Supporting Information
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Supporting Information

Lanthanum (III) Trifluoromethanesulfonate Catalyzed Direct Synthesis of Ureas from N-Cbz-, N-Alloc-, and N-Troc-Protected Amines

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**General information**

All chemicals were purchased from Sigma-Aldrich and used without further purification. Reaction progress was monitored by thin-layer chromatography (TLC) analysis. TLC analysis was performed using an aluminum plate with silica gel 60 F254, and TLC spots were visualized by UV light (254nm) exposure. Flash chromatography was performed using 230–400 mesh silica gel and analytical grade solvent. Melting points were recorded using a Stuart SMP10 Melting Point Apparatus. $^1$H and $^{13}$C NMR spectra were recorded on a 600 MHz & 150 MHz respectively JEOL JNM-ECA600 spectrometer or a 400 MHz & 100 MHz respectively Bruker Avance 400 spectrometer. The chemical shifts were reported in δ units (ppm) relative to the residual protonated solvent resonance, and the coupling constants (J) quoted in Hz.

**General procedure for the preparation of urea compounds**

$N$-Butylamine (0.110 g, 1.5 mmol) was added dropwise to a solution of 1a (0.177 g, 1.00 mmol) and La(OTf)$_3$ (0.088 g, 0.15 mmol) in trifluorotoluene (2 mL) at room temperature. The mixture was stirred for 12 h at 70 °C under a nitrogen atmosphere. The reaction was cooled to ambient temperature, and 1 M aqueous HCl (10 mL) was added to the mixture. The reaction mixture was extracted with CH$_2$Cl$_2$ (2 x 20 mL). The combined organic layers were dried over sodium sulfate and concentrated under reduced pressure. The resulting residue was purified by flash column chromatography on silica gel eluting with hexane-EtOAc (0-50%) to afford the desired product 3a (0.18 g, 94%).
1-Butyl-3-phenylurea (3a): White solid (0.180 g, 94%); m.p. 129-131°C; $^1$H NMR (400 MHz, DMSO-$d_6$) δ 8.35 (s, 1H), 7.39 - 7.36 (m, 2H), 7.22 - 7.18 (m, 2H), 6.89 (t, $J = 7.2$ Hz, 1H), 6.08 (t, $J = 5.2$ Hz, 1H), 3.08 (q, $J = 6.0$ Hz, 2H), 1.45 - 1.38 (m, 2H), 1.34 - 1.24 (m, 2H), 0.89 (t, $J = 7.2$ Hz, 3H); $^{13}$C NMR (100 MHz, DMSO-$d_6$) δ 155.64, 141.06, 129.05 (2C), 112.31, 111.7 (2C), 39.13, 32.35, 19.99, 14.16; HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{11}$H$_{17}$N$_2$O = 193.1341, found 193.1336.

1-Butyl-3-p-tolylurea (3b): White solid (0.189 g, 92%); m.p. 123-125°C; $^1$H NMR (400 MHz, CDCl$_3$) δ 7.17 (d, $J = 8$ Hz, 2H), 7.09 (d, $J = 8.4$ Hz, 2H), 6.96 (s, 1H), 5.26 (s, 1H), 3.22 - 3.17 (dd, $J = 7.2$ Hz, $J = 7.2$ Hz, 2H), 2.30 (s, 3H), 1.47 - 1.41 (m, 2H), 1.35 - 1.26 (m, 2H), 0.90 (t, $J = 7.6$ Hz, 3H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 156.63, 136.09, 133.31, 129.70 (2C), 121.44 (2C), 40.02, 32.25, 20.77, 20.05, 13.78; HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{12}$H$_{19}$N$_2$O = 207.1497, found 207.1495.

1-Butyl-3-(3,5-dimethylphenyl)urea (3c): White solid (0.200 g, 91%); m.p. 138-140°C; $^1$H NMR (400 MHz, DMSO-$d_6$) δ 8.19 (s, 1H), 6.99 (s, 2H), 6.52 (s, 1H), 6.05 (t, $J = 5.6$ Hz, 1H), 3.08 - 3.03 (dd, $J = 6.8$ Hz, $J = 6.4$ Hz, 2H), 2.19 (s, 6H), 1.43 - 1.34 (m, 2H), 1.33 - 1.27 (m, 2H), 0.89 (t, $J = 7.6$ Hz, 3H); $^{13}$C NMR (100 MHz, DMSO-$d_6$) δ 155.65, 140.89, 137.91 (2C), 122.98, 115.81 (2C), 39.10, 32.37, 21.60 (2C), 19.99, 14.15; HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{13}$H$_{21}$N$_2$O = 221.1654, found 221.1658.

1-Butyl-3-(4-methoxyphenyl)urea (3d): White solid (0.205 g, 92%); m.p. 122-124°C; $^1$H NMR (400 MHz, CDCl$_3$) δ 7.20 - 7.16 (m, 2H), 6.85 - 6.81 (m, 2H), 3.78 (s, 3H), 3.20 (t, $J = 7.2$ Hz, 2H), 1.47 - 1.41 (m, 2H), 1.34 - 1.28 (m, 2H), 0.90 (t, $J = 7.6$ Hz, 3H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 156.95, 156.55, 131.33, 124.09 (2C), 114.45 (2C), 55.48, 40.05, 32.27, 20.04, 13.80; HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{12}$H$_{19}$N$_2$O$_2$ = 223.1447, found 223.1449.
1-Butyl-3-(4-chlorophenyl)urea (3e): White solid (0.206 g, 91%); m.p. 177-179°C; \(^1\)H NMR (400 MHz, DMSO-\(d_6\)) \(\delta\) 7.43 - 7.41 (td, \(J = 4.8\) Hz, \(J = 4.8\) Hz, 2H), 7.26 - 7.23 (td, \(J = 5.2\) Hz, \(J = 5.2\) Hz, 2H), 8.52 (s, 1H), 6.14 (t, \(J = 11.2\) Hz, 1H), 3.09 - 3.05 (dd, \(J = 6.4\) Hz, \(J = 6.8\) Hz, 2H), 1.42 - 1.27 (m, 4H), 0.89 (t, \(J = 7.2\) Hz, 3H); \(^1^3\)C NMR (100 MHz, DMSO-\(d_6\)) \(\delta\) 155.47, 140.06, 128.87 (2C), 124.75, 119.46 (2C), 39.16, 32.28, 19.97, 14.14; HRMS (ESI) m/z (M+H)\(^+\) calcld for C\(_{11}\)H\(_{16}\)ClN\(_2\)O = 227.0951, found 227.0954.

1-Butyl-3-(3,5-dichlorophenyl)urea (3f): White solid (0.219 g, 84%); m.p. 123-125°C; \(^1\)H NMR (400 MHz, DMSO-\(d_6\)) \(\delta\) 8.80 (s, 1H), 7.47 (d, \(J = 2\) Hz, 2H), 7.04 (t, \(J = 2\) Hz, 1H), 6.33 (t, \(J = 5.6\) Hz, 1H), 3.10 - 3.05 (dd, \(J = 6.8\) Hz, \(J = 6.8\) Hz, 2H), 1.43 - 1.38 (m, 2H), 1.32 - 1.27 (m, 2H), 0.89 (t, \(J = 7.6\) Hz, 1H); \(^1^3\)C NMR (100 MHz, DMSO-\(d_6\)) \(\delta\) 155.12, 143.61, 134.39 (2C), 120.33, 116.03 (2C), 39.24, 32.16, 19.95, 14.12; HRMS (ESI) m/z (M+H)\(^+\) calcld for C\(_{11}\)H\(_{15}\)Cl\(_2\)N\(_2\)O = 261.0561, found 261.0565.

1-Butyl-3-(4-nitrophenyl)urea (3g): White solid (0.178 g, 75%); m.p. 149-151°C; \(^1\)H NMR (400 MHz, DMSO-\(d_6\)) \(\delta\) 9.21 (s, 1H), 8.14 - 8.10 (m, 2H), 7.63 - 7.59 (m, 2H), 6.42 (t, \(J = 11.2\) Hz, 1H), 3.13 - 3.08 (m, 2H), 1.46 - 1.39 (m, 2H), 1.35 - 1.26 (m, 2H), 0.89 (t, \(J = 14.4\) Hz, 6H); \(^1^3\)C NMR (100 MHz, DMSO-\(d_6\)) \(\delta\) 154.84, 147.73, 140.75, 125.55 (2C), 117.13 (2C), 39.24, 32.08, 19.94, 14.11; HRMS (ESI) m/z (M+H)\(^+\) calcld for C\(_{11}\)H\(_{16}\)N\(_3\)O\(_3\) = 238.1192, found 238.1197.

1-Butyl-3-hexylurea (3h): White solid (0.176 g, 88%); m.p. 49-51°C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 4.76 (s, 2H), 3.18 - 3.13 (m, 4H), 1.51 - 1.44 (m, 4H), 1.40 - 1.25 (m, 8H), 0.94 - 0.87 (m, 6H); \(^1^3\)C NMR (100 MHz, CDCl\(_3\)) \(\delta\) 158.66, 40.55, 40.22, 32.40, 31.56, 30.27, 26.60, 22.58, 20.06, 14.04, 13.80; HRMS (ESI) m/z (M+H)\(^+\) calcld for C\(_{11}\)H\(_{25}\)N\(_2\)O = 201.1967, found 201.1963.
1-Butyl-3-cyclopentylurea (3i): White solid (0.167 g, 91%); m.p. 114-116°C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta \) 4.76 (s, 2H), 4.00 - 3.95 (m, 1H), 3.18 - 3.14 (t, \(J = 14.4\) Hz, 2H), 1.99 - 1.91 (m, 2H), 1.71 - 1.55 (m, 4H), 1.51 - 1.30 (m, 6H), 0.94 (t, \(J = 14.4\) Hz, 3H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta \) 158.35, 52.09, 40.19, 33.64 (2C), 32.43, 23.62 (2C), 20.09, 13.82; HRMS (ESI) m/z (M+H)\(^+\) calcd for C\(_{10}\)H\(_{21}\)N\(_2\)O = 185.1654, found 185.1658.

1-Butyl-3-(prop-2-ynyl)urea (3j): White solid (0.119 g, 77%); m.p. 85-87°C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta \) 5.32 (s, 1H), 3.99 (d, \(J = 2.4\) Hz, 2H), 3.20 (t, \(J = 14\) Hz, 2H), 2.22 (t, \(J = 5.2\) Hz, 1H), 1.52 - 1.45 (m, 2H), 1.40 - 1.31 (m, 2H), 0.95 (t, \(J = 14.8\) Hz, 3H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta \) 158.16, 80.93, 70.88, 40.23, 32.33, 30.03, 20.07, 13.83; HRMS (ESI) m/z (M+H)\(^+\) calcd for C\(_8\)H\(_{15}\)N\(_2\)O = 155.1184, found 155.1187.

1-Benzyl-3-phenylurea (3k): White solid (0.217 g, 96%); m.p. 211-213°C; \(^1\)H NMR (400 MHz, DMSO-\(d_6\)) \(\delta \) 8.55 (s, 1H), 7.42 - 7.20 (m, 9H), 6.89 (t, \(J = 14.8\) Hz, 1H), 6.61 (t, \(J = 12\) Hz, 1H), 4.31 (d, \(J = 5.6\) Hz, 2H); \(^{13}\)C NMR (100 MHz, DMSO-\(d_6\)) \(\delta \) 155.68, 140.93, 140.81, 129.10 (2C), 128.76 (2C), 127.57 (2C), 127.17, 121.54, 118.14 (2C), 43.20; HRMS (ESI) m/z (M+H)\(^+\) calcd for C\(_{14}\)H\(_{15}\)N\(_2\)O = 227.1184, found 227.1179.

1-Cyclohexyl-3-phenylurea (3l): White solid (0.203 g, 93%); m.p. 185-187°C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta \) 7.32 - 7.26 (m, 4H), 7.24 (s, 1H), 7.05 - 7.03 (m, 1H), 3.68 - 3.61 (m, 1H), 1.92 (s, 2H), 1.69 - 1.66 (m, 2H), 1.66 (s, 1H), 1.33 - 1.29 (m, 2H), 1.11 - 1.08 (m, 3H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta \) 155.52, 138.95, 129.10 (2C), 123.25, 120.45 (2C), 48.90, 33.60 (2C), 24.86 (2C), 25.52 (1C); HRMS (ESI) m/z (M+H)\(^+\) calcd for C\(_{13}\)H\(_{19}\)N\(_2\)O = 219.1497, found 219.1495.

N-Phenylpiperidine-1-carboxamide (3m): White solid (0.177 g, 87%); m.p. 170-172°C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta \) 7.38 - 7.31 (m, 2H), 7.31 - 7.27 (m, 2H), 7.05 - 7.03 (m, 1H), 6.47 (s, 1H), 3.46 (t, \(J = 10.4\) Hz, 4H), 1.64 - 1.60 (m, 6H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta \)
154.93, 139.26, 128.85 (2C), 122.82, 119.82 (2C), 45.25 (2C), 25.66 (2C), 24.36; HRMS (ESI) m/z (M+H)^+ calcd for C_{12}H_{17}N_{2}O = 205.1341, found 205.1356.

3-Phenyl-1,1-dipropylurea (3n): White solid (0.180 g, 82%); m.p. 70-72°C; ^1H NMR (400 MHz, CDCl₃) δ 7.41 - 7.38 (m, 2H), 7.31 - 7.27 (m, 2H), 7.04 - 7.03 (m, 1H), 6.33 (s, 1H), 3.28 (t, J = 8 Hz, 4H), 1.70 - 1.64 (m, 4H), 0.97 (t, J = 7.6 Hz, 6H); ^13C NMR (100 MHz, CDCl₃) δ 154.93, 139.26, 128.81 (2C), 122.75, 119.72 (2C), 49.49 (2C), 21.87 (2C), 11.44 (2C); HRMS (ESI) m/z (M+H)^+ calcd for C_{13}H_{21}N_{2}O = 221.1654, found 211.1677.

1-Butyl-3-isobutylurea (3o): White solid (0.151 g, 88%); m.p. 58-60°C; ^1H NMR (400 MHz, CDCl₃) δ 4.97 (s, 2H), 3.16 (t, J = 14 Hz, 2H), 2.99 (d, J = 6.8 Hz, 2H), 1.78 - 1.68 (m, 1H), 1.51 - 1.44 (m, 2H), 1.39 - 1.30 (m, 2H), 2.99 (d, J = 6.4 Hz, 9H); ^13C NMR (100 MHz, CDCl₃) δ 158.86, 47.94, 40.19, 32.43, 29.00, 20.11 (2C), 20.07, 13.80; HRMS (ESI) m/z (M+H)^+ calcd for C_{9}H_{21}N_{2}O = 173.1654, found 173.1658.

1-Benzyl-3-isobutylurea (3p): White solid (0.188 g, 91%); m.p. 144-146°C; ^1H NMR (400 MHz, CDCl₃) δ 7.33 - 7.24 (m, 5H), 4.92 (s, 1H), 4.31 (s, 2H), 2.96 (d, J = 6.8 Hz, 2H), 1.74 - 1.64 (m, 1H), 0.87 (t, J = 12 Hz, 6H); ^13C NMR (100 MHz, CDCl₃) δ 158.59, 139.39, 128.57 (2C), 127.33 (2C), 127.19, 47.95, 44.43, 28.91, 20.05 (2C); HRMS (ESI) m/z (M+H)^+ calcd for C_{12}H_{19}N_{2}O = 207.1497; found 207.1492.

1-Cyclohexyl-3-isobutylurea (3q): White solid (0.178 g, 90%); m.p. 169-171°C; ^1H NMR (400 MHz, CDCl₃) δ 4.70 (s, 1H), 3.54 - 3.49 (m, 1H), 2.99 (d, J = 6.4 Hz, 2H), 1.96 - 1.92 (m, 2H), 1.79 - 1.68 (m, 3H), 1.63 - 1.58 (m, 1H), 1.41 - 1.30 (m, 2H), 1.21 - 1.06 (m, 3H), 0.92 (d, J = 6.8 Hz, 6H); ^13C NMR (100 MHz, CDCl₃) δ 157.90, 49.02, 47.99, 33.92 (2C), 28.95, 25.64 24.91 (2C), 20.11 (2C); HRMS (ESI) m/z (M+H)^+ calcd for C_{11}H_{23}N_{2}O = 199.1810, found 199.1812.
**N-Isobutylpyrrolidine-1-carboxamide (3r):** White solid (0.141 g, 83%); m.p. 72-74°C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 4.27 (s, 1H), 3.33 (t, $J$ = 13.2 Hz, 4H), 3.07 (d, $J$ = 5.6 Hz, 2H), 1.92 - 1.89 (m, 4H), 1.76 - 1.75 (m, 1H), 0.92 (d, $J$ = 6.4 Hz, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 156.92, 48.01, 45.48 (2C), 28.94, 25.58 (2C), 20.10 (2C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_9$H$_{19}$N$_2$O$_2$ = 187.1447, found 187.1449.

**N-Isobutylmorpholine-4-carboxamide (3s):** White solid (0.145 g, 78%); m.p. 109-111°C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 4.58 (s, 1H), 3.69 (t, $J$ = 9.6 Hz, 4H), 3.35 (t, $J$ = 9.6 Hz, 4H), 3.08 (d, $J$ = 3.6 Hz, 2H), 1.81 - 1.72 (m, 1H), 0.92 (d, $J$ = 6.8 Hz, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 157.94, 66.50 (2C), 48.26, 44.06 (2C), 28.77, 20.12 (2C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_9$H$_{19}$N$_2$O$_2$ = 187.1445, found 187.1445.

**1-(tert-Butyl)-3-butylurea (3t):** White solid (0.147 g, 85%); m.p. 82-84°C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 3.10 (t, $J$ = 5.6 Hz, 2H), 1.49 - 1.42 (m, 2H), 1.37 - 1.28 (m, 11H), 0.97 (t, $J$ = 6.8 Hz, 3H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 157.67, 50.47, 40.19, 32.29, 29.57 (3C), 20.11, 13.83; HRMS (ESI) m/z (M+H)$^+$ calcd for C$_9$H$_{21}$N$_2$O = 173.1654, found 173.1657.

**1-Benzyl-3-(tert-buty1)urea (3u):** White solid (0.169 g, 81%); m.p. 115-117°C; $^1$H NMR (400 MHz, CDCl$_3$-d$_1$) $\delta$ 7.34 - 7.25 (m, 5H), 4.31 (s, 2H), 1.33 (s, 9H); $^{13}$C NMR (100 MHz, CDCl$_3$-d$_1$) $\delta$ 157.53, 139.28, 128.62 (2C), 127.47 (2C), 127.26, 50.58, 44.39, 29.51 (3C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{12}$H$_{19}$N$_2$O = 207.1497, found 207.1498.

**1-Isobutyl-3-phenylurea (3v):** White solid (0.177 g, 92%); m.p. 157-159°C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.31 - 7.23 (m, 4H), 7.04 - 7.02 (m, 1H), 3.02 (d, $J$ = 7.2 Hz, 2H), 1.73 - 1.70 (m, 1H), 0.89 (d, $J$ = 6.4 Hz, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 156.68, 138.96, 129.07 (2C), 123.20, 120.48 (2C), 47.63, 28.89, 20.05 (2C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{11}$H$_{17}$N$_2$O = 193.1341, found 193.1344.
**N-Phenylpyrrolidine-1-carboxamide (3w):** White solid (0.167 g, 88%); m.p. 133-135°C; 
$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 6.26 (s, 1H), 7.44 - 7.42 (m, 2H), 7.30 - 7.26 (m, 2H), 7.04 - 7.02 (m, 1H), 3.48 - 3.45 (m, 4H), 2.18 - 1.94 (m, 4H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 153.94, 139.22, 128.83 (2C), 122.71, 119.49 (2C), 45.82 (2C), 25.61 (2C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{11}$H$_{15}$N$_2$O = 191.1184; found 191.1196.

**N-Phenylmorpholine-4-carboxamide (3x):** White solid (0.161 g, 78%); m.p. 261-263°C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.38 - 7.28 (m, 4H), 7.09 - 7.07 (m, 1H), 6.49 (s, 1H), 3.74 (t, $J =$ 8 Hz, 4H), 3.48 (t, $J =$ 8 Hz, 4H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 155.16, 138.69, 128.93 (2C), 123.39, 120.14 (2C), 66.49 (2C), 44.29 (2C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{11}$H$_{15}$N$_2$O$_2$ = 207.1134, found 207.1129.

**N-Isobutylpiperidine-1-carboxamide (3y):** White solid (0.162 g, 88%); m.p. 102-104°C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 4.53 (s, 1H), 3.32 (t, $J =$ 10.4 Hz, 4H), 3.08 - 3.05 (dd, $J =$ 5.6 Hz, $J =$ 6.0 Hz, 2H), 1.80 - 1.74 (m, 1H), 1.63 - 1.53 (m, 6H), 0.91 (d, $J =$ 6.8 Hz, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 157.83, 48.30, 44.98 (2C), 28.83, 25.60 (2C), 24.45, 20.15 (2C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{10}$H$_{21}$N$_2$O = 185.1654, found 185.1657.

**1-Butyl-3-cyclohexylurea (3z):** White solid (0.176 g, 89%); m.p. 109-111°C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 4.61 (s, 2H), 3.55 - 3.48 (m, 1H), 3.17 (t, $J =$ 14.4 Hz, 2H), 1.95 - 1.91 (m, 2H), 1.73 - 1.68 (m, 2H), 1.63 - 1.58 (m, 1H), 1.51 - 1.44 (m, 2H), 1.40 - 1.29 (m, 4H), 1.20 - 1.06 (m, 3H), 0.94 (t, $J =$ 14.8 Hz, 3H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 157.81, 48.99, 40.22, 33.99 (2C), 32.40, 25.63, 24.97 (2C), 20.07, 13.85; HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{11}$H$_{23}$N$_2$O = 199.1810, found 199.1813.

**1-Benzyl-3-cyclohexylurea (3aa):** White solid (0.195 g, 84%); m.p. 164 - 166°C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.34 - 7.25 (m, 5H), 4.95 (s, 1H), 4.60 (s, 1H), 4.33 (s, 2H), 3.55 - 3.48 (m, 1H), 1.92 - 1.88 (m, 2H), 1.70 - 1.56 (m, 3H), 1.38 - 1.27 (m, 2H), 1.19 - 1.03 (m, 3H);
$^{13}$C NMR (100 MHz, CDCl$_3$) δ 157.63, 139.38, 128.58 (2C), 127.42 (2C), 127.21, 49.10, 44.46, 33.93 (2C), 24.93 (2C), 25.61; HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{14}$H$_{21}$N$_2$O = 233.1654, found 233.1657.

$N$-Cyclohexylpyrrolidine-1-carboxamide (3ab): White solid (0.153 g, 78%); m.p. 146-148°C; $^1$H NMR (400 MHz, CDCl$_3$) δ 3.77 - 3.63 (m, 1H), 3.51 - 3.46 (dd, $J$ = 7.2 Hz, $J$ = 6.8 Hz, 1H), 3.32 (t, $J$ = 6.8 Hz, 4H), 1.98 - 1.93 (m, 2H), 1.92 - 1.86 (m, 4H), 1.73 - 1.68 (m, 2H), 1.64 - 1.59 (m, 1H), 1.43 - 1.32 (m, 2H), 1.23 - 1.06 (m, 3H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 156.19, 49.03, 45.52 (2C), 34.22 (2C), 25.56 (2C), 25.70, 25.07 (2C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{11}$H$_{21}$N$_2$O = 197.1654, found 197.1658.

$N$-Cyclohexylmorpholine-4-carboxamide (3ac): White solid (0.185 g, 87%); m.p. 181-183°C; $^1$H NMR (400 MHz, CDCl$_3$) δ 4.35 (s, 1H), 3.70 (t, $J$ = 6.0 Hz, 4H), 3.67 - 3.63 (m, 1H), 3.33 (t, $J$ = 10.0 Hz, 4H), 2.00 - 1.94 (m, 2H), 1.76 - 1.69 (m, 2H), 1.65 - 1.60 (m, 1H), 1.44 - 1.32 (m, 2H), 1.23 - 1.06 (m, 3H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 157.03, 66.45 (2C), 49.46, 44.07 (2C), 33.91 (2C), 25.71, 25.02 (2C); HRMS (ESI) m/z (M+H)$^+$ calcd for C$_{11}$H$_{21}$N$_2$O$_2$ = 213.1603, found 213.1605.
1-Butyl-3-phenylurea (3a)

\[ \text{H NMR spectrum of 1-butyl-3-phenylurea (3a)} \]

\[ \text{13C NMR spectrum of 1-butyl-3-phenylurea (3a)} \]
1-Butyl-3-p-tolylurea (3b)

$\text{H NMR spectrum of 1-butyl-3-p-tolylurea (3b)}$

$\text{13C NMR spectrum of 1-butyl-3-p-tolylurea (3b)}$
1-Butyl-3-(3,5-dimethylphenyl)urea (3c)

$\text{H NMR spectrum of 1-butyl-3-(3,5-dimethylphenyl)urea (3c)}$

$\text{13C NMR spectrum of 1-butyl-3-(3,5-dimethylphenyl)urea (3c)}$
1-Butyl-3-(4-methoxyphenyl)urea (3d)

1H NMR spectrum of 1-butyl-3-(4-methoxyphenyl)urea (3d)

13C NMR spectrum of 1-butyl-3-(4-methoxyphenyl)urea (3d)
1-Butyl-3-(4-chlorophenyl)urea (3e)

$^{1}$$H$ NMR spectrum of 1-butyl-3-(4-chlorophenyl)urea (3e)

$^{13}C$ NMR spectrum of 1-butyl-3-(4-chlorophenyl)urea (3e)
1-Butyl-3-(3,5-dichlorophenyl)urea (3f)

H NMR spectrum of 1-butyl-3-(3,5-dichlorophenyl)urea (3f)

13C NMR spectrum of 1-butyl-3-(3,5-dichlorophenyl)urea (3f)
1-Butyl-3-(4-nitrophenyl)urea (3g)

$\text{H NMR spectrum of 1-butyl-3-(4-nitrophenyl)urea (3g)}$

$\text{C NMR spectrum of 1-butyl-3-(4-nitrophenyl)urea (3g)}$
1-Butyl-3-hexylurea (3h)

$\text{H NMR spectrum of } 1\text{-butyl-3-hexylurea (3h)}$

$\text{C NMR spectrum of } 1\text{-butyl-3-hexylurea (3h)}$

$\text{H NMR spectrum of } 1\text{-butyl-3-hexylurea (3h)}$

$\text{C NMR spectrum of } 1\text{-butyl-3-hexylurea (3h)}$
1-Butyl-3-cyclopentylurea (3i)

\[
\begin{align*}
\text{H} & \quad \text{N} \\
\text{H} & \quad \text{N} \\
\text{O} & \\
\end{align*}
\]

\(1^1\)H NMR spectrum of 1-butyl-3-cyclopentylurea (3i)

\[
\begin{align*}
\text{H} & \quad \text{N} \\
\text{H} & \quad \text{N} \\
\text{O} & \\
\end{align*}
\]

\(1^3\)C NMR spectrum of 1-butyl-3-cyclopentylurea (3i)
1-Butyl-3-(prop-2-ynyl)urea (3j)

\[
\begin{align*}
\text{HN} & \quad \text{O} \\
\text{HN} & \quad \text{O} \\
\end{align*}
\]

\(^1\text{H NMR spectrum of 1-butyl-3-(prop-2-ynyl)urea (3j)}\)

\[
\begin{align*}
\text{HN} & \quad \text{O} \\
\text{HN} & \quad \text{O} \\
\end{align*}
\]

\(^{13}\text{C NMR spectrum of 1-butyl-3-(prop-2-ynyl)urea (3j)}\)
1-Benzyl-3-phenylurea (3k)

$\text{H NMR spectrum of 1-benzyl-3-phenylurea (3k)}$

$\text{C NMR spectrum of 1-benzyl-3-phenylurea (3k)}$
1-Cyclohexyl-3-phenylurea (3l)

\[\text{H NMR spectrum 1-cyclohexyl-3-phenylurea (3l)}\]

\[\text{13C NMR spectrum of 1-cyclohexyl-3-phenylurea (3l)}\]
N-Phenylpiperidine-1-carboxamide (3m)

**1H NMR spectrum of N-phenylpiperidine-1-carboxamide (3m)**

**13C NMR spectrum of N-phenylpiperidine-1-carboxamide (3m)**
3-Phenyl-1,1-dipropylurea (3n)

H NMR spectrum of 3-phenyl-1,1-dipropylurea (3n)

13C NMR spectrum of 3-phenyl-1,1-dipropylurea (3n)
1-Butyl-3-isobutylurea (3o)

\[
\begin{align*}
\text{H} & \quad \text{N} & \quad \text{O} \\
\text{N} & \quad \text{H} & \quad \text{N}
\end{align*}
\]

\[\text{\textit{H NMR spectrum of 1-butyl-3-isobutylurea (3o)}}\]

\[
\begin{align*}
\text{X} & \quad \text{parts per Million} & \quad \text{1H} \\
\text{10.0} & \quad \text{9.0} & \quad \text{8.0} & \quad \text{7.0} & \quad \text{6.0} & \quad \text{5.0} & \quad \text{4.0} & \quad \text{3.0} & \quad \text{2.0} & \quad \text{1.0} & \quad \text{0} \\
\text{2.01} & \quad \text{2.00} & \quad \text{2.00} & \quad \text{2.00} & \quad \text{2.01} & \quad \text{0.96}
\end{align*}
\]

\[\text{\textit{13C NMR spectrum of 1-butyl-3-isobutylurea (3o)}}\]

\[
\begin{align*}
\text{X} & \quad \text{parts per Million} & \quad \text{13C} \\
\text{200.0} & \quad \text{190.0} & \quad \text{180.0} & \quad \text{170.0} & \quad \text{160.0} & \quad \text{150.0} & \quad \text{140.0} & \quad \text{130.0} & \quad \text{120.0} & \quad \text{110.0} & \quad \text{100.0} & \quad \text{90.0} & \quad \text{80.0} & \quad \text{70.0} & \quad \text{60.0} & \quad \text{50.0} & \quad \text{40.0} & \quad \text{30.0} & \quad \text{20.0} & \quad \text{10.0} & \quad \text{0}
\end{align*}
\]

\[
\begin{align*}
\text{158.861} & \quad \text{77.347} & \quad \text{77.231} & \quad \text{77.026} & \quad \text{76.713} & \quad \text{47.943} & \quad \text{40.195} & \quad \text{32.439} & \quad \text{29.006} & \quad \text{20.114} & \quad \text{20.070} & \quad \text{13.809}
\end{align*}
\]
1-Benzyl-3-isobutylurea (3p)

$^1$H NMR spectrum of 1-benzyl-3-isobutylurea (3p)

$^{13}$C NMR spectrum of 1-benzyl-3-isobutylurea (3p)
1-Cyclohexyl-3-isobutylurea (3q)

$\text{H NMR spectrum of 1-cyclohexyl-3-isobutylurea (3q)}$

$\text{13C NMR spectrum of 1-cyclohexyl-3-isobutylurea (3q)}$
**N-Isobutylpyrrolidine-1-carboxamide (3r)**

**1H NMR spectrum of N-isobutylpyrrolidine-1-carboxamide (3r)**

**13C NMR spectrum of N-isobutylpyrrolidine-1-carboxamide (3r)**
**N-Isobutylmorpholine-4-carboxamide (3s)**

**1H NMR spectrum of N-isobutylmorpholine-4-carboxamide (3s)**

**13C NMR spectrum of N-isobutylmorpholine-4-carboxamide (3s)**
1-(tert-Butyl)-3-buty lurea (3t)

$^1$H NMR spectrum of 1-(tert-butyl)-3-buty lurea (3t)

$^{13}$C NMR spectrum of 1-(tert-butyl)-3-buty lurea (3t)
1-Benzyl-3-(tert-butyl)urea (3u)

$^1$H NMR spectrum of 1-benzyl-3-(tert-butyl)urea (3u)

$^{13}$C NMR spectrum of 1-benzyl-3-(tert-butyl)urea (3u)
1-Isobutyl-3-phenylurea (3v)

**1H NMR spectrum 1-isobutyl-3-phenylurea (3v)**

**13C NMR spectrum of 1-isobutyl-3-phenylurea (3v)**
$N$-Phenylpyrrolidine-1-carboxamide (3w)

$^1$H NMR spectrum of $N$-phenylpyrrolidine-1-carboxamide (3w)

$^{13}$C NMR spectrum of $N$-phenylpyrrolidine-1-carboxamide (3w)
N-Phenylmorpholine-4-carboxamide (3x)

1H NMR spectrum of N-phenylmorpholine-4-carboxamide (3x)

13C NMR spectrum of N-phenylmorpholine-4-carboxamide (3x)
N-Isobutylpiperidine-1-carboxamide (3y)

$\text{\textsuperscript{1}H NMR spectrum of } N$-isobutylpiperidine-1-carboxamide (3y)

$\text{\textsuperscript{13}C NMR spectrum of } N$-isobutylpiperidine-1-carboxamide (3y)
1-Butyl-3-cyclohexylurea (3z)

$\text{H NMR spectrum of 1-butyl-3-cyclohexylurea (3z)}$

$\text{13C NMR spectrum of 1-butyl-3-cyclohexylurea (3z)}$
1-Benzyl-3-cyclohexylurea (3aa)

$^1$H NMR spectrum of 1-benzyl-3-cyclohexylurea (3aa)

$^{13}$C NMR spectrum of 1-benzyl-3-cyclohexylurea (3aa)
N-Cyclohexylpyrrolidine-1-carboxamide (3ab)

\[ \text{N} - \text{Cyclohexylpyrrolidine - 1 - carboxamide} \]

\[ \text{H NMR spectrum of N-cyclohexylpyrrolidine-1-carboxamide (3ab)} \]

\[ 13\text{C NMR spectrum of N-cyclohexylpyrrolidine-1-carboxamide (3ab)} \]
**N-Cyclohexymorpholine-4-carboxamide (3ac)**

![H NMR spectrum of N-cyclohexymorpholine-4-carboxamide (3ac)](image)

**1H NMR spectrum of N-cyclohexymorpholine-4-carboxamide (3ac)**

![C NMR spectrum of N-cyclohexymorpholine-4-carboxamide (3ac)](image)

**13C NMR spectrum of N-cyclohexymorpholine-4-carboxamide (3ac)**