Supporting Information

A Fully Automated Continuous Flow Synthesis of 4,5-Disubstituted Oxazoles

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General procedure:

Unless otherwise stated the stock solutions were prepared at a 1 mM concentration in MeCN (distilled over calcium hydride) in 2 ml glass vials. MeCN of the same purity was used both as solvent of the flow reactor and as solvent to rinse the needles of both liquid handlers. Flow rates were usually set between 0.1 and 0.2 ml/min depending on the nature of the starting materials. In the same manner the temperature of the chip heating was chosen between 50 and 100 °C. Polymer supported reagents and scavengers were used in excess to gain the best result. The collection of the products was accomplished using a second liquid handler supported by a UV-detector. To remove the solvents a Vapour Tech V10[®] solvent evaporator was used.

¹H NMR spectra were recorded on a Bruker Avance DPX-500 spectrometer with residual chloroform as the internal reference ($\delta_{\text{H}} = 7.26$ ppm). ¹³C NMR spectra were recorded in CDCl₃ on the same spectrometer with the central peak of CDCl₃ as the internal reference ($\delta_{\text{C}} = 77.0$ ppm). ³¹P NMR spectra were recorded on a Bruker Avance DPX-400 spectrometer and are relative to 85% H₃PO₄ in D₂O at $\delta = 0.0$ (external reference). DEPT 135 was used to aid the assignment of signals in the ¹³C NMR spectra. Infrared spectra were recorded on a Perkin-Elmer Spectrum One FT-IR spectrometer neat. Letters in the parentheses refer to relative absorbency of the peak: w, weak, < 40% of the main peak; m, medium, 41-74% of the main peak; s, strong, >74% of the main peak. LC/MS analysis was performed on an Agilent HP 1100 chromatograph (Luna Max RP column) attached to an HPLC/MSD mass spectrometer. Elution was carried out using a reversed-phase gradient of MeCN/water with both solvents containing 0.1% trifluoroacetic acid. The gradient is described in Table 1. For HRMS a LCT Premier Micromass spectrometer was used.

t, min	MeCN, %	flow rate, ml/min
0.00	5	1
3.00	95	1
5.00	95	1
5.50	5	1
8.00	5	1

Table 1 LC/MS conditions

General description: The reactor configuration and photographic display is given below. All parts are commercially available and easily assembled without the aid of specialist knowledge. The flow reactor is driven by two HPLC-pumps, each responsible for an independent solvent and reagent stream. These HPLC-pumps are directly linked to a liquid handler aspirating the starting materials and injecting them into two separate sample ports to temporary store them in 1-10 ml sample loops. Individual components to construct the reactor were purchased from suppliers of Gilson equipment such as Anachem Ltd (Anachem House, Charles Street, Luton, Bedfordshire. LU2 0EB, United Kingdom) or OEM manufactures. Stock solutions can be provided in vials of several sizes standing in racks or in larger flasks if needed. The injecting needle is rinsed after each step using the syringe pump which is also responsible for the complete injection process. After injection the starting materials flow into a glass mixing chip where optimal mixing can be achieved. Glass reactor chips were sourced from Syrris Ltd (27 Jarman Way, Royston, Herts SG8 5HW, United Kingdom) consisting of 2 reagent inputs and internal volumes of 62.5µl, 250µl and 1000µl in addition a chip header was also used to make the connect of the input and output pipes to the chip. Custom made heating blocks have been built to allow reactions at different temperatures. In the next step the reaction mixture is passed through a series of direction valves which deliver the flow stream into several variable-sized glass columns containing polymer supported reagents, scavengers or catalysts. Glass reactor columns used were Chromaflex or Omnifit and were purchased from Kontes Glass Company (PO Box 1502, Vineland, NJ 08360-1502. USA) or Omnifit (Bio-Chem Valve/Omnifit. 2 College Park, Coldhams Lane, Cambridge, CB1 3HD. United Kingdom) respectively. A heating or cooling system for these columns is also available to control the reaction temperature. The vapourtec R-4 column heater was obtained from Vapourtec Ltd (Place Farm, Ingham, Suffolk, IP31 1NQ, United Kingdom) for the heating requirements. After that the flowing material passes through a UV-unit allowing the monitoring of the reactions progress. Finally, the system is connected to a second liquid handler collecting the products of subsequent reactions into different sized glass vials.

Furthermore, HPLC-columns can be applied in-line to purify intermediates or products if necessary in a fully automated fashion. The entire process is computer controlled for repeatability and ease of use.

See schematic for further details (pg4)

General reaction procedure post optimisation: Two 0.75 M solutions of the ethyl isocyanoacetate and the corresponding thioisocyanate were prepared in acetonitrile. Using an automated injection system, 4 mL of each solution (3 mmoles) were transferred at a constant flow rate (0.1 mL/min) onto preheated reaction chip maintained at 50° C (internal pressure of 12 bar). The chip is connected to a column (6.6mm id) packed with PS-BEMP (2.5 g, ~5.5 mmoles) also maintained at 50° C. The reaction takes place on the columns and the product is collected automatically as a solution triggered by UV threshold detection. While the reaction is proceeding the PS-BEMP is observed to colour and darken to a deep red. After the removal of the solvent from the solution the product was obtained in a pure form requiring no further purification.

5-(4-Bromophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 88 %, $R_t = 3.412$, $M + H$ $m/z = 298.0$; 1H NMR (500 MHz, $CDCl_3$): $\delta/ppm = 7.97$ (2H, d, $J = 8.8$ Hz), 7.90 (1H, s), 7.60 (2H, d, $J = 8.8$ Hz), 4.41 (2H, q, $J = 7.1$ Hz), 1.40 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, $CDCl_3$): $\delta/ppm = 161.84$ (C), 154.48 (C), 149.07 (CH), 132.36 (CH), 131.90 (CH), 131.72 (CH), 129.91 (CH), 127.00 (C), 125.56 (C), 125.05 (C), 61.59 (CH_2), 14.22 (CH_3); IR (neat) ν 3090.1 (w), 3093.1 (w), 2989.1 (w), 1787.1 (w), 1716.3 (s), 1588.4 (m), 1576.5 (m), 1523.2 (m), 1484.9 (s), 1397.4 (m), 1370.7 (m), 1343.6 (m), 1317.3 (m), 1222.9 (s), 1181.65 (s), 1101.4 (m), 1068.5 (s), 1026.5 (m), 1006.2 (m), 986.6 (m), 823.2 (s), 785.9 (s) cm^{-1} ; HRMS calculated for $C_{12}H_{11}NO_3Br$ 295.9922 (MH), found 295.9924.

5-(3-Bromophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 85 %, $R_t = 3.386$, $M + H$ $m/z = 298.0$; 1H NMR (500 MHz, $CDCl_3$): $\delta/ppm = 8.24$ (1H, s), 8.03 (1H, d, $J = 8.0$ Hz), 7.91 (1H, s), 7.56 (1H, d, $J = 8.0$ Hz), 7.34 (1H, t, $J = 8.0$ Hz), 4.42 (2H, q, $J = 7.1$ Hz), 1.40 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, $CDCl_3$): $\delta/ppm = 161.65$ (C), 153.71 (C), 149.28 (CH), 133.35 (CH), 131.24 (CH), 129.96 (CH), 128.54 (C), 127.41 (C), 127.01 (CH), 122.43 (C), 61.65 (CH_2), 14.21 (CH_3); IR (neat) ν 3095.0 (m), 3020.2 (w), 2985.4 (w), 1715.7 (s), 1575.5 (m), 1556.7 (m), 1525.8 (m), 1471.9 (m), 1423.8 (m), 1368.5 (m), 1335.4 (m), 1320.6 (s), 1224.2 (s), 1191.5 (m), 1106.2 (m), 1084.6 (s), 1024.6 (s), 994.7 (s), 943.9 (m), 910.0 (m), 834.7 (m), 781.3 (s), 734.7 (s), 694.4 (m), 672.2 (m) cm^{-1} ; HRMS calculated for $C_{12}H_{11}NO_3Br$ 295.9922 (MH), found 295.9917.

5-(2-Chlorophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 98 %, $R_t = 3.156$, $M + H$ $m/z = 252.0$; 1H NMR (500 MHz, $CDCl_3$): $\delta/ppm = 7.97$ (1H, s), 7.45-7.55 (2H, m), 7.43 (1H, t, $J = 7.4$ Hz), 7.36 (1H, t, $J = 7.4$ Hz), 4.29 (2H, q, $J = 7.1$ Hz), 1.24 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, $CDCl_3$): $\delta/ppm = 161.09$ (C), 152.96 (C), 150.25 (CH), 134.29 (C), 132.19 (CH), 131.67 (CH), 129.89 (CH), 129.46 (C), 126.59 (C), 126.42 (CH), 61.95 (CH_2), 13.99 (CH_3); IR (neat) ν 3118.6 (w), 3074.1 (w), 2984.8 (w), 2936.2 (w), 1724.3 (s), 1623.2 (w), 1583.2 (w), 1516.8 (m), 1472.6 (m), 1433.9 (m), 1375.1 (m), 1348.9 (m), 1300.7 (m), 1174.6 (s), 1089.5 (s), 1054.8 (s), 1018.8 (m), 991.6 (m), 835.8 (m), 758.2 (s) cm^{-1} ; HRMS calculated for $C_{12}H_{11}NO_3Cl$ 252.0427 (MH), found 252.0421.

5-(4-Nitrophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 83 %, $R_t = 3.144$, $M + H$ $m/z = 263.1$; 1H NMR (500 MHz, $CDCl_3$): $\delta/ppm = 8.32$ (4H, m), 8.00 (1H, s), 4.44 (2H, q, $J = 7.1$ Hz), 1.42 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, $CDCl_3$): $\delta/ppm = 161.55$ (C), 152.81

(C), 149.96 (CH), 148.42 (C), 132.39 (C), 129.27 (2 x CH), 128.99 (C), 123.67 (2 x CH), 61.97 (CH₂), 14.19 (CH₃); IR (neat) ν 3126.0 (w), 3080.8 (w), 2988.3 (w), 2904.1 (w), 1702.2 (s), 1601.6 (m), 1570.8 (m), 1520.7 (s), 1489.9 (m), 1376.0 (m), 1341.4 (s), 1317.0 (s), 1293.9 (m), 1228.7 (s), 1197.5 (s), 1108.9 (m), 1077.5 (s), 1023.5 (m), 983.3 (m), 854.5 (s), 792.6 (m), 754.5 (s), 693.7 (s) cm⁻¹; HRMS calculated for C₁₂H₁₁N₂O₅ 263.0668 (MH), found 263.0681.

5-(3-Nitrophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 91 %, Rt = 3.129, M + H m/z = 263.1; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 9.01 (1H, s), 8.48 (1H, d, J = 8.1 Hz), 8.30 (1H, d, J = 8.1 Hz), 7.99 (1H, s), 7.67 (1H, t, J = 8.1 Hz), 4.44 (2H, q, J = 7.1 Hz), 1.41 (3H, t, J = 7.1 Hz); ¹³C NMR (125 MHz, CDCl₃): δ /ppm = 161.55 (C), 152.74 (C), 149.66 (CH), 148.26 (C), 134.02 (CH), 129.64 (CH), 128.30 (C), 128.25 (C), 124.85 (CH), 123.44 (CH), 61.94 (CH₂), 14.18 (CH₃); IR (neat) ν 3094.7 (m), 3019.5 (w), 3000.3 (w), 2912.6 (w), 2868.0 (w), 1716.7 (s), 1582.8 (m), 1523.4 (s), 1475.4 (m), 1350.9 (s), 1320.1 (s), 1290.5 (m), 1226.7 (s), 1192.6 (s), 1104.6 (m), 1088.2 (s), 1063.2 (m), 1027.0 (s), 1003.0 (m), 874.2 (m), 833.2 (m), 788.5 (m), 733.8 (s), 688.4 (m), 659.4 (m) cm⁻¹; HRMS calculated for C₁₂H₁₁N₂O₅ 263.0668 (MH), found 263.0665.

5-(2,6-Difluorophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 94 %, Rt = 3.047, M + H m/z = 254.1; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 8.03 (1H, s), 7.40-7.50 (1H, m), 6.95-7.05 (2H, m), 4.31 (2H, q, J = 7.1 Hz), 1.26 (3H, t, J = 7.1 Hz); ¹³C NMR (125 MHz, CDCl₃): δ /ppm = 161.54 (d, ¹J_{C-F} = 5.5 Hz, CF), 160.71 (C), 159.11 (d, ¹J_{C-F} = 5.5 Hz, CF), 151.32 (CH), 144.53 (C), 132.82 (t, ¹J_{CH-CF} = 10.4 Hz, CH), 131.42 (C), 111.69 (d, ¹J_{CH-CF} = 4.4 Hz, CH), 111.53 (d, ²J_{CH-CF} = 4.3 Hz, CH), 105.74 (t, ²J_{C-CF} = 18.6 Hz, C), 61.33 (CH₂), 13.99 (CH₃); IR (neat) ν 3095.0 (m), 3019.3 (w), 2999.6 (w), 2912.4 (w), 1716.9 (s), 1583.4 (m), 1522.9 (s), 1467.2 (m), 1370.9 (m), 1350.2 (s), 1319.8 (m), 1290.3 (m), 1227.4 (s), 1191.9 (s), 1087.8 (s), 1062.0 (m), 1026.6 (m), 1004.1 (m), 874.1 (m), 833.5 (m), 788.4 (s), 732.8 (s), 688.5 (m) cm⁻¹; HRMS calculated for C₁₂H₉NO₃F₂Na 276.0448 (MNa), found 276.0441.

5-(4-Fluorophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 94 %, Rt = 3.137, M + H m/z = 236.1; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 8.07-8.12 (2H, m), 7.88 (1H, s), 7.12-7.17 (2H, m), 4.40 (2H, q, J = 7.1 Hz), 1.40 (3H, t, J = 7.1 Hz); ¹³C NMR (125 MHz, CDCl₃): δ /ppm = 164.83 (C), 162.82 (C), 161.94 (C), 154.70 (C), 148.85 (CH), 130.76 (CH), 130.70 (CH), 122.90 (C), 115.73 (CH), 115.55 (CH), 61.50 (CH₂), 14.22 (CH₃); IR (neat) ν 3087.6

(m), 3012.7 (w), 2909.3 (w), 1708.9 (s), 1606.0 (m), 1582.0 (w), 1501.7 (s), 1473.8 (w), 1447.3 (w), 1374.7 (m), 1345.4 (m), 1313.8 (m), 1228.4 (s), 1188.3 (s), 1160.0 (s), 1091.8 (s), 1075.8 (s), 1024.9 (m), 1014.9 (m), 990.5 (m), 941.2 (m), 840.0 (s), 810.1 (m), 788.3 (s) cm^{-1} ; HRMS calculated for $\text{C}_{12}\text{H}_{11}\text{NO}_3\text{F}$ 236.0723 (MH), found 236.0717.

5-(2-Trifluoromethylphenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 98 %, R_t = 3.244, $M + H$ m/z = 286.0; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 7.96 (1H, s), 7.77-7.82 (1H, m), 7.63-7.66 (2H, m), 7.57-7.60 (1H, m), 4.24 (2H, q, J = 7.1 Hz), 1.19 (3H, t, J = 7.1 Hz); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 160.93 (C), 152.80 (C), 150.25 (CH), 132.75 (CH), 131.39 (CH), 130.72 (CH), 129.83 (q, $^2J_{\text{C-CF}_3}$ = 0.25 Hz, C), 129.36 (C), 126.48 (q, $^2J_{\text{CH-CF}}$ = 0.04 Hz, CH), 125.33 (d, $^1J_{\text{C-CF}_3}$ = 0.02 Hz, CF_3), 124.39 (C), 122.22 (C), 61.21 (CH_2), 13.90 (CH_3); IR (neat) ν 3131.9 (w), 2987.8 (w), 1726.4 (m), 1598.9 (m), 1518.6 (m), 1489.8 (w), 1451.3 (w), 1377.5 (m), 1349.2 (m), 1313.7 (s), 1275.4 (m), 1246.4 (m), 1171.5 (s), 1129.3 (s), 1115.2 (s), 1086.9 (s), 1057.6 (s), 1034.5 (s), 1020.1 (m), 992.3 (m), 836.4 (m), 794.0 (m), 768.2 (s), 694.8 (m) cm^{-1} ; HRMS calculated for $\text{C}_{13}\text{H}_{10}\text{NO}_3\text{F}_3\text{Na}$ 308.0510 (MNa), found 308.0506.

5-(4-Trifluoromethylphenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 95 %, R_t = 3.466, $M + H$ m/z = 286.1; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 7.96 (1H, s), 7.78-7.82 (1H, m), 7.55-7.66 (3H, m), 4.24 (2H, q, J = 7.1 Hz), 1.19 (3H, t, J = 7.1 Hz); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 160.93 (C), 152.79 (C), 150.25 (CH), 132.78 (CH), 131.38 (CH), 130.72 (CH), 129.84 (q, $^2J_{\text{C-CF}_3}$ = 31.4 Hz, C), 129.36 (C), 126.50 (q, $^1J_{\text{C-F}}$ = 4.9 Hz, CH), 125.34 (C), 124.22 (C), 61.20 (CH_2), 13.90 (CH_3); IR (neat) ν 3124.0 (w), 2987.2 (w), 2942 (w), 1727.5 (m), 1598.9 (w), 1518.2 (m), 1451.3 (w), 1377.6 (m), 1349.2 (w), 1313.6 (s), 1275.6 (m), 1246.5 (m), 1171.7 (s), 1129.3 (s), 1087.0 (s), 1057.6 (s), 1034.5 (s), 836.4 (m), 768.2 (s), 694.7 (m) cm^{-1} ; HRMS calculated for $\text{C}_{13}\text{H}_{10}\text{NO}_3\text{F}_3\text{Na}$ 308.0510 (MNa), found 308.0508.

5-(3,4-Dimethoxyphenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 83 %, R_t = 2.908, $M + H$ m/z = 278.0; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 7.85 (1H, s), 7.84 (1H, s), 7.73 (1H, d, J = 8.5 Hz), 6.95 (1H, d, J = 8.5 Hz), 4.41 (2H, q, J = 7.1 Hz), 3.96 (3H, s), 3.94 (3H, s), 1.41 (3H, t, J = 7.1 Hz); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 162.23 (C), 155.64 (C), 150.85 (C), 148.65 (C), 148.22 (CH), 125.47 (C), 121.82 (CH), 119.35 (C), 111.40 (CH), 110.72 (CH), 61.35 (CH_2), 56.02 (CH_3), 55.94 (CH_3), 14.31 (CH_3); IR (neat) ν 3108.2 (w),

2939.3 (w), 2838.5 (w), 1708.1 (m), 1561.4 (m), 1508.2 (s), 1455.6 (m), 1373.5 (m), 1337.7 (m), 1312.2 (m), 1264.3 (s), 1238.6 (m), 1204.7 (s), 1172.6 (s), 1151.7 (s), 1105.7 (s), 1082.1 (s), 1037.4 (m), 1020.6 (s), 888.1 (m), 864.8 (m), 817.9 (m), 787.4 (m), 767.5 (m) cm^{-1} ; HRMS calculated for $\text{C}_{14}\text{H}_{15}\text{NO}_5$ 277.0950 (MH), found 277.1014.

5-Benzo[1,3]dioxol-5-yloxazole-4-carboxylic acid ethyl ester; Yield: 86 %, $R_t = 3.119$, $M + H$ $m/z = 262.1$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 7.84$ (1H, s), 7.67 (1H, d, $J = 8.3$ Hz), 7.62 (1H, s), 6.90 (1H, d, $J = 8.3$ Hz), 6.03 (2H, s), 4.41 (2H, q, $J = 7.1$ Hz), 1.41 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 162.07$ (C), 155.42 (C), 149.45 (C), 148.36 (CH), 147.74 (C), 125.59 (C), 123.52 (CH), 120.48 (C), 108.72 (CH), 108.35 (CH), 101.59 (CH₂), 61.39 (CH₂), 14.26 (CH₃); IR (neat) ν 3126.5 (w), 3000.2 (w), 2904.9 (w), 1705.9 (s), 1565.2 (m), 1488.6 (s), 1443.8 (m), 1359.6 (m), 1326.5 (m), 1244.9 (s), 1209.4 (s), 1183.9 (s), 1152.8 (m), 1108.1 (s), 1065.4 (s), 1023.7 (s), 996.7 (m), 926.4 (s), 886.2 (s), 864.9 (s), 853.4 (s), 828.3 (s), 817.1 (s), 786.7 (s) cm^{-1} ; HRMS calculated for $\text{C}_{13}\text{H}_{12}\text{NO}_5$ 262.0715 (MH), found 262.0708.

5-Isoxazol-5-yl-oxazole-4-carboxylic acid ethyl ester; Yield: 92 %, $R_t = 2.522$, $M + H$ $m/z = 209.1$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 8.40$ (1H, s), 8.02 (1H, s), 7.46 (1H, s), 4.45 (2H, q, $J = 7.1$ Hz), 1.43 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 160.68$ (C), 156.62 (C), 150.81 (CH), 150.56 (CH), 143.77 (C), 129.36 (C), 106.89 (CH), 62.01 (CH₂), 14.20 (CH₃); IR (neat) ν 3130.3 (w), 3105.2 (w), 2986.5 (w), 2942.1 (w), 1715.9 (m), 1625.45 (m), 1563.57 (m), 1518.9 (m), 1507.3 (m), 1458.4 (m), 1392.9 (m), 1364.9 (m), 1323.9 (m), 1299.5 (m), 1231.3 (m), 1207.9 (s), 1186.1 (m), 1106.2 (s), 1093.9 (m), 1039.5 (s), 1026.5 (m), 940.7 (m), 909.4 (m), 827.64 (m), 814.3 (s), 789.1 (s) cm^{-1} ; HRMS calculated for $\text{C}_9\text{H}_9\text{N}_2\text{O}_4$ 209.0562 (MH), found 209.0561.

5-(2,5-Dimethylfuran-3-yl)oxazole-4-carboxylic acid ethyl ester; Yield: 99 %, $R_t = 3.179$, $M + H$ $m/z = 236.1$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 7.80$ (1H, s), 6.67 (1H, s), 4.38 (2H, q, $J = 7.1$ Hz), 2.44 (3H, s), 2.27 (3H, s), 1.39 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 161.84$ (C), 151.84 (C), 151.49 (C), 150.33 (C), 148.21 (CH), 125.64 (C), 109.01 (C), 106.77 (CH), 61.14 (CH₂), 14.30 (CH₃), 13.99 (CH₃), 13.23 (CH₃); IR (neat) ν 3147.8 (w), 3099.4 (w), 3022.2 (w), 2981.0 (w), 2925.8 (w), 1712.5 (s), 1621.7 (m), 1598.6 (s), 1522.7 (m), 1429.7 (m), 1311.1 (s), 1232.2 (m), 1178.2 (s), 1141.3 (m), 1083.3 (s), 1067.0

(s), 1004.4 (m), 961.9 (s), 929.4 (m), 828.4 (m), 790.0 (m) cm^{-1} ; HRMS calculated for $\text{C}_{12}\text{H}_{14}\text{NO}_4$ 236.0923 (MH), found 236.0911.

5-[(5-*tert*-Butyl)-2-methyl-2*H*-pyrazol-3-yl]oxazole-4-carboxylic acid ethyl ester; Yield: 86 %, $R_t = 3.156$, $M + H \ m/z = 278.1$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 7.95$ (1H, s), 6.81 (1H, s), 4.39 (2H, q, $J = 7.1$ Hz), 3.93 (3H, s), 1.37 (3H, t, $J = 7.1$), 1.33 (9H, s); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 161.19$ (C), 160.89 (C), 149.63 (CH), 146.35 (C), 128.95 (C), 128.50 (C), 107.22 (CH), 61.54 (CH_2), 38.72 (CH_3), 32.03 (C), 30.53 (3 x CH_3), 14.19 (CH_3); IR (neat) ν 3117.5 (w), 2960.1 (m), 2868.9 (w), 1721.1 (s), 1600.1 (w), 1513.2 (m), 1484.0 (m), 1461.4 (m), 1441.7 (m), 1365.1 (m), 1299.0 (m), 1266.6 (m), 1235.7 (s), 1185.7 (s), 1091.5 (m), 1070.6 (s), 1020.3 (m), 993.9 (m), 982.3 (m), 827.7 (m), 789.2 (m), 723.0 (m) cm^{-1} ; HRMS calculated for $\text{C}_{14}\text{H}_{20}\text{N}_3\text{O}_3$ 278.1505 (MH), found 278.1503.

5-Benzo[b]thiophen-2-yl-oxazole-4-carboxylic acid ethyl ester; Yield: 92 %, $R_t = 3.519$, $M + H \ m/z = 274.0$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 8.45$ (1H, s), 7.84-7.90 (3H, m), 7.36-7.43 (2H, m), 4.48 (2H, q, $J = 7.1$ Hz), 1.46 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 166.90$ (C), 159.26 (C), 158.37 (CH), 148.77 (C), 146.10 (CH), 138.41 (C), 136.68 (C), 125.13 (C), 124.99 (CH), 123.58 (CH), 122.36 (CH), 119.61 (CH), 59.11 (CH_2), 11.60 (CH_3); IR (neat) ν 3090.2 (m), 2998.2 (w), 1705.3 (s), 1578.3 (s), 1517.5 (s), 1433.2 (m), 1372.3 (m), 1349.3 (m), 1316.9 (s), 1259.4 (m), 1237.9 (m), 1193.5 (s), 1088.1 (s), 1061.8 (s), 1021.5 (m), 921.4 (m), 834.7 (m), 823.1 (m), 785.9 (m), 741.6 (s), 724.4 (s) cm^{-1} ; HRMS calculated for $\text{C}_{14}\text{H}_{12}\text{NO}_3\text{S}$ 274.0538 (MH), found 274.0550.

5-[3-(2-Chloro-6-fluorophenyl)-5-(methyl-isoxazole-4-yl)]oxazole-4-carboxylic acid ethyl ester; Yield: 83 %, $R_t = 3.322$, $M + H \ m/z = 351.0$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 7.81$ (1H, s), 7.30-7.40 (1H, m), 7.21 (1H, d, $J = 8.2$ Hz), 7.05 (1H, t, $J = 8.2$ Hz), 4.26 (2H, q, $J = 7.1$ Hz), 2.54 (3H, s), 1.27 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 171.03$ (C), 161.80 (C), 160.58 (C), 159.79 (C), 154.98 (C), 150.63 (CH), 146.03 (C), 134.95 (C), 131.76 (d, $^2J_{\text{CH-CF}} = 10.1$ Hz, CH), 129.68 (C), 125.52 (CH), 114.40 (d, $^3J_{\text{CH-CF}} = 21.8$ Hz, CH), 105.65 (C), 61.41 (CH_2), 14.16 (CH_3), 12.68 (CH_3); IR (neat) ν 3132.4 (w), 2981.5 (w), 2930.3 (w), 1720.7 (s), 1611.5 (m), 1573.8 (m), 1514.2 (m), 1456.9 (m), 1371.0 (m), 1342.7 (m), 1301.7 (m), 1275.7 (m), 1250.8 (m), 1186.7 (s), 1155.8 (m), 1093.6 (m), 1070.7 (s), 1025, 3 (m), 958.3 (m), 896.1 (s), 785.6 (s) cm^{-1} ; HRMS calculated for $\text{C}_{16}\text{H}_{13}\text{N}_2\text{O}_4\text{FCl}$ 351.0548 (MH), found 351.0545.

5-Cyclopropyloxazole-4-carboxylic acid ethyl ester; Yield: 92 %, Rt = 2.653, M + H m/z = 182.1; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 7.79 (1H, s), 4.38 (2H, q, J = 7.1 Hz), 2.70-2.80 (1H, m), 1.39 (3H, t, J = 7.1 Hz), 1.10-1.15 (2H, m), 1.05-1.10 (2H, m); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 162.48 (C), 161.07 (C), 147.30 (CH), 126.64 (C), 60.86 (CH_2), 14.32 (CH_3), 9.03 (2 x CH_2), 7.80 (CH); IR (neat) ν 3122.7 (w), 2988.3 (w), 1709.6 (s), 1604.1 (s), 1527.1 (m), 1407.6 (s), 1383.3 (m), 1291.7 (s), 1174.9 (s), 1149.0 (s), 1082.9 (s), 1047.7 (s), 787.2 (m) cm^{-1} ; HRMS calculated for $\text{C}_9\text{H}_{11}\text{NO}_3\text{Na}$ 204.0637 (MNa), found 204.0639.

5-[1-(4-Chlorophenyl)cyclopentyl]oxazole-4-carboxylic acid ethyl ester; Yield: 92 %, Rt = 3.900, M + H m/z = 320.1; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 7.76 (1H, s), 7.20-7.25 (4H, m), 4.22 (2H, q, J = 7.1 Hz), 2.55-2.60 (2H, m), 2.30-2.35 (2H, m), 1.60-1.80 (4H, m), 1.27 (3H, t, J = 7.1 Hz); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 163.49 (C), 161.31 (C), 147.87 (CH), 142.95 (C), 132.23 (C), 128.22 (2 x CH), 127.98 (2 x CH), 126.57 (C), 61.09 (CH_2), 51.90 (C), 37.77 (2 x CH_2), 22.97 (2 x CH_2), 14.07 (CH_3); IR (neat) ν 2959.7 (w), 2875.5 (w), 1721.2 (s), 1586.7 (w), 1525.5 (m), 1493.2 (s), 1371.6 (m), 1299.6 (m), 1184.5 (s), 1094.5 (s), 1059.11 (m), 1013.4 (s), 819.1 (m) cm^{-1} ; HRMS calculated for $\text{C}_{17}\text{H}_{19}\text{NO}_3\text{Cl}$ 320.1053 (MH), found 320.1042.

5-[1-(4-Chlorophenyl)-5-propyl-1H-pyrazol-4-yl]oxazole-4-carboxylic acid ethyl ester; Yield: 94 %, Rt = 3.709, M + H m/z = 360.0; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 8.44 (1H, s), 7.88 (1H, s), 7.48 (2H, d, J = 8.8 Hz), 7.38 (2H, d, J = 8.8 Hz), 4.42 (2H, q, J = 7.1 Hz), 2.84 (2H, t, J = 7.7 Hz), 1.40-1.50 (5H, m), 0.80 (3H, t, J = 7.7 Hz); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 161.80 (C), 150.64 (C), 148.44 (CH), 143.84 (C), 141.45 (CH), 137.70 (C), 134.74 (C), 129.51 (2 x CH), 127.28 (2 x CH), 125.97 (C), 107.98 (C), 61.30 (CH_2), 27.32 (CH_2), 22.65 (CH_2), 14.32 (CH_3), 13.81 (CH_3); IR (neat) ν 3123.6 (w), 2972.9 (w), 1711.8 (m), 1600.1 (m), 1499.9 (s), 1420.0 (m), 1411.6 (m), 1314.9 (m), 1229.1 (m), 1208.5 (m), 1179.1 (s), 1076.6 (s), 1020.5 (s), 947.7 (s), 850.8 (s), 818.1 (s), 787.3 (s), 658.5 (m) cm^{-1} ; HRMS calculated for $\text{C}_{18}\text{H}_{19}\text{N}_3\text{O}_3\text{Cl}$ 360.1115 (MH), found 360.1099.

5-[(6-Chloropyridin-3-yl)]oxazole-4-carboxylic acid ethyl ester; Yield: 89 %, Rt = 2.897, M + H m/z = 253.0; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 9.00 (1H, s), 8.51 (1H, d, J = 8.3 Hz), 7.97 (1H, s), 7.44 (1H, d, J = 8.3 Hz), 4.42 (2H, q, J = 7.1 Hz), 1.41 (3H, t, J = 7.1 Hz); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 161.53 (C), 152.94 (C), 151.73 (C), 149.77 (CH),

149.04 (CH), 138.34 (CH), 128.45 (C), 124.02 (CH), 122.11 (C), 61.86 (CH₂), 14.18 (CH₃); IR (neat) ν 3124.5 (w), 3098.3 (w), 3069.9 (w), 2980.2 (w), 1696.2 (s), 1588.3 (m), 1565.0 (m), 1464.4 (m), 1375.1 (m), 1344.2 (m), 1299.0 (s), 1253.3 (m), 1223.7 (m), 1193.9 (s), 1118.3 (s), 1080.7 (s), 1018.5 (m), 983.0 (m), 861.6 (m), 835.3 (m), 791.3 (m) cm⁻¹; HRMS calculated for C₁₁H₁₀N₂O₃Cl 253.0380 (MH), found 253.0388.

5-(4-Cyanophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 83 %, Rt = 3.042, M + H m/z = 243.0; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 8.26 (2H, d, J = 8.8 Hz), 7.97 (1H, s), 7.76 (2H, d, J = 8.8 Hz), 4.44 (2H, q, J = 7.1 Hz), 1.42 (3H, t, J = 7.1); ¹³C NMR (125 MHz, CDCl₃): δ /ppm = 161.61 (C), 153.16 (C), 149.76 (CH), 132.21 (2 x CH), 130.68 (C), 128.23 (2 x CH), 128.63 (C), 118.22 (C), 113.76 (C), 61.91 (CH₂), 14.20 (CH₃); IR (neat) ν 3096.6 (w), 2989.0 (w), 2229.9 (m), 1720.0 (s), 1674.3 (m), 1578.6 (m), 1519.1 (m), 1499.8 (m), 1372.6 (m), 1344.9 (m), 1318.8 (s), 1227.0 (s), 1187.1 (s), 1079.2 (s), 1025.7 (m), 988.1 (m), 852.4 (m), 790.6 (m) cm⁻¹; HRMS calculated for C₁₃H₁₀N₂O₃ 243.0691 (MH), found 243.0799.

5-(5-Methyl-2-phenyl-2H-[1,2,3]-triazol-4-yl)oxazole-4-carboxylic acid ethyl ester; Yield: 93 %, Rt = 3.439, M + H m/z = 299.1; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 8.07 (2H, d, J = 7.8 Hz), 8.02 (1H, s), 7.48 (2H, t, J = 7.8 Hz), 7.36 (1H, t, J = 7.8 Hz), 4.40 (2H, q, J = 7.1 Hz), 2.45 (3H, s), 1.35 (3H, t, J = 7.1 Hz); ¹³C NMR (125 MHz, CDCl₃): δ /ppm = 160.88 (C), 150.52 (CH), 146.78 (C), 146.31 (C), 139.37 (C), 134.98 (C), 129.95 (C), 129.33 (2 x CH), 127.93 (CH), 118.90 (2 x CH), 61.56 (CH₂), 14.20 (CH₃), 11.21 (CH₃); IR (neat) ν 3119.5 (w), 2982.6 (w), 2941.1 (w), 1800.6 (w), 1726.1 (m), 1622.6 (m), 1594.0 (m), 1493.9 (s), 1463.7 (m), 1375.1 (m), 1365.6 (m), 1342.2 (m), 1308.6 (s), 1298.6 (s), 1221.7 (m), 1187.0 (m), 1108.9 (s), 1086.7 (s), 1030.6 (s), 991.9 (m), 961.8 (s), 912.9 (m), 859.1 (m), 832.9 (m), 787.2 (m), 755.8 (s), 741.1 (m), 690.6 (m), 670.4 (m), 657.4 (m) cm⁻¹; HRMS calculated for C₁₅H₁₅N₄O₃ 299.1144 (MH), found 299.1154.

5-[5-(3,5-Dichlorophenoxy)furan-2-yl]oxazole-4-carboxylic acid ethyl ester; Yield: 90 %, Rt = 4.058, M + H m/z = 368.0; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 7.80 (1H, s), 7.68 (1H, d, J = 3.6 Hz), 7.16 (1H, s), 7.01 (1H, s), 7.00 (1H, s), 5.86 (1H, d, J = 3.6 Hz), 4.43 (2H, q, J = 7.1 Hz), 1.42 (3H, t, J = 7.1 Hz); ¹³C NMR (125 MHz, CDCl₃): δ /ppm = 161.44 (C), 156.74 (C), 156.40 (C), 148.26 (CH), 146.58 (C), 135.85 (2C), 135.08 (C), 124.96 (CH), 124.92 (C), 117.65 (CH), 116.24 (2 x CH), 93.15 (CH), 61.44 (CH₂), 14.31 (CH₃); IR (neat) ν 3148.8 (w),

3062.1 (w), 2993.8 (w), 1704.4 (m), 1561.6 (s), 1529.0 (m), 1428.1 (m), 1373.8 (s), 1342.0 (s), 1308.8 (s), 1267.0 (m), 1251.9 (m), 1210.2 (m), 1186.7 (s), 1101.6 (s), 1088.1 (m), 1042.0 (s), 1024.2 (s), 992.8 (s), 928.4 (s), 854.0 (m), 802.9 (s), 784.7 (m), 673.9 (m), 657.9 (m) cm^{-1} ; HRMS calculated for $\text{C}_{16}\text{H}_{12}\text{NO}_5\text{Cl}_2$ 368.0093 (MH), found 368.0084.

5-(4-Phenylazophenyl)oxazole-4-carboxylic acid ethyl ester; Yield: 88 %, $R_t = 3.877$, $M + H$ $m/z = 322.1$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 8.28$ (2H, d, $J = 8.9$ Hz), 8.01 (2H, d, $J = 8.9$ Hz), 7.93-7.96 (3H, m), 7.48-7.56 (3H, m), 4.45 (2H, q, $J = 7.1$ Hz), 1.43 (3H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 161.89$ (C), 154.64 (C), 153.19 (C), 152.60 (C), 149.28 (CH), 131.51 (CH), 129.31 (2 x CH), 129.15 (2 x CH), 128.71 (C), 127.46 (C), 123.06 (2 x CH), 122.87 (2 x CH), 61.63 (CH_2), 14.25 (CH_3); IR (neat) ν 3132.8 (w), 2981.6 (w), 2936.0 (w), 1702.9 (s), 1585.6 (m), 1562.8 (m), 1521.7 (m), 1496.6 (m), 1441.1 (m), 1371.9 (m), 1345.4 (m), 1315.9 (s), 1222.1 (s), 1191.5 (s), 1159.8 (m), 1117.8 (m), 1073.5 (s), 1019.4 (m), 986.8 (m), 922.8 (m), 852.3 (s), 788.8 (m), 765.4 (s), 771.54 (s), 733.2 (m), 699.7 (m), 684.2 (s) cm^{-1} ; HRMS calculated for $\text{C}_{18}\text{H}_{16}\text{N}_3\text{O}_3$ 322.1192 (MH), found 322.1198.

5-(3-Nitrophenyl)-4-tosyloxazole; Yield: 84 %, $R_t = 3.518$, $M + H$ $m/z = 345.0$; ^1H NMR (500 MHz, d_3 -MeCN): $\delta/\text{ppm} = 8.76$ (1H, s), 8.37 (1H, d, $J = 7.9$ Hz), 8.27 (1H, d, $J = 7.9$ Hz), 8.14 (1H, s), 7.86 (2H, d, $J = 7.9$ Hz), 7.79 (1H, t, $J = 7.9$ Hz), 7.42 (2H, d, $J = 7.9$ Hz), 2.42 (3H, s); ^{13}C NMR (125 MHz, d_3 -MeCN): $\delta/\text{ppm} = 152.15$ (CH), 151.08 (C), 149.05 (C), 146.77 (C), 137.62 (C), 137.50 (C), 135.93 (CH), 131.00 (CH), 130.96 (2 x CH), 129.00 (2 x CH), 128.16 (C), 126.22 (CH), 124.93 (CH), 21.57 (CH_3); IR (neat) ν 3118.0 (w), 3090.5 (w), 1686.1 (m), 1595.6 (m), 1526.7 (s), 1477.3 (m), 1348.7 (s), 1325.9 (s), 1304.6 (m), 1291.9 (m), 1192.9 (m), 1145.5 (s), 1083.1 (m), 907.3 (m), 869.4 (m), 811.7 (m), 736.5 (m), 711.6 (s), 704.4 (s), 664.9 (s) cm^{-1} ; HRMS calculated for $\text{C}_{16}\text{H}_{13}\text{N}_2\text{O}_5\text{S}$ 345.0545 (MH), found 345.0547.

5-(4-Fluorophenyl)-4-tosyloxazole; Yield: 93 %, $R_t = 3.559$, $M + H$ $m/z = 318.0$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 7.98$ -8.01 (2H, m), 7.88 (2H, d, $J = 8.2$ Hz), 7.83 (1H, s), 7.32 (2H, d, $J = 8.2$ Hz), 7.17-7.22 (2H, m), 2.42 (3H, s); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 165.18$ (C), 163.17 (C), 151.72 (C), 149.11 (CH), 145.12 (C), 136.91 (C), 131.31 (2 x CH), 129.84 (2 x CH), 128.34 (2 x CH), 121.73 (d, $J = 3.5$ Hz, CF), 115.82 (2 x CH), 21.69 (CH_3); IR (neat) ν 3147.8 (w), 3045.0 (w), 1608.5 (m), 1596.0 (m), 1516.2 (m), 1328.2 (s), 1306.0 (m), 1262.8 (w), 1237.6 (m), 1191.3 (m), 1166.1 (m), 1148.1 (s), 1111.0 (m), 1088.0 (m),

1067.3 (m), 982.5 (w), 936.3 (w), 839.4 (s), 808.4 (m), 729.2 (m), 703.3 (s), 669.1 (s) cm^{-1} ; HRMS calculated for $\text{C}_{16}\text{H}_{12}\text{NO}_3\text{FNaS}$ 340.0420 (MNa), found 340.0421.

5-(4-Bromophenyl)-4-tosyloxazole; Yield: 84 %, $R_t = 3.767$, $M + H \ m/z = 379.9$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 7.86\text{--}7.90$ (4H, m), 7.85 (1H, s), 7.64 (2H, d, $J = 7.5$ Hz), 7.32 (2H, d, $J = 7.5$ Hz), 2.41 (3H, s); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 151.53$ (C), 149.33 (CH), 145.21 (C), 136.79 (C), 136.04 (C), 131.93 (2 $\times$ CH), 130.44 (2 $\times$ CH), 129.87 (2 $\times$ CH), 128.30 (2 $\times$ CH), 125.73 (C), 124.37 (C), 21.70 (CH_3); IR (neat) ν 3130.6 (w), 1678.8 (w), 1595.8 (m), 1514.6 (w), 1478.9 (m), 1400.3 (w), 1327.9 (m), 1188.2 (w), 1146.7 (s), 1074.7 (m), 1011.4 (m), 980.0 (m), 813.0 (m), 722.8 (m), 701.4 (m), 667.0 (s) cm^{-1} ; HRMS calculated for $\text{C}_{16}\text{H}_{13}\text{NO}_3\text{SBr}$ 377.9800 (MH), found 377.9794.

2-Chloro-5-(4-tosyloxazole-5-yl)pyridine; Yield: 90 %, $R_t = 3.390$, $M + H \ m/z = 335.0$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 8.87$ (1H, s), 8.38 (1H, d, $J = 8.5$ Hz), 7.92 (1H, s), 7.87 (2H, d, $J = 8.1$ Hz), 7.48 (1H, d, $J = 8.5$ Hz), 7.33 (2H, d, $J = 8.1$ Hz), 2.41 (3H, s); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 153.56$ (C), 150.17 (CH), 149.23 (CH), 148.68 (C), 145.57 (C), 139.08 (CH), 137.58 (C), 136.31 (C), 130.00 (2 $\times$ CH), 128.37 (2 $\times$ CH), 124.23 (CH), 121.03 (C), 21.72 (CH_3); IR (neat) ν 3146.6 (w), 3060.3 (w), 1617.5 (m), 1595.9 (m), 1571.3 (m), 1498.8 (m), 1451.2 (m), 1373.42 (m), 1326.7 (s), 1270.9 (m), 1208.5 (m), 1147.7 (s), 1110.8 (s), 1078.0 (s), 1026.6 (m), 982.4 (m), 928.3 (m), 840.0 (m), 821.1 (m), 763.2 (m), 740.7 (m), 723.3 (m), 705.3 (m) cm^{-1} ; HRMS calculated for $\text{C}_{15}\text{H}_{12}\text{N}_2\text{O}_3\text{SCl}$ 335.0257 (MH), found 335.0257.

5-(2,5-Dimethylfuran-3-yl)-4-tosyloxazole; Yield: 89 %, $R_t = 3.600$, $M + H \ m/z = 318.0$; ^1H NMR (500 MHz, CDCl_3): $\delta/\text{ppm} = 7.90$ (2H, d, $J = 8.1$ Hz), 7.76 (1H, s), 7.32 (2H, d, $J = 8.1$ Hz), 6.73 (1H, s), 2.45 (3H, s), 2.41 (3H, s), 2.30 (3H, s); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 152.38$ (C), 150.82 (C), 148.45 (C), 148.41 (CH), 144.75 (C), 137.47 (C), 134.123 (C), 129.77 (2 $\times$ CH), 128.09 (2 $\times$ CH), 107.89 (C), 107.05 (CH), 21.66 (CH_3), 13.98 (CH_3), 13.31 (CH_3); IR (neat) ν 3135.9 (w), 2924.4 (w), 1627.0 (m), 1595.2 (m), 1518.4 (m), 1402.7 (m), 1317.7 (s), 1292.3 (m), 1270.9 (m), 1233.8 (m), 1197.6 (m), 1173.5 (m), 1139.0 (s), 1104.2 (m), 1084.7 (m), 1058.9 (m), 1015.7 (m), 960.8 (m), 930.2 (m), 857.4 (m), 808.5 (s), 719.0 (s), 703.8 (s) cm^{-1} ; HRMS calculated for $\text{C}_{16}\text{H}_{16}\text{NO}_4\text{S}$ 318.0800 (MH), found 318.0801.

4-Methyl-2-phenyl-5-(4-tosyloxazole-5-yl)-2H-1,2,3-triazole; Yield: 94 %, Rt = 3.763, M + H m/z = 381.0; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 8.09 (2H, d, J = 7.7 Hz), 8.04 (2H, d, J = 8.2 Hz), 7.96 (1H, s), 7.52 (2H, t, J = 7.7 Hz), 7.40 (1H, t, J = 7.7 Hz), 7.34 (2H, d, J = 8.2 Hz), 2.55 (3H, s), 2.41 (3H, s); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 150.30 (CH), 146.48 (C), 145.17 (C), 144.43 (C), 139.37 (C), 138.53 (C), 136.91 (C), 133.73 (C), 129.78 (2 $\times$ CH), 129.40 (2 $\times$ CH), 128.60 (2 $\times$ CH), 128.12 (2 $\times$ CH), 119.03 (CH), 21.70 (CH_3), 11.19 (CH_3); IR (neat) ν 3124.7 (w), 3063.8 (w), 2926.2 (w), 1724.8 (w), 1681.8 (m), 1596.0 (m), 1511.8 (m), 1497.9 (m), 1462.6 (m), 1374.7 (w), 1333.4 (m), 1249.9 (m), 1197.4 (m), 1150.8 (s), 1084.4 (m), 968.3 (m), 910.7 (m), 814.6 (m), 758.6 (m), 705.7 (m), 690.9 (m), 670.7 (m), 659.0 (m) cm^{-1} ; HRMS calculated for $\text{C}_{19}\text{H}_{16}\text{N}_4\text{O}_3\text{NaS}$ 403.0841 (MNa), found 403.0847.

5-(5-(3,5-Dichlorophenoxy)furan-2-yl)-4-tosyloxazole; Yield: 88 %, Rt = 4.232, M + H m/z = 449.9; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 7.91 (2H, d, J = 8.2 Hz), 7.75 (1H, s), 7.57 (1H, d, J = 3.6 Hz), 7.31 (2H, d, J = 8.2 Hz), 7.19 (1H, s), 7.03 (2H, s), 5.87 (1H, d, J = 3.6 Hz), 2.41 (3H, s); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 156.92 (C), 156.56 (C), 148.62 (CH), 145.18 (C), 143.33 (C), 137.01 (C), 135.90 (2C), 133.44 (C), 133.27 (C), 129.89 (2 $\times$ CH), 128.01 (2 $\times$ CH), 125.13 (CH), 118.03 (CH), 116.38 (2 $\times$ CH), 93.24 (CH), 21.69 (CH_3); IR (neat) ν 3135.5 (w), 3084.9 (w), 1579.7 (m), 1558.9 (s), 1515.6 (m), 1427.4 (m), 1332.0 (m), 1304.1 (m), 1271.1 (m), 1252.4 (m), 1203.5 (m), 1148.5 (s), 1093.9 (m), 1084.8 (m), 1015.6 (m), 988.7 (m), 919.4 (m), 844.6 (m), 810.1 (m), 711.6 (m), 704.5 (m), 666.7 (s) cm^{-1} ; HRMS calculated for $\text{C}_{20}\text{H}_{14}\text{NO}_5\text{SCl}_2$ 449.9970 (MH), found 449.9969.

5-(4-Tosyloxazole-5-yl)isoxazole; Yield: 81 %, Rt = 3.189, M + H m/z = 291.0; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 8.43 (1H, s), 7.96 (1H, s), 7.92 (2H, d, J = 6.6 Hz), 7.46 (1H, s), 7.35 (2H, d, J = 8.0 Hz), 2.42 (3H, s); ^{13}C NMR (125 MHz, CDCl_3): δ/ppm = 155.34 (C), 150.95 (CH), 150.88 (CH), 145.90 (C), 140.50 (C), 138.22 (C), 136.01 (C), 130.08 (2 $\times$ CH), 128.37 (2 $\times$ CH), 107.60 (CH), 21.74 (CH_3); IR (neat) ν 3131.6 (w), 1693.9 (m), 1596 (m), 1504.9 (m), 1453.6 (m), 1399.7 (w), 1329.8 (m), 1253.6 (m), 1197.5 (m), 1149.6 (s), 1084.6 (m), 1038.4 (m), 1015.4 (m), 934.6 (m), 915.5 (m), 812.1 (m), 720.1 (m), 704.7 (m), 677.2 (s) cm^{-1} ; HRMS calculated for $\text{C}_{13}\text{H}_{11}\text{N}_2\text{O}_4\text{S}$ 291.0456 (MH), found 291.0447.

3-tert-Butyl-1-methyl-5-(4-tosyloxazole-5-yl)-1H-pyrazole; Yield: 85 %, Rt = 3.576, M + H m/z = 360.1; ^1H NMR (500 MHz, CDCl_3): δ/ppm = 7.91 (1H, s), 7.85 (2H, d, J = 8.1 Hz), 7.32 (2H, d, J = 8.1 Hz), 6.77 (1H, s), 3.88 (3H, s), 2.41 (3H, s), 1.34 (9H, s); ^{13}C NMR (125 MHz,

CDCl₃): δ /ppm = 161.43 (C), 149.97 (CH), 145.33 (C), 143.41 (C), 137.76 (C), 136.63 (C), 129.86 (2 $\times$ CH), 128.30 (2 $\times$ CH), 127.36 (C), 108.10 (CH), 38.57 (CH₃), 32.07 (C), 30.51 (3 $\times$ CH₃), 21.70 (CH₃); IR (neat) ν 3141.4 (w), 3045.9 (w), 2962.4 (m), 2931.1 (w), 1606.9 (m), 1596.4 (m), 1512.8 (m), 1458.7 (m), 1323.6 (m), 1304.9 (m), 1294.4 (m), 1241.3 (m), 1212.9 (m), 1150.3 (s), 1087.4 (m), 1063.3 (m), 995.5 (m), 976.7 (m), 933.1 (m), 851.8 (m), 825.2 (m), 804.6 (m), 734.8 (m), 706.6 (m), 676.1 (s), 654.5 (s) cm⁻¹; HRMS calculated for C₁₈H₂₂N₃O₃S 360.1382 (MH), found 360.1383.

[5-(3-Nitrophenyl)oxazole-4-yl]-phosphonic acid diethyl ester; Yield: 85 %, Rt = 2.958, M + H m/z = 327.1; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 8.91 (1H, s), 8.54 (1H, d, J = 8.0 Hz), 8.26 (1H, d, J = 8.0 Hz), 8.03 (1H, s), 7.65 (1H, t, J = 8.0 Hz), 4.15-4.30 (4H, m), 1.33 (6H, t, J = 7.1 Hz); ¹³C NMR (125 MHz, CDCl₃): δ /ppm = 155.04 (d, J = 38.1 Hz, C), 160.49 (d, J = 22.4 Hz, CH), 148.34 (C), 133.78 (CH), 129.84 (CH), 128.13 (C), 127.02 (C), 124.57 (CH), 122.70 (CH), 63.33 (d, J = 5.9 Hz, 2 $\times$ CH₂), 16.18 (d, J = 6.5 Hz, 2 $\times$ CH₃); ³¹P NMR (162 MHz, CDCl₃): δ /ppm = 8.17 (s); IR (neat) ν 3096.4 (w), 2984.4 (w), 2869.0 (w), 1582.9 (w), 1528.2 (s), 1478.2 (w), 1442.7 (w), 1393.1 (w), 1348.7 (s), 1271.1 (m), 1247.9 (m), 1164.9 (m), 1100.3 (m), 1045.4 (m), 1016.2 (s), 973.7 (s), 904.5 (m), 869.3 (m), 797.2 (m), 762.4 (m), 745.2 (m), 734.0 (s), 711.0 (m), 674.2 (m) cm⁻¹; HRMS calculated for C₁₃H₁₅N₂O₆P 326.0668 (MH), found 326.0700.

[5-(4-Trifluoromethylphenyl)-oxazole-4-yl]-phosphonic acid diethyl ester; Yield: 84 %, Rt = 3.318, M + H m/z = 350.1; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 8.20 (2H, d, J = 8.2 Hz), 8.00 (1H, s), 7.70 (2H, d, J = 8.2 Hz), 4.10-4.25 (4H, m), 1.31 (6H, t, J = 7.2 Hz); ¹³C NMR (125 MHz, CDCl₃): δ /ppm = 156.20 (C), 155.89 (C), 150.47 (2 $\times$ CH), 150.29 (2 $\times$ CH), 131.89 (q, J_{C-CF_3} = 32.8 Hz, C), 128.22 (CH), 126.56 (C), 125.57 (q, J_{C-F} = 3.7 Hz, CF₃), 63.21 (d, J = 5.8 Hz, 2 $\times$ CH₂), 16.18 (d, J = 6.5 Hz, 2 $\times$ CH₃); ³¹P NMR (162 MHz, CDCl₃): δ /ppm = 8.55 (s); IR (neat) ν 3111.4 (w), 2986.7 (w), 2911.8 (w), 1682.9 (w), 1621.9 (w), 1505.4 (m), 1413.9 (w), 1393.8 (w), 1323.8 (s), 1248.6 (m), 1166.8 (m), 1121.62 (s), 1077.1 (m), 1065.5 (m), 1048.1 (s), 1015.5 (s), 972.3 (s), 848.0 (m), 796.4 (m), 759.4 (m), 709.4 (w), 696.9 (w), 648.9 (m), 593.9 (s), 563.9 (m), 519.1 (s) cm⁻¹; HRMS calculated for C₁₄H₁₅F₃NO₄P 349.0691 (MH), found 349.0698.

[5-(4-Bromophenyl)-oxazole-4-yl]-phosphonic acid diethyl ester; Yield: 85 %, Rt = 3.265, M + H m/z = 360.0; ¹H NMR (500 MHz, CDCl₃): δ /ppm = 7.90-8.00 (3H, m), 7.58 (2H, d, J

= 8.7 Hz), 4.10-4.25 (4H, m), 1.31 (6H, t, $J = 7.1$ Hz); ^{13}C NMR (125 MHz, CDCl_3): $\delta/\text{ppm} = 156.68$ (d, $J = 32.8$ Hz, C), 149.94 (d, $J = 22.4$ Hz, CH), 131.87 ($2 \times \text{CH}$), 129.41 ($2 \times \text{CH}$), 125.44 (C), 124.79 (C), 123.37 (C), 63.11 (d, $J = 5.8$ Hz, $2 \times \text{CH}_2$), 16.19 (d, $J = 6.6$ Hz, $2 \times \text{CH}_3$); ^{31}P NMR (162 MHz, CDCl_3): $\delta/\text{ppm} = 9.09(\text{s})$; IR (neat) ν 3096.9 (w), 2981.1 (w), 2906.6 (w), 1683.9 (w), 1598.3 (w), 1511.7 (w), 1481.9 (m), 1392.6 (w), 1248.6 (m), 1164.0 (m), 1095.9 (w), 1077.5 (m), 1049.2 (s), 1024.3 (s), 975.4 (m), 831.3 (w), 801.8 (w), 766.3 (w), 723.9 (w), 571.6 (m), 537.4 (m), 526.3 (m) cm^{-1} ; HRMS calculated for $\text{C}_{13}\text{H}_{16}\text{NO}_4\text{PBr}$ 360.0004 (MH), found 360.0000.

Appendix of X-ray-structures

Crystal structure has been deposited at the Cambridge Crystallographic Data Centre (CCDC) under the deposition numbers 616809 to 616815. We wish to sincerely thank J. E. Davis for determining the crystal structures of all compounds presented and thank the EPSRC for financial contribution towards the purchase of the diffractometer.

**X-ray structure obtained from crystals of
4-methyl-2-phenyl-5-(4-tosyloxazole-5-yl)-2H-1,2,3-triazole**

File reference: CCDC 616815

Authors: M. Baumann, S. V. Ley, J. E. Davies

Journal: Organic Letters (1336)

Formula: $\text{C}_{19}\text{H}_{16}\text{N}_4\text{O}_3\text{S}$

Unit cell parameters: a 6.4990(2) b 7.6748(2) c 20.0116(7)

alpha 86.9490(10) beta 83.6590(10) gamma 65.8970(10)

space group P-1

**X-ray structure obtained from crystals of
5-(4-nitrophenyl)oxazole-4-carboxylic acid ethyl ester**

File reference: CCDC 616810

Authors: M. Baumann, S. V. Ley, J. E. Davies

Journal: Organic Letters (1336)

Formula: $C_{12}H_{10}N_2O_5$

Unit cell parameters: a 4.0555(2) b 24.1226(14) c 11.9033(8) beta 92.282(3)
space group Pc

**X-ray structure obtained from crystals of
5-[(6-chloropyridin-3-yl)]oxazole-4-carboxylic acid ethyl ester**

File reference: CCDC 616813

Authors: M. Baumann, S. V. Ley, J. E. Davies

Journal: Organic Letters (1336)

Formula: $C_{11}H_9N_2O_3Cl$

Unit cell parameters: a 5.06080(10) b 8.8397(2) c 24.3005(4) beta
92.2100(10)

space group P21/n

X-ray structure obtained from crystals of
3-*tert*-butyl-1-methyl-5-(4-tosyloxazole-5-yl)-1*H*-pyrazole

File reference: CCDC 616811

Authors: M. Baumann, S. V. Ley, J. E. Davies

Journal: Organic Letters (1336)

Formula: C₁₈H₂₁N₃O₃S

Unit cell parameters: a 13.0690(3) b 7.7037(10) c 17.8837(4) beta
 99.6030(10)

space group P21/c

X-ray structure obtained from crystals of

5-[1-(4-chlorophenyl)-5-propyl-1*H*-pyrazol-4-yl]oxazole-4-carboxylic acid ethyl ester

File reference: CCDC 616809

Authors: M. Baumann, S. V. Ley, J. E. Davies

Journal: Organic Letters (1336)

Formula: C₁₈H₁₈N₃O₃Cl

Unit cell parameters: a 7.7097(2) b 8.9484(3) c 12.6304(3)

alpha 94.830(2) beta 93.459(2) gamma 98.8310(10)

space group P-1

X-ray structure obtained from crystals of

5-[5-(3,5-dichlorophenoxy)furan-2-yl]oxazole-4-carboxylic acid ethyl ester

File reference: CCDC 616814

Authors: M. Baumann, S. V. Ley, J. E. Davies

Journal: Organic Letters (1336)

Formula: $C_{16}H_{11}NO_5Cl_2$

Unit cell parameters: a 7.0475(2) b 7.2298(2) c 16.9493(5)

alpha 87.0830(10) beta 89.8770(10) gamma 67.6660(10)

space group P-1

**X-ray structure obtained from crystals of
2-Chloro-5-(4-tosyloxazole-5-yl)pyridine**

File reference: CCDC 616812

Authors: M. Baumann, S. V. Ley, J. E. Davies

Journal: Organic Letters (1336)

Formula: C₁₅H₁₁N₂O₃SCl

Unit cell parameters: a 7.47300(10) b 11.68320(10) c 32.4274(4)
space group Pbca

Accumulated NMR spectra.

Proton and carbon spectra are presented below.

5-(4-Bromophenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Bromophenyl)oxazole-4-carboxylic acid ethyl ester

5-(3-Bromophenyl)oxazole-4-carboxylic acid ethyl ester

5-(3-Bromophenyl)oxazole-4-carboxylic acid ethyl ester

5-(2-Chlorophenyl)oxazole-4-carboxylic acid ethyl ester

5-(2-Chlorophenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Nitrophenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Nitrophenyl)oxazole-4-carboxylic acid ethyl ester

5-(3-Nitrophenyl)oxazole-4-carboxylic acid ethyl ester

5-(3-Nitrophenyl)oxazole-4-carboxylic acid ethyl ester

5-(2,6-Difluorophenyl)oxazole-4-carboxylic acid ethyl ester

5-(2,6-Difluorophenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Fluorophenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Fluorophenyl)oxazole-4-carboxylic acid ethyl ester

5-(2-Trifluoromethylphenyl)oxazole-4-carboxylic acid ethyl ester

5-(2-Trifluoromethylphenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Trifluoromethylphenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Trifluoromethylphenyl)oxazole-4-carboxylic acid ethyl ester

5-(3,4-Dimethoxyphenyl)oxazole-4-carboxylic acid ethyl ester

5-(3,4-Dimethoxyphenyl)oxazole-4-carboxylic acid ethyl ester

5-Benzo[1,3]dioxol-5-ylloxazole-4-carboxylic acid ethyl ester

5-Benzo[1,3]dioxol-5-ylloxazole-4-carboxylic acid ethyl ester

5-Isoxazol-5-yl-oxazole-4-carboxylic acid ethyl ester

5-Isoxazol-5-yl-oxazole-4-carboxylic acid ethyl ester

5-(2,5-Dimethylfuran-3-yl)oxazole-4-carboxylic acid ethyl ester

5-(2,5-Dimethylfuran-3-yl)oxazole-4-carboxylic acid ethyl ester

5-[(5-tert-Butyl)-2-methyl-2H-pyrazol-3-yl]oxazole-4-carboxylic acid ethyl ester

5-[(5-tert-Butyl)-2-methyl-2H-pyrazol-3-yl]oxazole-4-carboxylic acid ethyl ester

5-Benzo[b]thiophen-2-yl-oxazole-4-carboxylic acid ethyl ester

5-Benzo[b]thiophen-2-yl-oxazole-4-carboxylic acid ethyl ester

5-[3-(2-Chloro-6-fluorophenyl)-5-(methyl-isoxazole-4-yl)]oxazole-4-carboxylic acid ethyl ester

5-[3-(2-Chloro-6-fluorophenyl)-5-(methyl-isoxazole-4-yl)]oxazole-4-carboxylic acid ethyl ester

5-Cyclopropyloxazole-4-carboxylic acid ethyl ester

5-Cyclopropyloxazole-4-carboxylic acid ethyl ester

5-[1-(4-Chlorophenyl)cyclopentyl]oxazole-4-carboxylic acid ethyl ester

5-[1-(4-Chlorophenyl)cyclopentyl]oxazole-4-carboxylic acid ethyl ester

5-[1-(4-Chlorophenyl)-5-propyl-1H-pyrazol-4-yl]oxazole-4-carboxylic acid ethyl ester

5-[1-(4-Chlorophenyl)-5-propyl-1H-pyrazol-4-yl]oxazole-4-carboxylic acid ethyl ester

5-[(6-Chloropyridin-3-yl)]oxazole-4-carboxylic acid ethyl ester

5-[(6-Chloropyridin-3-yl)]oxazole-4-carboxylic acid ethyl ester

5-(4-Cyanophenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Cyanophenyl)oxazole-4-carboxylic acid ethyl ester

5-(5-Methyl-2-phenyl-2H-[1,2,3]-triazol-4-yl)oxazole-4-carboxylic acid ethyl ester

5-(5-Methyl-2-phenyl-2H-[1,2,3]-triazol-4-yl)oxazole-4-carboxylic acid ethyl ester

5-[5-(3,5-Dichlorophenoxy)furan-2-yl]oxazole-4-carboxylic acid ethyl ester

5-[5-(3,5-Dichlorophenoxy)furan-2-yl]oxazole-4-carboxylic acid ethyl ester

5-(4-Phenylazophenyl)oxazole-4-carboxylic acid ethyl ester

5-(4-Phenylazophenyl)oxazole-4-carboxylic acid ethyl ester

5-(3-Nitrophenyl)-4-tosyloxazole

5-(3-Nitrophenyl)-4-tosyloxazole

CC1=CC=C(C=C1)S(=O)(=O)c2c(c3ccccc3n2)c4ccc(F)cc4

5-(4-Fluorophenyl)-4-tosyloxazole

5-(4-Bromophenyl)-4-tosyloxazole

5-(4-Bromophenyl)-4-tosyloxazole

2-Chloro-5-(4-tosyloxazole-5-yl)pyridine

2-Chloro-5-(4-tosyloxazole-5-yl)pyridine

5-(2,5-Dimethylfuran-3-yl)-4-tosyloxazole

5-(2,5-Dimethylfuran-3-yl)-4-tosyloxazole

4-Methyl-2-phenyl-5-(4-tosyloxazole-5-yl)-2H-1,2,3-triazole

4-Methyl-2-phenyl-5-(4-tosyloxazole-5-yl)-2H-1,2,3-triazole

5-(5-(3,5-Dichlorophenoxy)furan-2-yl)-4-tosyloxazole

5-(5-(3,5-Dichlorophenoxy)furan-2-yl)-4-tosyloxazole

5-(4-Tosyloxazole-5-yl)isoxazole

5-(4-Tosyloxazole-5-yl)isoxazole

3-tert-Butyl-1-methyl-5-(4-tosyloxazole-5-yl)-1H-pyrazole

3-tert-Butyl-1-methyl-5-(4-tosyloxazole-5-yl)-1H-pyrazole

[5-(3-Nitrophenyl)-oxazole-4-yl]-phosphonic acid diethyl ester

[5-(3-Nitrophenyl)-oxazole-4-yl]-phosphonic acid diethyl ester

[5-(4-Trifluoromethylphenyl)-oxazole-4-yl]-phosphonic acid diethyl ester

[5-(4-Trifluoromethylphenyl)-oxazole-4-yl]-phosphonic acid diethyl ester

[5-(4-Bromophenyl)-oxazole-4-yl]-phosphonic acid diethyl ester

[5-(4-Bromophenyl)-oxazole-4-yl]-phosphonic acid diethyl ester