Smiles rearrangements in Ugi and Passerini type couplings:
new multicomponent access to *O*- and *N*-arylamides

SUPPORTING INFORMATION

Laurent El Kaïm, Marie Gizolme, Laurence Grimaud*, Julie Oble*

laurence.grimaud@ensta.fr; laurent.elkaim@ensta.fr

TABLE OF CONTENTS

General procedures	S2
Spectral data for products from Table 1	S2
Spectral data for products from Table 2	S3
Spectral data for products from Table 3	S8
Spectral data for products from Table 4	S8
Spectral data for products from Table 5	S11
Spectral data for products from Table 6	S13
Spectral data for products from Table 7	S17
NMR spectra of products for new compounds (Tables 1 to 7)	S18

General procedures

^1H NMR spectra were recorded on a Bruker Avance 400 spectrometer, using CDCl_3 solvent as reference and/or internal deuterium lock. ^{13}C NMR spectra were recorded on a Bruker Avance 400 (100.6 MHz) spectrometer. Two-dimensional NMR spectroscopy [^1H - ^1H COSY spectra, ^1H - ^{13}C COSY spectra (HSQC) and long-range ^1H - ^{13}C COSY spectra (HMBC)], were carried out to determine the correlation between ^1H and ^{13}C . The chemical shifts for all NMR spectra are expressed in parts per million to high frequency of TMS reference. Coupling constants (J) are quoted in Hz and are recorded to the nearest 0.1 Hz.

The IR spectra were obtained on a Bruker IFS 66 or a Perkin-Elmer FT 1600 spectrometer. Low resolution mass spectral analysis (EI and CI) were recorded using a Hewlett-Packard HP5989 mass spectrometer via either direct injection or GC/MS coupling with a Hewlett-Packard HP5890 chromatograph. High-resolution (HR) mass spectra were performed on a JEOL JMS-Gcmate II, GC/MS system spectrometer. TLC was carried out using precoated plates of silica gel 60F254.

Spectral data for products from Table 1

2-(*N*-(2,2-dimethoxy ethyl)-*N*-(2-nitro phenyl)amino)-*N*-cyclohexyl butanamide

Yellow oil. Yield (16h at 60°C in MeOH): 64%. ^1H NMR (CDCl_3 , 400 MHz) δ 7.70 (dd, 1H, J = 8.1, 1.5 Hz), 7.52 (td, 1H, J = 7.6, 1.5 Hz), 7.39 (dd, 1H, J = 7.6, 1.0 Hz), 7.33 (br s, 1H), 7.21 (ddd, 1H, J = 8.1, 7.6, 1.0 Hz), 4.24 (dd, 1H, J = 6.6, 4.3 Hz), 3.80-3.70 (m, 1H), 3.64 (t, 1H, J = 6.6 Hz), 3.36 (dd, 1H, J = 13.9, 6.6 Hz), 3.30 (s, 3H), 3.24 (s, 3H), 3.10 (dd, 1H, J = 13.9, 4.3 Hz), 2.01-1.81 (m, 2H), 1.78-1.57 (m, 4H), 1.46-1.04 (m, 6H), 0.92 (t, 3H, J = 7.6 Hz). ^{13}C NMR (CDCl_3 , 100.6 MHz) δ 170.9, 147.1, 143.4, 133.1, 125.8, 125.5, 124.6, 102.6, 70.5, 55.1, 54.3, 52.1, 48.4, 33.4, 33.1, 26.0, 25.3, 23.9, 11.8. IR (thin film) 3366, 2931, 2852, 1528, 1450, 1128 cm^{-1} . MS (DI, CI NH_3) m/z 393. HRMS Calcd. for $\text{C}_{20}\text{H}_{31}\text{N}_3\text{O}_5$ 393.2264, Found 393.2267.

2-(*N*-((furan-2-yl)methyl)-*N*-(2-nitro phenyl)amino)-*N*-cyclohexyl butanamide

Yellow oil. Yield (16h at 40°C in MeOH): 97%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.66 (dd, 1H, J = 8.3, 1.8 Hz), 7.46 (td, 1H, J = 7.8, 1.8 Hz), 7.29-7.27 (m, 1H), 7.22-7.16 (m, 2H), 7.07 (d, 1H, J = 8.3 Hz), 6.22 (dd, 1H, J = 3.3, 1.7 Hz), 5.96 (d, 1H, J = 3.3 Hz), 4.28 (d, 1H, J = 15.6 Hz), 4.03 (d, 1H, J = 15.6 Hz), 3.80 (dd, 1H, J = 7.6, 5.3 Hz), 3.77-3.70 (m, 1H), 2.02-1.77 (m, 2H), 1.76-1.56 (m, 4H), 1.42-1.12 (m, 6H), 0.96 (t, 3H, J = 7.3 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 170.9, 150.2, 147.2, 142.9, 142.6, 133.1, 126.5, 125.2, 125.1, 110.6, 109.9, 68.1, 48.6, 48.2, 33.9, 33.4, 25.9, 25.1, 25.2, 24.1, 10.8. **IR** (thin film) 3380, 2936, 2851, 1671, 1524, 1358, 1152 cm⁻¹. **MS (DI, CI NH₃)** m/z 386. **HRMS** Calcd. for C₂₁H₂₇N₃O₄ 385.2002, Found 385.1996.

2-(*N*-(2-nitro phenyl)-*N*-(prop-2-ynyl)amino)-*N*-cyclohexyl butanamide

Yellow solid. Yield (16h at 60°C in MeOH): 71%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.69 (dd, 1H, J = 8.1, 1.2 Hz), 7.57-7.51 (m, 2H), 7.33-7.29 (m, 1H), 6.71 (d, 1H, J = 8.6 Hz), 4.00 (dd, 1H, J = 7.8, 4.2 Hz), 3.88 (dd, 1H, J = 18.2, 2.3 Hz), 3.68 (dd, 1H, J = 18.2, 2.3 Hz), 3.64-3.58 (m, 1H), 2.28 (t, 1H, J = 2.3 Hz), 1.96-1.79 (m, 2H), 1.78-1.54 (m, 2H), 1.53-1.49 (m, 2H), 1.42-1.07 (m, 6H), 0.95 (t, 3H, J = 7.6 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 170.3, 147.7, 142.2, 133.1, 126.7, 126.3, 124.8, 77.3, 75.2, 65.7, 48.1, 42.9, 33.4, 32.8, 25.8, 25.2, 25.1, 24.1, 9.8. **IR** (thin film) 3363, 2932, 2855, 1665, 1526, 1356, 1266 cm⁻¹. **MS (DI, CI NH₃)** m/z 344. **HRMS** Calcd. for C₁₉H₂₅N₃O₃ 343.1896, Found 343.1885. **m.p.** 80°C.

2-(*N*-allyl-*N*-(2-nitro phenyl)amino)-*N*-cyclohexyl butanamide

Yellow oil. Yield (16h at 60°C in MeOH): 72%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.71 (dd, 1H, J = 8.1, 1.4 Hz), 7.49 (td, 1H, J = 7.8, 1.4 Hz), 7.28 (dd, 1H, J = 7.8, 1.0 Hz), 7.16 (td, 1H, J = 7.8, 1.0 Hz), 6.96 (d, 1H, J = 8.1 Hz), 5.65 (dddd, 1H, J = 16.9, 10.3, 6.4, 4.3 Hz), 5.09 (dd, 1H, J = 10.3, 1.1 Hz), 5.08 (dd, 1H, J = 16.9, 1.1 Hz), 3.81-3.69 (m, 3H), 3.53 (dd, 1H, J = 15.5, 6.4 Hz), 2.02-1.91 (m, 1H), 1.91-1.83 (m, 1H), 1.78-1.54 (m, 4H), 1.42-1.02 (m, 6H), 0.93 (t, 3H, J = 7.3 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 170.8, 146.3, 143.1, 133.2, 133.0, 125.6, 124.1, 119.6, 68.5, 53.7, 48.2, 33.4, 33.0, 25.9, 25.2, 23.5, 11.4. **IR** (thin film) 3384, 2932, 2856, 1664, 1523, 1159 cm⁻¹. **MS (DI, CI NH₃)** m/z 345. **HRMS** Calcd. for C₁₉H₂₇N₃O₃ 345.2052, Found 345.2066.

N-Benzyl-2-[(4-chloro benzyl)-(2-nitro phenyl) amino] butyramide

Yellow solid. Yield (4h at 40°C in MeOH): 96%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.61 (t, 1H, J = 8.1 Hz), 7.43 (td, 1H, J = 8.1, 1.5 Hz), 7.31-7.05 (m, 11H), 6.89 (d, 1H, J = 8.1 Hz), 4.48 (d, 2H, J = 5.8 Hz), 4.28 (d, 1H, J = 15.3 Hz), 4.11 (d, 1H, J = 15.3 Hz), 3.66 (dd, 1H, J = 8.8, 5.1 Hz), 2.04-1.91 (m, 1H), 1.78-1.66 (m, 1H), 0.91 (t, 3H, J = 7.3 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 171.6, 147.0, 142.4, 138.5, 135.2, 135.5, 133.1, 130.1, 129.1, 128.9, 128.2, 127.9, 126.3, 125.7, 124.9, 69.9, 53.9, 48.9, 23.3, 11.6. **IR** (thin film) 3293, 2969, 1653, 1521, 1363, 1089 cm⁻¹. **MS (DI, CI NH₃)** m/z 441, 439. **Anal.** Calcd. for C₂₄H₂₄ClN₃O₃: C, 65.82 ; H, 5.52. Found: C, 65.48 ; H, 5.72. **m.p.** 82°C.

2-[(4-Chloro benzyl)-(2-nitro phenyl)-amino]-octanoic acid *tert*-butylamide

Yellow oil. Yield (4h at 40°C in MeOH): 79%. ¹H NMR (CDCl₃, 400 MHz) δ 7.66 (dd, 1H, *J* = 8.1, 1.5 Hz), 7.40 (td, 1H, *J* = 7.6, 1.8 Hz), 7.23-7.07 (m, 6H), 6.78 (br s, 1H), 4.33 (d, 1H, *J* = 14.9 Hz), 4.13 (d, 1H, *J* = 14.9 Hz), 3.56 (dd, 1H, *J* = 8.1, 5.6 Hz), 1.94-1.84 (m, 1H), 1.63-1.48 (m, 1H), 1.34 (s, 9H), 1.32-1.13 (m, 8H), 0.84 (t, 3H, *J* = 6.8 Hz). ¹³C NMR (CDCl₃, 100.6 MHz) δ 170.9, 146.2, 142.5, 135.5, 133.6, 133.1, 129.8, 129.1, 125.9, 125.7, 124.4, 69.1, 53.3, 51.4, 31.9, 29.7, 29.5, 28.9, 26.9, 22.9, 14.4. IR (thin film) 3377, 2923, 2857, 1676, 1518, 1361, 1090 cm⁻¹. MS (DI, CI NH₃) *m/z* 461. HRMS Calcd. for C₂₅H₃₄ClN₃O₃ 459.2289, Found 459.2291.

N-(3,4-dimethoxy phenethyl)-2-(*N*-(2-methoxy ethyl)-*N*-(2-nitro phenyl)amino) butanamide.

Brown oil. Yield (16h at 60°C in MeOH): 71%. ¹H NMR (CDCl₃, 400 MHz) δ 7.70 (dd, 1H, *J* = 8.3, 1.7 Hz), 7.65 (br s, 1H), 7.48 (td, 1H, *J* = 7.8, 1.7 Hz), 7.25 (d, 1H, *J* = 8.3 Hz), 7.16 (td, 1H, *J* = 7.8, 1.1 Hz), 6.83-6.46 (m, 3H), 3.87 (s, 6H), 3.68 (t, 1H, *J* = 6.8 Hz), 3.59-3.49 (m, 2H), 3.35-3.27 (m, 1H), 3.28 (t, 2H, *J* = 5.8 Hz), 3.17-3.08 (m, 1H), 3.14 (s, 3H), 2.80 (t, 2H, *J* = 7.3 Hz), 2.05-1.93 (m, 1H), 1.73-1.61 (m, 1H), 0.91 (t, 3H, *J* = 7.6 Hz). ¹³C NMR (CDCl₃, 100.6 MHz) δ 172.5, 149.2, 147.9, 146.6, 142.7, 133.3, 132.1, 125.8, 125.7, 123.9, 121.0, 111.6, 111.2, 70.3, 69.5, 59.2, 56.3, 56.2, 49.7, 41.1, 35.4, 24.0, 11.9. IR (thin film) 3352, 3054, 2934, 1663, 1518, 1462, 1153 cm⁻¹. MS (DI, CI NH₃) *m/z* 456. HRMS Calcd. for C₂₃H₃₁N₃O₆ 445.2213, Found 445.2212.

2-(*N*-(4-chloro benzyl)-*N*-(2-nitro phenyl)amino)-*N*-((ethyl peroxy)methyl) butanamide.

Brown solid. Yield (16h at 60°C in MeOH): 60%. ¹H NMR (CDCl₃, 400 MHz) δ 7.66 (dd, 1H, *J* = 8.1, 1.5 Hz), 7.44 (td, 1H, *J* = 7.6, 1.3 Hz), 7.30-7.08 (m, 7H), 4.35 (d, 1H, *J* = 14.4 Hz), 4.22 (q, 2H, *J* = 7.3 Hz), 4.20 (d, 1H, *J* = 14.4 Hz), 4.11 (d, 2H, *J* = 5.6 Hz), 3.67 (dd, 1H, *J* = 9.3, 4.8 Hz), 2.01-1.89 (m, 1H), 1.73-1.62 (m, 1H), 1.28 (t, 3H, *J* = 7.3 Hz), 0.91 (t, 3H, *J* = 7.3 Hz). ¹³C NMR (CDCl₃, 100.6 MHz) δ 172.9, 169.9, 147.5, 142.2, 135.2, 133.6, 133.08, 130.5, 128.9, 126.9, 125.6, 125.2, 70.0, 61.9, 54.4, 41.7, 23.3, 14.6, 11.6. IR (thin film) 3404, 3054, 2985, 1743, 1679, 1424 cm⁻¹. MS (DI, CI NH₃) *m/z* 435. HRMS Calcd. for C₂₁H₂₄ClN₃O₅ 433.1404, Found 433.1409. **m.p.** 79°C.

2-[(4-Chloro benzyl)-(2-nitro phenyl)amino]-2-(4-chloro phenyl)-*N*-cyclohexyl acetamide:

Yellow solid. Yield (20h at 60°C in MeOH): 80%. ¹H NMR (CDCl₃, 400 MHz) δ 7.67 (dd, 1H, *J* = 8.1, 1.5 Hz), 7.47-7.33 (m, 4H), 7.28-7.22 (m, 2H), 7.18-7.12 (m, 3H), 6.96 (d, 1H, *J* = 7.1 Hz), 6.65 (d, 2H, *J* = 8.1 Hz), 4.80 (s, 1H), 4.01 (d, 1H, *J* = 14.1 Hz), 3.95 (d, 1H, *J* = 14.1 Hz), 3.53-3.46 (m, 1H), 1.72-1.50 (m, 4H), 1.45-1.25 (m, 4H), 1.15-1.04 (m, 2H). ¹³C NMR (CDCl₃, 100.6 MHz) δ 169.8, 147.8, 141.9, 135.0, 134.8, 134.4, 132.9, 133.0, 131.2, 130.3, 129.3, 128.9, 127.3, 126.1, 124.9, 71.2, 57.0, 48.2, 32.8, 25.7, 24.9, 22.7. IR (thin film) 3332, 2929, 2854, 1662, 1522, 1364, 1090, 1015 cm⁻¹. MS (DI, CI NH₃) *m/z* 513. Anal. Calcd for C₂₇H₂₇Cl₂N₃O₃: C, 63.28 ; H, 5.31. Found: C, 63.24 ; H, 5.56. **m.p.** 156°C.

2-(*N*-(4-chloro benzyl)-*N*-(2-nitro phenyl)amino)-*N*-cyclohexyl-2-(3-(trifluoromethyl)phenyl)acetamide.

Yellow solid. Yield (20h at 60°C in MeOH): 70%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.73 (br s, 1H), 7.67 (dd, 1H, J = 8.1, 1.5 Hz), 7.60 (d, 1H, J = 7.6 Hz), 7.52 (t, 1H, J = 7.6 Hz), 7.40 (dd, 1H, J = 7.8, 1.5 Hz), 7.29-7.22 (m, 3H), 7.19-7.15 (m, 2H), 6.99 (dd, 1H, J = 8.1, 1.5 Hz), 6.69-6.65 (m, 2H), 4.90 (s, 1H), 4.04 (d, 1H, J = 14.1 Hz), 3.92 (d, 1H, J = 14.1 Hz), 3.63-3.53 (m, 1H), 1.82-1.44 (m, 6H), 1.29-1.05 (m, 4H). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 168.7, 147.8, 141.7, 137.5, 134.8, 133.1, 132.9, 132.9, 131.2, 129.8, 127.3, 126.4, 126.0, 125.1, 71.7, 57.3, 48.3, 32.8, 25.7, 25.0, 24.9. **IR** (thin film) 3321, 2936, 2855, 1662, 1525, 1328, 1168, 1131 cm⁻¹. **MS (DI, CI NH₃)** m/z 547. **HRMS** Calcd. for C₂₈H₂₇ClF₃N₃O₃ 545.1693, Found 545.1673. **m.p.** 101°C.

2-(*N*-(4-chloro benzyl)-*N*-(2-nitro phenyl)amino)-*N*-cyclohexyl-2-(3,4-dimethoxyphenyl)acetamide.

Yellow solid. Yield (70h at 60°C in MeOH): 90%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.65 (d, 1H, J = 7.8 Hz), 7.37 (t, 1H, J = 8.1 Hz), 7.28 (br s, 1H), 7.25-7.11 (m, 3H), 7.08-7.01 (m, 2H), 6.98 (d, 1H, J = 8.1 Hz), 6.84 (d, 1H, J = 7.8 Hz), 6.68 (d, 2H, J = 7.6 Hz), 4.75 (s, 1H), 4.04 (d, 1H, J = 14.1 Hz), 3.98 (d, 1H, J = 14.1 Hz), 3.89 (s, 3H), 3.87 (s, 3H), 3.65-3.53 (m, 1H), 1.76-1.48 (m, 4H), 1.48-1.36 (m, 2H), 1.32-1.03 (m, 4H). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 169.7, 151.7, 149.5, 147.8, 142.2, 134.2, 133.2, 132.9, 131.4, 128.8, 127.6, 125.9, 124.9, 121.7, 111.4, 111.3, 71.2, 57.3, 56.3, 48.0, 33.0, 32.8, 25.7, 25.0, 24.9. **IR** (thin film) 3361, 2939, 2861, 1666, 1519, 1262, 1147, 1034 cm⁻¹. **MS (DI, CI NH₃)** m/z 539. **HRMS** Calcd. for C₂₉H₃₂ClN₃O₅ 537.2030, Found 537.2021. **m.p.** 126°C.

1-[(4-Chloro benzyl)-(2-nitro phenyl)-amino]-cyclopentanecarboxylic acid cyclohexylamide

Yellow oil. Yield (6d at 60°C in MeOH): 33%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.63-7.51 (m, 4H), 7.29-7.24 (m, 1H), 7.14 (d, 2H, J = 7.8 Hz), 7.02 (d, 2H, J = 7.8 Hz), 4.08 (s, 2H), 3.87-3.73 (m, 1H), 1.98 (d, 2H, J = 12.4 Hz), 1.85-1.61 (m, 8H), 1.52-1.21 (m, 8H). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 175.6, 150.7, 140.7 (C_A); 135.7, 133.6, 133.2, 130.7, 129.2, 128.8, 127.1, 125.5, 78.0, 56.4, 48.7, 33.5, 33.4, 30.2, 30.1, 25.9, 25.3, 24.8. **IR** (thin film) 3382, 2937, 2843, 1719, 1672, 1462, 1095 cm⁻¹. **IR** (thin film) 3382, 2937, 2843, 1719, 1672, 1462, 1095 cm⁻¹. **MS (DI, CI NH₃)** m/z 457. **Anal.** Calcd for C₂₃H₂₀ClN₃O₃: C, 65.85; H, 6.63. Found: C, 65.81; H, 7.01.

2-(*N*-(4-chloro benzyl)-*N*-(2-nitro phenyl)amino)-*N*-cyclohexyl-2-methyl butanamide

Yellow oil. Yield (10d at 60°C in MeOH): 71%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.61 (dd, 1H, *J* = 8.3, 1.3 Hz), 7.58 (br s, 1H), 7.52-7.44 (m, 2H), 7.22 (d, 1H, *J* = 7.6 Hz), 7.02 (d, 2H, *J* = 8.3 Hz), 6.76 (d, 2H, *J* = 8.3 Hz), 3.88 (s, 2H), 3.85-3.73 (m, 1H), 2.01-1.87 (m, 2H), 1.81-1.55 (m, 5H), 1.51 (s, 3H), 1.40-1.17 (m, 5H), 0.71 (t, 3H, *J* = 7.3 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 174.4, 151.6, 141.6, 135.7, 134.1, 133.5, 131.5, 131.1, 129.1, 127.8, 125.7, 70.5, 57.1, 49.0, 33.7, 33.6, 32.7, 26.2, 25.7, 25.6, 15.9, 9.9. **IR** (thin film) 3382, 2982, 2855, 1665, 1523, 1357, 1092 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 444. **HRMS** Calcd. for C₂₄H₃₀ClN₃O₃ 443.1976, Found 443.1971.

2-[(4-Chloro benzyl)-(4-nitro phenyl)-amino]-*N*-cyclohexyl butyramide

Yellow oil. Yield (16h at 40°C in MeOH): 72%. **¹H NMR** (CDCl₃, 400 MHz) δ 8.09 (d, 2H, *J* = 7.6 Hz), 7.34-7.26 (m, 4H), 6.74 (d, 2H, *J* = 8.1 Hz), 5.69 (br s, 1H), 4.62 (d, 1H, *J* = 16.9 Hz), 4.23 (d, 1H, *J* = 16.9 Hz), 4.23 (t, 1H, *J* = 7.3 Hz), 3.75-3.64 (m, 1H), 2.26-2.15 (m, 2H), 1.92-1.78 (m, 2H), 1.75-1.53 (m, 4H), 1.20-1.36 (m, 4H), 0.90 (t, 3H, *J* = 7.3 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 169.3, 153.4, 139.2, 136.1, 133.8, 129.5, 128.3, 126.3, 113.2, 66.3, 51.8, 48.9, 33.3, 33.2, 30.1, 25.7, 25.1, 22.9, 12.0. **IR** (thin film) 3315, 2930, 2856, 1648, 1597, 1314 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 431. **Anal.** Calcd. for C₂₃H₂₈ClN₃O₃: C, 64.25 ; H, 6.56. Found: C, 65.29 ; H, 6.51.

2-[Allyl-(4-nitro phenyl)-amino]-4-methyl pentanoic acid *tert*-butylamide

Yellow solid. Yield (48h at 60°C in MeOH): 98%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.28 (d, 2H, *J* = 1.7 Hz), 6.77 (d, 2H, *J* = 7.1 Hz), 5.90 (dddd, 1H, *J* = 17.5, 10.6, 7.1, 4.2), 5.80 (br s, 1H), 5.32 (d, 1H, *J* = 10.6 Hz), 5.27 (d, 1H, *J* = 17.5), 4.25 (t, 1H, *J* = 6.6 Hz), 4.11 (dd, 1H, *J* = 16.6, 7.1 Hz), 4.00 (dd, 1H, *J* = 16.6, 4.2 Hz), 2.10-2.01 (m, 1H), 1.71-1.54 (m, 2H), 1.30 (s, 9H), 0.94 (d, 3H, *J* = 6.6 Hz), 0.91 (d, 3H, *J* = 6.6 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 170.2, 153.1, 138.9, 133.4, 126.3, 118.8, 113.0, 63.3, 51.9, 51.1, 38.3, 29.0, 25.7, 23.3, 22.6. **IR** (thin film) 3311, 2937, 2859, 1659, 1594, 1306, 1111 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 348. **Anal.** Calcd. for C₁₉H₂₉N₃O₃: C, 65.68 ; H, 8.41. Found: C, 65.62 ; H, 8.39. **m.p.** 95°C.

2-[(2-Methoxy ethyl)-(4-nitro phenyl)amino]-2,6-dimethyl-hept-5-enoic acid cyclohexylamide

Yellow oil. Yield (10d at 60°C in MeOH): 46%. **¹H NMR** (CDCl₃, 400 MHz) δ 8.10 (d, 2H, *J* = 9.3 Hz), 7.61 (br s, 1H), 6.79 (d, 2H, *J* = 9.3 Hz), 4.95 (t, 1H, *J* = 6.6 Hz), 3.40 (s, 3H), 3.96-3.64 (m, 4H), 3.56-3.48 (m, 1H), 2.33-2.22 (m, 2H), 1.95-1.63 (m, 6H), 1.63 (s, 3H), 1.61 (s, 3H), 1.39 (s, 3H), 1.34-1.19 (m, 6H). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 175.4, 151.1, 138.1, 132.7, 125.5, 123.5, 115.2, 69.6, 66.7, 59.3, 48.7, 45.3, 34.7, 33.4, 31.4, 26.0, 25.9, 25.3, 25.2, 22.4, 17.7. **IR** (thin film) 3311, 2937, 2859, 1657, 1516, 1313, 1118, 1015 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 433. **Anal.** Calcd. for C₂₄H₃₇N₃O₄: C, 66.79 ; H, 8.64. Found: C, 66.51 ; H, 8.66.

Spectral data for products from Table 2

2-(*N*-(4-chloro benzyl)-*N*-(2-methoxy-4-nitro phenyl)amino)-*N*-cyclohexyl butanamide

Red oil. Yield (16h at 60°C in MeOH): 62%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.75 (d, 1H, *J* = 2.5 Hz), 7.69 (dd, 1H, *J* = 8.8, 2.5 Hz), 7.27 (d, 2H, *J* = 8.3 Hz), 7.10 (d, 2H, *J* = 8.3 Hz), 6.92 (d, 1H, *J* = 8.1 Hz), 6.84 (d, 1H, *J* = 8.8 Hz), 4.48 (d, 1H, *J* = 14.6 Hz), 4.27 (d, 1H, *J* = 14.6 Hz), 4.08 (t, 1H, *J* = 7.1 Hz), 4.04 (s, 3H), 3.77-3.88 (m, 1H), 2.21-2.10 (m, 2H), 2.02-1.71 (m, 4H), 1.70-1.59 (m, 2H), 1.51-1.29 (m, 2H), 1.13-1.06 (m, 2H), 0.88 (t, 3H, *J* = 7.1 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 170.9, 152.1, 144.8, 142.8, 135.9, 133.3, 129.1, 129.0, 120.9, 117.7, 107.2, 67.7, 56.4, 49.9, 48.3, 33.8, 25.9, 25.2, 25.1, 25.1, 12.5. **IR** (thin film) 3400, 2932, 2855, 1664, 15910, 1511, 1334, 1092 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 460. **HRMS** Calcd. for C₂₄H₃₀ClN₃O₄ 459.1925, Found 459.1920.

2-(*N*-(4-chloro benzyl)-*N*-(4-methyl-2-nitro phenyl)amino)-*N*-cyclohexyl butanamide

Orange oil. Yield (72h at 60°C in MeOH): 96%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.43 (d, 1H, *J* = 1.8 Hz), 7.23 (dd, 1H, *J* = 8.1, 1.8 Hz), 7.19 (d, 2H, *J* = 8.3 Hz), 7.09 (d, 1H, *J* = 8.1 Hz), 7.01 (d, 2H, *J* = 8.3 Hz), 6.84 (d, 1H, *J* = 8.4 Hz), 4.24 (d, 1H, *J* = 14.4 Hz), 4.05 (d, 1H, *J* = 14.4 Hz), 3.86-3.75 (m, 1H), 3.55 (dd, 1H, *J* = 8.8, 5.1 Hz), 2.34 (s, 3H), 1.91-1.81 (m, 2H), 1.78-1.53 (m, 4H), 1.46-1.29 (m, 4H), 1.28-1.44 (m, 2H), 0.89 (t, 3H, *J* = 7.6 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 171.1, 147.5, 139.6, 135.7, 135.4, 133.8, 133.6, 130.3, 128.9, 126.7, 125.6, 69.9, 54.8, 48.2, 33.5, 33.3, 25.8, 25.1, 23.4, 20.9, 11.4. **IR** (thin film) 3396, 2931, 2856, 1665, 1526, 1453 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 444. **HRMS** Calcd. for C₂₄H₃₀ClN₃O₃ 443.1976, Found 443.1960.

2-(*N*-(4-chloro benzyl)-*N*-(4-methoxy-2-nitro phenyl)amino)-*N*-cyclohexyl butanamide

Red oil. Yield (72h at 60°C in MeOH): 98%. **¹H NMR** (CDCl₃, 400 MHz) δ 7.18-7.15 (m, 3H), 7.09 (d, 1H, *J* = 2.7 Hz), 7.00 (dd, 1H, *J* = 8.8, 2.7 Hz), 6.95 (d, 2H, *J* = 8.1 Hz), 6.84 (d, 1H, *J* = 8.3 Hz), 4.17 (d, 1H, *J* = 13.9 Hz), 3.97 (d, 1H, *J* = 13.9 Hz), 3.88-3.77 (m, 1H), 3.81 (s, 3H), 3.50 (t, 1H, *J* = 7.1 Hz), 1.95-1.85 (m, 2H), 1.81-1.68 (m, 4H), 1.66-1.55 (m, 2H), 1.46-1.32 (m, 2H), 1.30-1.17 (m, 2H), 0.89 (t, 3H, *J* = 7.3 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 171.6, 157.1, 149.3, 135.3, 134.5, 133.7, 130.7, 129.0, 128.8, 119.5, 109.3, 70.1, 56.4, 56.4, 48.2, 33.6, 33.4, 25.9, 25.2, 25.1, 23.9, 11.1. **IR** (thin film) 3377, 2932, 2854, 1666, 1527, 1092 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 460. **HRMS** Calcd. for C₂₄H₃₀ClN₃O₄ 459.1925, Found 459.1902.

2-[[2-(4-Benzyl piperazin-1-ylmethyl)-4-nitro phenyl]-(4-chloro benzyl)-amino]-*N*-cyclohexyl butyramide

Yellow oil. Yield (48h at 60°C in MeOH): 88%. **¹H NMR** (CDCl₃, 400 MHz) δ 8.20 (d, 1H, *J* = 2.7 Hz), 7.93 (dd, 1H, *J* = 8.8, 2.7 Hz), 7.37-7.26 (m, 6H), 7.16 (d, 2H, *J* = 8.3 Hz), 7.07 (d, 2H, *J* = 8.3

Hz), 5.94 (d, 1H, $J = 7.6$ Hz), 4.51 (d, 1H, $J = 15.6$ Hz), 4.40 (d, 1H, $J = 15.6$ Hz), 4.16 (dd, 1H, $J = 5.5, 4.0$ Hz), 3.81-3.71 (m, 1H), 3.68 (d, 1H, $J = 12.9$ Hz), 3.59 (d, 1H, $J = 12.6$ Hz), 3.53 (d, 1H, $J = 12.6$ Hz), 3.48 (d, 1H, $J = 12.9$ Hz), 2.56 (br s, 8H), 2.10-2.00 (m, 1H), 1.91-1.79 (m, 1H), 1.74-1.57 (m, 4H), 1.43-1.00 (m, 6H), 0.91 (t, 3H, $J = 7.3$ Hz). **^{13}C NMR** (CDCl_3 , 100.6 MHz) δ 171.3, 154.7, 143.3, 138.2, 136.3, 133.7, 133.3, 129.6, 129.0, 128.7, 127.9, 127.6, 123.9, 123.4, 117.3, 69.1, 63.3, 59.3, 53.0, 51.1, 48.4, 33.9, 33.7, 25.8, 25.3, 25.2, 23.3, 11.8. **IR** (thin film) 3421, 3053, 2933, 1668, 1586, 1459, 1339, 1155 cm^{-1} . **MS (DI, CI NH_3)** m/z 618. **HRMS** Calcd. for $\text{C}_{35}\text{H}_{44}\text{ClN}_5\text{O}_3$ 617.3133, Found 617.3134.

Spectral data for products from Table 3

Methyl 2-(*N*-(1-(cyclohexyl carbamoyl)propyl)-*N*-((furan-2-yl)methyl) amino) benzoate.

Brown oil. Yield (16h at 60°C in MeOH): 63%. **^1H NMR** (CDCl_3 , 400 MHz) δ 7.78 (d, 1H, $J = 8.4$ Hz), 7.64 (d, 1H, $J = 7.8$ Hz), 7.38 (t, 1H, $J = 7.8$ Hz), 7.28 (d, 1H, $J = 1.6$ Hz), 7.14-7.08 (m, 2H), 6.20 (dd, 1H, $J = 2.7, 1.6$ Hz), 5.89 (d, 1H, $J = 2.7$ Hz), 4.25 (d, 1H, $J = 15.1$ Hz), 3.99 (d, 1H, $J = 15.1$ Hz), 3.91 (s, 3H), 3.79 (dd, 1H, $J = 7.6, 5.0$ Hz), 3.76-3.68 (m, 1H), 1.96-1.83 (m, 1H), 1.82-1.56 (m, 5H), 1.43-1.11 (m, 6H), 0.92 (t, 3H, $J = 7.6$ Hz). **^{13}C NMR** (CDCl_3 , 100.6 MHz) δ 172.4, 168.5, 151.6, 149.1, 142.2, 132.4, 130.7, 128.9, 125.4, 124.5, 110.5, 109.1, 68.2, 52.6, 49.2, 48.1, 33.5, 32.9, 26.0, 25.2, 23.9, 10.1. **IR** (thin film) 3324, 2936, 2858, 1719, 1668, 1525, 1090 cm^{-1} . **MS (DI, CI NH_3)** m/z 398. **HRMS** Calcd. for $\text{C}_{23}\text{H}_{30}\text{N}_2\text{O}_4$ 398.2206, Found 398.2190.

Methyl 2-(*N*-(1-(cyclohexyl carbamoyl)propyl)-*N*-isopentyl amino) benzoate.

Yellow oil. Yield (48h at 60°C in MeOH): 47%. **^1H NMR** (CDCl_3 , 400 MHz) δ 7.74 (d, 1H, $J = 8.8$ Hz), 7.68 (dd, 1H, $J = 7.8, 1.3$ Hz), 7.49 (t, 1H, $J = 7.6$ Hz), 7.22 (d, 1H, $J = 8.1$ Hz), 7.12 (t, 1H, $J = 7.6$ Hz), 3.59 (dd, 1H, $J = 8.1, 5.1$ Hz), 3.07 (dt, 1H, $J = 11.4, 5.1$ Hz), 2.84 (dt, 1H, $J = 11.4, 5.1$ Hz), 1.95-1.64 (m, 5H), 1.64-1.01 (m, 10H), 0.86 (t, 3H, $J = 7.3$ Hz), 0.81 (d, 3H, $J = 6.7$ Hz), 0.79 (d, 3H, $J = 6.7$ Hz). **^{13}C NMR** (CDCl_3 , 100.6 MHz) δ 172.6, 168.8, 149.8, 132.5, 130.9, 129.1, 124.8, 123.8, 69.8, 52.6, 50.4, 48.0, 36.2, 33.5, 33.1, 26.7, 26.0, 25.2, 23.3, 23.0, 11.4. **IR** (thin film) 3330, 2933, 2855, 1722, 1675, 1525, 1444, 1249, 1084 cm^{-1} . **MS (DI, CI NH_3)** m/z 389. **HRMS** Calcd. for $\text{C}_{23}\text{H}_{36}\text{N}_2\text{O}_3$ 388.2726, Found 388.2739.

Spectral data for products from Table 4

N-Cyclohexyl-2-[(4-methoxy benzyl)-(5-nitro quinolin-8-yl) amino] butyramide.

Yellow oil. Yield (48h at 60°C in MeOH): 64%. **^1H NMR** (CDCl_3 , 400 MHz) δ 9.35 (d, 1H, $J = 8.9$ Hz), 9.30 (d, 1H, $J = 8.5$ Hz), 8.90-8.88 (m, 1H), 8.29 (d, 1H, $J = 8.9$ Hz), 7.74-7.69 (m, 1H), 7.17 (d, 2H, $J = 7.6$ Hz), 6.90 (d, 1H, $J = 8.9$ Hz), 6.71 (d, 2H, $J = 8.3$ Hz), 4.98 (t, 1H, $J = 7.3$ Hz), 4.69 (d, 1H, $J = 16.2$ Hz), 4.58 (d, 1H, $J = 16.2$ Hz), 3.99-3.88 (m, 1H), 3.71 (s, 3H), 2.18-2.02 (m, 1H), 2.00-1.79 (m, 1H), 1.77-1.55 (m, 2H), 1.55-1.35 (m, 4H), 1.33-1.18 (m, 4H), 0.75 (t, 3H, $J = 7.1$ Hz). **^{13}C**

NMR (CDCl₃, 100.6 MHz) δ 171.1, 159.1, 153.2, 147.4, 141.0, 136.8, 134.4, 128.9, 127.5, 124.5, 115.9, 114.3, 68.9, 55.6, 49.8, 48.1, 34.1, 26.1, 25.2, 25.1, 22.6, 12.0. **IR** (thin film) 3277, 2938, 2858, 1675, 1509, 1290 cm⁻¹. **MS** (**DI**, **CI** NH₃) m/z 478. **HRMS** Calcd. for C₂₇H₃₂N₄O₄ 476.2424, Found 476.2417.

(2-[(4-Chloro benzyl)-(5-nitro quinolin-8-yl) amino] butyrylamino) acetic acid ethyl ester

Brown solid. Yield (60h at 60°C in MeOH): 43%. **¹H NMR** (CDCl₃, 400 MHz) δ 10.11 (br s, 1H), 9.33 (dd, 1H, J = 8.8, 1.7 Hz), 9.15 (dd, 1H, J = 4.3, 1.7 Hz), 8.28 (d, 1H, J = 9.1 Hz), 7.74 (dd, 1H, J = 8.8, 4.3 Hz), 7.21 (d, 2H, J = 8.6 Hz), 7.14 (d, 2H, J = 8.6 Hz), 6.90 (d, 1H, J = 9.1 Hz), 5.06 (t, 1H, J = 7.6 Hz), 4.64 (s, 2H), 4.43 (dd, 1H, J = 18.7, 6.1 Hz), 4.30 (q, 2H, J = 7.1 Hz), 4.10 (dd, 1H, J = 18.7, 4.0 Hz), 2.08-2.01 (m, 1H), 1.95-1.88 (m, 1H), 1.33 (t, 3H, J = 7.1 Hz), 0.78 (t, 3H, J = 7.6 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 172.4, 170.7, 152.6, 148.6, 141.4, 137.5, 135.7, 134.3, 133.3, 129.2, 129.1, 127.1, 124.7, 124.4, 115.8, 68.4, 61.9, 49.8, 42.1, 22.4, 14.6, 11.9. **IR** (thin film) 3247, 2928, 1749, 1683, 1514, 1308 cm⁻¹. **MS** (**DI**, **CI** NH₃) m/z 486. **HRMS** Calcd. for C₂₄H₂₅ClN₄O₅ 484.1513, Found 484.1511. **m.p.** 156°C.

2-(*N*-allyl-*N*-(5-nitro pyridin-2-yl)amino)-*N*-*tert*-butyl butanamide.

Yellow oil. Yield (72h at 60°C in MeOH): 96%. **¹H NMR** (CDCl₃, 400 MHz) δ 9.08 (d, 1H, J = 2.5 Hz), 8.24 (dd, 1H, J = 9.3, 2.5 Hz), 6.55 (d, 1H, J = 9.3 Hz), 6.22 (br s, 1H), 5.81 (dddd, 1H, J = 17.2, 10.4, 5.3, 4.3 Hz), 5.26 (dd, 1H, J = 10.4, 0.9 Hz), 5.21 (dd, 1H, J = 17.2, 0.9 Hz), 5.22-5.16 (m, 1H), 4.25 (dd, 1H, J = 17.2, 5.3 Hz), 4.21 (dd, 1H, J = 17.2, 4.3 Hz), 2.15-2.04 (m, 1H), 1.79-1.67 (m, 1H), 1.29 (s, 9H), 0.93 (t, 3H, J = 7.5 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 169.8, 161.0, 146.0, 136.1, 133.3, 133.2, 118.1, 107.1, 60.8, 51.7, 48.4, 29.1, 22.2, 11.2. **IR** (thin film) 3361, 2973, 2881, 1677, 1592, 1495, 1329, 1295, 1121 cm⁻¹. **MS** (**DI**, **CI** NH₃) m/z 320. **HRMS** Calcd. for C₁₆H₂₄N₄O₃ 320.1848, Found 320.1845.

2-(*N*-(4-chlorobenzyl)-*N*-(3-nitropyridin-2-yl)amino)-*N*-cyclohexylbutanamide.

Yellow oil. Yield (16h at 60°C in MeOH): 68%. **¹H NMR** (CDCl₃, 400 MHz) δ 8.39 (dd, 1H, J = 4.5, 1.7 Hz), 8.00 (dd, 1H, J = 8.1, 1.7 Hz), 7.32 (br s, 1H), 7.11 (d, 2H, J = 8.3 Hz), 6.91 (d, 2H, J = 8.3 Hz), 6.81 (dd, 1H, J = 8.1, 4.5 Hz), 4.79 (dd, 1H, J = 8.8, 6.3 Hz), 4.67 (d, 1H, J = 15.8 Hz), 4.55 (d, 1H, J = 15.8 Hz), 3.90-3.77 (m, 1H), 2.18-2.00 (m, 1H), 2.06-1.96 (m, 3H), 1.88-1.56 (m, 6H), 1.46-1.14 (m, 2H), 1.00 (t, 3H, J = 7.3 Hz). **¹³C NMR** (CDCl₃, 100.6 MHz) δ 170.0, 152.4, 151.8, 135.8, 135.1, 134.8, 133.6, 129.9, 128.9, 115.2, 66.1, 49.7, 48.4, 33.5, 33.4, 25.9, 25.0, 22.9, 11.3. **IR** (thin film) 3323, 2935, 2861, 1667, 1515, 1335, 1256, 1092 cm⁻¹. **MS** (**DI**, **CI** NH₃) m/z 431. **HRMS** Calcd. for C₂₂H₂₇ClN₄O₃ 430.1772, Found 430.1782.

2-(*N*-(5-chloro pyridin-2-yl)-*N*-(2,2-dimethoxy ethyl)amino)-*N*-*tert*-butyl butanamide.

Colorless oil. Yield (16h at 80°C in toluene): 14%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.11 (d, 1H, *J* = 2.5 Hz), 7.39 (dd, 1H, *J* = 8.8, 2.5 Hz), 7.22 (br s, 1H), 6.55 (d, 1H, *J* = 8.8 Hz), 4.75 (dd, 1H, *J* = 5.7, 4.5 Hz), 4.11 (dd, 1H, *J* = 14.6, 4.5 Hz), 4.06 (dd, 1H, *J* = 5.5, 9.3 Hz), 3.44 (s, 3H), 3.41 (s, 3H), 3.34 (dd, 1H, *J* = 14.6, 5.7 Hz), 2.21-2.10 (m, 1H), 1.94-1.83 (m, 1H), 1.28 (s, 9H), 0.88 (t, 3H, *J* = 7.3 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 171.5, 155.9, 146.2, 137.1, 120.7, 109.7, 103.3, 66.9, 55.2, 54.4, 51.1, 51.1, 28.9, 21.2, 11.8. **I.R.** (thin film) 3409, 3054, 2985, 1649, 1428 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 358. **HRMS** Calcd. for C₁₇H₂₈ClN₃O₃ 357.1819, Found 357.1817.

2-(*N*-allyl-*N*-(5-chloro pyridin-2-yl)amino)-*N*-*tert*-butyl butanamide.

Colorless oil. Yield (72h at 80°C in toluene): 56%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.08 (d, 1H, *J* = 2.5 Hz), 7.42 (dd, 1H, *J* = 9.1, 2.5 Hz), 6.54 (br s, 1H), 6.50 (d, 1H, *J* = 9.1 Hz), 5.82 (dddd, 1H, *J* = 16.7, 10.8, 5.3, 4.6 Hz), 5.21 (dd, 1H, *J* = 10.8, 1.5 Hz), 5.20 (dd, 1H, *J* = 16.7, 1.5 Hz), 4.97 (t, 1H, *J* = 7.3 Hz), 4.08 (dd, 1H, *J* = 17.9, 5.3 Hz), 3.88 (dd, 1H, *J* = 17.9, 4.6 Hz), 2.12-2.01 (m, 1H), 1.75-1.65 (m, 1H), 1.28 (s, 9H), 0.90 (t, 3H, *J* = 7.6 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 171.2, 161.3, 153.1, 145.6, 137.6, 134.6, 120.2, 109.3, 60.5, 51.2, 48.4, 29.0, 22.0, 11.4. **I.R.** (thin film) 3317, 2974, 1664, 1486, 1262 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 310. **HRMS** Calcd. for C₁₆H₂₄ClN₃O 309.1608, Found 309.1607.

2-(*N*-allyl-*N*-(5-(trifluoromethyl) pyridin-2-yl)amino)-*N*-*tert*-butyl butanamide.

Colorless oil. Yield (16h at 80°C in toluene): 58%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.39 (d, 1H, *J* = 2.5 Hz), 7.64 (dd, 1H, *J* = 9.1, 2.5 Hz), 6.58 (d, 1H, *J* = 9.1 Hz), 6.44 (br s, 1H), 5.81 (dddd, 1H, *J* = 18.2, 10.1, 5.2, 4.6 Hz), 5.22 (d, 1H, *J* = 10.1 Hz), 5.20 (d, 1H, *J* = 18.2 Hz), 5.13 (t, 1H, *J* = 7.6 Hz), 4.15 (dd, 1H, *J* = 17.4, 5.2 Hz), 3.97 (dd, 1H, *J* = 17.4, 4.6 Hz), 2.14-2.02 (m, 1H), 1.73-1.60 (m, 1H), 1.29 (s, 9H), 0.92 (t, 3H, *J* = 7.3 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 170.8, 160.4, 145.3, 134.9, 134.1, 125.5, 117.5, 115.7, 107.7, 60.4, 51.4, 48.1, 29.1, 22.1, 11.4. **I.R.** (thin film) 3321, 2973, 1667, 1515, 1273 cm⁻¹. **MS (DI, CI NH₃)** *m/z* 344. **HRMS** Calcd. for C₁₇H₂₄F₃N₃O 343.1871, Found 343.1875.

N-Cyclohexyl-2-[prop-2-ynyl-(5-trifluoromethyl pyridin-2-yl) amino] butyramide.

Colorless oil. Yield (30 min, μ W 50W at 120°C in toluene): 25%. **^1H NMR (CDCl_3 , 400 MHz)** δ 8.44 (s, 1H), 7.74 (d, 1H, J = 8.8 Hz), 6.82 (d, 1H, J = 8.8 Hz), 6.29 (d, 1H, J = 7.8 Hz), 5.12 (t, 1H, J = 6.8 Hz), 4.34 (dd, 1H, J = 18.4, 2.0 Hz), 4.12 (dd, 1H, J = 18.4, 2.0 Hz), 3.79-3.69 (m, 1H), 2.28 (t, 1H, J = 2.0 Hz), 2.24-2.11 (m, 1H), 1.95-1.88 (m, 2H), 1.80-1.52 (m, 5H), 1.42-1.09 (m, 4H), 0.95 (t, 3H, J = 7.3 Hz). **^{13}C NMR (CDCl_3 , 100.6 MHz)** δ 170.4, 159.6, 145.6, 135.2, 126.2, 123.5, 107.7, 79.8, 72.9, 60.7, 48.4, 35.4, 33.3, 33.1, 25.8, 25.1, 24.9, 22.3, 11.5. **IR.** (thin film) 3415, 3303, 2932, 2856, 1667, 1612, 1509, 1330, 1267 cm^{-1} . **MS (DI, CI NH_3)** m/z 368. **HRMS** Calcd. for $\text{C}_{19}\text{H}_{24}\text{F}_3\text{N}_3\text{O}$ 367.1871, Found 367.1863.

Spectral data for products from Table 5

N-Cyclohexyl-2-[(2,6-dimethyl pyrimidin-4-yl)-prop-2-ynyl amino] butyramide.

Colorless oil. Yield (20 min, μ W 50W at 80°C in MeOH): 60%. **^1H NMR (CDCl_3 , 400 MHz)** δ 6.49 (d, 1H, J = 7.8 Hz), 6.36 (s, 1H), 5.08 (br s, 1H), 4.28 (dd, 1H, J = 18.4, 2.3 Hz), 4.01 (dd, 1H, J = 18.4, 2.3 Hz), 3.77-3.66 (m, 1H), 2.53 (s, 3H), 2.40 (s, 3H), 2.28 (t, 1H, J = 2.3 Hz), 2.20-2.10 (m, 1H), 1.96-1.82 (m, 2H), 1.77-1.50 (m, 5H), 1.14-1.23 (m, 4H), 0.94 (t, 3H, J = 7.8 Hz). **^{13}C NMR (CDCl_3 , 100.6 MHz)** δ 170.3, 166.8, 166.3, 162.4, 100.4, 79.6, 72.9, 59.8, 48.3, 34.7, 33.3, 33.1, 25.5, 25.9, 24.9, 24.8, 22.0, 11.4. **IR.** (thin film) 3403, 3053, 2985, 1659, 1602, 1424, 1109 cm^{-1} . **MS (DI, CI NH_3)** m/z 329. **HRMS** Calcd. for $\text{C}_{19}\text{H}_{28}\text{N}_4\text{O}$ 328.2263, Found 328.2264.

2-(*N*-(4-chloro benzyl)-*N*-(2,6-dimethyl pyrimidin-4-yl)amino)-*N*-cyclohexyl-2-(3-(trifluoromethyl) phenyl) acetamide.

Yellow oil. Yield (4d at 60°C in MeOH): 50%. **^1H NMR (CDCl_3 , 400 MHz)** δ 7.64 (s, 1H), 7.59 (d, 1H, J = 7.8 Hz), 7.51 (d, 1H, J = 7.8 Hz), 7.39 (t, 1H, J = 7.8 Hz), 7.15 (d, 2H, J = 8.3 Hz), 6.93 (d, 2H, J = 8.3 Hz), 6.50 (s, 1H), 6.05 (s, 1H), 6.01 (br s, 1H), 4.67 (d, 1H, J = 17.7 Hz), 4.58 (d, 1H, J = 17.7 Hz), 3.89-3.78 (m, 1H), 2.55(s, 3H), 2.28 (s, 3H), 1.96-1.82 (m, 2H), 1.73-1.56 (m, 4H), 1.43-1.31 (m, 2H), 1.19-1.06 (m, 2H). **^{13}C NMR (CDCl_3 , 100.6 MHz)** δ 168.9, 166.8, 166.5, 163.1, 136.8, 136.3, 133.2, 131.1, 131.2, 129.4, 128.9, 127.9, 127.1, 125.5, 122.8, 100.7, 62.5, 49.9, 48.9, 33.3, 26.5, 25.8, 25.1, 24.7. **IR.** (thin film) 3293, 2935, 2862, 1674, 1467, 1327, 1175 cm^{-1} . **MS (DI, CI NH_3)** m/z 532. **HRMS** Calcd. for $\text{C}_{28}\text{H}_{30}\text{ClF}_3\text{N}_4\text{O}$ 530.2060, Found 530.2059.

2-(*N*-(4-chloro benzyl)-*N*-(2,6-dimethyl pyrimidin-4-yl)amino)-*N*-cyclohexyl-2-methyl butanamide.

Yellow oil. Yield (8d at 60°C in MeOH): 54%. **^1H NMR (CDCl_3 , 400 MHz)** δ 7.42 (d, 2H, J = 8.3 Hz), 7.33 (d, 2H, J = 8.3 Hz), 6.03 (s, 1H), 5.73 (d, 1H, J = 7.8 Hz), 4.89 (d, 1H, J = 17.6 Hz), 4.63 (d, 1H, J = 17.6 Hz), 3.78-3.67 (m, 1H), 2.46 (s, 3H), 2.48-2.37 (m, 1H), 2.26 (s, 3H), 1.90-1.73 (m, 3H), 1.67-1.54 (m, 3H), 1.50 (s, 3H), 1.41-0.97 (m, 5H), 0.85 (t, 3H, J = 7.5 Hz). **^{13}C NMR (CDCl_3 , 100.6**

MHz) δ 174.6, 166.1, 165.6, 162.7, 138.7, 133.2, 129.4, 128.3, 101.4, 66.4, 48.6, 48.5, 33.3, 28.2, 26.4, 25.9, 25.1, 24.8, 22.3, 8.9. **I.R.** (thin film) 3361, 2940, 2856, 1663, 1584, 1495, 1295, 1091 cm^{-1} . **MS (DI, CI NH_3)** m/z 429. **HRMS** Calcd. for $\text{C}_{24}\text{H}_{33}\text{ClN}_4\text{O}$ 428.2343, Found 428.2342.

2-(*N*-(4-chloro benzyl)-*N*-(6-methyl-2-phenyl pyrimidin-4-yl)amino)-*N*-cyclohexyl butanamide.

White solid. Yield (16h at 60°C in MeOH): 89%. **^1H NMR (CDCl_3 , 400 MHz)** δ 8.44-8.38 (m, 2H), 7.54-7.48 (m, 3H), 7.29 (d, 2H, $J = 8.6$ Hz), 7.20 (d, 2H, $J = 8.6$ Hz), 6.62 (br s, 1H), 6.10 (s, 1H), 5.26 (br s, 1H), 4.76 (d, 1H, $J = 17.2$ Hz), 4.68 (d, 1H, $J = 17.2$ Hz), 3.74-3.63 (m, 1H), 2.40 (s, 3H), 2.21-2.08 (m, 1H), 1.84-1.66 (m, 2H), 1.63-1.36 (m, 5H), 1.33-1.13 (m, 4H), 0.97 (t, 3H, $J = 7.2$ Hz). **^{13}C NMR (CDCl_3 , 100.6 MHz)** δ 170.2, 166.9, 163.3, 138.6, 138.5, 136.7, 133.4, 130.8, 129.4, 128.9, 128.3, 101.7, 59.8, 49.0, 48.1, 33.1, 32.9, 25.7, 25.0, 24.8, 24.7, 22.3, 11.6. **I.R.** (thin film) 3336, 2932, 2855, 1671, 1573, 1480, 1379 cm^{-1} . **MS (DI, CI NH_3)** m/z 478. **HRMS** Calcd. for $\text{C}_{28}\text{H}_{33}\text{ClN}_4\text{O}$ 476.2343, Found 476.2349. **m.p.** 123°C.

2-(*N*-allyl-*N*-(6-methyl-2-phenyl pyrimidin-4-yl)amino)-*N*-cyclohexyl-2-(4-methoxy phenyl) acetamide.

Brown oil. Yield (72h at 60°C in MeOH with 15 mol% of $\text{Mg}(\text{ClO}_4)_2$): 30%. **^1H NMR (CDCl_3 , 400 MHz)** δ 8.36 (dd, 2H, $J = 7.8, 3.1$ Hz), 7.46-7.41 (m, 3H), 7.35 (d, 2H, $J = 8.6$ Hz), 6.89 (d, 2H, $J = 8.6$ Hz), 6.47 (br s, 1H), 6.29 (s, 1H), 5.98 (d, 1H, $J = 8.1$ Hz), 5.62 (dddd, 1H, $J = 17.7, 10.1, 5.2, 4.8$ Hz), 5.07 (dd, 1H, $J = 17.7, 1.3$ Hz), 5.06 (dd, 1H, $J = 10.1, 1.3$ Hz), 4.05 (dd, 1H, $J = 17.4, 4.8$ Hz), 3.98 (dd, 1H, $J = 17.4, 5.2$ Hz), 3.89-3.79 (m, 1H), 3.82 (s, 3H), 2.45 (s, 3H), 1.92-1.83 (m, 2H), 1.66-1.50 (m, 4H), 1.35-1.24 (m, 2H), 1.15-1.00 (m, 2H). **^{13}C NMR (CDCl_3 , 100.6 MHz)** δ 170.1, 166.2, 163.3, 162.8, 159.9, 139.0, 134.2, 131.3, 130.4, 128.6, 128.5, 128.0, 117.1, 114.3, 101.7, 62.9, 55.7, 49.0, 48.7, 33.3, 25.8, 25.1, 25.0. **I.R.** (thin film) 3299, 2946, 2856, 1657, 1589, 1478, 1388, 1259, 1192 cm^{-1} . **MS (DI, CI NH_3)** m/z 471. **HRMS** Calcd. for $\text{C}_{29}\text{H}_{34}\text{N}_4\text{O}_2$ 470.2682, Found 470.2683.

2-(*N*-allyl-*N*-(6-(trifluoromethyl)-2-phenyl pyrimidin-4-yl) amino)-*N*-cyclohexyl-2-(4-methoxy phenyl) acetamide.

White solid. Yield (16h at 60°C in MeOH with 15 mol% of $\text{Mg}(\text{ClO}_4)_2$): 51%. **^1H NMR (CDCl_3 , 400 MHz)** δ 8.43 (dd, 2H, $J = 8.1, 1.8$ Hz), 7.52-7.44 (m, 3H), 7.37 (d, 2H, $J = 8.6$ Hz), 6.93 (d, 2H, $J = 8.6$ Hz), 6.76 (s, 1H), 6.51 (s, 1H), 5.74 (d, 1H, $J = 8.1$ Hz), 5.59 (ddt, 1H, $J = 17.4, 10.1, 4.4$ Hz), 5.11 (d, 1H, $J = 17.4$ Hz), 5.11 (d, 1H, $J = 10.1$ Hz), 4.10 (dd, 1H, $J = 17.6, 4.4$ Hz), 4.07 (dd, 1H, $J = 17.6, 4.4$ Hz), 3.91-3.81 (m, 1H), 3.85 (s, 3H), 1.97-1.88 (m, 2H), 1.72-1.53 (m, 4H), 1.42-1.24 (m, 2H), 1.20-1.03 (m, 2H). **^{13}C NMR (CDCl_3 , 100.6 MHz)** δ 169.4, 164.5, 163.3, 160.3, 155.3, 137.7, 133.3,

131.5, 131.3, 128.8, 128.7, 127.2, 120.2, 117.8, 114.7, 99.3, 63.4, 55.7, 49.1, 49.0, 33.4, 25.8, 25.2, 25.1. **I.R.** (thin film) 3412, 3054, 2985, 1675, 1592, 1424, 1258 cm^{-1} . **MS** (**DI**, **CI** NH_3) m/z 525. **HRMS** Calcd. for $\text{C}_{29}\text{H}_{31}\text{F}_3\text{N}_4\text{O}_2$ 524.2399, Found 524.2400. **m.p.** 182°C.

2-(*N*-(4-chloro benzyl)-*N*-(2,6-diphenyl pyrimidin-4-yl)amino)-*N*-cyclohexyl butanamide.

White solid. Yield (72h at 60°C in MeOH): 51%. **^1H NMR** (CDCl_3 , 400 MHz) δ 8.61-8.55 (m, 2H), 8.04-7.97 (m, 2H), 7.54-7.53 (m, 3H), 7.50-7.45 (m, 3H), 7.34 (d, 2H, $J = 8.6$ Hz), 7.27 (d, 2H, $J = 8.6$ Hz), 6.66 (s, 1H), 5.35 (br s, 1H), 4.82 (br s, 2H), 3.80-3.64 (m, 1H), 2.29-2.16 (m, 1H), 1.91-1.73 (m, 2H), 1.66-1.38 (m, 5H), 1.35-1.13 (m, 4H), 1.01 (t, 3H, $J = 7.3$ Hz). **^{13}C NMR** (CDCl_3 , 100.6 MHz) δ 170.2, 164.3, 163.8, 163.5, 138.6, 138.3, 136.7, 133.5, 131.0, 130.7, 129.5, 121.1, 128.9, 128.5, 127.5, 98.6, 66.3, 49.2, 48.3, 33.2, 32.9, 25.7, 24.8, 24.7, 22.4, 11.7. **I.R.** (thin film) 3418, 2975, 2933, 1671, 1526, 1377, 1262 cm^{-1} . **MS** (**DI**, **CI** NH_3) m/z 538. **HRMS** Calcd. for $\text{C}_{33}\text{H}_{35}\text{ClN}_4\text{O}$ 538.2499, Found 538.2498. **m.p.** 134°C.

2-(*N*-(4-chloro benzyl)-*N*-(2-isopropyl-6-methyl pyrimidin-4-yl) amino)-*N*-cyclohexyl butanamide.

White oil. Yield (16h at 60°C in MeOH): 63%. **^1H NMR** (CDCl_3 , 400 MHz) δ 7.28 (d, 2H, $J = 8.3$ Hz), 7.14 (d, 2H, $J = 8.3$ Hz), 6.47 (br s, 1H), 5.96 (s, 1H), 5.22 (br s, 1H), 4.73 (d, 1H, $J = 17.9$ Hz), 4.52 (d, 1H, $J = 17.9$ Hz), 3.74-3.64 (m, 1H), 3.06 (sept., 1H, $J = 6.8$ Hz), 2.28 (s, 3H), 2.18-1.99 (m, 1H), 1.95-1.85 (m, 1H), 1.75-1.57 (m, 5H), 1.36 (d, 3H, $J = 6.8$ Hz), 1.34 (d, 3H, $J = 6.8$ Hz), 1.31-1.19 (m, 3H), 1.16-1.02 (m, 2H), 0.90 (t, 3H, $J = 7.3$ Hz). **^{13}C NMR** (CDCl_3 , 100.6 MHz) δ 174.1, 170.3, 166.4, 163.3, 136.9, 133.2, 129.2, 128.1, 100.9, 59.6, 48.6, 48.5, 37.9, 33.6, 33.4, 25.8, 25.3, 25.2, 24.9, 22.5, 22.4, 22.2, 11.5. **I.R.** (thin film) 3398, 2948, 1665, 1477, 1273 cm^{-1} . **MS** (**DI**, **CI** NH_3) m/z 443. **HRMS** Calcd. for $\text{C}_{25}\text{H}_{35}\text{ClN}_4\text{O}$ 442.2499, Found 442.2492.

Spectral data for products from Table 6

2-(2-nitrophenoxy)-3,3,3-trichloro-*N*-cyclohexyl propanamide

White solid. **Yield** 50%. **^1H NMR** (CDCl_3 , 400 MHz) δ 7.94 (dd, 1H, $J = 8.1, 1.6$ Hz), 7.62 (td, 1H, $J = 8.1, 1.6$ Hz), 7.28-7.19 (m, 3H), 5.37 (s, 1H), 3.82-3.73 (m, 1H), 1.75-1.67 (m, 2H), 1.65-1.55 (m, 2H), 1.40-1.25 (m, 4H), 1.20-1.05 (m, 2H). **^{13}C NMR** (CDCl_3 , 100.6 MHz) δ 161.9, 149.3, 140.4, 135.2, 126.7, 121.7, 115.9, 95.4, 87.5, 49.2, 32.9, 32.6, 25.7, 24.9. **I.R.** (thin film) 2944, 1693, 1592, 1530, 1356, 1250, 1115, 1059 cm^{-1} . **MS** (**DI**, **CI** NH_3) m/z 394. **HRMS** Calcd. for $\text{C}_{15}\text{H}_{17}\text{Cl}_3\text{N}_2\text{O}_4$ 394.0254 ; Found 394.0254. **m.p.** 128°C.

2-(2-nitrophenoxy)-*N*-*tert*-butyl butanamide

Yield 36%. **¹H NMR (CDCl₃, 400 MHz)** δ 7.94 (dd, 1H, J = 7.9, 1.3 Hz), 7.57 (td, 1H, J = 7.9, 1.3 Hz), 7.13-7.08 (m, 3H), 4.78 (t, 1H, J = 4.8 Hz), 2.15-1.97 (m, 2H), 1.38 (s, 9H), 0.99 (t, 3H, J = 7.4 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 169.2, 151.0, 140.0, 135.2, 126.7, 121.7, 115.2, 80.4, 51.7, 29.2, 25.3, 8.7. **I.R.** (thin film) 2978, 1687, 1530, 1485, 1367, 1255, 1092 cm⁻¹. **MS (DI, CI NH₃)** m/z 281. **HRMS** Calcd. for C₁₄H₂₀N₂O₄ 280.1423 ; Found 280,1431.

2-(2-nitrophenoxy)-*N*-tert-butyl acetamide

Yield 27%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.06 (dd, 1H, J = 8.2, 1.7 Hz), 7.63 (td, 1H, J = 8.2, 1.7 Hz), 7.17-7.13 (m, 2H), 7.06 (br s, 1H), 4.52 (s, 2H), 1.46 (s, 9H). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 169.9, 151.0, 140.4, 135.8, 127.1, 122.0, 115.0, 68.7, 51.6, 29.5. **I.R.** (thin film) 1687, 1597, 1530, 1491, 1367, 1255, 1098 cm⁻¹. **MS (DI, CI NH₃)** m/z 253. **HRMS** Calcd. for C₁₂H₁₆N₂O₄ 252.1110 ; Found 252.1104. **m.p.** 82°C.

2-(2-nitrophenoxy)-*N*-(3,4-dimethoxyphenethyl) butanamide

Yellow solid. **Yield** 28%. **¹H NMR (CDCl₃, 400 MHz)** δ 7.89 (dd, 1H, J = 8.3, 1.0 Hz), 7.53 (td, 1H, J = 8.3, 1.0 Hz), 7.16 (br s, 1H), 7.09 (td, 1H, J = 8.3, 1.0 Hz), 7.02 (d, 1H, J = 8.3 Hz), 6.72 (d, 1H, J = 5.6 Hz), 6.66 (dd, 2H, J = 5.6, 1.8 Hz), 4.81 (t, 1H, J = 5.2 Hz), 3.85 (s, 3H), 3.82 (s, 3H), 3.58 (d, 1H, J = 7.1 Hz), 3.55 (d, 1H, J = 7.1 Hz), 2.78 (t, 2H, J = 7.1 Hz), 2.06-1.99 (m, 2H), 0.96 (t, 3H, J = 7.4 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 170.2, 150.9, 149.3, 147.9, 140.0, 134.6, 131.2, 126.0, 121.8, 115.2, 112.0, 111.6, 80.7, 56.3, 56.1, 40.7, 35.4, 25.8, 9.1. **I.R.** (thin film) 2939, 1682, 1592, 1496, 1362, 1019 cm⁻¹. **MS (DI, CI NH₃)** m/z 389. **HRMS** Calcd. for C₂₀H₂₄N₂O₆ 388.1634 ; Found 388.1633. **m.p.** 86°C.

2-(2-nitrophenoxy)-2-(4-chlorophenyl)-*N*-cyclohexyl acetamide

Yellow solid. **Yield** 57%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.06 (dd, 1H, J = 8.5, 0.8 Hz), 7.51-7.46 (m, 3H), 7.42 (br s, 1H), 7.37 (d, 2H, J = 8.6 Hz), 7.12 (td, 1H, J = 8.5, 0.8 Hz), 6.92 (dd, 1H, J = 8.5, 0.8 Hz), 5.64 (s, 1H), 3.82-3.73 (m, 1H), 1.94-1.85 (m, 2H), 1.77-1.71 (m, 2H), 1.64-1.59 (m, 2H), 1.41-1.23 (m, 4H). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 167.1, 150.6, 139.6, 135.6, 135.4, 134.3, 129.6, 128.2, 127.1, 122.3, 116.2, 80.5, 48.6, 33.1, 25.8, 25.0. **I.R.** (thin film) 2939, 1687, 1586, 1536, 1491, 1356, 1250, 1098 cm⁻¹. **MS (DI, CI NH₃)** m/z 388. **HRMS** Calcd. for C₂₀H₂₁ClN₂O₄ 388.1190 ; Found 388.1212. **m.p.** 142°C.

2-(2-nitrophenoxy)-*N*-cyclohexyl-2-(3-(trifluoromethyl)phenyl) acetamide

White solid. **Yield** 62%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.07 (dd, 1H, J = 7.6, 1.1 Hz), 7.82 (s, 1H), 7.75 (d, 1H, J = 7.6 Hz), 7.63 (d, 1H, J = 8.5 Hz), 7.56-7.47 (m, 3H), 7.14 (td, 1H, J = 7.6, 1.1 Hz), 6.91 (dd, 1H, J = 8.5, 0.9 Hz), 5.72 (s, 1H), 3.82-3.72 (m, 1H), 1.94-1.85 (m, 2H), 1.76-1.71 (m, 2H), 1.40-1.20 (m, 6H). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 166.8, 150.5, 139.6, 135.7, 130.0, 129.9, 127.2, 126.3, 125.5, 124.9, 123.7, 122.8, 122.5, 116., 80.6, 48.7, 33.1, 33.0, 25.8, 25.0. **I.R.** (thin film) 2359, 1670, 1521, 1479, 1348, 1238, 1071 cm⁻¹. **MS (DI, CI NH₃)** m/z 423. **HRMS** Calcd. for C₂₁H₂₁F₃N₂O₄ 422.1452. Found 422.1454. **m.p.** 91°C.

1-(2-nitrophenoxy)-N-cyclohexyl cyclopentane carboxamide

Yellow solid. **Yield** 26%. **¹H NMR (CDCl₃, 400 MHz)** δ 7.76 (dd, 1H, J = 8.5, 0.9 Hz), 7.43 (td, 1H, J = 8.5, 0.9 Hz), 7.06 (td, 1H, J = 8.5, 0.9 Hz), 6.92 (dd, 1H, J = 8.5, 0.9 Hz), 6.28 (br s, 1H), 3.81-3.71 (m, 1H), 2.43-2.35 (m, 2H), 2.13-2.06 (m, 2H), 1.84-1.71 (m, 6H), 1.64-1.53 (m, 2H), 1.36-0.93 (m, 6H). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 172.0, 148.7, 142.0, 133.4, 125.7, 121.7, 118.4, 93.1, 48.6, 37.5, 33.1, 25.7, 25.5, 25.0. **I.R.** (thin film) 2933, 1586, 1530, 1491, 1362, 1260, 1092, 1047 cm⁻¹. **MS (DI, CI NH₃)** m/z 333. **HRMS** Calcd. for C₁₈H₂₄N₂O₄ 332.1736 ; Found 332.1727. **m.p.** 71°C.

2-(2-nitrophenoxy)-3-chloro-N-cyclohexyl-2-methyl propanamide

Yield 71%. **¹H NMR (CDCl₃, 400 MHz)** δ 7.94 (dd, 1H, J = 8.1, 1.7 Hz), 7.58 (td, 1H, J = 8.1, 1.7 Hz), 7.30-7.26 (m, 2H), 7.24 (br s, 1H), 4.14 (d, 1H, J = 12.2 Hz), 3.86-3.78 (m, 1H), 3.77 (d, 1H, J = 12.1 Hz), 1.98-1.92 (m, 2H), 1.78-1.71 (m, 2H), 1.55 (s, 3H), 1.42-1.18 (m, 6H). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 169.3, 147.8, 144.0, 134.6, 126.7, 124.6, 122.9, 86.3, 49.1, 47.8, 33.2, 33.0, 25.9, 25.2, 25.1, 21.9. **I.R.** (thin film) 2341, 1669, 1521, 1479, 1348, 1238, 1071 cm⁻¹. **MS (DI, CI NH₃)** m/z 341. **HRMS** Calcd. for C₁₆H₂₁ClN₂O₄ 340.1190 ; Found 340.1192.

N-Cyclohexyl-3,3,3-trifluoro-2-methyl-2-(2-nitro-phenoxy) propionamide

Yield 56%. **¹H NMR (CDCl₃, 400 MHz)** δ 7.83 (dd, 1H, J = 8.1, 1.7 Hz), 7.56 (td, 1H, J = 8.1, 1.7 Hz), 7.31 (dd, 1H, J = 8.1, 1.7 Hz), 7.24 (dd, 1H, J = 8.1, 1.7 Hz), 6.79 (br s, 1H), 3.89-3.80 (m, 1H), 1.97-1.88 (m, 2H), 1.76-1.71 (m, 2H), 1.69 (s, 3H), 1.41-1.33 (m, 2H), 1.28-1.17 (m, 4H). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 164.3, 146.4, 144.4, 133.9, 125.9, 125.4, 125.0, 123.2 (q, J = 1.5 Hz), 84.4 (q, J = 2.9 Hz), 49.4, 32.9, 32.8, 25.2, 25.1, 15.7. **I.R.** (thin film) 2932, 1673, 1603, 1529, 1184, 1144, 1106 cm⁻¹. **MS (DI, CI NH₃)** m/z 361. **HRMS** Calcd. for C₁₆H₁₉F₃N₂O₄ 360.1297 ; Found 360.1298.

2-(4-methyl-2-nitrophenoxy)-N-cyclohexyl butanamide

Yield 74%. **¹H NMR (CDCl₃, 400 MHz)** δ 7.72 (d, 1H, J = 1.9 Hz), 7.34 (dd, 1H, J = 8.6, 1.9 Hz), 7.15 (br s, 1H), 6.97 (d, 1H, J = 8.6 Hz), 4.80 (t, 1H, J = 4.9 Hz), 3.82-3.72 (m, 1H), 2.36 (s, 3H), 2.10-2.00 (m, 1H), 1.95-1.89 (m, 1H), 1.77-1.70 (m, 2H), 1.64-1.55 (m, 2H), 1.38-1.10 (m, 6H), 0.97 (t, 3H, J = 7.4 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 169.3, 148.9, 139.7, 135.8, 131.8, 126.7, 115.3, 80.5, 48.3, 33.3, 33.0, 25.8, 25.6, 25.0, 20.6, 8.9. **I.R.** (thin film) 2390, 1661, 1524, 1495, 1347, 1249 cm⁻¹. **MS (DI, CI NH₃)** m/z 320. **HRMS** Calcd. for C₁₇H₂₄N₂O₄ 320.1736 ; Found 320.1737.

2-(2-Allyl-6-nitro-phenoxy)-*N*-cyclohexyl butyramide

Brown solid. **Yield** 72%. **¹H NMR (CDCl₃, 400 MHz)** δ 7.66 (dd, 1H, J = 7.7, 1.6 Hz), 7.45 (dd, 1H, J = 7.7, 1.6 Hz), 7.19 (t, 1H, J = 7.7 Hz), 6.72 (br s, 1H), 5.92 (ddt, 1H, J = 10.3, 6.3, 2.5 Hz), 5.18 (dd, 1H, J = 10.1, 1.5 Hz), 5.09 (dd, 1H, J = 17.1, 1.5 Hz), 4.37 (t, 1H, J = 5.2 Hz), 3.89-3.80 (m, 1H), 3.48-3.46 (m, 2H), 1.97-1.85 (m, 2H), 1.75-1.59 (m, 4H), 1.41-1.33 (m, 2H), 1.27-1.17 (m, 4H), 0.90 (t, 3H, J = 7.4 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 168.9, 148.6, 144.8, 136.1, 135.7, 135.4, 124.6, 124.0, 118.0, 86.0, 48.4, 34.5, 33.5, 33.2, 25.9, 25.5, 25.2, 8.6. **I.R.** (thin film) 2931, 2360, 1654, 1524, 1449, 1349, 1227 cm⁻¹. **MS (DI, CI NH₃)** m/z 347. **HRMS** Calcd. for C₁₉H₂₆N₂O₄ 346.1893 ; Found 346.1886. **m.p.** 66°C.

2-(2,4-dinitrophenoxy)-*N*-cyclohexyl butanamide

Yellow solid. **Yield** 29%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.85 (d, 1H, J = 2.8 Hz), 8.47 (dd, 1H, J = 9.3, 2.8 Hz), 7.26 (d, 1H, J = 9.3 Hz), 6.87 (br s, 1H), 4.97 (t, 1H, J = 4.9 Hz), 3.86-3.76 (m, 1H), 2.19-2.07 (m, 2H), 1.80-1.71 (m, 2H), 1.70-1.58 (m, 2H), 1.43-1.09 (m, 6H), 1.01 (t, 3H, J = 7.4 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 167.8, 155.3, 141.2, 139.3, 130.1, 122.9, 115.6, 81.8, 48.6, 33.3, 33.1, 25.7, 25.5, 25.0, 8.8. **I.R.** (thin film) 1665, 1605, 1525, 1486, 1340, 1152 cm⁻¹. **MS (DI, CI NH₃)** m/z 352. **HRMS** Calcd. for C₁₆H₂₁N₃O₆ 351.1430 ; Found 351.1424. **m.p.** 133°C.

2-(1-(4-nitrophenoxy)propoxy)-*N*-cyclohexyl butanamide

Yield 72%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.18 (d, 2H, J = 9.2 Hz), 7.02 (d, 2H, J = 9.2 Hz), 6.16 (br s, 1H), 5.31 (t, 1H, J = 5.5 Hz), 4.10 (t, 1H, J = 5.3 Hz), 3.74-3.66 (m, 1H), 1.94-1.84 (m, 2H), 1.80-1.56 (m, 6H), 1.39-1.08 (m, 6H), 1.04 (t, 3H, J = 7.4 Hz), 0.92 (t, 3H, J = 7.4 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 170.9, 162.2, 142.6, 126.3, 116.8, 103.8, 78.7, 48.1, 33.5, 33.3, 27.4, 27.1, 26.5, 25.8, 25.1, 9.3, 9.2. **I.R.** (thin film) 2973, 1654, 1591, 1513, 1494, 1339, 1251, 1109 cm⁻¹.

2-[2-(4-Benzyl-piperazin-1-ylmethyl)-4-nitro-phenoxy]-*N*-cyclohexyl butyramide

Yield 65%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.19 (d, 1H, J = 2.8 Hz), 8.15 (dd, 1H, J = 9.1, 2.8 Hz), 7.34-7.28 (m, 5H), 6.88 (d, 1H, J = 9.1 Hz), 7.13 (br s, 1H), 4.70 (t, 1H, J = 5.9 Hz), 3.86 (d, 1H, J = 13.3 Hz), 3.83-3.75 (m, 1H), 3.56 (s, 2H), 3.34 (d, 1H, J = 13.3 Hz), 2.64-2.51 (m, 8H), 2.08-2.00 (m, 2H), 1.92-1.85 (m, 1H), 1.76-1.70 (m, 1H), 1.64-1.56 (m, 2H), 1.41-1.14 (m, 6H), 1.07 (t, 3H, J = 7.4 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 169.5, 160.8, 142.0, 138.1, 129.6, 128.7, 127.6, 126.9, 125.4, 112.1, 80.1, 63.5, 57.5, 53.9, 53.3, 48.3, 33.7, 33.3, 26.4, 25.8, 25.3, 25.2, 9.6. **MS (DI, CI NH₃)** m/z 495.

Spectral data for products from Table 7

2-(5-nitropyridin-2-yloxy)-*N*-cyclohexyl butanamide

Yield 32%. **¹H NMR (CDCl₃, 400 MHz)** δ 8.41 (dd, 1H, J = 4.8, 1.8 Hz), 8.36 (dd, 1H, J = 8.0, 1.8 Hz), 7.13 (dd, 1H, J = 8.0, 4.8 Hz), 7.06 (br s, 1H), 5.77 (t, 1H, J = 5.0 Hz), 3.87-3.78 (m, 1H), 2.14-2.07 (m, 2H), 1.98-1.94 (m, 1H), 1.84-1.80 (m, 1H), 1.77-1.57 (m, 2H), 1.44-1.17 (m, 6H), 0.96 (t, 3H, J = 7.4 Hz). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 169.3, 155.2, 152.6, 136.0, 134.1, 117.9, 78.1, 48.2, 33.4, 33.1, 25.9, 25.3, 25.0, 8.7. **MS (DI, CI NH₃)** m/z 308. **I.R.** (thin film) 2931, 2359, 1665, 1601, 1526, 1349, 1300 cm⁻¹. **HRMS** Calcd. for C₁₅H₂₁N₃O₄ 307.1532 ; Found 307.1520.

2-(2,6-dimethylpyrimidin-4-yloxy)-2-(4-chlorophenyl)-*N*-cyclohexyl acetamide

White solid. **Yield** 24%. **¹H NMR (CDCl₃, 400 MHz)** δ 7.47 (d, 2H, J = 8.5 Hz), 7.33 (d, 2H, J = 8.5 Hz), 6.54 (s, 1H), 6.45 (s, 1H), 6.28 (br s, 1H), 3.80 (m, 1H), 2.56 (s, 3H), 2.43 (s, 3H), 1.92-1.85 (m, 2H), 1.72-1.59 (m, 2H), 1.41-1.10 (m, 6H). **¹³C NMR (CDCl₃, 100.6 MHz)** δ 168.8, 168.1, 168.0, 135.2, 135.0, 129.2, 104.2, 76.2, 48.5, 33.4, 33.3, 26.2, 25.8, 25.2, 25.1, 24.4. **I.R.** (thin film) 2929, 2360, 1660, 1589, 1491, 1395 cm⁻¹. **MS (DI, CI NH₃)** m/z 374. **HRMS** Calcd. for C₂₀H₂₄ClN₃O₂ 373.1557 ; Found 373.1559. **m.p.** 182°C.

NMR spectra for all new compounds
Entry 1 Table 1

Entry 2 Table 1

Chemical structure of compound 10: COCN(CC(=O)Nc1ccc(cc1)N)C(c2ccccc2)c3ccc(cc3)[N+](=O)[O-]

¹H NMR spectrum (CDCl₃) of compound 10. The x-axis represents the chemical shift in ppm (t1), ranging from 0 to 8. The y-axis represents the intensity, ranging from -100 to 5000. The spectrum shows several peaks, with integration values provided below the baseline.

Chemical Shift (ppm)	Integration
~7.2	1.00
~7.1	1.04
~7.0	1.21
~6.9	0.91
~6.8	0.96
~3.8	1.11
~3.6	1.93
~3.4	2.59
~3.2	2.08
~3.0	1.11
~2.2	3.23
~2.0	2.08
~1.8	4.38
~1.6	4.82
~1.4	3.86

Entry 4 Table 1

Entry 5 Table1

Entry 6 Table1

Entry 11 Table1

Entry 12 Table1

Entry 13 Table1

Entry 14 Table1

Entry 17 Table1

Entry 18 Table1

Entry 19 Table1

Entry 20 Table1

Entry 21 Table1

Entry 23 Table1

Entry 24 Table1

Entry 1 Table 2

Entry 2 Table 2

Entry 5 Table 2

Entry 6 Table 2

Entry 7 Table 2

Entry 8 Table 2

Entry 2 Table 3

Entry 3 Table 3

Entry 4 Table 3

Entry 5 Table 3

Entry 6 Table 3

Entry 1 Table 4

Entry 2 Table 4

Entry 4 Table 4

Entry 5 Table 4

Entry 6 Table 4

Entry 7 Table 4

Entry 8 Table 4

Entry 9 Table 4

Entry 10 Table 4

Entry 11 Table 4

Entry 12 Table 4

Entry 1 Table 5

Entry 2 Table 5

Entry 3 Table 5

Entry 4 Table 5

Chemical structure of compound 10 is shown above the spectrum. The structure is a 4-chlorophenyl ring connected to a pyrimidine ring, which is further connected to a benzamide group. The benzamide group has a trifluoromethyl group at the para position.

¹H NMR spectrum (CDCl₃) of compound 10. The x-axis represents the chemical shift in ppm (δ), ranging from 0.0 to 8.0. The y-axis represents the intensity in arbitrary units (a.u.), ranging from 0 to 150. The spectrum shows several peaks corresponding to the protons in the molecule. The peaks are labeled with their chemical shifts and integration values.

Peak list (Chemical Shift δ / Integration):

- 7.46 (m, 1H)
- 7.41 (m, 1H)
- 7.36 (m, 1H)
- 7.31 (m, 1H)
- 7.26 (m, 1H)
- 7.21 (m, 1H)
- 7.16 (m, 1H)
- 7.11 (m, 1H)
- 7.06 (m, 1H)
- 7.01 (m, 1H)
- 6.96 (m, 1H)
- 6.91 (m, 1H)
- 6.86 (m, 1H)
- 6.81 (m, 1H)
- 6.76 (m, 1H)
- 6.71 (m, 1H)
- 6.66 (m, 1H)
- 6.61 (m, 1H)
- 6.56 (m, 1H)
- 6.51 (m, 1H)
- 6.46 (m, 1H)
- 6.41 (m, 1H)
- 6.36 (m, 1H)
- 6.31 (m, 1H)
- 6.26 (m, 1H)
- 6.21 (m, 1H)
- 6.16 (m, 1H)
- 6.11 (m, 1H)
- 6.06 (m, 1H)
- 6.01 (m, 1H)
- 5.96 (m, 1H)
- 5.91 (m, 1H)
- 5.86 (m, 1H)
- 5.81 (m, 1H)
- 5.76 (m, 1H)
- 5.71 (m, 1H)
- 5.66 (m, 1H)
- 5.61 (m, 1H)
- 5.56 (m, 1H)
- 5.51 (m, 1H)
- 5.46 (m, 1H)
- 5.41 (m, 1H)
- 5.36 (m, 1H)
- 5.31 (m, 1H)
- 5.26 (m, 1H)
- 5.21 (m, 1H)
- 5.16 (m, 1H)
- 5.11 (m, 1H)
- 5.06 (m, 1H)
- 5.01 (m, 1H)
- 4.96 (m, 1H)
- 4.91 (m, 1H)
- 4.86 (m, 1H)
- 4.81 (m, 1H)
- 4.76 (m, 1H)
- 4.71 (m, 1H)
- 4.66 (m, 1H)
- 4.61 (m, 1H)
- 4.56 (m, 1H)
- 4.51 (m, 1H)
- 4.46 (m, 1H)
- 4.41 (m, 1H)
- 4.36 (m, 1H)
- 4.31 (m, 1H)
- 4.26 (m, 1H)
- 4.21 (m, 1H)
- 4.16 (m, 1H)
- 4.11 (m, 1H)
- 4.06 (m, 1H)
- 4.01 (m, 1H)
- 3.96 (m, 1H)
- 3.91 (m, 1H)
- 3.86 (m, 1H)
- 3.81 (m, 1H)
- 3.76 (m, 1H)
- 3.71 (m, 1H)
- 3.66 (m, 1H)
- 3.61 (m, 1H)
- 3.56 (m, 1H)
- 3.51 (m, 1H)
- 3.46 (m, 1H)
- 3.41 (m, 1H)
- 3.36 (m, 1H)
- 3.31 (m, 1H)
- 3.26 (m, 1H)
- 3.21 (m, 1H)
- 3.16 (m, 1H)
- 3.11 (m, 1H)
- 3.06 (m, 1H)
- 3.01 (m, 1H)
- 2.96 (m, 1H)
- 2.91 (m, 1H)
- 2.86 (m, 1H)
- 2.81 (m, 1H)
- 2.76 (m, 1H)
- 2.71 (m, 1H)
- 2.66 (m, 1H)
- 2.61 (m, 1H)
- 2.56 (m, 1H)
- 2.51 (m, 1H)
- 2.46 (m, 1H)
- 2.41 (m, 1H)
- 2.36 (m, 1H)
- 2.31 (m, 1H)
- 2.26 (m, 1H)
- 2.21 (m, 1H)
- 2.16 (m, 1H)
- 2.11 (m, 1H)
- 2.06 (m, 1H)
- 2.01 (m, 1H)
- 1.96 (m, 1H)
- 1.91 (m, 1H)
- 1.86 (m, 1H)
- 1.81 (m, 1H)
- 1.76 (m, 1H)
- 1.71 (m, 1H)
- 1.66 (m, 1H)
- 1.61 (m, 1H)
- 1.56 (m, 1H)
- 1.51 (m, 1H)
- 1.46 (m, 1H)
- 1.41 (m, 1H)
- 1.36 (m, 1H)
- 1.31 (m, 1H)
- 1.26 (m, 1H)
- 1.21 (m, 1H)
- 1.16 (m, 1H)
- 1.11 (m, 1H)
- 1.06 (m, 1H)
- 1.01 (m, 1H)
- 0.96 (m, 1H)
- 0.91 (m, 1H)
- 0.86 (m, 1H)
- 0.81 (m, 1H)
- 0.76 (m, 1H)
- 0.71 (m, 1H)
- 0.66 (m, 1H)
- 0.61 (m, 1H)
- 0.56 (m, 1H)
- 0.51 (m, 1H)
- 0.46 (m, 1H)
- 0.41 (m, 1H)
- 0.36 (m, 1H)
- 0.31 (m, 1H)
- 0.26 (m, 1H)
- 0.21 (m, 1H)
- 0.16 (m, 1H)
- 0.11 (m, 1H)
- 0.06 (m, 1H)
- 0.01 (m, 1H)

Entry 6 Table 5

Entry 7 Table 5

Entry 8 Table 5

Entry 9 Table 5

Entry 10 Table 5

Entry 11 Table 5

Table 6, Entry 1

Table 6, Entry 2

Table 6, Entry 3

Table 6, Entry 4

Table 6, Entry 5

Table 6, Entry 6

Table 6, Entry 7

Table 6, Entry 8

Table 6, Entry 9

Table 6, Entry 11

Table 6, Entry 12

Table 6, Entry 13

Table 6, Entry 14

Table 6, Entry 15

Table 6, Entry 16

Table 6, Entry 18

Table 6, Entry 17

Table 7, Entry 1

Table 7, Entry 2

Table 7, Entry 3

Table 7, Entry 4

Table 7, Entry 5