Supporting Information

Direct Electrochemical Reductive Amination between
Aldehydes and Amines with H/D-Donor Solvent

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A. General Methods

Unless otherwise noted, all the chemicals were purchased commercially, and used without further purification. Technical grade petroleum ether (40-60°C bp.) and ethyl acetate were used for chromatography column. $^1$H and $^{13}$C NMR spectra were recorded on a Bruker Advance III 500 spectrometers using CDCl$_3$ as solvent with TMS as the internal standard. The chemical shifts are referenced to signals at 7.26 and 77.0 ppm, respectively. Chemical shift ($\delta$) and coupling constants ($J$) are given in ppm and in Hz, respectively. The peak patterns are indicated as follows: s, singlet; d, doublet; t, triplet; q, quartet; m, multiplet. Electrolysis reactions were conducted using ElectraSyn 2.0 Package supply purchased from IKA Instruments. Cathode and anode electrodes were Graphite SK-50 electrodes provided by IKA electrochemical kit. Cyclic voltammetry (CV) analysis was performed on ElectraSyn 2.0 Package, using a glassy carbon electrode as working electrode, a platinum plated electrode as counter electrode and Ag/AgCl electrode as a reference electrode. Cyclic voltammograms were recorded at 0.2 V/s scan rate. Mass spectra were recorded on a Shimadzu GCMS-QP2020 gas chromatograph-mass spectrometer. The data of HRMS was carried out on a high-resolution mass spectrometer (Thermo Scientific Q Exactive-UltiMate3000). TLC was performed by using commercially prepared 100-400 mesh silica gel plates and visualization was affected at 254 nm. Deuterium incorporation was determined by integration of the residual formyl proton in $^1$H NMR. The GC yield was determined using n-dodecane as the internal standard in the mechanistic studies.

B. General Procedures

General procedure A: the synthesis of products 3aa-3ta and 3ab-3ar: A mixture of 1 (0.5 mmol), 2 (0.6 mmol), $^{n}$Bu$_4$NHSO$_4$ (1 equiv) in 5 mL DMSO was added to an electrolytic cell (10 mL). The electrolytic cell was equipped with graphite anode and graphite cathode. The solution was electrolyzed in an undivided cell at ambient temperature under a constant current (10 mA) for 5 h. After electrolysis, the mixture was poured into water and extracted with ethyl acetate twice. The combined organic layer was washed with brine (10 mL) and dried over MgSO$_4$, filtered and
concentrated. The resulting mixture was purified by silica gel column chromatography to afford 3.

**General procedure B: the synthesis of products 3as**: A mixture of 1a (0.5 mmol), 2s (1.5 mmol), 4-Bu4NHSO4 (1 equiv) in 5 mL DMSO was added to an electrolytic cell (10 mL). The electrolytic cell was equipped with graphite anode and graphite cathode. The solution was electrolyzed in an undivided cell at ambient temperature under a constant current (10 mA) for 5 h. After electrolysis, the mixture was poured into water and extracted with ethyl acetate twice. The combined organic layer was washed with brine (10 mL) and dried over MgSO4, filtered and concentrated. The resulting mixture was purified by silica gel column chromatography to afford 3as.

**General procedure C: the synthesis of products 3-d1**: A mixture of 1 (0.3 mmol), 2 (0.6 mmol), 4-Bu4NHSO4 (1 equiv) in 3 mL DMSO-d6 was added to an electrolytic cell (10 mL). The electrolytic cell was equipped with graphite anode and graphite cathode. The solution was electrolyzed in an undivided cell at ambient temperature under a constant current (10 mA) for 3 h. After electrolysis, the mixture was poured into water and extracted with ethyl acetate twice. The combined organic layer was washed with brine (10 mL) and dried over MgSO4, filtered and concentrated. The resulting mixture was purified by silica gel column chromatography to afford 3-d1.

![Fig S1. Reaction setup for the electrochemical reductive amination](image)

**General procedure D: the synthesis of aryl sulfonyl tertiary amine products**

**products 5a**: In air, a 50 mL round flask was charged with N-benzyuaniline (0.5 mmol), 4-methylbenzenesulfonyl chloride (0.6 mmol), triethylamine (0.5 mmol) and
2 mL DCM. The reaction was allowed to stir at 0 °C for 24 h. After concentrating the reaction solution, methanol was added for recrystallization to obtain white crystal.

**General procedure E:** the synthesis of aryl sulfonyl tertiary amine products 5b-5c: In air, a 50 mL round bottom was charged with substituted N-benzylaniline (0.2 mmol), N-acetyl sulfanilyl chloride (0.24 mmol) and 3 mL pyridine. The reaction was allowed to stir at 60 °C for 4 h. After that, water was added and extracted with ethyl acetate twice. The combined organic phase was dried over Na₂SO₄ and concentrated. The residue was purified by flash column chromatography on silica gel with petroleum ether/ethyl acetate (PE/EA = 1:5) as the eluent to afford the desired product.

**General procedure F:** the synthesis of nBu₄NDSO₄: nBu₄NOH solution (40 wt% in MeOH, 648.68mg) was added into a round bottom flask for concentration and drying. After adding D₂O (1 mL) to dissolve the nBu₄NOH solid, D₂SO₄ (96%-98% in D₂O, 100.09 mg) was added for reaction. After stirring the mixture for 20 min, drying and removing D₂O to give the desired product nBu₄NDSO₄.

**C. Cyclic Voltammograms**

In order to analyze the reaction process in depth, cyclic voltammetry (CV) experiments were performed at room temperature (Fig S2). The electrochemical reductive amination between benzaldehyde and aniline did not proceed without the addition of an electrolyte (Fig S2, a), which indicated that electrolyte played a key role in this transformation. After the addition of nBu₄NHSO₄ as the electrolyte, the reduction peak was observed at -0.0566 V vs Ag/AgCl and the oxidation peak were observed at 0.0378 V vs Ag/AgCl (Fig S2, b). In the system with the addition of nBu₄NHSO₄ as the electrolyte, the reduction peak of benzaldehyde was observed at -0.4647V vs Ag/AgCl (Fig S2, d). Under the condition of adding nBu₄NHSO₄ as the electrolyte, no reduction peak of aniline was observed (Fig S2, f). With DMSO as a solvent, the reduction peak of (E)-N-benzylideneaniline 4aa was observed as -0.0706V vs Ag/AgCl. After adding nBu₄NHSO₄ as the electrolyte, the reduction peak of 4aa dropped to -0.3183V vs Ag/AgCl.
Fig S2. Cyclic voltammograms at room temperature: (a) after addition of benzaldehyde 1a (0.1 M) and aniline 2a (0.12 M) in DMSO; (b) after addition of benzaldehyde 1a (0.1 M), aniline 2a (0.12 M) and 4Bu3NHSO4 (0.1 M) in DMSO; (c) after addition of benzaldehyde 1a (0.1 M) in DMSO; (d) after addition of benzaldehyde 1a (0.1 M) and 4Bu3NHSO4 (0.1 M) in DMSO; (e) after addition of aniline 2a (0.12 M) in DMSO; (f) after addition of aniline 2a (0.12 M) and 4Bu3NHSO4 (0.1 M) in DMSO; (g) after addition of (E)-N-benzylideneaniline 4aa (0.1 M) in DMSO; (h) after addition of (E)-N-benzylideneaniline 4aa (0.1 M) and 4Bu3NHSO4 (0.1 M) in DMSO. The voltammogram was obtained at a scan rate of 0.2 V/s with glassy carbon electrode as working electrode, Pt electrode as counter electrode and Ag/AgCl electrode as a reference electrode.

D. Free Radical Trapping Experiments

To verify the reaction process further, we conducted several free radical trapping experiments. We had tried to add the free radical inhibitor TEMPO into the reaction, and only a trace of 3aa was detected after 2.5 h of reaction. Meanwhile, we had also added 1,1-diphenylethylene into the reaction to try to trap free radicals, and a trace of trapping product 6 was detected, where trapping product 6 ([M + Na]+ = 386.1883) had been confirmed by HRMS. The above experiments proved that the reaction could undergo a free radical process.
Scheme S1. Free radical trapping experiments. Reaction conditions: (i) benzaldehyde 1a (0.1 mmol), aniline 2a (0.12 mmol), "Bu₄NHSO₄ (1 equiv), TEMPO (2 equiv), DMSO (2 mL). (ii) benzaldehyde 1a (0.1 mmol), aniline 2a (0.12 mmol), "Bu₄NHSO₄ (1 equiv), 1,1-diphenylethylene (1 equiv), DMSO (2 mL). The electrolysis was conducted in an undivided cell at room temperature under air for 2.5 h. The yields of product 3aa was determined by GC yields with n-dodecane as the internal standard, and the free radical trapping product 6 was confirmed by HRMS analysis: HRMS (ESI) (m/z): calcd for C₂₇H₂₅NNa [M+Na]⁺: 386.1879, found: 386.1883.

E. Deuterium-labeling Experiments

Through the following deuterium-labeling experiments, we considered that the hydrogen atom on the N-H site was derived from aniline.

Scheme S2. Deuterium-labeling experiments. Reaction conditions: (iii) benzaldehyde 1a (0.3 mmol), aniline 2a (0.6 mmol), "Bu₄NHSO₄ (1 equiv), DMSO-d₆. (iv) benzaldehyde 1a (0.1 mmol), aniline 2a (0.2 mmol), "Bu₄NHSO₄ (1 equiv), dry DMSO/D₂O (30:1 v/v). (v) benzaldehyde 1a (0.1 mmol), aniline 2a (0.12 mmol), "Bu₄NDSO₄ (1 equiv), DMSO. The electrolysis was
conducted in an undivided cell at room temperature under air for 2.5-3 h. The ratio of 3aa-d₁ and 3aa was confirmed by ¹H NMR to be 97:3 among 92% isolated yield.

F. Characterization Data for Products

\[ \begin{align*} 
\text{N-Benzylaniline (3aa).} \quad & \text{Yellow solid, yield: 88 mg (96%), mp 36-37 \degree C.} \\
\quad & \text{¹H NMR (500 MHz, CDCl₃, ppm) } \delta = 7.50-7.44 \text{ (m, 4H), 7.40 (ddd, } J = 6.9, 4.0, 1.7 \text{ Hz, 1H), 7.32-7.28 \text{ (m, 2H), 6.85 (td, } J = 7.3, 1.0 \text{ Hz, 1H), 6.77-6.72 \text{ (m, 2H), 4.42 (s, 2H), 3.99 (s, 1H).} \\
\quad & \text{¹³C NMR (126 MHz, CDCl₃, ppm) } \delta = 148.3, 139.6, 129.4, 128.8, 127.7, 127.4, 117.7, 113.0, 48.4. \text{ MS (EI, 70 eV) } m/z: 183, 152, 115, 91. \text{ HRMS (ESI) (m/z): calcd for C₁₃H₁₄N [M+H]+: 184.1120, found: 184.1117.} \\
\end{align*} \]

\[ \begin{align*} 
\text{N-(4-Methylbenzyl)aniline (3ba).} \quad & \text{Orange oil, yield: 61 mg (62%).} \\
\quad & \text{¹H NMR (500 MHz, CDCl₃, ppm) } \delta = 7.28 \text{ (d, } J = 7.9 \text{ Hz, 2H), 7.21-7.16 \text{ (m, 4H), 6.76-6.71 \text{ (m, 1H), 6.65 (dd, } J = 8.6, 0.9 \text{ Hz, 2H), 4.30 (s, 2H), 4.00 (s, 1H), 2.36 \text{ (s, 3H).} \\
\quad & \text{¹³C NMR (126 MHz, CDCl₃, ppm) } \delta = 148.2, 136.9, 136.4, 129.4, 129.3, 127.6, 117.5, 112.8, 48.1, 21.2. \text{ MS (EI, 70 eV) } m/z: 197, 180, 152, 118, 105. \text{ HRMS (ESI) (m/z): calcd for C₁₄H₁₆N [M+H]+: 198.1277, found: 198.1273.} \\
\end{align*} \]

\[ \begin{align*} 
\text{N-(4-Isopropylbenzyl)aniline (3ca).} \quad & \text{Orange oil, yield: 96 mg (85%).} \\
\quad & \text{¹H NMR (500 MHz, CDCl₃, ppm) } \delta = 7.35 \text{ (d, } J = 7.9 \text{ Hz, 2H), 7.27-7.21 \text{ (m, 4H), 6.76 (dd, } J = 10.6, 4.1 \text{ Hz, 1H), 6.70-6.68 \text{ (m, 2H), 4.33 (s, 2H), 4.03 (s, 1H), 2.95 (dt, } J = 13.8, 6.9 \text{ Hz, 1H), 1.30 (d, } J = 6.9 \text{ Hz, 6H).} \\
\quad & \text{¹³C NMR (126 MHz, CDCl₃, ppm) } \delta = 148.3, 148.0, 136.8, 129.3, 127.7, 126.7, 117.5, 112.8, 48.1, 33.8, 24.1. \text{ MS} \\
\end{align*} \]
(EI, 70 eV) \textit{m/z}: 225, 133, 105. HRMS (ESI) (m/z): calcd for C_{16}H_{30}N [M+H]^+: 226.1590, found: 226.1585.

\begin{center}
\includegraphics[width=0.3\textwidth]{figure1.png}
\end{center}

\textit{N-(4-(\textit{tert}-Butyl)benzyl)aniline (3da).} Orange oil, yield: 117 mg (98%). \textit{^1}H NMR (500 MHz, CDCl$_3$, ppm) \(\delta = 7.40\) (m, 2H), 7.34 (d, \(J = 8.5\) Hz, 2H), 7.21 (m, 2H), 6.75 (tt, \(J = 7.4, 1.0\) Hz, 1H), 6.68 (dd, \(J = 8.6, 1.0\) Hz, 2H), 4.32 (s, 2H), 4.16 (s, 1H), 1.35 (s, 9H). \textit{^{13}}C NMR (126 MHz, CDCl$_3$, ppm) \(\delta = 150.3, 148.3, 136.4, 129.3, 127.4, 125.6, 117.5, 112.8, 48.0, 34.5, 31.4\). MS (EI, 70 eV) \textit{m/z}: 239, 147, 117. HRMS (ESI) (m/z): calcd for C$_{17}$H$_{22}$N [M+H]$^+$: 240.1747, found: 240.1741.

\begin{center}
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\end{center}

\textit{N-(4-Methoxybenzyl)aniline (3ea).} Yellow oil, yield: 62 mg (58%). \textit{^1}H NMR (500 MHz, CDCl$_3$, ppm) \(\delta = 7.33\) (m, 2H), 7.22 (m, 2H), 6.92 (m, 2H), 6.75 (m, 1H), 6.68 (m, 2H), 4.29 (s, 2H), 4.00 (s, 1H), 3.84 (d, \(J = 2.3\) Hz, 3H). \textit{^{13}}C NMR (126 MHz, CDCl$_3$, ppm) \(\delta = 158.9, 148.2, 131.4, 129.3, 128.8, 117.5, 114.0, 112.8, 55.3, 47.8\). MS (EI, 70 eV) \textit{m/z}: 213, 121, 91. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{16}$NO [M+H]$^+$: 214.1226, found: 214.1224.

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\end{center}

\textit{N-([1,1'-Biphenyl]-4-ylmethyl)aniline (3fa).} Orange oil, yield: 127 mg (98%). \textit{^1}H NMR (500 MHz, CDCl$_3$, ppm) \(\delta = 7.64\) (dd, \(J = 11.7, 4.6\) Hz, 4H), 7.51-7.47 (m, 4H), 7.40 (t, \(J = 7.4\) Hz, 1H), 7.24 (dd, \(J = 8.2, 7.5\) Hz, 2H), 6.78 (t, \(J = 7.3\) Hz, 1H), 6.73-6.70 (m, 2H), 4.42 (s, 2H), 4.13 (s, 1H). \textit{^{13}}C NMR (126 MHz,

**N-(3-Methoxybenzyl)aniline (3ga).** Orange oil, yield: 88 mg (83%). H NMR (500 MHz, CDCl₃, ppm) δ = 7.29 (d, J = 7.3 Hz, 1H), 7.21 (m, 2H), 6.99 (m, 2H), 6.86 (dd, J = 8.2, 2.4 Hz, 1H), 6.76 (t, J = 7.3 Hz, 1H), 6.67 (dd, J = 8.5, 0.8 Hz, 2H), 4.34 (s, 2H), 4.09 (s, 1H), 3.83 (s, 3H). ¹³C NMR (126 MHz, CDCl₃, ppm) δ = 159.9, 148.2, 141.2, 129.7, 129.3, 119.8, 117.6, 113.0, 112.9, 112.7, 55.2, 48.3. MS (EI, 70 eV) m/z: 213, 121, 91. HRMS (ESI) (m/z): calcd for C₁₄H₁₆NO [M+H]+: 214.1226, found: 214.1222.

**N-(3-Methylbenzyl)aniline (3ha).** Orange oil, yield: 51 mg (52%). H NMR (500 MHz, CDCl₃, ppm) δ = 7.27 (d, J = 7.5 Hz, 1H), 7.22 (dd, J = 8.5, 7.4 Hz, 4H), 7.13 (d, J = 7.5 Hz, 1H), 6.75 (m, 1H), 6.68 (dd, J = 8.6, 0.9 Hz, 2H), 4.32 (s, 2H), 4.04 (s, 1H), 2.39 (s, 3H). ¹³C NMR (126 MHz, CDCl₃, ppm) δ = 148.2, 139.4, 138.4, 129.3, 128.6, 128.3, 128.0, 124.6, 117.5, 112.8, 48.4, 21.5. MS (EI, 70 eV) m/z: 197, 180, 152, 118, 105. HRMS (ESI) (m/z): calcd for C₁₄H₁₆NO [M+H]+: 198.1277, found: 198.1274.

**N-(3-Fluorobenzyl)aniline (3ia).** Yellow oil, yield: 89 mg (89%). H NMR (500 MHz, CDCl₃, ppm) δ = 7.35 (dd, J = 7.9, 6.0 Hz, 1H), 7.26-7.19 (m, 3H), 7.15 (d, J = 9.8 Hz, 1H), 7.02 (td, J = 8.4, 2.2 Hz, 1H), 6.80 (t, J = 7.3 Hz, 1H), 6.67 (d, J = 7.7 Hz, 2H), 4.39 (s, 2H), 4.14 (s, 1H). ¹³C NMR (126 MHz, CDCl₃,
ppm) δ = 163.2 (d, J = 246.1 Hz), 147.9, 142.4 (d, J = 6.7 Hz), 130.2 (d, J = 8.2 Hz), 129.4, 122.8 (d, J = 2.7 Hz), 117.8, 114.2 (d, J = 14.1 Hz), 114.1 (d, J = 13.5 Hz), 112.9, 47.8. MS (EI, 70 eV) m/z: 201, 180, 152, 109. HRMS (ESI) (m/z): calcd for C₁₃H₁₃FN [M+H]⁺: 202.1026, found: 202.1023.

\[ \text{N-}(2\text{-Methoxybenzyl})\text{aniline (3ja). Orange oil, yield: 103 mg (97%).} \]

\[ \text{H NMR (500 MHz, CDCl}_3\text{, ppm) δ = 7.34 (dd, J = 7.4, 1.5 Hz, 1H), 7.27 (d, J = 6.5 Hz, 1H), 7.19 (ddd, J = 7.4, 5.7, 2.1 Hz, 2H), 6.94 (m, 2H), 6.73 (m, 1H), 6.68 (dt, J = 3.2, 1.6 Hz, 2H), 4.36 (s, 2H), 4.17 (s, 1H), 3.89 (s, 3H).} \]

\[ \text{C NMR (126 MHz, CDCl}_3\text{, ppm)} δ = 157.4, 148.4, 129.2, 128.9, 128.3, 127.3, 120.5, 117.4, 113.1, 110.2, 55.3, 43.5. MS (EI, 70 eV) m/z: 213, 121, 91. HRMS (ESI) (m/z): calcd for C₁₃H₁₆NO [M+H]⁺: 214.1226, found: 214.1223. \]

\[ \text{N-}(2\text{-Methylbenzyl})\text{aniline (3ka). Orange oil, yield: 84 mg (85%).} \]

\[ \text{H NMR (500 MHz, CDCl}_3\text{, ppm) δ = 7.38 (d, J = 7.1 Hz, 1H), 7.25 (m, 5H), 6.78 (t, J = 7.3 Hz, 1H), 6.69 (m, 2H), 4.32 (s, 2H), 3.90 (s, 1H), 2.42 (s, 3H).} \]

\[ \text{C NMR (126 MHz, CDCl}_3\text{, ppm) δ = 148.3, 137.0, 136.4, 130.4, 129.3, 128.3, 127.5, 126.2, 117.5, 112.7, 46.4, 19.0. MS (EI, 70 eV) m/z: 197, 180, 152, 105. HRMS (ESI) (m/z): calcd for C₁₄H₁₆N [M+H]⁺: 198.1277, found: 198.1273.} \]

\[ \text{N-}(3,4\text{-Dimethoxybenzyl})\text{aniline (3la). Brown oil, yield: 104 mg (86%).} \]

\[ \text{H NMR (500 MHz, CDCl}_3\text{, ppm) δ = 7.26-7.20 (m, 2H), 6.96 (d, J = 5.8 Hz, 2H), 6.88 (dd, J = 8.5, 2.4 Hz, 1H), 6.77 (t, J = 6.6 Hz, 1H), 6.69 (d, J = 6.9 Hz, 2H), 4.29 (s, 2H), 4.02 (s, 1H), 3.91 (d, J = 3.0 Hz, 6H).} \]

\[ \text{C NMR (126 MHz,} \]
CDCl₃, ppm) δ = 149.2, 148.3, 148.2, 132.0, 129.3, 119.7, 117.6, 112.9, 111.2, 110.8, 56.0, 55.9, 48.3. MS (EI, 70 eV) m/z: 243, 151, 121, 107. HRMS (ESI) (m/z): calcd for C₁₅H₁₈NO₂ [M+H]^+: 244.1332, found: 244.1328.

\[ \text{N-(Naphthalen-2-ylmethyl)aniline (3ma). Orange oil, yield: } \]
108 mg (93%). \(^1\)H NMR (500 MHz, CDCl₃, ppm) δ = 7.96-7.90 (m, 4H), 7.62-7.56 (m, 3H), 7.31 (t, J = 7.7 Hz, 2H), 6.87 (td, J = 7.3, 0.7 Hz, 1H), 6.78 (d, J = 7.7 Hz, 2H), 4.56 (s, 2H), 4.19 (s, 1H). \(^{13}\)C NMR (126 MHz, CDCl₃, ppm) δ = 148.3, 137.1, 133.6, 132.9, 129.4, 128.5, 127.9, 127.8, 126.3, 125.9, 117.7, 113.1, 48.6. HRMS (ESI) (m/z): calcd for C₁₇H₁₆N [M+H]^+: 234.1277, found: 234.1272.

\[ \text{N-(Naphthalen-1-ylmethyl)aniline (3na). Orange oil, yield: } \]
82 mg (70%). \(^1\)H NMR (500 MHz, CDCl₃, ppm) δ = 8.14 (d, J = 7.5 Hz, 1H), 7.97 (dd, J = 5.0, 2.3 Hz, 1H), 7.89 (d, J = 8.1 Hz, 1H), 7.60 (m, 3H), 7.50 (m, 1H), 7.29 (m, 2H), 6.84 (t, J = 7.3 Hz, 1H), 6.75 (d, J = 7.3 Hz, 2H), 4.79 (s, 2H), 4.05 (s, 1H). \(^{13}\)C NMR (126 MHz, CDCl₃, ppm) δ = 148.3, 134.4, 133.9, 131.6, 129.4, 128.9, 128.3, 126.4, 126.1, 125.9, 125.6, 123.7, 117.6, 112.8, 46.5. MS (EI, 70 eV) m/z: 233, 141, 115, 104. HRMS (ESI) (m/z): calcd for C₁₇H₁₅NNa [M+Na]^+: 256.1097, found: 256.1096.

\[ \text{N-(Furan-2-ylmethyl)aniline (3oa). Orange oil, yield: } \]
43 mg (50%). \(^1\)H NMR (500 MHz, CDCl₃, ppm) δ = 7.53-7.50 (m, 1H), 7.37-7.33 (m, 2H), 6.91 (t, J = 7.3 Hz, 1H), 6.81 (dd, J = 8.6, 0.9 Hz, 2H), 6.47 (dd, J = 3.2, 1.9 Hz, 1H), 6.37 (d, J = 3.2 Hz, 1H), 4.43 (s, 2H), 4.14 (s, 1H). \(^{13}\)C NMR (126 MHz, CDCl₃, ppm) δ = 153.0, 147.8, 142.1, 129.4, 118.1, 113.3, 110.6, 107.2, 41.5. MS (EI, 70 eV) m/z:
173, 145, 115, 81. HRMS (ESI) (m/z): calcd for C\textsubscript{11}H\textsubscript{12}NO [M+H]\textsuperscript{+}: 174.0913, found: 174.0911.

\[ \text{N-}(\text{Thiophen-3-ylmethyl})\text{aniline (3pa)}. \] Orange oil, yield: 29 mg (31%). \textsuperscript{1}\text{H} NMR (500 MHz, CDCl\textsubscript{3}, ppm) \( \delta = 7.47 \) (dt, \( J = 4.9, 3.0 \) Hz, 1H), 7.43-7.38 (m, 2H), 7.33 (s, 1H), 7.26 (t, \( J = 4.4 \) Hz, 1H), 6.96 (q, \( J = 6.8 \) Hz, 1H), 6.83 (dd, \( J = 6.6, 4.7 \) Hz, 2H), 4.47 (s, 2H), 4.10 (s, 1H). \textsuperscript{13}\text{C} NMR (126 MHz, CDCl\textsubscript{3}, ppm) \( \delta = 148.3, 140.8, 129.6, 127.5, 126.4, 122.0, 117.9, 113.2, 43.9 \). MS (EI, 70 eV) \( m/z \): 189, 156, 115, 97. HRMS (ESI) (m/z): calcd for C\textsubscript{11}H\textsubscript{12}NS [M+H]\textsuperscript{+}: 190.0685, found: 190.0681.

\[ \text{N-}(\text{Pyridin-4-ylmethyl})\text{aniline (3qa)}. \] Orange oil, yield: 11 mg (12%). \textsuperscript{1}\text{H} NMR (500 MHz, CDCl\textsubscript{3}, ppm) \( \delta = 8.56 \) (dd, \( J = 4.5, 1.5 \) Hz, 2H), 7.32 (d, \( J = 6.0 \) Hz, 2H), 7.19 (m, 2H), 6.76 (m, 1H), 6.60 (dd, \( J = 8.6, 1.0 \) Hz, 2H), 4.40 (s, 2H), 4.10 (s, 1H). \textsuperscript{13}\text{C} NMR (126 MHz, CDCl\textsubscript{3}, ppm) \( \delta = 149.9, 149.2, 147.5, 129.4, 122.1, 118.0, 112.9, 47.0 \). MS (EI, 70 eV) \( m/z \): 184, 106, 79. HRMS (ESI) (m/z): calcd for C\textsubscript{12}H\textsubscript{12}NNa [M+Na]\textsuperscript{+}: 207.0893, found: 207.0889.

\[ \text{N-}(\text{Cyclohexylmethyl})\text{aniline (3ra)}. \] Orange oil, yield: 42 mg (44%). \textsuperscript{1}\text{H} NMR (500 MHz, CDCl\textsubscript{3}, ppm) \( \delta = 7.20 \) (m, 2H), 6.71 (m, 1H), 6.63 (dd, \( J = 8.5, 0.9 \) Hz, 2H), 3.75 (s, 1H), 2.99 (d, \( J = 6.7 \) Hz, 2H), 1.86 (dd, \( J = 13.6, 1.8 \) Hz, 2H), 1.78 (m, 2H), 1.72 (m, 1H), 1.61 (m, 1H), 1.28 (m, 3H), 1.02 (dt, \( J = 12.1, 9.2 \) Hz, 2H). \textsuperscript{13}\text{C} NMR (126 MHz, CDCl\textsubscript{3}, ppm) \( \delta = 148.6, 129.2, 116.9, 112.7, 50.6, 37.6, 31.3, 26.6, 26.0 \). MS (EI, 70 eV) \( m/z \): 189, 144, 117, 106. HRMS (ESI) (m/z): calcd for C\textsubscript{13}H\textsubscript{19}NNa [M+Na]\textsuperscript{+}: 212.1410, found: 212.1414.
**N-(Cyclopentylmethyl)aniline (3sa).** Orange oil, yield: 10.5 mg (12%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.20 (m, 2H), 6.72 (dd, $J$ = 10.5, 4.1 Hz, 1H), 6.65 (m, 2H), 3.81 (s, 1H), 3.06 (d, $J$ = 7.2 Hz, 2H), 2.19 (dt, $J$ = 15.1, 7.6 Hz, 1H), 1.84 (m, 2H), 1.67 (m, 3H), 1.60 (m, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 148.5, 129.2, 117.2, 112.8, 49.6, 39.5, 30.7, 25.3. MS (EI, 70 eV) $m/z$: 175, 106, 77, 65, 51. HRMS (ESI) (m/z): calcd for C$_{12}$H$_{18}$N [M+H]$^+$: 176.1434, found: 176.1428.

**N-(2-Phenylpropyl)aniline (3ta).** Yellow oil, yield: 86 mg (82%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.37 (t, $J$ = 7.5 Hz, 2H), 7.28 (m, 3H), 7.20 (m, 2H), 6.73 (t, $J$ = 7.2 Hz, 1H), 6.62 (d, $J$ = 7.7 Hz, 2H), 3.81 (s, 1H), 3.33 (m, 2H), 3.10 (dd, $J$ = 14.3, 7.0 Hz, 1H), 1.38 (d, $J$ = 6.9 Hz, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 148.0, 144.5, 129.3, 128.7, 127.3, 126.7, 117.4, 113.1, 51.0, 39.2, 19.8. MS (EI, 70 eV) $m/z$: 211, 117, 106. HRMS (ESI) (m/z): calcd for C$_{15}$H$_{17}$NNa [M+Na]$^+$: 234.1253, found: 234.1257.

**N-Benzyl-4-methylaniline (3ab).** Orange oil, yield: 97 mg (98%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.64-7.59 (m, 4H), 7.55 (t, $J$ = 6.5 Hz, 1H), 7.28 (d, $J$ = 8.4 Hz, 2H), 6.82 (d, $J$ = 8.3 Hz, 2H), 4.53 (s, 2H), 4.10 (s, 1H), 2.55 (s, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 146.3, 140.0, 130.1, 128.9, 127.8, 127.4, 126.9, 113.3, 48.8, 20.8. MS (EI, 70 eV) $m/z$: 197, 120, 91, 77, 65. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{16}$N [M+H]$^+$: 198.1277, found: 198.1267.
**N-Benzyl-4-butylaniline (3ac).** Orange oil, yield: 117 mg (98%). ¹H NMR (500 MHz, CDCl₃, ppm) δ = 7.39 (dt, J = 12.9, 7.4 Hz, 4H), 7.31 (t, J = 7.2 Hz, 1H), 7.03 (d, J = 8.4 Hz, 2H), 6.62 (d, J = 8.4 Hz, 2H), 4.34 (s, 2H), 2.54 (m, 2H), 1.58 (m, 2H), 1.38 (m, 2H), 0.95 (t, J = 7.3 Hz, 3H). ¹³C NMR (126 MHz, CDCl₃, ppm) δ = 146.2, 139.7, 132.1, 129.2, 128.6, 127.6, 127.2, 112.9, 48.7, 34.7, 34.0, 22.4, 14.0. MS (EI, 70 eV) m/z: 239, 196, 91, 77, 65. HRMS (ESI) (m/z): calcd for C₁₇H₂₁NNa [M+Na]⁺: 262.1566, found: 262.1566.

**N-Benzyl-4-(tert-butyl)aniline (3ad).** Orange oil, yield: 103 mg (86%). ¹H NMR (500 MHz, CDCl₃, ppm) δ = 7.42 (m, 4H), 7.34 (td, J = 6.8, 1.4 Hz, 1H), 7.28 (m, 2H), 6.67 (m, 2H), 4.37 (s, 2H), 3.85 (m, 1H), 1.35 (s, 9H). ¹³C NMR (126 MHz, CDCl₃, ppm) δ = 145.9, 140.4, 139.7, 128.7, 127.6, 127.2, 112.6, 48.7, 33.9, 31.6. MS (EI, 70 eV) m/z: 239, 146, 132, 91, 65. HRMS (ESI) (m/z): calcd for C₁₇H₂₁NNa [M+Na]⁺: 262.1566, found: 262.1571.

**N-Benzyl-4-methoxyaniline (3ae).** Orange oil, yield: 50 mg (47%). ¹H NMR (500 MHz, CDCl₃, ppm) δ = 7.38 (m, 4H), 7.31 (dt, J = 4.5, 1.9 Hz, 1H), 6.81 (m, 2H), 6.64 (m, 2H), 4.31 (s, 2H), 3.97 (s, 1H), 3.77 (s, 3H). ¹³C NMR (126 MHz, CDCl₃, ppm) δ = 152.2, 142.3, 139.6, 128.6, 127.6, 127.2, 114.9, 114.2, 55.8, 49.3. MS (EI, 70 eV) m/z: 213, 198, 122, 91, 65. HRMS (ESI) (m/z): calcd for C₁₄H₁₅NONa [M+Na]⁺: 236.1046, found: 236.1049.
**N-Benzyl-4-phenoxyaniline (3af).** Orange oil, yield: 127 mg (92%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.48 (q, $J = 7.1$ Hz, 4H), 7.39 (m, 3H), 7.12 (td, $J = 7.4$, 0.6 Hz, 1H), 7.06 (m, 2H), 7.02 (m, 2H), 6.72 (d, $J = 8.7$ Hz, 2H), 4.40 (s, 2H), 3.93 (s, 1H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 159.2, 147.8, 144.9, 139.5, 129.7, 128.8, 127.7, 127.4, 122.1, 121.4, 117.2, 114.0, 48.9. MS (EI, 70 eV) $m/z$: 275, 91, 77, 65, 51. HRMS (ESI) (m/z): calcd for C$_{19}$H$_{17}$NONa [M+Na]$^+$: 298.1202, found: 298.1210.

**N-Benzyl-[1,1'-biphenyl]-4-amine (3ag).** Orange solid, yield: 80 mg (62%), mp 100-101 °C. $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.67 (d, $J = 7.4$ Hz, 2H), 7.57 (d, $J = 8.2$ Hz, 2H), 7.55-7.45 (m, 6H), 7.45-7.34 (m, 2H), 6.81 (d, $J = 8.2$ Hz, 2H), 4.46 (s, 2H), 4.16 (s, 1H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 147.5, 141.3, 139.3, 130.5, 128.7, 128.7, 128.0, 127.6, 127.4, 126.4, 126.1, 113.2, 48.4. MS (EI, 70 eV) $m/z$: 259, 115, 91, 65, 51. HRMS (ESI) (m/z): calcd for C$_{19}$H$_{17}$NNa [M+Na]$^+$: 282.1253, found: 282.1258.

**N-Benzyl-4-fluoroaniline (3ah).** Yellow oil, yield: 61 mg (61%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.46-7.43 (m, 4H), 7.37 (ddd, $J = 11.0$, 5.5, 3.1 Hz, 1H), 6.99-6.95 (m, 2H), 6.65-6.62 (m, 2H), 4.35 (s, 2H), 4.01 (s, 1H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 155.9 (d, $J = 234.6$ Hz), 144.6 (d, $J = 1.6$ Hz), 139.4, 128.8, 127.6, 127.4, 115.8 (d, $J = 22.4$ Hz), 113.7 (d, $J = 7.4$ Hz), 48.9. MS (EI, 70 eV) $m/z$: 201, 91, 75, 65, 51. HRMS (ESI) (m/z): calcd for C$_{13}$H$_{13}$FN [M+H]$^+$: 202.1026, found: 202.1017.
**N-Benzyl-4-chloroaniline (3ai).** Orange oil, yield: 71 mg (65%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.38 (d, $J$ = 4.4 Hz, 4H), 7.32 (dd, $J$ = 8.4, 4.1 Hz, 1H), 7.14 (m, 2H), 6.58 (m, 2H), 4.33 (s, 2H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 146.6, 138.9, 129.1, 128.7, 127.5, 127.4, 122.2, 114.0, 48.4. MS (EI, 70 eV) m/z: 217, 91, 75, 65, 51. HRMS (ESI) (m/z): calcd for C$_{13}$H$_{13}$ClN [M+H]$^+$: 218.0731, found: 218.0721.

**N-Benzyl-3-methylaniline (3aj).** Orange oil, yield: 71 mg (71%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.40 (qd, $J$ = 8.1, 3.9 Hz, 4H), 7.32 (m, 1H), 7.12 (t, $J$ = 7.7 Hz, 1H), 6.60 (d, $J$ = 7.5 Hz, 1H), 6.51 (dd, $J$ = 13.0, 5.0 Hz, 2H), 4.36 (s, 2H), 3.99 (s, 1H), 2.32 (s, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 148.2, 139.5, 139.1, 129.2, 128.7, 127.6, 127.2, 118.6, 113.7, 110.0, 48.4, 21.7. MS (EI, 70 eV) m/z: 197, 120, 91, 65, 51. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{15}$NNa [M+Na]$^+$: 220.1097, found: 220.1088.

**N-Benzyl-3-methoxyaniline (3ak).** Orange oil, yield: 55 mg (52%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.39 (qd, $J$ = 8.1, 3.9 Hz, 4H), 7.31 (m, 1H), 7.11 (t, $J$ = 8.1 Hz, 1H), 6.31 (m, 2H), 6.23 (t, $J$ = 2.3 Hz, 1H), 4.35 (s, 2H), 4.09 (s, 1H), 3.78 (s, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 160.8, 149.6, 139.3, 130.0, 128.7, 127.6, 127.3, 106.0, 102.7, 98.9, 55.1, 48.3. MS (EI, 70 eV) m/z: 213, 136, 91, 65, 51. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{16}$NO [M+H]$^+$: 214.1226, found: 214.1219.
**N-Benzyl-2-methylaniline (3al).** Orange oil, yield: 33 mg (33%).

$^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta = 7.54$-$7.47$ (m, 4H), 7.42 (t, $J = 6.8$ Hz, 1H), 7.24 (dd, $J = 15.3$, 7.5 Hz, 2H), 6.82 (t, $J = 7.4$ Hz, 1H), 6.75 (d, $J = 8.0$ Hz, 1H), 4.50 (s, 2H), 3.99 (s, 1H), 2.30 (s, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta = 146.2$, 139.6, 130.2, 128.8, 127.7, 127.4, 127.3, 122.0, 117.3, 110.1, 48.4, 17.7. MS (EI, 70 eV) m/z: 197, 91, 77, 65, 51. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{16}$N [M+H]$^+$: 198.1277, found: 198.1269.

**N-Benzyl-2-methoxyaniline (3am).** Brown oil, yield: 52 mg (49%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta = 7.55$-$7.52$ (m, 2H), 7.49 (td, $J = 7.6$, 1.9 Hz, 2H), 7.42 (td, $J = 6.8$, 1.4 Hz, 1H), 7.02-6.98 (m, 1H), 6.95-6.92 (m, 1H), 6.87-6.82 (m, 1H), 6.77-6.73 (m, 1H), 4.79 (s, 1H), 4.49 (s, 2H), 3.97 (s, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta = 146.9$, 139.8, 138.3, 128.7, 127.7, 127.3, 121.4, 116.8, 110.2, 109.5, 55.5, 48.2. MS (EI, 70 eV) m/z: 213, 120, 91, 65, 51. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{15}$ONa [M+Na]$^+$: 236.1046, found: 236.1042.

**N-Benzyl-2,6-dimethylaniline (3an).** Yellow oil, yield: 50 mg (47%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta = 7.38$ (m, 4H), 7.32 (ddd, $J = 6.9$, 3.9, 1.6 Hz, 1H), 7.04 (d, $J = 7.5$ Hz, 2H), 6.88 (t, $J = 7.5$ Hz, 1H), 4.14 (s, 2H), 3.71 (s, 1H), 2.31 (s, 6H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta = 145.9$, 140.4, 129.9, 128.9, 128.6, 128.0, 127.3, 122.2, 52.9, 18.5. MS (EI, 70 eV) m/z: 211, 91, 77, 65, 51. HRMS (ESI) (m/z): calcd for C$_{15}$H$_{18}$N [M+H]$^+$: 212.1434, found: 212.1429.
**N-Benzyl-3,5-dimethylaniline (3ao).** Orange oil, yield: 103 mg (98%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.39 (dt, $J = 12.2$, 7.3 Hz, 4H), 7.31 (t, $J = 6.9$ Hz, 1H), 6.44 (s, 1H), 6.34 (s, 2H), 4.34 (s, 2H), 3.91 (s, 1H), 2.27 (s, 6H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 148.2, 139.6, 139.0, 128.6, 127.6, 127.2, 119.7, 110.8, 48.4, 21.5. MS (EI, 70 eV) $m/z$: 211, 91, 77, 64, 39. HRMS (ESI) (m/z): calcd for C$_{15}$H$_{17}$NNa [M+Na]$^+$: 234.1253, found: 234.1258.

**N-Benzyl-3,5-dimethoxyaniline (3ap).** Brown oil, yield: 37 mg (30%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.38 (m, 5H), 7.31 (m, 1H), 5.93 (t, $J = 2.1$ Hz, 1H), 5.87 (d, $J = 2.1$ Hz, 2H), 4.33 (s, 2H), 3.87 (s, 1H), 3.76 (s, 6H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 161.7, 150.1, 139.2, 128.7, 127.6, 127.3, 91.8, 89.9, 55.2, 48.4. MS (EI, 70 eV) $m/z$: 243, 166, 91, 73, 65. HRMS (ESI) (m/z): calcd for C$_{15}$H$_{17}$NO$_2$Na [M+Na]$^+$: 266.1152, found: 266.1161.

**N-Benzyl-2,3-dihydro-1H-inden-5-amine (3aq).** Orange oil, yield: 56 mg (50%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.55 (dt, $J = 12.7$, 7.3 Hz, 4H), 7.50-7.45 (m, 1H), 7.24 (d, $J = 8.0$ Hz, 1H), 6.75 (d, $J = 1.2$ Hz, 1H), 6.64 (dd, $J = 8.0$, 2.2 Hz, 1H), 4.48 (s, 2H), 4.04 (s, 1H), 3.03 (dd, $J = 14.3$, 7.1 Hz, 4H), 2.28-2.22 (m, 2H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 147.0, 145.5, 139.8, 133.4, 128.6, 127.5, 127.1, 124.8, 111.3, 109.1, 48.9, 33.2, 32.0, 25.7. MS (EI, 70 eV) $m/z$: 223, 91, 77, 65, 51, 32. HRMS (ESI) (m/z): calcd for C$_{16}$H$_{17}$NNa [M+Na]$^+$: 246.1253, found: 246.1258.
N-Benzylbenzo[\textit{d}][1,3]dioxol-5-amine (3ar). Brown oil, yield: 34 mg (30%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) δ = 7.38 (dd, J = 10.2, 3.7 Hz, 4H), 7.32 (dd, J = 4.1, 2.2 Hz, 1H), 6.69 (dd, J = 8.3, 4.3 Hz, 1H), 6.31 (d, J = 2.3 Hz, 1H), 6.11 (m, 1H), 5.87 (s, 2H), 4.29 (s, 2H), 3.24 (s, 1H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) δ = 148.4, 143.9, 139.7, 139.4, 128.7, 127.6, 127.3, 108.7, 104.5, 100.6, 96.0, 49.3. MS (EI, 70 eV) m/z: 227, 136, 91, 65, 51. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{13}$NO$_2$Na [M+Na]$^+$: 250.0838, found: 250.0833.

N-Benzylcyclohexanamine (3as). Yellow oil, yield: 65 mg (69%). $^1$H NMR (500 MHz, CDCl$_3$, ppm) δ = 7.34 (d, J = 4.4 Hz, 4H), 7.28 (dd, J = 8.4, 3.9 Hz, 1H), 3.84 (s, 2H), 2.52 (ddd, J = 10.4, 6.6, 3.8 Hz, 1H), 1.95 (d, J = 10.1 Hz, 3H), 1.77 (m, 2H), 1.64 (d, J = 11.8 Hz, 1H), 1.21 (m, 6H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) δ = 140.8, 128.4, 128.2, 126.8, 56.2, 51.0, 33.5, 26.2, 25.0. MS (EI, 70 eV) m/z: 189, 158, 146, 132, 91. HRMS (ESI) (m/z): calcd for C$_{13}$H$_{19}$N [M+Na]$^+$: 250.0838, found: 250.0833.

N-Benzylaniline-\textit{d}_1 (3aa-\textit{d}_1). Yellow oil, yield: 51 mg (92%, 97%-\textit{D}). $^1$H NMR (500 MHz, CDCl$_3$, ppm) δ = 7.36 (dt, J = 15.0, 7.4 Hz, 4H), 7.28 (t, J = 7.1 Hz, 1H), 7.19 (dd, J = 8.4, 7.5 Hz, 2H), 6.74 (t, J = 7.3 Hz, 1H), 6.66 (d, J = 7.7 Hz, 2H), 4.34 (s, 1H), 3.66 (s, 1H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) δ = 148.1, 139.3, 129.3, 128.7, 127.6, 127.3, 117.6, 112.9, 48.4. MS (EI, 70 eV) m/z: 184, 92, 77, 51. HRMS (ESI) (m/z): calcd for C$_{13}$H$_{13}$DN [M+H]$^+$: 185.1184, found: 185.1174.
**N-(4-Isopropylbenzyl)aniline-d$_1$ (3ca-d$_1$).** Yellow oil, yield: 38 mg (56%, 94%-D). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.32 (d, $J$ = 8.0 Hz, 2H), 7.21 (m, 4H), 6.74 (t, $J$ = 7.3 Hz, 1H), 6.67 (d, $J$ = 7.8 Hz, 2H), 4.30 (s, 1H), 3.94 (s, 1H), 2.93 (dt, $J$ = 13.8, 6.9 Hz, 1H), 1.28 (s, 3H), 1.26 (s, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 148.2, 148.0, 136.7, 129.3, 127.7, 126.7, 117.5, 112.9, 48.2, 33.8, 24.1. MS (EI, 70 eV) $m/z$: 226, 184, 134, 105, 77, 51. HRMS (ESI) (m/z): calcd for C$_{16}$H$_{19}$DN [M+H]$^+$: 227.1653, found: 227.1644.

**N-(4-(tert-Butyl)benzyl)aniline-d$_1$ (3da-d$_1$).** Yellow oil, yield: 57 mg (79%, 96%-D). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.39 (m, 2H), 7.33 (d, $J$ = 8.2 Hz, 2H), 7.20 (dd, $J$ = 8.3, 7.5 Hz, 2H), 6.74 (t, $J$ = 7.3 Hz, 1H), 6.67 (d, $J$ = 7.7 Hz, 2H), 4.31 (s, 1H), 1.34 (s, 9H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 150.3, 148.2, 136.4, 129.3, 127.4, 125.6, 117.6, 112.9, 48.1, 34.5, 31.4. MS (EI, 70 eV) $m/z$: 240, 148, 105, 77, 55. HRMS (ESI) (m/z): calcd for C$_{17}$H$_{21}$DN [M+H]$^+$: 241.1810, found: 241.1802.

**N-([1,1'-Biphenyl]-4-ylmethyl)aniline-d$_1$ (3fa-d$_1$).** Yellow solid, yield: 76 mg (98%, 82%-D), mp 88-90 °C. $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.70-7.66 (m, 4H), 7.53 (t, $J$ = 7.7 Hz, 4H), 7.44 (t, $J$ = 7.4 Hz, 1H), 7.29 (t, $J$ = 7.9 Hz, 2H), 6.84 (t, $J$ = 7.3 Hz, 1H), 6.75 (d, $J$ = 7.8 Hz, 2H), 4.44 (d, $J$ = 9.6 Hz, 1H), 4.32-3.75 (m, 1H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 148.2, 140.9, 140.3, 138.6, 138.6, 129.4, 128.9, 128.0, 127.5, 127.4, 127.2, 117.7, 113.0, 48.1. MS (EI, 70

\[ \text{N-(3-Methoxybenzyl)aniline-}d_1 \ (3\text{ga-}d_1) \]. Yellow oil, yield: 48 mg (75%, 72%-D). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.28 (m, 1H), 7.19 (t, $J = 7.9$ Hz, 2H), 6.97 (m, 2H), 6.84 (d, $J = 8.2$ Hz, 1H), 6.74 (t, $J = 7.3$ Hz, 1H), 6.66 (d, $J = 7.9$ Hz, 2H), 4.32 (s, 1H), 4.07 (s, 1H), 3.81 (s, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 159.9, 148.1, 141.1, 129.7, 129.3, 119.8, 117.6, 113.1, 112.9, 112.7, 55.2, 48.4. MS (EI, 70 eV) m/z: 214, 122, 92, 77, 51. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{15}$DNO [M+H]^+: 215.1289, found: 215.1279.

\[ \text{N-(3-Fluorobenzyl)aniline-}d_1 \ (3\text{ia-}d_1) \]. Yellow oil, yield: 50 mg (82%, 94%-D). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.42-7.38 (m, 1H), 7.33-7.29 (m, 2H), 7.25 (d, $J = 7.4$ Hz, 1H), 7.20 (d, $J = 9.6$ Hz, 1H), 7.08 (t, $J = 8.3$ Hz, 1H), 6.89-6.85 (m, 1H), 6.74-6.71 (m, 2H), 4.40 (s, 1H), 4.17 (s, 1H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 163.3 (d, $J = 245.7$ Hz), 148.0, 142.5 (d, $J = 6.7$ Hz), 130.2 (d, $J = 8.2$ Hz), 129.5, 122.9 (d, $J = 2.1$ Hz), 117.9, 114.3 (d, $J = 21.5$ Hz), 114.2 (d, $J = 21.1$ Hz), 113.0, 47.5. MS (EI, 70 eV) m/z: 202, 111, 109, 77, 51. HRMS (ESI) (m/z): calcd for C$_{14}$H$_{12}$DFN [M+H]^+: 203.1089, found: 203.1099.

\[ \text{N-(2-Methoxybenzyl)aniline-}d_1 \ (3\text{ja-}d_1) \]. Yellow oil, yield: 63 mg (98%, 91%-D). $^1$H NMR (500 MHz, CDCl$_3$, ppm) $\delta$ = 7.32 (dd, $J = 7.4, 1.5$ Hz, 1H), 7.26 (q, $J = 6.0$ Hz, 1H), 7.17 (m, 2H), 6.92 (m, 2H), 6.69 (m, 3H), 4.34 (s, 1H), 3.87 (s, 3H). $^{13}$C NMR (126 MHz, CDCl$_3$, ppm) $\delta$ = 157.4, 148.4, 129.2, 129.0, 128.4,
127.3, 120.5, 117.4, 113.2, 110.3, 55.3, 43.5. MS (EI, 70 eV) m/z: 214, 122, 93, 77, 51. HRMS (ESI) (m/z): calcd for C_{14}H_{15}DNO [M+H]^+: 215.1289, found: 215.1282.

\[ \text{N-(2-Methylbenzyl)aniline-} d_1 \text{(3ka-}d_1) \]. Yellow oil, yield: 34 mg (58%, 78%-D). \(^1\)H NMR (500 MHz, CDCl\(_3\), ppm) \( \delta = 7.35 \text{ (d, } J = 7.2 \text{ Hz, } 1H) \), 7.21 (m, 5H), 6.75 (m, 1H), 6.66 (dt, \( J = 8.8, 1.6 \text{ Hz, } 2H) \), 4.29 (s, 1H), 3.84 (s, 1H), 2.39 (s, 3H). \(^{13}\)C NMR (126 MHz, CDCl\(_3\), ppm) \( \delta = 148.3, 137.0, 136.4, 130.4, 129.3, 128.3, 127.5, 126.2, 117.5, 112.7, 46.4, 19.0 \). MS (EI, 70 eV) m/z: 198, 180, 106, 77, 51. HRMS (ESI) (m/z): calcd for C_{14}H_{15}DN [M+H]^+: 199.1340, found: 199.1335.

\[ \text{N-(Naphthalen-2-ylmethyl)aniline-} d_1 \text{(3ma-}d_1) \]. Yellow solid, yield: 54 mg (77%, 86%-D), mp 62-63 °C. \(^1\)H NMR (500 MHz, CDCl\(_3\), ppm) \( \delta = 7.90 \text{ (m, } 4H) \), 7.55 (m, 3H), 7.26 (t, \( J = 7.9 \text{ Hz, } 2H) \), 6.82 (t, \( J = 7.3 \text{ Hz, } 1H) \), 6.75 (d, \( J = 8.1 \text{ Hz, } 2H) \), 4.52 (s, 1H), 4.05 (s, 1H). \(^{13}\)C NMR (126 MHz, CDCl\(_3\), ppm) \( \delta = 148.2, 137.0, 133.6, 132.9, 129.4, 128.4, 127.8, 127.8, 126.2, 126.0, 125.8, 117.7, 113.0, 48.6 \). MS (EI, 70 eV) m/z: 234, 142.1, 116.1, 105, 77, 51. HRMS (ESI) (m/z): calcd for C_{17}H_{15}DN [M+H]^+: 235.1340, found: 235.1331.

\[ \text{N-Benzyl-4-methylaniline-} d_1 \text{(3ab-}d_1) \]. Yellow oil, yield: 45 mg (76%, 77%-D). \(^1\)H NMR (500 MHz, CDCl\(_3\), ppm) \( \delta = 7.37 \text{ (m, } 4H) \), 7.29 (t, \( J = 7.1 \text{ Hz, } 1H) \), 7.01 (d, \( J = 7.4 \text{ Hz, } 2H) \), 6.59 (d, \( J = 8.0 \text{ Hz, } 2H) \), 4.33 (s, 1H), 3.86 (s, 1H), 2.26 (s, 3H). \(^{13}\)C NMR (126 MHz, CDCl\(_3\), ppm) \( \delta = 145.9, 139.6, 129.8, 128.6, 127.5, 127.2, 126.8, 113.0, 48.7, 20.4 \). MS (EI, 70 eV) m/z: 198, 121, 92, 65, 51. HRMS (ESI) (m/z): calcd for C_{14}H_{15}DN [M+H]^+: 199.1340, found: 199.1333.
**N-Benzyl-4-butylaniline-d₁ (3ac-d₁).** Yellow oil, yield: 50 mg (70%, 90%-D). $^1$H NMR (500 MHz, CDCl₃, ppm) $\delta = 7.37$ (m, 4H), 7.28 (t, $J = 7.2$ Hz, 1H), 7.01 (d, $J = 8.2$ Hz, 2H), 6.60 (m, 2H), 4.32 (s, 1H), 3.84 (s, 1H), 2.51 (m, 2H), 1.55 (dd, $J = 15.3$, 8.2 Hz, 2H), 1.35 (dd, $J = 14.9$, 7.4 Hz, 2H), 0.93 (d, $J = 7.4$ Hz, 3H). $^{13}$C NMR (126 MHz, CDCl₃, ppm) $\delta = 146.0$, 139.6, 132.2, 129.2, 128.6, 127.6, 127.2, 113.0, 48.7, 34.7, 34.0, 22.4, 14.0. MS (EI, 70 eV) $m/z$: 240, 197, 92, 65, 51. HRMS (ESI) (m/z): calcd for C₁₇H₂₁DN [M+H]$^+$: 241.1810, found: 241.1802.

**N-Benzyl-4-(tert-butyl)aniline-d₁ (3ad-d₁).** Yellow oil, yield: 54 mg (75%, 80%-D). $^1$H NMR (500 MHz, CDCl₃, ppm) $\delta = 7.37$ (m, 4H), 7.28 (t, $J = 7.2$ Hz, 1H), 7.22 (m, 2H), 6.63 (m, 2H), 4.32 (s, 1H), 29 (s, 9H). $^{13}$C NMR (126 MHz, CDCl₃, ppm) $\delta = 145.6$, 140.7, 139.4, 128.6, 127.7, 127.3, 126.1, 112.9, 48.8, 33.9, 31.6. MS (EI, 70 eV) $m/z$: 240, 225, 92, 65, 51. HRMS (ESI) (m/z): calcd for C₁₇H₂₁DN [M+H]$^+$: 241.1810, found: 241.1802.

**N-Benzyl-4-phenoxyaniline-d₁ (3af-d₁).** Yellow oil, yield: 70 mg (85%, 97%-D). $^1$H NMR (500 MHz, CDCl₃, ppm) $\delta = 7.38$ (dt, $J = 14.9$, 7.5 Hz, 4H), 7.29 (dd, $J = 16.3$, 8.0 Hz, 3H), 7.02 (t, $J = 7.4$ Hz, 1H), 6.93 (m, 4H), 6.65 (m, 2H), 4.33 (s, 1H), 4.03 (s, 1H). $^{13}$C NMR (126 MHz, CDCl₃, ppm) $\delta = 159.1$, 147.9, 144.8, 139.3, 129.5, 128.7, 127.6, 127.4, 122.0, 121.2, 117.2, 113.9, 48.9. MS (EI, 70 eV) $m/z$: 276, 184, 129, 92, 77, 51. HRMS (ESI) (m/z): calcd for C₁₉H₁₇DNO [M+H]$^+$: 277.1446, found: 277.1439.
**N-Benzyl-4-chloroaniline-d₁ (3ai-d₁).** Yellow oil, yield: 31 mg (48%, 91%-D). $^1$H NMR (500 MHz, CDCl₃, ppm) $\delta = 7.38$ (d, $J = 4.4$ Hz, 4H), 7.32 (dd, $J = 8.9, 4.5$ Hz, 1H), 7.16-7.12 (m, 2H), 6.59-6.56 (m, 2H), 4.31 (s, 1H). $^{13}$C NMR (126 MHz, CDCl₃, ppm) $\delta = 146.7$, 138.9, 129.1, 128.7, 127.4, 127.4, 122.1, 113.9, 48.0. MS (EI, 70 eV) $m/z$: 218, 139, 111, 91, 65, 51. HRMS (ESI) ($m/z$): calcd for C₁₃H₁₂DCIN [M+H]$^+$: 219.0794, found: 219.0793.

**N-Benzyl-3,5-dimethylaniline-d₁ (3ao-d₁).** Yellow oil, yield: 43 mg (68%, 91%-D). $^1$H NMR (500 MHz, CDCl₃, ppm) $\delta = 7.43$-$7.36$ (m, 4H), 7.31 (dd, $J = 9.5, 4.4$ Hz, 1H), 6.43 (s, 1H), 6.33 (s, 2H), 4.34 (s, 1H), 2.27 (s, 6H). $^{13}$C NMR (126 MHz, CDCl₃, ppm) $\delta = 148.3$, 139.7, 139.0, 128.6, 127.6, 127.2, 119.6, 110.8, 48.4, 21.5. MS (EI, 70 eV) $m/z$: 212, 135, 92, 77, 51. HRMS (ESI) ($m/z$): calcd for C₁₅H₁₇DN [M+H]$^+$: 213.1497, found: 213.1488.

**N-Benzyl-4-methyl-N-phenylbenzenesulphonamide  (5a).** White solid, yield: 140mg (82%), mp 144-145 °C. $^1$H NMR (500 MHz, CDCl₃, ppm) $\delta = 7.57$ (d, $J = 8.1$ Hz, 2H), 7.30 (d, $J = 8.1$ Hz, 2H), 7.26-7.24 (m, 4H), 7.22 (dd, $J = 5.3, 1.6$ Hz, 4H), 7.00 (dd, $J = 7.2, 2.3$ Hz, 2H), 4.75 (s, 2H), 2.47 (s, 3H). $^{13}$C NMR (126 MHz, CDCl₃, ppm) $\delta = 143.5$, 139.0, 136.0, 135.6, 129.5, 129.0, 128.9, 128.5, 128.4, 127.8, 127.8, 127.6, 54.7, 21.6. HRMS (ESI) ($m/z$): calcd for C₂₀H₁₉NO₂SNa [M+Na]$^+$: 360.1029, found: 360.1030.
N-(4-(N-Benzyl-N-phenylsulfamoyl)phenyl)acetamide (5b). White solid, yield: 55 mg (72%), mp 202-203 °C. \(^1\)H NMR (500 MHz, CD\(_2\)OD, ppm) \(\delta = 9.65\) (s, 1H), 7.85 (m, 2H), 7.60 (m, 2H), 7.32 (m, 2H), 7.23 (m, 6H), 7.11 (m, 2H), 4.85 (s, 2H), 2.16 (s, 3H). \(^{13}\)C NMR (126 MHz, CD\(_2\)OD, ppm) \(\delta = 168.9, 143.6, 139.3, 136.6, 132.3, 128.8, 128.7, 128.6, 128.3, 128.2, 127.5, 127.4, 118.5, 54.0, 23.6\). HRMS (ESI) (m/z): calcd for C\(_{21}\)H\(_{21}\)N\(_2\)O\(_3\)S [M+H]\(^+\): 381.1267, found: 381.1259.

N-(4-(N-Benzyl-N-(4-phenoxyphenyl)sulfamoyl)phenyl)acetamide (5c). White solid, yield: 79 mg (84%), mp 96-97 °C. \(^1\)H NMR (500 MHz, CDCl\(_3\), ppm) \(\delta = 8.45\) (s, 1H), 7.70 (d, \(J = 8.7\) Hz, 2H), 7.62 (d, \(J = 8.8\) Hz, 2H), 7.33 (t, \(J = 7.8\) Hz, 2H), 7.24 (m, 4H), 7.13 (t, \(J = 7.4\) Hz, 1H), 6.97 (d, \(J = 8.5\) Hz, 2H), 6.91 (m, 2H), 6.80 (m, 2H), 4.70 (s, 2H), 2.20 (s, 3H). \(^{13}\)C NMR (126 MHz, CDCl\(_3\), ppm) \(\delta = 169.4, 157.2, 156.1, 142.6, 135.8, 133.4, 132.8, 130.5, 129.9, 128.8, 128.5, 128.5, 127.8, 124.0, 119.6, 119.3, 118.4, 55.2, 24.6\). HRMS (ESI) (m/z): calcd for C\(_{27}\)H\(_{23}\)N\(_2\)O\(_4\)S [M+H]\(^+\): 473.1530, found: 473.1523.
G. NMR Spectra

$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3aa

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3aa
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ba

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ba
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ca

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ca
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3da

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3da
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ea

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ea
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3fa

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3fa
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ga

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ga
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ha

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ha
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ia

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ia
\(^1\)H NMR (500 MHz, CDCl\(_3\)) spectrum of compound 3ja

\(^{13}\)C NMR (126 MHz, CDCl\(_3\)) spectrum of compound 3ja
$^{1}H$ NMR (500 MHz, CDCl$_3$) spectrum of compound 3ka

$^{13}C$ NMR (126 MHz, CDCl$_3$) spectrum of compound 3ka
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3la

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3la
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ma

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ma
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3na

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3na
\( ^1H \text{ NMR (500 MHz, CDCl}_3 \) spectrum of compound 3oa

\[
\begin{align*}
7.31 & \quad 7.51 & \quad 7.57 & \quad 7.35 & \quad 7.34 & \quad 7.33 & \quad 7.68 & \quad 6.80 & \quad 4.43 & \quad 4.43 \\
1.00 & \quad 2.00 & \quad 1.00 & \quad 1.00 & \quad 1.00 & \quad 1.00 & \quad 5.00 & \quad 0.00 & \quad 0.00 & \quad 0.00
\end{align*}
\]

\( ^{13}C \text{ NMR (126 MHz, CDCl}_3 \) spectrum of compound 3oa

\[
\begin{align*}
152.89 & \quad 147.83 & \quad 142.06 & \quad 129.42 & \quad 118.34 & \quad 113.31 & \quad 110.56 & \quad 107.17 & \quad 41.51
\end{align*}
\]
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3pa

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3pa
$^{1}H$ NMR (500 MHz, CDCl$_3$) spectrum of compound 3qa

$^{13}C$ NMR (126 MHz, CDCl$_3$) spectrum of compound 3qa
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ra

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ra
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3sa

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3sa
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ta

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ta
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ab

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ab
\[ ^1H\text{ NMR (500 MHz, CDCl}_3\] spectrum of compound 3ac

\[ ^{13}C\text{ NMR (126 MHz, CDCl}_3\] spectrum of compound 3ac
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ad

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ad
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ae

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ae
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3af

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3af
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ag

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ag
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ah

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ah
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ai

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ai
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3aj

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3aj
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ak

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ak
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3al

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3al
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3am

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3am
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3an

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3an
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ao

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ao
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ap

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ap
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3aq

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3aq
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ar

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ar
$^{1}H$ NMR (500 MHz, CDCl$_3$) spectrum of compound 3as

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3as
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3aa-$d_1$

13C NMR (126 MHz, CDCl$_3$) spectrum of compound 3aa-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ca-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ca-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3da-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3da-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3fa-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3fa-$d_1$
$^{1}$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ga-d$_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ga-d$_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ia-d$_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ia-d$_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ja-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ja-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ka-d$_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ka-d$_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ma-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ma-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ab-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ab-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ac-$d_1$

\[
\begin{array}{c|c}
7.39 & 4.32 \\
7.37 & 3.84 \\
7.35 & 4.32 \\
7.34 & 2.53 \\
7.28 & 3.43 \\
7.27 & 3.16 \\
7.01 & 0.81 \\
6.68 & 0.92 \\
6.88 & 0.91 \\
\end{array}
\]

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ac-$d_1$

\[
\begin{array}{c|c}
138.93 & 48.74 \\
127.60 & 34.74 \\
112.98 & 34.02 \\
127.60 & 22.36 \\
121.29 & 14.01 \\
\end{array}
\]
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ad-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ad-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3af-d$_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3af-d$_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ai-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ai-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 3ao-$d_1$

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 3ao-$d_1$
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 5a

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 5a
$^1$H NMR (500 MHz, C$_3$D$_6$O) spectrum of compound 5b

$^{13}$C NMR (126 MHz, C$_3$D$_6$O) spectrum of compound 5b
$^1$H NMR (500 MHz, CDCl$_3$) spectrum of compound 5c

$^{13}$C NMR (126 MHz, CDCl$_3$) spectrum of compound 5c