Supporting Information

Direct Synthesis of Nitrones via Transition-metal-free
Ring-openings of N-tosylaziridines with the Nitrogen Atom
of Various (E)-aldoximes and (E)-ketoximes

Xing Li,* Wenjing Yan, Rui Zhang, Honghong Chang, Wenchao Gao, Xiuping Tian* and Wenlong Wei

Department of Chemistry and Chemical Engineering, Taiyuan University of Technology, 79 West Yingze Street, Taiyuan 030024, People’s Republic of China.
E-mail: lixing@tyut.edu.cn

Contents

Page no

1. General S-2
2. Typical experimental procedure for the preparation of products S-2
3. Characterization data for products S-2
4. ¹H NMR and ¹³C NMR spectra S-22

S-1
1. General

$^1$H NMR spectra were taken on a Bruker AVANCE III 600 MHz NMR spectrometers. The chemical shifts are reported in ppm downfield to the CDCl$_3$ resonance ($\delta = 7.27$). Spectra are reported as follows: chemical shift (δ ppm), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), coupling constants (Hz), integration, and assignment. $^{13}$C NMR data were collected at 150 MHz with complete proton decoupling. The chemical shifts are reported in ppm downfield to the central CDCl$_3$ resonance ($\delta = 77.0$). High-resolution mass spectra were performed on a micrOTOF-Q II instrument with an ESI source. Melting points were measured with a RD-II melting point apparatus and are uncorrected. Unless otherwise noted, Reagents obtained from commercial sources were used without further purification. All solvents were purchased from commercial sources and used with further purification. Deuterated solvents were purchased from Sigma–Aldrich. Column chromatography was performed on silica gel (200-300 mesh). All yields were referred to isolated yields (average of two runs) of compounds.

2. Typical experimental procedure for the preparation of products

A mixture of N-tosylaziridine 1 (0.1 mmol) and oxime 2 or 2' (0.12 mmol) in CH$_3$CN (0.5 mL) in the presence of KOH (10 mol%) as a catalyst was stirred at specified temperature until the substrate had been completely consumed as determined by TLC. Subsequently, the mixture was purified by column chromatography (silica gel, EtOAc/PE) to afford the product.

3. Characterization data for products

N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-phenylmethanimine oxide (3a)

White solid; mp 106-107 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.65 (d, $J = 8.2$ Hz, 2H), 7.60 (s, 1H), 7.42-7.44 (m, 2H), 7.35-7.39 (m, 3H), 7.10 (d, $J = 8.1$ Hz, 2H), 5.26 (d, $J = 4.0$ Hz, 1H), 3.83-3.88 (m, 1H), 3.15-3.20 (m, 1H), 2.30-2.33 (m, 1H), 2.30 (s, 3H), 2.02-2.06 (m, 1H), 1.71-1.74 (m, 1H), 1.64-1.67 (m, 1H), 1.30-1.41 (m, 2H), 1.19-1.29 (m, 2H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 151.6, 145.8, 140.5, 134.7, 133.0, 132.2, 131.7, 130.1, 129.8, 86.1, 60.1, 36.0, 33.5, 26.8, 26.8, 24.3 ppm; HRMS
(ESI): Calcd for C$_{20}$H$_{24}$N$_2$O$_3$S + H 373.1586, found 373.1565.

1-(2-methoxyphenyl)-N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)methanimine oxide (3b)

![Structural formula of 3b]

White solid; mp 169-170 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 8.05 (s, 1H), 7.57 (q, $J = 1.6$ Hz, 1H), 7.34-7.37 (m, 1H), 7.11 (d, $J = 8.1$ Hz, 2H), 6.93 (t, $J = 7.4$ Hz, 1H), 6.90 (d, $J = 8.3$ Hz, 1H), 5.48 (d, $J = 3.9$ Hz, 1H), 3.84-3.89 (m, 4H), 3.09-3.14 (m, 1H), 2.32-2.35 (m, 1H), 2.30 (s, 3H), 2.02-2.05 (m, 1H), 1.70-1.73 (m, 1H), 1.64-1.66 (m, 1H), 1.30-1.39 (m, 2H), 1.19-1.29 (m, 2H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 160.4, 148.0, 145.8, 140.2, 134.3, 132.2, 130.1, 129.5, 123.7, 114.0, 85.8, 60.5, 58.5, 36.0, 33.5, 26.9, 26.8, 24.3 ppm; HRMS (ESI): Calcd for C$_{21}$H$_{26}$N$_2$O$_4$S + H 403.1692, found 403.1685.

1-(3-methoxyphenyl)-N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)methanimine oxide (3c)

![Structural formula of 3c]

White solid; mp 101-102 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.66 (d, $J = 8.2$ Hz, 2H), 7.58 (s, 1H), 7.27 (t, $J = 8.0$ Hz, 1H), 7.12 (d, $J = 8.4$ Hz, 2H), 7.01-7.02 (m, 1H), 6.97 (d, $J = 7.9$ Hz, 1H), 6.92 (qd, $J = 1.0$, 0.8 Hz, 1H), 5.32 (d, $J = 4.8$ Hz, 1H), 3.85-3.89 (m, 1H), 3.84 (s, 3H), 3.15-3.20 (m, 1H), 2.29-2.33 (m, 4H), 2.03-2.06 (m, 1H), 1.71-1.74 (m, 1H), 1.64-1.67 (m, 1H), 1.31-1.41 (m, 2H), 1.24-1.30 (m, 2H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 162.8, 151.6, 145.8, 140.6, 132.6, 132.2, 130.1, 122.9, 119.1, 114.2, 86.1, 60.0, 58.2, 35.8, 33.5, 29.8, 26.8, 24.3 ppm; HRMS (ESI): Calcd for C$_{21}$H$_{26}$N$_2$O$_4$S + H 403.1692, found 403.1685.

1-(4-methoxyphenyl)-N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)methanimine oxide (3d)

![Structural formula of 3d]

White solid; mp 134-135 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.65 (d, $J = 8.2$ Hz, 2H), 7.58 (s, 1H), 7.37 (dt, $J = 2.6$, 2.0 Hz, 2H), 7.12 (d, $J = 7.9$ Hz, 2H), 6.88 (dt, $J = 2.9$, 1.8 Hz, 2H), 5.40 (d, $J = 4.1$ Hz, 1H), 3.82-3.86 (m, 4H), 3.12-3.18 (m, 1H), 2.29-2.33 (m, 4H), 2.01-2.06 (m, 1H), 1.71-1.74 (m, 1H), 1.63-1.66 (m, 1H), 1.30-1.39 (m, 2H), 1.21-1.29 (m, 2H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 164.1,
151.3, 145.7, 140.6, 131.3, 130.1, 127.4, 117.2, 85.7, 60.3, 58.2, 35.8, 33.5, 26.9, 26.8, 24.3 ppm; HRMS (ESI): Calcd for C_{21}H_{26}N_{2}O_{3}S + H 403.1692, found 403.1680.

\(N-(2-((4\text{-methylphenyl})\text{sulfonamido})\text{cyclohexyl})-1-(o\text{-tolyl})\text{methanimine oxide (3e)}\)

![Image of compound 3e]

White solid; mp 109-110 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.93 (s, 1H), 7.66 (d, \(J = 8.2\) Hz, 2H), 7.51 (d, \(J = 7.5\) Hz, 1H), 7.26-7.29 (m, 1H), 7.17 (q, \(J = 7.3\) Hz, 2H), 7.09 (d, \(J = 8.0\) Hz, 2H), 5.31 (d, \(J = 3.8\) Hz, 1H), 3.85-3.90 (m, 1H), 3.17-3.22 (m, 1H), 2.34 (s, 3H), 2.30-2.33 (m, 1H), 2.28 (s, 3H), 2.04-2.07 (m, 1H), 1.71-1.74 (m, 1H), 1.64-1.67 (m, 1H), 1.31-1.41 (m, 2H), 1.24-1.30 (m, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 150.8, 145.8, 140.4, 139.6, 133.8, 132.8, 132.7, 132.2, 130.1, 129.9, 129.1, 85.9, 60.1, 35.9, 33.5, 26.9, 26.8, 24.3, 22.9 ppm; HRMS (ESI): Calcd for C_{21}H_{26}N_{2}O_{3}S + H 387.1742, found 387.1738.

\(N-(2-((4\text{-methylphenyl})\text{sulfonamido})\text{cyclohexyl})-1-(m\text{-tolyl})\text{methanimine oxide (3f)}\)

![Image of compound 3f]

White solid; mp 98-99 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.66 (d, \(J = 8.0\) Hz, 2H), 7.57 (s, 1H), 7.26 (d, \(J = 4.7\) Hz, 2H), 7.18 (q, \(J = 7.6\) Hz, 2H), 7.11 (d, \(J = 8.5\) Hz, 2H), 5.30 (d, \(J = 4.4\) Hz, 1H), 3.84-3.88 (m, 1H), 3.15-3.20 (m, 1H), 2.37 (s, 3H), 2.32-2.34 (m, 1H), 2.30 (s, 3H), 2.03-2.06 (m, 1H), 1.71-1.74 (m, 1H), 1.64-1.67 (m, 1H), 1.30-1.40 (m, 2H), 1.22-1.29 (m, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 151.8, 145.8, 140.4, 134.6, 133.8, 132.2, 131.5, 130.2, 130.1, 127.2, 86.0, 60.1, 36.0, 33.5, 26.9, 26.8, 24.3, 24.2 ppm; HRMS (ESI): Calcd for C_{21}H_{26}N_{2}O_{3}S + H 387.1742, found 387.1739.

\(N-(2-((4\text{-methylphenyl})\text{sulfonamido})\text{cyclohexyl})-1-(p\text{-tolyl})\text{methanimine oxide (3g)}\)

![Image of compound 3g]

White solid; mp 123-124 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.65 (d, \(J = 8.5\) Hz, 2H), 7.58 (s, 1H), 7.32 (d, \(J = 8.2\) Hz, 2H), 7.17 (d, \(J = 7.9\) Hz, 2H), 7.10 (d, \(J = 7.7\) Hz, 2H), 5.36 (d, \(J = 4.0\) Hz, 1H), 3.83-3.87 (m, 1H), 3.13-3.18 (m, 1H), 2.37 (s, 3H),
2.31-2.34 (m, 1H), 2.30 (s, 3H), 2.03-2.05 (m, 1H), 1.70-1.74 (m, 1H), 1.64-1.66 (m, 1H), 1.30-1.39 (m, 2H), 1.21-1.29 (m, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 151.7, 145.8, 143.2, 140.4, 132.4, 132.2, 131.9, 130.1, 129.8, 85.9, 60.3, 36.0, 33.5, 26.9, 26.8, 24.4, 24.3 ppm; HRMS (ESI): Calcd for C\(_{21}\)H\(_{26}\)N\(_2\)O\(_3\)S + H 387.1742, found 387.1731.

1-(2-chlorophenyl)-N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)methanimine oxide (3h)

White solid; mp 129-130 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 8.03 (s, 1H), 7.70 (q, \(J = 1.7\) Hz, 1H), 7.66 (d, \(J = 8.3\) Hz, 2H), 7.36 (q, \(J = 1.2\) Hz, 1H), 7.29 (td, \(J = 1.7, 1.7\) Hz, 1H), 7.23-7.25 (m, 1H), 7.12 (d, \(J = 8.0\) Hz, 2H), 5.18 (d, \(J = 4.6\) Hz, 1H), 3.86-3.91 (m, 1H), 3.18-3.23 (m, 1H), 2.31-2.34 (m, 1H), 2.28 (s, 3H), 2.04-2.07 (m, 1H), 1.71-1.75 (m, 1H), 1.65-1.68 (m, 1H), 1.32-1.43 (m, 2H), 1.24-1.29 (m, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 148.5, 146.0, 140.3, 136.6, 133.9, 132.8, 132.4, 132.3, 130.0, 129.9, 129.8, 86.5, 59.9, 36.2, 26.9, 26.8, 24.4 ppm; HRMS (ESI): Calcd for C\(_{20}\)H\(_{23}\)ClN\(_2\)O\(_3\)S + H 407.1196, found 407.1190.

1-(3-chlorophenyl)-N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)methanimine oxide (3i)

White solid; mp 109-110 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.67 (d, \(J = 8.2\) Hz, 2H), 7.55 (s, 1H), 7.41 (s, 1H), 7.33 (dt, \(J = 2.6, 2.3\) Hz, 1H), 7.27-7.31 (m, 2H), 7.12 (d, \(J = 8.2\) Hz, 2H), 5.11 (d, \(J = 4.7\) Hz, 1H), 3.83-3.88 (m, 1H), 3.21-3.27 (m, 1H), 2.30 (s, 3H), 2.27-2.28 (m, 1H), 2.03-2.05 (m, 1H), 1.71-1.74 (m, 1H), 1.64-1.67 (m, 1H), 1.31-1.45 (m, 2H), 1.25-1.28 (m, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 150.2, 145.9, 140.6, 137.7, 136.6, 132.9, 132.3, 130.0, 129.5, 128.1, 86.5, 59.5, 35.9, 33.5, 26.8, 26.7, 24.3 ppm; HRMS (ESI): Calcd for C\(_{20}\)H\(_{23}\)ClN\(_2\)O\(_3\)S + H 407.1196, found 407.1190.

1-(4-chlorophenyl)-N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)methanimine oxide (3j)

White solid; mp 120-121 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.66 (d, \(J = 8.2\) Hz, 2H),
7.58 (s, 1H), 7.33 (q, J = 8.6 Hz, 4H), 7.12 (d, J = 8.0 Hz, 2H), 5.19 (d, J = 4.4 Hz, 1H), 3.83-3.88 (m, 1H), 3.19-3.24 (m, 1H), 2.31 (s, 3H), 2.26-2.29 (m, 1H), 2.03-2.05 (m, 1H), 1.71-1.74 (m, 1H), 1.64-1.67 (m, 1H), 1.30-1.43 (m, 2H), 1.23-1.29 (m, 2H), ppm; 13C NMR (150 MHz, CDCl3): δ 150.4, 145.8, 140.6, 138.8, 133.3, 132.3, 131.9, 130.9, 130.1, 86.3, 59.8, 35.9, 33.5, 26.8, 26.7, 24.3 ppm; HRMS (ESI): Calcd for C20H23ClN2O3S + H 407.1196, found 407.1190.

N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(2-nitrophenyl) methanimine oxide (3k)

Yellow solid; mp 108-110 °C; 1H NMR (600 MHz, CDCl3): δ 8.19 (s, 1H), 8.01 (q, J = 1.1 Hz, 1H), 7.85 (q, J = 1.3 Hz, 1H), 7.69 (d, J = 8.3 Hz, 2H), 7.61 (dt, J = 0.8, 0.5 Hz, 1H), 7.52 (dt, J = 1.4, 1.2 Hz, 1H), 7.17 (d, J = 8.0 Hz, 2H), 5.14 (d, J = 5.0 Hz, 1H), 3.91-3.95 (m, 1H), 3.19-3.25 (m, 1H), 2.31 (s, 3H), 2.27-2.30 (m, 1H), 2.06-2.09 (m, 1H), 1.72-1.75 (m, 1H), 1.65-1.67 (m, 1H), 1.34-1.43 (m, 2H), 1.25-1.30 (m, 2H), ppm; HRMS (ESI): Calcd for C20H23N3O5S + H 418.1437, found 418.1432.

N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(3-nitrophenyl) methanimine oxide (3l)

Yellowish solid; mp 101-102 °C; 1H NMR (600 MHz, CDCl3): δ 8.24 (d, J = 1.6 Hz, 1H), 8.20-8.22 (m, 1H), 7.76 (d, J = 7.7 Hz, 1H), 7.70 (d, J = 8.2 Hz, 2H), 7.65 (t, J = 3.8 Hz, 1H), 7.54 (t, J = 7.9 Hz, 1H), 7.15 (d, J = 8.0 Hz, 2H), 5.08 (d, J = 5.3 Hz, 1H), 3.89-3.94 (m, 1H), 3.27-3.33 (m, 1H), 2.31 (s, 3H), 2.21-2.24 (m, 1H), 2.06-2.09 (m, 1H), 1.73-1.75 (m, 1H), 1.65-1.66 (m, 1H), 1.40-1.47 (m, 1H), 1.32-1.35 (m, 1H), 1.27-1.31 (m, 2H) ppm; HRMS (ESI): Calcd for C20H23N3O5S + H 418.1437, found 418.1432.

N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(pyridin-2-yl) methanimine oxide (3m)

White solid; mp 140-141 °C; 1H NMR (600 MHz, CDCl3): δ 8.60 (dt, J = 0.8, 0.7 Hz, 1H), 7.69-7.71 (m, 2H), 7.66-7.68 (m, 2H), 7.63 (d, J = 7.9 Hz, 1H), 7.26-7.29 (m, 1H), 7.13 (d, J = 8.3 Hz, 2H), 5.14 (d, J = 5.6 Hz, 1H), 3.91-3.95 (m, 1H), 3.18-3.24
(m, 1H), 2.31-2.33 (m, 1H), 2.30 (s, 3H), 2.05-2.08 (m, 1H), 1.73-1.75 (m, 1H), 1.65-1.67 (m, 1H), 1.31-1.46 (m, 2H), 2.05-2.07 (m, 1H), 1.71-1.75 (m, 1H), 1.65-1.67 (m, 1H), 1.33-1.45 (m, 2H), 1.25-1.29 (m, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 153.7, 151.6, 148.5, 145.8, 140.9, 136.1, 132.3, 130.9, 130.0, 126.6, 86.7, 59.5, 35.9, 33.5, 26.8, 26.7, 24.3 ppm; HRMS (ESI): Calcd for C\(_{19}\)H\(_{23}\)N\(_3\)O\(_3\)S + H 374.1538, found 374.1537.

**N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(pyridin-3-yl) methanimine oxide (3n)**

White solid; mp 118-119 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 8.60 (q, \(J = 1.6\) Hz, 1H), 8.56 (d, \(J = 1.7\) Hz, 1H), 7.80 (dt, \(J = 1.9, 1.9\) Hz, 1H), 7.68 (d, \(J = 8.3\) Hz, 2H), 7.60 (s, 1H), 7.29 (q, \(J = 4.8\) Hz, 1H), 7.14 (d, \(J = 8.0\) Hz, 2H), 5.19 (d, \(J = 4.9\) Hz, 1H), 3.87-3.91 (m, 1H), 3.23-3.29 (m, 1H), 2.30 (s, 3H), 2.25-2.27 (m, 1H), 2.05-2.07 (m, 1H), 1.73-1.76 (m, 1H), 1.66-1.68 (m, 1H), 1.34-1.46 (m, 2H), 1.28-1.33 (m, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 153.7, 151.6, 148.5, 145.8, 140.9, 136.1, 132.3, 130.9, 130.0, 126.6, 86.7, 59.5, 36.0, 33.5, 26.8, 26.7, 24.3 ppm; HRMS (ESI): Calcd for C\(_{19}\)H\(_{23}\)N\(_3\)O\(_3\)S + H 374.1538, found 374.1537.

**N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(pyridin-4-yl) methanimine oxide (3o)**

White solid; mp 175-176 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 8.62 (d, \(J = 6.0\) Hz, 2H), 7.67 (d, \(J = 8.2\) Hz, 2H), 7.56 (s, 1H), 7.29 (q, \(J = 1.4\) Hz, 2H), 7.13 (d, \(J = 8.0\) Hz, 2H), 5.06 (d, \(J = 5.0\) Hz, 1H), 3.89-3.93 (m, 1H), 3.26-3.30 (m, 1H), 2.30 (s, 3H), 2.25-2.27 (m, 1H), 2.05-2.07 (m, 1H), 1.73-1.76 (m, 1H), 1.66-1.68 (m, 1H), 1.34-1.46 (m, 2H), 1.28-1.33 (m, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 153.2, 149.4, 145.8, 142.2, 140.9, 132.3, 130.0, 126.7, 87.0, 59.3, 35.9, 33.5, 26.8, 26.7, 24.3 ppm; HRMS (ESI): Calcd for C\(_{19}\)H\(_{23}\)N\(_3\)O\(_3\)S + H 374.1538, found 374.1537.

**N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(naphthalen-1-yl) methanimine oxide (3p)**

White solid; mp 106-107 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 8.32 (d, \(J = 8.4\) Hz, 1H), 8.28 (s, 1H), 7.89 (d, \(J = 8.0\) Hz, 2H), 7.65 (d, \(J = 8.2\) Hz, 2H), 7.63 (d, \(J = 7.0\) Hz, 1H), 7.56-7.59 (m, 1H), 7.52-7.55 (m, 1H), 7.47 (t, \(J = 7.9\) Hz, 1H), 7.00 (d, \(J = 8.0\) Hz, 2H), ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 153.7, 151.6, 148.5, 145.8, 142.2, 140.9, 132.3, 130.0, 126.7, 87.0, 59.3, 35.9, 33.5, 26.8, 26.7, 24.3 ppm; HRMS (ESI): Calcd for C\(_{19}\)H\(_{23}\)N\(_3\)O\(_3\)S + H 374.1538, found 374.1537.
$\text{S} - 8$ Hz, 2H), 5.24 (d, $J = 4.1$ Hz, 1H), 3.94-3.98 (m, 1H), 3.24-3.30 (m, 1H), 2.33-2.36 (m, 1H), 2.12-2.14 (m, 4H), 1.75-1.78 (m, 1H), 1.67-1.70 (m, 1H), 1.37-1.48 (m, 2H), 1.26-1.31 (m, 2H), ppm; HRMS (ESI): Calcd for $\text{C}_{24}\text{H}_{26}\text{N}_2\text{O}_3\text{S} + \text{H} 423.1742$, found 423.1732.

$N$-$(2-((4$-methylphenyl)sulfonamido)cyclohexyl)-1-(naphthalen-2-yl)methanimine oxide (3q)

White solid; mp 129-132 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.84-7.87 (m, 2H), 7.82 (d, $J = 8.6$ Hz, 1H), 7.74 (s, 1H), 7.72 (s, 1H), 7.67 (dd, $J = 1.7$, 1.5 Hz, 1H), 7.65 (d, $J = 8.3$ Hz, 2H), 7.52-7.54 (m, 2H), 7.08 (d, $J = 8.1$ Hz, 2H), 5.28 (d, $J = 3.8$ Hz, 1H), 3.89-3.93 (m, 1H), 3.19-3.24 (m, 1H), 2.34-2.37 (m, 1H), 2.24 (s, 3H), 2.07-2.10 (m, 1H), 1.75-1.77 (m, 1H), 1.67-1.69 (m, 1H), 1.36-1.44 (m, 2H), 1.25-1.32 (m, 2H), ppm; HRMS (ESI): Calcd for $\text{C}_{24}\text{H}_{26}\text{N}_2\text{O}_3\text{S} + \text{H} 423.1742$, found 423.1730.

$E$-$N$-$(2-((4$-methylphenyl)sulfonamido)cyclohexyl)$-3$-phenylprop-2-en-1-imine oxide (3r)

Colourless liquid; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.71 (d, $J = 8.4$ Hz, 2H), 7.44-7.45 (m, 2H), 7.41 (d, $J = 8.9$ Hz, 1H), 7.36 (td, $J = 1.7$, 1.2 Hz, 2H), 7.31 (tt, $J = 2.1$, 1.2 Hz, 1H), 7.23 (dd, $J = 1.8$, 0.6 Hz, 2H), 6.66 (t, $J = 6.8$ Hz, 2H), 5.18 (d, $J = 4.0$ Hz, 1H), 3.77-3.81 (m, 1H), 3.13-3.18 (m, 1H), 2.37 (s, 3H), 2.29-2.31 (m, 1H), 2.01-2.05 (m, 1H), 1.72-1.74 (m, 1H), 1.63-1.66 (m, 1H), 1.32-1.36 (m, 2H), 1.28-1.31 (m, 2H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 153.6, 145.8, 141.6, 140.7, 138.7, 138.3, 131.9, 131.8, 130.1, 129.8, 124.5, 86.2, 60.1, 35.9, 33.5, 29.8, 26.8, 26.8, 24.4 ppm; HRMS (ESI): Calcd for $\text{C}_{22}\text{H}_{26}\text{N}_2\text{O}_3\text{S} + \text{H} 399.1742$, found 399.1735.

$N$-$(2-((4$-methylphenyl)sulfonamido)cyclohexyl)$pentan-1-imine oxide (3s)

Colourless liquid; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.70 (d, $J = 8.3$ Hz, 2H), 7.23 (d, $J = 8.0$ Hz, 2H), 6.48 (t, $J = 5.3$ Hz, 1H), 5.36 (d, $J = 2.7$ Hz, 1H), 3.74-3.79 (m, 1H), 3.02-3.06 (m, 1H), 2.40 (s, 3H), 2.24-2.27 (m, 1H), 2.07-2.13 (m, 1H), 1.90-1.97 (m, 2H), 1.66-1.68 (m, 1H), 1.60-1.61 (m, 1H), 1.31-1.37 (m, 2H), 1.23-1.30 (m, 4H), 1.15-1.22 (m, 2H), 0.87 (t, $J = 7.3$ Hz, 3H) ppm; HRMS (ESI): Calcd for
C_{22}H_{28}N_{2}O_{3}S + H 353.1899, found 353.1898.

3-methyl-N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)butan-1-imino oxide (3t)

 Colourless liquid; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.72 (d, $J = 8.3$ Hz, 2H), 7.26 (d, $J = 7.9$ Hz, 2H), 7.04 (t, $J = 6.6$ Hz, 1H), 5.27 (d, $J = 3.5$ Hz, 1H), 3.71-3.76 (m, 1H), 3.04-3.10 (m, 1H), 2.42 (s, 3H), 2.22-2.25 (m, 1H), 1.99-2.02 (m, 1H), 1.96-1.98 (m, 2H), 1.72-1.79 (m, 1H), 1.68-1.69 (m, 1H), 1.59-1.62 (m, 1H), 1.25-1.30 (m, 2H), 1.18-1.24 (m, 2H), 0.91 (t, $J = 6.4$ Hz, 6H) ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 153.6, 145.8, 140.7, 132.3, 130.1, 85.2, 60.2, 41.1, 35.5, 33.5, 29.6, 26.8, 25.3, 25.2, 24.4 ppm; HRMS (ESI): Calcd for C$_{18}$H$_{28}$N$_{2}$O$_{3}$S + H 353.1899, found 353.1899.

N-(2-((4-methylphenyl)sulfonamido)-1-phenylethyl)-1-phenylmethanimine oxide (4b)

 White solid; mp 110-111 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 8.06 (s, 1H), 7.71 (d, $J = 8.3$ Hz, 2H), 7.47 (dd, $J = 1.9$, 1.4 Hz, 2H), 7.33-7.36 (m, 3H), 7.31 (dt, $J = 1.6$, 1.4 Hz, 2H), 7.28-7.30 (m, 1H), 7.26 (d, $J = 1.8$ Hz, 2H), 7.25 (s, 2H), 5.20 (q, $J = 4.1$ Hz, 1H), 4.95 (q, $J = 4.1$ Hz, 1H), 3.43-3.48 (m, 1H), 3.36-3.41 (m, 1H), 2.38 (s, 3H) ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 152.9, 146.3, 141.2, 134.6, 133.1, 132.6, 131.6, 131.2, 130.1, 130.0, 129.5, 86.1, 50.8, 24.4 ppm; HRMS (ESI): Calcd for C$_{22}$H$_{28}$N$_{2}$O$_{3}$S + H 395.1429, found 395.1423.

(Z)-N-benzylidene-2-((4-methylphenyl)sulfonamido)-2-phenylethananine oxide (5b)

 $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.86 (s, 1H), 7.57 (d, $J = 8.5$ Hz, 2H), 7.47 (dd, $J = 2.1$, 1.4 Hz, 2H), 7.39-7.42 (m, 3H), 7.27-7.30 (m, 4H), 7.24-7.26 (m, 1H), 7.04 (d, $J = 8.2$ Hz, 2H), 5.42 (d, $J = 4.3$ Hz, 1H), 4.61-4.65 (m, 1H), 4.19 (q, $J = 4.0$ Hz, 1H), 4.07 (q, $J = 8.6$ Hz, 1H), 2.22 (s, 3H) ppm; MS (ESI): Calcd for C$_{22}$H$_{28}$N$_{2}$O$_{3}$S +H 395.1429, found 395.1423.

N-(2-((4-methylphenyl)sulfonamido)-1-(o-tolyl)ethyl)-1-phenylmethanimine oxide (4c)
White solid; mp 133-134 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 8.05 (s, 1H), 7.73 (d, $J = 8.3$ Hz, 2H), 7.47 (dd, $J = 2.0$, 1.5 Hz, 2H), 7.33-7.37 (m, 3H), 7.24 (d, $J = 8.3$ Hz, 3H), 7.16 (dd, $J = 2.3$, 1.7 Hz, 1H), 7.12-7.15 (m, 2H), 5.45 (q, $J = 3.5$ Hz, 1H), 5.13 (q, $J = 3.6$ Hz, 1H), 3.39-3.44 (m, 1H), 3.28-3.32 (m, 1H), 2.38 (s, 3H), 2.30 (s, 3H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 152.8, 146.3, 140.0, 139.3, 138.3, 134.6, 133.6, 133.1, 132.6, 131.6, 131.0, 130.1, 129.1, 129.0, 83.2, 50.0, 24.4, 22.0 ppm; HRMS (ESI): Calcd for C$_{23}$H$_{24}$N$_2$O$_3$S + H 409.1586, found 409.1583.

$N$-((2-(4-methylphenyl)sulfonamido)-1-(m-tolyl)ethyl)-1-phenylmethanimine oxide (4d)

Colourless liquid; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 8.05 (s, 1H), 7.71 (d, $J = 8.3$ Hz, 2H), 7.48 (dd, $J = 2.0$, 1.5 Hz, 2H), 7.33-7.37 (m, 3H), 7.24 (d, $J = 3.0$ Hz, 2H), 7.19 (t, $J = 7.9$ Hz, 1H), 7.09 (d, $J = 7.6$ Hz, 1H), 7.04-7.05 (m, 2H), 5.17 (q, $J = 4.1$ Hz, 1H), 4.96 (q, $J = 4.2$ Hz, 1H), 3.42-3.46 (m, 1H), 3.34-3.39 (m, 1H), 2.39 (s, 3H), 2.32 (s, 3H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 152.9, 146.3, 141.2, 141.0, 140.0, 134.6, 133.1, 132.6, 132.0, 131.6, 131.4, 130.2, 130.1, 126.6, 86.1, 50.9, 24.4, 24.3 ppm; HRMS (ESI): Calcd for C$_{23}$H$_{24}$N$_2$O$_3$S + H 409.1586, found 409.1584.

(Z)-$N$-benzylidene-2-(4-methylphenylsulfonamido)-2-(m-tolyl)ethanamine oxide (5d)

$^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.86 (s, 1H), 7.56 (d, $J = 8.3$ Hz, 2H), 7.47 (dd, $J = 2.2$, 1.6 Hz, 2H), 7.38-7.42 (m, 3H), 7.15 (t, $J = 7.5$ Hz, 1H), 7.08 (t, $J = 8.0$ Hz, 1H), 7.03-7.05 (m, 4H), 5.39 (d, $J = 4.1$ Hz, 1H), 4.58-4.62 (m, 1H), 4.17 (q, $J = 4.1$, 4.1 Hz, 1H), 4.05 (q, $J = 8.8$ Hz, 1H), 2.26 (s, 3H), 2.21 (s, 3H) ppm; HRMS (ESI): Calcd for C$_{23}$H$_{24}$N$_2$O$_3$S + H 409.1586, found 409.1584.

$N$-((2-(4-methylphenyl)sulfonamido)-1-(p-tolyl)ethyl)-1-phenylmethanimine oxide (4e)
White solid; mp 119-120 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 8.03 (s, 1H), 7.71 (d, $J$ = 8.3 Hz, 2H), 7.46 (dd, $J$ = 1.9, 1.4 Hz, 2H), 7.32-7.36 (m, 3H), 7.24 (d, $J$ = 7.9 Hz, 2H), 7.11-7.15 (m, 4H), 5.17 (q, $J$ = 4.2 Hz, 1H), 5.00 (q, $J$ = 4.3 Hz, 1H), 3.40-3.45 (m, 1H), 3.34-3.39 (m, 1H), 2.38 (s, 3H), 2.31 (s, 3H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 152.8, 146.3, 141.1, 139.9, 138.1, 134.6, 133.1, 132.6, 132.2, 131.6, 130.1, 130.1, 129.5, 85.9, 50.8, 24.4, 24.1 ppm; HRMS (ESI): Calcd for C$_{23}$H$_{24}$N$_2$O$_3$S + H 409.1586, found 409.1584.

$^{(Z)}$-N-benzylidene-2-(4-methylphenylsulfonamido)-2-(p-tolyl)ethanamine oxide (5e)

$^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.86 (s, 1H), 7.57 (d, $J$ = 8.3 Hz, 2H), 7.47 (dd, $J$ = 2.2, 1.6 Hz, 2H), 7.38-7.42 (m, 3H), 7.16 (d, $J$ = 8.0 Hz, 2H), 7.08 (d, $J$ = 7.9 Hz, 2H), 7.04 (d, $J$ = 8.0 Hz, 2H), 5.36 (d, $J$ = 4.0 Hz, 1H), 4.55-4.59 (m, 1H), 4.17 (q, $J$ = 4.2 Hz, 1H), 4.06 (q, $J$ = 8.8 Hz, 1H), 2.32 (s, 3H), 2.22 (s, 3H) ppm; HRMS (ESI): Calcd for C$_{23}$H$_{24}$N$_2$O$_3$S + H 409.1586, found 409.1584.

N-(1-(2-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylmethanimine oxide (4f)

White solid; mp 118-119 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 8.08 (s, 1H), 7.73 (d, $J$ = 8.3 Hz, 2H), 7.47 (dd, $J$ = 1.7, 1.4 Hz, 2H), 7.35-7.37 (m, 2H), 7.32-7.35 (m, 2H), 7.30-7.32 (m, 1H), 7.23 (d, $J$ = 8.1 Hz, 2H), 7.20-7.22 (m, 2H), 5.57 (q, $J$ = 3.2 Hz, 1H), 5.05 (q, $J$ = 4.1 Hz, 1H), 3.57-3.62 (m, 1H), 3.24-3.29 (m, 1H), 2.37 (s, 3H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 153.3, 146.2, 140.0, 139.0, 135.1, 134.4, 133.2, 132.6, 132.5, 132.1, 131.6, 130.9, 130.2, 130.1, 129.9, 83.0, 49.1, 24.4 ppm; HRMS (ESI): Calcd for C$_{23}$H$_{23}$ClN$_2$O$_3$S + H 429.1040, found 429.1035.

$^{(Z)}$-N-(2-(2-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylmethanimine oxide (5f)
White solid; mp 118-119 °C; $^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 7.84 (s, 1H), 7.75-7.68 (m, 2H), 7.63 (d, $J = 8.4$ Hz, 2H), 7.54 (q, $J = 3.2$ Hz, 2H), 7.49-7.44 (m, 1H), 7.43-7.37 (d, $J = 6.4$ Hz, 2H), 7.33-7.31 (m, 1H), 7.21-7.19 (m, 2H), 7.05 (d, $J = 8.0$ Hz, 1H), 5.65 (d, $J = 4.0$ Hz, 1H), 5.13-5.05 (m, 1H), 4.27 (dd, $J = 12.4$, 3.6 Hz, 1H), 4.00 (dd, $J = 4$, 8 Hz, 1H), 2.19 (s, 3H) ppm; HRMS (ESI): Calcd for C$_{22}$H$_{21}$ClN$_2$O$_3$S + H 429.1040, found 429.1035.

$N$-((1-(3-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylmethanimine oxide (4g)

![Structure](image)

Mixture of 4g and 5g, Colourless liquid; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 8.06 (s, 1H), 7.71 (d, $J = 8.3$ Hz, 2H), 7.47 (dd, $J = 1.8$, 1.4 Hz, 2H), 7.36-7.37 (m, 1H), 7.35-7.36 (m, 1H), 7.27 (d, $J = 0.6$ Hz, 1H), 7.26 (s, 2H), 7.24 (d, $J = 1.0$ Hz, 1H), 7.20-7.22 (m, 2H), 7.13-7.15 (m, 1H), 5.18 (q, $J = 3.8$ Hz, 1H), 5.01 (q, $J = 4.2$ Hz, 1H), 3.41-3.46 (m, 1H), 3.29-3.33 (m, 1H), 2.39 (s, 3H) ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 153.3, 146.5, 143.3, 139.8, 137.4, 134.3, 133.2, 132.8, 131.6, 131.3, 130.2, 130.0, 129.6, 127.7, 85.5, 50.6, 24.4 ppm; HRMS (ESI): Calcd for C$_{22}$H$_{21}$ClN$_2$O$_3$S + H 429.1040, found 429.1035.

(Z)-$N$-((2-(3-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylmethanimine oxide (5g)

![Structure](image)

Colourless liquid; $^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 7.88 (s, 1H), 7.75-7.68 (m, 1H), 7.58-7.51 (m, 3H), 7.50 (dd, $J = 7.2$, 2.0 Hz, 2H), 7.42-7.35 (m, 3H), 7.21 (d, $J = 2.4$ Hz, 2H), 7.07 (d, $J = 8.0$ Hz, 2H), 5.5 (d, $J = 4.0$ Hz, 1H), 4.64-4.58 (m, 1H), 4.19 (dd, $J = 8.4$, 4.0 Hz, 1H), 4.07 (dd, $J = 3.6$, 8.4 Hz, 1H), 2.21 (s, 3H) ppm; HRMS (ESI): Calcd for C$_{22}$H$_{21}$ClN$_2$O$_3$S + H 429.1040, found 429.1035.

$N$-((1-(4-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylmethanimine oxide (4h)

![Structure](image)

White solid; mp 145-146 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 8.05 (s, 1H), 7.70 (d, $J = 8.2$ Hz, 2H), 7.45 (dd, $J = 1.7$, 1.3 Hz, 2H), 7.32-7.37 (m, 3H), 7.26 (d, $J = 8.5$ Hz, 2H), 7.23 (d, $J = 8.1$ Hz, 2H), 7.17 (d, $J = 8.5$ Hz, 2H), 5.16-5.21 (m, 2H), 3.40-3.44
(m, 1H), 3.28-3.33 (m, 1H), 2.37 (s, 3H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 153.2, 146.4, 139.8, 139.8, 137.0, 134.4, 133.2, 132.6, 131.6, 130.9, 130.1, 130.0, 85.4, 50.6, 24.4 ppm; HRMS (ESI): Calcd for C\(_{22}\)H\(_{21}\)ClN\(_2\)O\(_3\)S + H 429.1040, found 429.1035.

(Z)-\(N\)-(2-(4-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylmethanimine oxide (5h)

White solid; mp 145-146 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.80 (s, 1H), 7.64 (d, \(J = 7.6\) Hz, 1H), 7.48 (d, \(J = 7.2\) Hz, 2H), 7.39 (d, \(J = 7.6\) Hz, 2H), 7.34 (d, \(J = 6.8\) Hz, 3H), 7.23-7.17 (m, 2H), 7.15-7.10 (m, 1H), 6.99 (d, \(J = 7.6\) Hz, 2H), 5.42 (d, \(J = 3.2\) Hz, 1H), 4.53-4.51 (m, 1H), 4.11 (dd, \(J = 9.6, 2.4\) Hz, 1H), 3.99 (dd, \(J = 10.4, 3.2\) Hz, 1H), 2.14 (s, 3H) ppm; HRMS (ESI): Calcd for C\(_{22}\)H\(_{21}\)ClN\(_2\)O\(_3\)S + H 429.1040, found 429.1035.

N-(2-((4-methylphenyl)sulfonamido)-1-(naphthalen-1-yl)ethyl)-1-phenylmethanimine oxide (4i)

Colourless liquid; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 8.14 (s, 1H), 7.89-7.91 (m, 1H), 7.84-7.86 (m, 1H), 7.77 (d, \(J = 8.5\) Hz, 1H), 7.71 (dt, \(J = 2.2, 1.9\) Hz, 2H), 7.50-7.51 (m, 2H), 7.48-7.49 (m, 2H), 7.47 (s, 1H), 7.40 (t, \(J = 7.4\) Hz, 1H), 7.35-7.36 (m, 2H), 7.33-7.34 (m, 1H), 7.23 (d, \(J = 0.8\) Hz, 1H), 7.22 (s, 1H), 6.01 (q, \(J = 3.2\) Hz, 1H), 5.18 (q, \(J = 3.7\) Hz, 1H), 3.65-3.70 (m, 1H), 3.40-3.44 (m, 1H), 2.37 (s, 3H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 153.0, 146.3, 140.1, 136.8, 136.7, 134.6, 133.4, 133.1, 132.6, 131.8, 131.6, 130.1, 130.0, 129.4, 128.6, 128.1, 127.2, 125.7, 83.7, 50.4, 24.4 ppm; HRMS (ESI): Calcd for C\(_{26}\)H\(_{24}\)N\(_2\)O\(_3\)S + H 445.1586, found 445.1568.

(Z)-N-(2-((4-methylphenyl)sulfonamido)-2-(naphthalen-1-yl)ethyl)-1-phenylmethanimine oxide (5i)

Colourless liquid; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 8.08 (d, \(J = 8.8\) Hz, 1H), 7.93-7.88 (m, 1H), 7.87 (d, \(J = 8.0\) Hz, 1H), 7.79-7.65 (m, 3H), 7.55-7.48 (m, 6H), 7.43-7.39 (m, 3H), 6.99 (d, \(J = 8.4\) Hz, 2H), 5.50 (d \(J = 7.2\) Hz, 1H), 5.35 (d \(J = 9.2\) Hz, 1H), 4.40 (dd, \(J = 10.4, 3.2\) Hz, 1H), 4.13 (dd, \(J = 3.6, 8.4\) Hz, 1H), 2.16 (s, 3H) ppm; HRMS (ESI): Calcd for C\(_{26}\)H\(_{24}\)N\(_2\)O\(_3\)S + H 445.1586, found 445.1568.
N-(2-((4-methylphenyl)sulfonamido)-1-(naphthalen-2-yl)ethyl)-1-phenylmethanimine oxide (4j)

White solid; mp 107-108 °C; ^1H NMR (600 MHz, CDCl_3): δ 8.11 (s, 1H), 7.79-7.82 (m, 3H), 7.69 (d, J = 8.3 Hz, 3H), 7.47 (td, J = 2.3, 1.4 Hz, 4H), 7.34-7.37 (m, 4H), 7.21 (d, J = 8.0 Hz, 2H), 5.38 (q, J = 4.1 Hz, 1H), 4.97 (q, J = 4.2 Hz, 1H), 3.52-3.57 (m, 1H), 3.43-3.48 (m, 1H), 2.37 (s, 3H) ppm; ^13C NMR (150 MHz, CDCl_3): δ 153.1, 146.4, 139.8, 138.5, 136.0, 134.5, 133.1, 132.6, 131.6, 131.4, 130.9, 130.6, 130.1, 130.0, 129.3, 129.2, 128.9, 127.0, 86.2, 50.8, 24.4 ppm; HRMS (ESI): Calcd for C_{26}H_{24}N_2O_3S + H 445.1586, found 445.1586.

(Z)-N-(2-((4-methylphenyl)sulfonamido)-2-(naphthalen-2-yl)ethyl)-1-phenylmethanimine oxide (5j)

White solid; ^1H NMR (400 MHz, CDCl_3): δ 7.93 (s, 1H), 7.89 (d, J = 6.8 Hz, 2H), 7.76-7.67 (m, 5H), 7.58-7.41 (m, 5H), 7.35 (t, J = 5.2 Hz, 2H), 6.97 (d, J = 7.6 Hz, 2H), 5.54 (d, J = 2.8 Hz, 1H), 5.40-5.34 (m, 1H), 4.81 (t, J = 4.0 Hz, 1H), 4.21 (dd, J = 3.6, 8.4 Hz, 1H), 2.16 (s, 3H) ppm; ^13C NMR (150 MHz, CDCl_3): δ 151.9, 146.1, 146.0, 140.0, 139.9, 134.9, 133.9, 133.0, 133.0, 132.4, 131.6, 130.2, 129.9, 90.9, 90.9, 62.6, 34.2, 31.3, 24.4, 24.3, 23.8 ppm; HRMS (ESI): Calcd for C_{26}H_{24}N_2O_3S + H 445.1586, found 445.1586.

N-(2-((4-methylphenyl)sulfonamido)cyclopentyl)-1-phenylmethanimine oxide (5k)

White solid; mp 99-100 °C; ^1H NMR (600 MHz, CDCl_3): δ 7.85 (s, 1H), 7.70 (d, J = 8.3 Hz, 2H), 7.48-7.50 (m, 2H), 7.37-7.41 (m, 3H), 7.10 (d, J = 7.9 Hz, 2H), 5.23 (d, J = 4.3 Hz, 1H), 4.45-4.49 (m, 1H), 3.48-3.52 (m, 1H), 2.30 (s, 3H), 2.09-2.15 (m, 1H), 1.97-2.02 (m, 1H), 1.67-1.73 (m, 3H), 1.57-1.62 (m, 1H) ppm; ^13C NMR (150 MHz, CDCl_3): δ 151.9, 146.1, 146.0, 140.0, 139.9, 134.9, 133.9, 133.0, 133.0, 132.4, 131.6, 130.2, 129.9, 90.9, 90.9, 62.6, 34.2, 31.3, 24.4, 24.3, 23.8 ppm; HRMS (ESI): Calcd for C_{19}H_{22}N_2O_3S + H 359.1429, found 359.1422.

N-(2-((4-methylphenyl)sulfonamido)octyl)-1-phenylmethanimine oxide (5l)
White solid; mp 76-77 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.83 (s, 1H), 7.73 (d, $J$ = 8.3 Hz, 2H), 7.47-7.49 (m, 2H), 7.36-7.39 (m, 3H), 7.19 (d, $J$ = 8.1 Hz, 2H), 4.86 (d, $J$ = 7.7 Hz, 1H), 3.96 (qd, $J$ = 5.5, 4.3 Hz, 2H), 3.46 (m, 1H), 2.32 (s, 3H), 1.50-1.56 (m, 2H), 1.24-1.32 (m, 4H), 1.20-1.23 (m, 4H), 0.85 (t, $J$ = 7.1 Hz, 3H) ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 152.1, 146.0, 146.0, 141.0, 140.9, 134.7, 133.0, 132.4, 131.6, 130.1, 129.9, 78.0, 56.8, 35.4, 34.5, 31.9, 28.2, 25.4, 24.3, 24.3, 17.0, 16.9, 24.4 ppm; HRMS (ESI): Calcd for C$_{22}$H$_{30}$N$_2$O$_3$S + H 403.2055, found 403.2054.

$N$-((2-((4-methylphenyl)sulfonamido)octadecyl)-1-phenylmethanimine oxide (5m)

White solid; mp 85-86 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.82 (s, 1H), 7.46-7.48 (m, 2H), 7.36-7.38 (m, 3H), 7.18 (d, $J$ = 8.3 Hz, 2H), 4.85 (d, $J$ = 7.6 Hz, 1H), 3.95 (qd, $J$ = 5.6, 4.3 Hz, 2H), 3.46-3.51 (m, 1H), 2.31 (s, 3H), 1.49-1.56 (m, 2H), 1.20-1.25 (m, 24H), 1.20-1.23 (m, 4H), 0.86 (t, $J$ = 6.7 Hz, 3H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 152.1, 146.0, 141.0, 141.0, 141.0, 134.7, 133.0, 132.4, 131.6, 130.1, 129.9, 78.0, 56.8, 35.4, 34.8, 32.6, 32.5, 32.4, 32.3, 32.2, 28.3, 25.6, 24.3, 17.0 ppm; HRMS (ESI): Calcd for C$_{32}$H$_{50}$N$_2$O$_3$S + H 543.3620, found 543.3602.

$N$-(1-hydroxy-4-((4-methylphenyl)sulfonamido)hexan-3-yl)-1-phenylmethanimine oxide (5n)

White solid; mp 100-101 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.95 (s, 1H), 7.76 (d, $J$ = 8.4 Hz 2H), 7.51 (d, $J$ = 2.2 Hz, 1H), 7.50-7.51 (m, 1H), 7.40 (d, $J$ = 1.8 Hz, 2H), 7.39-7.38 (m, 1H), 7.26 (d, $J$ = 8.1 Hz, 2H), 4.98 (d, $J$ = 8.9 Hz, 1H), 4.38-4.41 (m, 1H), 3.68-3.76 (m, 2H), 3.40-3.45 (m, 1H), 2.40 (s, 3H), 2.00 (s, 1H), 1.87-1.93 (m, 1H), 1.76-1.81 (m, 1H), 1.63-1.69 (m, 1H), 1.38-1.43 (m, 1H), 0.80 (t, $J$ = 7.6 Hz, 2H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 152.1, 146.1, 141.3, 134.6, 133.1, 132.5, 131.7, 83.7, 62.5, 61.3, 36.6, 32.6, 28.2, 24.4, 13.1 ppm; HRMS (ESI): Calcd for C$_{20}$H$_{26}$N$_2$O$_4$S + H 391.1692, found 391.1680.

$N$-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-phenylethan-1-imine oxide (3a')
White solid; mp 120-121 °C; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.63 (d, $J$ = 8.3 Hz, 2H), 7.54-7.57 (m, 2H), 7.36-7.39 (m, 3H), 7.13 (d, $J$ = 8.0 Hz, 2H), 5.56 (d, $J$ = 3.1 Hz, 1H), 3.90-3.95 (m, 1H), 3.11-3.16 (m, 1H), 2.32-2.35 (m, 4H), 2.02-2.06 (m, 1H), 1.93 (s, 3H), 1.71-1.75 (m, 1H), 1.64-1.66 (m, 1H), 1.31-1.40 (m, 2H), 1.23-1.28 (m, 2H), ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 157.8, 145.8, 140.3, 138.8, 132.3, 132.3, 131.4, 130.0, 128.8, 85.6, 60.8, 35.9, 33.6, 27.0, 26.8, 24.4, 15.4 ppm; HRMS (ESI): Calcd for C$_{21}$H$_{26}$N$_2$O$_3$S + H 387.1742, found 387.1734.

$N$-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-phenylpropan-1-imine oxide (3b')

Colourless liquid; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.64 (d, $J$ = 8.1 Hz, 2H), 7.54-7.56 (m, 2H), 7.37 (t, $J$ = 3.5 Hz, 3H), 7.14 (d, $J$ = 8.0 Hz, 2H), 5.61 (d, $J$ = 2.5 Hz, 1H), 3.89-3.94 (m, 1H), 3.12-3.17 (m, 1H), 2.44-2.51 (m, 2H), 2.34-2.37 (m, 1H), 2.33 (s, 3H), 2.03-2.06 (m, 1H), 1.71-1.74 (m, 1H), 1.62-1.66 (m, 1H), 1.32-1.40 (m, 2H), 1.23-1.31 (m, 2H), 0.96 (t, $J$ = 7.4 Hz, 3H) ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 162.9, 145.8, 140.2, 137.8, 132.3, 132.2, 131.5, 130.0, 129.0, 85.4, 60.7, 35.7, 33.5, 26.9, 26.7, 24.3, 22.8, 13.9 ppm; HRMS (ESI): Calcd for C$_{22}$H$_{28}$N$_2$O$_3$S + H 401.1899, found 401.1892.

$N$-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(o-tolyl)ethan-1-imine oxide (3c')

Colourless liquid; $^1$H NMR (600 MHz, CDCl$_3$): $\delta$ 7.73 (d, $J$ = 8.2 Hz, 2H), 7.23 (d, $J$ = 8.3 Hz, 3H), 7.18-7.21 (m, 3H), 5.29 (d, $J$ = 3.4 Hz, 1H), 3.88-3.93 (m, 1H), 3.15-3.20 (m, 1H), 2.39 (s, 3H), 2.32 (s, 3H), 2.23-2.26 (m, 1H), 2.08-2.11 (m, 1H), 1.99 (s, 3H), 1.70-1.73 (m, 1H), 1.62-1.63 (m, 1H), 1.31-1.40 (m, 2H), 1.23-1.26 (m, 2H) ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): $\delta$ 160.7, 145.9, 140.7, 139.8, 138.6, 133.7, 132.4, 131.5, 131.0, 130.0, 128.8, 85.7, 60.3, 35.5, 33.9, 26.9, 26.8, 24.4, 23.3, 19.3 ppm; HRMS (ESI): Calcd for C$_{22}$H$_{28}$N$_2$O$_3$S + H 401.1899, found 401.1894.

$N$-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(m-tolyl)ethan-1-imine oxide (3d')
Colourless liquid; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.63 (d, \(J = 8.3\) Hz, 2H), 7.38 (s, 1H), 7.33 (d, \(J = 7.9\) Hz, 1H), 7.25 (t, \(J = 7.6\) Hz, 1H), 7.19 (d, \(J = 7.5\) Hz, 1H), 7.14 (d, \(J = 8.0\) Hz, 2H), 5.61 (d, \(J = 2.9\) Hz, 1H), 3.91–3.95 (m, 1H), 3.09–3.14 (m, 1H), 2.39 (s, 3H), 2.33–2.36 (s, 4H), 2.04–2.07 (m, 1H), 1.92 (s, 3H), 1.72–1.75 (m, 1H), 1.64–1.67 (m, 1H), 1.34–1.41 (m, 2H), 1.24–1.28 (m, 2H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 158.1, 145.8, 141.0, 140.3, 138.8, 133.1, 132.3, 131.3, 130.0, 129.4, 126.0, 85.6, 60.9, 33.6, 27.0, 26.8, 24.4, 24.4, 15.5 ppm; HRMS (ESI): Calcd for C\(_{22}\)H\(_{28}\)N\(_2\)O\(_3\)S + H 401.1899, found 401.1892.

\(N-(2-((4\text{-methylphenyl})\text{sulfonamido})\text{cyclohexyl})-1-(p\text{-tolyl})\text{ethan-1-imine oxide (3e')}\)

Colourless liquid; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.61 (d, \(J = 8.2\) Hz, 2H), 7.45 (d, \(J = 8.3\) Hz, 2H), 7.17 (d, \(J = 8.1\) Hz, 2H), 7.13 (d, \(J = 8.1\) Hz, 2H), 5.67 (d, \(J = 2.7\) Hz, 1H), 3.89–3.94 (m, 1H), 3.07–3.12 (m, 1H), 2.38 (s, 3H), 2.35–2.37 (m, 1H), 2.34 (s, 3H), 2.02–2.05 (m, 1H), 1.90 (s, 3H), 1.71–1.75 (m, 1H), 1.64–1.66 (m, 1H), 1.31–1.40 (m, 2H), 1.21–1.28 (m, 2H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 157.8, 145.8, 142.3, 140.2, 136.0, 132.3, 132.1, 130.0, 128.7, 85.5, 61.0, 36.0, 33.5, 27.0, 26.8, 24.4, 24.2, 15.3 ppm; HRMS (ESI): Calcd for C\(_{22}\)H\(_{28}\)N\(_2\)O\(_3\)S + H 421.1353, found 421.1343.

1-(4-chlorophenyl)-\(N-(2-((4\text{-methylphenyl})\text{sulfonamido})\text{cyclohexyl})\text{ethan-1-imine oxide (3f')}\)

Colourless liquid; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.62 (dt, \(J = 2.2\), 1.9 Hz, 2H), 7.48 (dt, \(J = 2.3\), 2.2 Hz, 2H), 7.32 (dt, \(J = 2.3\), 2.2 Hz, 2H), 7.13 (q, \(J = 0.6\) Hz, 2H), 5.42 (d, \(J = 3.5\) Hz, 1H), 3.89–3.94 (m, 1H), 3.13–3.19 (m, 1H), 2.34 (s, 3H), 2.28–2.33 (m, 1H), 2.02–2.06 (m, 1H), 1.93 (s, 3H), 1.71–1.75 (m, 1H), 1.63–1.67 (m, 1H), 1.33–1.41 (m, 2H), 1.27–1.31 (m, 2H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 156.7, 145.9, 140.4, 138.2, 137.3, 132.3, 131.6, 130.0, 129.9, 85.8, 60.5, 35.9, 33.5, 26.9, 26.8, 24.4, 15.2 ppm; HRMS (ESI): Calcd for C\(_{21}\)H\(_{23}\)ClN\(_2\)O\(_3\)S + H 421.1353, found 421.1343.

1-(4-bromophenyl)-\(N-(2-((4\text{-methylphenyl})\text{sulfonamido})\text{cyclohexyl})\text{ethan-1-imine oxide (3g')}\)


Colourless liquid; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.63 (d, \(J = 8.3\) Hz, 2H), 7.48 (dt, \(J = 2.4, 1.9\) Hz, 2H), 7.41 (dt, \(J = 2.3, 1.9\) Hz, 2H), 7.13 (d, \(J = 8.0\) Hz, 2H), 5.39 (d, \(J = 4.3\) Hz, 1H), 3.89-3.94 (m, 1H), 3.14-3.19 (m, 1H), 2.28-2.32 (m, 1H), 2.02-2.06 (m, 1H), 1.93 (s, 3H), 1.71-1.74 (m, 1H), 1.63-1.66 (m, 1H), 1.31-1.42 (m, 2H), 1.24-1.28 (m, 2H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 156.8, 145.9, 140.4, 137.8, 134.5, 132.3, 130.3, 130.0, 126.5, 85.9, 60.4, 35.8, 33.5, 29.8, 26.9, 26.8, 24.4, 15.2 ppm; HRMS (ESI): Calcd for C\(_{21}\)H\(_{25}\)BrN\(_2\)O\(_3\)S + H 465.0848, found 465.0838.

\(N-(2-((4\text{-methylphenyl})sulfonamido)cyclohexyl)-1-(2\text{-nitrophenyl})ethan-1\text{-imine oxide (3h')}\)

Yellow liquid; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.97 (q, \(J = 1.0\) Hz, 1H), 7.76 (d, \(J = 8.2\) Hz, 2H), 7.64 (td, \(J = 1.1, 1.1\) Hz, 1H), 7.53 (td, \(J = 1.4, 0.7\) Hz, 1H), 7.44 (q, \(J = 1.3\) Hz, 1H), 7.27 (d, \(J = 8.0\) Hz, 2H), 5.20 (d, \(J = 4.0\) Hz, 1H), 3.87-3.92 (m, 1H), 3.15-3.20 (m, 1H), 2.41 (s, 3H), 2.19-2.22 (m, 1H), 2.06-2.08 (m, 1H), 1.98 (s, 3H), 1.69-1.72 (m, 1H), 1.60-1.62 (m, 1H), 1.28-1.39 (m, 2H), 1.18-1.25 (m, 2H) ppm; HRMS (ESI): Calcd for C\(_{21}\)H\(_{25}\)N\(_3\)O\(_5\)S + H 432.1593, found 432.1595.

\(N-(2-((4\text{-methylphenyl})sulfonamido)cyclohexyl)-1-(3\text{-nitrophenyl})ethan-1\text{-imine oxide (3i')}\)

White solid; mp 121-122 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 8.36 (t, \(J = 2.0\) Hz, 1H), 8.21 (dq, \(J = 1.0, 0.9\) Hz, 1H), 7.91-7.94 (m, 1H), 7.67 (d, \(J = 8.3\) Hz, 2H), 7.54 (t, \(J = 8.0\) Hz, 1H), 7.17 (q, \(J = 0.5\) Hz, 2H), 5.22 (d, \(J = 4.4\) Hz, 1H), 3.95-4.00 (m, 1H), 3.23-3.28 (m, 1H), 2.34 (s, 3H), 2.23-2.27 (m, 1H), 2.06-2.10 (m, 1H), 2.02 (s, 3H), 1.73-1.76 (m, 1H), 1.64-1.67 (m, 1H), 1.41-1.48 (m, 1H), 1.31-1.36 (m, 1H), 1.24-1.30 (m, 2H) ppm; HRMS (ESI): Calcd for C\(_{21}\)H\(_{25}\)N\(_3\)O\(_5\)S + H 432.1593, found 432.1583.

\(N-(2-((4\text{-methylphenyl})sulfonamido)cyclohexyl)-1-(4\text{-nitrophenyl})ethan-1\text{-imine oxide (3j')}\)
Yellow liquid; $^1$H NMR (600 MHz, CDCl$_3$): δ 8.20 (dt, $J = 2.5$, 2.2 Hz, 2H), 7.71 (dt, $J = 2.5$, 1.7 Hz, 2H), 7.66 (d, $J = 8.3$ Hz, 2H), 7.17 (d, $J = 7.9$ Hz, 2H), 5.21 (d, $J = 4.4$ Hz, 1H), 3.96-4.00 (m, 1H), 3.22-3.27 (m, 1H), 2.34 (s, 3H), 2.23-2.26 (m, 1H), 2.06-2.09 (m, 1H), 2.01 (s, 3H), 1.73-1.76 (m, 1H), 1.64-1.67 (m, 1H), 1.41-1.48 (m, 2H), 1.28-1.34 (m, 2H) ppm; HRMS (ESI): Calcd for C$_{21}$H$_{25}$N$_3$O$_5$S + H 432.1593, found 432.1589.

$N$-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(naphthalen-2-yl)ethan-1-imine oxide (3k$'$)

White solid; mp 132-133 °C; $^1$H NMR (600 MHz, CDCl$_3$): δ 7.92 (d, $J = 1.0$ Hz, 1H), 7.87 (q, $J = 3.5$ Hz, 1H), 7.84 (q, $J = 3.3$ Hz, 1H), 7.81 (d, $J = 8.7$ Hz, 1H), 7.79 (d, $J = 1.7$ Hz, 1H), 7.62 (d, $J = 8.3$ Hz, 2H), 7.50-7.53 (m, 2H), 7.09 (d, $J = 8.0$ Hz, 2H), 5.60 (d, $J = 2.8$ Hz, 1H), 3.95-4.00 (m, 1H), 3.14-3.19 (m, 1H), 2.36-2.39 (m, 1H), 2.27 (s, 3H), 2.06-2.10 (m, 1H), 2.04 (s, 3H), 1.74-1.77 (m, 1H), 1.66-1.69 (m, 1H), 1.38-1.45 (m, 2H), 1.24-1.33 (m, 2H) ppm; HRMS (ESI): Calcd for C$_{25}$H$_{28}$N$_2$O$_3$S + H 437.1899, found 437.1891.

$N$-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1,2-diphenylethan-1-imine oxide (3l$'$)

Colourless liquid; $^1$H NMR (600 MHz, CDCl$_3$): δ 7.58 (d, $J = 8.3$ Hz, 2H), 7.55 (d, $J = 1.6$ Hz, 1H), 7.54-7.55 (m, 1H), 7.30-7.34 (m, 3H), 7.22 (d, $J = 7.6$ Hz, 2H), 7.16 (t, $J = 7.4$ Hz, 1H), 7.08-7.10 (m, 4H), 5.41 (d, $J = 3.2$ Hz, 1H), 3.96-4.00 (m, 1H), 3.86 (d, $J = 14.6$ Hz, 1H), 3.77 (d, $J = 14.6$ Hz, 1H), 3.11-3.16 (m, 1H), 2.31-2.34 (m, 1H), 2.30 (s, 3H), 2.03-2.06 (m, 1H), 1.68-1.71 (m, 1H), 1.62-1.64 (m, 1H), 1.30-1.38 (m, 2H), 1.19-1.29 (m, 2H) ppm; $^{13}$C NMR (150 MHz, CDCl$_3$): δ 159.5, 145.9, 140.2, 139.3, 138.0, 132.4, 132.3, 131.6, 131.4, 131.2, 130.0, 129.3, 85.9, 60.1, 35.5, 33.5, 26.8, 26.6, 24.4 ppm; HRMS (ESI): Calcd for C$_{27}$H$_{30}$N$_2$O$_3$S + H 463.2055, found 463.2042.

1-(furan-2-yl)-$N$-(2-((4-methylphenyl)sulfonamido)cyclohexyl)ethan-1-imine oxide (3m$'$)
Yellow solid; mp 131-133 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.61 (d, \(J = 8.2\) Hz, 2H), 7.43-7.44 (m, 1H), 7.06 (d, \(J = 8.0\) Hz, 2H), 6.87 (d, \(J = 3.4\) Hz, 1H), 6.41 (q, \(J = 1.8\) Hz, 1H), 5.55 (d, \(J = 2.9\) Hz, 1H), 3.88-3.92 (m, 1H), 3.08-3.13 (m, 1H), 2.32-2.36 (m, 1H), 2.28 (s, 3H), 2.14 (s, 3H), 2.04-2.07 (m, 1H), 1.72-1.76 (m, 1H), 1.64-1.67 (m, 1H), 1.33-1.40 (m, 2H), 1.24-1.27 (m, 2H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 148.7, 146.6, 145.7, 145.4, 140.2, 132.1, 129.9, 120.7, 114.8, 86.3, 61.3, 36.1, 33.7, 27.0, 26.8, 24.3, 20.1 ppm; HRMS (ESI): Calcd for C\(_{19}\)H\(_{24}\)N\(_2\)O\(_4\)S + H \(377.1535\), found 377.1529.

\(N\)-(2-((4-methylphenyl)sulfonamido)cyclohexyl)-1-(thiophen-2-yl)ethan-1-imine oxide (3n')

White solid; mp 121-122 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.62 (d, \(J = 8.2\) Hz, 2H), 7.29 (q, \(J = 1.0\) Hz, 1H), 7.17 (q, \(J = 1.1\) Hz, 1H), 7.12 (d, \(J = 8.0\) Hz, 2H), 7.02 (dd, \(J = 3.8, 3.6\) Hz, 1H), 5.53 (d, \(J = 3.1\) Hz, 1H), 3.85-3.90 (m, 1H), 3.08-3.13 (m, 1H), 2.35 (s, 3H), 2.31-2.33 (m, 1H), 2.01-2.03 (m, 1H), 1.90 (s, 3H), 1.72-1.74 (m, 1H), 1.64-1.66 (m, 1H), 1.33-1.40 (m, 2H), 1.24-1.28 (m, 2H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 153.7, 145.7, 142.8, 140.3, 132.2, 130.2, 130.0, 129.9, 129.2, 85.6, 60.9, 36.2, 33.4, 27.0, 26.8, 24.3, 15.6 ppm; HRMS (ESI): Calcd for C\(_{19}\)H\(_{24}\)N\(_2\)O\(_3\)S\(_2\) + H \(393.1307\), found 393.1304.

\(N\)-(2-((4-methylphenyl)sulfonamido)cyclohexyl)butan-2-imine oxide (3o')

White solid; mp 53-54 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.69 (d, \(J = 8.3\) Hz, 2H), 7.25 (d, \(J = 9.1\) Hz, 2H), 5.79 (d, \(J = 2.0\) Hz, 1H), 3.75-3.79 (m, 1H), 2.97-3.02 (m, 1H), 2.42 (s, 3H), 2.27-2.31 (m, 1H), 2.11 (q, \(J = 7.6\) Hz, 2H), 1.96-1.99 (m, 1H), 1.68-1.71 (m, 1H), 1.60-1.63 (m, 1H), 1.56 (s, 3H), 1.28-1.32 (m, 1H), 1.22-1.27 (m, 2H), 1.15-1.21 (m, 1H), 1.05-1.08 (t, \(J = 7.2\) Hz, 3H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 162.1, 145.8, 140.4, 132.3, 130.0, 84.7, 61.5, 35.8, 33.5, 32.1, 27.0, 26.8, 24.4, 16.8, 13.6 ppm; HRMS (ESI): Calcd for C\(_{17}\)H\(_{26}\)N\(_2\)O\(_3\)S\(_2\) + H \(339.1742\), found 339.1749.

\(N\)-(2-((4-methylphenyl)sulfonamido)cyclohexyl)hexan-2-imine oxide (3p')

Colourless liquid; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.70 (d, \(J = 8.3\) Hz, 2H), 7.2 (d, \(J = 8.3\) Hz, 2H), 7.03 (d, \(J = 8.3\) Hz, 2H), 6.87 (d, \(J = 3.4\) Hz, 1H), 6.41 (q, \(J = 1.8\) Hz, 1H), 5.55 (d, \(J = 2.9\) Hz, 1H), 3.88-3.92 (m, 1H), 3.08-3.13 (m, 1H), 2.32-2.36 (m, 1H), 2.28 (s, 3H), 2.14 (s, 3H), 2.04-2.07 (m, 1H), 1.72-1.76 (m, 1H), 1.64-1.67 (m, 1H), 1.33-1.40 (m, 2H), 1.24-1.27 (m, 2H) ppm; \(^{13}\)C NMR (150 MHz, CDCl\(_3\)): \(\delta\) 148.7, 146.6, 145.7, 145.4, 140.2, 132.1, 129.9, 120.7, 114.8, 86.3, 61.3, 36.1, 33.7, 27.0, 26.8, 24.3, 20.1 ppm; HRMS (ESI): Calcd for C\(_{17}\)H\(_{26}\)N\(_2\)O\(_3\)S\(_2\) + H \(339.1742\), found 339.1749.
N-(2-((4-methylphenyl)sulfonamido)cyclohexyl)cyclohexanimine oxide (3q')

Colourless liquid; ¹H NMR (600 MHz, CDCl₃): δ 7.71 (d, J = 8.2 Hz, 2H), 7.26 (d, J = 8.0 Hz, 2H), 5.65 (d, J = 1.9 Hz, 1H), 3.71-3.76 (m, 1H), 2.99-3.04 (m, 1H), 2.42 (s, 3H), 2.24-2.29 (m, 2H), 2.11-2.14 (m, 3H), 1.97-2.00 (m, 1H), 1.65-1.70 (m, 2H), 1.60-1.64 (m, 2H), 1.56-1.59 (m, 2H), 1.50-1.54 (m, 2H), 1.15-1.32 (m, 4H) ppm; ¹³C NMR (150 MHz, CDCl₃): δ 163.6, 145.7, 140.8, 132.3, 130.0, 84.6, 61.0, 35.7, 34.9, 33.6, 29.7, 28.6, 28.4, 28.1, 26.9, 26.8, 24.4 ppm; HRMS (ESI): Calcd for C₁₉H₂₈N₂O₃S + H 365.1899, found 365.1895.

N-(2-((4-methylphenyl)sulfonamido)-1-phenylethyl)-1-phenylethan-1-imine oxide (4b') and N-(2-((4-methylphenyl)sulfonamido)-2-phenylethyl)-1-phenylethan-1-imine oxide (5b')

Colourless liquid; ¹H NMR (600 MHz, CDCl₃): δ 7.54-7.56 (m, 4H), 7.40-7.41 (d, J = 1.9 Hz, 2H), 7.39-7.40 (d, J = 2.2 Hz, 1H), 7.34-7.36 (m, 1H), 7.27-7.29 (m, 3H), 7.25-7.26 (m, 2H), 7.24-7.25 (m, 1H), 7.06-7.07 (d, J = 8.0 Hz, 2H), 5.64-5.65 (d, J = 3.8 Hz, 1H), 5.25-5.27 (dd, J = 3.6, 8.4 Hz, 0.2H), 5.06-5.08 (dd, J = 4.2, 8.4 Hz, 0.2H), 4.60-4.63 (m, 1H), 4.20-4.23 (dd, J = 4.0, 4.0 Hz, 1H), 4.11-4.15 (dd, J = 8.7, 8.8 Hz, 1H), 3.45-3.50 (m, 0.2H), 3.37-3.41 (m, 0.2H), 2.39 (s, 0.6H), 2.25 (s, 3H), 2.24 (s, 0.6H), 2.09 (s, 3H) ppm; HRMS (ESI): Calcd for C₂₃H₂₄N₂O₃S + H 409.1586, found 409.1580.

N-(2-((4-methylphenyl)sulfonamido)-1-(m-tolyl)ethyl)-1-phenylethan-1-imine oxide (4c') and N-(2-((4-methylphenyl)sulfonamido)-2-(m-tolyl)ethyl)-1-phenylethan-1-imine oxide (5c')
White solid; mp 102-103 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.56-7.57 (d, \(J = 2.2\) Hz, 1H), 7.55-7.56 (m, 1H), 7.53-7.55 (d, \(J = 8.3\) Hz, 2H), 7.40-7.41 (d, \(J = 2.0\) Hz, 2H), 7.39-7.40 (d, \(J = 1.9\) Hz, 1H), 7.15-7.18 (t, \(J = 7.8\) Hz, 1H), 7.08-7.10 (m, 1H), 7.06-7.07 (d, \(J = 0.6\) Hz, 1H), 7.05-7.06 (d, \(J = 0.7\) Hz, 1H), 7.03-7.04 (m, 2H), 5.59-5.61 (d, \(J = 4.4\) Hz, 1H), 5.20-5.22 (dd, \(J = 4.2, 8.4\) Hz, 0.17H), 5.03-5.05 (dd, \(J = 4.2, 8.0\) Hz, 0.17H), 4.58-4.61 (m, 1H), 4.21-4.22 (dd, \(J = 4.0, 4.1\) Hz, 0.33H), 3.43-3.47 (m, 0.33H), 3.37-3.41 (m, 0.33H), 2.39 (s, 3H), 2.27 (s, 3H), 2.25 (s, 3H), 2.24 (s, 3H), 2.09 (s, 3H), ppm; HRMS (ESI): Calcd for \(\text{C}_{24}\text{H}_{26}\text{N}_2\text{O}_3\text{S} + \text{H}\) 423.1742, found 423.1738.

\[\text{N-(2-((4-methylphenyl)sulfonamido)-1-(p-toly)ethyl}-1\text{-phenylethan-1-imine oxide (4d')}\]

Colourless liquid; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.69-7.71 (d, \(J = 8.3\) Hz, 1H), 7.55-7.56 (m, 1H), 7.53-7.55 (t, \(J = 1.8\) Hz, 3H), 7.40-7.41 (d, \(J = 1.9\) Hz, 2H), 7.39-7.40 (m, 1H), 7.34-7.36 (m, 1H), 7.08-7.10 (d, \(J = 8.0\) Hz, 2H), 7.13-7.14 (d, \(J = 2.5\) Hz, 1H), 7.08-7.10 (d, \(J = 8.0\) Hz, 2H), 7.06-7.07 (d, \(J = 8.0\) Hz, 2H), 5.57-5.58 (d, \(J = 3.7\) Hz, 1H), 5.21-5.23 (dd, \(J = 3.6, 7.8\) Hz, 0.33H), 5.03-5.05 (dd, \(J = 4.2, 7.8\) Hz, 0.33H), 4.54-4.57 (m, 1H), 4.17-4.21 (dd, \(J = 4.0, 4.1\) Hz, 1H), 4.10-4.14 (dd, \(J = 8.8, 8.8\) Hz, 1H), 3.43-3.47 (m, 0.33H), 3.37-3.41 (m, 0.33H), 2.39 (s, 1H), 2.33 (s, 1H), 2.25 (s, 3H), 2.22 (s, 1H), 2.09 (s, 3H), ppm; HRMS (ESI): Calcd for \(\text{C}_{24}\text{H}_{26}\text{N}_2\text{O}_3\text{S} + \text{H}\) 423.1742, found 423.1724.

\[\text{N-(2-((4-methylphenyl)sulfonamido)-2-(p-toly)ethyl}-1\text{-phenylethan-1-imine oxide (5d')}\]

\[\text{N-(2-(3-methoxyphenyl)-2-((4-methylphenyl)sulfonamido)ethyl}-1\text{-phenylethan-1-imine oxide (4e')}\]

White solid; mp 96-97 °C; \(^1\)H NMR (600 MHz, CDCl\(_3\)): \(\delta\) 7.56-7.57 (d, \(J = 2.0\) Hz, 1H), 7.55-7.56 (d, \(J = 4.0\) Hz, 2H), 7.54 (s, 1H), 7.40-7.41 (d, \(J = 1.9\) Hz, 2H), 7.39-7.40 (d, \(J = 1.9\) Hz, 1H), 7.18-7.21 (t, \(J = 7.9\) Hz, 1H), 7.06-7.08 (d, \(J = 8.0\) Hz, 2H), 7.04-7.06 (d, \(J = 8.0\) Hz, 2H), 7.02-7.04 (m, 2H), 5.54-5.56 (d, \(J = 3.7\) Hz, 1H), 5.02-5.04 (dd, \(J = 4.0, 4.1\) Hz, 1H), 4.97-5.00 (dd, \(J = 4.0, 4.1\) Hz, 1H), 4.10-4.14 (dd, \(J = 8.8, 8.8\) Hz, 1H), 3.43-3.47 (m, 0.33H), 3.37-3.41 (m, 0.33H), 2.39 (s, 1H), 2.33 (s, 1H), 2.25 (s, 3H), 2.22 (s, 1H), 2.09 (s, 3H), ppm; HRMS (ESI): Calcd for \(\text{C}_{24}\text{H}_{26}\text{N}_2\text{O}_3\text{S} + \text{H}\) 423.1742, found 423.1724.
N-(1-(3-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylethan-1-amine oxide (4f') and N-(2-(3-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylethan-1-amine oxide (5f')

White solid; mp 104-105 °C; ¹H NMR (600 MHz, CDCl₃): δ 7.56-7.57 (d, J = 1.8 Hz, 1H), 7.55-7.56 (m, 1H), 7.53-7.55 (t, J = 8.2 Hz, 2H), 7.39-7.43 (m, 3H), 7.20-7.22 (m, 4H), 7.07-7.09 (d, J = 7.9 Hz, 2H), 5.68-5.69 (d, J = 3.6 Hz, 1H), 5.22-5.24 (dd, J = 3.6, 7.8 Hz, 0.16H), 5.01-5.03 (dd, J = 3.6, 8.4 Hz, 0.16H), 4.59-4.62 (m, 1H), 4.18-4.21 (dd, J = 3.8, 3.8 Hz, 1H), 4.07-4.11 (dd, J = 8.6, 8.6 Hz, 1H), 3.44-3.48 (m, 0.17H), 3.33-3.36 (m, 0.17H), 2.41 (s, 0.5H), 2.26 (s, 3H), 2.25 (s, 0.5H), 2.10 (s, 3H) ppm; HRMS (ESI): Calcd for C₂₃H₂₃ClN₂O₃S + Na 461.1511, found 461.1511.

N-(1-(4-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylethan-1-amine oxide (4g') and N-(2-(4-chlorophenyl)-2-((4-methylphenyl)sulfonamido)ethyl)-1-phenylethan-1-amine oxide (5g')

White solid; mp 108-109 °C; ¹H NMR (600 MHz, CDCl₃): δ 7.53-7.55 (m, 4H), 7.39-7.40 (m, 3H), 7.34-7.36 (m, 1H), 7.26-7.28 (d, J = 8.4 Hz, 1H), 7.23 (s, 4H), 7.17-7.19 (d, J = 8.5 Hz, 1H), 7.07-7.08 (d, J = 8.0 Hz, 2H), 5.70-5.71 (d, J = 3.8 Hz, 1H), 5.22-5.24 (dd, J = 4.2, 8.4 Hz, 0.2H), 5.05-5.07 (dd, J = 4.2, 7.8 Hz, 0.2H), 4.57-4.61 (m, 1H), 4.16-4.19 (dd, J = 3.9, 4.0 Hz, 1H), 4.07-4.11 (dd, J = 8.6, 8.6 Hz, 1H), 3.44-3.48 (m, 0.2H), 3.33-3.38 (m, 0.2H), 2.41 (s, 0.5H), 2.39 (s, 0.6H), 2.25 (s, 3H), 2.23 (s, 0.6H), 2.09 (s, 3H) ppm; HRMS (ESI): Calcd for C₂₃H₂₃ClN₂O₃S + H 443.1196, found 443.1198.

N-(2-((4-methylphenyl)sulfonamido)-1-(naphthalen-2-yl)ethyl)-1-phenylethan-1-amine oxide (4h') and N-(2-((4-methylphenyl)sulfonamido)-2-(naphthalen-2-yl)ethyl)-1-phenylethan-1-amine oxide (4h')
mine oxide (5h')

Yellowish solid; mp 38-39 °C; ^1H NMR (600 MHz, CDCl₃): δ 7.78-7.80 (m, 2H), 7.72-7.75 (m, 2H), 7.70-7.71 (m, 2H), 7.68-7.69 (m, 1H), 7.57-7.58 (m, 1H), 7.56-7.57 (m, 1H), 7.53-7.54 (m, 3H), 7.45-7.47 (m, 2H), 7.40-7.41 (d, J = 1.7 Hz, 2H), 7.39-7.40 (d, J = 2.8 Hz, 1H), 7.38-7.39 (m, 1H), 7.32-7.35 (m, 1H), 7.19-7.21 (dd, J = 0.5, 0.6 Hz, 1H), 6.96-6.98 (d, J = 7.8 Hz, 2H), 5.77-5.78 (d, J = 3.8 Hz, 1H), 5.41-5.43 (dd, J = 4.2, 8.4 Hz, 0.33H), 5.10-5.12 (dd, J = 3.6, 7.8 Hz, 0.33H), 4.79-4.82 (m, 1H), 4.28-4.31 (dd, J = 4.1, 4.0 Hz, 1H), 4.12 (s, 1H), 2.36 (s, 1H), 2.28 (s, 1H), 2.16 (s, 3H) ppm; HRMS (ESI): Calcd for C₂₇H₂₆N₂O₃S + H 459.1742, found 459.1736.

N-(2-((4-methylphenyl)sulfonamido)cyclopentyl)-1-phenylethan-1-imine oxide (5i')

Colourless liquid; ^1H NMR (600 MHz, CDCl₃): δ 7.64 (dt, J = 2.1, 2.0 Hz, 2H), 7.56-7.58 (m, 2H), 7.38-7.41 (m, 3H), 7.11 (d, J = 0.7 Hz, 1H), 7.10 (s, 1H), 5.35 (d, J = 3.9 Hz, 1H), 4.47-4.51 (m, 1H), 3.42-3.47 (m, 1H), 2.33 (s, 3H), 2.10-2.17 (m, 1H), 2.07 (s, 3H), 1.98-2.04 (m, 1H), 1.68-1.74 (m, 3H), 1.57-1.63 (m, 1H) ppm; ^13C NMR (150 MHz, CDCl₃): δ 158.0, 146.0, 139.9, 139.1, 132.3, 132.2, 131.4, 130.2, 128.8, 90.5, 63.1, 34.2, 31.2, 24.3, 23.7, 15.4 ppm; HRMS (ESI): Calcd for C₂₀H₂₄N₂O₃S + H 373.1586, found 373.1578.

N-(2-((4-methylphenyl)sulfonamido)octyl)-1-phenylethan-1-imine oxide (5j')

White solid; mp 83-84 °C; ^1H NMR (600 MHz, CDCl₃): δ 7.72 (dt, J = 2.0, 1.7 Hz, 2H), 7.56 (d, J = 2.5 Hz, 1H), 7.55 (dt, J = 1.1, 1.0 Hz, 1H), 7.37-7.39 (m, 3H), 7.20 (d, J = 8.0 Hz, 2H), 5.02 (d, J = 7.4 Hz, 1H), 4.01 (dd, J = 2.3, 1.4 Hz, 2H), 3.46-3.51 (m, 1H), 2.34 (s, 3H), 2.10 (s, 3H), 1.54-1.58 (m, 2H), 1.27-1.30 (m, 2H), 1.24 (d, J = 6.7 Hz, 2H), 1.19-1.22 (m, 4H), 0.85 (t, J = 7.3 Hz, 3H) ppm; ^13C NMR (150 MHz, CDCl₃): δ 158.4, 146.0, 140.8, 138.9, 132.4, 132.3, 131.4, 130.0, 128.9, 77.7, 57.1, 35.5, 34.6, 32.0, 28.2, 25.5, 24.4, 17.0, 15.5 ppm; HRMS (ESI): Calcd for C₂₅H₃₂N₂O₃S + H 417.2212, found 417.2199.
4. $^1$H NMR and $^{13}$C NMR spectra
S-54