Four-Component Coupling Reaction of Carbon dioxide, Amines, Cyclic Ethers and 3-Triflyloxybenzynes for the Synthesis of Functionalized Carbamates

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A. General methods

$^1$H and $^{13}$C NMR spectra were recorded by using a 400 MHz NMR spectrometer. The chemical shifts are referenced to signals at 7.26 and 77.0 ppm, respectively, and CDCl$_3$ is used as a solvent with TMS as the internal standard. Mass spectra were recorded on a gas chromatograph-mass spectrometer. The data of HRMS was carried out on a high-resolution mass spectrometer (LCMS-IT-TOF). IR spectra were obtained either as potassium bromide plates or as liquid films between two potassium bromide plates with an infrared spectrometer. Melting points were determined with a digital melting point measuring instrument. Substrates 1b-1h were prepared according to the literature procedure.$^1$ Substrate 1a and other reagents were commercially purchased and used without further purification. Reagent 3m (optical rotation (c=10, in methanol): + 30.2°) was commercially purchased from Alfa Aesar. All air- and moisture-sensitive manipulations were carried out with standard Schlenk techniques under nitrogen or in a glove box.

B. General procedure for the preparation of organic carbamates

In a glove box, TBAI (0.4 mmol), 3-triflyloxybenzenes 1 (0.1 mmol), cyclic ethers 2 (anhydrous, 3 mL) were added to a 25 mL Schlenk tube equipped with a Teflon cap and a magnetic stirring bar. After the sealed tube was taken out of the glovebox, the reaction mixture was subjected to vacuum for a while and CO$_2$ (1 atm) was introduced into the reaction vessel. Subsequently, amines 3 (0.5 mmol) was slowly added to the resulted mixture via a syringe under stirring at room temperature. The reaction was allowed to continue at room temperature for 8 h. After the reaction was completed, the reaction mixture was quenched with saturated brine water (5 mL), then extracted with ethyl acetate (10 mL) and washed with saturated brine water. The organic layer was dried over anhydrous Na$_2$SO$_4$, then filtered and concentrated in vacuum. The crude residue was separated by column chromatography on silica gel to give the desired product 4.
C. Optimization of reaction conditions

Table S1 Optimization of reaction conditions.

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<td>-</td>
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\(^a\) Reaction conditions: 1 (0.1 mmol), 2\(_a\) (THF, 3 mL), 3\(_a\) (5 equiv), base (3 equiv.), CO\(_2\) (1 atm), 8 h. \(^b\) GC yield with dodecane as the internal standard; the number in parentheses is the yield of the isolated product. \(^c\) n.d. = not detected. \(^d\) The reaction was carried out with 5 equiv. of THF using DMF (3mL) as the solvent. \(^e\) The reaction was performed with 5 equiv. of THF using MeCN (3mL) as the solvent. \(^f\) 4 h. \(^g\) 18-Crown-6 (3 equiv) was added. \(^h\) TBAI (4 equiv.). \(^i\) TBAI (2 equiv.).
reaction was carried out on a 1 mmol scale.

D. Procedure for the larger scale synthesis of 4c

\[
\begin{align*}
&\text{OTf} \quad \text{TMS} \quad \text{OTf} \\
&\text{O} \quad \text{T} \quad \text{M} \quad \text{S} \quad \text{O} \quad \text{T} \quad \text{f} \\
&\text{+} \\
&\text{HN} \quad \text{CO}_2 \\
&\text{+} \\
&TBAI (4 mmol) \\
&\text{rt. 8 h} \\
&\text{OTf} \quad \text{N} \quad \text{O} \\
&\text{O} \quad \text{T} \quad \text{f} \\
&\text{4c} \\
\end{align*}
\]

(0.445 g, 1 mmol) (5 mL) (0.365 g, 5 mmol) (55%, 227.1 mg)

In a glove box, TBAI (4 mmol), 2-(trimethylsilyl)-1,3-phenylene bis(trifluoromethanesulfonate) 1c (1 mmol), anhydrous tetrahydrofuran 2a (5 mL) were added to a 25 mL Schlenk tube equipped with a Teflon cap and a magnetic stirring bar. After the sealed tube was taken out of the glovebox, the reaction mixture was subjected to vacuum for a while and CO\(_2\) (1 atm) was introduced into the reaction vessel. Subsequently, amines 3a (5 mmol) was slowly added to the resulted mixture via a syringe under stirring at room temperature. The reaction was allowed to continue at room temperature for 8 h. After the reaction was completed, the reaction mixture was quenched with saturated brine water (10 mL), then extracted with ethyl acetate (30 mL) and washed with saturated brine water. The organic layer was dried over anhydrous Na\(_2\)SO\(_4\), then filtered and concentrated in vacuum. The crude residue was separated by column chromatography on silica gel to give the desired product 4c.

E. Procedure for the synthesis of compounds 5-8

Procedure for the synthesis of compounds 5:

To a solution of 3-(4-((diethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate 4c (0.2 mmol) in THF (2 mL) at room temperature was added Pd(PPh\(_3\))\(_4\) (0.01 mmol) under N\(_2\). After the reaction was stirred for 20 minutes, 2 M aqueous K\(_2\)CO\(_3\) (1 mL) and a solution of phenylboronic acid (0.24 mmol) in THF (1 mL) was added successively. The resulting mixture was refluxed for 12 h. The desired product 5 was concentrated and purified by column chromatography on silica gel.

Procedure for the synthesis of compounds 6:
To a solution of 3-(4-((dimethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate 4d (0.2 mmol) in THF (2 mL) at room temperature was added Pd(PPh₃)₄ (0.01 mmol) under N₂. After the reaction was stirred for 20 minutes, 2 M aqueous K₂CO₃ (1 mL) and a solution of (3,5-dimethylisoxazol-4-yl)boronic acid (0.24 mmol) in THF (1 mL) was added successively. The resulting mixture was refluxed for 12 h. The desired product 6 was concentrated and purified by column chromatography on silica gel.

**Procedure for the synthesis of compounds 7:**

To a solution of 3-(4-((dimethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate 4d (0.2 mmol) in DMF (2 mL) was added potassium phthalimide (0.3 mmol). The mixture was stirred at 120 °C for 24 h. After the reaction was completed, the reaction mixture was quenched with 2 M HCl (2 mL), then extracted with ethyl acetate (10 mL) and washed with saturated brine water. The organic layer was dried over anhydrous Na₂SO₄, then filtered and concentrated in vacuum. The volatile compounds were removed under vacuum and the crude residue was separated by column chromatography on silica gel to give the desired product 7.

**Procedure for the synthesis of compounds 8:**

To a solution of 3-(4-((diethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate 4c (0.2 mmol) in anhydrous THF (3 mL) at -78 °C was slowly added Lithium diisopropylamide (0.3 mmol) under N₂. The mixture was stirred at the same temperature for 0.5 h. After the reaction was completed, the reaction mixture was quenched with distilled water (5 mL), then extracted with ethyl
acetate (10 mL) and washed with saturated brine water. The organic layer was dried over anhydrous
Na$_2$SO$_4$, then filtered and concentrated in vacuum. The volatile compounds were removed under
vacuum and the crude residue was separated by column chromatography on silica gel to give the
desired product 8.
F. NOE and HMBC interactions of the 4r and 4r’

The NOE interactions of the 4r

The HMBC interactions of the 4r
The NOE interactions of the 4r’

The HMBC interactions of the 4r’
G. HPLC Spectrums of 4o

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Chiral HPLC analyses were performed on an Aglient 1200 system using a Chiralcel IA-H column (25 °C, flow rate: 1.0 mL/min, hexanes/isopropanol: 90/10, 254 nm).
H. Analytical data

3-(4-((Diethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4c)  
Pale yellow oil (32.2 mg, 78%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta =$ 7.32 (t, $J =$ 8.4 Hz, 1 H), 6.91 (dd, $J =$ 8.4 Hz, 2.2 Hz, 1 H), 6.85 (dd, $J =$ 8.2 Hz, 2.0 Hz, 1 H), 6.80 (t, $J =$ 2.4 Hz, 1 H), 4.16 (t, $J =$ 6.0 Hz, 2 H), 4.01 (t, $J =$ 6.0 Hz, 2 H), 3.27 (s, 4 H), 1.91 – 1.81 (m, 4 H), 1.12 (t, $J =$ 7.0 Hz, 6 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta =$ 160.2, 155.9, 150.2, 130.5, 118.7 ($J =$ 318.8 Hz), 114.5, 113.1, 107.9, 67.9, 64.4, 41.7, 41.2, 25.8, 25.8, 25.8. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta =$ -72.97. IR (KBr) = 2971, 2930, 1696, 1613, 1483, 1425, 1276, 1214, 1142, 1108, 945, 846, 774, 605, 512 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{16}$H$_{22}$F$_3$NO$_6$SNa (M + Na)$^+$: 436.1012; found: 436.1017.

3-(4-((Dimethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4d)  
Pale yellow oil (25.0 mg, 65%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta =$ 7.32 (t, $J =$ 8.4 Hz, 1 H), 6.91 (dd, $J =$ 8.4 Hz, 2.4 Hz, 1 H), 6.85 (dd, $J =$ 8.0 Hz, 2.0 Hz, 1 H), 6.79 (t, $J =$ 2.4 Hz, 1 H), 4.15 (t, $J =$ 6.0 Hz, 2 H), 4.00 (t, $J =$ 6.0 Hz, 2 H), 2.90 (s, 6 H), 1.92 – 1.80 (m, 4 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta =$ 160.2, 156.7, 150.2, 130.5, 118.7 ($J =$ 318.8 Hz), 114.5, 113.1, 107.9, 67.9, 64.8, 36.4, 35.8, 25.7. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta =$ -72.94. IR (KBr) = 2923, 2856, 1704, 1582, 1489, 1420, 1209, 1142, 938, 857, 604 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{14}$H$_{18}$F$_3$NNaO$_6$S (M + Na)$^+$: 408.0699; found: 408.0704.

3-(4-((Dipropylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4e)  
Pale yellow oil (31.2 mg, 71%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta =$ 7.32 (t, $J =$ 8.0 Hz, 1 H), 6.91 (d, $J =$ 8.4 Hz, 1 H), 6.85 (d, $J =$ 8.0 Hz, 2 H), 6.79 (s, 1 H), 4.14 (t, $J =$ 6.4 Hz, 2 H), 4.00 (t, $J =$ 5.6 Hz, 2 H), 3.17 (s, 4 H), 1.90 – 1.79 (m, 4 H), 1.59 – 1.49 (m, 8 H), 0.88 (t, $J =$ 7.2 Hz, 6 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta =$ 160.2, 156.4, 150.2, 130.5, 118.7 ($J =$ 318.8 Hz), 114.6, 113.1, 108.0, 68.0, 64.4, 49.2, 48.7, 25.8, 25.8, 21.9, 21.3, 11.2. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta =$ -72.94. IR (KBr) = 2961, 2927, 1698, 1612, 1475, 1423, 1213, 1143, 1107, 946, 845, 772, 604 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{18}$H$_{26}$F$_3$NO$_6$SNa (M + Na)$^+$: 464.1325; found: 464.1332.
3-(4-((Dibutylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4f)

Pale yellow oil (31.5 mg, 67%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ = 7.32 (t, $J = 8.4$ Hz, 1 H), 6.90 (d, $J = 8.4$ Hz, 1 H), 6.85 (d, $J = 8.4$ Hz, 1 H), 6.79 (s, 1 H), 4.14 (t, $J = 6$ Hz, 2 H), 4.00 (t, $J = 5.6$ Hz, 2 H), 4.00 (s, 2 H), 3.20 (s, 4 H), 1.91 – 1.79 (m, 4 H), 1.54 – 1.46 (m, 4 H), 1.33 – 1.27 (m, 4 H), 0.92 (t, $J = 7.2$ Hz, 6 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ = 160.2, 156.4, 150.2, 130.5, 118.7 ($J = 318.6$ Hz), 114.6, 113.1, 108.0, 68.0, 64.4, 47.2, 46.6, 30.8, 30.3, 25.8, 20.0, 13.8. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta$ = -72.94. IR (KBr) = 2957, 2933, 2875, 1697, 1612, 1477, 1424, 1216, 1145, 1107, 942, 846, 604 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{20}$H$_{30}$F$_{3}$NO$_6$SNa (M + Na)$^+$: 492.1638; found: 492.1643.

3-(4-((Methyl(propyl)carbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4g)

Pale yellow oil (31.4 mg, 76%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ = 7.32 (t, $J = 8.4$ Hz, 1 H), 6.91 (d, $J = 8.4$ Hz, 1 H), 6.85 (d, $J = 8.0$ Hz, 1 H), 6.79 (s, 1 H), 4.15 (t, $J = 6.0$ Hz, 2 H), 4.00 (t, $J = 6.0$ Hz, 2 H), 3.21 (s, 2 H), 2.89 (s, 3 H), 1.91 – 1.79 (m, 4 H), 1.58 – 1.49 (m, 2 H), 0.88 (t, $J = 7.2$ Hz, 3 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ = 160.2, 156.6, 150.2, 130.5, 118.7 ($J = 318.9$ Hz), 114.6, 113.1, 107.9, 68.0, 64.7, 50.6, 50.3, 25.8, 21.1. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta$ = -72.93. IR (KBr) = 2959, 2871, 1700, 1606, 1582, 1484, 1421, 1213, 1142, 1105, 941, 849, 604, 509 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_16$H$_{22}$F$_3$NNaO$_6$S (M + Na)$^+$: 436.1012; found: 436.1011.

3-(4-((Benzyl(methyl)carbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4h)

Pale yellow oil (24.0 mg, 52%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ = 7.36 – 7.18 (m, 6 H), 6.95 – 6.82 (m, 2 H), 6.78 (s, 1 H), 4.47 (s, 2 H), 4.21 (s, 2 H), 3.97 (d, $J=24.8$ Hz, 2 H), 2.86 (d, $J=31.3$ Hz, 3 H), 1.83 (s, 4 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ = 160.1, 156.8, 156.5, 150.1, 137.5, 130.5, 128.6, 127.8, 127.3, 127.2, 127.1, 118.7 ($J = 318.9$ Hz), 114.5, 113.1, 107.9, 67.9, 65.0, 52.4, 52.3, 34.4, 33.5, 25.7. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta$ = -72.91. IR (KBr) = 2928, 1701, 1612, 1587, 1485, 1419, 1213, 1143, 1105, 945, 848, 771, 697, 604, 511 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{20}$H$_{26}$F$_3$NNaO$_6$S (M + Na)$^+$: 484.1012; found: 484.1016.
4-(3-(((Trifluoromethyl)sulfonyl)oxy)phenoxy)butyl piperidine-1-carboxylate (4i)

Pale yellow oil (29.6 mg, 70%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ = 7.32 (t, $J$ = 8.4 Hz, 1 H), 6.93 – 6.88 (m, 1 H), 6.85 (d, $J$ = 8.4 Hz, 1 H), 6.79 (s, 1 H), 4.15 (t, $J$ = 6.0 Hz, 2 H), 4.00 (t, $J$ = 6.0 Hz, 2 H), 3.49 – 3.30 (m, 4 H), 1.93 – 1.80 (m, 4 H), 1.61 – 1.48 (m, 6 H).

$^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ = 160.2, 155.5, 150.2, 130.5, 118.7 ($J$ = 318.7 Hz), 114.6, 113.1, 107.9, 68.0, 64.7, 44.8, 25.8, 25.7, 24.4.

$^{19}$F NMR (376 MHz, CDCl$_3$) $\delta$ = -72.92. IR (KBr) = 2933, 2858, 1697, 1611, 1426, 1214, 1144, 1106, 1028, 945, 849, 604 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{17}$H$_{22}$F$_3$NNaO$_6$S (M + Na)$^+$: 448.1012; found: 448.1017.

4-(3-(((Trifluoromethyl)sulfonyl)oxy)phenoxy)butyl azepane-1-carboxylate (4j)

Pale yellow oil (30.1 mg, 69%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ = 7.32 (t, $J$ = 8.4 Hz, 1 H), 6.92 – 6.88 (m, 1 H), 6.84 (d, $J$ = 8.0 Hz, 1 H), 6.81 – 6.77 (m, 1 H), 4.16 (t, $J$ = 6.0 Hz, 2 H), 4.00 (t, $J$ = 6.0 Hz, 2 H), 3.40 (dt, $J$ = 10.7 Hz, 5.6 Hz, 4 H), 1.91 – 1.80 (m, 4 H), 1.67 (d, $J$ = 14.8 Hz, 4 H), 1.58 – 1.50 (m, 4 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ = 160.2, 156.4, 150.2, 130.5, 118.7 ($J$ = 319.0 Hz), 114.6, 113.1, 107.9, 68.0, 64.6, 46.9, 28.5, 28.3, 27.4, 26.9, 25.8. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta$ = -72.92. IR (KBr) = 2931, 2856, 1695, 1612, 1481, 1423, 1141, 1109, 946, 849, 769, 604 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{18}$H$_{24}$F$_3$NNaO$_6$S (M + Na)$^+$: 462.1169; found: 462.1170.

3-(4-((Propylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4k)

Pale yellow oil (24.3 mg, 61%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ = 7.32 (t, $J$ = 8.4 Hz, 1 H), 6.91 (dd, $J$ = 8.4 Hz, 2.0 Hz, 1 H), 6.85 (dd, $J$ = 8.0 Hz, 2.0 Hz, 1 H), 6.79 (t, $J$ = 2.1 Hz, 1 H), 4.67 (s, 1 H), 4.13 (t, $J$ = 5.6 Hz, 2 H), 4.00 (t, $J$ = 6.0 Hz, 2 H), 3.13 (d, $J$ = 6.4 Hz, 2 H), 1.91 – 1.78 (m, 4 H), 1.56 – 1.47 (m, 2 H), 0.92 (t, $J$ = 7.2 Hz, 3 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ = 160.2, 156.7, 150.2, 130.5, 118.7 ($J$ = 318.8 Hz), 114.6, 113.1, 107.9, 68.0, 64.2, 42.7, 25.7, 25.7, 23.2, 11.1. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta$ = -72.93. IR (KBr) = 3344, 2959, 2928, 2880, 1711, 1613, 1527, 1483, 1421, 1214, 1141, 1109, 1044, 947, 847, 774, 604, 510 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{15}$H$_{20}$F$_3$NNaO$_6$S (M + Na)$^+$: 422.0856; found: 422.0855.
3-(4-((Pentylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4l)

Pale yellow solid (24.8 mg, 58%, mp = 65-66 °C). \(^1\)H NMR (400 MHz, CDCl\(_3\) \(\delta = 7.32 (t, J = 8.4 \text{ Hz}, 1 \text{ H}), 6.90 (d, J = 8.4 \text{ Hz}, 1 \text{ H}), 6.85 (d, J = 8.0 \text{ Hz}, 1 \text{ H}), 6.79 (s, 1 \text{ H}), 4.65 (s, 1 \text{ H}), 4.14 (t, \(J = 5.6 \text{ Hz}, 2 \text{ H}), 3.99 (t, J = 6.0 \text{ Hz}, 2 \text{ H}), 3.16 (q, J = 6.4 \text{ Hz}, 2 \text{ H}), 1.91 – 1.79 (m, 4 \text{ H}), 1.53 – 1.45 (m, 2 \text{ H}), 1.34 – 1.28 (m, 4 \text{ H}), 0.90 (t, J = 6.4 \text{ Hz}, 2 \text{ H}). \(^{13}\)C NMR (100 MHz, CDCl\(_3\) \(\delta = 160.2, 156.6, 150.2, 130.5, 118.7 (J = 318.9 \text{ Hz}), 114.6, 113.1, 107.9, 67.9, 64.2, 41.0, 29.7, 28.9, 25.7, 25.7, 22.3, 13.9. \(^{19}\)F NMR (376 MHz, CDCl\(_3\) \(\delta = -72.94. \text{ IR (KBr) = 3332, 2956, 2928, 2866, 1710, 1612, 1487, 1421, 1140, 1108, 1043, 946, 775, 680, 605, 511 \text{ cm}^{-1}. \text{ HRMS-ESI (m/z): calcd for C}_{17}H_{24}F_{3}NNaO_{6}S (M + Na)^+ : 450.1169; found: 450.1173.}

3-(4-((Cyclopentylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4m)

Pale yellow solid (21.6 mg, 51%, mp = 63-64 °C). \(^1\)H NMR (400 MHz, CDCl\(_3\) \(\delta = 7.32 (t, J = 8.4 \text{ Hz}, 1 \text{ H}), 6.91 (dd, J = 8.4 \text{ Hz}, 2.4 \text{ Hz}, 1 \text{ H}), 6.85 (dd, J = 8.0 \text{ Hz}, 2.0 \text{ Hz}, 1 \text{ H}), 4.60 (s, 1 \text{ H}), 4.12 (s, 2 \text{ H}), 4.04 – 3.89 (m, 3 \text{ H}), 2.01 – 1.91 (m, 2 \text{ H}), 1.90 – 1.78 (m, 4 \text{ H}), 1.69 – 1.56 (m, 4 \text{ H}), 1.43 – 1.34 (m, 2 \text{ H}). \(^{13}\)C NMR (100 MHz, CDCl\(_3\) \(\delta = 160.2, 156.1, 150.2, 130.5, 118.7 (J = 318.8 \text{ Hz}), 114.6, 113.1, 107.9, 67.9, 64.1, 52.7, 33.2, 25.7, 25.7, 23.5. \(^{19}\)F NMR (376 MHz, CDCl\(_3\) \(\delta = -72.92. \text{ IR (KBr) = 3335, 2961, 2926, 2861, 1710, 1612, 1488, 1422, 1214, 1141, 1108, 1043, 946, 848, 774, 605, 511 \text{ cm}^{-1}. \text{ HRMS-ESI (m/z): calcd for C}_{17}H_{22}F_{3}NNaO_{6}S (M + Na)^+ : 448.1012; found: 448.1016.}

3-(4-((Benzylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4n)

Pale yellow solid (21.3 mg, 48%, mp = 62-63 °C). \(^1\)H NMR (400 MHz, CDCl\(_3\) \(\delta = 7.38 – 7.28 (m, 6 \text{ H}), 6.92 (d, J = 8.4 \text{ Hz}, 1 \text{ H}), 6.85 (dd, J = 8.0 \text{ Hz}, 2.0 \text{ Hz}, 1 \text{ H}), 6.79 (t, J = 2.0 \text{ Hz}, 1 \text{ H}), 4.60 (s, 1 \text{ H}), 4.12 (s, 2 \text{ H}), 4.04 – 3.89 (m, 3 \text{ H}), 2.01 – 1.91 (m, 2 \text{ H}), 1.90 – 1.78 (m, 4 \text{ H}), 1.69 – 1.56 (m, 4 \text{ H}), 1.43 – 1.34 (m, 2 \text{ H}). \(^{13}\)C NMR (100 MHz, CDCl\(_3\) \(\delta = 160.2, 156.6, 150.2, 130.5, 118.7 (J = 318.9 \text{ Hz}), 114.6, 113.1, 107.9, 67.9, 64.1, 52.7, 33.2, 25.7, 25.7, 23.5. \(^{19}\)F NMR (376 MHz, CDCl\(_3\) \(\delta = -72.89. \text{ IR (KBr) = 3335, 2961, 2926, 2861, 1710, 1613, 1488, 1422, 1214, 1141, 1108, 1043, 946, 848, 774, 605, 511 \text{ cm}^{-1}. \text{ HRMS-ESI (m/z): calcd for C}_{19}H_{20}F_{3}NNaO_{6}S (M + Na)^+ : 470.0856; found: 470.0858.}
(R)-3-((1-Phenylethyl)carbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4o)

Pale yellow oil (20.6 mg, 45%). ¹H NMR (400 MHz, CDCl₃) δ = 7.36 – 7.24 (m, 6 H), 6.94 – 6.82 (m, 2 H), 6.78 (s, 1 H), 5.07 – 4.60 (m, 2 H), 4.16 – 4.07 (m, 2 H), 4.02 – 3.77 (m, 2 H), 1.90 – 1.68 (m, 4 H), 1.47 (d, J= 6.6 Hz, 3 H). ¹³C NMR (100 MHz, CDCl₃) δ = 160.2, 155.7, 150.2, 130.5, 128.6, 127.3, 125.9, 118.7 (J = 318.9 Hz), 114.6, 113.1, 107.9, 67.9, 64.3, 50.6, 25.6, 22.4. ¹⁹F NMR (376 MHz, CDCl₃) δ = -72.89. IR (KBr) = 3326, 2929, 1710, 1611, 1489, 1420, 1216, 1139, 945, 846, 770, 698, 603, 512 cm⁻¹. HRMS-ESI (m/z): calcd for C₂₀H₂₂F₃NNaO₆S (M + Na)⁺: 484.1012; found: 484.1015.

3-(4-((Diethylcarbamoyl)oxy)butoxy)-5-methylphenyl trifluoromethanesulfonate (4p)

Pale yellow oil (26.1 mg, 61%). ¹H NMR (400 MHz, CDCl₃) δ = 6.65 (s, 1 H), 6.59 (s, 1 H), 6.52 (s, 1 H), 4.07 (t, J = 6.0 Hz, 2 H), 3.90 (t, J = 6.0 Hz, 2 H), 3.20 (s, 4 H), 2.27 (s, 3 H), 1.81 – 1.73 (m, 4 H), 1.04 (t, J = 7.2 Hz, 6 H). ¹³C NMR (100 MHz, CDCl₃) δ = 159.9, 156.0, 145.0, 141.3, 118.7 (J = 318.6 Hz), 115.3, 113.8, 104.9, 67.9, 64.4, 41.7, 41.2, 25.8, 25.8, 21.5, 14.0, 13.6. ¹⁹F NMR (376 MHz, CDCl₃) δ = -73.03, -73.04, -73.04. IR (KBr) = 2969, 2937, 1699, 1618, 1582, 1473, 1424, 1278, 1214, 1164, 1106, 963, 828, 771, 608 cm⁻¹. HRMS-ESI (m/z): calcd for C₁₇H₂₄F₃NNaO₆S (M + Na)⁺: 450.1169; found: 450.1170.

5-(4-((Diethylcarbamoyl)oxy)butoxy)-[1,1'-biphenyl]-3-yl trifluoromethanesulfonate (4q)

Pale yellow oil (34.8 mg, 71%). ¹H NMR (400 MHz, CDCl₃) δ = 7.56 – 7.52 (m, 2 H), 7.45 (t, J = 7.2 Hz, 2 H), 7.42 – 7.37 (m, 1 H), 7.14 – 7.10 (m, 1 H), 7.09 – 7.02 (m, 1 H), 6.77 (t, J = 2.2 Hz, 1 H), 4.17 (t, J = 6.4 Hz, 2 H), 4.06 (t, J = 6.0 Hz, 2 H), 3.27 (s, 4 H), 1.95 – 1.83 (m, 4 H), 1.11 (t, J = 7.2 Hz, 6 H). ¹³C NMR (100 MHz, CDCl₃) δ = 160.3, 156.0, 150.4, 144.4, 139.2, 129.0, 128.4, 127.1, 118.7 (J = 318.8), 113.4, 112.1, 106.4, 68.1, 64.5, 41.4, 41.2, 25.8, 25.8, 13.9, 13.6. ¹⁹F NMR (376 MHz, CDCl₃) δ = -72.83. IR (KBr) = 2966, 2930, 1697, 1614, 1578, 1466, 1423, 1274, 1213, 1141, 912, 749, 604 cm⁻¹. HRMS-ESI (m/z): calcd for C₂₂H₂₆F₃NNaO₆S (M + Na)⁺: 512.1325; found: 512.1327.
5-(4-((Diethylcarbamoyl)oxy)butoxy)-2-methylphenyl trifluoromethanesulfonate (4r)

Pale yellow oil (21.3 mg, 50%). \(^1\)H NMR (400 MHz, CDCl\(_3\))\(\delta = 7.17\) (d, \(J = 8.4\) Hz, 1 H), 6.82 (dd, \(J = 8.4\) Hz, 2.4 Hz, 1 H), 6.77 (d, \(J = 2.4\) Hz, 1 H), 4.15 (t, \(J = 6.0\) Hz, 2 H), 3.97 (t, \(J = 6.0\) Hz, 2 H), 3.27 (s, 4 H), 2.29 (s, 3 H), 1.88 – 1.80 (m, 4 H), 1.11 (t, \(J = 7.2\) Hz, 6 H). \(^{13}\)C NMR (100 MHz, CDCl\(_3\))\(\delta = 158.1, 156.0, 148.5, 132.2, 122.3, 118.6 (J = 318.3\) Hz), 114.5, 107.8, 68.0, 64.5, 41.6, 41.3, 25.9, 25.8, 15.5, 13.9, 13.4. \(^{19}\)F NMR (376 MHz, CDCl\(_3\))\(\delta = -73.86\). IR (KBr) = 2966, 2928, 1698, 1608, 1270, 1139, 1001, 952, 860, 770, 602 cm\(^{-1}\). HRMS-ESI (m/z): calcd for C\(_{17}\)H\(_{24}\)F\(_3\)NNaO\(_6\)S (M + Na): 450.1169; found: 450.1165.

3-(4-((Diethylcarbamoyl)oxy)butoxy)-4-methylphenyl trifluoromethanesulfonate (4r')

Pale yellow oil (14.9 mg, 35%). \(^1\)H NMR (400 MHz, CDCl\(_3\))\(\delta = 7.08\) (d, \(J = 8.4\) Hz, 1 H), 6.68 (dd, \(J = 8.4\) Hz, 2.4 Hz, 1 H), 6.61 (d, \(J = 2.0\) Hz, 1 H), 4.10 (t, \(J = 6.4\) Hz, 2 H), 3.93 (t, \(J = 6.0\) Hz, 2 H), 3.20 (s, 4 H), 2.14 (s, 3 H), 1.87 – 1.77 (m, 4 H), 1.04 (t, \(J = 7.2\) Hz, 6 H). \(^{13}\)C NMR (100 MHz, CDCl\(_3\))\(\delta = 157.8, 156.0, 148.1, 130.9, 127.4, 118.7 (J = 318.9\) Hz), 112.3, 104.3, 67.9, 64.6, 41.7, 41.2, 26.0, 25.9, 15.9, 14.0, 13.6. \(^{19}\)F NMR (376 MHz, CDCl\(_3\))\(\delta = -72.88\). IR (KBr) = 2928, 2866, 1699, 1626, 1507, 1477, 1422, 1213, 1143, 1072, 953, 847, 768, 606, 508 cm\(^{-1}\). HRMS-ESI (m/z): calcd for C\(_{17}\)H\(_{23}\)F\(_3\)NNaO\(_6\)S (M + Na): 450.1169; found: 450.1166.

5-(4-((Diethylcarbamoyl)oxy)butoxy)-2-ethylphenyl trifluoromethanesulfonate (4s)

Pale yellow oil (18.0 mg, 41%). \(^1\)H NMR (400 MHz, CDCl\(_3\))\(\delta = 7.21\) (d, \(J = 8.8\) Hz, 1 H), 6.85 (dd, \(J = 8.4\) Hz, 1.6 Hz, 1 H), 6.77 (d, \(J = 2.0\) Hz, 1 H), 4.14 (t, \(J = 6.0\) Hz, 2 H), 3.97 (t, \(J = 6.0\) Hz, 2 H), 3.27 (s, 4 H), 2.66 (q, \(J = 7.6\) Hz, 2 H), 1.89 – 1.78 (m, 4 H), 1.22 (t, \(J = 7.6\) Hz, 3 H), 1.11 (t, \(J = 7.2\) Hz, 6 H). \(^{13}\)C NMR (100 MHz, CDCl\(_3\))\(\delta = 158.0, 156.0, 147.9, 130.6, 128.2, 118.6 (J = 318.2\) Hz), 114.7, 107.7, 67.9, 64.5, 41.7, 41.3, 25.9, 25.8, 22.3, 14.2, 14.1, 13.6. \(^{19}\)F NMR (376 MHz, CDCl\(_3\))\(\delta = -73.94\). IR (KBr) = 2961, 2926, 1506, 1469, 1422, 1274, 1174, 1142, 1075, 983, 847, 606 cm\(^{-1}\). HRMS-ESI (m/z): calcd for C\(_{18}\)H\(_{25}\)F\(_3\)NNaO\(_6\)S (M + Na): 464.1325; found: 464.1322.
3-(4-((Diethylcarbamoyl)oxy)butoxy)-4-ethylphenyl trifluoromethanesulfonate (4s’)

Pale yellow oil (15.5 mg, 35%). $^1$H NMR (400 MHz, CDCl$_3$) δ = 7.17 (d, $J = 8.4$ Hz, 1 H), 6.79 (dd, $J = 8.4$ Hz, 2.0 Hz, 1 H), 6.69 (s, 1 H), 4.17 (t, $J = 6.0$ Hz, 2 H), 4.00 (t, $J = 5.8$ Hz, 2 H), 3.27 (s, 4 H), 2.63 (q, $J = 7.2$ Hz, 4 H), 1.94 – 1.84 (m, 4 H), 1.18 (t, $J = 7.2$ Hz, 3 H), 1.12 (t, $J = 7.2$ Hz, 6 H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ = 157.5, 156.0, 148.1, 133.2, 129.4, 118.7 ($J = 318.5$ Hz), 112.4, 104.4, 67.8, 64.5, 48.3, 41.6, 41.2, 25.9, 23.0, 13.7. $^{19}$F NMR (376 MHz, CDCl$_3$) δ = -72.90. IR (KBr) = 2925, 2851, 1700, 1605, 1466, 1424, 1377, 1212, 1174, 1140, 955, 858, 603 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{18}$H$_{26}$F$_3$NNaO$_6$S (M + Na)$^+$: 464.1325; found: 464.1320.

The mixture of 3-((5-((Diethylcarbamoyl)oxy)pentan-2-yl)oxy)phenyl trifluoromethanesulfonate (4t) and 3-((4-((Diethylcarbamoyl)oxy)pentyl)oxy)phenyl trifluoromethanesulfonate (4t’)

Pale yellow oil (19.8 mg, 46%). $^1$H NMR (400 MHz, CDCl$_3$) δ = 7.35 – 7.28 (m, 1 H), 6.90 (t, $J = 7.2$ Hz, 1 H), 6.84 (t, $J = 7.2$ Hz, 1 H), 4.95 – 4.86 (m, 0.5 H), 4.45 – 4.36 (m, 0.5 H), 4.11 (t, $J = 6.0$ Hz, 1 H), 3.98 (t, $J = 6.4$ Hz, 1 H), 3.26 (s, 4 H), 1.87 – 1.69 (m, 4 H), 1.32 (d, $J = 6.0$ Hz, 1.5 H), 1.27 (d, $J = 6.0$ Hz, 1.5 H), 1.11 (t, $J = 6.8$ Hz, 6 H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ = 160.3, 159.3, 156.0, 155.7, 150.3, 150.2, 130.5, 118.7 ($J = 318.9$ Hz), 115.7, 114.6, 113.1, 113.0, 109.1, 108.0, 74.1, 70.7, 68.2, 64.6, 41.3, 41.2, 32.7, 25.1, 20.4, 19.3, 14.1, 13.7. $^{19}$F NMR (376 MHz, CDCl$_3$) δ = -72.94. IR (KBr) = 2975, 2930, 1698, 1612, 1583, 1484, 1424, 1380, 1212, 1175, 1143, 1107, 1003, 971, 854, 774, 606, 511 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{17}$H$_{24}$F$_3$NNaO$_6$S (M + Na)$^+$: 450.1169; found: 450.1167.

3-((5-((Diethylcarbamoyl)oxy)pentyl)oxy)phenyl trifluoromethanesulfonate (4u)

Pale yellow oil (22.2 mg, 52%). $^1$H NMR (400 MHz, CDCl$_3$) δ = 7.32 (t, $J = 8.4$ Hz, 1 H), 6.90 (dd, $J = 8.4$ Hz, 2.0 Hz, 1 H), 6.84 (dd, $J = 8.4$ Hz, 2.0 Hz, 1 H), 6.78 (t, $J = 2.3$ Hz, 1 H), 4.11 (t, $J = 6.4$ Hz, 2 H), 3.97 (t, $J = 6.4$ Hz, 2 H), 3.27 (s, 4 H), 1.87 – 1.80 (m, 2 H), 1.73 – 1.68 (m, 2 H), 1.60 – 1.52 (m, 2 H), 1.11 (t, $J = 7.2$ Hz, 6 H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ = 160.3, 156.1, 150.2, 130.5, 118.7 ($J = 318.7$ Hz), 114.6, 113.0, 107.9, 68.3, 64.7, 41.7, 41.4, 28.8, 28.7, 22.5, 13.8, 13.7. $^{19}$F NMR (376 MHz, CDCl$_3$) δ = -72.94. IR (KBr) = 2975, 2861, 1699, 1611, 1582, 1480, 1423, 1211, 1105, 1015, 845, 774, 680, 604, 511 cm$^{-1}$. HRMS-ESI ($m/z$): calcd for C$_{17}$H$_{23}$F$_3$NNaO$_6$S (M + Na)$^+$: 450.1169;
found: 450.1172.

4-[(1,1'-Biphenyl]-3-yloxy)butyl diethylcarbamate (5)

Pale yellow oil (55.3 mg, 81%). \( ^1H \) NMR (400 MHz, CDCl\(_3\)) \( \delta = 7.58 \) (d, \( J = 7.6 \) Hz, 2 H), 7.42 (t, \( J = 7.6 \) Hz, 2 H), 7.33 \( (t, J = 8.0 \) Hz, 2 H), 7.12 (d, \( J = 7.6 \) Hz, 1 H), 6.88 (dd, \( J = 8.0 \), 1.6 Hz, 1 H), 4.16 (t, \( J = 6.0 \) Hz, 2 H), 4.06 (t, \( J = 6.0 \) Hz, 2 H), 3.26 (s, 4 H), 1.93 – 1.82 (m, 4 H), 1.11 (t, \( J = 7.0 \) Hz, 6 H). \(^{13}C \) NMR (100 MHz, CDCl\(_3\)) \( \delta = 159.3, 156.0, 142.7, 141.1, 129.7, 128.7, 127.3, 127.1, 119.6, 113.5, 113.2, 67.4, 64.6, 41.6, 41.2, 26.0, 25.9, 14.1, 13.5. IR (KBr) = 3057, 2966, 2930, 1697, 1592, 1598, 1476, 1427, 1379, 1275, 1210, 1172, 1070, 1005, 760, 699 cm\(^{-1}\). HRMS-ESI (m/z): calcd for C\(_{21}\)H\(_{28}\)NO\(_3\) (M + H\(^+\)): 342.2064; found: 342.2055.

4-(3-(3,5-Dimethylisoxazol-4-yl)phenoxy)butyl dimethylcarbamate (6)

Pale yellow oil (47.8 mg, 72%). \( ^1H \) NMR (400 MHz, CDCl\(_3\)) \( \delta = 7.34 \) (t, \( J = 8.0 \) Hz, 1 H), 6.89 (dd, \( J = 8.4 \) Hz, 2.4 Hz, 1 H), 6.83 (d, \( J = 7.2 \) Hz, 1 H), 6.78 (d, \( J = 2.4 \) Hz, 1 H), 4.16 (t, \( J = 6.0 \) Hz, 2 H), 4.03 (t, \( J = 6.0 \) Hz, 2 H), 2.91 (s, 6 H), 2.42 (s, 3 H), 2.28 (s, 3 H), 1.93 – 1.82 (m, 4 H). \(^{13}C \) NMR (100 MHz, CDCl\(_3\)) \( \delta = 165.1, 159.1, 158.6, 156.6, 131.7, 129.7, 121.4, 116.5, 115.5, 113.2, 67.4, 64.8, 36.3, 35.7, 25.8, 25.8, 11.5, 10.8. IR (KBr) = 2930, 2871, 1703, 1583, 1490, 1368, 1299, 1247, 1190, 1058, 967, 868, 783, 699, 617 cm\(^{-1}\). HRMS-ESI (m/z): calcd for C\(_{18}\)H\(_{25}\)N\(_2\)O\(_4\) (M + Na\(^+\)): 333.1809; found: 333.1805.

4-(3-Hydroxyphenoxy)butyl dimethylcarbamate (7)

Pale yellow oil (26.3 mg, 52%). \( ^1H \) NMR (400 MHz, CDCl\(_3\)) \( \delta = 7.09 \) (t, \( J = 8.0 \) Hz, 1H), 6.56 – 6.34 (m, 3 H), 4.16 (d, \( J = 6.0 \) Hz, 2 H), 3.94 (d, \( J = 5.2 \) Hz, 2 H), 2.90 (s, 6 H), 1.82 (s, 4 H). \(^{13}C \) NMR (100 MHz, CDCl\(_3\)) \( \delta = 160.2, 157.3, 157.0, 123.0, 107.8, 106.6, 102.1, 67.3, 65.2, 36.1, 36.0, 25.8, 25.8. IR (KBr) = 3352, 2927, 2861, 1678, 1600, 1495, 1463, 1406, 1369, 1285, 1201, 1153, 1056, 845, 768, 690 cm\(^{-1}\). HRMS-ESI (m/z): calcd for C\(_{13}\)H\(_{19}\)NNaO\(_4\) (M + Na\(^+\)): 276.1206; found: 276.1207.
4-(3-(Diisopropylamino)phenoxy)butyl diethylcarbamate (8)

Pale yellow oil (61.9 mg, 85%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta = 7.06$ (t, $J = 8.2$ Hz, 1 H), 6.49 (d, $J = 8.2$ Hz, 1 H), 6.42 (s, 1 H), 6.31 (d, $J = 7.6$ Hz, 1 H), 4.14 (t, $J = 6.0$ Hz, 2 H), 3.97 (t, $J = 6.0$ Hz, 2 H), 3.81 – 3.73 (m, 2 H), 3.27 (s, 4 H), 1.87 – 1.80 (m, 4 H), 1.22 (d, $J = 6.8$ Hz, 12 H), 1.11 (t, $J = 7.2$ Hz, 6 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta =$ 159.5, 156.0, 149.4, 128.8, 111.6, 105.4, 103.2, 67.2, 64.7, 47.5, 41.6, 41.2, 26.1, 25.9, 21.3, 14.0, 13.6. IR (KBr) = 2972, 2871, 1700, 1603, 1488, 1430, 1375, 1275, 1212, 1167, 1070, 826, 768, 698 cm$^{-1}$. HRMS-ESI (m/z): calcd for C$_{21}$H$_{37}$N$_2$O$_3$ (M + H)$^+$: 365.2799; found: 365.2802.

2-D-3-(4-((Diethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4c-D)

Pale yellow oil (25.4 mg, 61%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta =$ 7.32 (t, $J = 8.4$ Hz, 1 H), 6.91 (d, $J = 8.4$ Hz, 1 H), 6.85 (d, $J = 8.0$ Hz, 1 H), 6.80 (s, 0.07 H), 4.16 (t, $J = 6.0$ Hz, 2 H), 4.01 (t, $J = 6.0$ Hz, 2 H), 3.27 (s, 4 H), 1.92 – 1.80 (m, 4 H), 1.12 (t, $J = 7.1$ Hz, 6 H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta =$ 160.2, 155.9, 150.1, 130.4, 118.7 ($J = 318.7$ Hz), 114.6, 113.1, 68.0, 64.4, 41.7, 41.2, 25.8, 13.9, 13.6. $^{19}$F NMR (376 MHz, CDCl$_3$) $\delta =$ -72.96. IR (KBr) = 2966, 2933, 1699, 1607, 1471, 1425, 1272, 1215, 1174, 1143, 1066, 1019, 854, 788, 606, 511 cm$^{-1}$. HRMS-ESI (m/z): calcd for C$_{16}$H$_{21}$DF$_3$NNaO$_6$S (M + Na)$^+$: 437.1075; found: 437.1074.

References:
I. NMR Spectra.

3-(4-((Diethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate) (4c)
3-(4-((Dimethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4d)
3-(4-((Dipropylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4e)
3-(4-((Dibutylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4f)
3-(4-((Methyl(propyl)carbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4g)
3-(4-((Benzyl(methyl)carbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4h)
4-(3-(((Trifluoromethyl)sulfonyl)oxy)phenoxy)butyl piperidine-1-carboxylate (4i)
4-(3-(((Trifluoromethyl)sulfonyl)oxy)phenoxy)butyl azepane-1-carboxylate (4j)
3-(4-((Propylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4k)
3-(4-((Pentylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4l)
3-(4-((Cyclopentylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4m)
3-(4-((Benzylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4n)
(R)-3-(4-(((1-Phenylethyl)carbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4o)
3-((Diethylcarbamoyl)oxy)butoxy)-5-methylphenyl trifluoromethanesulfonate (4p)
5-(4-((Diethylcarbamoyl)oxy)butoxy)-[1,1'-biphenyl]-3-yl trifluoromethanesulfonate (4q)
5-(4-((Diethylcarbamoyl)oxy)butoxy)-2-methylphenyl trifluoromethanesulfonate (4r)
3-(4-((Diethylcarbamoyl)oxy)butoxy)-4-methylphenyl trifluoromethanesulfonate(4r')
5-(4-((Diethylcarbamoyl)oxy)butoxy)-2-ethylphenyl trifluoromethanesulfonate (4s)
3-(4-(Diethylcarbamoyl)oxy)butoxy)-4-ethylphenyl trifluoromethanesulfonate (4s')
The mixture of 3-((5-(Diethylcarbamoyl)oxy)pentan-2-yl)oxy)phenyl trifluoromethanesulfonate (4t) and 3-((4-(Diethylcarbamoyl)oxy)pentyl)oxy)phenyl trifluoromethanesulfonate (4t')
3-((5-((Diethylcarbamoyl)oxy)pentyl)oxy)phenyl trifluoromethanesulfonate (4u)
4-([1,1'-Biphenyl]-3-yloxy)butyl diethylcarbamate (5)
4-(3-(3,5-Dimethylisoxazol-4-yl)phenoxy)butyl dimethylcarbamate (6)
4-(3-Hydroxyphenoxy)butyl dimethylcarbamate (7)
4-(3-(Diisopropylamino)phenoxy)butyl diethylcarbamate (8)
2-D-3-(4-((Diethylcarbamoyl)oxy)butoxy)phenyl trifluoromethanesulfonate (4c-D)