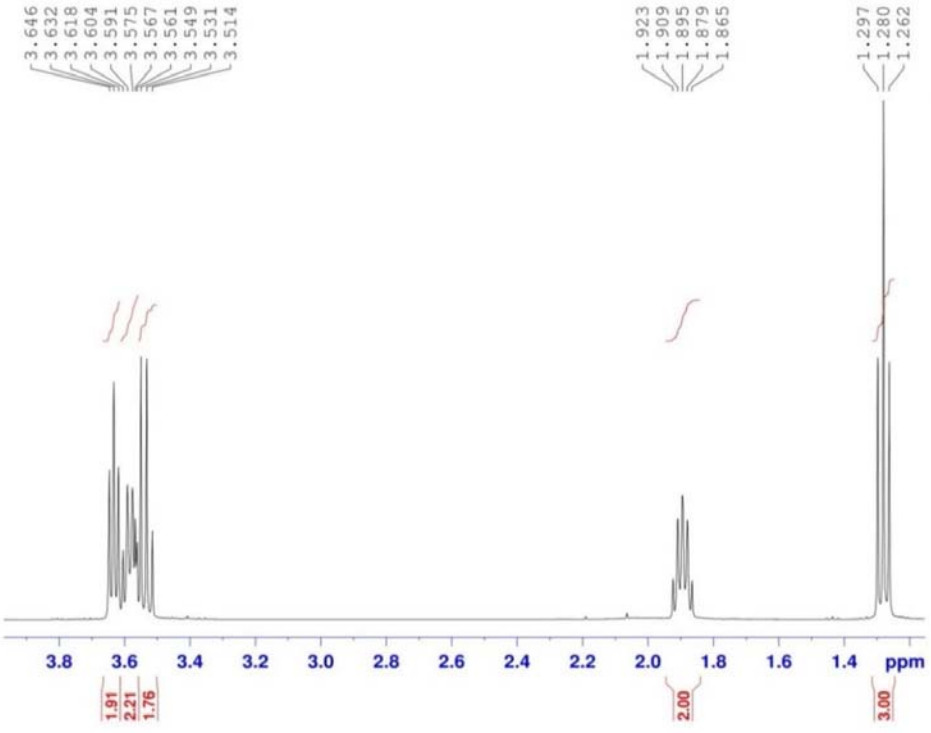

Figure S128. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**) expanded.

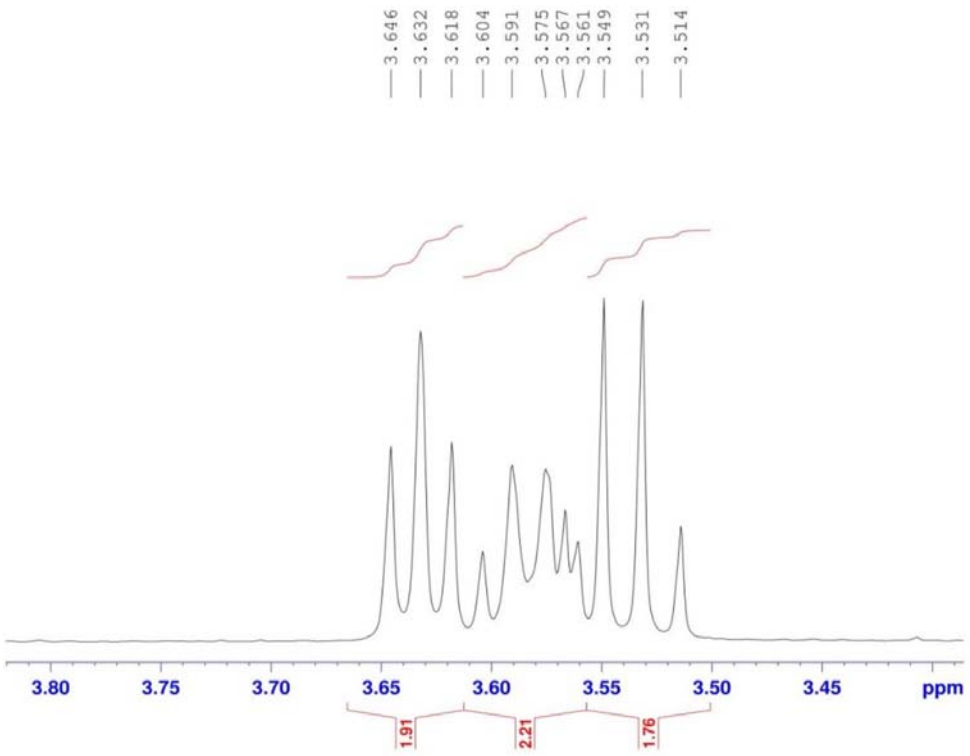

Figure S129. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**) expanded.

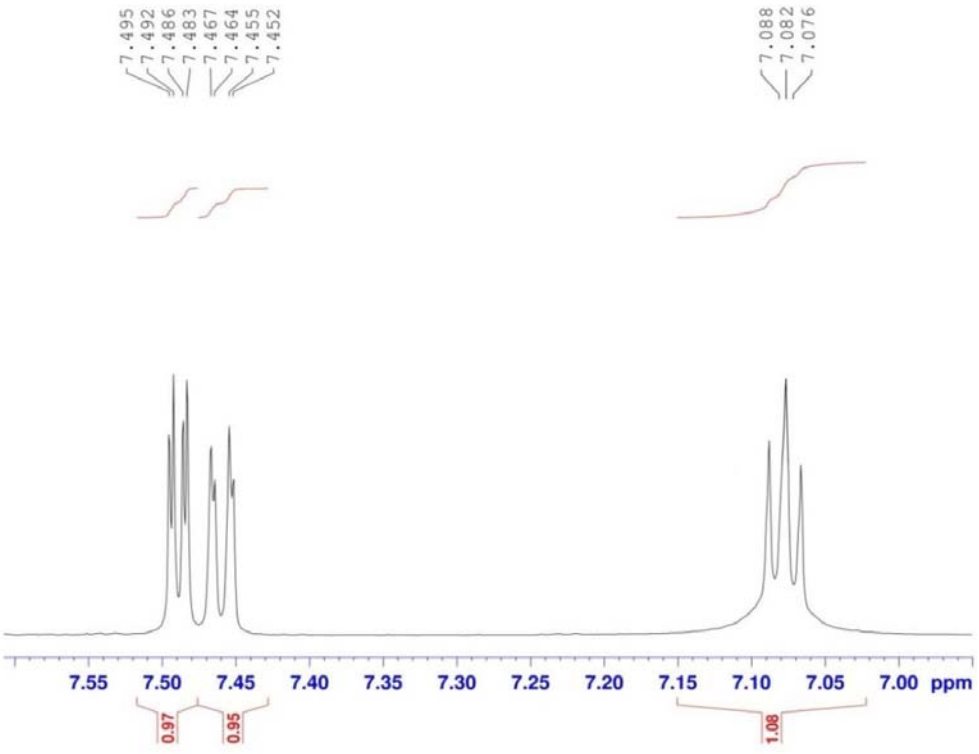

Figure S130. ^{1}H NMR spectrum (400 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**) expanded.

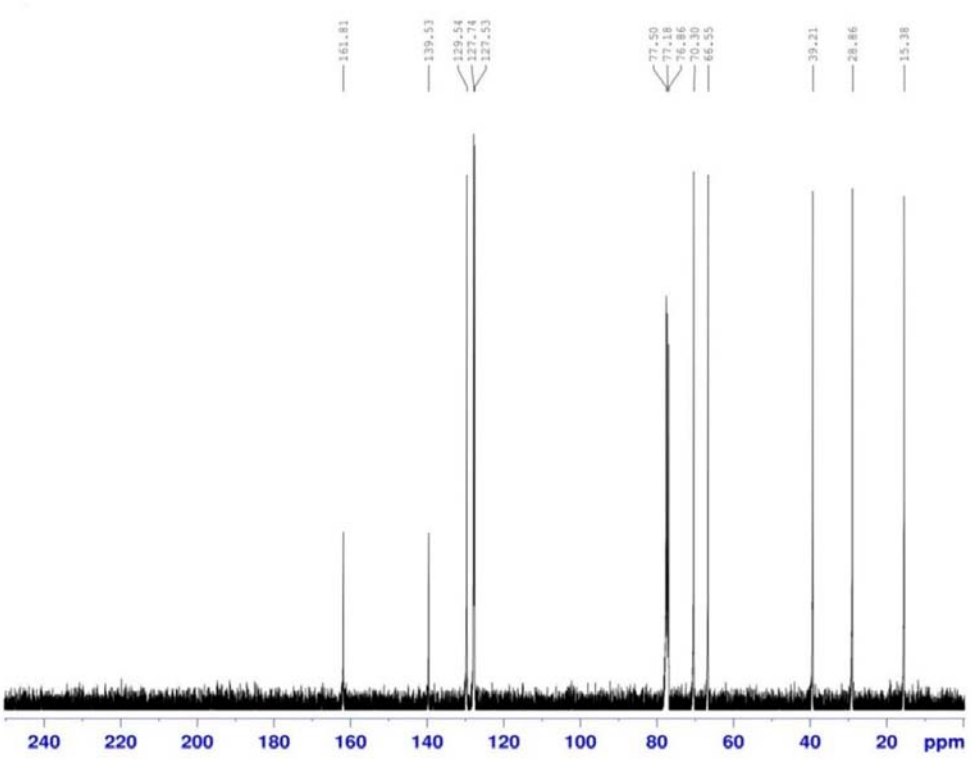

Figure S131. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**).

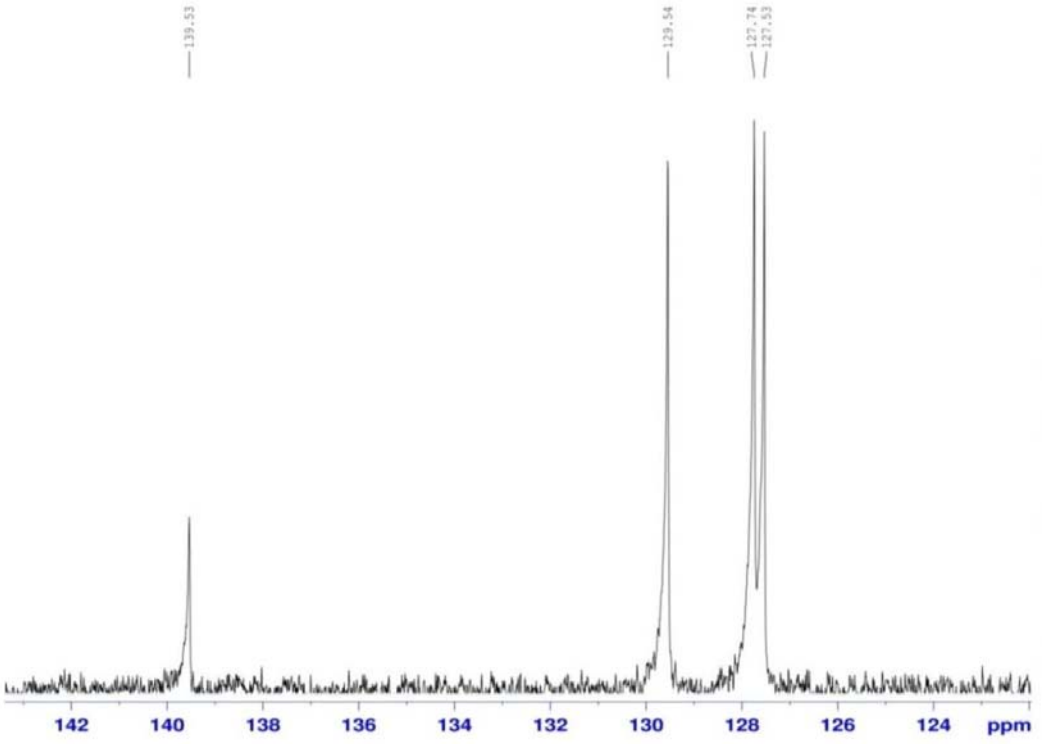

Figure S132. ^{13}C NMR spectrum (100 MHz, $CDCl_3$) of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**) expanded.

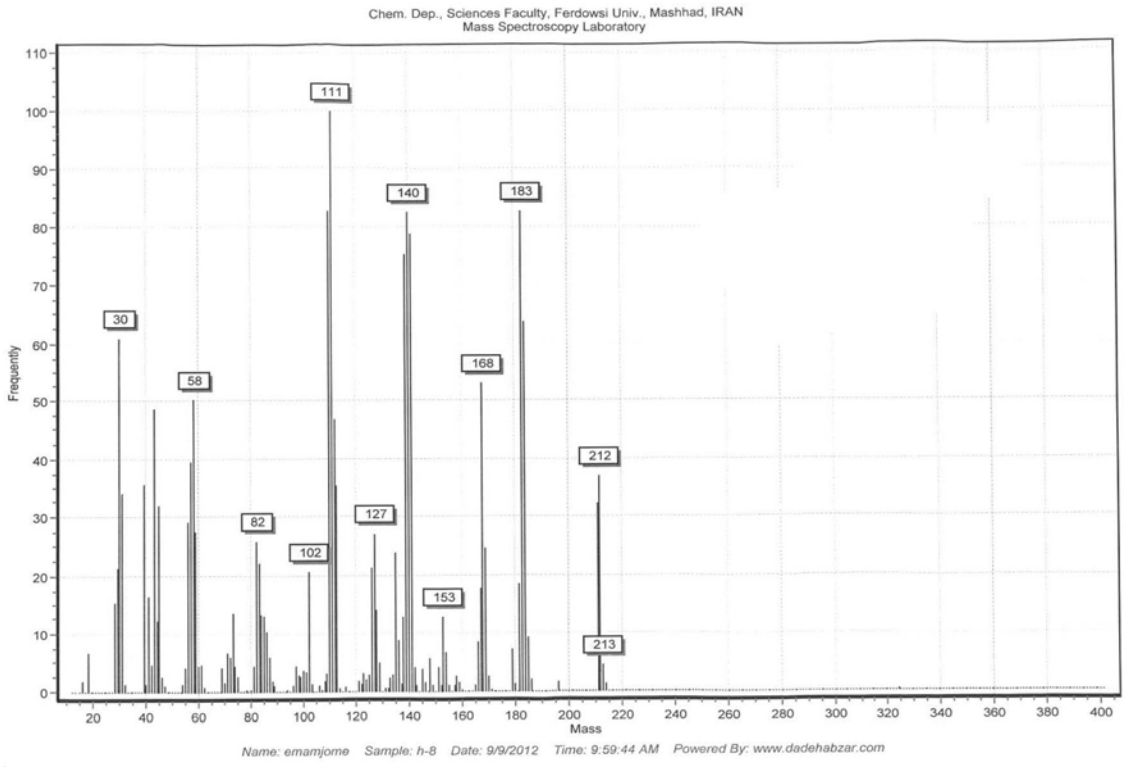

Figure S133. MS spectrum (EI, 70 eV) of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**).

Eager 300 Summarize Results

Date : 01/08/2012 at 13:10:41
Method Name : NCHS
Method Filename : Copy of Copy of N C H S-bkp .mth

Filename	AS Method	Vial
emamjome-54		

#	Group	Sample Name	Type	Weig.	Pro.F		
54	1	h-8	UNK	1.109	6.25	---	

Component name	Element %
Nitrogen%	6.881211758
Carbon%	56.86362457
Hydrogen%	7.642203808
Sulphur%	14.79428101

Calcd for $C_{10}H_{15}NO_2S$

Nitrogen%	6.57
Carbon%	56.31
Hydrogen%	7.09
Suphur%	15.03

1 Sample(s) in Group No : 1

Component Name	Average
Nitrogen%	6.881211758
Carbon%	56.86362457
Hydrogen%	7.642203808
Sulphur%	14.79428101

Figure S134. Elemental analysis data of *N*-(3-ethoxypropyl)thiophene-2-carboxamide (**23**).

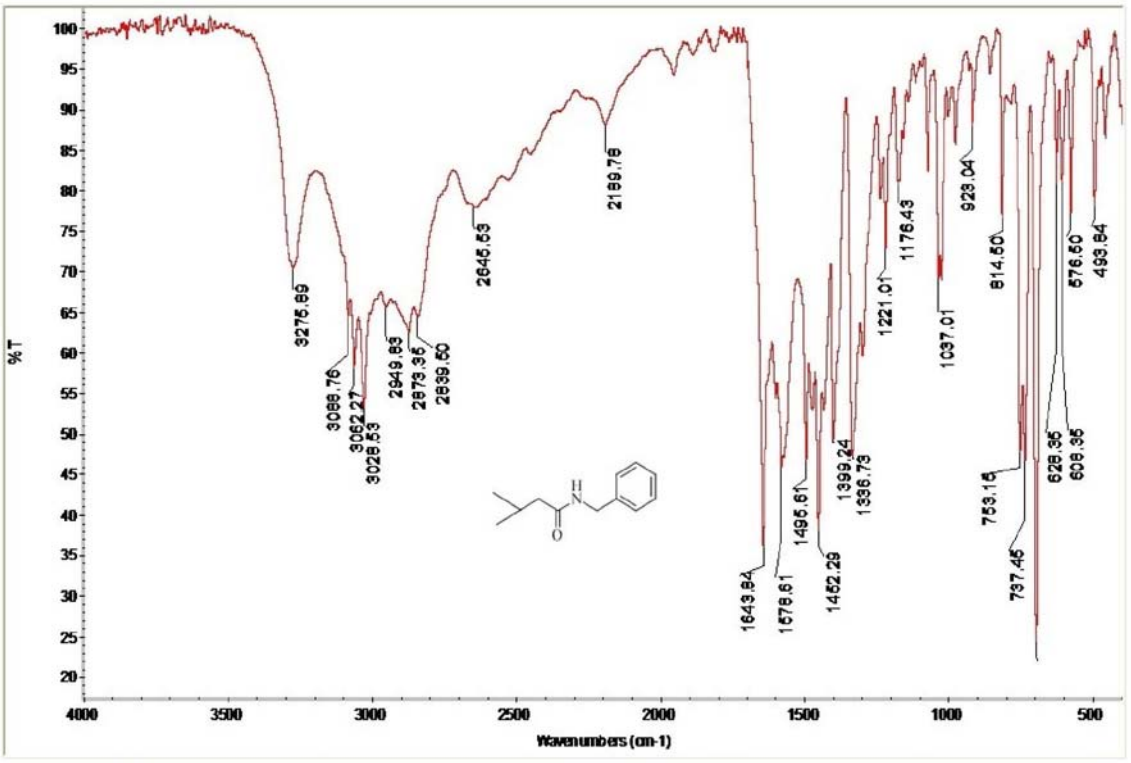

Figure S135. FTIR spectrum of *N*-benzyl-3-methylbutanamide (**24**).

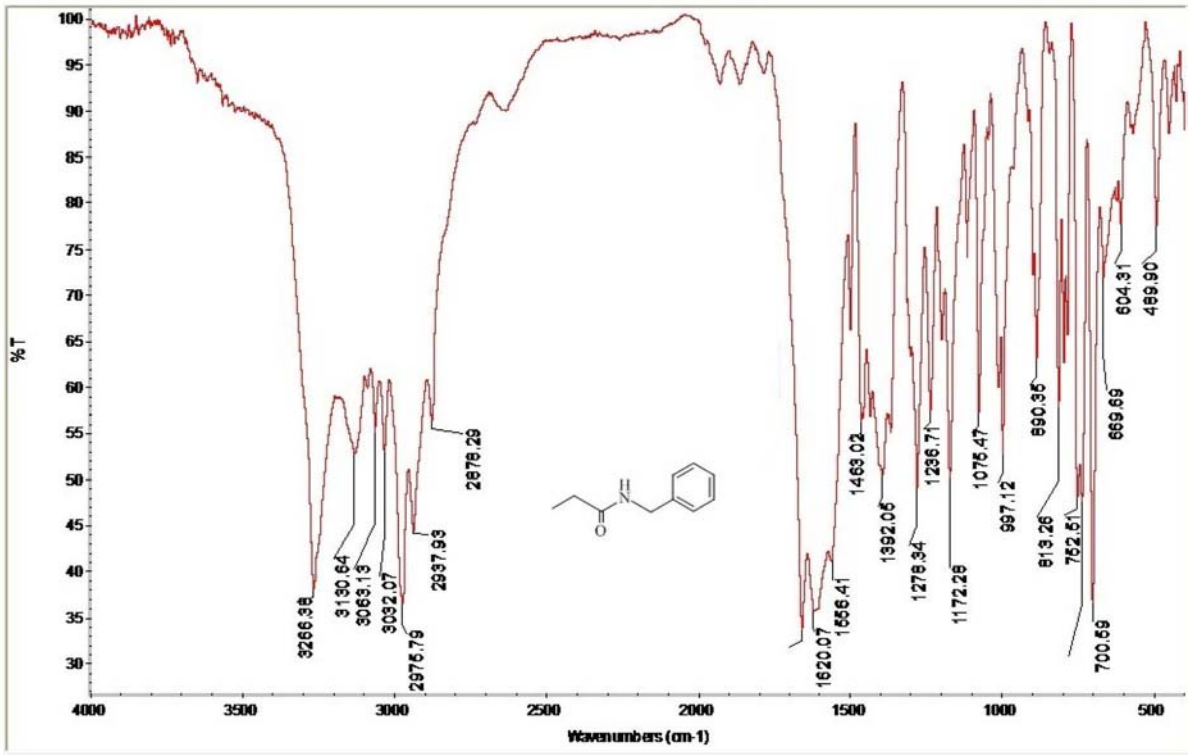

Figure S136. FTIR of *N*-benzylpropionamide (**25**).