Electronic Supplementary Material (ESI) for RSC Advances

A one pot synthesis of [1,3,4]-oxadiazoles mediated by molecular iodine

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Experimental:

General remarks

Unless otherwise stated, all reagents were purchased from commercial sources and used without further purification. Reaction progress was monitored by TLC using Merck silica gel 60 F254 (0.25mm) with detection by UV or iodine. Chromatography was performed using Merck silica gel (60-120) mesh size with freshly distilled solvents. Columns were typically packed as slurry and equilibrated with the appropriate solvent system prior to use.1H NMR (400 MHz) and 13C NMR (100 MHz) spectra were recorded on a Varian FT-400 MHz instrument using TMS as an internal standard. Data are presented as follows: chemical shift (ppm), multiplicity (s = singlet, d = doublet, t = triplet, m = multiplet, b = broad, brs = broad singlet, brm= broad multiplet, coupling constant *J* (Hz). Elemental analyses were carried out on a Perkin–Elmer 2400 automatic carbon, hydrogen, nitrogen and sulfur analyser. Melting points were recorded on Buchi B-545 melting point apparatus and are uncorrected. IR spectra were recorded in KBr or neat on a Nicolet Impact 410 spectrophotometer. Mass data were obtained with a WATERS MS system, Q-tof premier and data analyzed using Mass Lynx4.1.

Crystallographic Analysis: Crystal data were collected with Bruker Smart Apex-II CCD diffractometer using graphite by using graphite-monochromated Mo-K_α radiation (λ = 0.71073 Å) at 298 K. Cell parameters were retrieved using SMART [1]USA, 1995 software and refined with SAINT[1] for all observed reflections. Data reduction was performed with the SAINT software and corrected for Lorentzian and polarization effects. Absorption corrections were applied with the SADABS program.[2].The structures were solved by direct methods implemented in the SHELX-97[3] program and refined by full-matrix least-squares methods on F^2. All non-hydrogen atom positions were located in difference Fourier maps and refined anisotropically. The hydrogen atoms were placed in their geometrically generated positions. The crystals were isolated in rectangular shape from ethyl acetate and hexane mixture at room temperature.

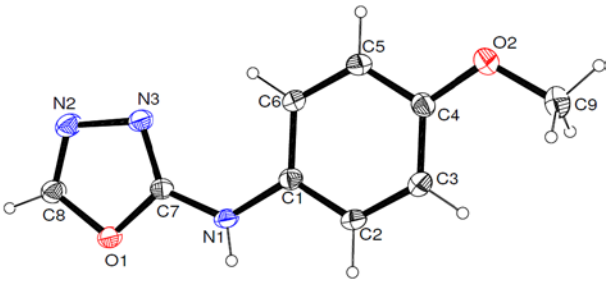

Fig. 2 ORTEP view of ***N*-(4-Methoxyphenyl)-1,3,4-oxadiazol-2-amine (4a).**

Crystallographic description of *N*-(4-Methoxyphenyl)-1,3,4-oxadiazol-2-amine (4a): $C_9H_9N_3O_2$, crystal dimensions 0.38 x 0.32 x 0.28 mm, M_r = 191.19, triclinic, space group P-1, a = 8.2269(8), b = 10.1265(11), c = 11.1995(11) Å, α = 84.312(6)°, β = 86.837(6)°, γ = 76.573(7)°, V = 902.56(16) Å^3, Z = 4, ρ_{calcd} = 1.407 mg/m^3, μ = 0.103 mm^{-1}, F(000) = 400.0, reflection collected / unique = 4510 / 2747, refinement method = full-matrix least-squares on F^2, final R indices [$I > 2\sigma(I)$]: R_1 = 0.0782, wR_2 = 0.2253, R indices (all data): R_1 = 0.1067, wR_2 = 0.2489, goodness of fit = 1.093. CCDC-824583 for ***N*-(4-Methoxyphenyl)-1,3,4-oxadiazol-2-amine (4a)** contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif.

Spectral Data

***N*-Phenyl-1,3,4-oxadiazol-2-amine (1a):** Pinkish solid; M.p. 149-150 ^{o}C (Lit. M.p. 153-154 ^{o}C).[4] ^{1}H NMR (400 MHz, $CDCl_3$): δ = 7.01 (t, 1H, *J* = 7.6 Hz), 7.31 (t, 2H, *J* = 7.6 Hz), 7.52 (d, 2H, *J* = 8.0 H), 8.44 (s, 1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$): δ = 118.9, 123.9, 130.3, 139.9, 149.4, 162.1 ppm. IR (KBr): 3255, 3155, 3092, 3044, 2316, 1614, 1591, 1211, 1098, 1012, 755 cm^{-1}. $C_8H_7N_3O$ (161.08): calcd. C 59.65, H 4.38, N 26.09; found C 59.61, H 4.32, N 26.13.

***N*-*p*-Tolyl-1,3,4-oxadiazol-2-amine (2a):** White solid; M.p. 129-132 ^{o}C. ^{1}H NMR (400 MHz, CD_3OD): δ = 2.29 (s, 3H), 7.14 (d, 2H, *J* = 8.4 Hz), 7.38 (d, 2H, *J* = 8.4 Hz), 8.43 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 20.9, 119.0, 130.8, 133.6, 137.4, 149.3, 162.3 ppm. IR (KBr): 3159, 2956, 2923, 2854, 1626, 1614, 1596, 1514, 1217, 1095, 1015, 819 cm^{-1}. $C_9H_9N_3O$ (175.19): calcd. C 61.70, H 5.18, N 23.99; found C 61.66, H 5.23, N 23.96.

***N*-(2-Methoxyphenyl)-1,3,4-oxadiazol-2-amine (3a):** White solid; M.p. 103-105 ^{o}C. ^{1}H NMR (400 MHz, CD_3OD): δ = 3.91 (s, 3H), 6.94-7.07 (m, 3H), 7.95 (d, 1H, *J* = 8 Hz), 8.46 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 56.4, 111.9, 119.7, 121.9, 124.7, 128.7, 149.5, 150.2, 162.3 ppm. IR (KBr): 3367, 3147, 3087, 2940, 2840, 1623, 1590, 1548, 1464, 1252, 1097, 1023, 773, 758 cm^{-1}. $C_9H_9N_3O_2$ (191.19): calcd. C 56.54, H 4.74, N 21.98; found C 56.51, H 4.72, N 21.91.

***N*-(4-Methoxyphenyl)-1,3,4-oxadiazol-2-amine (4a):** Pink solid; M.p. 164-166 ^{o}C. ^{1}H NMR (400 MHz, CD_3OD): δ = 3.76 (s, 3H), 6.90 (d, 2H, *J* = 9.2 Hz), 7.40 (d, 2H, *J* = 9.2), 8.40 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 56.1, 115.6, 120.9, 133.1, 149.3, 157.3, 162.6 ppm. IR (KBr): 3234, 3142, 3046, 2341, 1614, 1511, 1237, 1097, 1032, 829 cm^{-1}. $C_9H_9N_3O_2$ (191.19): calcd. C 56.54, H 4.74, N 21.98; found C 56.59, H 4.69, N 21.97.

***N*-(3,4-Dimethylphenyl)-1,3,4-oxadiazol-2-amine (5a):.** White solid; M.p. 133-135 ^{o}C. ^{1}H NMR (400 MHz, CD_3OD): δ = 2.17 (s, 3H), 2.21 (s, 3H), 7.03 (d, 1H, *J* = 8.4 Hz), 7.19 (d, 1H, *J* = 8.4 Hz), 7.25 (s, 1H), 8.40 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 19.3, 20.2, 116.5, 120.2, 131.2, 132.1, 137.5, 138.6, 149.2, 162.2 ppm. IR (KBr): 3444, 3228,

2923, 2854, 2288, 1626, 1503, 1328, 1096, 871, 817, 723 cm^{-1}. $C_{10}H_{11}N_3O$ (189.22): calcd. C 63.48, H 5.86, N 22.21; found C 63.44, H 5.89, N 22.19.

***N*-(2-Chlorophenyl)-1,3,4-oxadiazol-2-amine (6a):** White solid; M.p. 57-60 ^oC. ^1H NMR (400MHz, CD_3OD): δ = 7.07 (dt, 1H, J_1 = 8.0 Hz, J_2 = 1.6 Hz), 7.31 (dt, 1H, J_1 = 8.0 Hz, J_2 = 1.6 Hz), 7.41 (dd, 1H, J_1 = 8.0 Hz, J_2 = 1.2 Hz), 8.02 (dd, 1H, J_1 = 7.6 Hz, J_2 = 1.6 Hz), 8.51 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 122.6, 125.9, 129.0, 131.0, 136.5, 143.4, 150.1, 162.3 ppm. IR (KBr): 3428, 3230, 2357, 1614, 1444, 1321, 1120, 1039, 737 cm^{-1}. $C_8H_6ClN_3O$ (195.61): calcd. C 49.12, H 3.09, N 21.48; found C 49.16, H 3.05, N 21.41.

***N*-(3-Chlorophenyl)-1,3,4-oxadiazol-2-amine (7a):** White solid; M.p. 119-122 ^oC. ^1H NMR (400 MHz, CD_3OD): δ = 6.96 (d, 1H, J = 8.0 Hz), 7.24 (t, 1H, J = 8.4 Hz), 7.36 (d, 1H, J = 8.4 Hz), 7.63 (s, 1H), 8.47 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 116.8, 118.4, 123.5, 131.5, 135.9, 141.2, 149.6, 161.6 ppm. IR (KBr): 3435, 3153, 2924, 2853, 1687, 1599, 1502, 1484, 1217, 1065, 1025, 904, 852, 755 cm^{-1}. HRMS (ESI): calcd. for $C_8H_6ClN_3O$ (MH^+) 196.0272; found 196.0278.

***N*-(4-Bromophenyl)-1,3,4-oxadiazol-2-amine (8a):** Pink solid; M.p. 167-169 ^oC. ^1H NMR (400 MHz, CD_3OD): δ = 7.38-7.44 (m, 4 H), 8.45 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 115.9, 120.4, 133.2, 139.2, 149.5, 161.7 ppm. IR (KBr): 3277, 3092, 2925, 2854, 2399, 1609, 1405, 1093, 1008, 825, 777 cm^{-1}. $C_8H_6BrN_3O$ (240.06): calcd. C 40.03, H 2.52, N 17.50; found C 40.07, H 2.46, N 17.48.

***N*-(3-Nitrophenyl)-1,3,4-oxadiazol-2-amine (9a):** Yellowish white solid; M.p. 189-191 ^oC. ^1H NMR (400 MHz, CD_3OD): δ = 7.53 (t, 1H, J = 8.4 Hz), 7.83 (m, 2H), 8.52 (m, 3H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 113.0, 118.0, 124.2, 131.4, 141.4, 149.9, 150.4, 161.5 ppm. IR (KBr): 3437, 3329, 3153, 2856, 1685, 1520, 1352, 1226, 1078, 1025, 934, 834, 735 cm^{-1}. $C_8H_6N_4O_3$ (206.16): calcd. C 46.61, H 2.93, N 27.18; found C 46.57, H 2.98, N 27.11. HRMS (ESI): calcd. for $C_8H_6N_4O_3$ (MH^+) 207.0513; found 207.0523.

***N*-(4-(Trifluoromethyl)phenyl)-1,3,4-oxadiazol-2-amine (10a):** White solid; M.p. 166-169 ^oC. ^1H NMR (400 MHz, CD_3OD): δ = 7.59 (d, 2H, J = 8.4 Hz), 7.69 (d, 2H, J = 8.4 Hz), 8.51 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 118.4, 124.7, 125.1, 125.4, 127.5, 127.6,

143.4, 149.9, 161.6 ppm. IR (KBr): 3444, 3268, 2924, 1614, 1422, 1332, 1164, 1113, 1070, 1015, 838, 787 cm^{-1}. $C_9H_6F_3N_3O$ (229.16): calcd. C 47.17, H 2.64, F 24.87, N 18.34; found C 47.23, H 2.61, F 24.84, N 18.37. HRMS (ESI): calcd. for $C_9H_6F_3N_3O$ (MH^+) 230.0536; found 230.0539.

***N*-(Naphthalen-1-yl)-1,3,4-oxadiazol-2-amine (11a):** Black solid; M.p. 136-139 ^oC. ^1H NMR (400 MHz, CD_3OD): δ = 7.47-7.57 (m, 3H), 7.70 (d, 1H, *J* = 8 Hz), 7.86-7.91 (m, 2H), 8.12 (m, 1H), 8.48 (s, 1H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 119.4, 122.8, 126.2, 126.8, 127.36, 127.42, 128.4, 129.6, 135.0, 135.9, 149.8, 163.6. ppm. IR (KBr): 3175, 2961, 2845, 1574, 1400, 1217, 1088, 1006, 780, 724 cm^{-1}. $C_{12}H_9N_3O$ (211.22): calcd. C 68.24, H 4.29, N 19.89; found C 68.29, H 4.26, N 19.83. HRMS (ESI): calcd for $C_{12}H_9N_3O$ (MH^+) 212.0818; found 212.0824.

***N*,5-Diphenyl-1,3,4-oxadiazol-2-amine (12a):** White solid; M.p. 218-220 ^oC.(Lit. M.p. 214.9-215.9 ^oC).[5] ^1H NMR (400 MHz, CD_3OD): δ = 7.06 (t, 1H, *J* = 7.6 Hz), 7.36 (t, 2H, *J* = 6.8 Hz), 7.55 (m, 5H), 7.96 (m, 2H) ppm. ^{13}C NMR (100 MHz, CD_3OD + DMSO-d_6): δ = 118.9, 123.9, 125.4, 127.2, 130.5, 130.6, 132.6, 140.0, 160.2, 162.0 ppm. IR (KBr): 3446, 3264, 3053, 2923, 1620, 1580, 1500, 1444, 1242, 1050, 1021, 745, 722, 685 cm^{-1}. $C_{14}H_{11}N_3O$ (237.26): calcd. C 70.87, H 4.67, N 17.71; found C 70.81; H 4.69, N 17.75. HRMS (ESI): calcd. for $C_{14}H_{11}N_3O$ (MH^+) 238.0975; found 238.0981.

5-Phenyl-*N*-*p*-tolyl-1,3,4-oxadiazol-2-amine (13a): White solid; M.p. 214-217 ^oC (Lit. M.p. 214-216 ^oC).[6] ^1H NMR (400 MHz, CD_3OD): δ = 2.31 (s, 3H), 7.17 (d, 2H, *J* = 8.4 Hz), 7.43 (d, 2H, *J* = 8.4 Hz), 7.54 (m, 3H), 7.95 (m, 2H) ppm. ^{13}C NMR (100 MHz, CD_3OD + DMSO-d_6): δ = 21.2, 119.0, 125.5, 127.1, 129.0, 130.6, 131.0, 132.5, 137.6, 159.9, 162.0 ppm. IR (KBr): 3435, 3298, 3044, 2917, 1613, 1581, 1518, 1286, 1244, 1232, 1050, 818, 719, 682 cm^{-1}. $C_{15}H_{13}N_3O$ (251.29): calcd. C 71.70, H 5.21, N 16.72; found C 71.74, H 5.17, N 16.66.

***N*-(2-Fluorophenyl)-5-phenyl-1,3,4-oxadiazol-2-amine (14a):** White solid; M.p. 120-122 ^oC. ^1H NMR (400 MHz, CD_3OD): δ = 7.05 (m, 1H), 7.13-7.20 (m, 2H), 7.49 (m, 3H), 7.93 (m, 2H), 8.09 (t, 1H, 8.0 Hz) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 116.4, 116.6, 121.8, 125.0, 125.1, 125.2, 125.8, 125.9, 127.2, 127.8, 127.9, 130.4, 132.5, 153.1, 155.5, 160.7, 162.0 ppm. IR (KBr): 3391, 3063, 1620, 1581, 1557, 1488, 1461, 1252, 1051, 749, 719, 688

cm^{-1}. $C_{14}H_{10}FN_3O$ (255.24): calcd. C 65.88, H 3.95, N 16.46; found C 65.83, H 3.99, N 16.41. HRMS (ESI): calcd. for $C_{14}H_{10}FN_3O$ (MH^+) 256.0881; found 256.0883.

***N*-Cyclohexyl-5-phenyl-1,3,4-oxadiazol-2-amine (15a):** White solid; M.p. 146-148 ^oC (Lit. M.p. 152.8-152.9 ^oC).[7] ^1H NMR (400 MHz, CD_3OD): δ = 1.22-1.48 (m, 5H), 1.66 (m, 1H), 1.81 (m, 2H), 2.07 (m, 2H), 3.49 (m, 1H), 7.49 (m, 3H), 7.87 (m, 2H) ppm ^{13}C NMR (100 MHz, CD_3OD): δ = 26.1, 26.8, 34.0, 53.77, 125.6, 126.8, 130.3, 132.1, 159.9, 164.8 ppm. IR (KBr): 3264, 3022, 2919, 2852, 1621, 1586, 1452, 1379, 1346, 1048, 770, 736, 693 cm^{-1}. $C_{14}H_{17}N_3O$ (243.31): calcd. C 69.11, H 7.04, N 17.27; found C 69.15, H 7.06, N 17.20.

***(R)*-5-Phenyl-*N*-(1-phenylethyl)-1,3,4-oxadiazol-2-amine (16a).** White solid; M.p. 179-180 ^oC (Lit. M.p. 181-183 ^oC).[7] ^1H NMR (400 MHz, CD_3OD): δ = 1.58 (d, 3H, *J* = 6.8 Hz), 4.94 (m, 1H), 7.25 (m, 1H), 7.35 (t, 2H, *J* = 8.0 Hz), 7.42 (m, 2H), 7.49 (m, 3H), 7.85 (m, 2H) ppm. ^{13}C NMR (100 MHz, CD_3OD): δ = 23.6, 54.6, 125.5, 126.9, 127.2, 128.6, 129.8, 130.3, 132.2, 142.7, 145.2, 164.7 ppm. IR (KBr): 3231, 3036, 2976, 2936, 1614, 1494, 1256, 1127, 1048, 700, 691 cm^{-1}. $C_{16}H_{15}N_3O$ (265.31): calcd. C 72.43, H 5.70, N 15.84; found C 72.39, H 5.73, N 15.77. HRMS (ESI): calcd. for $C_{16}H_{15}N_3O$ (MH^+) 266.1288; found 266.1293.

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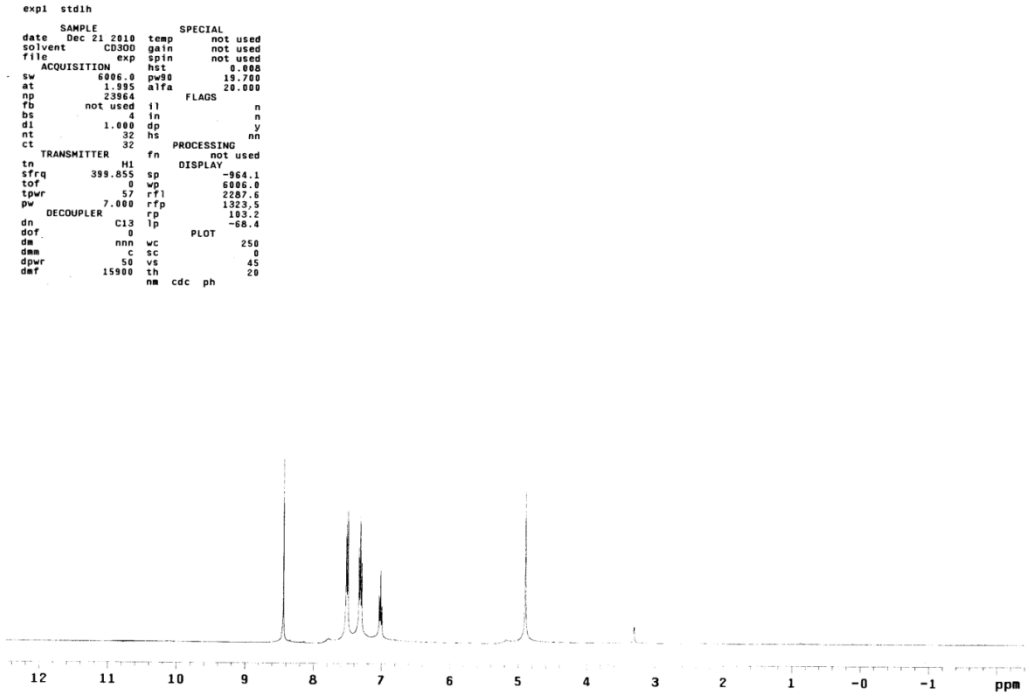
SPECTRA

_N_-Phenyl-1,3,4-oxadiazol-2-amine (1a): ^{1}H NMR (CD_3OD, 400 MHz)



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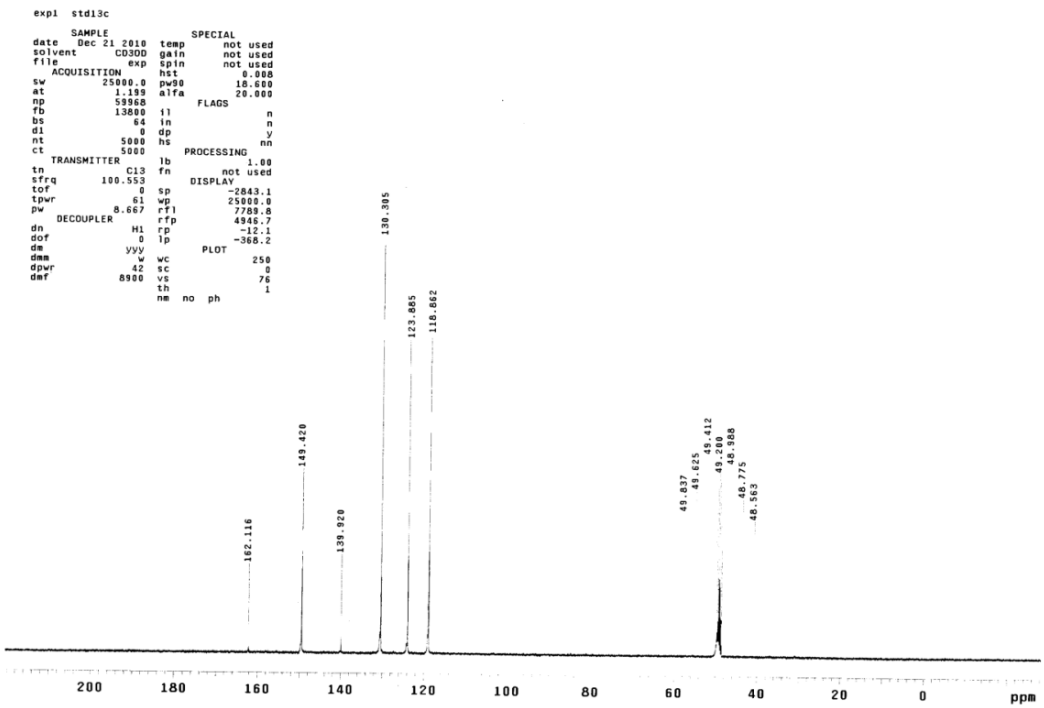

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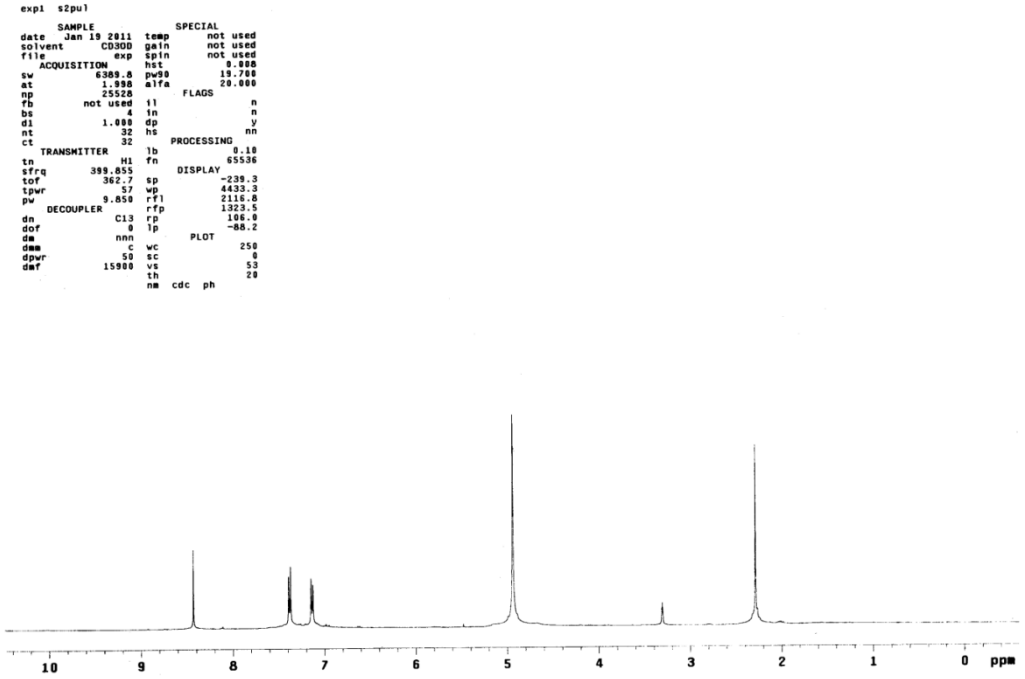
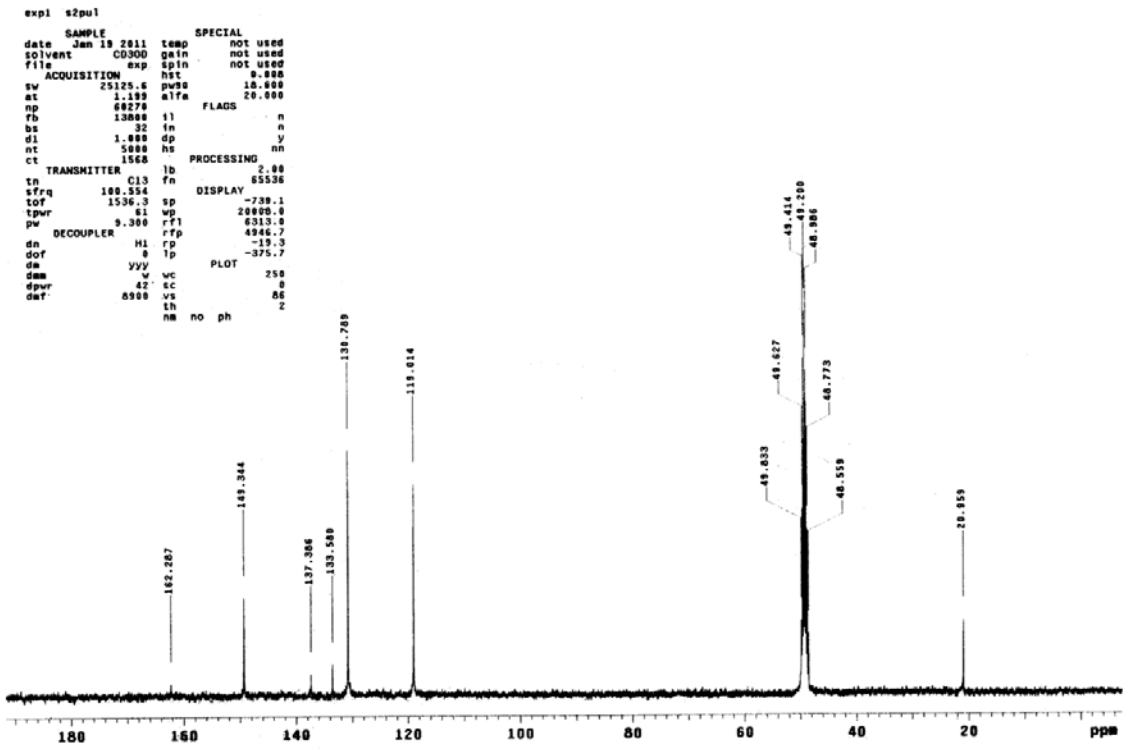
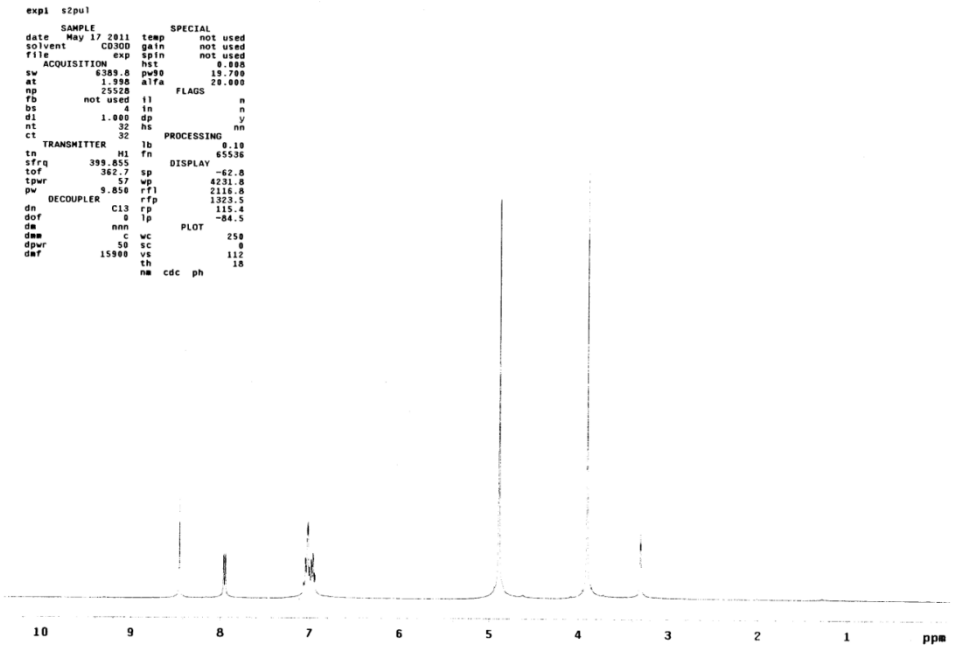


***N*-*p*-Tolyl-1,3,4-oxadiazol-2-amine (2a): ^{13}C NMR (CD_3OD, 100 MHz)**



***N*-(2-Methoxyphenyl)-1,3,4-oxadiazol-2-amine (3a): ^{1}H NMR (CD_3OD, 400 MHz)**



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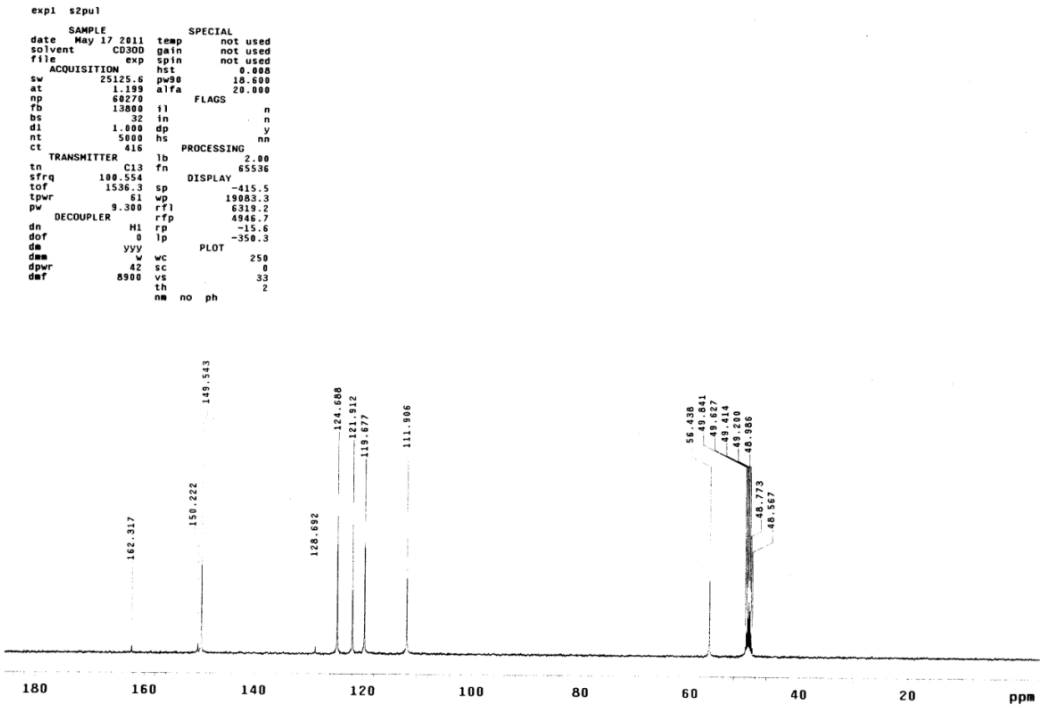
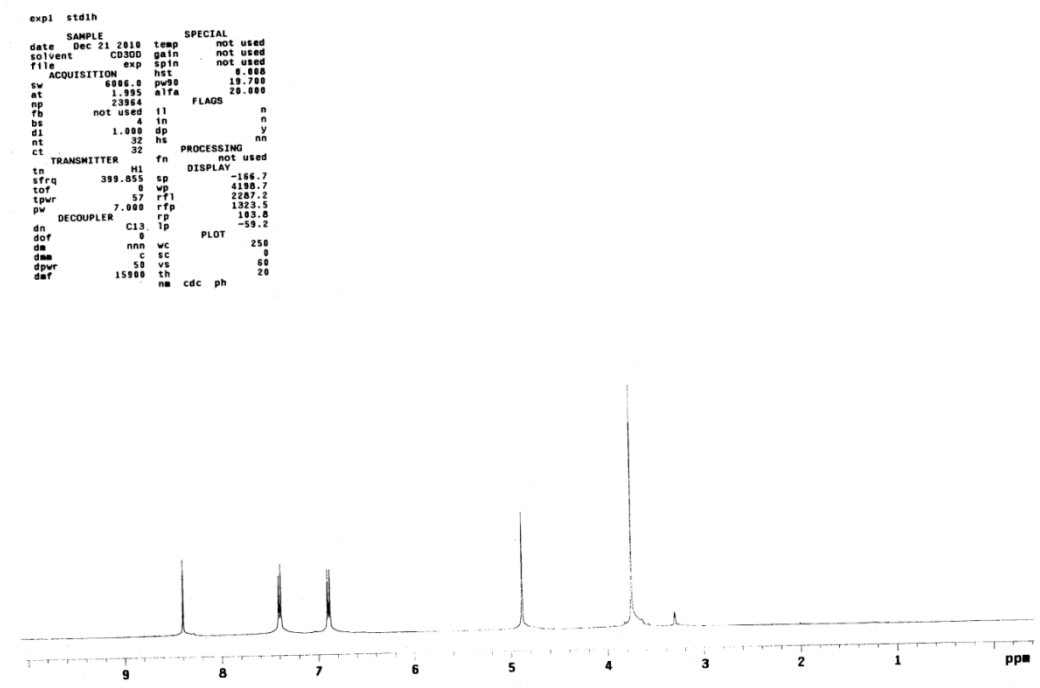
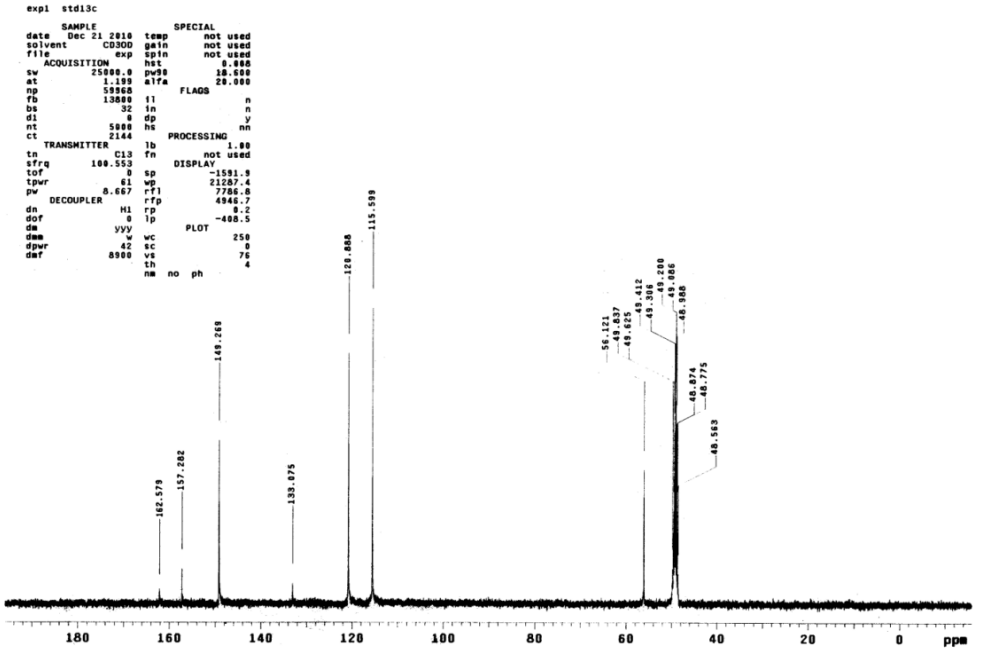


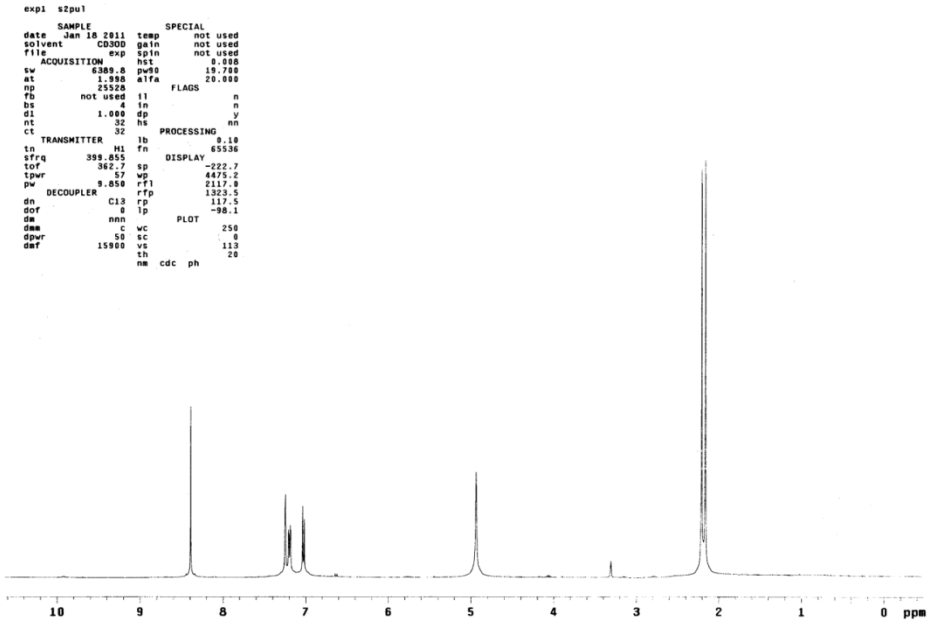
***N*-(4-Methoxyphenyl)-1,3,4-oxadiazol-2-amine (4a): ^{1}H NMR (CD_3OD, 400 MHz)**



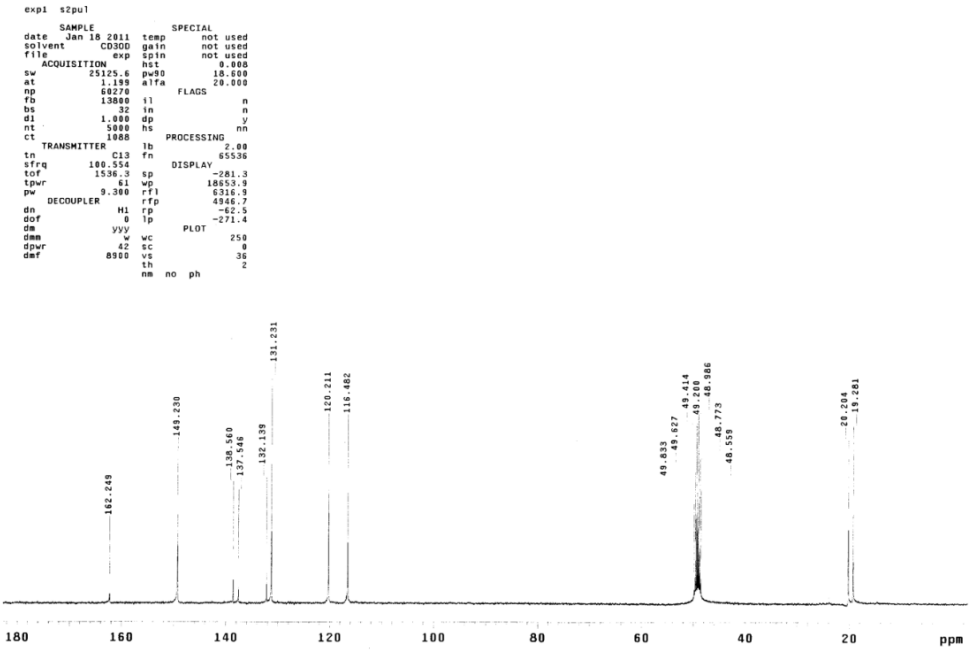
***N*-(4-Methoxyphenyl)-1,3,4-oxadiazol-2-amine (4a): ^{13}C NMR (CD_3OD, 100 MHz)**



***N*-(3,4-Dimethylphenyl)-1,3,4-oxadiazol-2-amine (5a): ^{1}H NMR (CD_3OD, 400 MHz)**



***N*-(3,4-Dimethylphenyl)-1,3,4-oxadiazol-2-amine (5a): ^{13}C NMR (CD_3OD, 100 MHz)**



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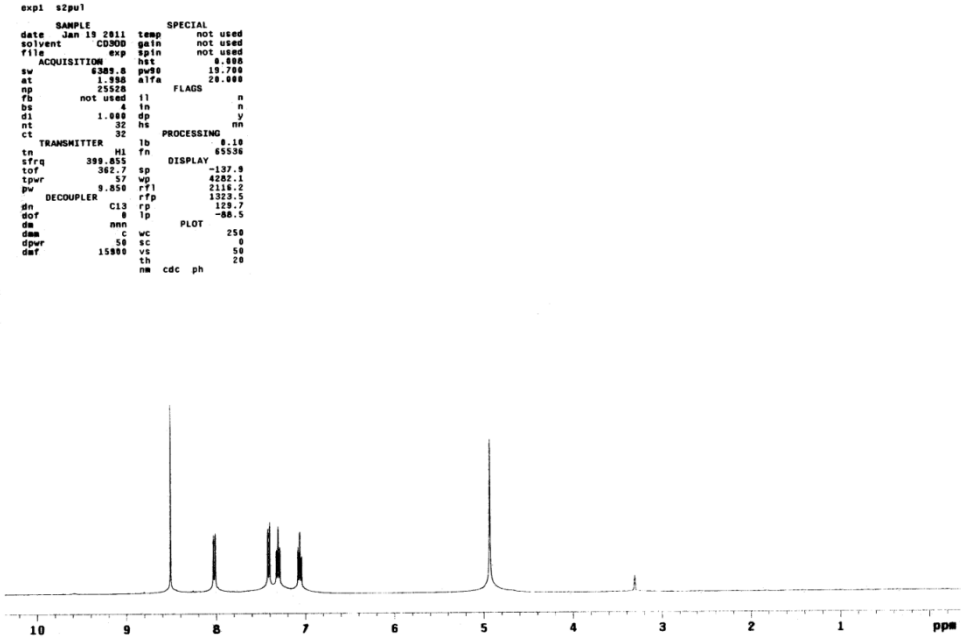
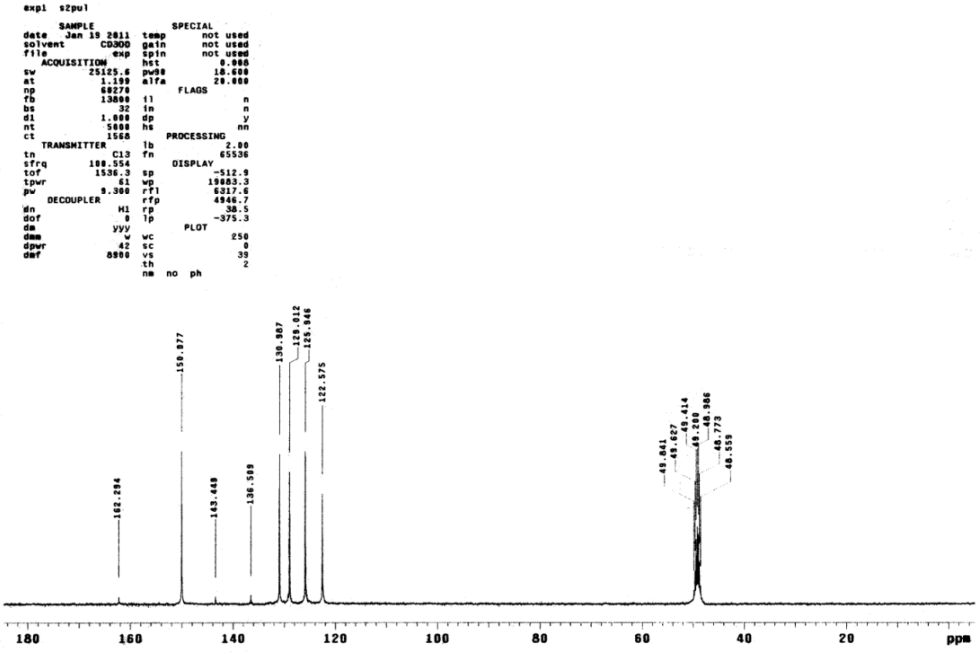
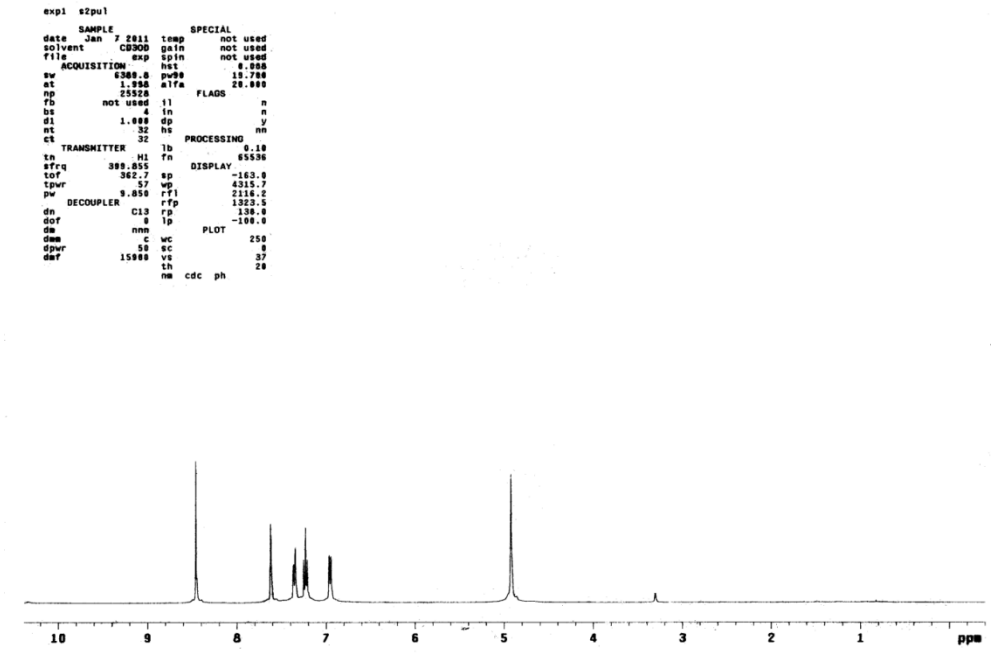


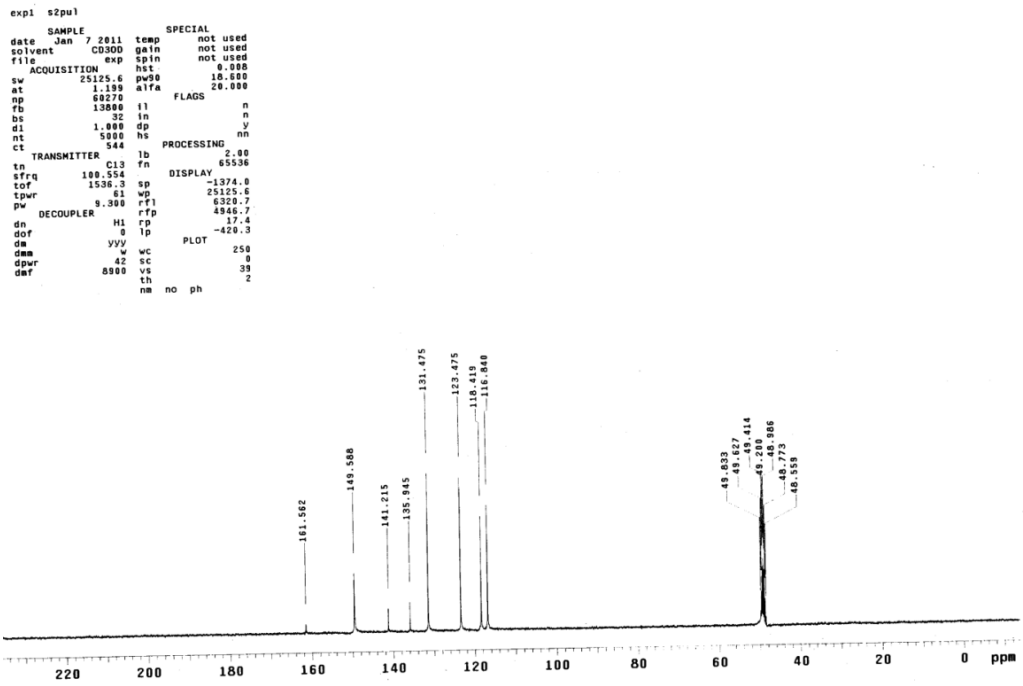
***N*-(2-Chlorophenyl)-1,3,4-oxadiazol-2-amine (6a): ^{13}C NMR (CD_3OD, 100 MHz)**



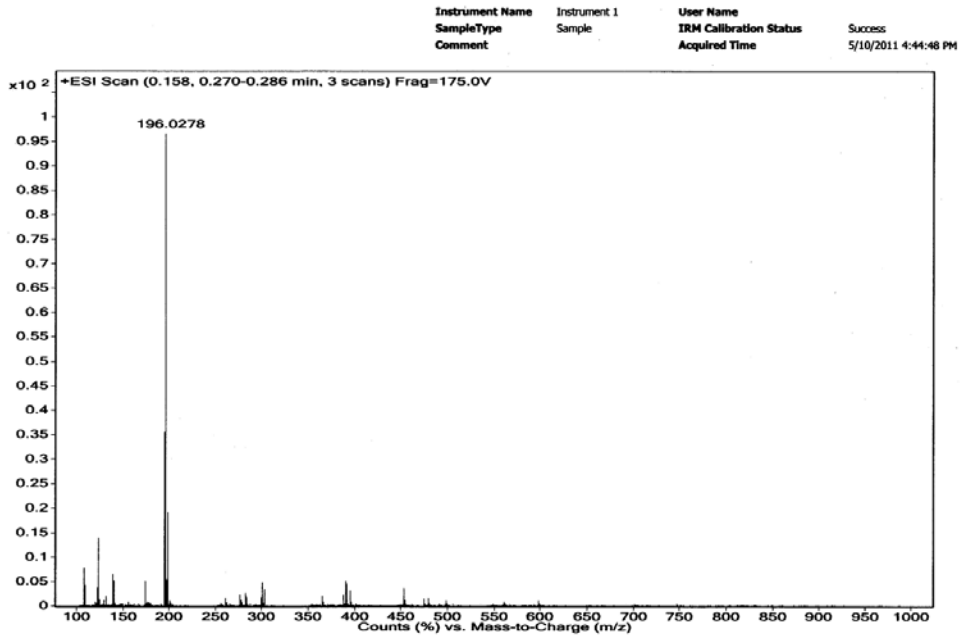
***N*-(3-Chlorophenyl)-1,3,4-oxadiazol-2-amine (7a): ^{1}H NMR (CD_3OD, 400 MHz)**



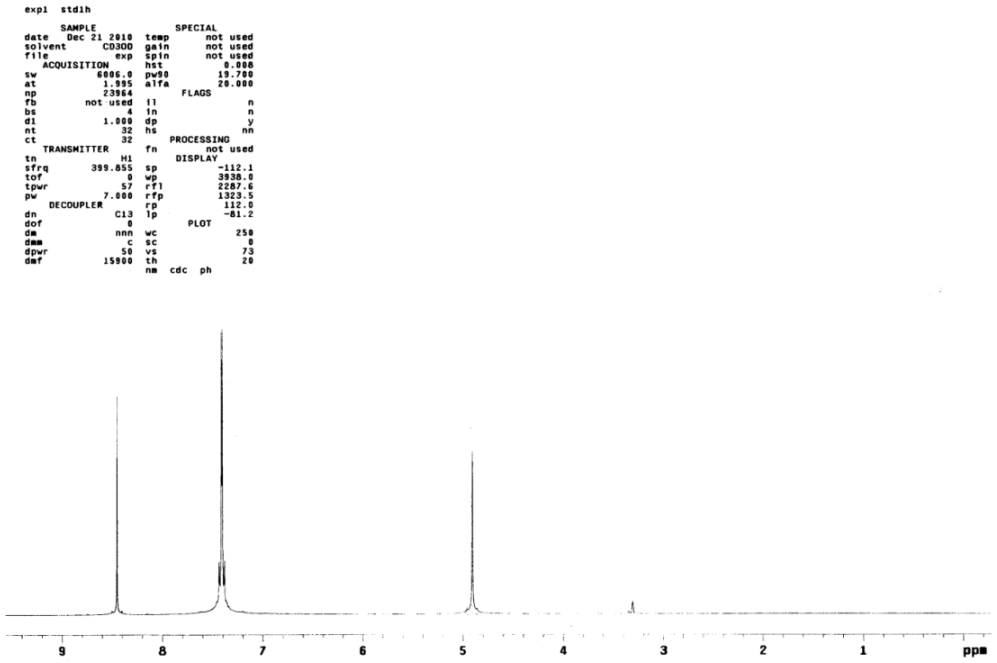
***N*-(3-Chlorophenyl)-1,3,4-oxadiazol-2-amine (7a): ^{13}C NMR (CD_3OD, 100 MHz)**



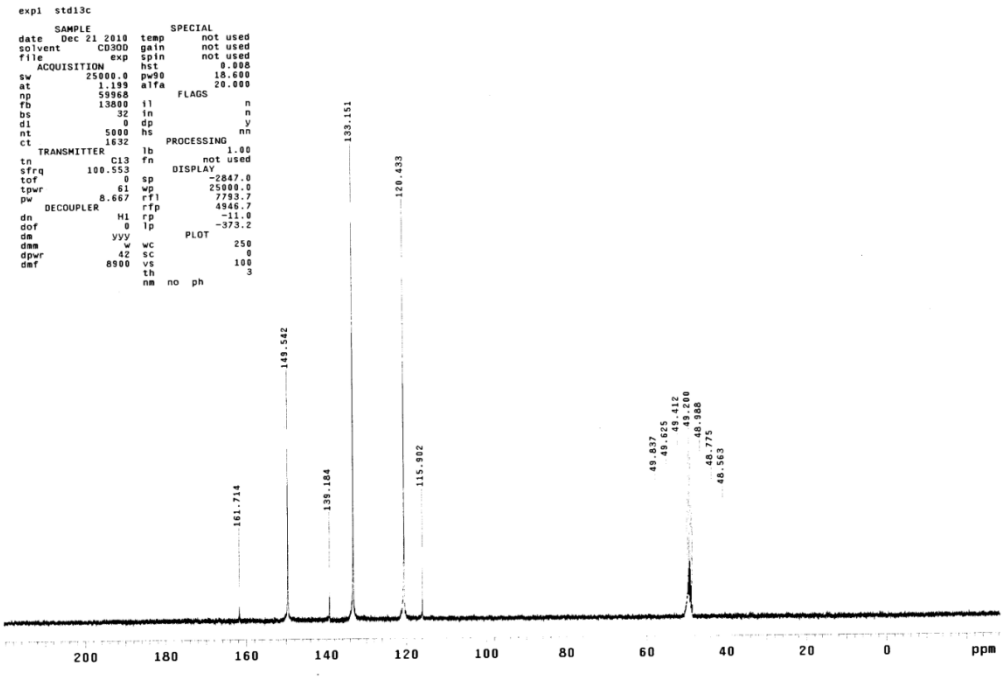
***N*-(3-Chlorophenyl)-1,3,4-oxadiazol-2-amine (7a): (Mass Spectra)**



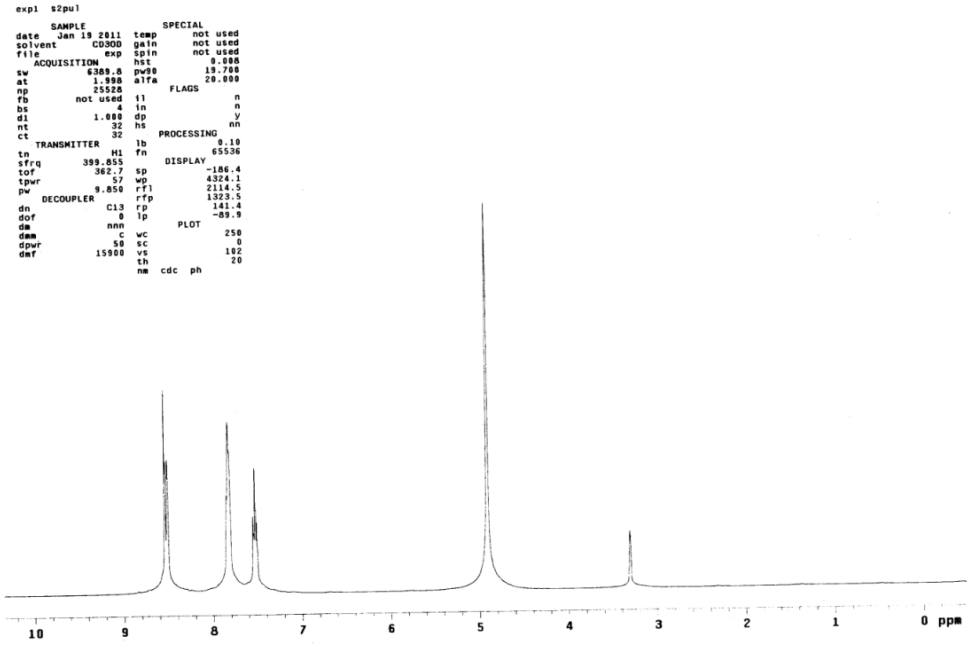
***N*-(4-Bromophenyl)-1,3,4-oxadiazol-2-amine (8a): ^{1}H NMR (CD_3OD, 400 MHz)**



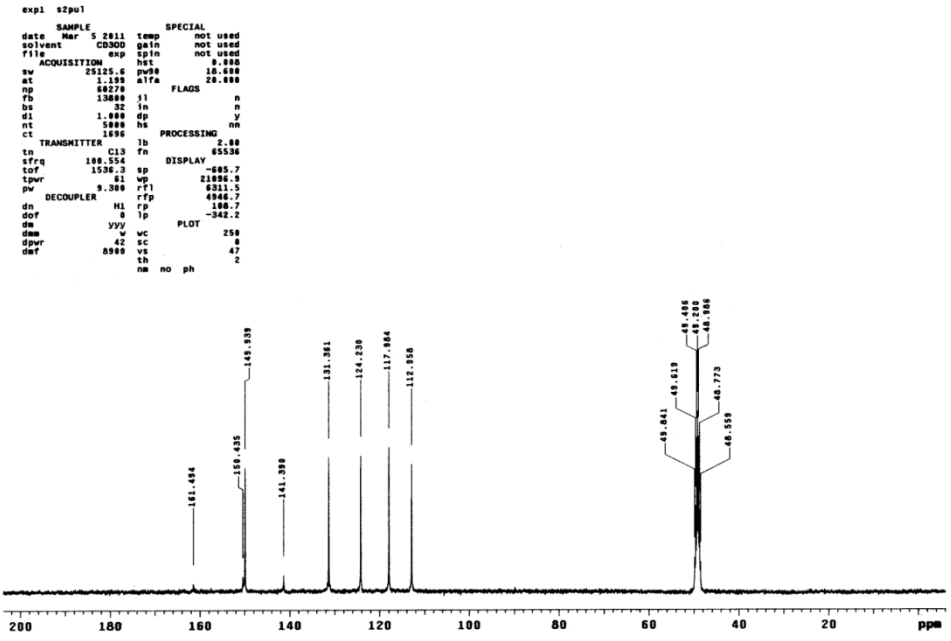
***N*-(4-Bromophenyl)-1,3,4-oxadiazol-2-amine (8a): ^{13}C NMR (CD_3OD, 100 MHz)**



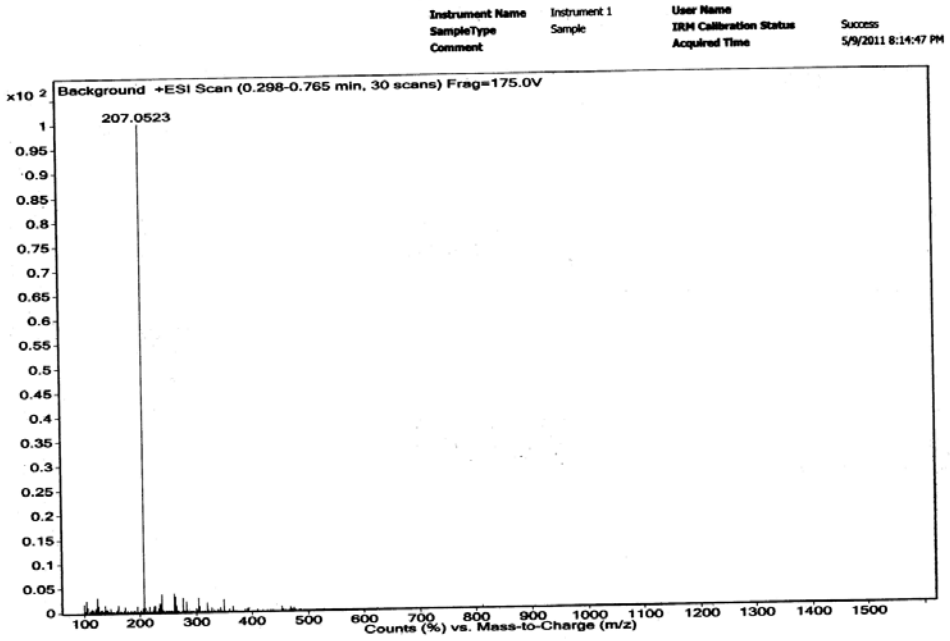
***N*-(3-Nitrophenyl)-1,3,4-oxadiazol-2-amine (9a): ^{1}H NMR (CD_3OD, 400 MHz)**



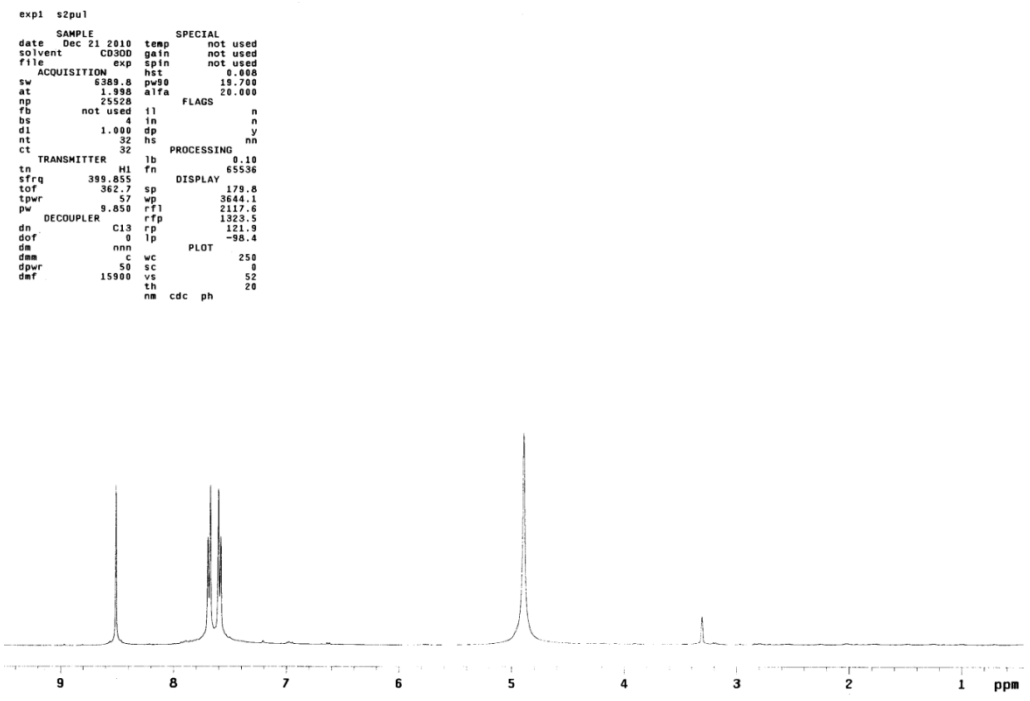
***N*-(3-Nitrophenyl)-1,3,4-oxadiazol-2-amine (9a): ^{13}C NMR (CD_3OD, 100 MHz)**



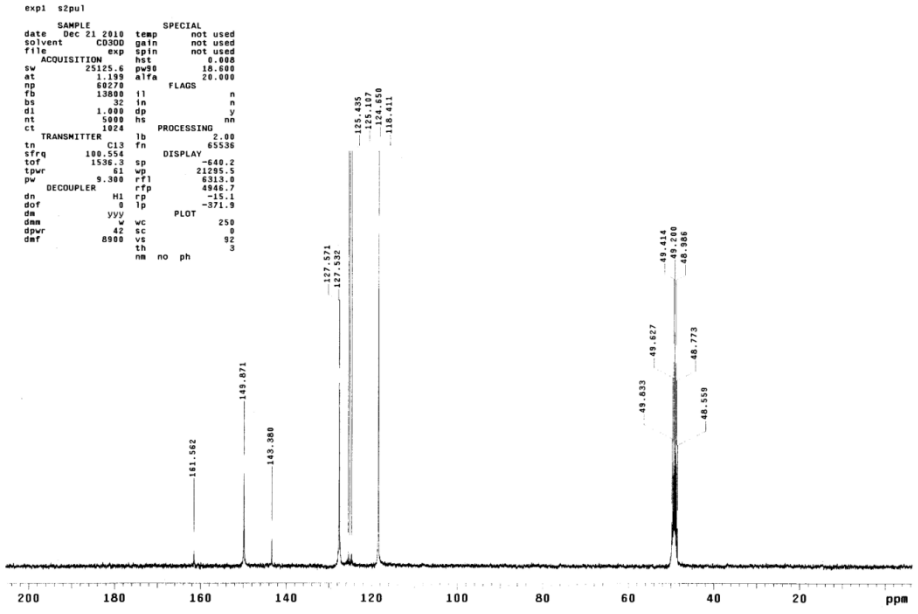
***N*-(3-Nitrophenyl)-1,3,4-oxadiazol-2-amine (9a): (Mass Spectra)**



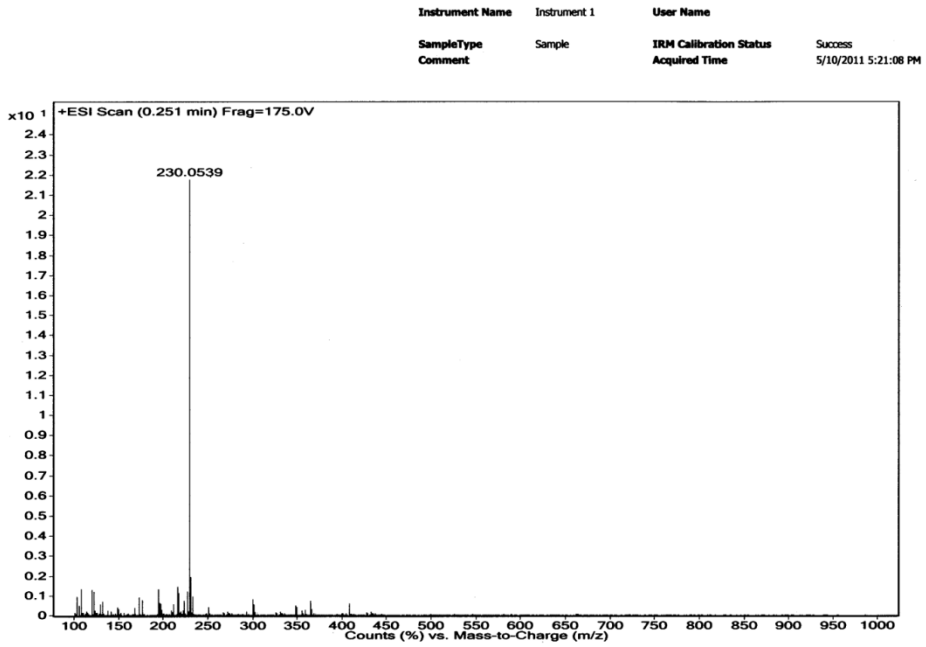
_N_-(4-(Trifluoromethyl)phenyl)-1,3,4-oxadiazol-2-amine (10a): ^{1}H NMR (CD_3OD, 400 MHz)



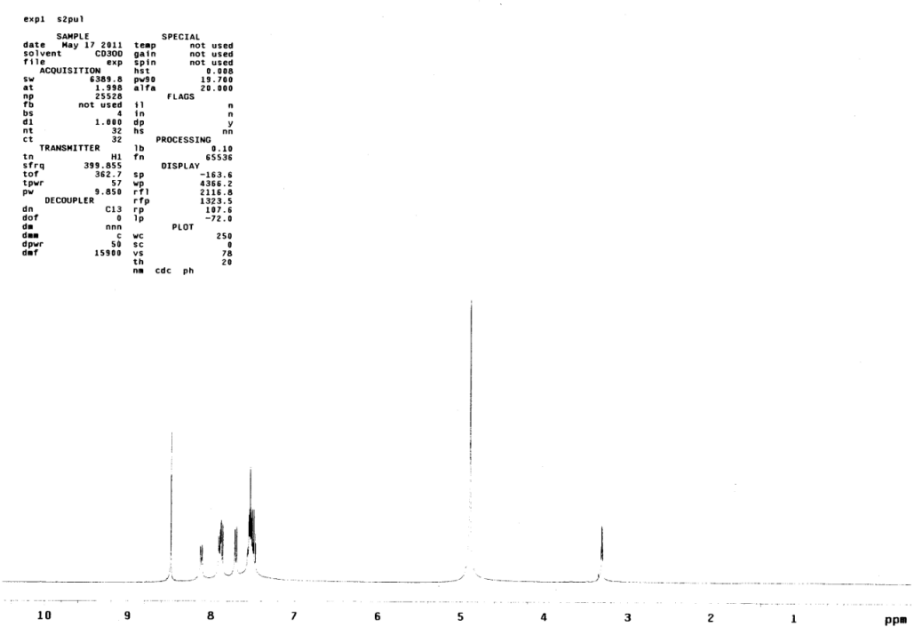
_N_-(4-(Trifluoromethyl)phenyl)-1,3,4-oxadiazol-2-amine (10a): ^{13}C NMR (CD_3OD, 100 MHz)



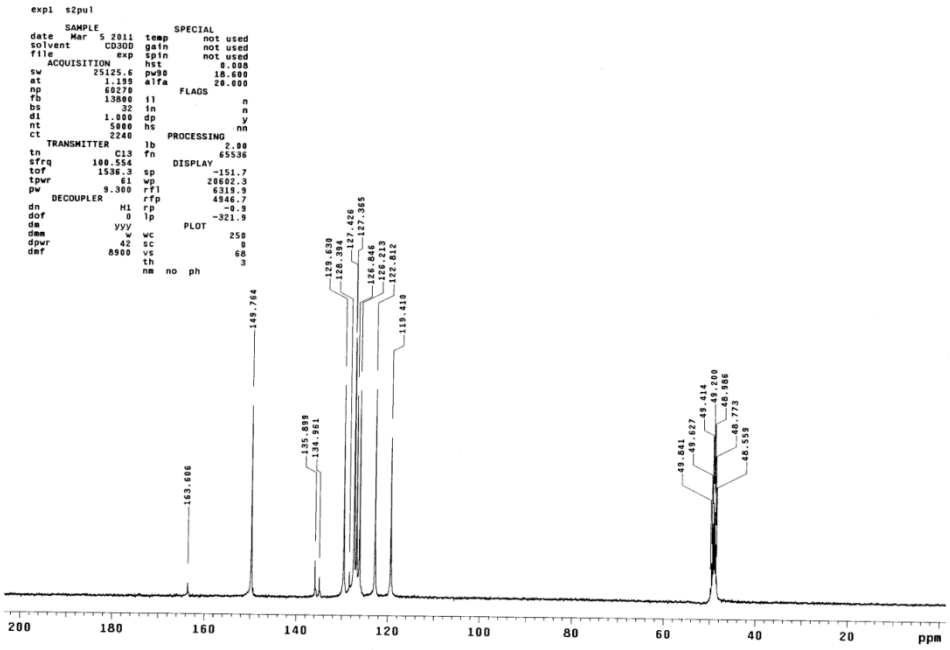
***N*-(4-(Trifluoromethyl)phenyl)-1,3,4-oxadiazol-2-amine (10a): (Mass Spectra)**



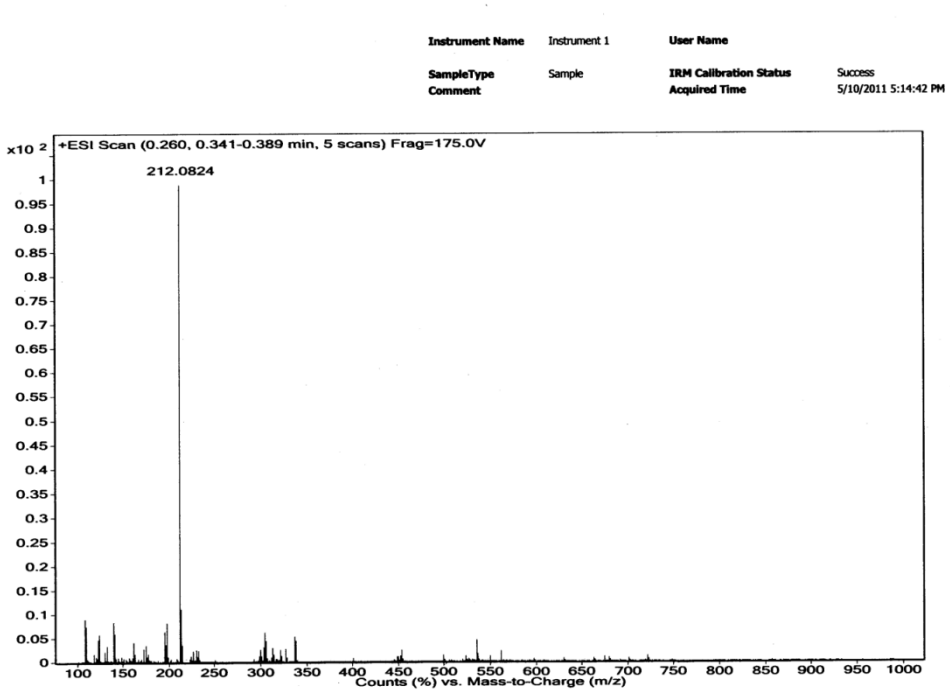
***N*-(Naphthalen-1-yl)-1,3,4-oxadiazol-2-amine (11a): ^{1}H NMR (CD_3OD, 400 MHz)**



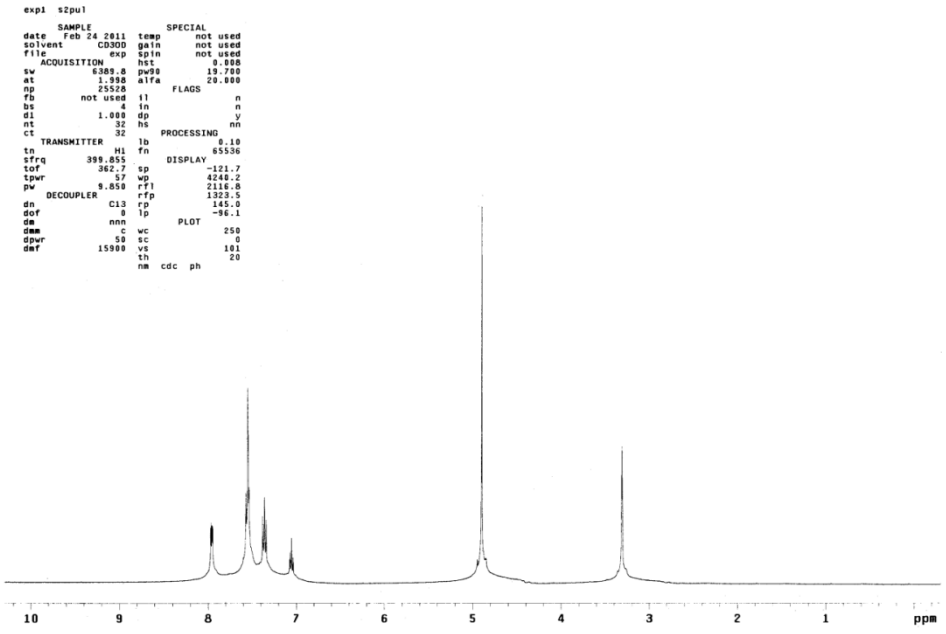
_N_-(Naphthalen-1-yl)-1,3,4-oxadiazol-2-amine (11a): ^{13}C NMR (CD_3OD, 100 MHz)



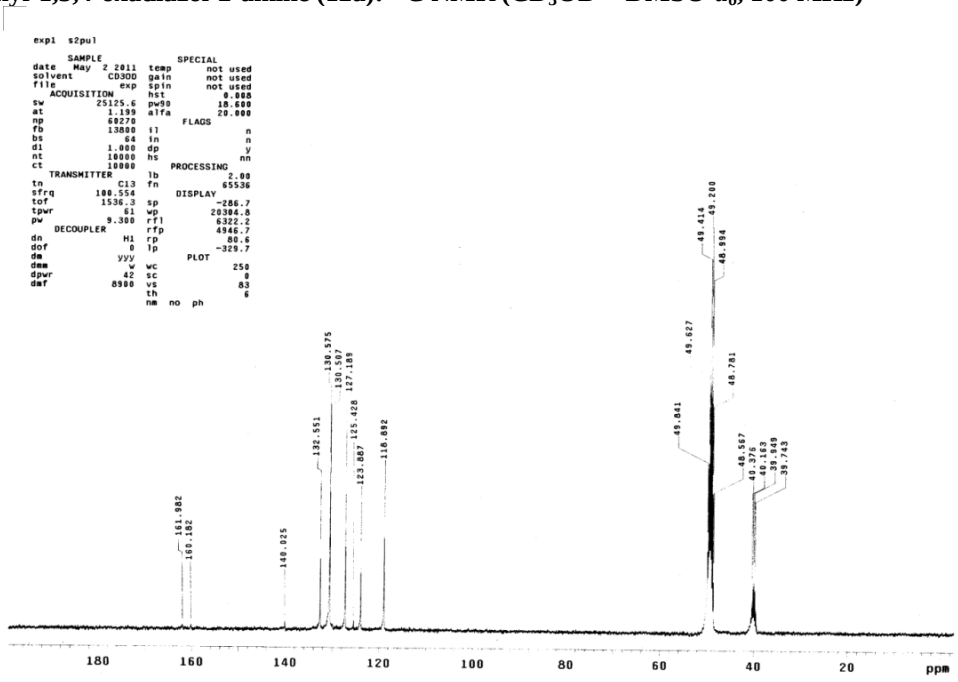
_N_-(Naphthalen-1-yl)-1,3,4-oxadiazol-2-amine (11a): (Mass Spectra)



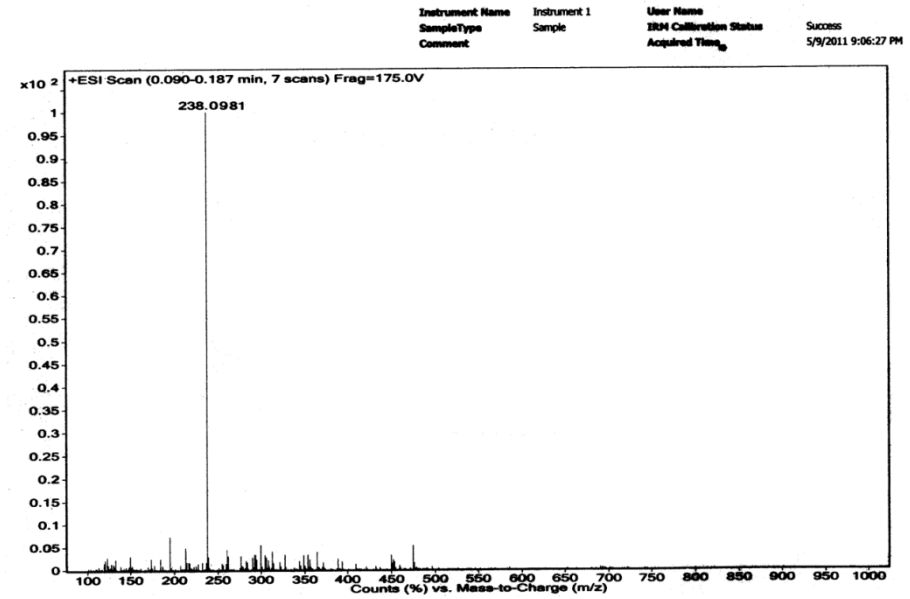
_N_,5-Diphenyl-1,3,4-oxadiazol-2-amine (12a): ^{1}H NMR (CD_3OD, 400 MHz)



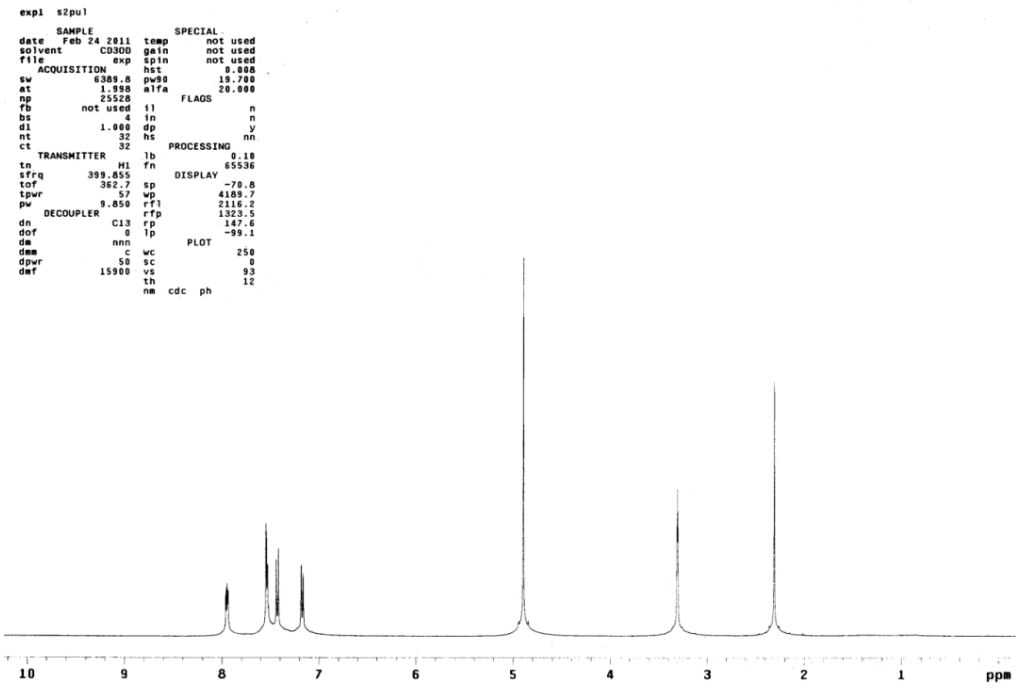
_N_,5-Diphenyl-1,3,4-oxadiazol-2-amine (12a): ^{13}C NMR (CD_3OD + DMSO-d_6, 100 MHz)



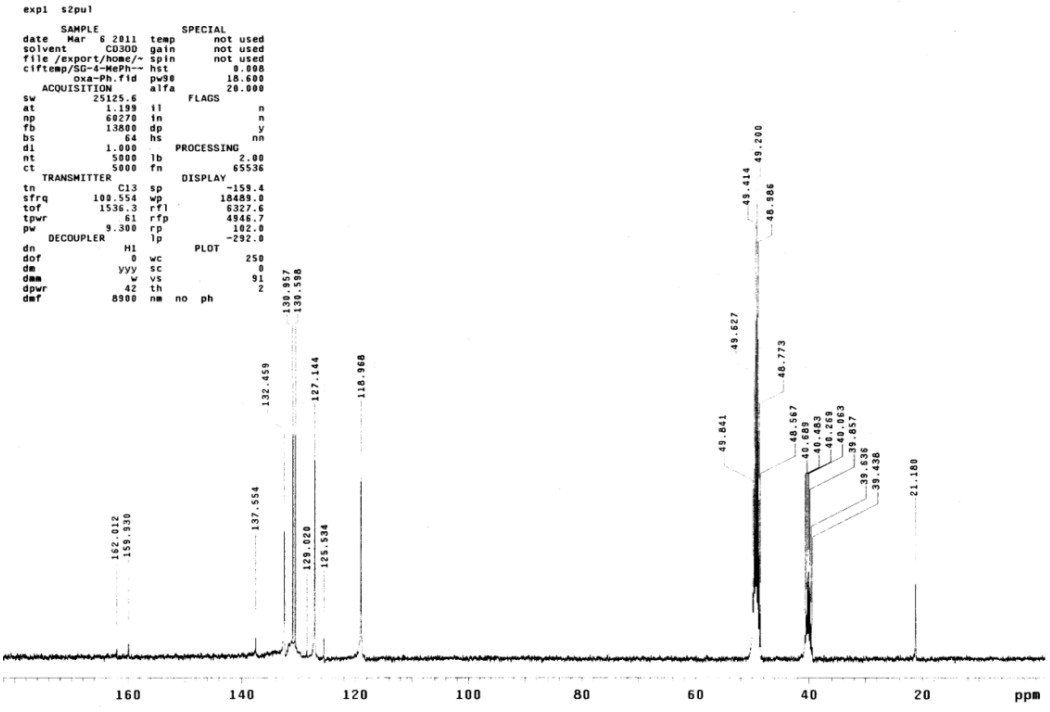
***N*,5-Diphenyl-1,3,4-oxadiazol-2-amine (12a): (Mass Spectra)**



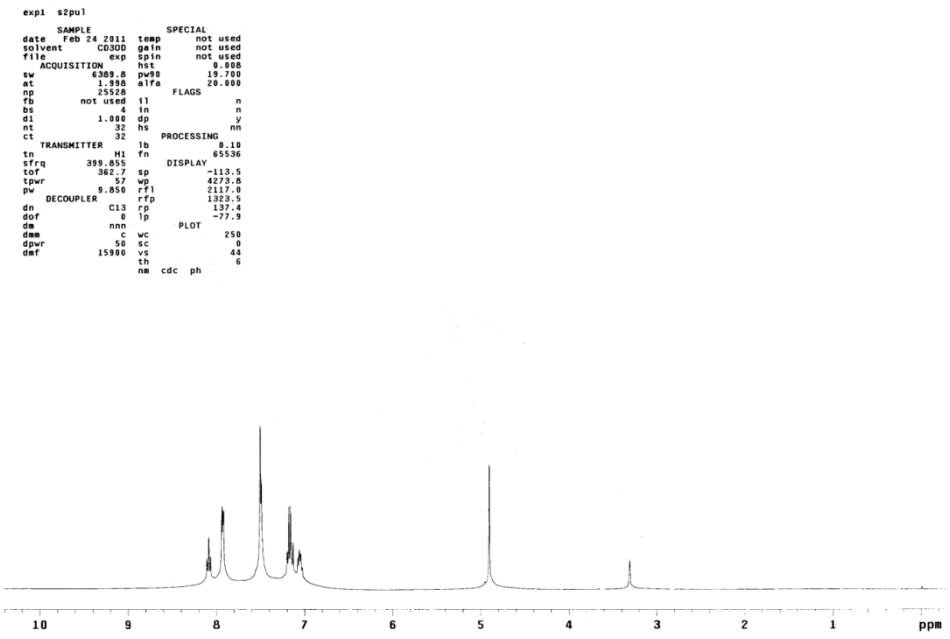
5-Phenyl-*N*-*p*-tolyl-1,3,4-oxadiazol-2-amine (13a): ^{1}H NMR (CD_3OD, 400 MHz)



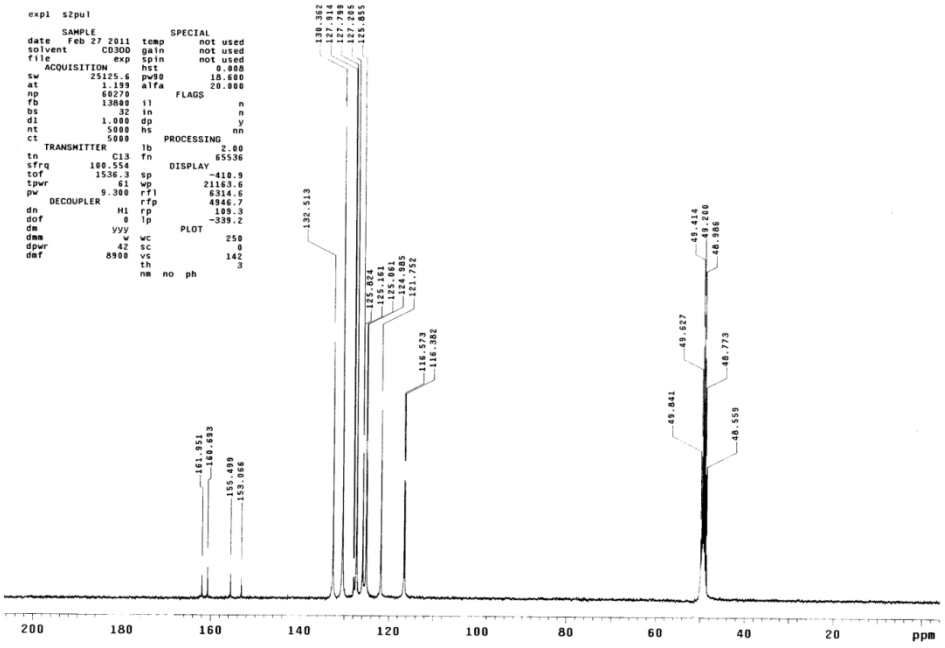
5-Phenyl-*N*-*p*-tolyl-1,3,4-oxadiazol-2-amine (13a): ^{13}C NMR (CD_3OD + DMSO-d_6, 100 MHz)



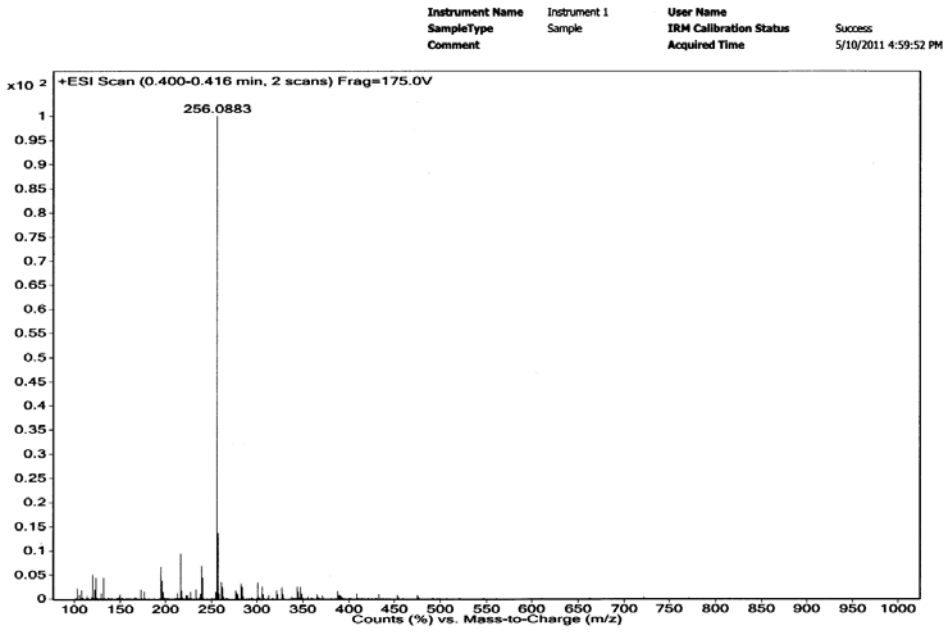
***N*-(2-Fluorophenyl)-5-phenyl-1,3,4-oxadiazol-2-amine (14a): ^{1}H NMR (CD_3OD, 400 MHz)**



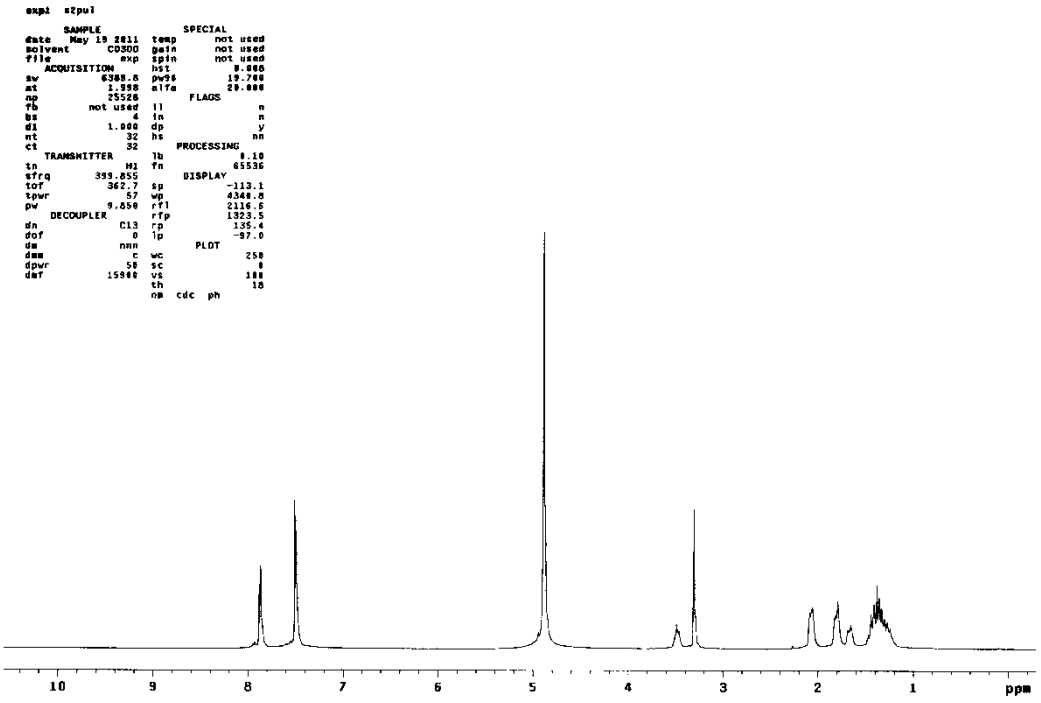
***N*-(2-Fluorophenyl)-5-phenyl-1,3,4-oxadiazol-2-amine (14a): ^{13}C NMR (CD_3OD , 100 MHz)**



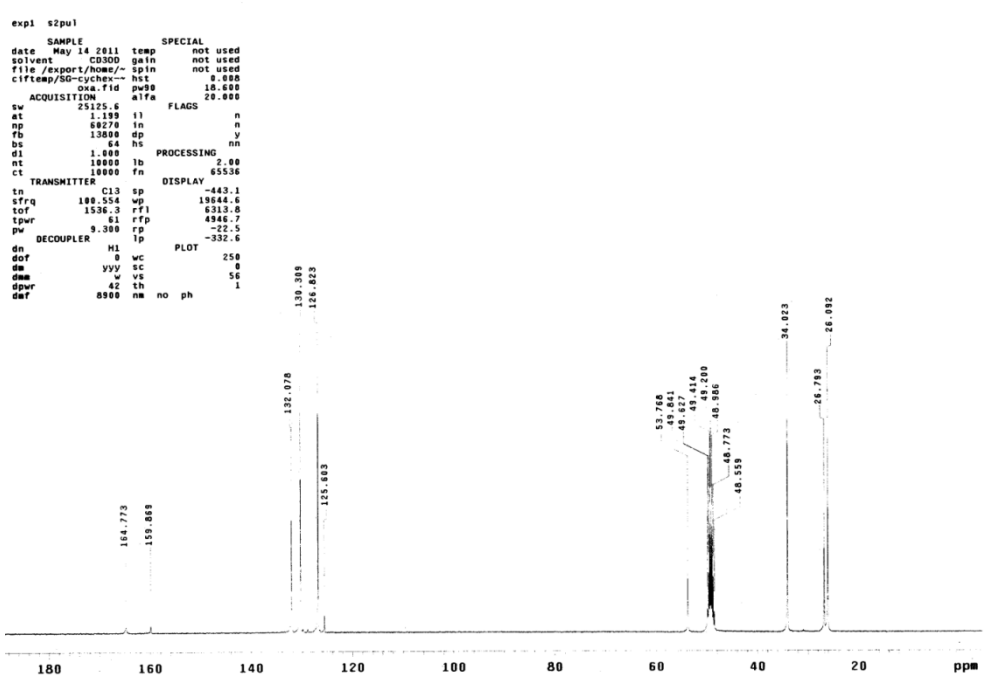
***N*-(2-Fluorophenyl)-5-phenyl-1,3,4-oxadiazol-2-amine (14a): (Mass Spectra)**



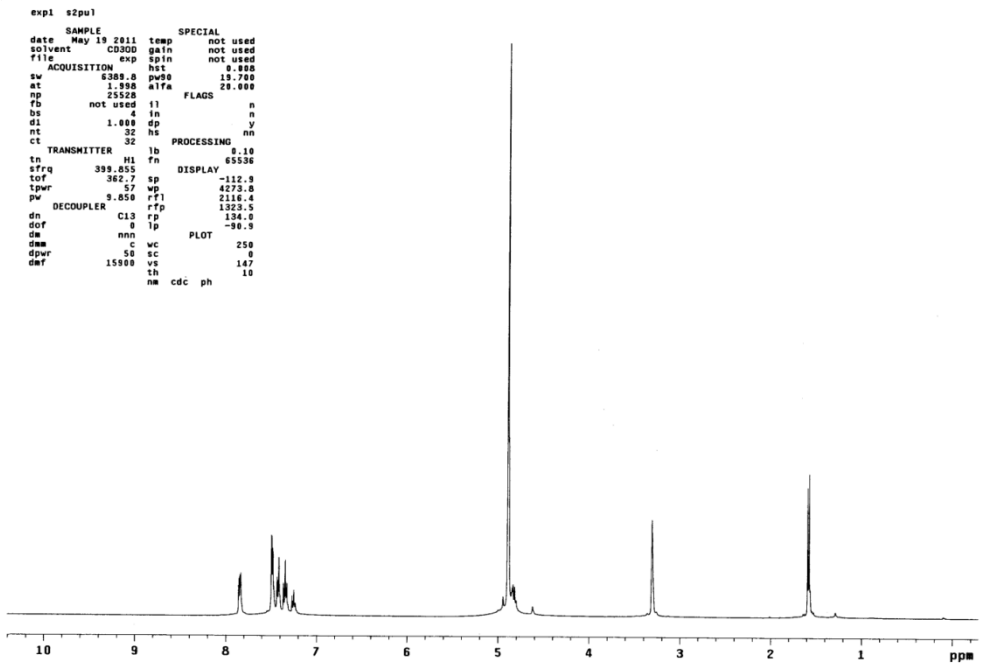
_N_-Cyclohexyl-5-phenyl-1,3,4-oxadiazol-2-amine (15a): ^{1}H NMR (CD_3OD, 400 MHz)



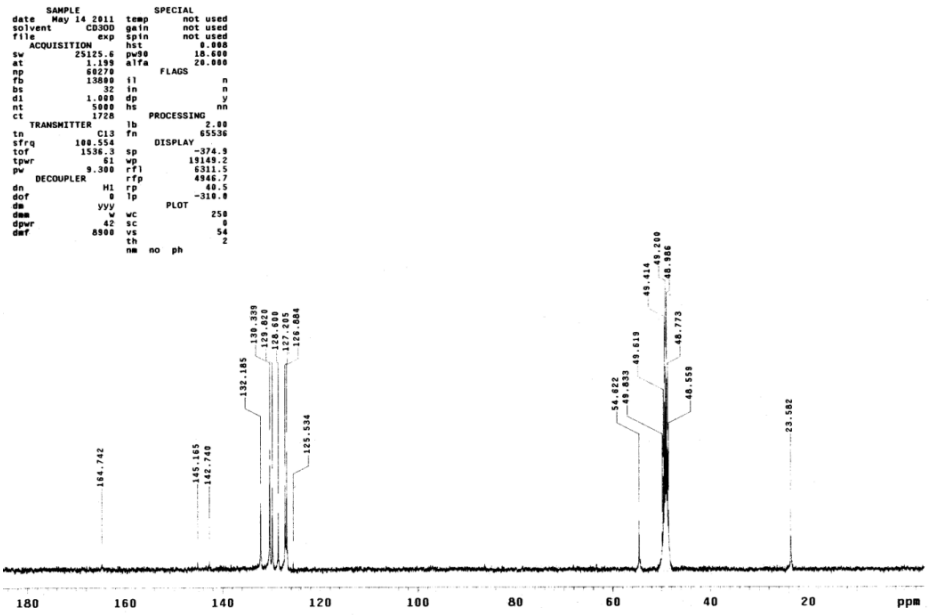
_N_-Cyclohexyl-5-phenyl-1,3,4-oxadiazol-2-amine (15a): ^{13}C NMR (CD_3OD , 100 MHz)



(*R*)-5-Phenyl-*N*-(1-phenylethyl)-1,3,4-oxadiazol-2-amine (16a): ^{1}H NMR (CD_3OD, 400 MHz)



(*R*)-5-Phenyl-*N*-(1-phenylethyl)-1,3,4-oxadiazol-2-amine (16a): ^{13}C NMR (CD_3OD , 100 MHz)



***(R)*-5-Phenyl-*N*-(1-phenylethyl)-1,3,4-oxadiazol-2-amine (16a): (Mass Spectra)**