

Supporting Information

**Expedient Ni-catalyzed C-H/C-H cross-dehydrogenative coupling of aryl amides with azoles**

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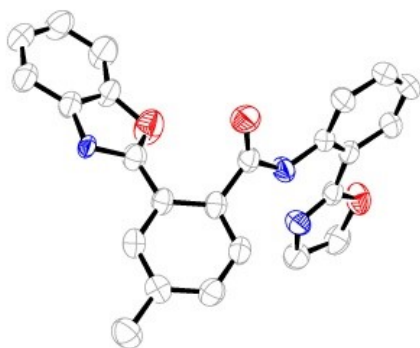
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**General Information.** NiCl<sub>2</sub> (99%), Ni(OAc)<sub>2</sub>•4H<sub>2</sub>O (99.99%), Ni(PPh<sub>3</sub>)<sub>2</sub>Cl<sub>2</sub> (99.99%), Ni(COD)<sub>2</sub> (99%), Ag<sub>2</sub>O (99.99%), P(*o*-Tol)<sub>3</sub> (97%) and 1-AdCO<sub>2</sub>H (99%) were purchased from Aldrich and used as received. The solvents were dried prior to use according to the standard procedure. Carboxamides<sup>1</sup> and azoles<sup>2</sup> were prepared according to reported procedure. SRL silica gel G/GF 254 plates were used for analytical TLC and SRL silica gel (100-200 mesh) was used for column chromatography. NMR (<sup>1</sup>H, <sup>13</sup>C and <sup>19</sup>F) spectra were recorded with Bruker Avance III 600, Ascend 400 and 500 MHz spectrometers using CDCl<sub>3</sub> as solvent and TMS as an internal standard. Chemical shifts ( $\delta$ ) and spin-spin coupling constant (*J*) are reported in ppm and in Hz, respectively, and other data are reported as follows: s = singlet, d = doublet, t = triplet, m = multiplet, q = quartet, dd = doublet of doublets. Melting points were determined using a Büchi B-540 apparatus and are uncorrected. FT-IR spectra were collected on Perkin Elmer IR spectrometer. Q-ToF ESI-MS instrument (model HAB 273) was used for recording mass spectra. Single crystal X-ray data of **3ga** was collected on a Bruker SMART APEX equipped with a CCD area detector using Mo/K $\alpha$  radiation and the structure was solved by direct method using *SHELXL-18* (Göttingen, Germany).

### Crystal Structure and Data of **3ga**



**Figure S1.** ORTEP diagram of 2-(benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide **3ga** (CCDC 2152876) with 50% ellipsoid. H-omitted for clarity.

|                     |  |
|---------------------|--|
| Identification code | <b>3ga</b>   |
| Empirical formula   | 'C <sub>24</sub> H <sub>19</sub> N <sub>3</sub> O <sub>3</sub> ' |
| Formula weight      | 397.43   |

|   |  |
|---|--|
| Crystal habit, colour                             | block/Colorless  |
| Temperature, $T/K$                                | 296 K  |
| Wavelength, $\lambda/\text{\AA}$                  | 0.71073  |
| Crystal system                                    | 'monoclinic'   |
| Space group                                       | 'P 21/c'   |
| Unit cell dimensions                              | a = 15.661(2) $\text{\AA}$<br>b = 21.437(3) $\text{\AA}$<br>c = 12.3333(18) $\text{\AA}$<br>$\alpha = 90$<br>$\beta = 111.862(9)$<br>$\gamma = 90$ |
| Volume, $V/\text{\AA}^3$                          | 3842.8(9)  |
| Z   | 8  |
| Calculated density, $\text{Mg}\cdot\text{m}^{-3}$ | 1.370  |
| Absorption coefficient, $\mu/\text{mm}^{-1}$      | 0.092  |
| $F(000)$  | 1656.0   |
| $\theta$ range for data collection                | 1.40 to 25°  |
| Limiting indices                                  | $-18 \leq h \leq 17, -25 \leq k \leq 25, -14 \leq l \leq 14$   |
| Reflection collected / unique                     | 6550/ 4713   |
| Completeness to $\theta$                          | 96.6%  |
| Absorption correction                             | Multi-scan   |
| Max. and min. transmission                        | 0.984 and 0.977  |
| Refinement method                                 | 'SHELXL-2018/3 (Sheldrick, 2018)'  |
| Data / restraints / parameters                    | 6550/0/544   |
| Goodness-of-fit on $F^2$                          | 1.010  |
| Final $R$ indices [ $I > 2\sigma(I)$ ]            | R1 = 0.0618, wR2 = 0.1806  |
| $R$ indices (all data)                            | R1 = 0.0856, wR2 = 0.2080  |

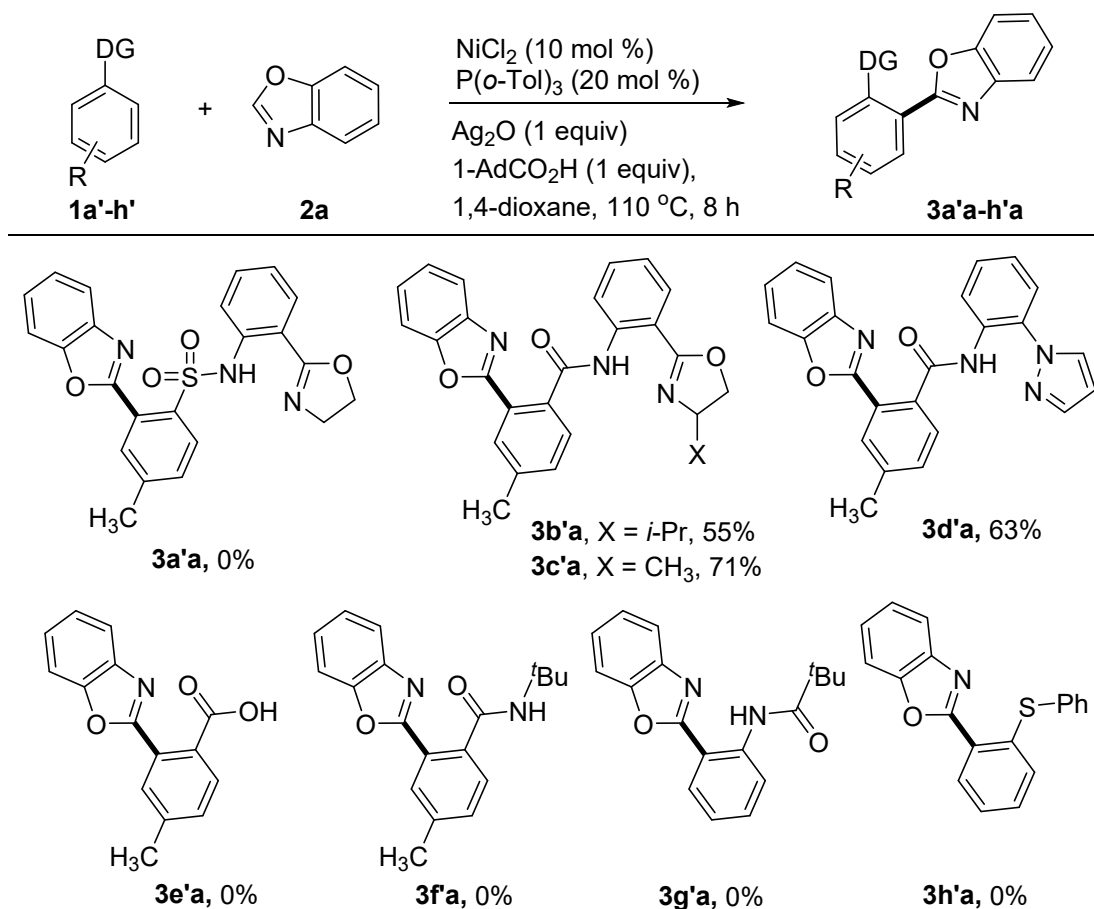
**Table S1.** Optimization of the Reaction Conditions<sup>a</sup>

Reaction scheme showing the conversion of **1g** and **2a** to **3ga**. The reaction conditions are: 10 mol% NiCl<sub>2</sub>, ligand, additive, oxidant, solvent, 110 °C, 8 h. The structure of **1g** is a 4-methylbenzoic acid derivative with a DG group. The structure of **2a** is a benzimidazole derivative. The structure of **3ga** is a 2-(4-methylphenyl)-2-oxo-1,2-dihydro-1H-benzimidazole derivative with a DG group. The structure of DG is defined as a 2-phenyl-1,3-oxazolidinone derivative.

| Entry     | Ligand                             | Additive                   | Oxidant                         | Solvent                           | Yield (%) <sup>b</sup> |
|-----------|------------------------------------|----------------------------|---------------------------------|-----------------------------------|------------------------|
| 1         | PCy <sub>3</sub>                   | 1-AdCO <sub>2</sub> H      | Ag <sub>2</sub> CO <sub>3</sub> | Toluene                           | 61                     |
| 2         | P( <i>o</i> -Tol) <sub>3</sub>     | 1-AdCO <sub>2</sub> H      | Ag <sub>2</sub> CO <sub>3</sub> | Toluene                           | 69                     |
| 3         | DPPE                               | 1-AdCO <sub>2</sub> H      | Ag <sub>2</sub> CO <sub>3</sub> | Toluene                           | n.r.                   |
| 4         | -                                  | 1-AdCO <sub>2</sub> H      | Ag <sub>2</sub> CO <sub>3</sub> | Toluene                           | n.r.                   |
| 5         | P( <i>o</i> -Tol) <sub>3</sub>     | PivOH                      | Ag <sub>2</sub> CO <sub>3</sub> | Toluene                           | 62                     |
| 6         | P( <i>o</i> -Tol) <sub>3</sub>     | TFA                        | Ag <sub>2</sub> CO <sub>3</sub> | Toluene                           | n.r.                   |
| 7         | P( <i>o</i> -Tol) <sub>3</sub>     | KOAc                       | Ag <sub>2</sub> CO <sub>3</sub> | Toluene                           | 12                     |
| 8         | P( <i>o</i> -Tol) <sub>3</sub>     | -                          | Ag <sub>2</sub> CO <sub>3</sub> | Toluene                           | n.r.                   |
| 9         | P( <i>o</i> -Tol) <sub>3</sub>     | 1-AdCO <sub>2</sub> H      | Ag <sub>2</sub> O               | Toluene                           | 75                     |
| 10        | P( <i>o</i> -Tol) <sub>3</sub>     | 1-AdCO <sub>2</sub> H      | BQ                              | Toluene                           | n.r.                   |
| 11        | P( <i>o</i> -Tol) <sub>3</sub>     | 1-AdCO <sub>2</sub> H      | Cu(OAc) <sub>2</sub>            | Toluene                           | 18                     |
| 12        | P( <i>o</i> -Tol) <sub>3</sub>     | 1-AdCO <sub>2</sub> H      | -                               | Toluene                           | n.r.                   |
| 13        | P( <i>o</i> -Tol) <sub>3</sub>     | 1-AdCO <sub>2</sub> H      | Ag <sub>2</sub> O               | (CH <sub>2</sub> Cl) <sub>2</sub> | 53                     |
| <b>14</b> | <b>P(<i>o</i>-Tol)<sub>3</sub></b> | <b>1-AdCO<sub>2</sub>H</b> | <b>Ag<sub>2</sub>O</b>          | <b>1,4-Dioxane</b>                | <b>81</b>              |
| 15        | P( <i>o</i> -Tol) <sub>3</sub>     | 1-AdCO <sub>2</sub> H      | Ag <sub>2</sub> O               | DMF                               | 55                     |

<sup>a</sup>Reaction conditions: **1g** (0.2 mmol), **2a** (0.24 mmol), [Ni] (10 mol %), ligand (20 mol %), additive (0.2 mmol), oxidant (0.2 mmol), solvent (2 mL), 110 °C, 8 h. <sup>b</sup>Isolated yield. n.r. = no reaction.

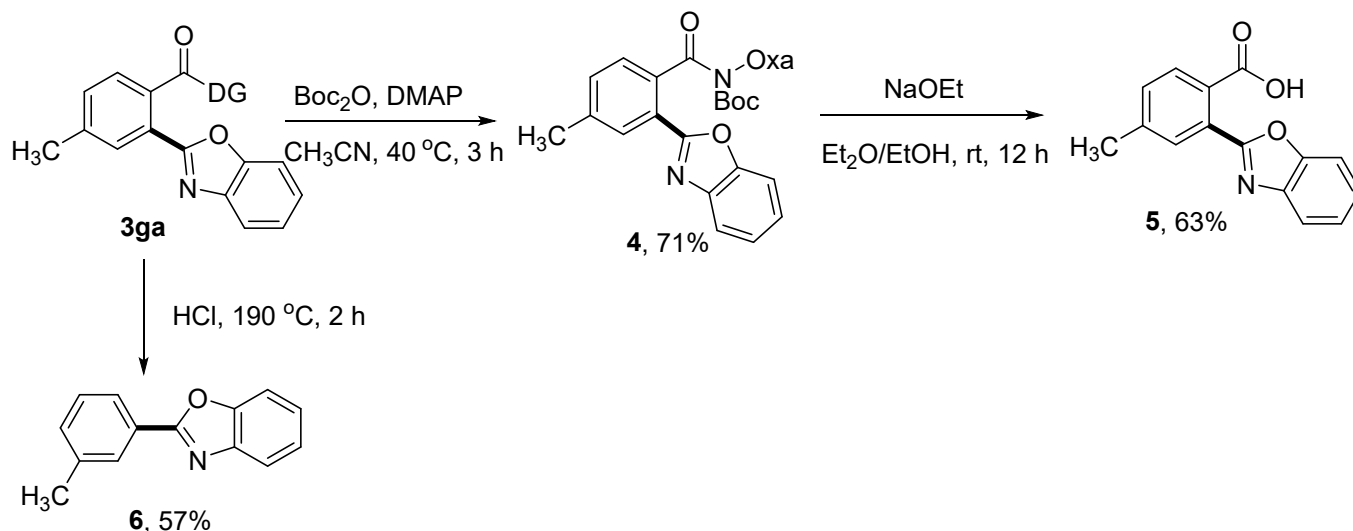
**Scheme S1.** Investigation on Reactivity of DG<sup>a</sup>



<sup>a</sup>Reaction conditions: DGs **1a'-h'** (0.2 mmol), **2a** (0.24 mmol),  $\text{NiCl}_2$  (10 mol %),  $\text{P}(o\text{-Tol})_3$  (20 mol %),  $\text{Ag}_2\text{O}$  (0.2 mmol), Ad-CO<sub>2</sub>H (0.2 mmol), 1,4-dioxane (2 mL), 110 °C, 8 h. <sup>b</sup>Isolated yield.

**General Procedure for the Oxidative C-H Heteroarylation.** A mixture of amide **1** (0.2 mmol),azole **2** (0.24 mmol),  $\text{NiCl}_2$  (0.02 mmol, 3 mg),  $\text{P}(o\text{-Tol})_3$  (0.04 mmol, 12 mg),  $\text{Ag}_2\text{O}$  (0.2 mmol, 46 mg) and 1-AdCO<sub>2</sub>H (0.2 mmol, 36 mg) was stirred in 1,4-dioxane (2 mL) at 110 °C for 8 h under air. The progress of the reaction was monitored by TLC using ethyl acetate and hexane. Upon completion, the reaction mixture was cooled to room temperature, diluted with ethyl acetate (20 mL) and passed through a short pad of celite. The organic layer was washed with brine (2 × 5 mL) and water (2 × 5 mL). Drying ( $\text{Na}_2\text{SO}_4$ ) and evaporation of the solvent gave a residue that was purified on silica gel column chromatography using ethyl acetate/hexane as an eluent to afford **3**.

**Scheme S2.** Removal of the Directing Group.

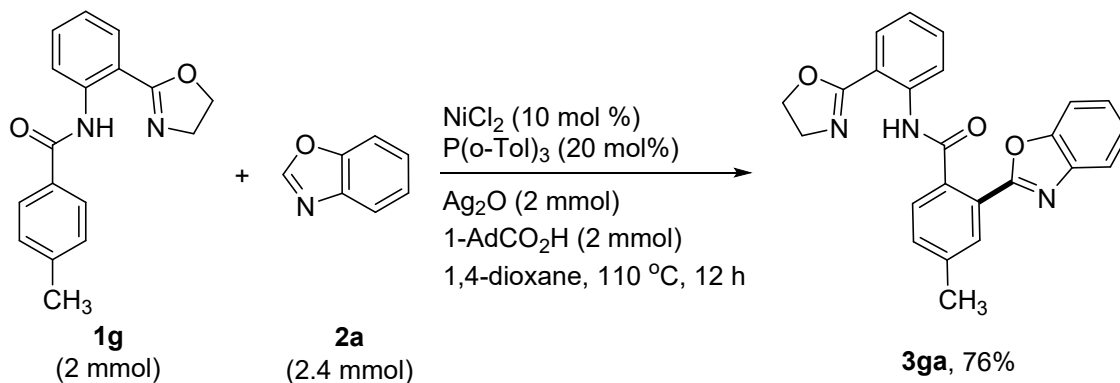


**Synthesis of 4 and 5.**<sup>3a</sup> Di-*tert*-butyl dicarbonate (1 mmol, 218 mg) was added to a solution of 2-(benzo[d]oxazol-2-yl)-*N*-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide **3ga** (0.1 mmol, 40 mg) and DMAP (0.2 mmol, 24 mg) in  $\text{CH}_3\text{CN}$  (2 mL) and was stirred at 40 °C for 3 h under air. The solvent was evaporated under reduced pressure to give a residue, which was purified by silica gel column chromatography using ethyl acetate/*n*-hexane as the eluent to furnish **4** as a yellow solid. Next, to a stirred a solution of **4** (0.07 mmol, 35 mg) in  $\text{Et}_2\text{O}/\text{EtOH}$  (4/1, v/v, 3 mL), EtONa (20% w/w in EtOH, 0.21 mmol, 71 mg) was added at 0 °C under inert atmosphere and the resultant mixture was stirred at room temperature for 12 h. The reaction mixture was then diluted with ethyl acetate (10 mL) and washed with 1 N HCl (1 × 5 mL), brine (2 × 5 mL) and water (5 mL). Drying ( $\text{Na}_2\text{SO}_4$ ) and evaporation of the solvent gave a residue that was purified by a silica gel column chromatography using ethyl acetate/hexane as the eluent to afford **5** in 63% yield (11 mg).

**Synthesis of 6.**<sup>3b</sup> A mixture of 2-(benzo[d]oxazol-2-yl)-*N*-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide **3ga** (0.1 mmol, 40 mg) in conc. HCl (1 mL) was stirred at 190 °C for 2 h in a sealed tube. The mixture was cooled to room temperature and treated with NaOH solution until the pH was adjusted to 9. The aqueous layer was extracted with dichloromethane (3 × 5 mL). Drying ( $\text{Na}_2\text{SO}_4$ ) and evaporation of the solvent gave a residue, which was purified on silica gel

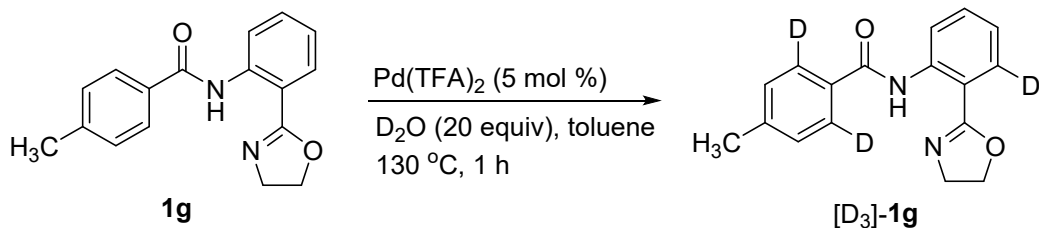
column chromatography to afford 2-(*m*-tolyl)benzo[d]oxazole **6** as a brown solid in 57% yield (12 mg).

### Scheme S3. Scale-up Synthesis



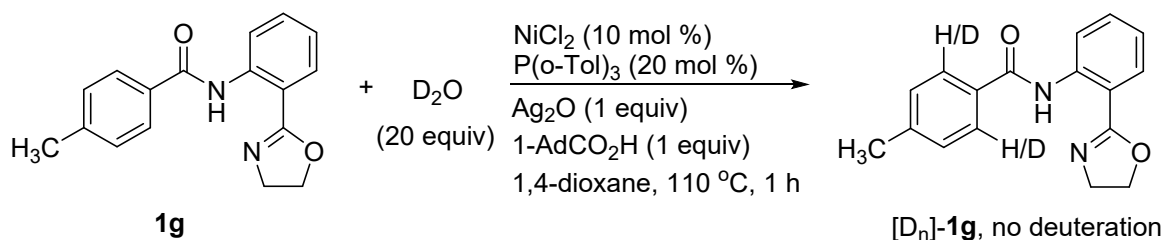
**Scale-up Synthesis of 3ga.** A mixture of *N*-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide **1g** (2 mmol, 560 mg), benzoxazole **2a** (2.4 mmol, 286 mg), NiCl<sub>2</sub> (0.2 mmol, 26 mg), P(*o*-Tol)<sub>3</sub> (0.4 mmol, 122 mg), Ag<sub>2</sub>O (2 mmol, 464 mg) and 1-AdCO<sub>2</sub>H (2 mmol, 360 mg) was stirred in 1,4-dioxane (20 mL) at 110 °C for 12 h under air. The reaction mixture was then cooled to room temperature, diluted with ethyl acetate (20 mL) and passed through a short pad of celite. The workup and purification of the product was performed as described in the general procedure to afford **3ga** in 76% yield (603 mg).

**Synthesis of [D<sub>3</sub>]-1g.** *N*-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methylbenzamide **1g** (0.2 mmol, 56 mg), Pd(TFA)<sub>2</sub> (0.01 mmol, 3 mg), D<sub>2</sub>O (4 mmol, 80 mg) and toluene (1 mL) were stirred at 130 °C for 1 h in a sealed tube. The resultant mixture was extracted with ethyl acetate (2 × 5 mL) and the organic layer was dried over Na<sub>2</sub>SO<sub>4</sub>. Evaporation of the solvent gave a residue that was purified on silica gel column chromatography using ethyl acetate/hexane to afford [D<sub>3</sub>]-**1g** in 98% yield. The deuterium incorporation was determined using 400 MHz <sup>1</sup>H NMR as 93% D was incorporated into the two *ortho* positions of the carboxamide aryl ring.



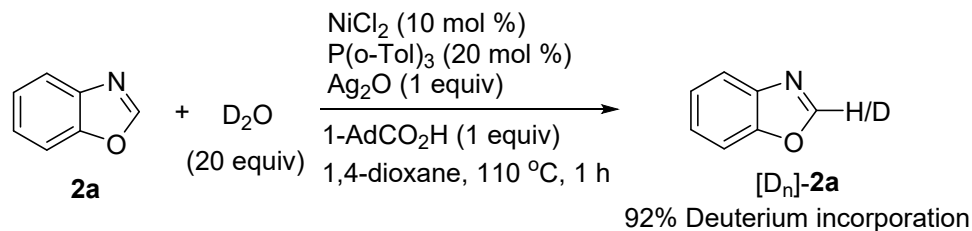
## Mechanistic Investigation

### H/D Exchange Experiment of **1g** with D<sub>2</sub>O in the Absence of **2a**.



*N*-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methylbenzamide **1g** (0.2 mmol, 56 mg), NiCl<sub>2</sub> (0.02 mmol, 3 mg), P(*o*-Tol)<sub>3</sub> (0.04 mmol, 12 mg), Ag<sub>2</sub>O (0.2 mmol, 46 mg), 1-AdCO<sub>2</sub>H (0.2 mmol, 36 mg) and D<sub>2</sub>O (4 mmol, 80 mg) were stirred in 1,4-dioxane (2 mL) at 110 °C for 1 h under air. The reaction mixture was cooled to room temperature, diluted with ethyl acetate (2 × 5 mL) and passed through a short pad of celite. The work-up and purification were performed as described in the general procedure. 400 MHz <sup>1</sup>H NMR analysis of the product showed no deuterium incorporation.

### H/D Exchange Experiment of **2a** with D<sub>2</sub>O in the Absence of **1g**.

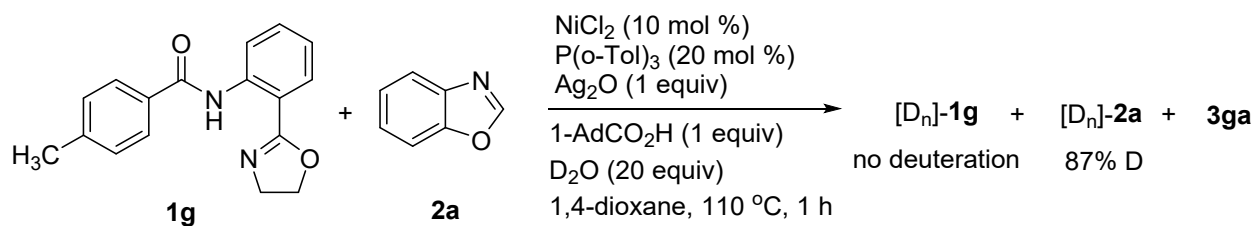


Benzoxazole **2a** (0.2 mmol, 24 mg), NiCl<sub>2</sub> (0.02 mmol, 3 mg), P(*o*-Tol)<sub>3</sub> (0.04 mmol, 12 mg), Ag<sub>2</sub>O (0.2 mmol, 46 mg), 1-AdCO<sub>2</sub>H (0.2 mmol, 36 mg) and D<sub>2</sub>O (4 mmol, 80 mg) were stirred in 1,4-dioxane (2 mL) at 110 °C for 1 h under air. The reaction mixture was cooled, diluted with



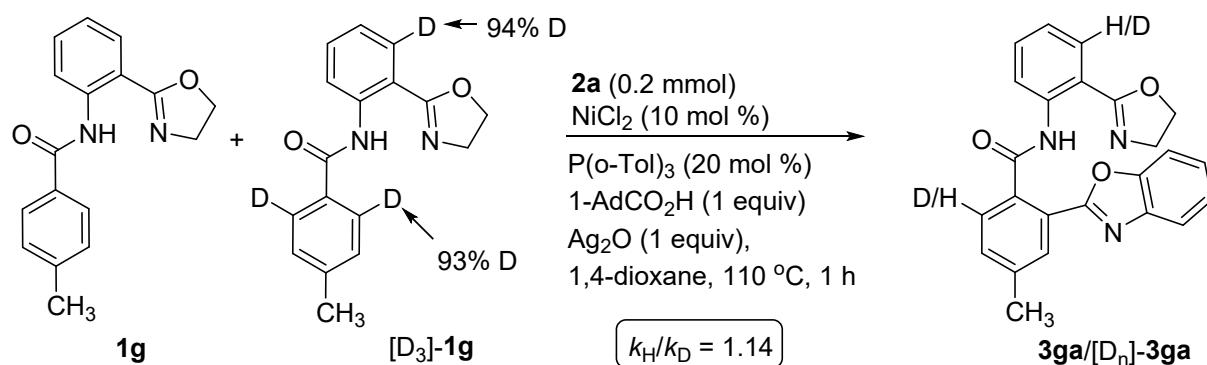
ethyl acetate (2 × 5 mL) and passed through a short pad of celite. The work-up and purification were performed as described in the general procedure. The deuterium incorporation was calculated using 400 MHz <sup>1</sup>H NMR as 92%.

### H/D Exchange Experiment of **1g** with D<sub>2</sub>O in the Presence of **2a**.



A mixture of amide **1g** (0.2 mmol, 56 mg), benzoxazole **2a** (0.24 mmol, 28 mg), NiCl<sub>2</sub> (0.02 mmol, 3 mg), P(*o*-Tol)<sub>3</sub> (0.04 mmol, 12 mg), Ag<sub>2</sub>O (0.2 mmol, 46 mg), 1-AdCO<sub>2</sub>H (0.2 mmol, 36 mg) and D<sub>2</sub>O (4 mmol, 80 mg) was stirred in 1,4-dioxane (2 mL) at 110 °C for 1 h under air. The reaction mixture was cooled to room temperature, diluted with ethyl acetate (2 × 5 mL) and passed through a short pad of celite. The work-up and purification were performed as described in the general procedure. 400 MHz <sup>1</sup>H NMR analysis revealed no deuterium incorporation into carboxamide while 87% D was observed at the 2-position of benzoxazole.

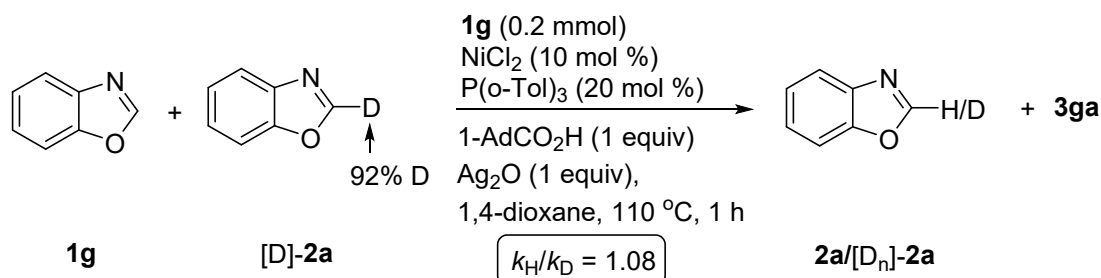
### Intermolecular Kinetic Isotope Effect Experiment using **1g** and [D<sub>3</sub>]-**1g**.



A mixture of **1g** (0.2 mmol, 56 mg) and [D<sub>3</sub>]-**1g** (0.2 mmol, 57 mg) was reacted with **2a** (0.2 mmol, 24 mg) for 1 h under standard reaction condition. The resulting solution was then diluted with ethyl acetate (2 × 5 mL), passed through a short pad of celite, washed with brine (2 × 5 mL) and water (5 mL). Drying (Na<sub>2</sub>SO<sub>4</sub>) and evaporation of the solvent produced a residue, which was

purified on silica gel column chromatography using ethyl acetate/hexane as the eluent to afford a mixture of **3ga**/[D<sub>n</sub>]-**3ga**. The intermolecular  $k_H/k_D$  was found to be 1.14, based on the 400 MHz <sup>1</sup>H NMR spectroscopy.

### Intermolecular Kinetic Isotope Effect Experiment using **2a** and [D]-**2a**.

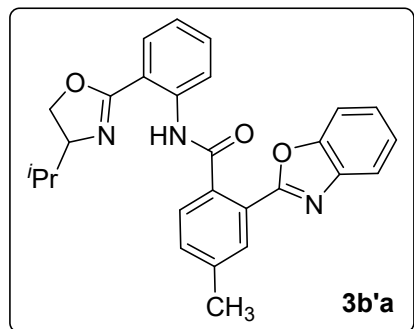


*N*-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methylbenzamide **1g** (0.2 mmol, 56 mg) was reacted with **2a** (0.2 mmol, 24 mg) and [D]-**2a** (0.2 mmol, 24 mg) for 1 h under the standard reaction condition. The resulting solution was diluted with ethyl acetate (2 x 5 mL), passed through a short pad of celite, washed with brine (2 x 5 mL) and water (5 mL). Drying (Na<sub>2</sub>SO<sub>4</sub>) and evaporation of the solvent produced a residue, which was purified on silica gel column chromatography using ethyl acetate/hexane as the eluent to afford a mixture of unreacted **2a** and [D]-**2a**. The intermolecular  $k_H/k_D$  was found to be 1.08, based on the 400 MHz <sup>1</sup>H NMR spectroscopy analysis.

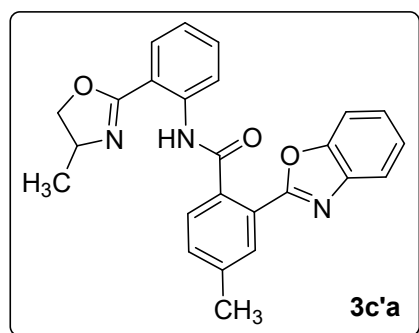
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- For preparation of azoles, see: a) M. Kitahara, N. Umeda, K. Hirano, T. Satoh and M. Miura, *J. Am. Chem. Soc.*, 2011, **133**, 2160; b) M. Nishino, K. Hirano, T. Satoh and M. Miura, *Angew. Chem., Int. Ed.*, 2012, **51**, 6993; c) R. Odani, K. Hirano, T. Satoh and M. Miura, *J. Org. Chem.*, 2013, **78**, 11045.
- a) M. Shang, H.-L. Wang, S.-Z. Sun, H.-X. Dai and J.-Q. Yu, *J. Am. Chem. Soc.*, 2014, **136**, 11590; b) L.-L. Xu, X. Wang, B. Ma, M.-X. Yin, H.-X. Lin, H.-X. Dai and J.-Q. Yu, *Chem. Sci.*, 2018, **9**, 5160.

## Characterization Data

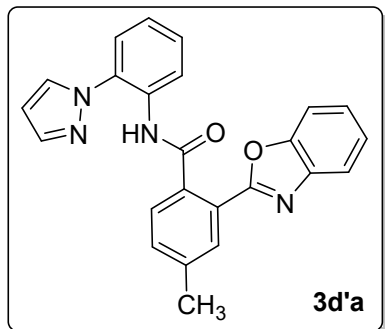


**2-(Benzo[d]oxazol-2-yl)-N-(2-(4-isopropyl-4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide 3b'a.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f$  = 0.54; colorless solid; mp 173-174 °C; yield 55% (48 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.76 (s, 1H), 8.89 (d,  $J$  = 8.4 Hz, 1H), 8.03 (s, 1H), 7.81-7.78 (m, 1H), 7.72-7.68 (m, 2H), 7.54-7.50 (m, 1H), 7.41-7.36 (m, 2H), 7.32-7.26 (m, 2H), 7.13-7.09 (m, 1H), 4.17-4.13 (m, 1H), 3.91-3.79 (m, 2H), 2.49 (s, 3H), 1.60-1.51 (m, 1H), 0.75-0.72 (m, 6H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.8, 163.3, 162.5, 151.1, 141.9, 140.5, 140.2, 135.4, 132.6, 131.8, 130.8, 129.1, 128.6, 125.27, 125.22, 124.5, 122.6, 120.3, 120.1, 113.6, 110.7, 72.5, 69.4, 33.0, 21.3, 18.7, 18.5; FT-IR (KBr) 3009, 2962, 1683, 1635, 1610, 1536, 1449, 1275, 1260, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{27}\text{H}_{26}\text{N}_3\text{O}_3$ : 440.1969, found: 440.1969.

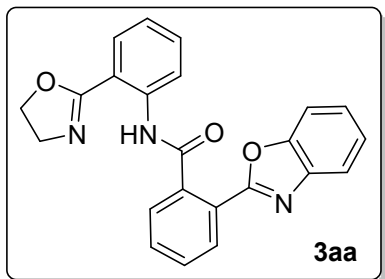


**2-(Benzo[d]oxazol-2-yl)-4-methyl-N-(2-(4-methyl-4,5-dihydrooxazol-2-yl)phenyl)benzamide 3c'a.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f$  = 0.52; colorless solid; mp 169-170 °C; yield 71% (58 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.64 (s, 1H), 8.89 (d,  $J$  = 8.4 Hz, 1H), 8.06-8.05 (m, 1H), 7.82-7.79 (m, 1H), 7.76-7.72 (m, 2H), 7.56-7.52 (m, 1H), 7.47-7.44 (m, 1H),

7.39-7.37 (m, 1H), 7.34-7.27 (m, 2H), 7.15-7.11 (m, 1H), 4.19-4.09 (m, 2H), 3.74-3.71 (m, 1H), 2.52 (s, 3H), 1.14 (d,  $J = 6.4$  Hz, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.7, 163.2, 162.6, 151.1, 141.9, 140.7, 140.1, 135.3, 132.6, 131.9, 131.0, 129.0, 128.8, 125.3, 125.2, 124.5, 122.6, 120.3, 120.2, 113.7, 110.7, 72.6, 61.7, 21.4, 21.3; FT-IR (KBr) 3009, 2988, 1683, 1634, 1610, 1536, 1447, 1275, 1260, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{25}\text{H}_{22}\text{N}_3\text{O}_3$ : 412.1656, found: 412.1657.

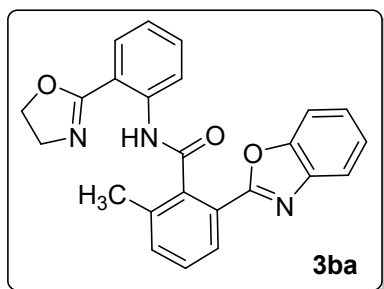


***N*-(2-(1H-Pyrazol-1-yl)phenyl)-2-(benzo[d]oxazol-2-yl)-4-methylbenzamide 3d'a.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.46$ ; colorless solid; mp 154-155  $^\circ\text{C}$ ; yield 63% (50 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  10.61 (s, 1H), 8.58 (d,  $J = 8.0$  Hz, 1H), 7.93 (s, 1H), 7.59-7.57 (m, 1H), 7.53 (d,  $J = 7.6$  Hz, 1H), 7.42-7.33 (m, 4H), 7.30-7.27 (m, 1H), 7.21-7.017 (m, 3H), 7.14-7.09 (m, 1H), 6.03-6.02 (m, 1H), 2.41 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.3, 161.9, 151.0, 141.9, 140.9, 140.8, 134.9, 132.1, 131.6, 130.8, 129.5, 129.4, 128.6, 128.0, 125.2, 124.8, 124.48, 124.46, 123.6, 122.2, 120.4, 110.6, 106.7, 21.4; FT-IR (KBr) 3006, 1681, 1599, 1529, 1513, 1452, 1275, 1260, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{19}\text{N}_4\text{O}_2$ : 395.1503, found: 395.1505.



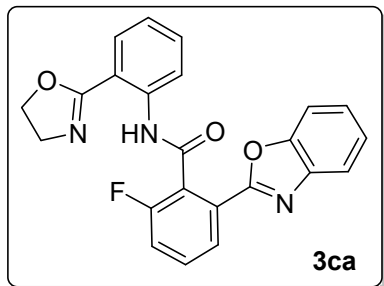
**2-(Benzo[d]oxazol-2-yl)-*N*-(2-(4,5-dihydrooxazol-2-yl)phenyl)benzamide 3aa.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.42$ ; colorless solid; mp 180-181  $^\circ\text{C}$ ; yield 77%

(59 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.47 (s, 1H), 8.87 (d,  $J = 8.4$  Hz, 1H), 8.26-8.22 (m, 1H), 7.84-7.80 (m, 1H), 7.77-7.75 (m, 1H), 7.71-7.69 (m, 1H), 7.65-7.60 (m, 2H), 7.55-7.51 (m, 1H), 7.34-7.24 (m, 3H), 7.13-7.09 (m, 1H), 3.99 (t,  $J = 9.6$  Hz, 2H), 3.71 (t,  $J = 9.2$  Hz, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.8, 164.4, 162.2, 151.1, 141.9, 139.8, 137.9, 132.6, 131.4, 130.3, 129.1, 129.0, 125.3, 125.0, 124.5, 122.8, 120.5, 120.2, 113.8, 110.7, 66.1, 54.4; FT-IR (KBr) 2976, 1681, 1634, 1610, 1532, 1448, 1303, 1058, 747  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{23}\text{H}_{18}\text{N}_3\text{O}_3$ : 384.1343, found: 384.1346.



**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-6-methylbenzamide 3ba.**

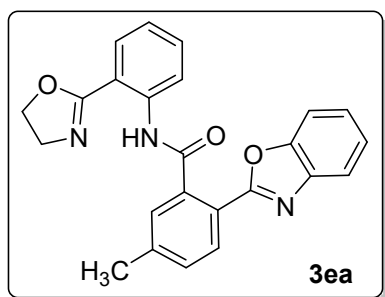
Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.52$ ; colorless solid; mp 148-149  $^{\circ}\text{C}$ ; yield 67% (53 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.14 (s, 1H), 8.83 (d,  $J = 8.4$  Hz, 1H), 8.17-8.15 (m, 1H), 7.78-7.76 (m, 1H), 7.65-7.62 (m, 1H), 7.60-7.55 (m, 1H), 7.50-7.43 (m, 2H), 7.29-7.21 (m, 3H), 7.13 (t,  $J = 7.6$  Hz, 1H), 3.99-3.94 (m, 2H), 3.66 (t,  $J = 9.2$  Hz, 2H), 2.55 (s, 3H);  $^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  168.1, 164.2, 162.1, 150.8, 141.9, 139.6, 137.4, 136.5, 133.6, 132.4, 129.3, 129.1, 127.1, 125.2, 124.5, 124.1, 122.9, 121.2, 120.2, 114.2, 110.5, 66.0, 54.4, 19.6; FT-IR (KBr) 2978, 1684, 1528, 1446, 1300, 1056, 743  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{20}\text{N}_3\text{O}_3$ : 398.1499, found: 398.1502.



**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-6-fluorobenzamide 3ca.**

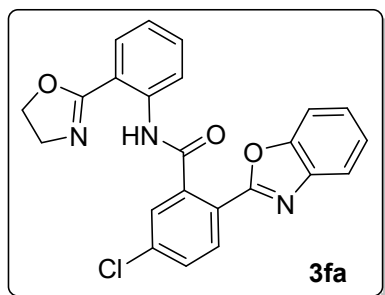
Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.46$ ; colorless solid; mp 153-154  $^{\circ}\text{C}$ ;

yield 69% (55 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.47 (s, 1H), 8.84 (d,  $J = 8.4$  Hz, 1H), 8.13 (d,  $J = 8.0$  Hz, 1H), 7.81-7.79 (m, 1H), 7.69-7.66 (m, 1H), 7.61-7.55 (m, 2H), 7.38-7.27 (m, 4H), 7.18-7.14 (m, 1H), 4.03 (t,  $J = 9.6$  Hz, 2H), 3.71 (t,  $J = 9.6$  Hz, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  164.4, 162.9, 161.2 ( $J_{\text{C-F}} = 247.9$  Hz), 160.8 ( $J_{\text{C-F}} = 3.4$  Hz), 151.0, 141.9, 139.6, 132.6, 131.2 ( $J_{\text{C-F}} = 8.6$  Hz), 129.1, 126.6 ( $J_{\text{C-F}} = 4.3$  Hz), 126.1 ( $J_{\text{C-F}} = 20.8$  Hz), 125.7, 125.4 ( $J_{\text{C-F}} = 3.2$  Hz), 124.8, 123.2, 121.1, 120.6, 119.1 ( $J_{\text{C-F}} = 22.1$  Hz), 114.2, 110.8, 66.2, 54.5;  $^{19}\text{F}$  NMR (377 MHz,  $\text{CDCl}_3$ )  $\delta$  -114.5; FT-IR (KBr) 2979, 1690, 1635, 1535, 1448, 1307, 1244, 945, 748  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{23}\text{H}_{17}\text{FN}_3\text{O}_3$ : 402.1248, found: 402.1251.



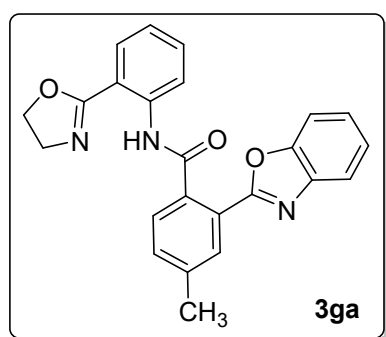
**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-5-methylbenzamide 3ea.**

Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.50$ ; colorless solid; mp 182-183  $^{\circ}\text{C}$ ; yield 74% (59 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.42 (s, 1H), 8.88 (d,  $J = 8.4$  Hz, 1H), 8.17 (d,  $J = 8.0$  Hz, 1H), 7.78-7.76 (m, 1H), 7.71-7.68 (m, 1H), 7.65 (s, 1H), 7.58-7.54 (m, 1H), 7.47-7.44 (m, 1H), 7.33-7.24 (m, 3H), 7.15-7.11 (m, 1H), 3.95 (t,  $J = 10$  Hz, 2H), 3.68 (t,  $J = 9.2$  Hz, 2H), 2.51 (s, 3H);  $^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  168.1, 164.3, 162.4, 151.0, 142.1, 142.0, 139.8, 137.8, 132.5, 131.1, 130.2, 129.8, 129.0, 125.1, 124.4, 122.7, 122.0, 120.6, 120.0, 113.9, 110.6, 66.0, 54.3, 21.6.; FT-IR (KBr) 2976, 1682, 1611, 1533, 1448, 1305, 1059, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{20}\text{N}_3\text{O}_3$ : 398.1499, found: 398.1514.



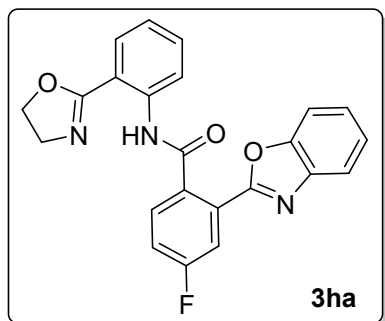
**2-(Benzo[d]oxazol-2-yl)-5-chloro-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)benzamide 3fa.**

Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.46$ ; colorless solid; mp 186-187 °C; yield 76% (63 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.53 (s, 1H), 8.82 (d,  $J = 8.4$  Hz, 1H), 8.20 (d,  $J = 8.4$  Hz, 1H), 7.80-7.52 (m, 5H), 7.33-7.25 (m, 3H), 7.13 (t,  $J = 7.6$  Hz, 1H), 3.99 (t,  $J = 9.6$  Hz, 2H), 3.70 (t,  $J = 9.6$  Hz, 2H);  $^{13}\text{C NMR}$  (100 MHz,  $\text{CDCl}_3$ )  $\delta$  166.3, 164.4, 161.2, 151.0, 141.8, 139.5, 139.1, 137.7, 132.6, 131.6, 130.5, 129.3, 129.1, 125.5, 124.7, 123.4, 123.0, 120.6, 120.3, 113.9, 110.7, 66.1, 54.3; FT-IR (KBr) 2981, 1681, 1611, 1531, 1448, 1304, 1058, 745  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{23}\text{H}_{17}\text{ClN}_3\text{O}_3$ : 418.0953, found: 418.0962.



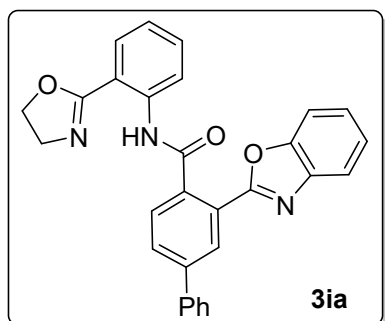
**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide 3ga.**

Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.48$ ; colorless solid; mp 161-162 °C; yield 81% (64 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.35 (s, 1H), 8.79 (d,  $J = 8.4$  Hz, 1H), 7.97 (s, 1H), 7.69-7.61 (m, 3H), 7.47-7.43 (m, 1H), 7.37 (d,  $J = 7.6$  Hz, 1H), 7.25-7.16 (m, 3H), 7.02 (t,  $J = 7.2$  Hz, 1H), 3.91 (t,  $J = 9.6$  Hz, 2H), 3.63 (t,  $J = 9.6$  Hz, 2H), 2.43 (s, 3H);  $^{13}\text{C NMR}$  (150 MHz,  $\text{CDCl}_3$ )  $\delta$  167.9, 164.4, 162.6, 151.1, 141.9, 140.7, 139.9, 135.3, 132.6, 132.1, 130.9, 129.2, 129.0, 125.3, 125.0, 124.5, 122.7, 120.5, 120.1, 113.8, 110.7, 66.1, 54.4, 21.4; FT-IR (KBr) 3006, 2921, 1636, 1610, 1535, 1449, 1306, 1275, 1260, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{20}\text{N}_3\text{O}_3$ : 398.1499, found: 398.1508.



**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-fluorobenzamide 3ha.**

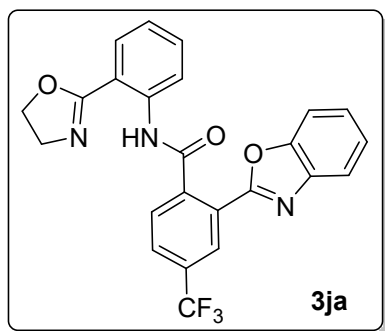
Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.54$ ; colorless solid; mp 187-188 °C; yield 77% (62 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.48 (s, 1H), 8.85 (d,  $J = 8.4$  Hz, 1H), 7.95-7.92 (m, 1H), 7.83-7.76 (m, 2H), 7.71-7.69 (m, 1H), 7.56-7.52 (m, 1H), 7.39-7.27 (m, 4H), 7.14-7.10 (m, 1H), 3.99 (t,  $J = 9.6$  Hz, 2H), 3.70 (t,  $J = 9.2$  Hz, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  166.9 ( $J_{\text{C-F}} = 241.4$  Hz), 162.0, 161.0, 151.1, 141.8, 139.8, 134.2 ( $J_{\text{C-F}} = 3.6$  Hz), 132.7, 131.4 ( $J_{\text{C-F}} = 8.6$  Hz), 129.1, 127.4 ( $J_{\text{C-F}} = 8.8$  Hz), 125.8, 124.8, 122.9, 120.5, 120.4, 118.5 ( $J_{\text{C-F}} = 21.4$  Hz), 117.3 ( $J_{\text{C-F}} = 24.3$  Hz), 113.8, 110.8, 66.2, 54.4; FT-IR (KBr) 3006, 1691, 1635, 1535, 1449, 1275, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{23}\text{H}_{17}\text{FN}_3\text{O}_3$ : 402.1248, found: 402.1244.



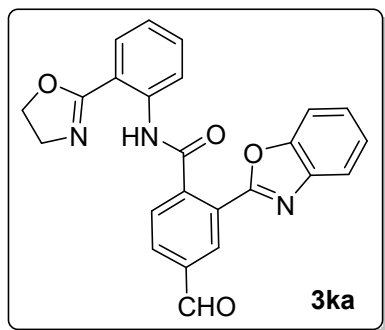
**3-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-[1,1'-biphenyl]-4-carboxamide 3ia.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.40$ ; colorless solid; mp 166-167 °C; yield 72% (66 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.53 (s, 1H), 8.89 (d,  $J = 8.4$  Hz, 1H), 8.476-8.472 (m, 1H), 7.92-7.85 (m, 2H), 7.79-7.71 (m, 4H), 7.57-7.48 (m, 3H), 7.45-7.40 (m, 1H), 7.36-7.28 (m, 3H), 7.14-7.10 (m, 1H), 4.00 (t,  $J = 9.6$  Hz, 2H), 3.74 (t,  $J = 9.2$  Hz, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.6, 164.4, 162.3, 151.2, 143.3, 142.0, 139.9, 139.3, 136.6, 132.6, 129.8, 129.7, 129.1, 129.0, 128.4, 127.4, 125.7, 125.4, 124.6, 122.8, 120.5, 120.3, 113.8, 110.7,



66.1, 54.4; FT-IR (KBr) 3031, 1681, 1635, 1534, 1448, 1305, 1060, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{29}\text{H}_{22}\text{N}_3\text{O}_3$ : 460.1656, found: 460.1657.

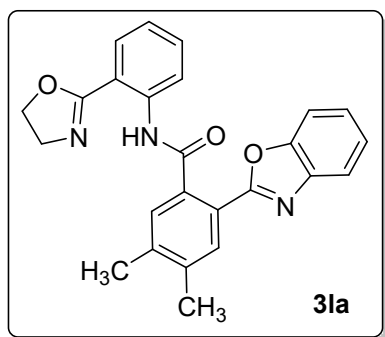


**2-(benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-(trifluoromethyl)benzamide 3ja.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.46$ ; colorless solid; mp 139-140  $^\circ\text{C}$ ; yield 74% (67 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.59 (s, 1H), 8.85 (d,  $J = 8.4$  Hz, 1H), 8.55 (s, 1H), 7.94-7.87 (m, 2H), 7.80-7.78 (m, 1H), 7.73-7.70 (m, 1H), 7.58-7.54 (m, 1H), 7.37-7.29 (m, 3H), 7.17-7.13 (m, 1H), 4.02 (t,  $J = 9.6$  Hz, 2H), 3.71 (t,  $J = 9.6$  Hz, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  166.5, 164.5, 160.7, 151.1, 141.8, 140.8, 139.6, 132.7, 132.4, 129.7, 129.2, 128.0 ( $J_{\text{C-F}} = 3.4$  Hz), 127.4 ( $J_{\text{C-F}} = 3.8$  Hz), 125.9, 125.8, 124.9, 123.2, 122.1, 120.67, 120.60, 114.0, 110.8, 66.2, 54.4;  $^{19}\text{F}$  NMR (377 MHz,  $\text{CDCl}_3$ )  $\delta$  -63.0; FT-IR (KBr) 2978, 1687, 1636, 1536, 1449, 1309, 1278, 1131, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{17}\text{F}_3\text{N}_3\text{O}_3$ : 452.1217, found: 452.1229.



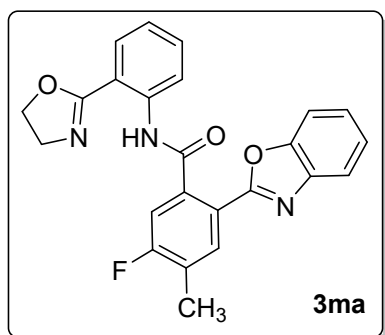
**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-formylbenzamide 3ka.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.42$ ; colorless solid; mp 165-166  $^\circ\text{C}$ ; yield 68% (56 mg);  $^1\text{H}$  NMR (600 MHz,  $\text{CDCl}_3$ )  $\delta$  12.61 (s, 1H), 10.18 (s, 1H), 8.84 (d,  $J = 8.4$  Hz, 1H), 8.76 (s, 1H), 8.15-8.13 (m, 1H), 7.96 (d,  $J = 7.8$  Hz, 1H), 7.80 (d,  $J = 7.8$  Hz, 1H), 7.72-

7.70 (m, 1H), 7.56 (t,  $J = 8.4$  Hz, 1H), 7.38-7.30 (m, 3H), 7.16-7.14 (m, 1H), 4.02 (t,  $J = 9.0$  Hz, 2H), 3.70 (t,  $J = 9.6$  Hz, 2H);  $^{13}\text{C}$  NMR (150 MHz,  $\text{CDCl}_3$ )  $\delta$  190.8, 166.7, 164.5, 160.8, 151.1, 142.4, 141.8, 139.5, 137.4, 132.7, 132.2, 131.3, 129.9, 129.2, 126.0, 125.9, 124.9, 123.2, 120.6, 120.5, 113.9, 110.8, 66.2, 54.4; FT-IR (KBr) 2979, 1696, 1614, 1535, 1449, 1309, 1246, 1057, 751  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{18}\text{N}_3\text{O}_4$ : 412.1292, found: 412.1287.



**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4,5-dimethylbenzamide 3la.**

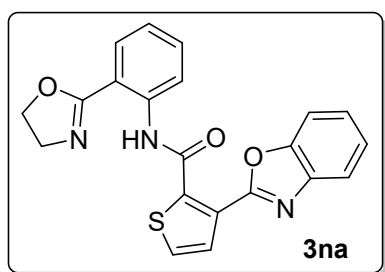
Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.54$ ; colorless solid; mp 182-183  $^{\circ}\text{C}$ ; yield 71% (58 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.37 (s, 1H), 8.87 (d,  $J = 8.4$  Hz, 1H), 8.02 (s, 1H), 7.74-7.72 (m, 1H), 7.69-7.67 (m, 1H), 7.60 (s, 1H), 7.55-7.50 (m, 1H), 7.30-7.21 (m, 3H), 7.11-7.07 (m, 1H), 3.91 (t,  $J = 9.6$  Hz, 2H), 3.64 (t,  $J = 9.6$  Hz, 2H), 2.40-2.39 (m, 6H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.1, 164.3, 162.7, 151.1, 141.9, 140.8, 139.9, 139.4, 135.4, 132.5, 131.2, 130.5, 129.0, 125.0, 124.4, 122.6, 122.2, 120.5, 119.9, 113.8, 110.6, 66.0, 54.3, 19.9, 19.7; FT-IR (KBr) 2973, 1681, 1609, 1531, 1447, 1305, 1058, 748  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{25}\text{H}_{22}\text{N}_3\text{O}_3$ : 412.1656, found: 412.1657.



**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-5-fluoro-4-methylbenzamide**

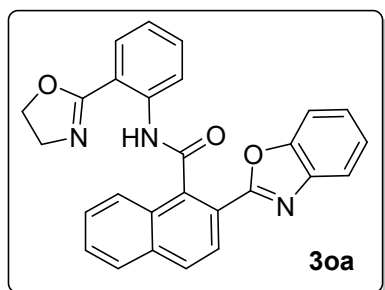
**3ma.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.46$ ; colorless solid; mp 165-166

°C; yield 73% (60 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.44 (s, 1H), 8.76 (d,  $J = 8.0$  Hz, 1H), 8.03 (d,  $J = 7.2$  Hz, 1H), 7.70-7.67 (m, 1H), 7.62-7.60 (m, 1H), 7.48-7.44 (m, 1H), 7.41 (d,  $J = 9.2$  Hz, 1H), 7.25-7.16 (m, 3H), 7.08-7.02 (m, 1H), 3.91 (t,  $J = 9.6$  Hz, 2H), 3.63 (t,  $J = 9.2$  Hz, 2H), 2.35 (s, 3H);  $^{13}\text{C NMR}$  (100 MHz,  $\text{CDCl}_3$ )  $\delta$  166.4, 164.4, 164.0, 161.8, 161.5, 151.1, 141.9, 139.7, 137.6 ( $J_{\text{C-F}} = 7.5$  Hz), 133.9, 133.8, 132.7, 129.1, 128.0, 127.8, 125.3, 124.6, 123.0, 120.9 ( $J_{\text{C-F}} = 3.8$  Hz), 120.5, 120.1, 116.3 ( $J_{\text{C-F}} = 24.7$  Hz), 113.9, 110.7, 66.1, 54.3, 14.6 ( $J_{\text{C-F}} = 3.0$  Hz);  $^{19}\text{F NMR}$  (377 MHz,  $\text{CDCl}_3$ )  $\delta$  -111.5; FT-IR (KBr) 2987, 1683, 1635, 1533, 1448, 1312, 1059, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{19}\text{FN}_3\text{O}_3$ : 416.1405, found: 416.1407.



### 3-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)thiophene-2-carboxamide

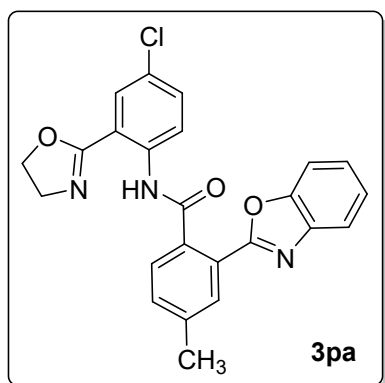
**3na.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.40$ ; thick liquid; yield 67% (52 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.89 (s, 1H), 8.88 (d,  $J = 8.4$  Hz, 1H), 7.81-7.78 (m, 1H), 7.77-7.73 (m, 2H), 7.57-7.52 (m, 2H), 7.38-7.29 (m, 3H), 7.16-7.12 (m, 1H), 3.86 (t,  $J = 9.6$  Hz, 2H), 3.27 (t,  $J = 9.2$  Hz, 2H);  $^{13}\text{C NMR}$  (100 MHz,  $\text{CDCl}_3$ )  $\delta$  164.2, 160.4, 158.9, 150.7, 142.1, 141.7, 139.4, 132.6, 129.7, 129.3, 128.8, 126.8, 125.6, 124.8, 123.1, 120.6, 120.2, 114.2, 110.8, 66.2, 54.1; FT-IR (neat) 2922, 1637, 1614, 1538, 1450, 1275, 1260, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{21}\text{H}_{16}\text{N}_3\text{O}_3\text{S}$ : 390.0907, found: 390.0909.



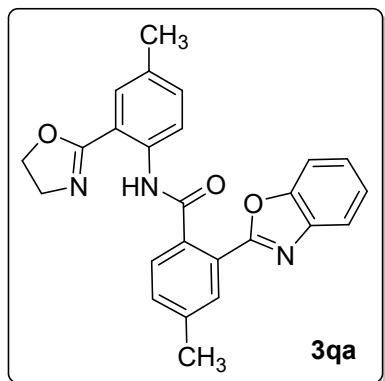
### 2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-1-naphthamide 3oa.

Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.42$ ; colorless solid; mp 188-189 °C;

yield 65% (56 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.45 (s, 1H), 9.01 (d,  $J = 8.4$  Hz, 1H), 8.44 (d,  $J = 8.4$  Hz, 1H), 8.31-8.29 (m, 1H), 8.09 (d,  $J = 8.8$  Hz, 1H), 7.98-7.96 (m, 1H), 7.82-7.80 (m, 1H), 7.73-7.72 (m, 1H), 7.69-7.63 (m, 3H), 7.35-7.28 (m, 3H), 7.21 (t,  $J = 7.6$  Hz, 1H), 4.12-4.07 (m, 1H), 3.83-3.78 (m, 1H), 3.58-3.51 (m, 2H);  $^{13}\text{C NMR}$  (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.6, 164.1, 162.2, 151.1, 142.0, 139.7, 136.1, 134.8, 132.5, 130.6, 129.9, 129.1, 128.25, 128.22, 127.9, 126.8, 125.4, 125.2, 124.6, 123.1, 121.4, 121.1, 120.3, 114.4, 110.7, 66.0, 54.3; FT-IR (KBr) 2987, 1684, 1636, 1531, 1448, 1300, 1260, 1061, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{27}\text{H}_{20}\text{N}_3\text{O}_3$ : 434.1499, found: 434.1499.

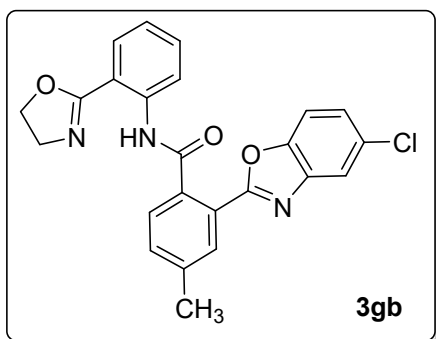


**2-(Benzo[d]oxazol-2-yl)-N-(4-chloro-2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide**  
**3pa.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.38$ ; colorless solid; mp 179-180  $^{\circ}\text{C}$ ; yield 70% (60 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.49 (s, 1H), 8.967-8.962 (m, 1H), 8.05-8.04 (m, 1H), 7.72-7.66 (m, 3H), 7.46-7.44 (m, 1H), 7.36-7.27 (m, 3H), 7.09-7.06 (m, 1H), 3.98 (t,  $J = 10$  Hz, 2H), 3.70 (t,  $J = 9.2$  Hz, 2H), 2.51 (s, 3H);  $^{13}\text{C NMR}$  (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.0, 163.8, 162.4, 151.1, 141.9, 141.0, 140.8, 138.6, 134.8, 132.2, 130.9, 130.0, 129.3, 125.4, 125.0, 124.6, 122.9, 120.4, 120.2, 112.0, 110.7, 66.2, 54.4, 21.4; FT-IR (KBr) 2988, 1685, 1637, 1576, 1523, 1408, 1275, 1260, 1059, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{19}\text{ClN}_3\text{O}_3$ : 432.1109, found: 432.1115.



**2-(Benzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)-4-methylphenyl)-4-methylbenzamide**

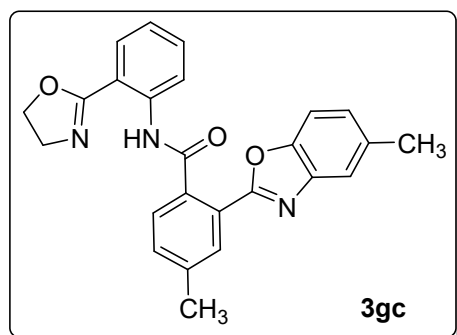
**3qa.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.42$ ; colorless solid; mp 161-162 °C; yield 69% (57 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.45 (s, 1H), 8.72 (s, 1H), 8.06 (s, 1H), 7.75-7.72 (m, 2H), 7.66 (d,  $J = 8.0$  Hz, 1H), 7.47-7.44 (m, 1H), 7.3-7.26 (m, 3H), 6.95-6.92 (m, 1H), 3.96 (t,  $J = 9.6$  Hz, 2H), 3.69 (t,  $J = 9.6$  Hz, 2H), 2.52 (s, 3H), 2.46 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.8, 164.4, 162.6, 151.1, 143.3, 141.9, 140.7, 139.8, 135.3, 132.1, 130.9, 129.2, 128.9, 125.2, 124.9, 124.5, 123.6, 120.9, 120.1, 111.2, 110.7, 65.9, 54.3, 22.1, 21.4; FT-IR (KBr) 2981, 1680, 1632, 1577, 1535, 1451, 1297, 1242, 1056, 747  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{25}\text{H}_{22}\text{N}_3\text{O}_3$ : 412.1656, found: 412.1657.



**2-(5-Chlorobenzo[d]oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide**

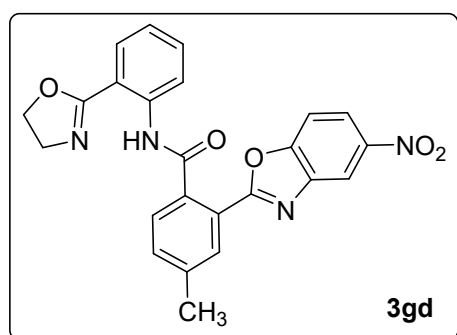
**3gb.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.44$ ; colorless solid; mp 164-165 °C; yield 79% (68 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.50 (s, 1H), 8.85 (d,  $J = 8.4$  Hz, 1H), 7.99 (s, 1H), 7.79-7.77 (m, 1H), 7.73 (d,  $J = 8.0$  Hz, 1H), 7.68-7.67 (m, 1H), 7.53-7.49 (m, 1H), 7.45-7.43 (m, 1H), 7.26-7.21 (m, 2H), 7.12-7.08 (m, 1H), 4.08 (t,  $J = 9.6$  Hz, 2H), 3.77 (t,  $J = 9.6$  Hz, 2H), 2.49 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.5, 164.5, 164.0, 149.7, 143.0, 140.8, 139.9, 135.3, 132.6, 132.4, 131.0, 129.9, 129.1, 129.0, 125.5, 124.7, 122.7, 120.2, 120.0, 113.6, 111.4,

66.1, 54.4, 21.3; FT-IR (KBr) 2987, 1677, 1609, 1531, 1446, 1301, 1258, 1056, 751  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[M+H]^+$  calcd for  $\text{C}_{24}\text{H}_{19}\text{ClN}_3\text{O}_3$ : 432.1109, found: 432.1111.



**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methyl-2-(5-methylbenzo[d]oxazol-2-yl)benzamide**

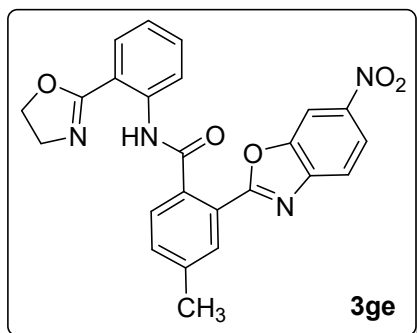
**3gc.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.52$ ; colorless solid; mp 156-157  $^{\circ}\text{C}$ ; yield 77% (63 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.42 (s, 1H), 8.86 (d,  $J = 8.4$  Hz, 1H), 8.02 (s, 1H), 7.76-7.74 (m, 1H), 7.71 (d,  $J = 8.0$  Hz, 1H), 7.53-7.47 (m, 2H), 7.42-7.40 (m, 1H), 7.18 (d,  $J = 8.4$  Hz, 1H), 7.11-7.04 (m, 2H), 3.98 (t,  $J = 9.6$  Hz, 2H), 3.71 (t,  $J = 9.6$  Hz, 2H), 2.48 (s, 3H), 2.43 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.9, 164.3, 162.6, 149.4, 142.1, 140.6, 139.9, 135.2, 134.3, 132.5, 131.9, 130.8, 129.1, 129.0, 126.3, 125.1, 122.6, 120.4, 119.9, 113.7, 110.0, 66.0, 54.4, 21.5, 21.3; FT-IR (KBr) 2984, 1682, 1609, 1531, 1446, 1301, 1261, 1057, 945, 765  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[M+H]^+$  calcd for  $\text{C}_{25}\text{H}_{22}\text{N}_3\text{O}_3$ : 412.1656, found: 412.1652.



**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methyl-2-(5-nitrobenzo[d]oxazol-2-yl)benzamide**

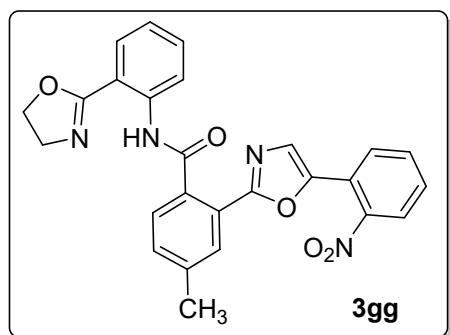
**3gd.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.46$ ; yellow solid; mp 191-192  $^{\circ}\text{C}$ ; yield 71% (63 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.65 (s, 1H), 8.84 (d,  $J = 8.8$  Hz, 1H), 8.60-8.59 (m, 1H), 8.26-8.23 (m, 1H), 8.00 (s, 1H), 7.83-7.81 (m, 1H), 7.77 (d,  $J = 8.0$  Hz, 1H), 7.56-7.46 (m, 3H), 7.15-7.11 (m, 1H), 4.18 (t,  $J = 9.6$  Hz, 2H), 3.87 (t,  $J = 9.6$  Hz, 2H), 2.52 (s,

3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.2, 165.9, 164.7, 154.6, 145.4, 142.3, 141.1, 139.9, 135.5, 132.9, 132.8, 131.4, 129.3, 128.9, 124.5, 122.9, 121.3, 120.1, 116.5, 113.6, 110.9, 66.2, 54.5, 21.4; FT-IR (KBr) 3108, 2984, 1680, 1610, 1525, 1305, 1058, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{19}\text{N}_4\text{O}_5$ : 443.1350, found: 443.1337.



**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methyl-2-(6-nitrobenzo[d]oxazol-2-yl)benzamide**

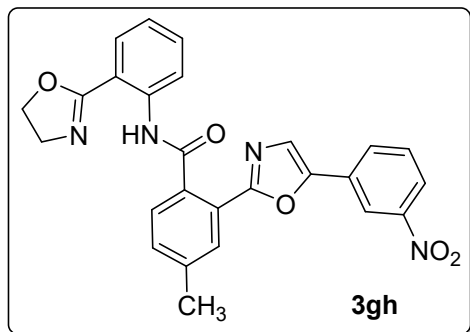
**3ge.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.48$ ; yellow solid; mp 188-189  $^{\circ}\text{C}$ ; yield 73% (64 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.69 (s, 1H), 8.84 (d,  $J = 8.4$  Hz, 1H), 8.31-8.26 (m, 2H), 8.00 (s, 1H), 7.84-7.75 (m, 3H), 7.55-7.50 (m, 2H), 7.14 (t,  $J = 7.6$  Hz, 1H), 4.20 (t,  $J = 9.6$  Hz, 2H), 3.89 (t,  $J = 9.6$  Hz, 2H), 2.52 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.3, 167.1, 164.8, 150.2, 147.2, 145.3, 141.1, 139.9, 135.8, 133.1, 132.8, 131.5, 129.3, 128.9, 124.6, 123.0, 120.7, 120.2, 120.1, 113.6, 107.4, 66.2, 54.6, 21.4; FT-IR (KBr) 2992, 1682, 1583, 1523, 1447, 1305, 1274, 1059, 764  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{19}\text{N}_4\text{O}_5$ : 443.1350, found: 443.1336.



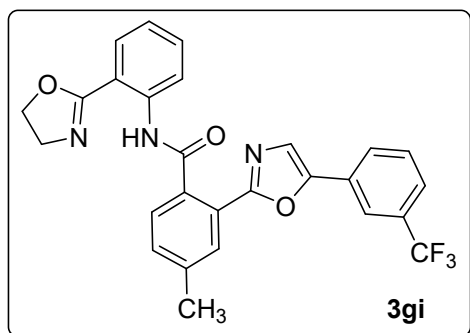
**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methyl-2-(5-(2-nitrophenyl)oxazol-2-yl)benzamide**

**3gg.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.42$ ; yellow solid; mp 199-200  $^{\circ}\text{C}$ ; yield 70% (65 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.54 (s, 1H), 8.91 (d,  $J = 8.4$  Hz, 1H), 7.96

(s, 1H), 7.72-7.69 (m, 2H), 7.64 (d,  $J = 7.6$  Hz, 1H), 7.52-7.44 (m, 3H), 7.40-7.37 (m, 1H), 7.33-7.29 (m, 1H), 7.23-7.19 (m, 1H), 7.06-7.02 (m, 1H), 4.24 (t,  $J = 9.6$  Hz, 2H), 3.85 (t,  $J = 9.6$  Hz, 2H), 2.48 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.3, 164.4, 161.4, 146.7, 146.0, 140.6, 140.1, 134.4, 132.4, 132.4, 131.7, 129.9, 129.2, 128.8, 128.5, 124.2, 124.1, 122.7, 121.3, 120.2, 113.6, 66.2, 54.5, 21.4; FT-IR (KBr) 2987, 1681, 1530, 1306, 1275, 1261, 1057, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{26}\text{H}_{21}\text{N}_4\text{O}_5$ : 469.1506, found: 469.1508.

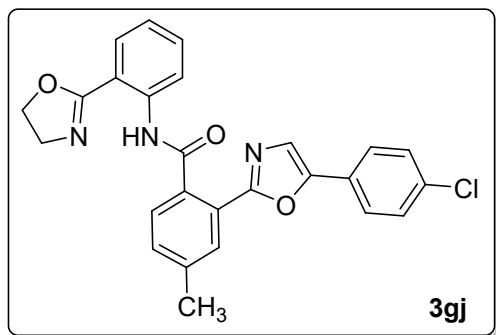


**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methyl-2-(5-(3-nitrophenyl)oxazol-2-yl)benzamide**  
**3gh.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.44$ ; yellow solid; mp 194-195  $^{\circ}\text{C}$ ; yield 74% (69 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.56 (s, 1H), 8.95 (d,  $J = 8.4$  Hz, 1H), 8.29-8.28 (m, 1H), 8.05-8.02 (m, 1H), 7.986-7.980 (m, 1H), 7.72-7.70 (m, 1H), 7.67-7.61 (m, 2H), 7.54-7.49 (m, 2H), 7.41-7.39 (m, 1H), 7.32 (t,  $J = 8.0$  Hz, 1H), 7.08-7.03 (m, 1H), 4.22 (t,  $J = 9.6$  Hz, 2H), 3.88 (t,  $J = 9.6$  Hz, 2H), 2.50 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.2, 164.5, 161.3, 149.6, 148.6, 140.6, 140.0, 134.5, 132.7, 131.7, 129.9, 129.8, 129.5, 129.2, 128.8, 125.1, 124.3, 122.79, 122.73, 120.2, 118.7, 113.5, 66.2, 54.5, 21.4; FT-IR (KBr) 3009, 1681, 1526, 1348, 1305, 1261, 1060, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{26}\text{H}_{21}\text{N}_4\text{O}_5$ : 469.1506, found: 469.1507.

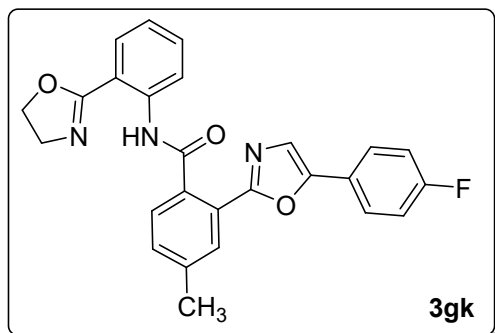




**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methyl-2-(5-(3-(trifluoromethyl)phenyl)oxazol-2-yl)benzamide 3gi.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f$ = 0.48; colorless solid; mp 157-158 °C; yield 72% (71 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.53 (s, 1H), 8.95 (d,  $J$  = 8.4 Hz, 1H), 7.97 (s, 1H), 7.75-7.70 (m, 2H), 7.66 (d,  $J$  = 8.0 Hz, 1H), 7.55-7.49 (m, 2H), 7.45-7.43 (m, 2H), 7.40-7.37 (m, 1H), 7.31-7.27 (m, 1H), 7.08-7.04 (m, 1H), 4.21 (t,  $J$  = 10.0 Hz, 2H), 3.87 (t,  $J$  = 9.2 Hz, 2H), 2.49 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.3, 164.6, 161.0, 150.6, 140.6, 140.1, 134.6, 132.7, 131.9 ( $J_{\text{C-F}}$  = 32.6 Hz), 131.4, 129.8, 129.4, 129.2, 128.8, 128.5, 127.9 ( $J_{\text{C-F}}$  = 270.6 Hz), 127.2, 124.9 ( $J_{\text{C-F}}$  = 3.8 Hz), 124.6, 124.4, 122.7, 120.9 ( $J_{\text{C-F}}$  = 3.9 Hz), 120.1, 113.5, 66.2, 54.6, 21.4;  $^{19}\text{F}$  NMR (377 MHz,  $\text{CDCl}_3$ )  $\delta$  -62.9; FT-IR (KBr) 2984, 1682, 1609, 1532, 1447, 1304, 1262, 1124, 1060, 751  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{27}\text{H}_{21}\text{F}_3\text{N}_3\text{O}_3$ : 492.1530, found: 492.1533.

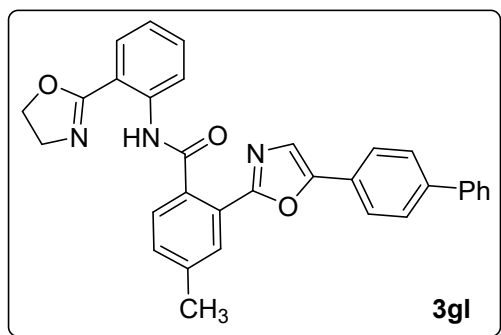


**2-(5-(4-Chlorophenyl)oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide 3gj.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f$ = 0.54; colorless solid; mp 191-192 °C; yield 78% (71 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.51 (s, 1H), 8.95 (d,  $J$  = 8.4 Hz, 1H), 7.96 (s, 1H), 7.76-7.73 (m, 1H), 7.64 (d,  $J$  = 7.6 Hz, 1H), 7.56-7.52 (m, 1H), 7.38-7.35 (m, 2H), 7.32-7.29 (m, 2H), 7.16-7.08 (m, 3H), 4.21 (t,  $J$  = 9.6 Hz, 2H), 3.86 (t,  $J$  = 9.6 Hz, 2H), 2.48 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.4, 164.5, 160.5, 151.0, 140.4, 140.1, 134.4, 134.1, 132.6, 131.3, 129.6, 129.3, 129.0, 128.7, 126.1, 125.3, 124.6, 123.5, 122.7, 120.2, 113.6, 66.2, 54.6, 21.4; FT-IR (KBr) 2992, 1682, 1635, 1533, 1447, 1305, 1261, 1057, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{26}\text{H}_{21}\text{ClN}_3\text{O}_3$ : 458.1266, found: 458.1257.



**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-2-(5-(4-fluorophenyl)oxazol-2-yl)-4-methylbenzamide**

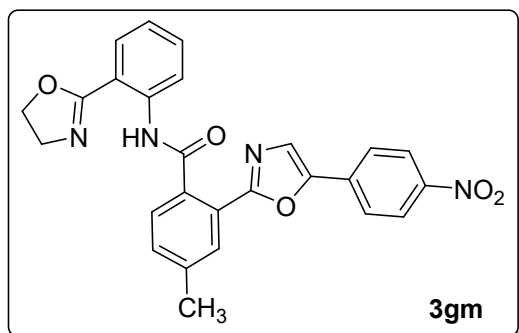
**3gk.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.52$ ; colorless solid; mp 116-117 °C; yield 73% (64 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.52 (s, 1H), 8.95 (d,  $J = 8.4$  Hz, 1H), 7.96-7.95 (m, 1H), 7.74-7.72 (m, 1H), 7.63 (d,  $J = 7.6$  Hz, 1H), 7.55-7.50 (m, 1H), 7.37-7.30 (m, 3H), 7.30 (s, 1H), 7.10-7.06 (m, 1H), 6.86 (t,  $J = 8.8$  Hz, 2H), 4.18 (t,  $J = 9.6$  Hz, 2H), 3.84 (t,  $J = 9.6$  Hz, 2H), 2.47 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.5, 164.4, 163.8 ( $J_{\text{C-F}} = 247.2$  Hz), 160.2, 151.1, 140.4, 140.1, 134.3, 132.6, 131.2, 129.5, 129.2, 128.7, 126.0, 125.9, 124.6, 123.9 ( $J_{\text{C-F}} = 3.4$  Hz), 122.7, 122.7, 122.7, 120.2, 115.9 ( $J_{\text{C-F}} = 21.9$  Hz), 113.6, 66.2, 54.5, 21.4;  $^{19}\text{F}$  NMR (377 MHz,  $\text{CDCl}_3$ )  $\delta$  -112.3; FT-IR (KBr) 2987, 1679, 1609, 1497, 1303, 1261, 1232, 1056, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{26}\text{H}_{21}\text{FN}_3\text{O}_3$ : 442.1561, found: 442.1564.



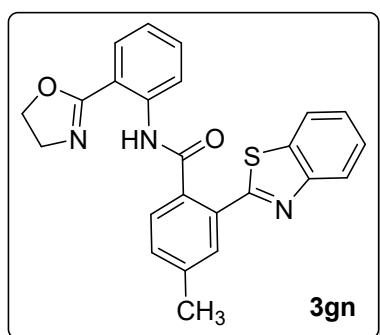
**2-(5-([1,1'-Biphenyl]-4-yl)oxazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide **3gl.****

Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.40$ ; thick liquid; yield 69% (69 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.55 (s, 1H), 9.00 (d,  $J = 8.0$  Hz, 1H), 7.99 (s, 1H), 7.75-7.72 (m, 1H), 7.66 (d,  $J = 7.6$  Hz, 1H), 7.57-7.53 (m, 3H), 7.47-7.40 (m, 7H), 7.38-7.34 (m, 2H), 7.10-7.06 (m, 1H), 4.18 (t,  $J = 9.6$  Hz, 2H), 3.85 (t,  $J = 9.6$  Hz, 2H), 2.49 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.5, 164.4, 160.2, 151.7, 140.9, 140.4, 140.3, 140.2, 134.3, 132.5, 131.1, 129.5, 129.2, 128.9, 128.7, 127.6, 127.4, 127.0, 126.5, 124.6, 124.5, 123.2, 122.6, 120.2, 113.6,

66.2, 54.5, 21.4; FT-IR (neat) 2926, 1679, 1583, 1531, 1446, 1303, 1261, 1056, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[M+H]^+$  calcd for  $\text{C}_{32}\text{H}_{26}\text{N}_3\text{O}_3$ : 500.1969, found: 500.1966.

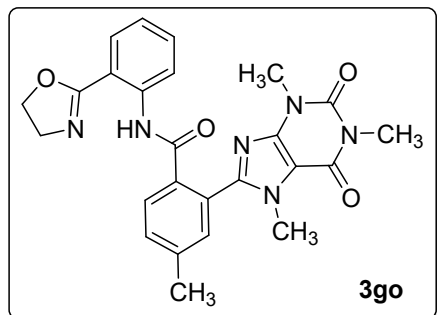


**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methyl-2-(5-(4-nitrophenyl)oxazol-2-yl)benzamide 3gm.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.42$ ; yellow solid; mp 196-197  $^{\circ}\text{C}$ ; yield 76% (71 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.58 (s, 1H), 8.95 (d,  $J = 8.4$  Hz, 1H), 8.03-7.98 (m, 3H), 7.75-7.73 (M, 1H), 7.66 (d,  $J = 8.0$  Hz, 1H), 7.58-7.54 (m, 2H), 7.51-7.49 (m, 2H), 7.42-7.40 (m, 1H), 7.13-7.09 (m, 1H), 4.22 (t,  $J = 9.6$  Hz, 2H), 3.87 (t,  $J = 9.6$  Hz, 2H), 2.49 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  168.3, 164.5, 162.0, 149.7, 147.0, 140.6, 140.0, 134.6, 133.3, 132.7, 131.8, 129.9, 129.3, 128.7, 126.4, 125.5, 124.7, 124.4, 124.3, 124.2, 123.0, 120.1, 113.6, 66.2, 54.5, 21.4; FT-IR (KBr) 2987, 1678, 1606, 1516, 1335, 1261, 1058, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[M+H]^+$  calcd for  $\text{C}_{26}\text{H}_{21}\text{N}_4\text{O}_5$ : 469.1506, found: 469.1509.

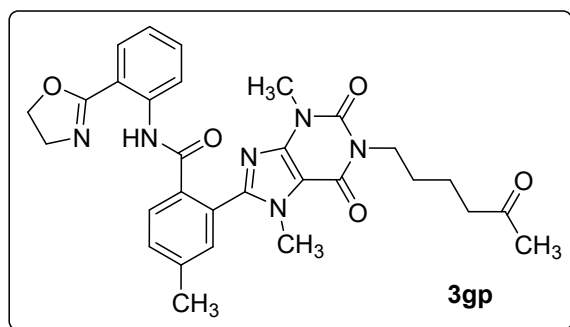


**2-(Benzo[d]thiazol-2-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide 3gn.** Analytical TLC on silica gel, 1:4 ethyl acetate/hexane  $R_f = 0.50$ ; thick liquid; yield 71% (59 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.51 (s, 1H), 8.83 (d,  $J = 8.8$  Hz, 1H), 7.95 (d,  $J = 8.0$  Hz, 1H), 7.84-7.68 (m, 4H), 7.50-7.32 (m, 4H), 7.08 (t,  $J = 7.6$  Hz, 1H), 4.12 (t,  $J = 9.6$  Hz, 2H), 3.87 (t,  $J = 9.2$  Hz, 2H), 2.49 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  167.9, 166.7, 164.3, 153.6, 140.7,

140.0, 136.2, 135.0, 132.5, 132.1, 131.3, 131.1, 129.0, 128.9, 126.1, 125.2, 123.5, 122.6, 121.5, 120.3, 113.7, 66.1, 54.6, 21.4; FT-IR (neat) 3006, 1680, 1636, 1534, 1447, 1305, 1275, 1261, 1057, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[M+H]^+$  calcd for  $\text{C}_{24}\text{H}_{20}\text{N}_3\text{O}_2\text{S}$ : 414.1271, found: 414.1274.

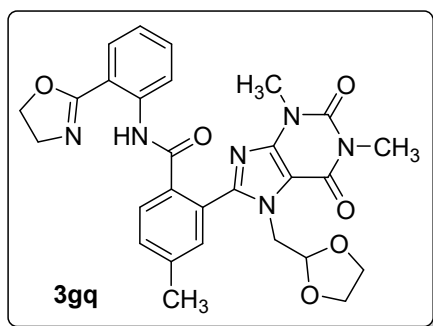


**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-4-methyl-2-(1,3,7-trimethyl-2,6-dioxo-2,3,6,7-tetrahydro-1H-purin-8-yl)benzamide 3go.** Analytical TLC on silica gel, 1:1 ethyl acetate/hexane  $R_f$  = 0.58; colorless solid; mp >200  $^{\circ}\text{C}$ ; yield 69% (65 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.92 (s, 1H), 8.66 (d,  $J$  = 8.8 Hz, 1H), 7.92-7.86 (m, 2H), 7.47-7.41 (m, 2H), 7.35-7.34 (m, 1H), 7.12-7.08 (m, 1H), 4.40 (t,  $J$  = 9.6 Hz, 2H), 4.13 (t,  $J$  = 9.6 Hz, 2H), 3.79 (s, 3H), 3.56 (s, 3H), 3.42 (s, 3H), 2.48 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  165.7, 165.0, 155.7, 152.3, 151.9, 148.2, 141.9, 139.8, 134.5, 132.8, 132.6, 131.3, 129.4, 128.9, 128.2, 122.9, 119.8, 113.6, 108.1, 66.4, 54.7, 33.0, 29.9, 28.0, 21.4; FT-IR (KBr) 3005, 1702, 1659, 1541, 1275, 1260, 1063, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[M+H]^+$  calcd for  $\text{C}_{25}\text{H}_{25}\text{N}_6\text{O}_4$ : 473.1932, found: 473.1948.

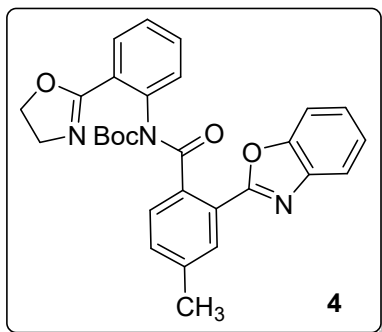


**N-(2-(4,5-Dihydrooxazol-2-yl)phenyl)-2-(3,7-dimethyl-2,6-dioxo-1-(5-oxohexyl)-2,3,6,7-tetrahydro-1H-purin-8-yl)-4-methylbenzamide 3gp.** Analytical TLC on silica gel, 1:1 ethyl acetate/hexane  $R_f$  = 0.54; colorless solid; mp 195-196  $^{\circ}\text{C}$ ; yield 67% (74 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.91 (s, 1H), 8.66 (d,  $J$  = 8.4 Hz, 1H), 7.92-7.86 (m, 2H), 7.46-7.41 (m, 2H), 7.33 (s, 1H), 7.09 (t,  $J$  = 8.0 Hz, 1H), 4.40 (t,  $J$  = 9.2 Hz, 2H), 4.13 (t,  $J$  = 9.2 Hz, 2H), 4.03-4.00 (m, 2H),

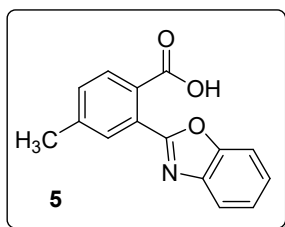
3.77 (s, 3H), 3.53 (s, 3H), 2.52-2.47 (m, 5H), 2.14 (s, 3H), 1.68-1.67 (m, 4H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  208.9, 165.7, 165.0, 155.5, 152.40, 151.6, 148.26, 141.9, 139.8, 134.4, 132.8, 132.6, 131.3, 129.4, 128.9, 128.1, 122.9, 119.9, 113.6, 108.1, 66.4, 54.7, 43.4, 40.9, 33.0, 30.0, 29.8, 27.6, 21.4, 21.2; FT-IR (KBr) 2955, 1700, 1656, 1541, 1308, 1062, 751  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{30}\text{H}_{33}\text{N}_6\text{O}_5$ : 557.2507, found: 557.2510.



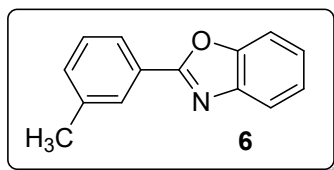
**2-(7-((1,3-Dioxolan-2-yl)methyl)-1,3-dimethyl-2,6-dioxo-2,3,6,7-tetrahydro-1H-purin-8-yl)-N-(2-(4,5-dihydrooxazol-2-yl)phenyl)-4-methylbenzamide 3gq.** Analytical TLC on silica gel, 1:1 ethyl acetate/hexane  $R_f = 0.42$ ; colorless solid; mp 189-190  $^\circ\text{C}$ ; yield 61% (66 mg);  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  12.85 (s, 1H), 8.63 (d,  $J = 8.4$  Hz, 1H), 7.90-7.85 (m, 2H), 7.45-7.40 (m, 3H), 7.10-7.06 (m, 1H), 5.33 (t,  $J = 4.8$  Hz, 1H), 4.40 (t,  $J = 9.6$  Hz, 2H), 4.30 (d,  $J = 5.2$  Hz, 2H), 4.13 (t,  $J = 9.6$  Hz, 2H), 3.80 (s, 4H), 3.54 (s, 3H), 3.42 (s, 3H), 2.47 (s, 3H);  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  165.6, 165.0, 155.5, 152.6, 151.9, 148.3, 141.4, 139.9, 134.5, 133.4, 132.7, 131.2, 129.3, 129.1, 128.0, 122.8, 120.0, 113.7, 107.8, 101.8, 66.4, 64.9, 54.8, 48.2, 29.9, 28.1, 21.4; FT-IR (KBr) 2953, 1702, 1659, 1541, 1308, 1060, 750  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{28}\text{H}_{29}\text{N}_6\text{O}_6$ : 545.2143, found: 545.2150.



**tert-Butyl (2-(benzo[d]oxazol-2-yl)-4-methylbenzoyl)(2-(4,5-dihydrooxazol-2-yl)phenyl)carbamate 4.** Analytical TLC on silica gel, 1:1 ethyl acetate/hexane  $R_f = 0.44$ ; colorless solid; mp  $>200$  °C; yield 71% (35 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.08-8.06 (m, 2H), 7.84-7.80 (m, 2H), 7.67-7.63 (m, 1H), 7.61-7.58 (m, 1H), 7.54 (d,  $J = 8.0$  Hz, 1H), 7.49-7.45 (m, 1H), 7.42-7.36 (m, 3H), 4.43-4.32 (m, 2H), 4.14-4.00 (m, 2H), 2.49 (s, 3H), 1.01 (s, 9H);  $^{13}\text{C NMR}$  (100 MHz,  $\text{CDCl}_3$ )  $\delta$  171.1, 162.5, 161.9, 151.4, 150.7, 142.2, 138.8, 138.1, 136.8, 131.86, 131.81, 130.6, 129.8, 128.9, 128.2, 127.0, 125.9, 125.3, 124.7, 123.1, 120.3, 110.6, 82.8, 67.0, 55.3, 27.4, 21.4; FT-IR (KBr) 2925, 1746, 1677, 1452, 1365, 1249, 1156, 1049, 1025, 748  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{29}\text{H}_{28}\text{N}_3\text{O}_5$ : 498.2023, found: 498.2035.



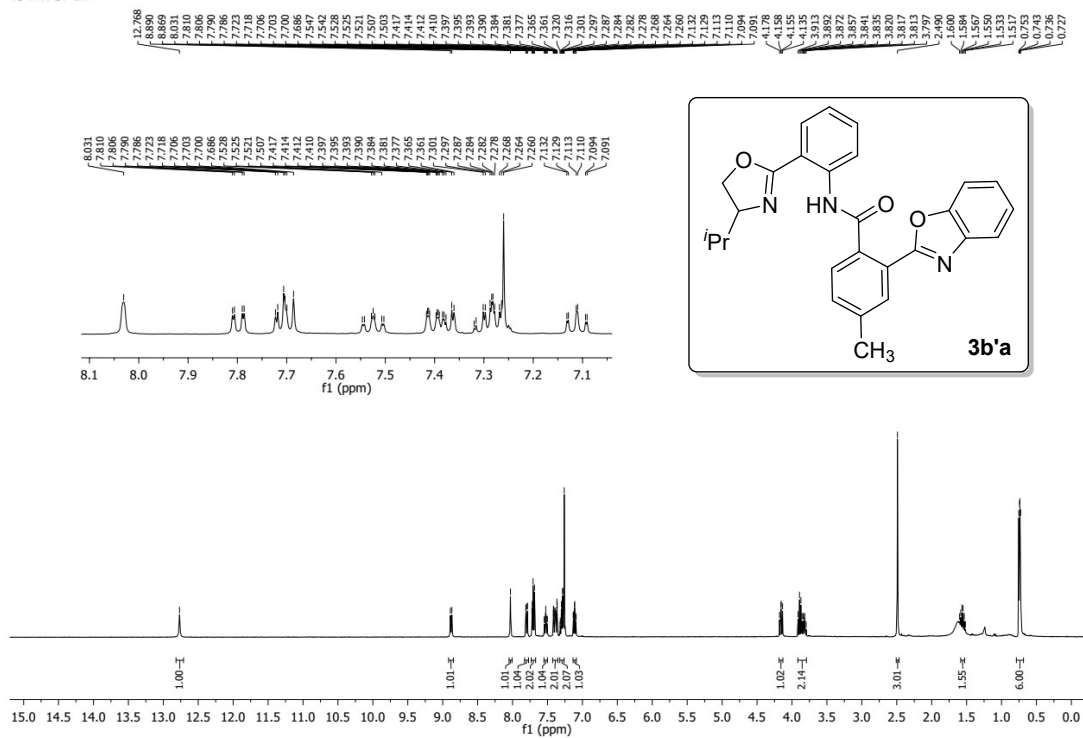
**2-(Benzo[d]oxazol-2-yl)-4-methylbenzoic acid 5.** Analytical TLC on silica gel, 1:1 ethyl acetate/hexane  $R_f = 0.52$ ; colorless solid; mp 155-156 °C; yield 63% (11 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.49 (d,  $J = 8.4$  Hz, 1H), 8.18 (s, 1H), 7.83-7.80 (m, 1H), 7.68-7.66 (m, 1H), 7.52-7.46 (m, 3H), 2.53 (s, 3H);  $^{13}\text{C NMR}$  (100 MHz,  $\text{CDCl}_3$ )  $\delta$  192.8, 162.6, 149.9, 143.3, 138.6, 135.7, 133.2, 131.0, 128.8, 126.9, 125.9, 123.9, 119.8, 111.2, 21.5; FT-IR (KBr) 2989, 1716, 1455, 1275, 1260, 749  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}-\text{H}]^-$  calcd for  $\text{C}_{15}\text{H}_{10}\text{NO}_3$ : 252.0666, found: 252.0663.



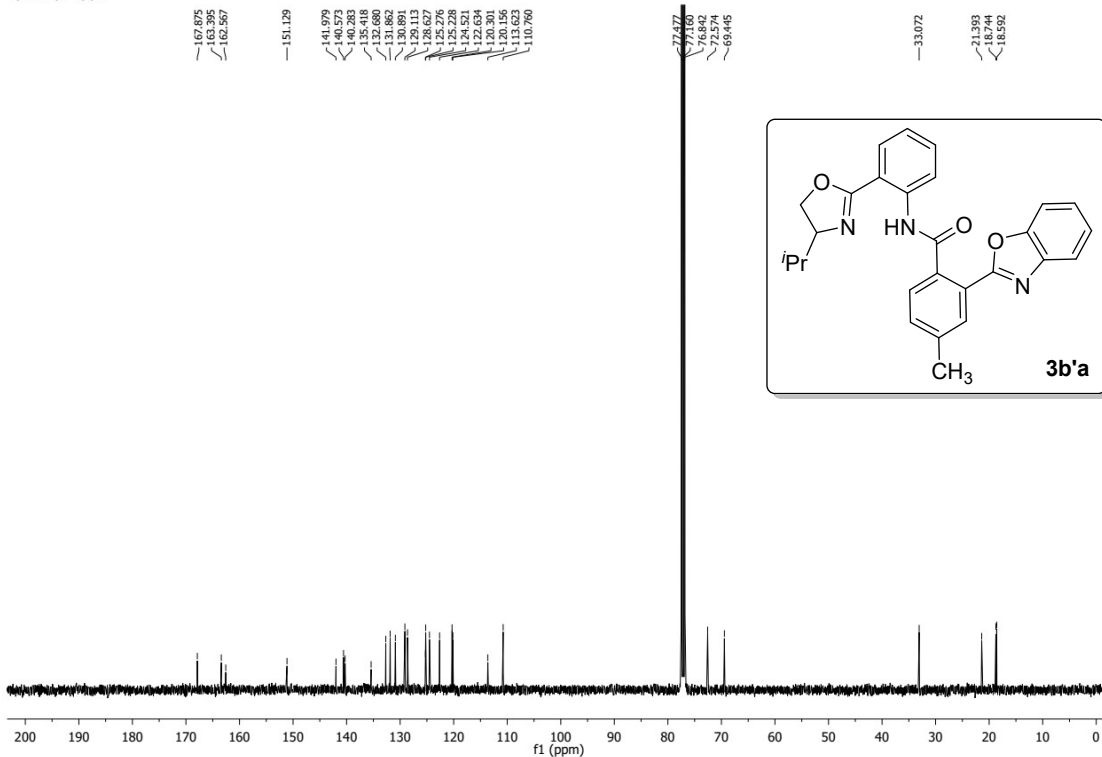
**2-(*m*-Tolyl)benzo[d]oxazole 6.** Analytical TLC on silica gel, 1:9 ethyl acetate/hexane  $R_f = 0.58$ ; brown solid; mp 72-73 °C; yield 57% (12 mg);  $^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.19-8.17 (m, 1H), 7.83-7.79 (m, 1H), 7.62-7.57 (m, 1H), 7.44-7.33 (m, 5H), 2.82 (s, 3H);  $^{13}\text{C NMR}$  (100 MHz,  $\text{CDCl}_3$ )  $\delta$  163.5, 150.4, 142.2, 138.9, 131.9, 131.0, 130.0, 126.3, 126.1, 125.1, 124.5, 120.2, 110.6, 22.3; FT-IR (KBr) 2923, 1615, 1549, 1452, 1241, 1029, 472  $\text{cm}^{-1}$ ; HRMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+$  calcd for  $\text{C}_{14}\text{H}_{12}\text{NO}$ : 210.0913, found: 210.0931.

# <sup>1</sup>H, <sup>13</sup>C and <sup>19</sup>F NMR Spectra

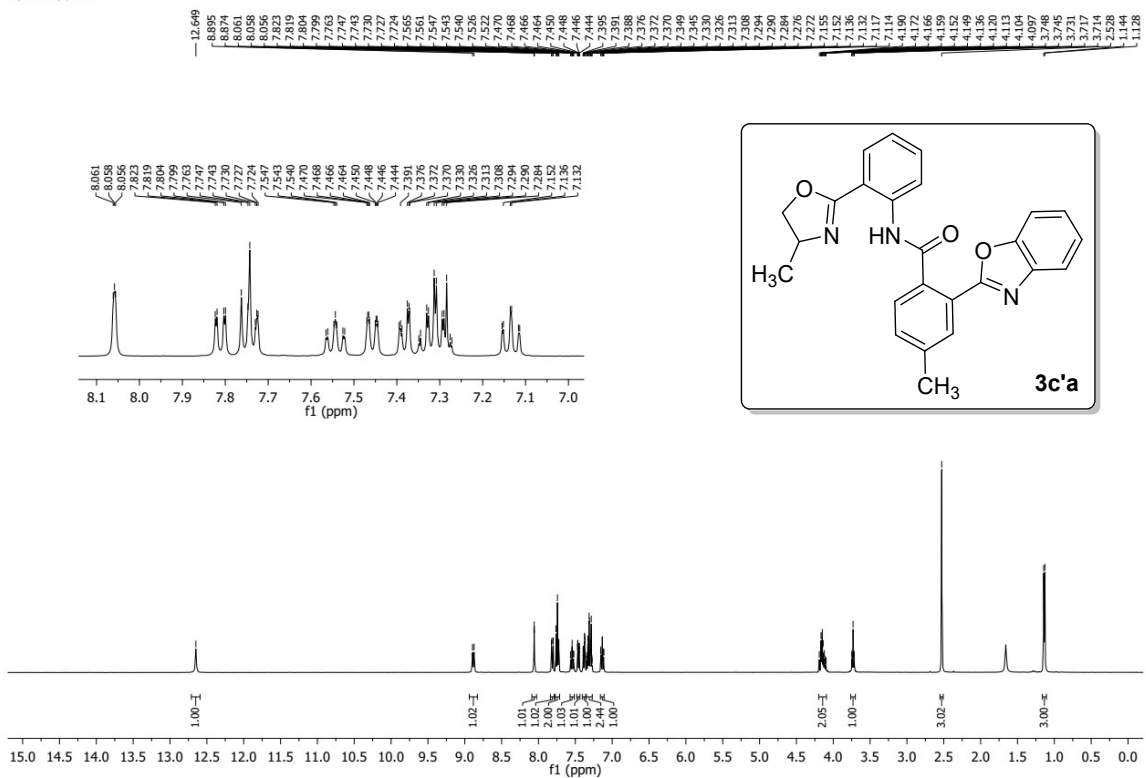
TS-PR4-37-1H



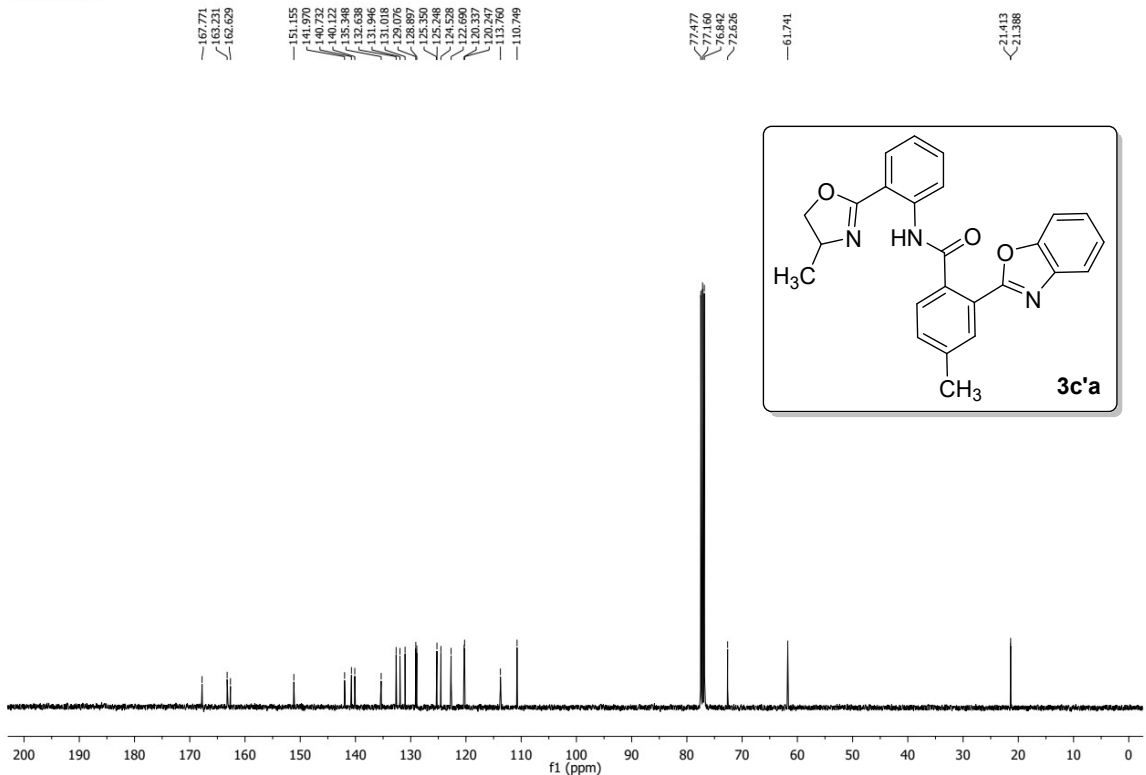
TS-PR4-37-13C-2



TS-PR4-36-1H

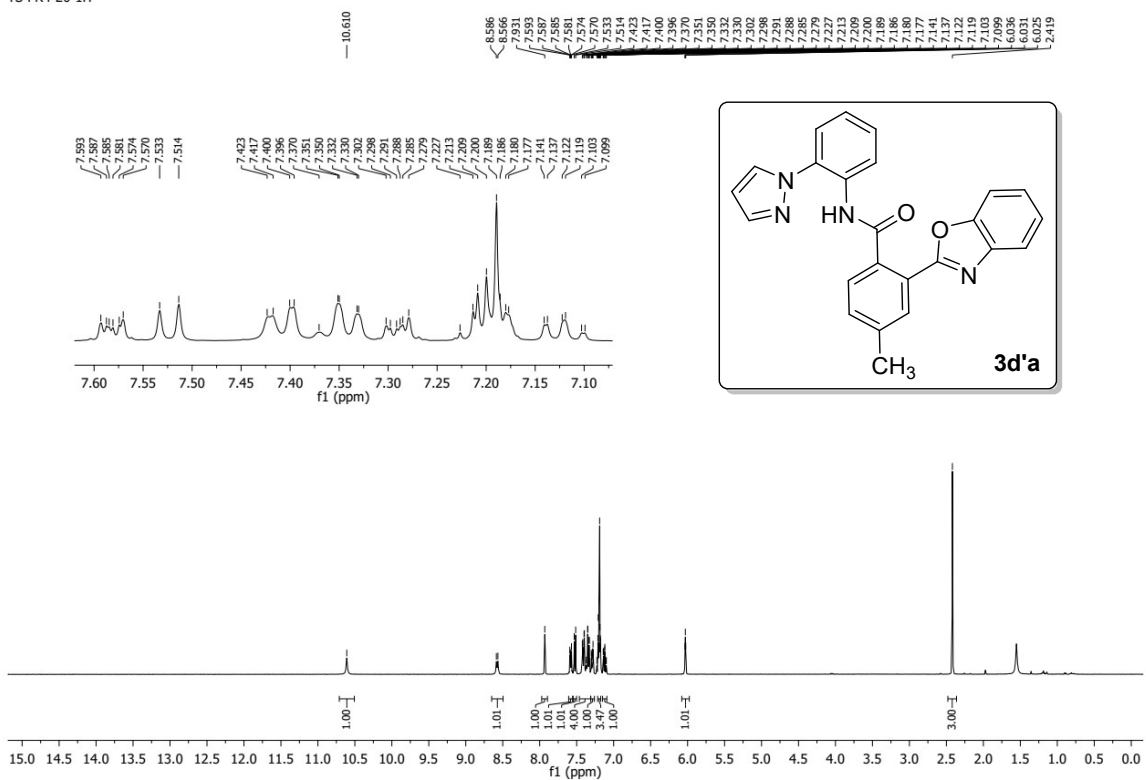


TS-PR4-36-13C

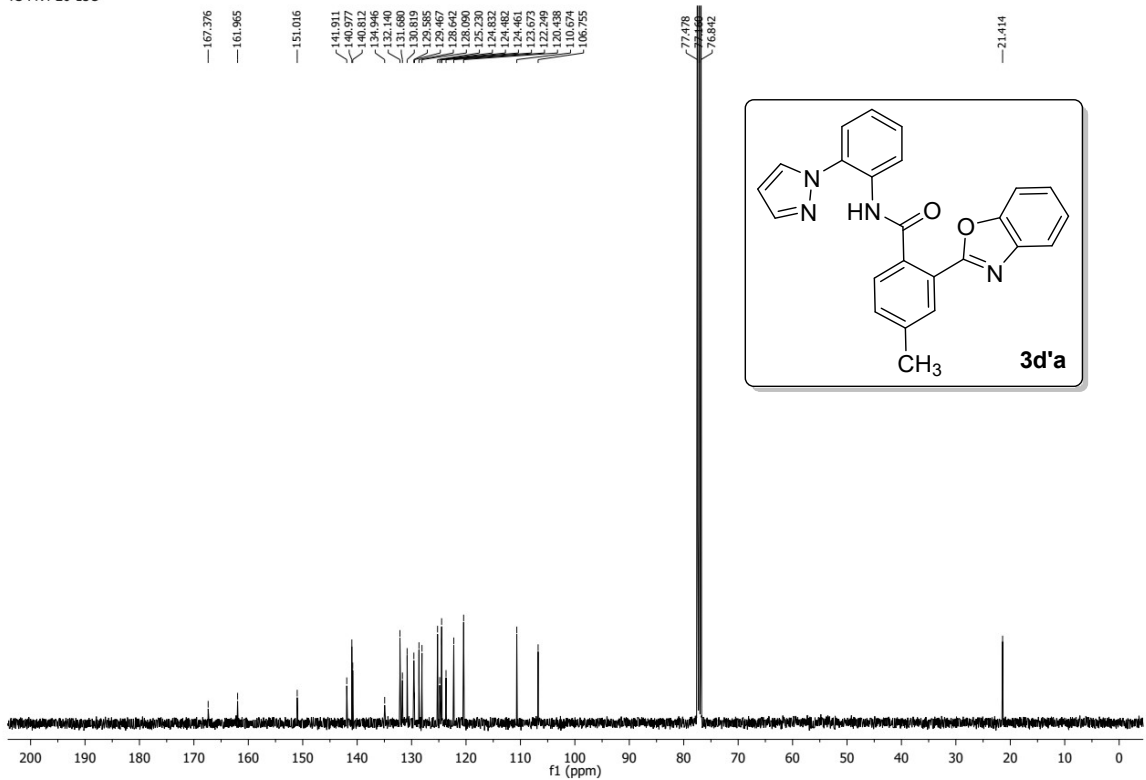




TS-PR4-20-1H



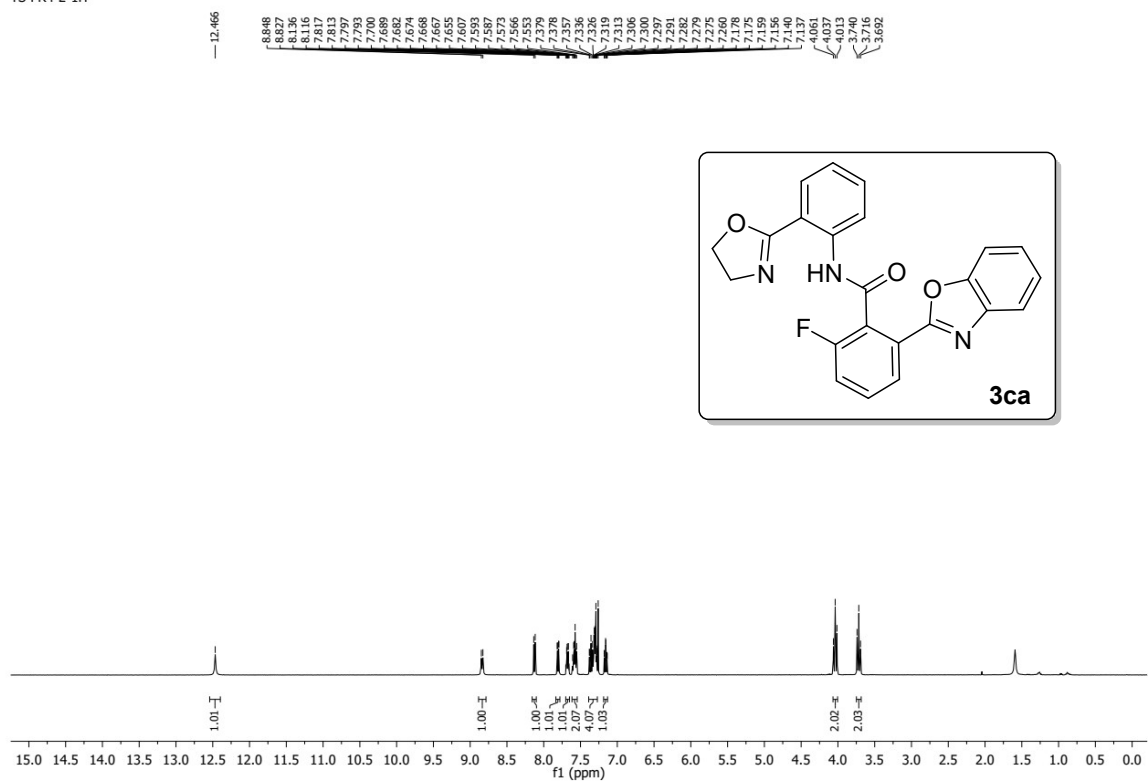
TS-PR4-20-13C



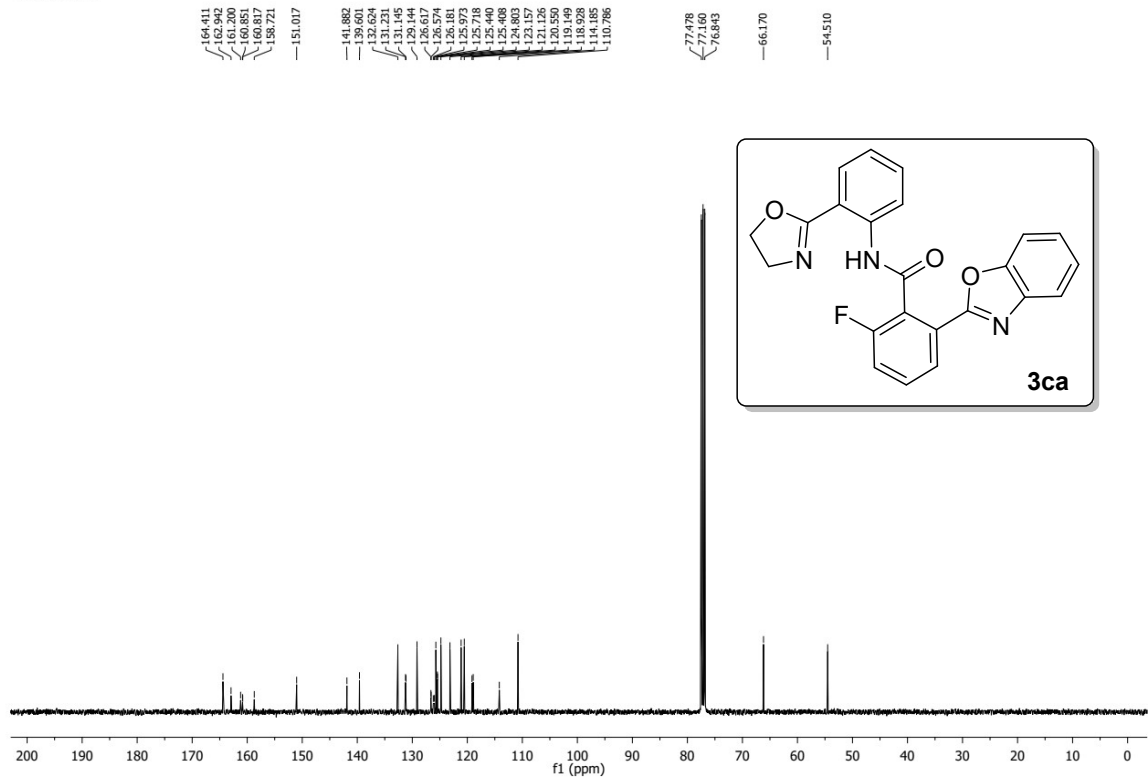




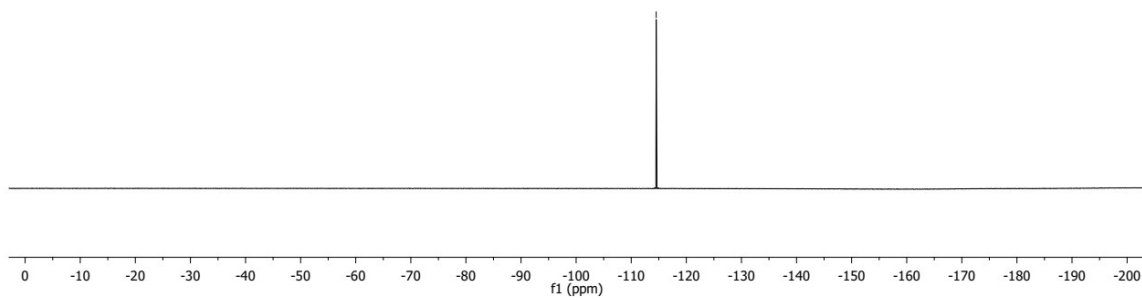
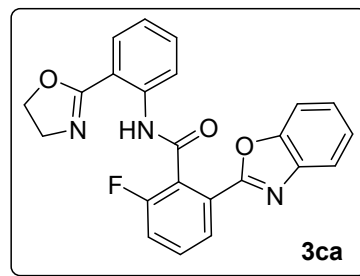
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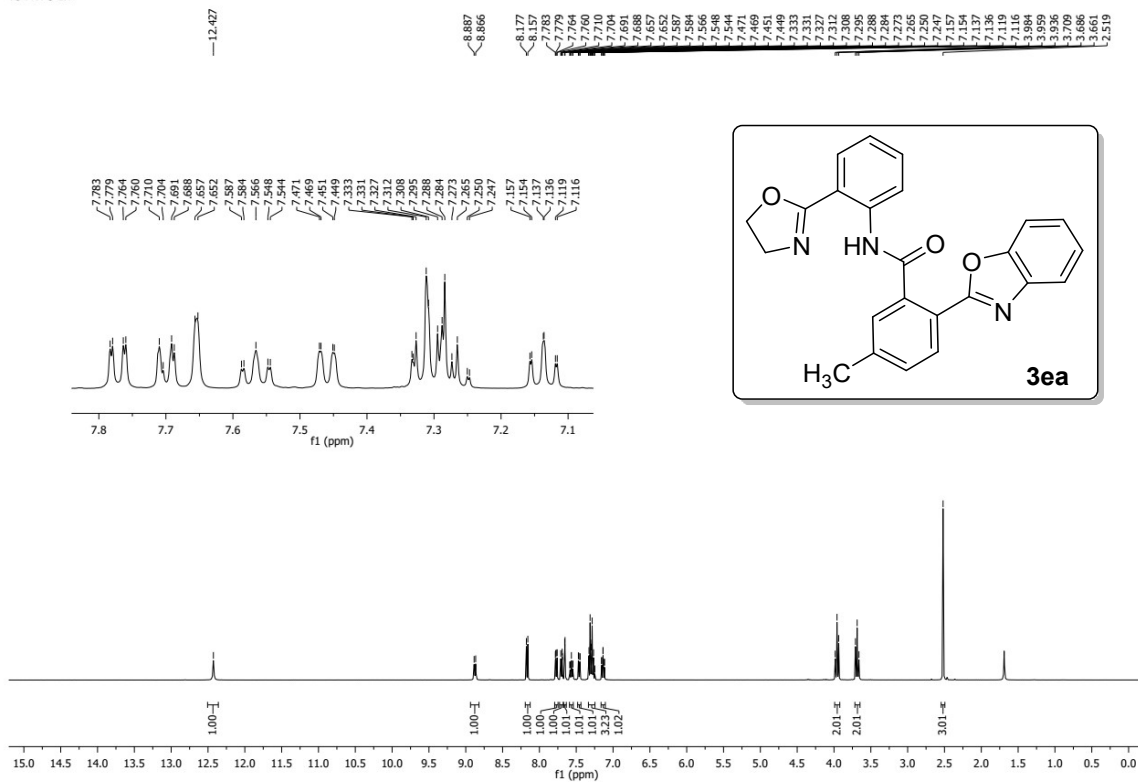
TS-PR4-2-13C



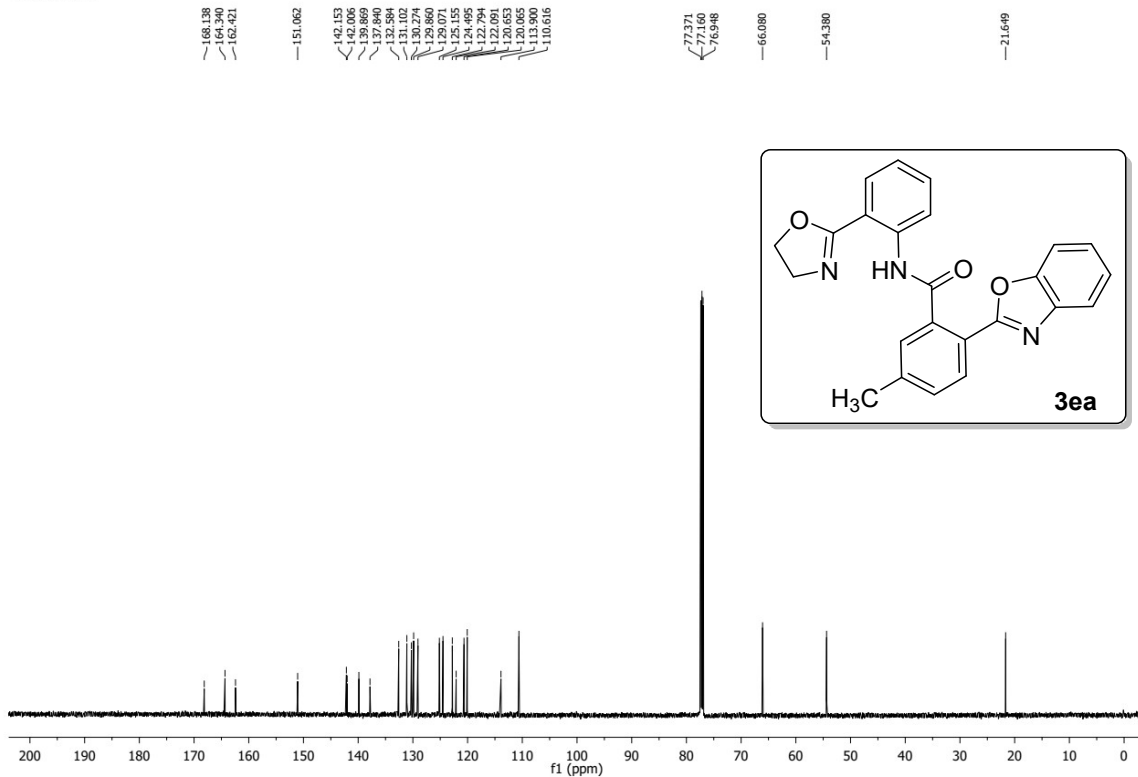
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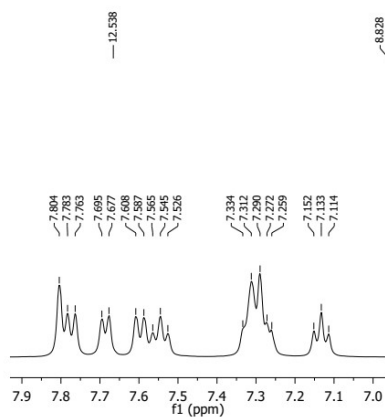
TS-PR4-3-1H



TS-PR4-3-13C

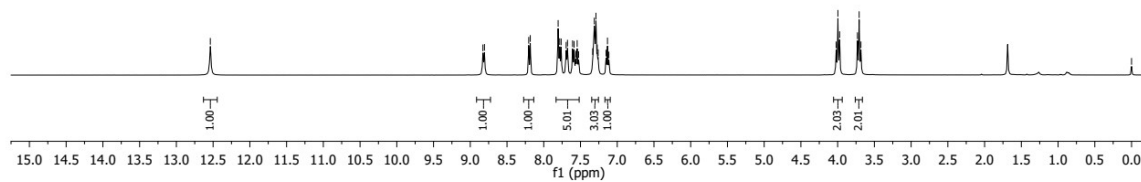
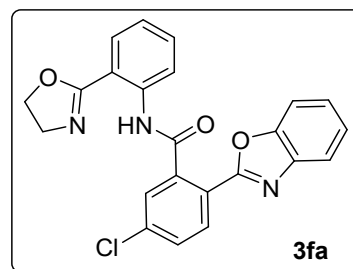


TS-PR4-4-1H



8.828  
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8.183  
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7.695  
7.677  
7.655  
7.587  
7.565  
7.545  
7.526  
7.334  
7.300  
7.272  
7.259  
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7.114  
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3.928  
3.683

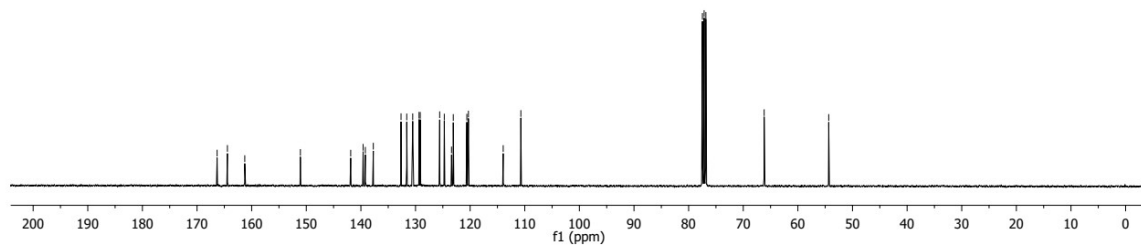
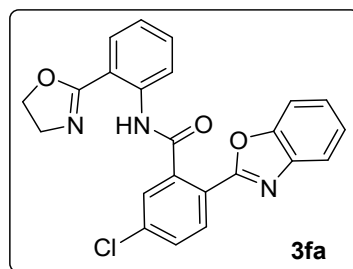
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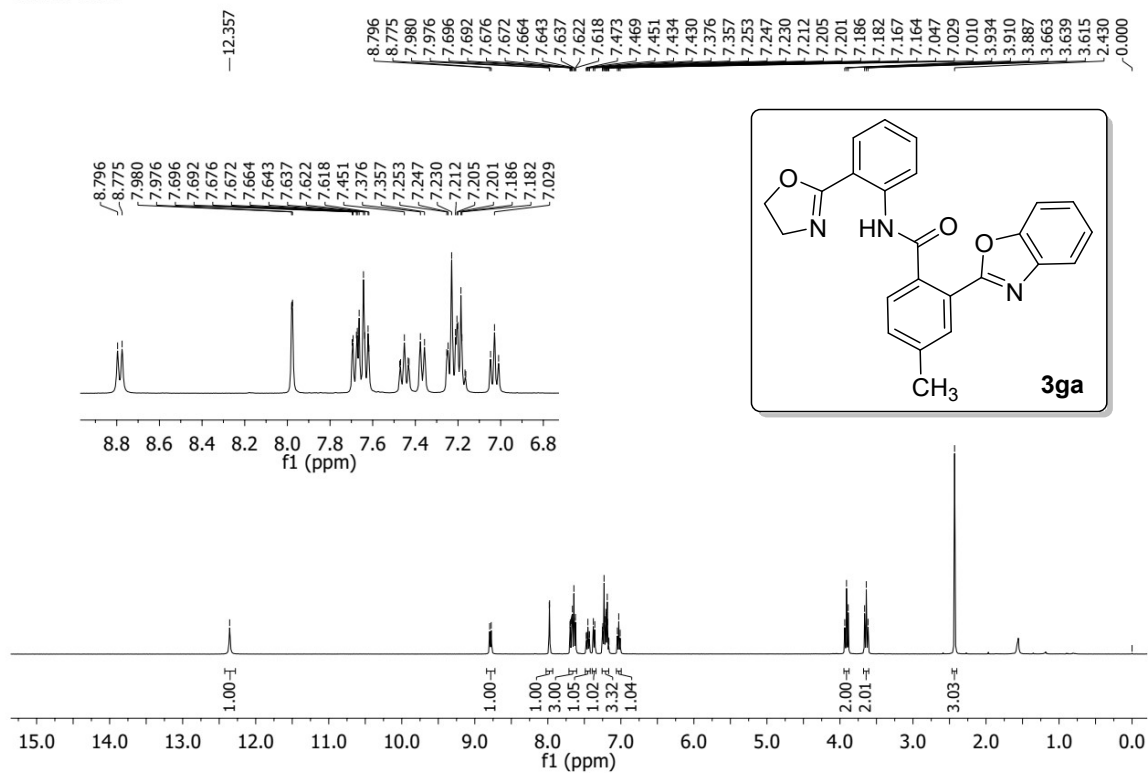
TS-PR4-4-13C

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117.675  
130.515  
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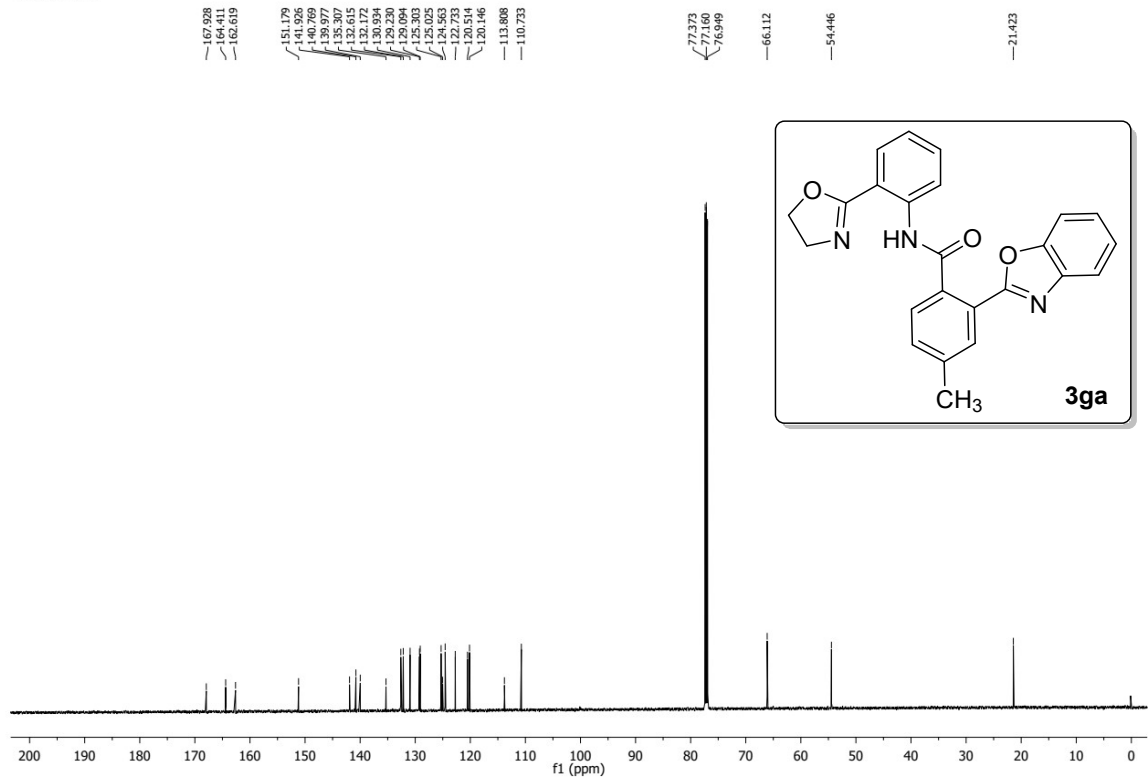
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54.352



TS-PR4-9-1H

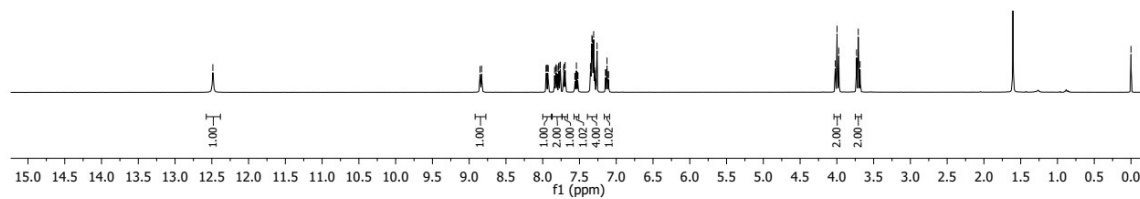
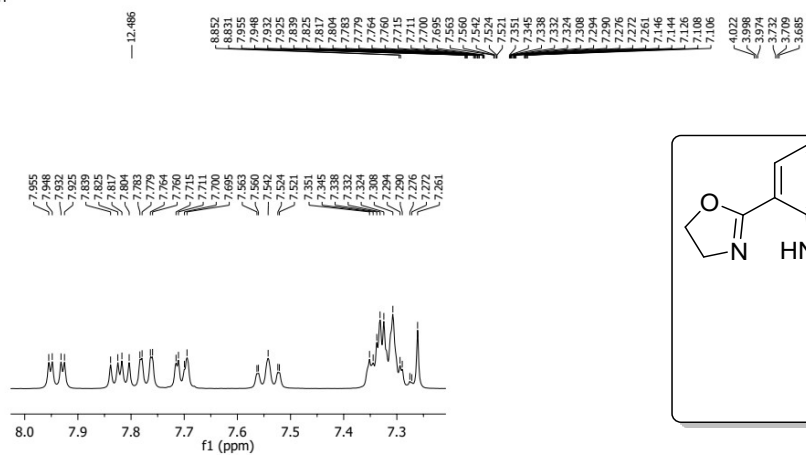


TS-PR4-9-13C

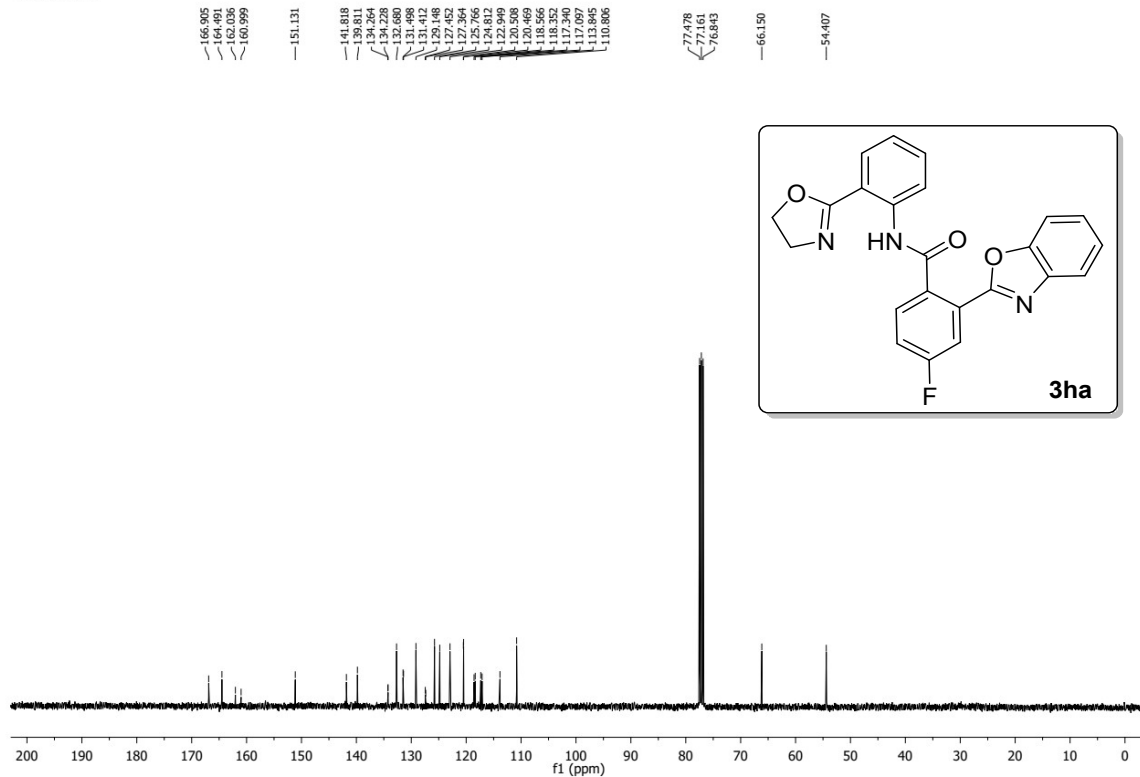




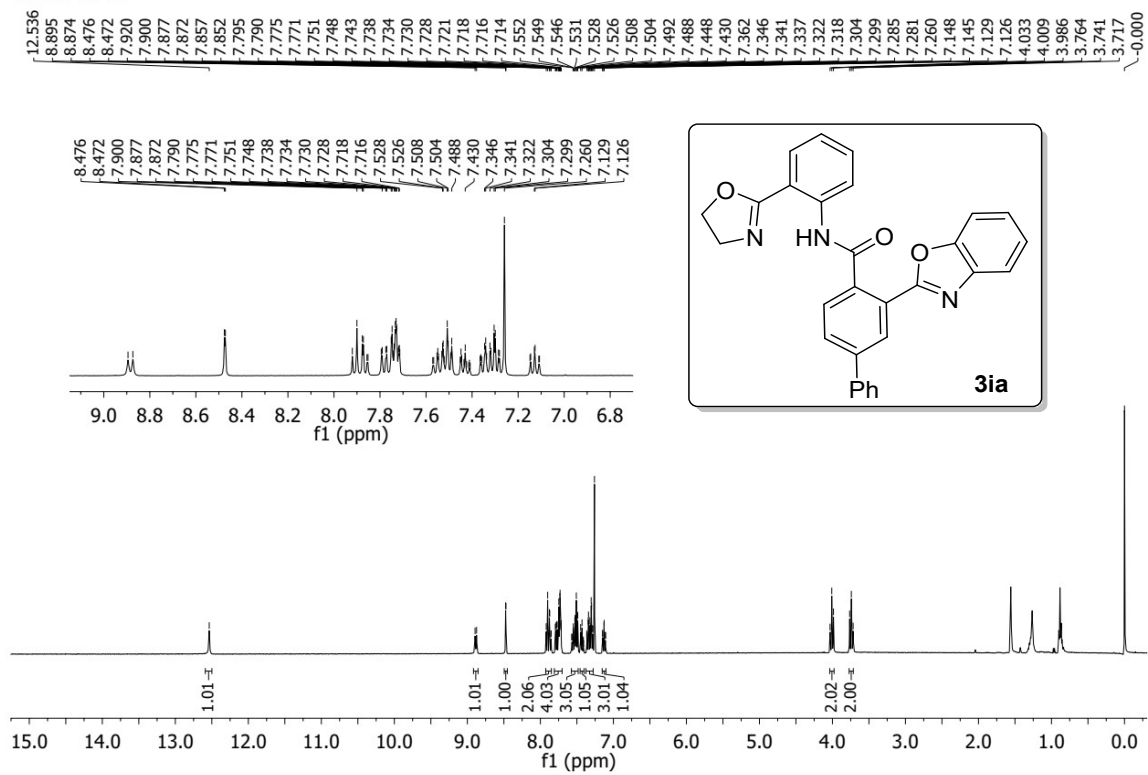
TS-PR4-6-1H



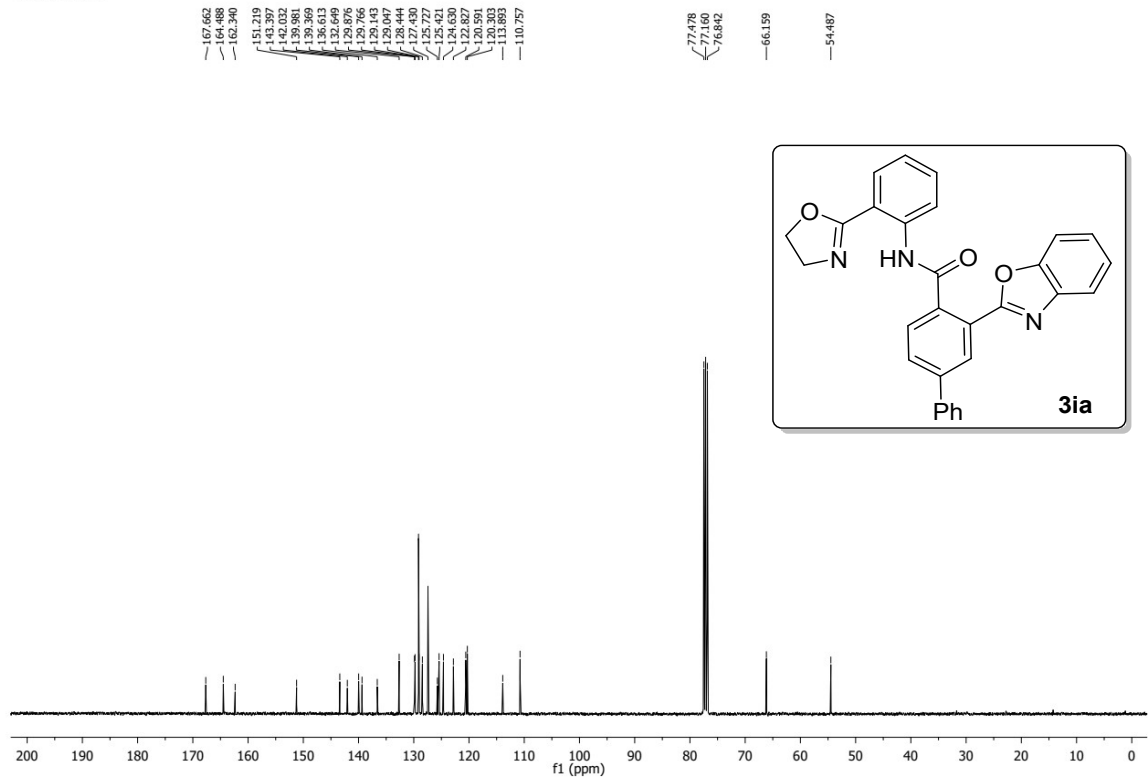
TS-PR4-6-13C



TS-PR4-10-1H



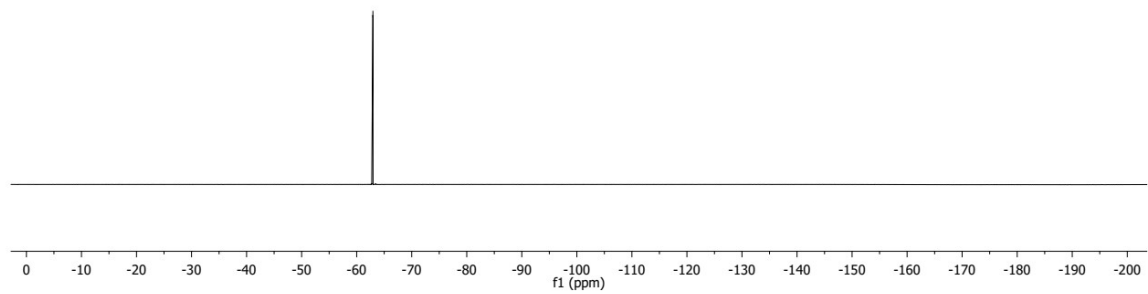
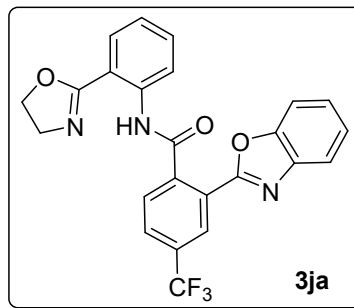
TS-PR4-10-13C



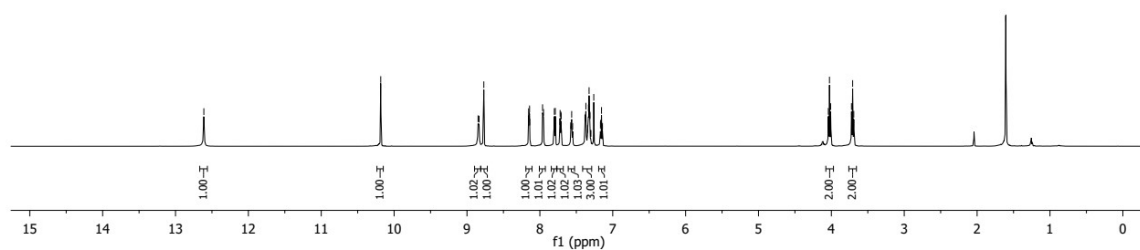
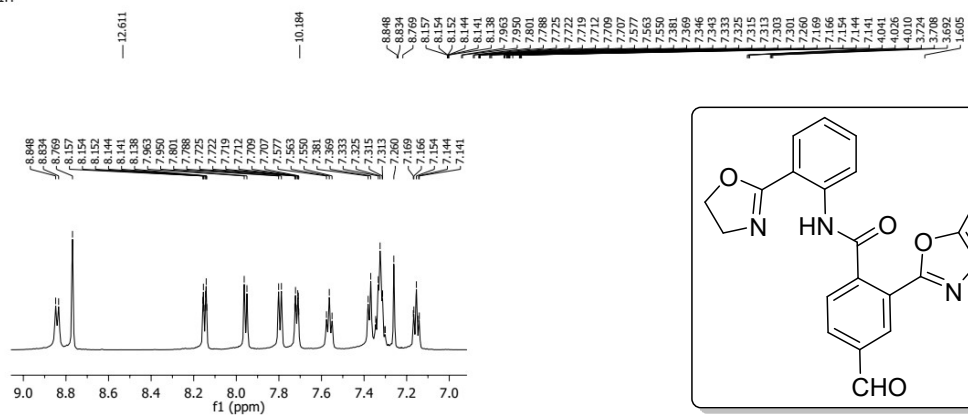


TS-PR4-8-19F

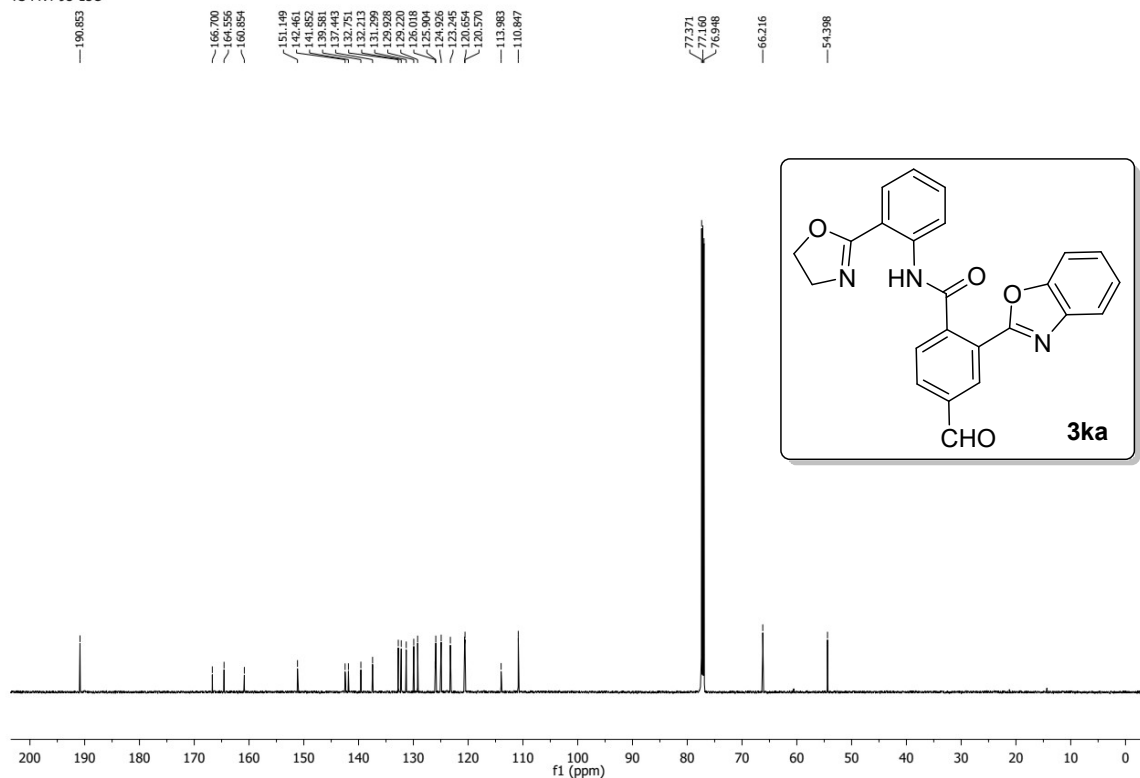
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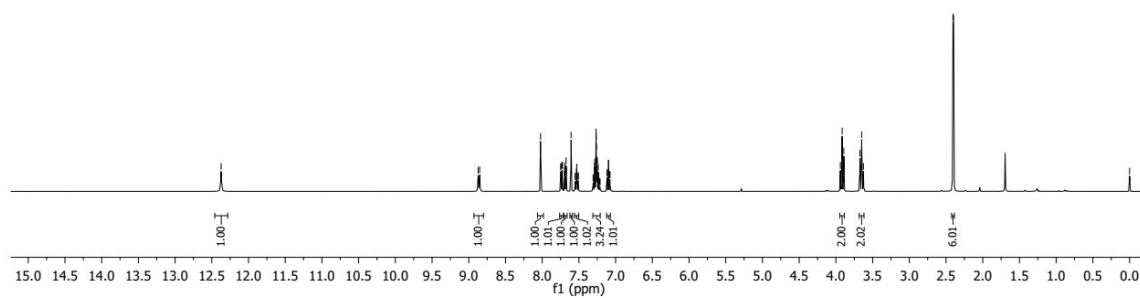
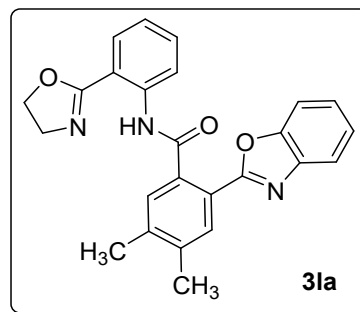
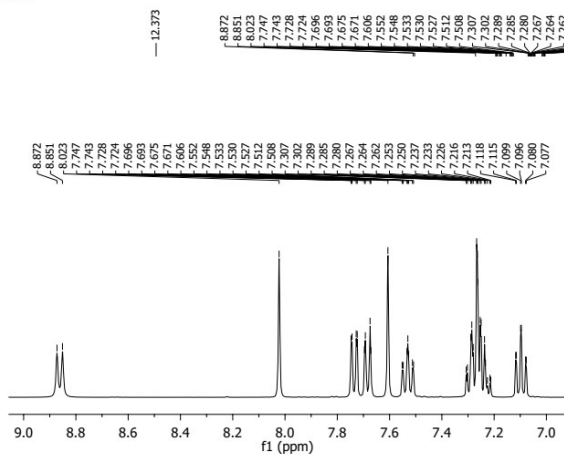
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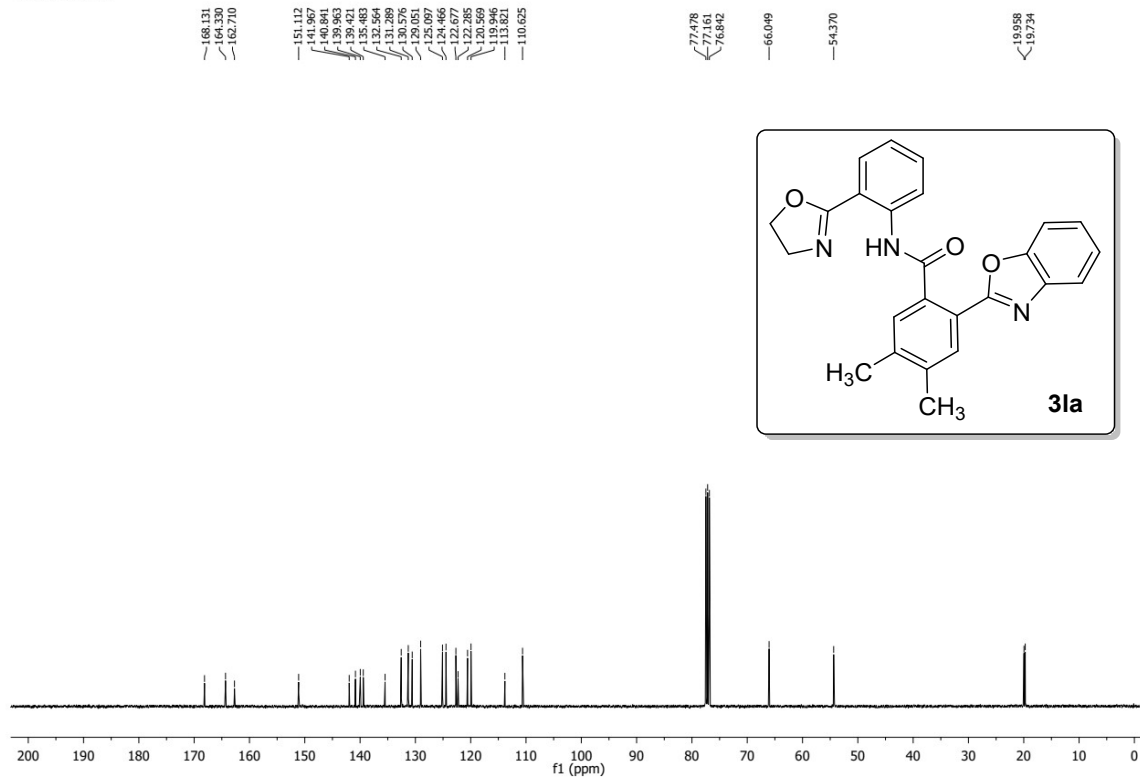
TS-PR4-95-13C



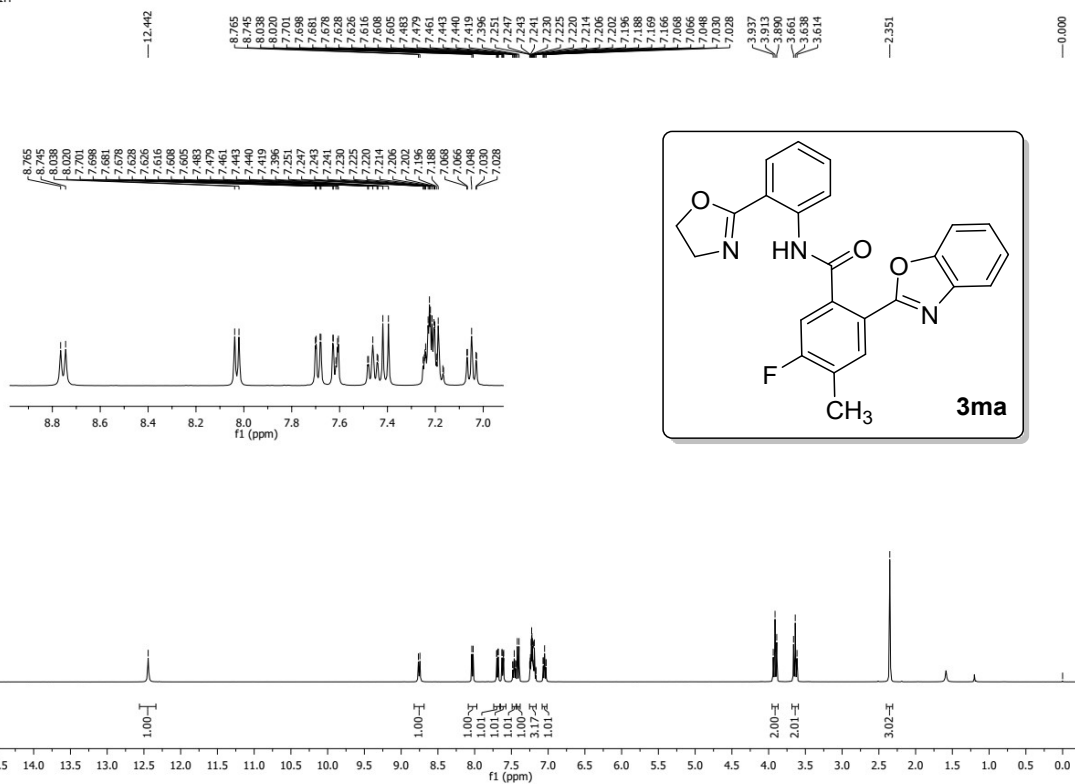
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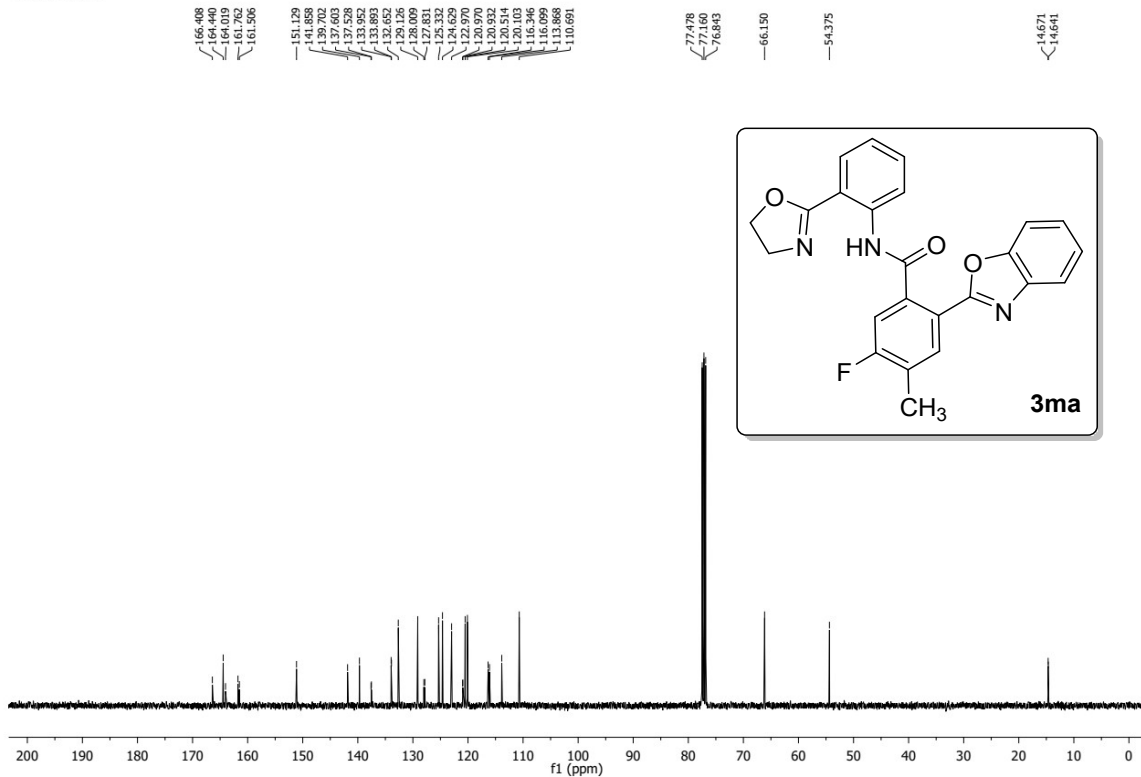
TS-PR4-12-13C-2



TS-PR4-14-1H

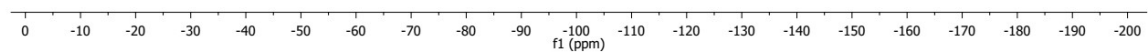
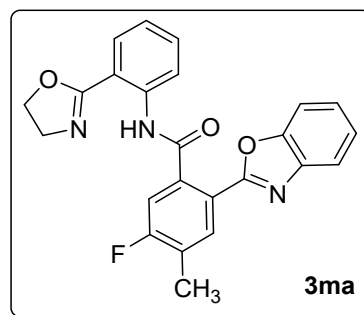


TS-PR4-14-13C



TS-PR4-14-19F

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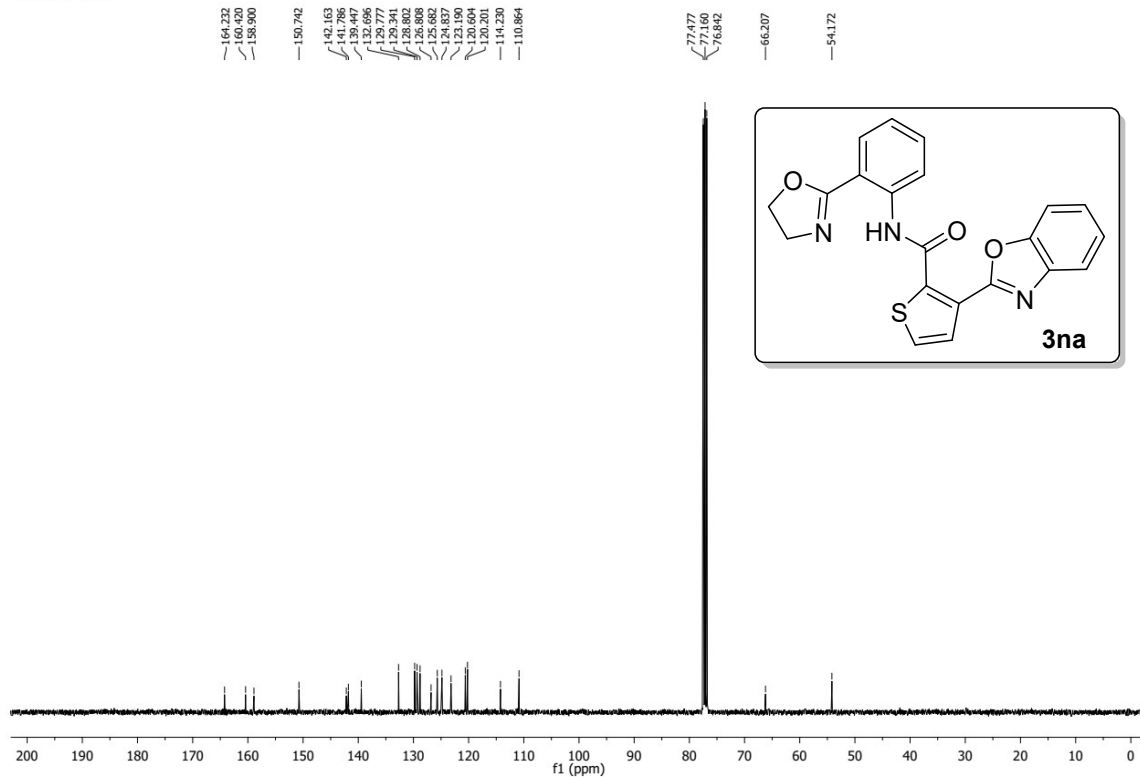




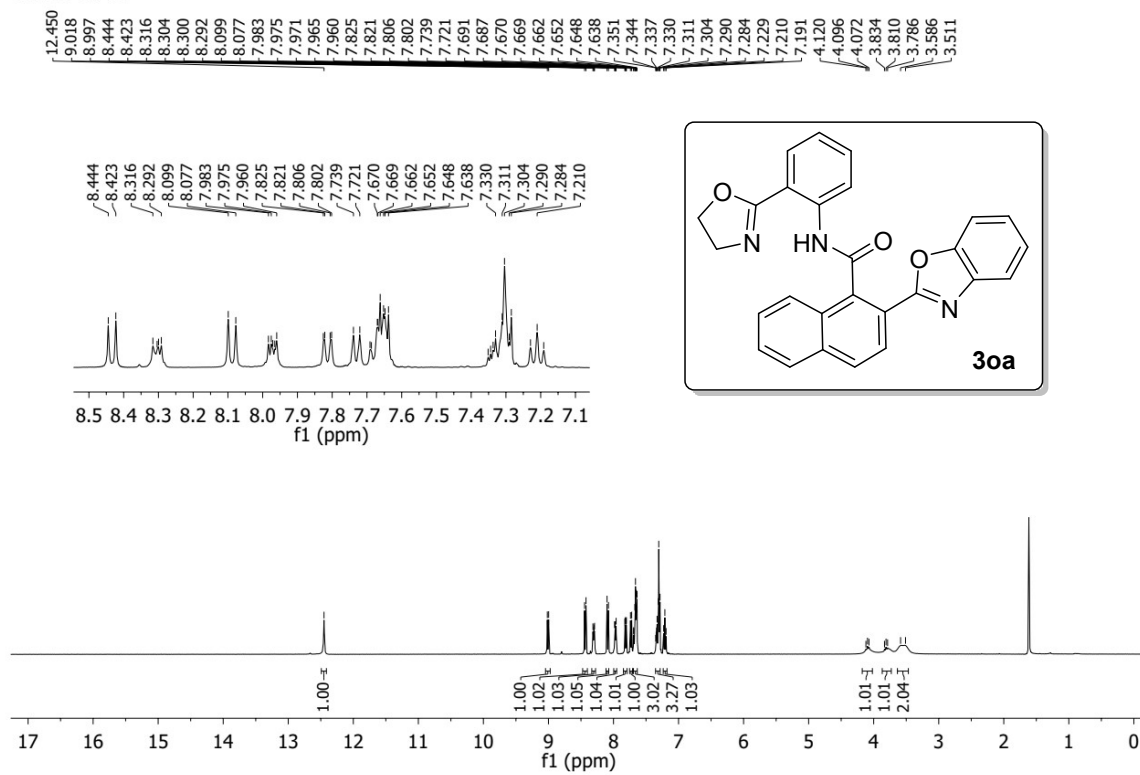
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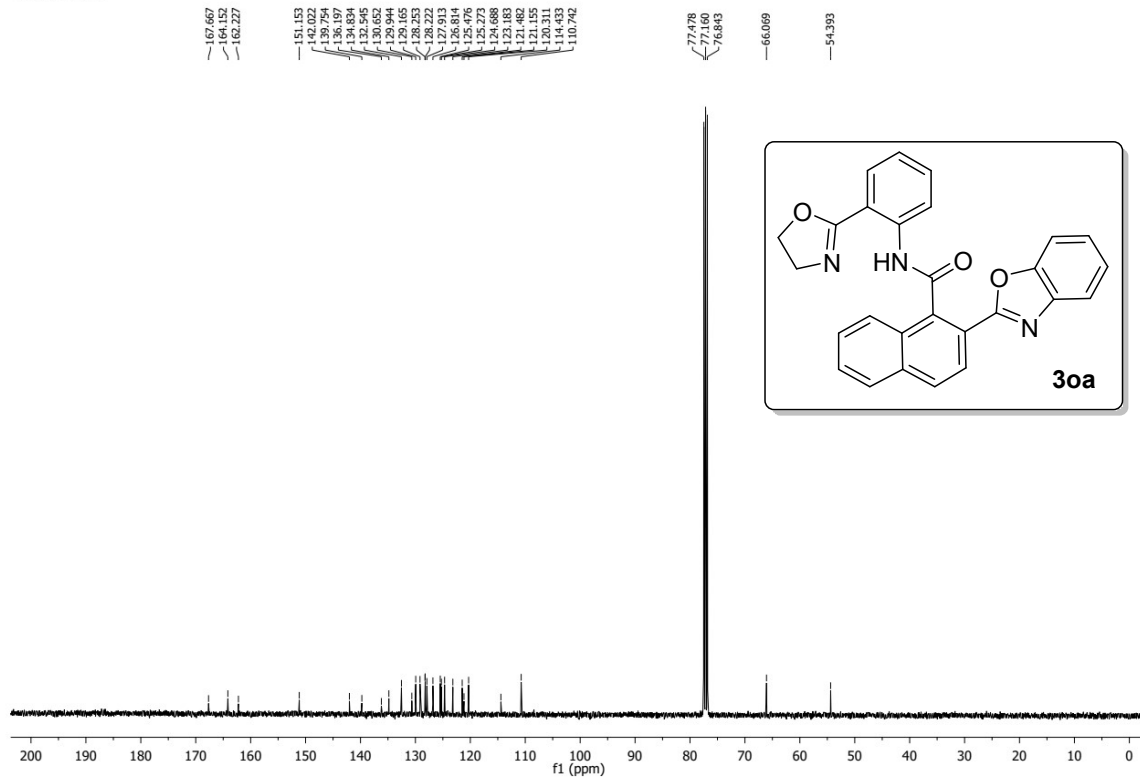
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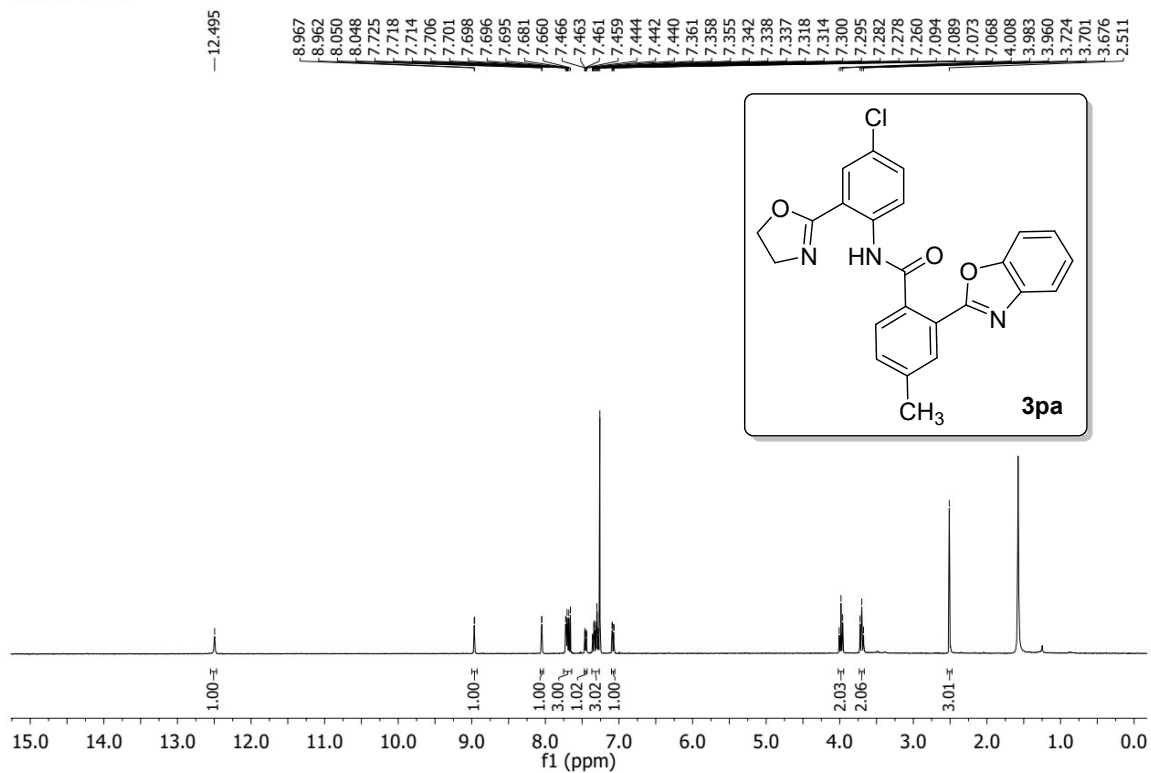
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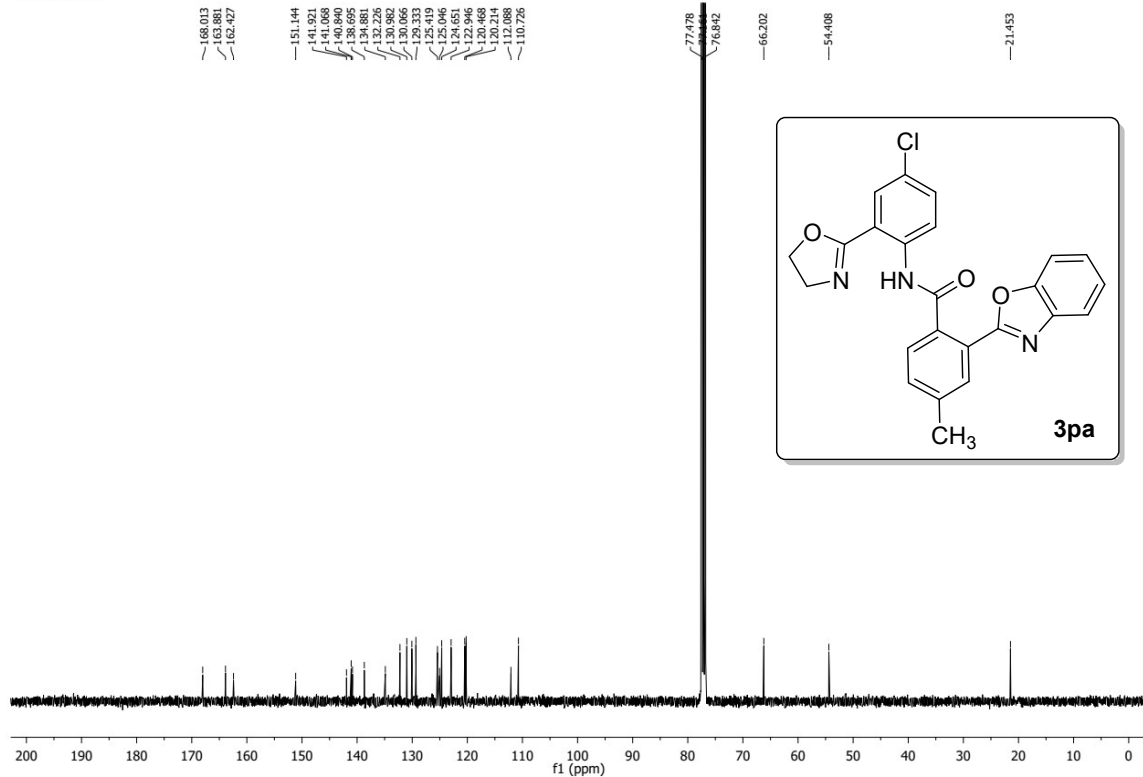
TS-PR4-15-13C



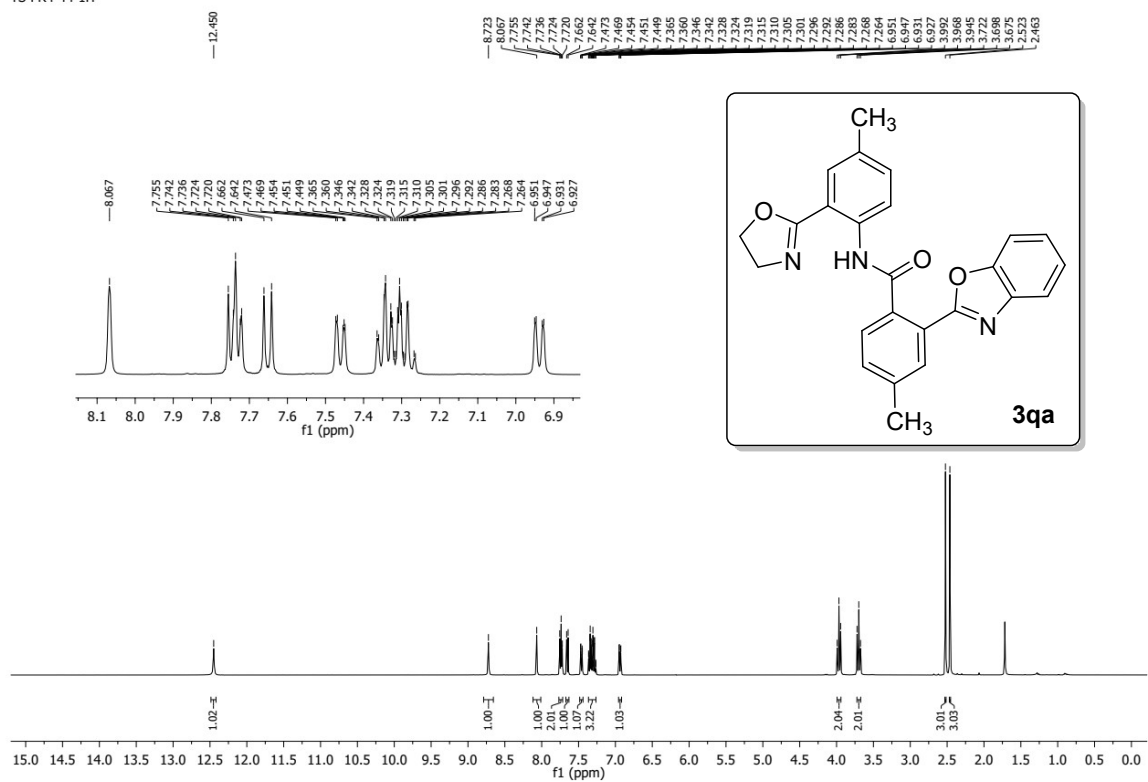
TS-PR4-21-1H



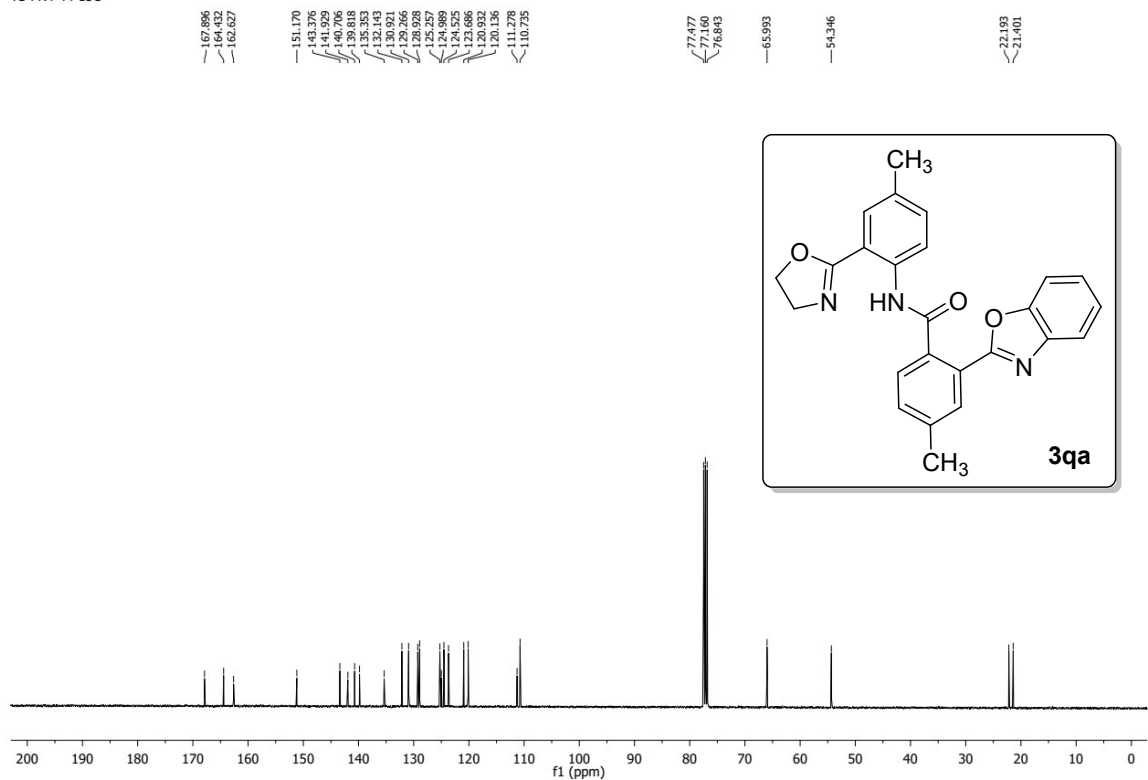
TS-PR4-21-13C



TS-PR4-44-1H



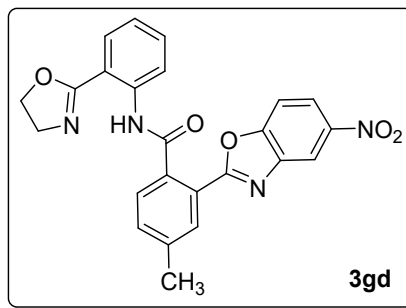
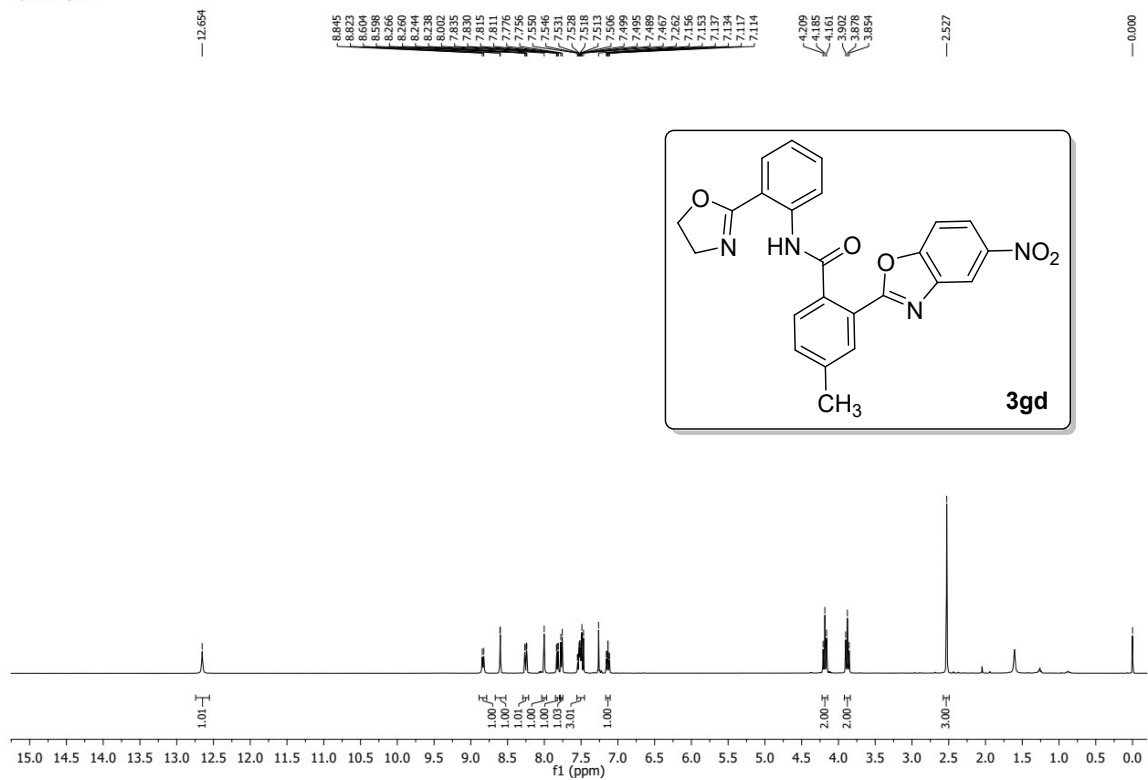
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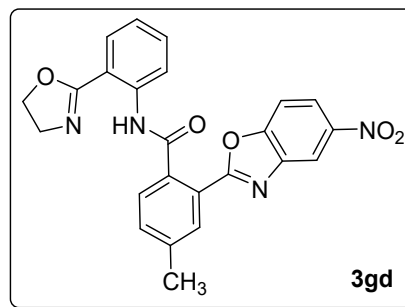
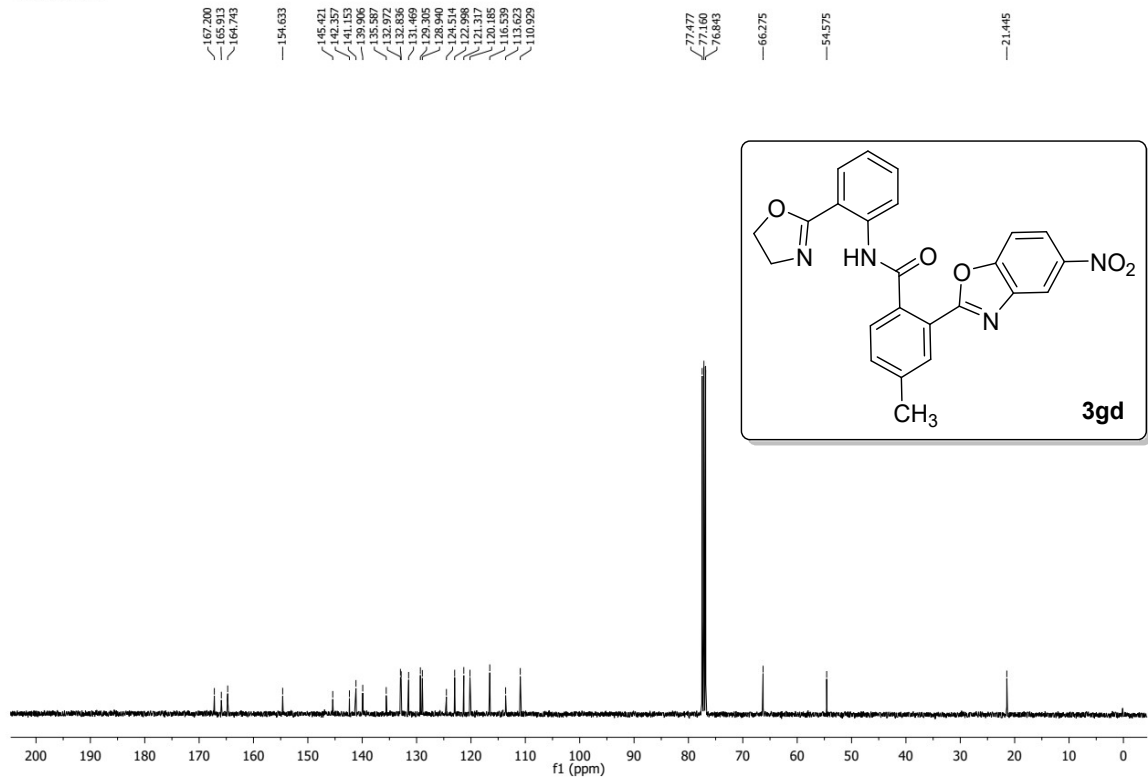




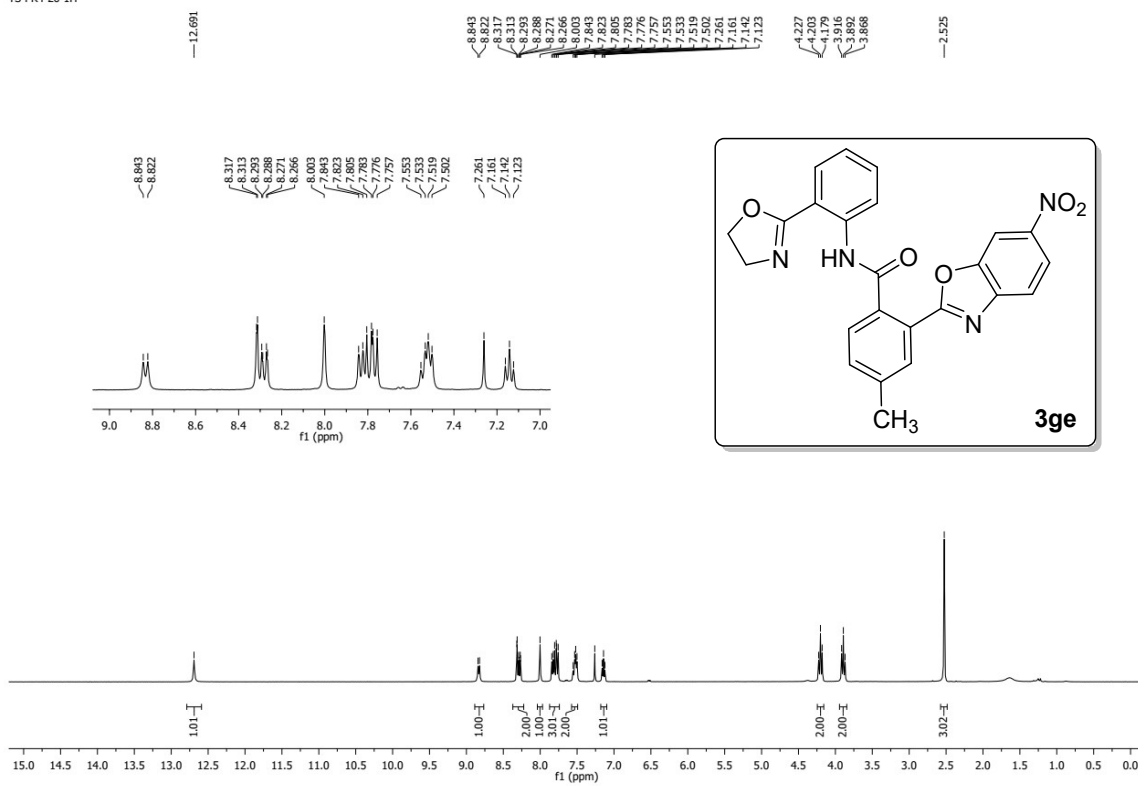
TS-PR4-23-1H



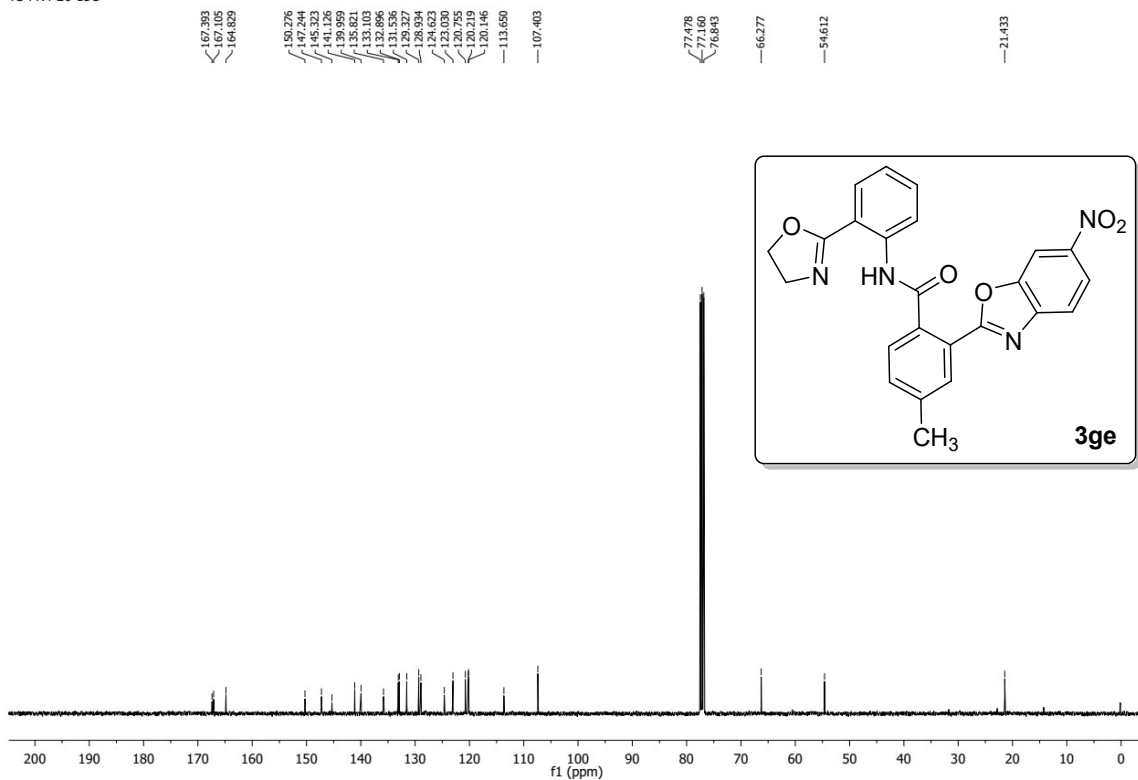
TS-PR4-23-13C



TS-PR4-26-1H

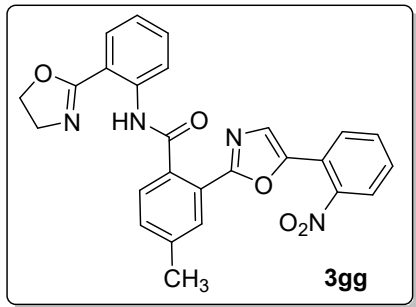
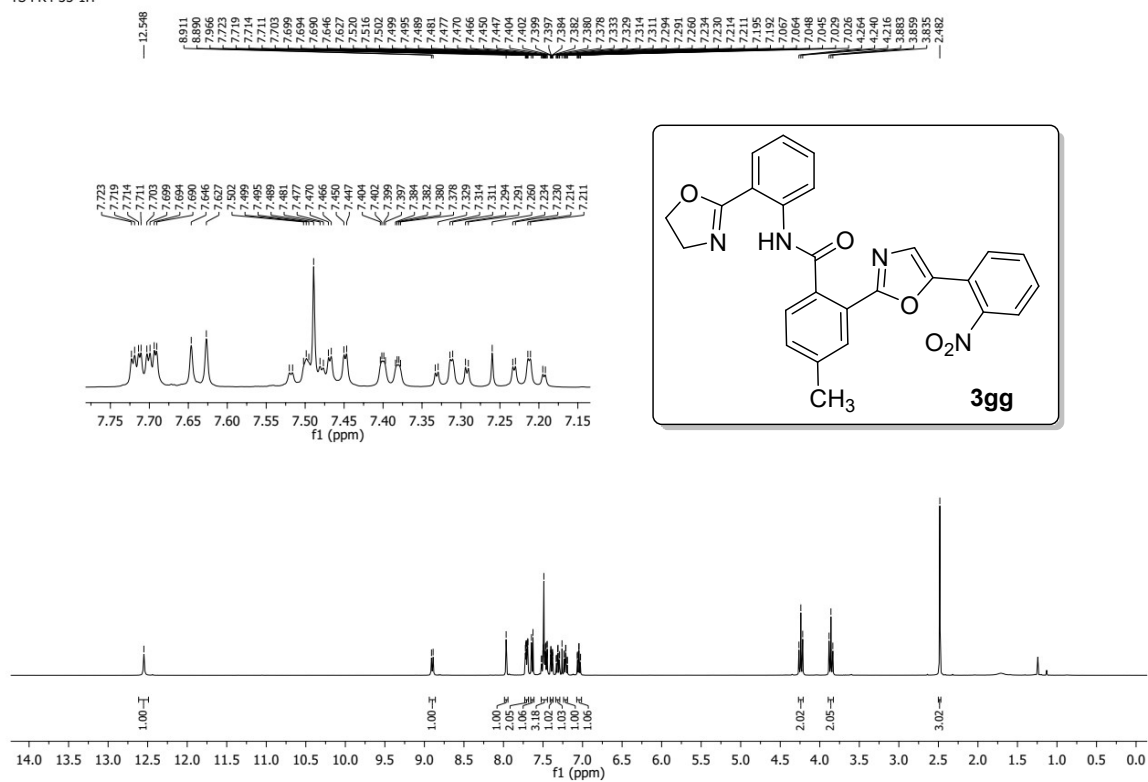


TS-PR4-26-13C

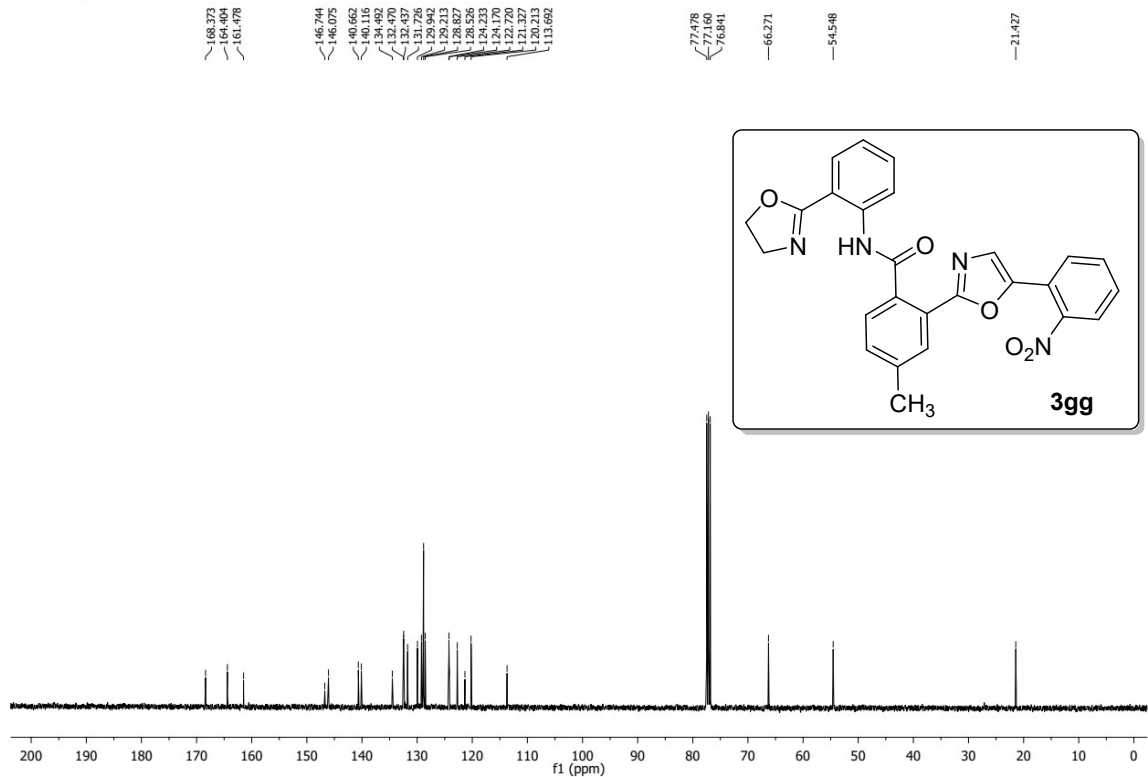




TS-PR4-33-1H

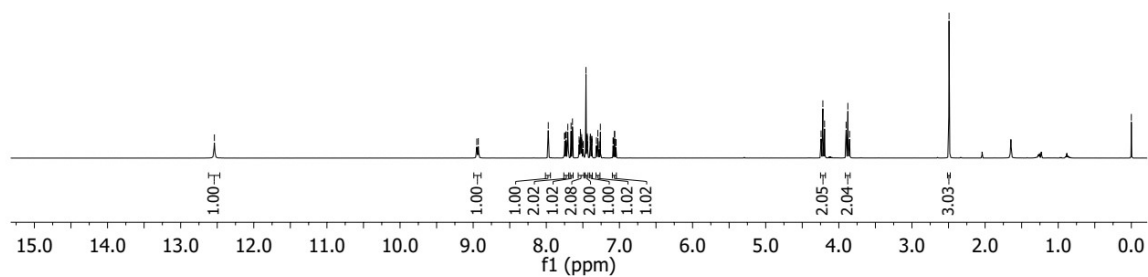
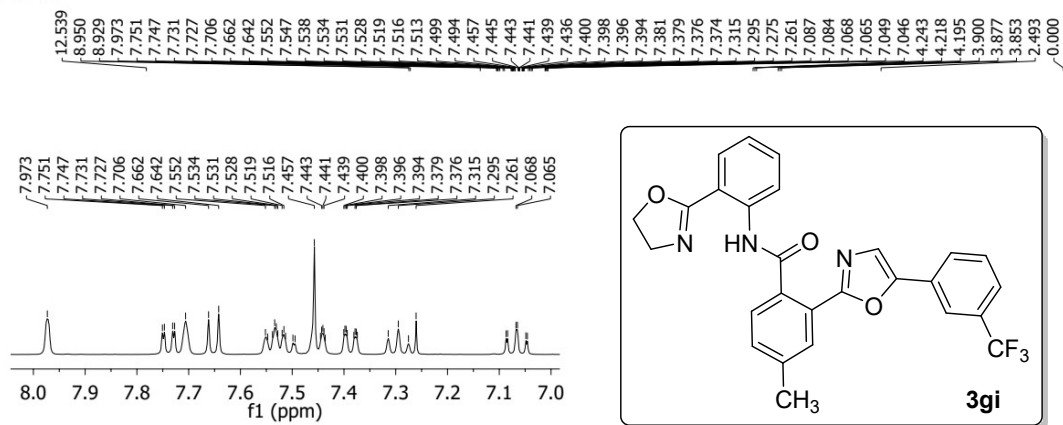


TS-PR4-33-13C

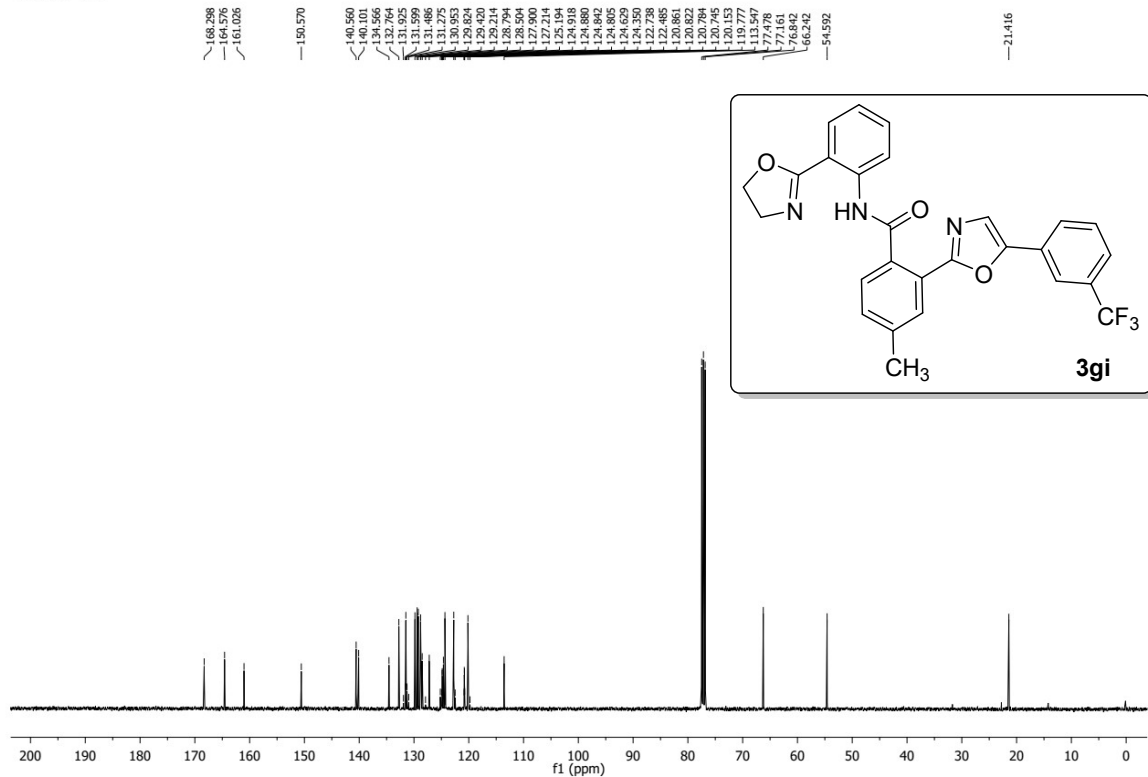




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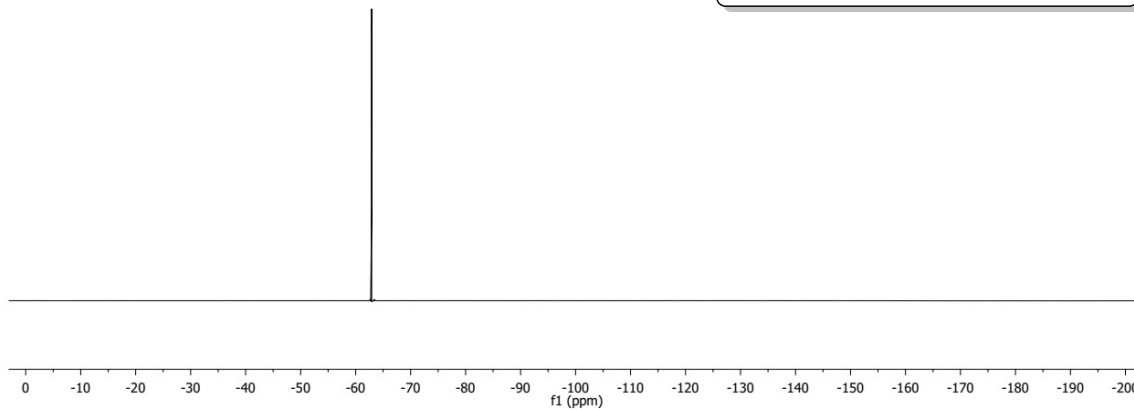
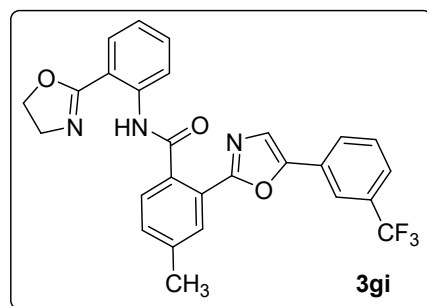


TS-PR4-27-13C

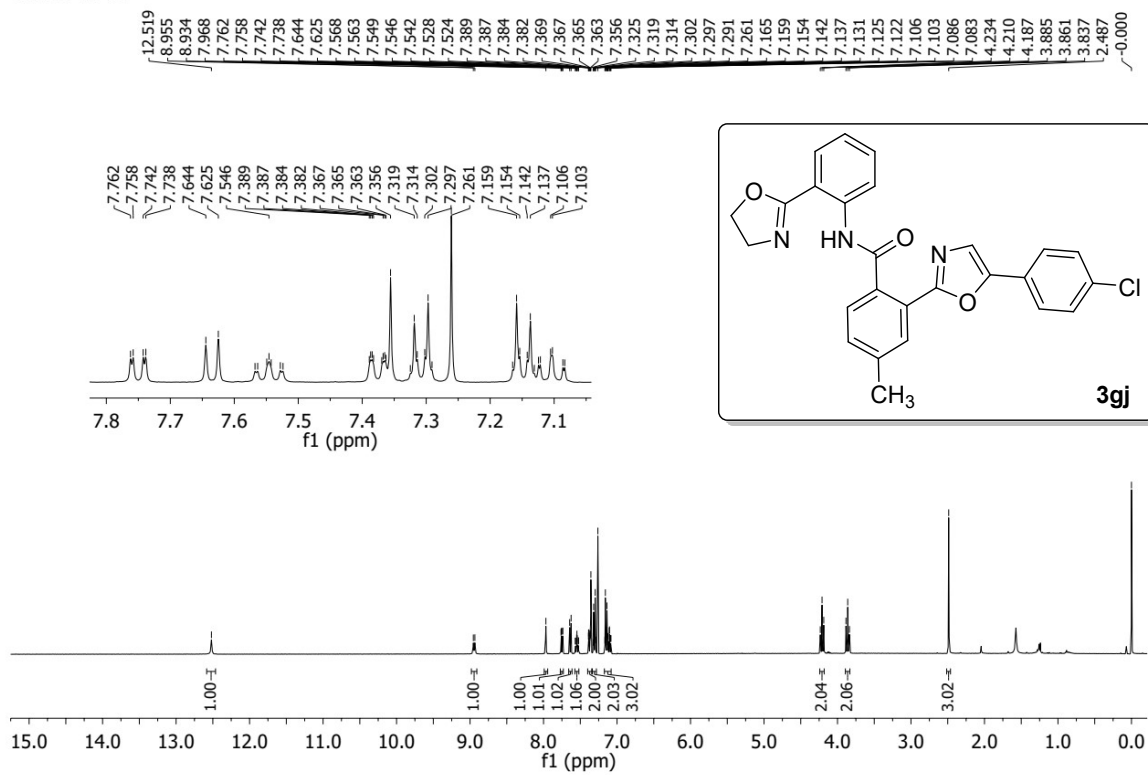


TS-PR4-27-19F

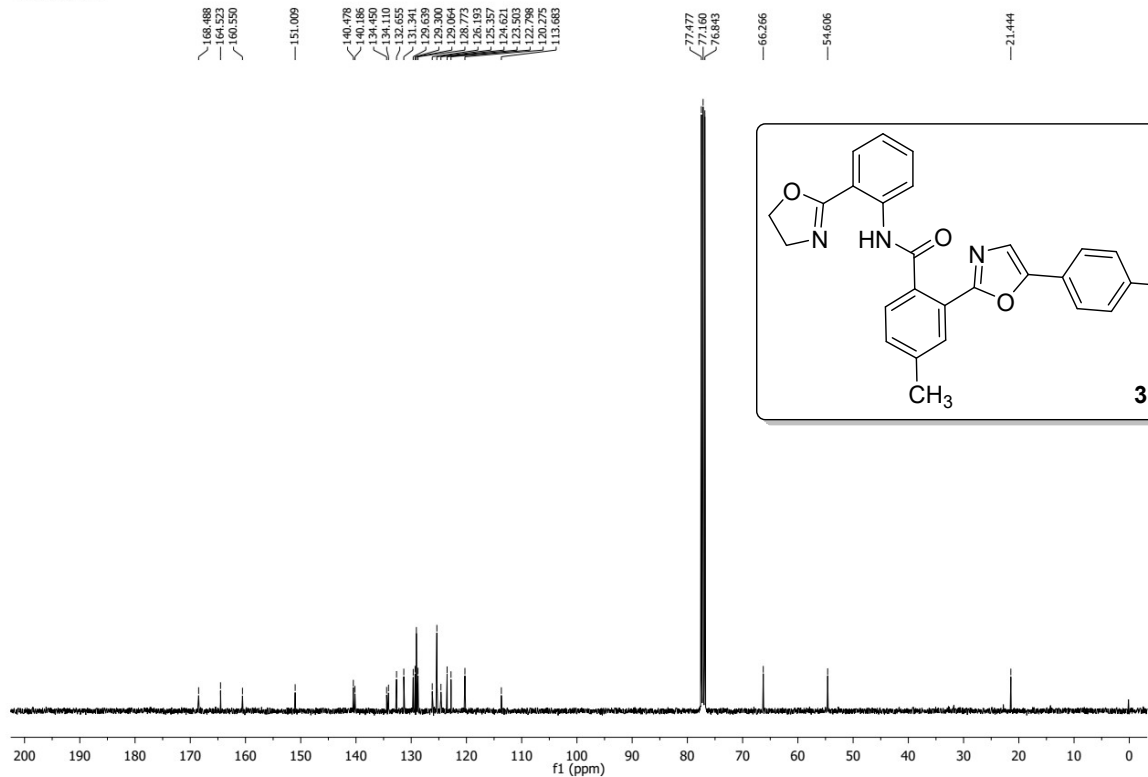
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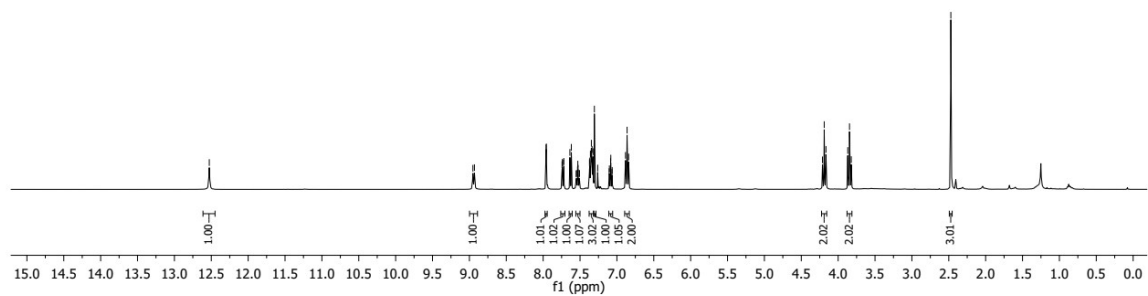
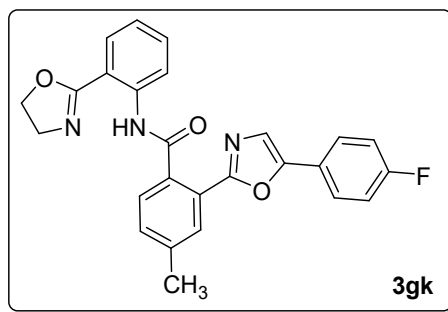
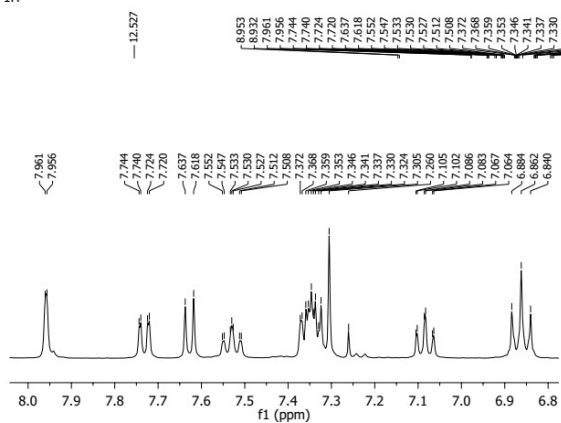
TS-PR4-28-1H



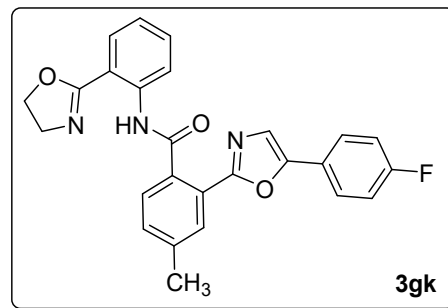
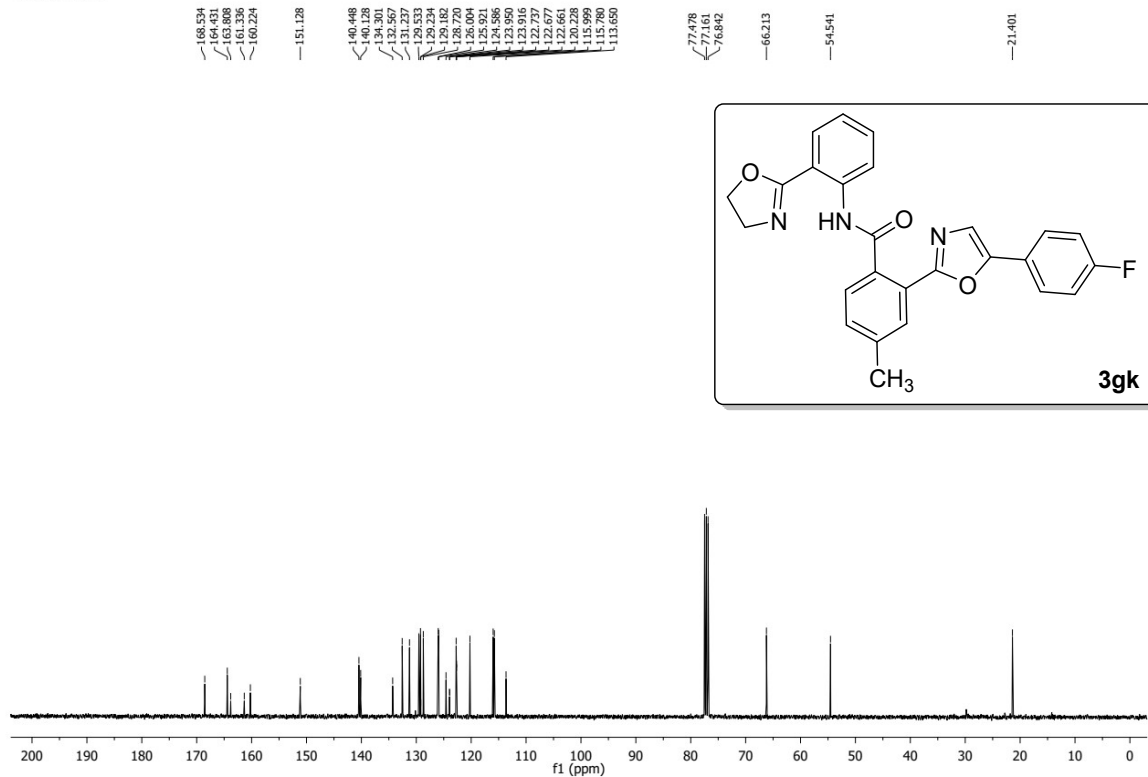
TS-PR4-28-13C



TS-PR4-30-1H

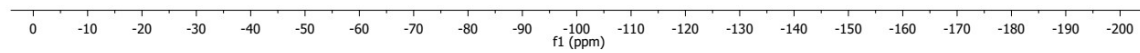
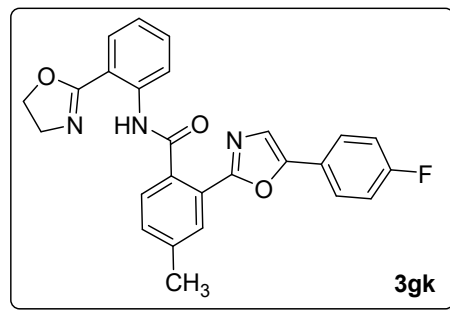


TS-PR4-30-13C

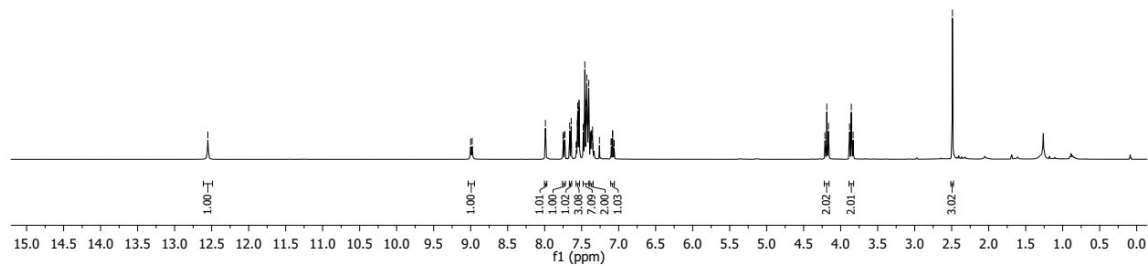
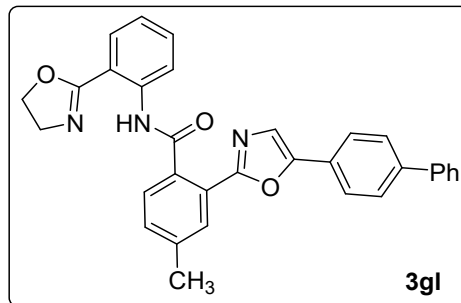
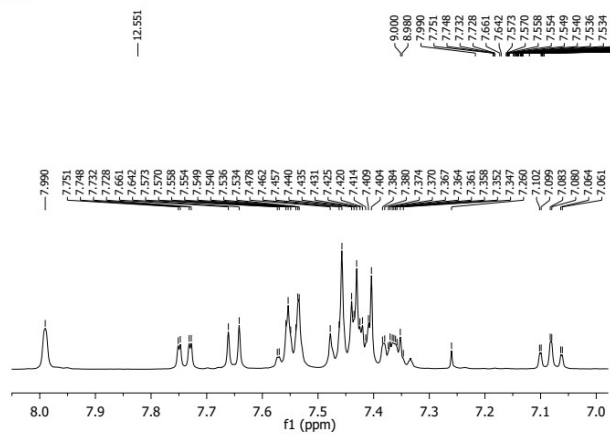


TS-PR4-30-19F

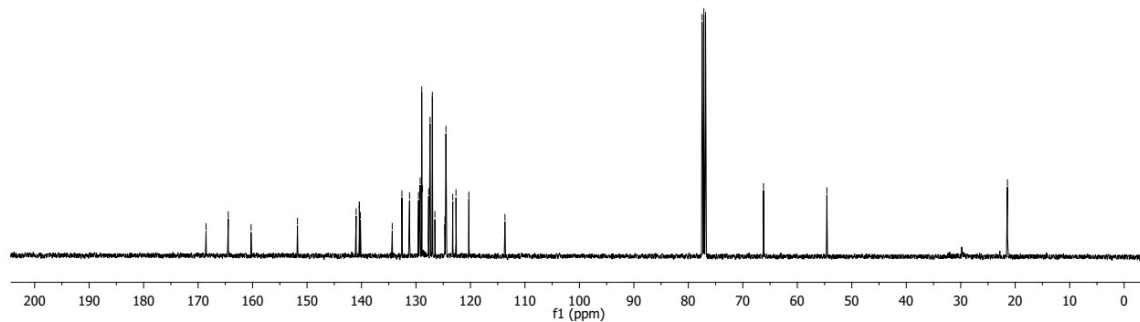
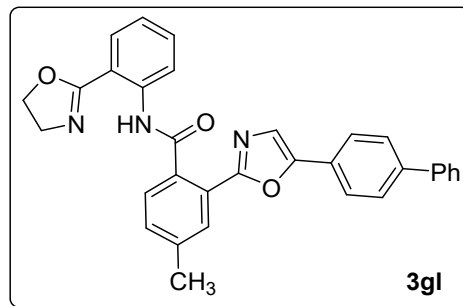
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TS-PR4-31-1H

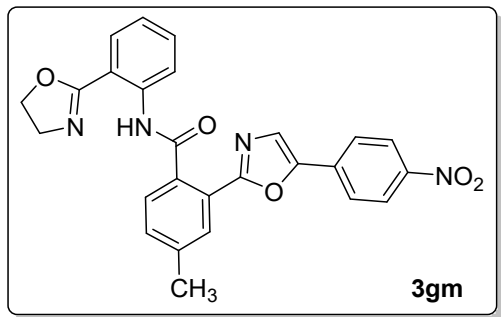
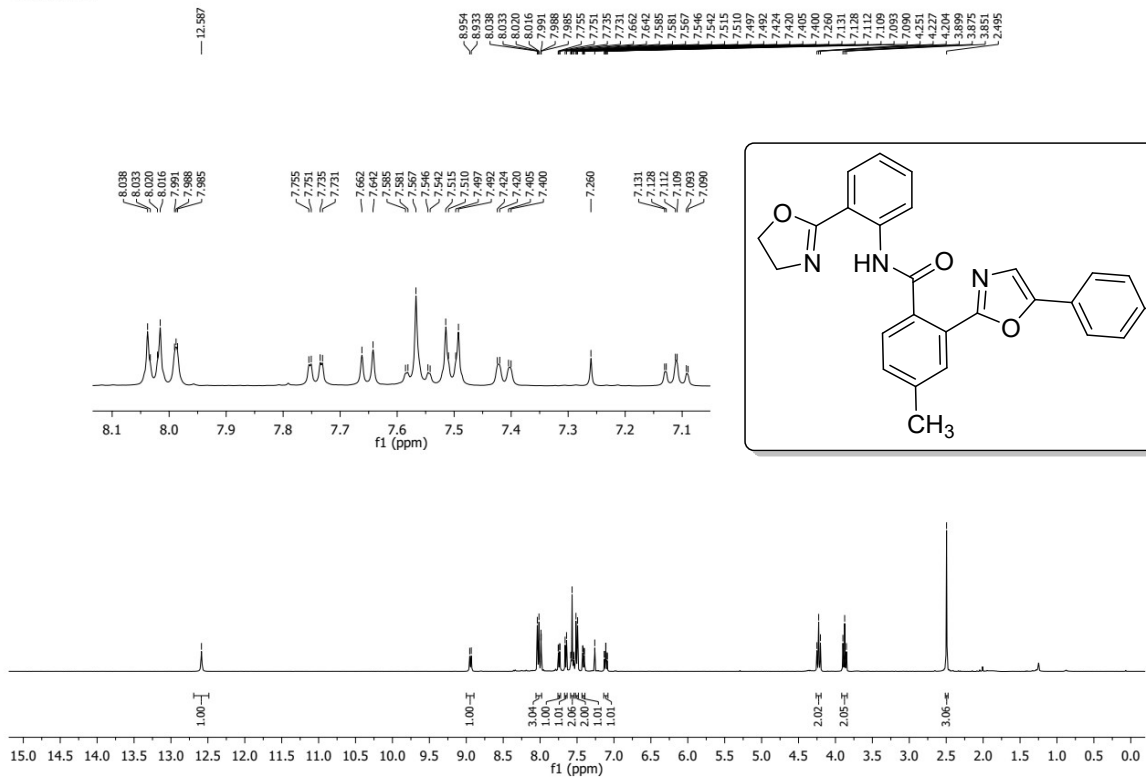


TS-PR4-31-13C

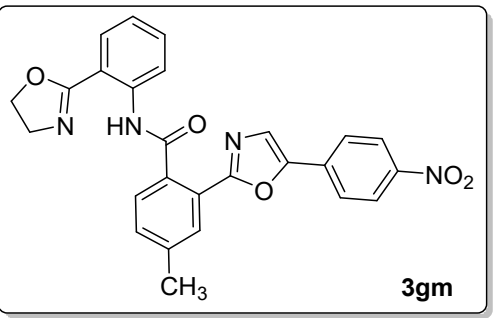
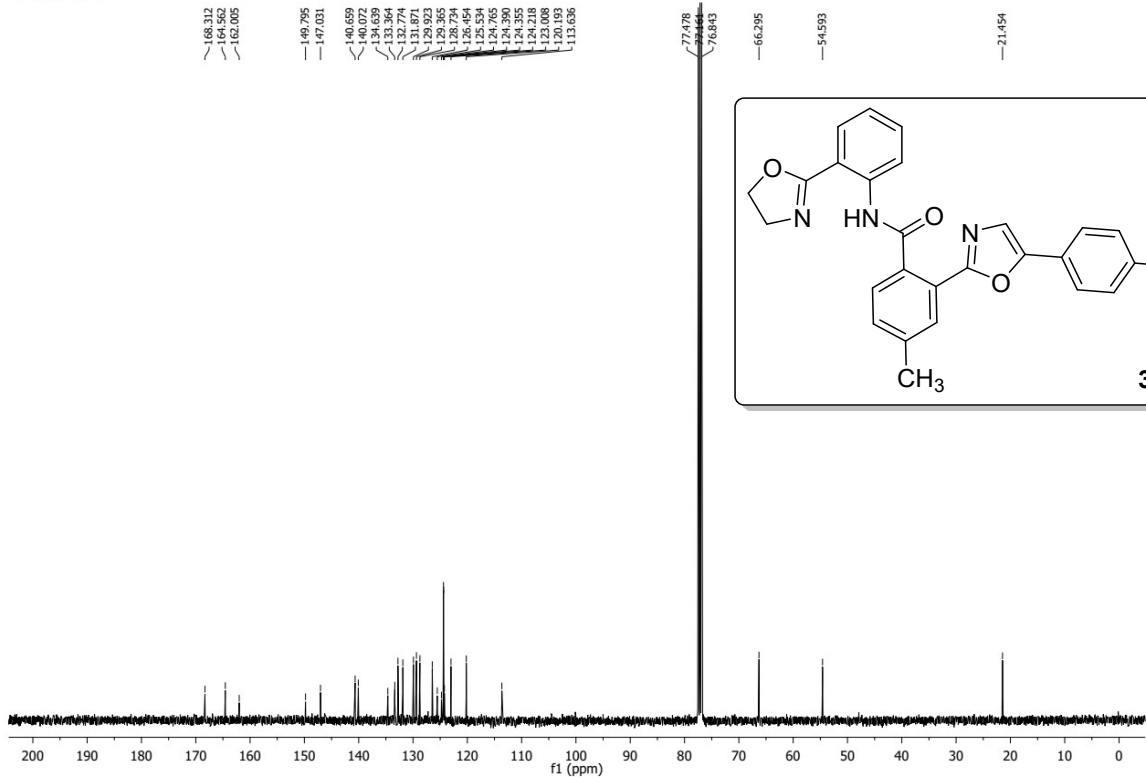




TS-PR4-29-1H



TS-PR4-29-13C







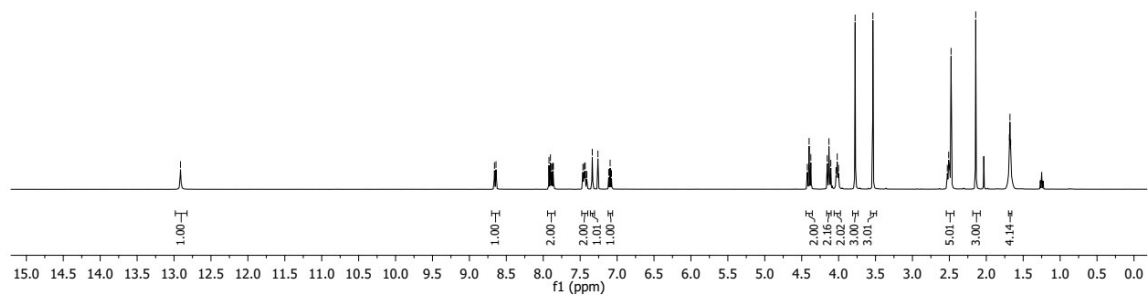
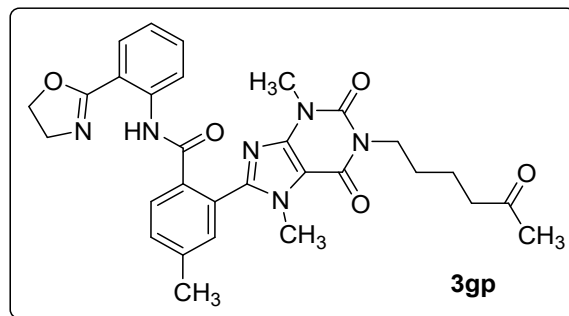
TS-PR4-49-1H

—12.913

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7.831  
7.815  
7.810  
7.736  
7.760  
7.714  
7.694  
7.676

4.463  
4.462  
4.376  
4.154  
4.131  
4.106  
4.085  
4.019  
4.001  
3.776  
3.596

2.528  
2.510  
2.493  
2.477  
2.143  
1.887  
1.870  
1.670



TS-PR4-49-13C

—208.913

165.787  
165.035

155.566  
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—66.434

—54.779

—43.422

—40.932

33.035

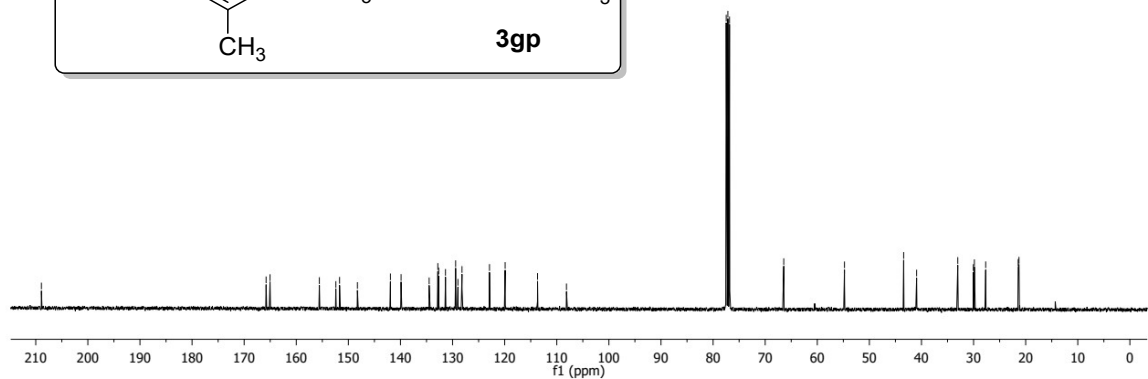
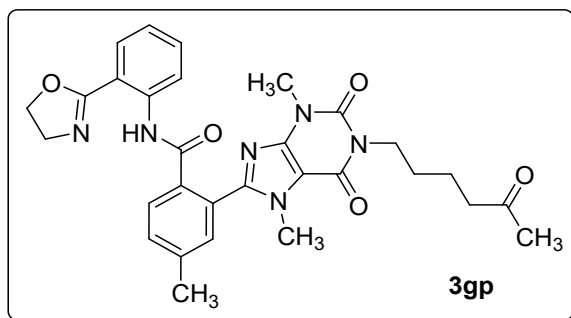
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29.850

27.677

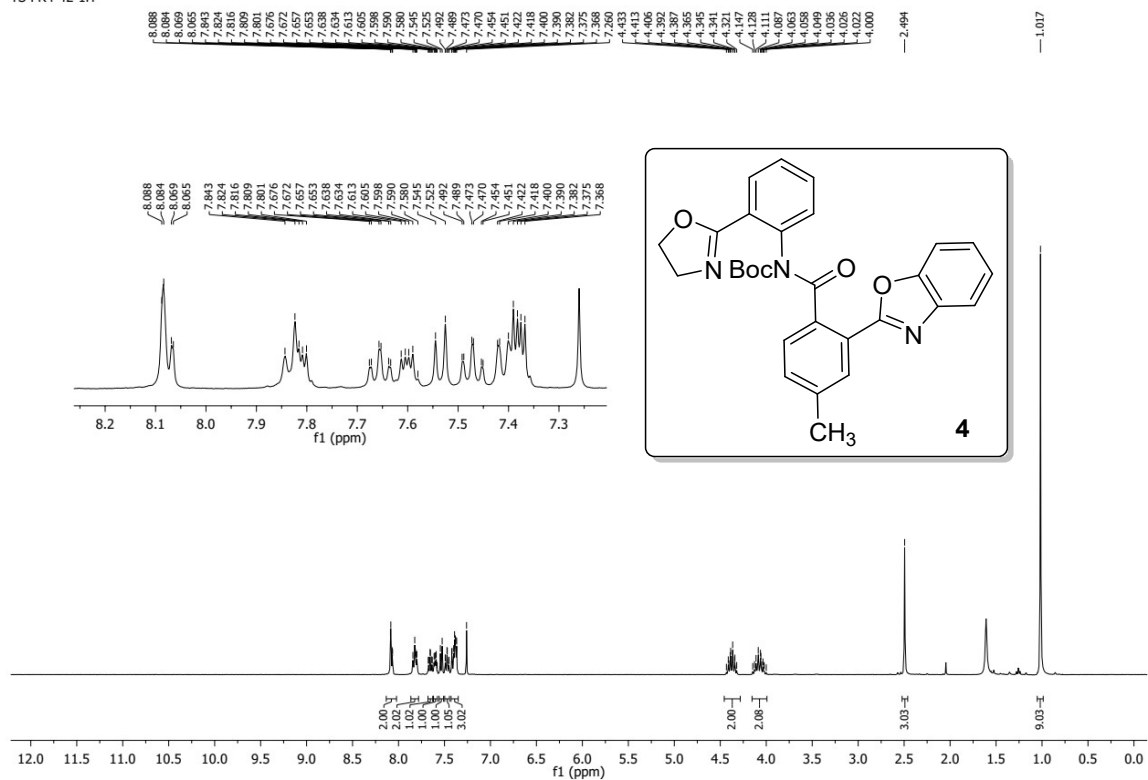
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21.289

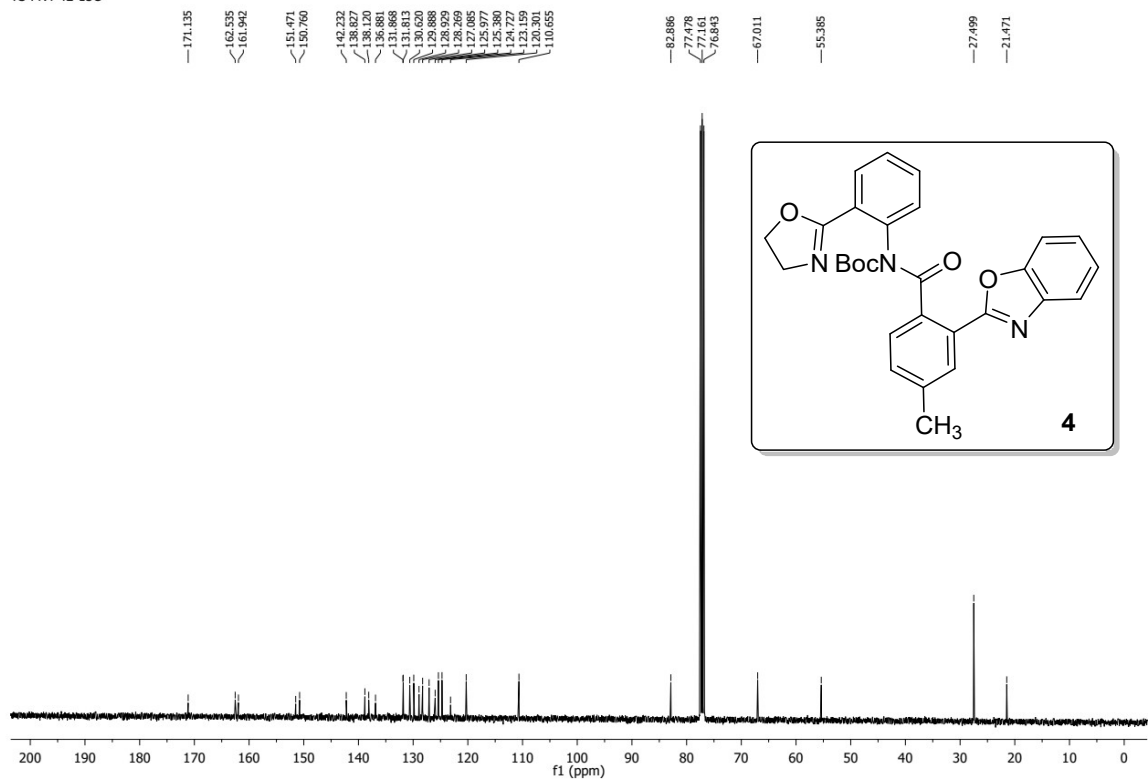




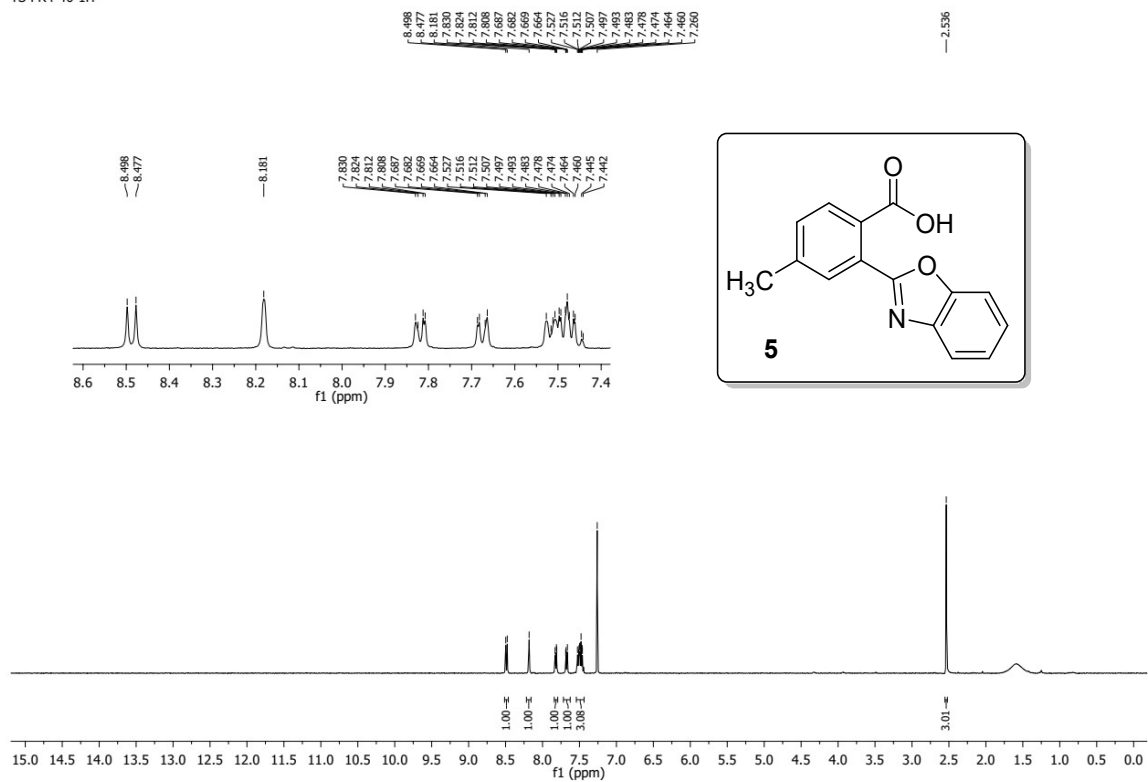
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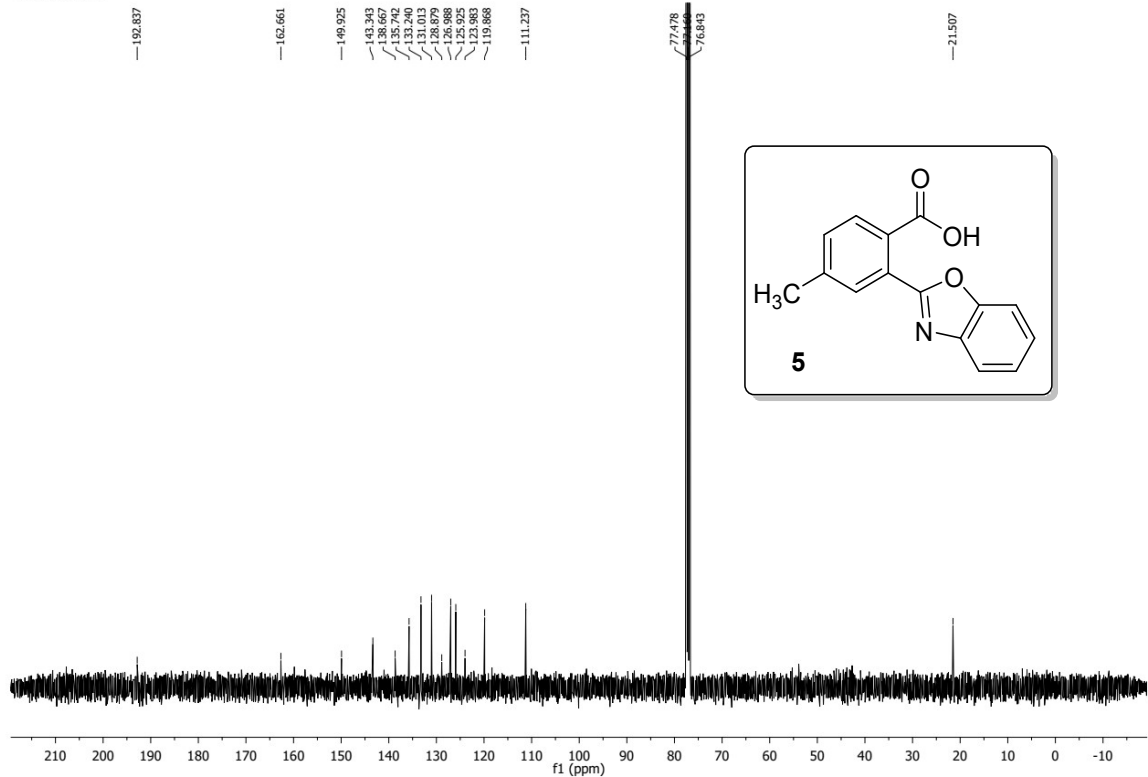
TS-PR4-42-13C



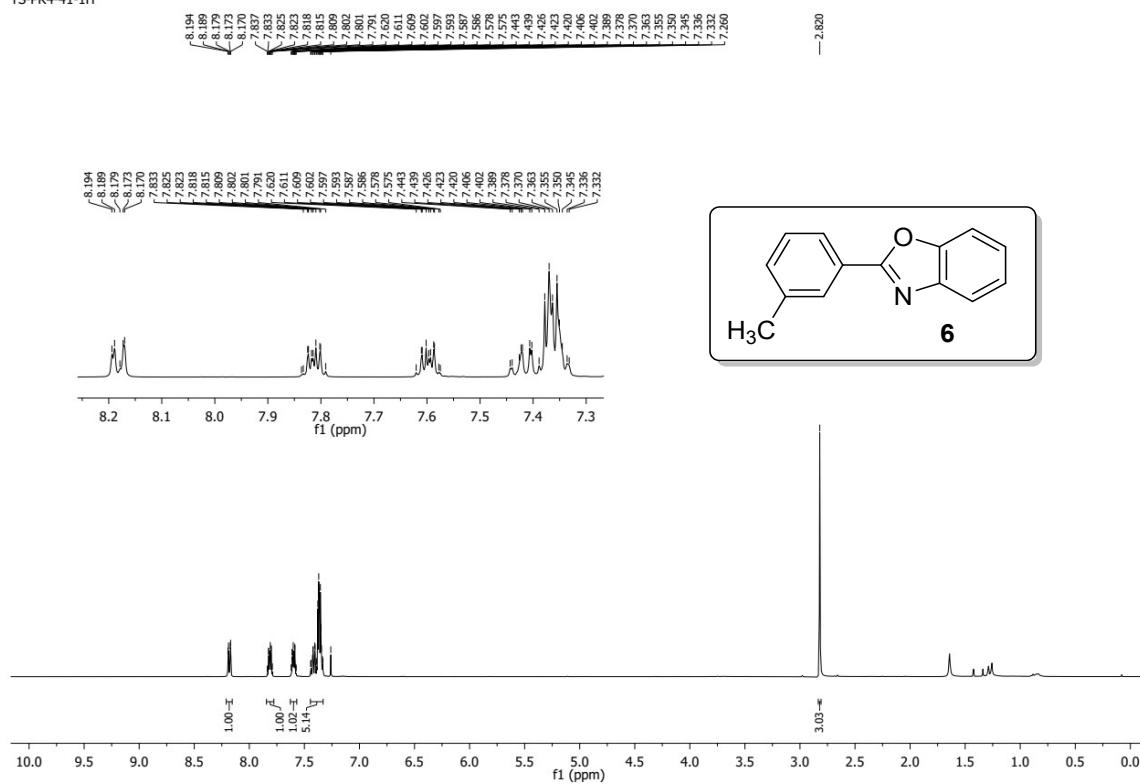
TS-PR4-40-1H



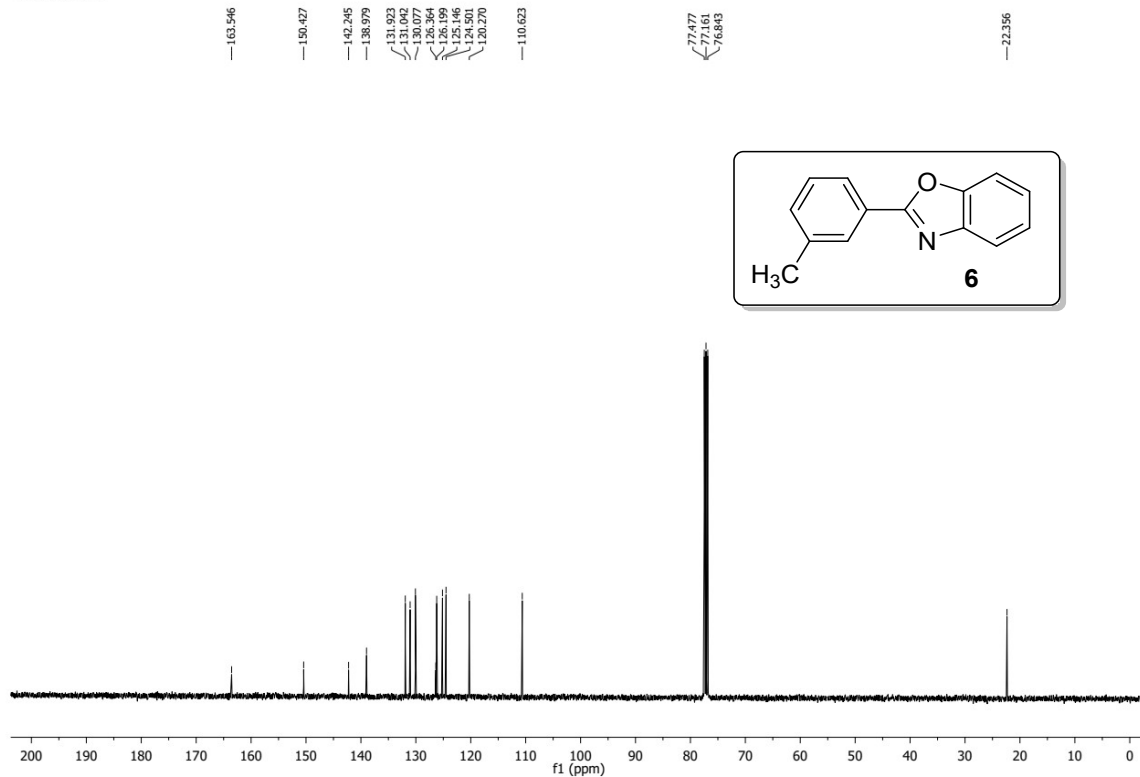
TS-PR4-40-13C



TS-PR4-41-1H

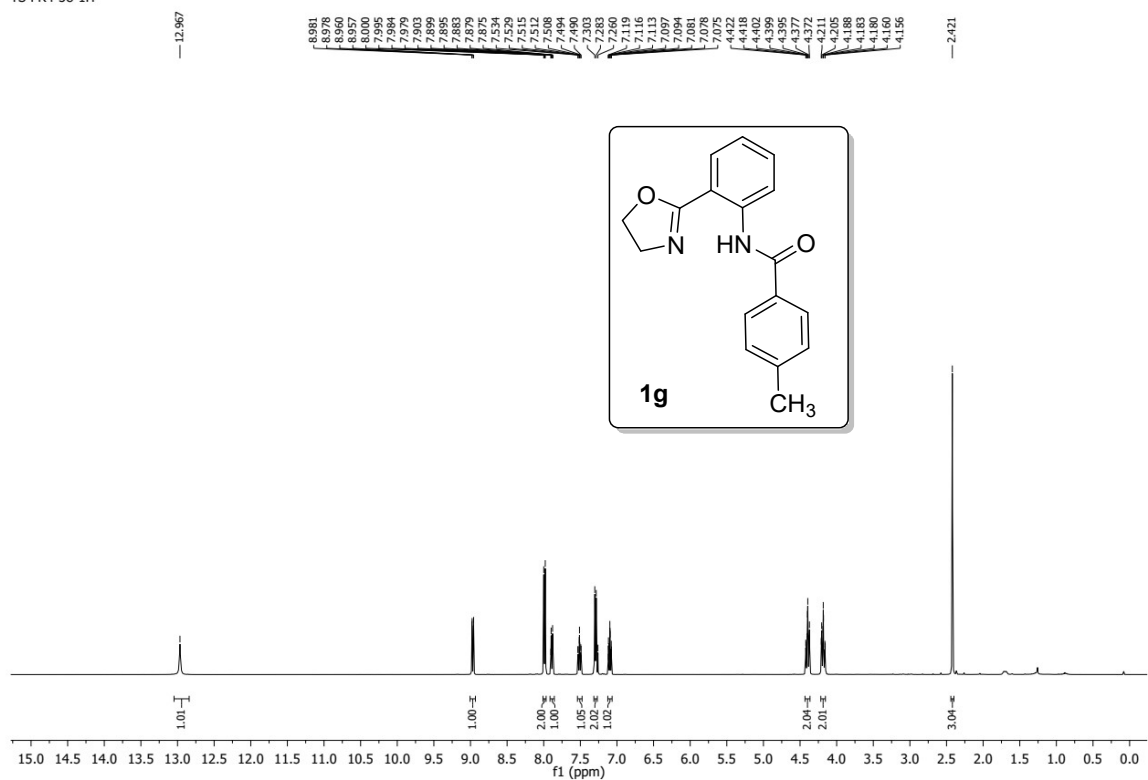


TS-PR4-41-13C

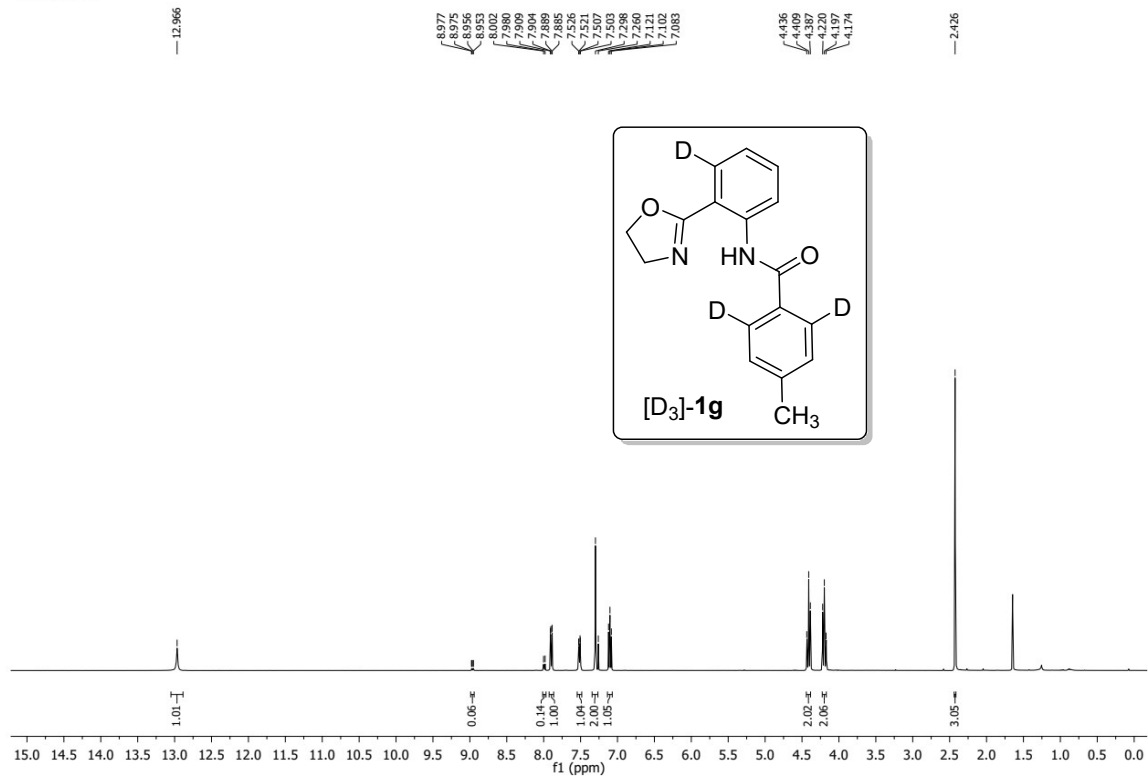




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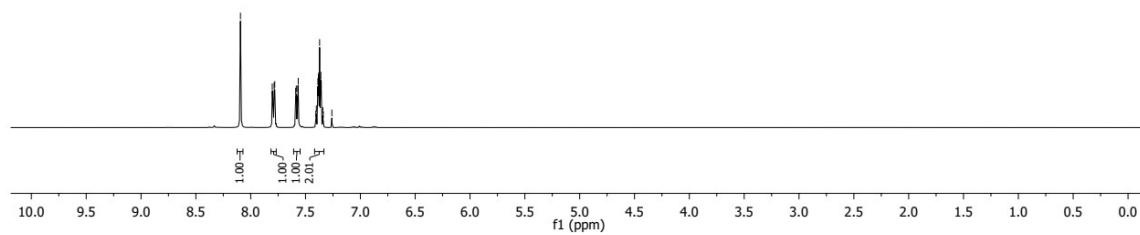
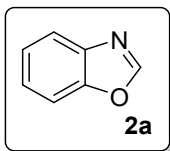


TS-PR4-86-1H



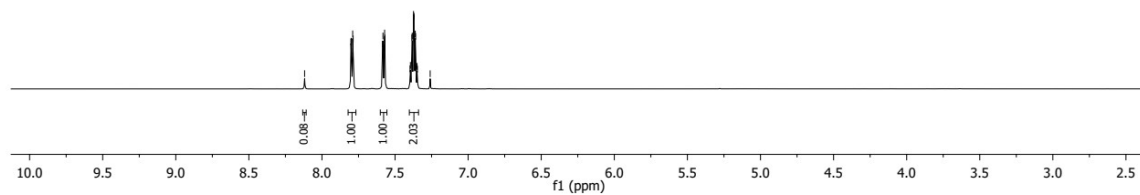
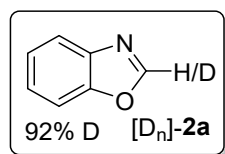
TS-PR4-90-1H

8.093  
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7.800  
7.795  
7.788  
7.780  
7.590  
7.584  
7.575  
7.570  
7.406  
7.401  
7.387  
7.383  
7.375  
7.372  
7.364  
7.360  
7.356  
7.358  
7.260



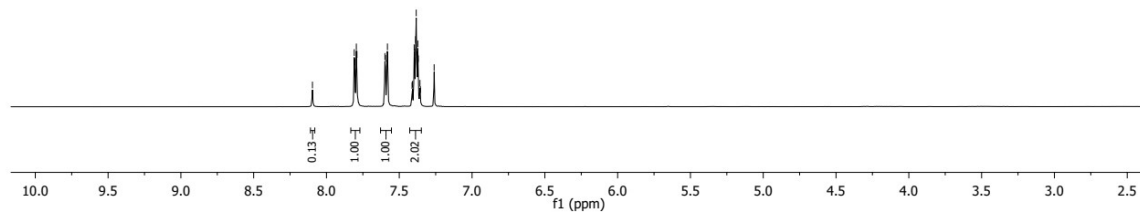
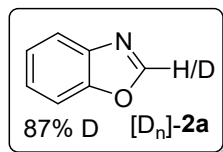
TS-PR4-90-D-1H

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7.584  
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7.571  
7.570  
7.397  
7.385  
7.382  
7.374  
7.370  
7.366  
7.358  
7.349  
7.347  
7.260



TS-PR4-90-87%D-1H

8.096  
7.809  
7.806  
7.803  
7.795  
7.791  
7.598  
7.595  
7.591  
7.412  
7.409  
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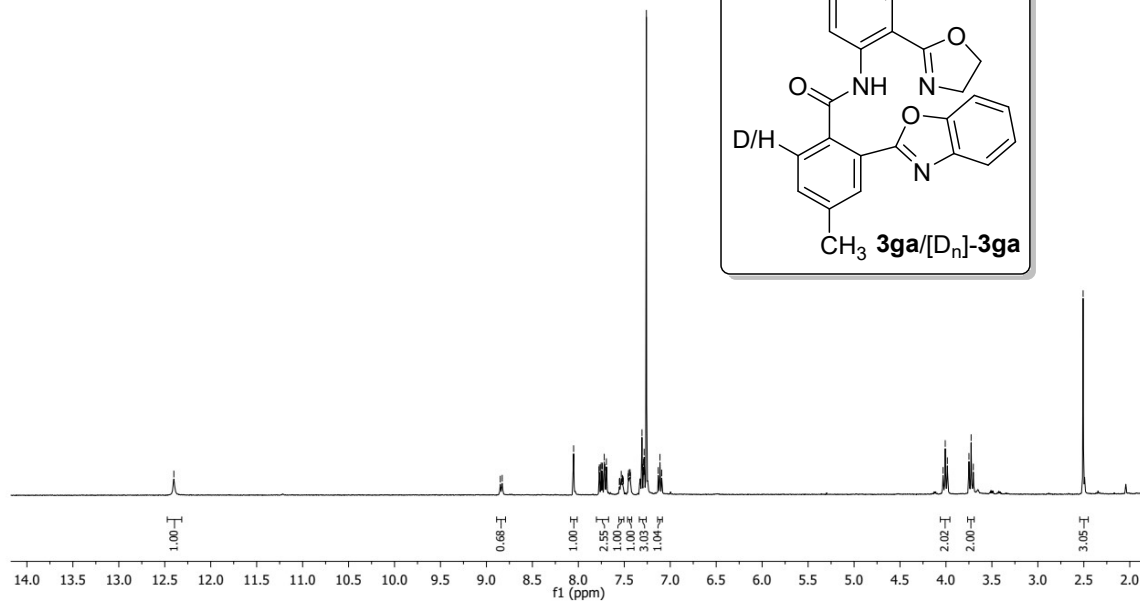
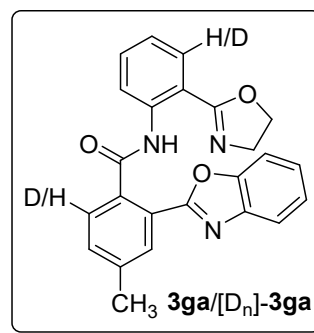


TS-PR4-KIE-2

12.401

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8.828  
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7.768  
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7.759  
7.718  
7.712  
7.698  
7.695  
7.692  
7.554  
7.550  
7.533  
7.530  
7.519  
7.514  
7.510  
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7.260  
7.255  
7.112  
7.093  
4.032  
4.008  
3.976  
3.769  
3.726  
3.702

2.508



TS-PR4-90-KIE-1H

8.103  
7.803  
7.798  
7.788  
7.784  
7.781  
7.777  
7.573  
7.401  
7.399  
7.397  
7.384  
7.376  
7.373  
7.368  
7.362  
7.358  
7.348  
7.344  
7.350

