Electronic Supplementary Information

Photocatalytic C(sp²)–H sulfamoylation of enamides: regio- and stereoselective construction of (E)-β-sulfamoyl enamides

LingLi Liu, Yechun Wu, Xian Wu, Jin-Tao Yu* and Changduo Pan*

Email: yujintao@cczu.edu.cn; panchangduo@jsut.edu.cn

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1. General Considerations

**General Information:** Unless otherwise noted, all chemicals were purchased and used without further purification. $^1$H NMR and $^{13}$C NMR spectra were recorded at ambient temperature on a 400 MHz NMR spectrometer (100 MHz for $^{13}$C). NMR experiments are reported in $\delta$ units, parts per million (ppm), and were referenced to CDCl$_3$ ($\delta$ 7.26 or 77.0) as the internal standard. The coupling constants $J$ are given in Hz. Column chromatography was performed using EM Silica gel 60 (300-400 mesh).

2. General Synthetic Procedures

All Enamides (1a-1z, 1aa-1ad) were prepared according to the previous reports.$^1$

**General procedure for the synthesis of Compounds (3a-3z, 3aa-3an):**

\[
\text{Ph} \overset{\text{N}}{\underset{R_1}{\text{N}}} \overset{\text{R}_2}{\text{R}_1} + \overset{\text{O}}{\text{O}} \text{Cl} \overset{\text{SO}}{\text{SO}} \text{Ph} \overset{\text{N}}{\underset{R_1}{\text{R}_1}} \overset{\text{R}_2}{\text{R}_3} \overset{\text{Cl}}{\text{SO}} \overset{\text{Ph}}{\text{N}} \overset{\text{R}_1}{\text{R}_2} \overset{\text{R}_3}{\text{R}_3}
\]

Under N$_2$, the mixture of enamides 1 (0.2 mmol), sulfonyl chloride 2 (0.4 mmol), 4CzIPN (2 mol%, 3.2 mg), NaHCO$_3$ (0.2 mmol, 16.8 mg) and CH$_3$CN (2 mL) were added to a Schlenk tube and sealed. The mixture was stirred at room temperature under 460-465 nm blue LEDs for 16 hours. Then, the solvent was evaporated under reduced pressure, and the residue was purified by silica gel flash column chromatography to obtain the product 3.

![Figure S1. Photoreactor used in this work (20 W blue LEDs, $\lambda_{max} = 465$ nm).](image)

**The Light Source and the Material of the Irradiation Vessel:**

The photochemical reaction was carried out under visible light irradiation by a 20W 460-465 nm blue LED at room temperature. This blue LED was purchased from taobao (link: https://m.tb.cn/h.UHPcb7J?sm=b633d5?tk=5p3fdOWulMq). The blue LED's energy peak wavelength is 465 nm, the peak width at half-height is 18.6 nm, and irradiance@20 W is 26.92 mW/cm$^2$. The reaction vessel is a borosilicate glass tube. The distance between the tube and lamp is about 1 cm, and no filter is applied.
Figure S2. The spectral distribution of 20 W 460-465 nm blue LED

Synthetic applications:

(1) Cleavage of N-Boc Protecting Group

\[
\begin{align*}
&\text{Ac}_2\text{N-}~\text{Boc} \quad \text{ZnBr}_2 (2.0 \text{ equiv}) \quad \text{CH}_2\text{Cl}_2, \text{rt, 4 h} \\
&3z \quad \xrightarrow{\text{CH}_2\text{Cl}_2, \text{rt, 4 h}} \quad 4, 62\%
\end{align*}
\]

The mixture of 3z (41.0 mg, 0.1 mmol) and ZnBr\(_2\) (44.4 mg, 0.2 mmol) in CH\(_2\)Cl\(_2\) (1.0 mL) was stirred at room temperature for 4 h. The solvent was then removed under vacuum. The residue was purified by flash column chromatography, giving the desired product 4 (19.2 mg, 62% yield).

(2) Conversion of configuration of 3ae

\[
\begin{align*}
&\text{Ac}_2\text{N-}~\text{Bn} \quad \text{TFA (5.0 equiv)} \quad \text{benzene, 110 °C, 36 h} \\
&E-3ae \quad \xrightarrow{\text{benzene, 110 °C, 36 h}} \quad Z-3ae, 43\%
\end{align*}
\]

A mixture of \(E\)-3ae (35.8 mg, 0.1 mmol), trifluoroacetic acid (57.0 mg, 0.5 mmol) in dry benzene (2.0 mL) were stirred at 110 °C for 36 h. Upon completion, the solution was concentrated in vacuum and the product was isolated through flash column chromatography to furnish \(Z\)-3af as yellow oil (15.4 mg, 43% yield).

(3) Hydrolysis of 3ae

\[
\begin{align*}
&\text{Ac}_2\text{N-}~\text{Bn} \quad \text{1 M HCl} \quad \text{THF, rt, 12 h} \\
&3ae \quad \xrightarrow{\text{THF, rt, 12 h}} \quad 5, 84\%
\end{align*}
\]
3ae (35.8 mg, 0.1 mmol) was dissolved in THF (1.0 mL) and concentrated hydrochloric acid (1 mL) were added sequentially. The mixture was stirred at 50 °C for 12 h. Upon completion, the solution was concentrated in vacuum and the product was isolated through flash column chromatography to give 5 as yellow oil (19.1 mg, 84% yield).

(4) The palladium-catalyzed cyclization reaction of 3z to access 3-phenylisoquinoline 6

A mixture of 3y (48.5 mg, 0.1 mmol), Pd(OAc)₂ (2.3 mg, 10 mol%), tricyclohexylphosphane (5.6 mg, 20 mol%), and Cs₂CO₃ (39.1 mg, 0.12 mmol) in DMF (2.0 mL) were stirred at 120 °C for 24 h. Upon completion, the solution was concentrated in vacuum and the product was isolated through flash column chromatography to give 6 as yellow oil (18.9 mg, 92% yield).

3. Mechanism Studies

3.1 Radical inhibiting experiments

Under N₂, the mixture of enamides 1a (0.1 mmol), 2a (2 equiv), 4CzIPN (2 mol%), NaHCO₃ (0.1 mmol), TMEPO (2 equiv) or BHT (2 equiv) or 1,1-diphenylethylene (2 equiv), and CH₃CN (1 mL) were added to a Schlenk tube and sealed. The mixture was stirred at room temperature under 460-465 nm blue LEDs for 16 hours.

Compound 9 (13.3 mg, 18%), ¹H NMR (400 MHz, CDCl₃) δ 6.60 (s, 2H), 3.57 (t, J = 4.7 Hz, 4H), 3.16 (t, J = 4.7 Hz, 4H), 1.71 (s, 1H), 1.25 (s, 9H); ¹³C NMR (101 MHz, CDCl₃) δ 185.4, 151.1, 135.4, 67.1, 66.4, 48.1, 35.4, 29.3, 22.2. HRMS (ESI) m/z calcd for C₁₉H₃₂NO₄S [M+H⁺]: 370.2047, found 370.2052.
**Figure S3.** $^1$H NMR of the adduct 9 formed by sulfamoyl radical and BHT.

**Figure S4.** $^{13}$C NMR of the adduct 9 formed by sulfamoyl radical and BHT.

**Compound 10** (25.7 mg, 39%), $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.42-7.37 (m, 4H), 7.35-7.31 (m, 4H), 7.26-7.23(m, 2H), 6.63 (s, 1H), 3.62 (t, $J = 4.6$ Hz, 4H), 3.08 (t, $J = 4.8$ Hz, 4H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 155.7, 139.8, 136.4, 130.3, 129.8,
129.2, 128.7, 128.4, 128.0, 121.7, 77.4, 77.1, 76.8, 66.4, 45.5. HRMS (ESI) m/z calcd for C_{18}H_{20}NO_3S [M+H]^+: 330.1158, found 330.1155.

**Figure S5.** $^1$H NMR of the adduct 10 formed by sulfamoyl radical and 1,1-diphenylethylene.

**Figure S6.** $^{13}$C NMR of the adduct 10 formed by sulfamoyl radical and 1,1-diphenylethylene.
3.2 Determination of stereochemistry-NOESY experiment of \(E\)-3a

NOESY-experiment of \(E\)-3a was performed to confirm the stereoselectivity. It was found that a NOE effect between the olefinic hydrogen (\(H_A\)) and the methyl of acetyl group (\(H_B\)) was observed, which indicated the \(E\)-configuration of 3a.

3.3 \(^1\)H NMR evidence for the stereoselectivity

The other products in Tables 2 and 3 exhibited similar \(^1\)H NMR signals for their olefinic and benzylic hydrogens as compared to 3a, which should also be \(E\)-configured. For \(Z\)-3ae, the chemical shift of the olefinic hydrogen (about 0.2 ppm shifts to the low fields) and the spin splitting of benzylic hydrogens (two doublets for \(Z\)-isomers vs one broad singlet for \(E\)-isomers) are distinct from the \(E\)-3ae (Figure S8 & S9).
Figure S8. $^1$H NMR of $E$-3ae.

Figure S9. $^1$H NMR of $Z$-3ae.
4. Characterization Data for the Products

(E)-N-benzyl-N-(2-(morpholinosulfonyl)-1-phenylvinyl)acetamide (3a, 64.8 mg, 81%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.49-7.41 (m, 5H), 7.36-7.27 (m, 3H), 7.18-7.16 (m, 2H), 6.04 (s, 1H), 4.59 (s, 2H), 3.55 (t, $J = 4.7$ Hz, 4H), 2.94 (t, $J = 4.6$ Hz, 4H), 2.23 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.3, 151.3, 136.5, 132.6, 131.2, 129.8, 128.9, 128.5, 128.3, 128.0, 123.0, 66.2, 50.6, 45.4, 23.3. HRMS (ESI) m/z calcd for C$_{21}$H$_{25}$N$_2$O$_4$S [M+H$^+$]: 401.1530, found 401.1533.

(E)-N-benzyl-N-(2-(morpholinosulfonyl)-1-(p-tolyl)vinyl)acetamide (3b, 54.7 mg, 66%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.37-7.29 (m, 5H), 7.24 (d, $J = 7.9$ Hz, 2H), 7.19-7.16 (m, 2H), 5.96 (s, 1H), 4.60 (s, 2H), 3.57 (t, $J = 4.6$ Hz, 4H), 2.95 (t, $J = 4.6$ Hz, 4H), 2.41 (s, 3H), 2.21 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.3, 151.5, 141.8, 136.6, 129.8, 129.7, 129.3, 128.8, 128.3, 127.9, 122.3, 66.2, 50.7, 45.4, 23.3, 21.6. HRMS (ESI) m/z calcd for C$_{22}$H$_{27}$N$_2$O$_4$S [M+H$^+$]: 415.1686, found 415.1687.

(E)-N-benzyl-N-(1-(3,4-dimethylphenyl)-2-(morpholinosulfonyl)vinyl)acetamide (3c, 55.7 mg, 65%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.36-7.28 (m, 3H), 7.25-7.23 (m, 1H), 7.20-7.17 (m, 4H), 5.95 (s, 1H), 4.60 (s, 2H), 3.56 (t, $J = 4.7$ Hz, 4H), 2.95 (t, $J = 4.6$ Hz, 4H), 2.31 (s, 3H), 2.28 (s, 3H), 2.21 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.3, 151.7, 140.6, 137.0, 136.7, 130.5, 130.0, 129.7, 128.8, 128.4,
127.9, 127.7, 122.1, 66.2, 50.7, 45.4, 23.3, 20.0, 19.9. HRMS (ESI) m/z calcd for C_{23}H_{29}N_2O_4S [M+H]: 429.1843, found 429.1838.

(\textit{E})-N-benzyl-N-(1-(4-(tert-butyl)phenyl)-2-(morpholinosulfonyl)vinyl)acetamide (3d, 66.6 mg, 73%), yellow oil; \textsuperscript{1}H NMR (400 MHz, CDCl\textsubscript{3}) \(\delta\) 7.46-7.40 (m, 4H), 7.35-7.29 (m, 3H), 7.20-7.18 (m, 2H), 5.97 (s, 1H), 4.60 (s, 2H), 3.52 (t, \(J = 4.7\) Hz, 4H), 2.93 (t, \(J = 4.6\) Hz, 4H), 2.20 (s, 3H), 1.34 (s, 9H); \textsuperscript{13}C NMR (101 MHz, CDCl\textsubscript{3}) \(\delta\) 170.3, 154.9, 151.5, 136.6, 129.7, 129.6, 128.8, 128.5, 127.9, 125.5, 122.6, 66.2, 50.7, 45.4, 35.0, 31.2, 23.3. HRMS (ESI) m/z calcd for C_{25}H_{33}N_2O_4S [M+H\textsuperscript{+}]: 457.2156, found 457.2159.

(\textit{E})-N-benzyl-N-(1-(4-methoxyphenyl)-2-(morpholinosulfonyl)vinyl)acetamide (3e, 34.5 mg, 40%), yellow oil; \textsuperscript{1}H NMR (400 MHz, CDCl\textsubscript{3}) \(\delta\) 7.44-7.42 (m, 2H), 7.36-7.28 (m, 3H), 7.19-7.17 (m, 2H), 6.95-6.93 (m, 2H), 5.90 (s, 1H), 4.62 (s, 2H), 3.86 (s, 3H), 3.57 (t, \(J = 4.7\) Hz, 4H), 2.95 (t, \(J = 4.6\) Hz, 4H), 2.19 (s, 3H); \textsuperscript{13}C NMR (101 MHz, CDCl\textsubscript{3}) \(\delta\) 170.4, 162.0, 151.4, 136.6, 131.6, 128.8, 128.4, 127.9, 124.6, 121.2, 114.0, 66.2, 55.5, 50.9, 45.4, 23.3. HRMS (ESI) m/z calcd for C_{22}H_{27}N_2O_5S [M+H\textsuperscript{+}]: 431.1635, found 431.1630.

(\textit{E})-N-benzyl-N-(1-(3-methoxyphenyl)-2-(morpholinosulfonyl)vinyl)acetamide (3f, 50.8 mg, 59%), yellow oil; \textsuperscript{1}H NMR (400 MHz, CDCl\textsubscript{3}) \(\delta\) 7.37-7.29 (m, 4H), 7.20-7.18 (m, 2H), 7.05-6.98 (m, 3H), 6.04 (s, 1H), 4.61 (s, 2H), 3.80 (s, 3H), 3.56 (t, \(J = 4.6\) Hz, 4H), 2.22 (s, 3H); \textsuperscript{13}C NMR (101 MHz, CDCl\textsubscript{3}) \(\delta\) 170.3, 159.4, 151.1, 136.6, 133.9, 129.6, 128.8, 128.3, 127.9, 123.2, 122.0, 116.9, 115.3, 66.2, 55.5, 50.7, 45.4, 23.3. HRMS (ESI) m/z calcd for C_{22}H_{27}N_2O_5S [M+H\textsuperscript{+}]: 431.1635, found 431.1631.
(E)-N-benzyl-N-(1-(4-fluorophenyl)-2-(morpholinosulfonyl)vinyl)acetamide  (3g, 58.4 mg, 70%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.46-7.43 (m, 2H), 7.36-7.28 (m, 3H), 7.16-7.10 (m, 4H), 6.03 (s, 1H), 4.59 (s, 2H), 3.60 (t, $J = 4.5$ Hz, 4H), 2.97 (t, $J = 4.6$ Hz, 4H), 2.23 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.2, 164.2 (d, $J_{C-F} = 251.1$ Hz), 150.2, 136.3, 132.0 (d, $J_{C-F} = 8.7$ Hz), 128.9, 128.6 (d, $J_{C-F} = 3.4$ Hz), 128.0, 122.8, 115.8 (d, $J_{C-F} = 21.8$ Hz), 66.2, 50.7, 45.4, 23.3. HRMS (ESI) m/z calcd for C$_{21}$H$_{24}$FN$_2$O$_4$S [M+H$^+$]: 419.1435, found 419.1437.

(E)-N-benzyl-N-(1-(3,4-difluorophenyl)-2-(morpholinosulfonyl)vinyl)acetamide  (3h, 50.4 mg, 58%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.29-7.12 (m, 6H), 7.10-7.06 (m, 2H), 5.98 (s, 1H), 4.50 (s, 2H), 3.55 (t, $J = 4.6$ Hz, 4H), 2.93 (t, $J = 2.9$ Hz, 4H), 2.16 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.1, 151.9 (dd, $J_{C-F} = 255.6$, 12.6 Hz), 149.9 (dd, $J_{C-F} = 251.8$, 13.0 Hz), 148.8, 136.1, 129.4 (dd, $J_{C-F} = 9.9$, 4.5 Hz), 128.9, 128.1, 128.0, 126.7 (dd, $J_{C-F} = 6.9$, 3.8 Hz), 123.6, 119.0 (d, $J_{C-F} = 18.5$ Hz), 117.6 (d, $J_{C-F} = 17.8$ Hz), 66.2, 50.8, 45.4, 23.1. HRMS (ESI) m/z calcd for C$_{21}$H$_{23}$F$_2$N$_2$O$_4$S [M+H$^+$]: 437.1341, found 437.1346.

(E)-N-benzyl-N-(1-(4-chlorophenyl)-2-(morpholinosulfonyl)vinyl)acetamide  (3i, 95.6 mg, 75%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.42-7.27 (m, 7H), 7.16-7.14 (m, 2H), 6.04 (s, 1H), 4.58 (s, 2H), 3.61 (t, $J = 4.6$ Hz, 4H), 2.98 (t, $J = 4.8$ Hz, 4H), 2.23 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.2, 150.0, 137.4, 136.3, 131.2, 131.0, 128.9, 128.8, 128.2, 128.1, 123.2, 66.2, 50.7, 45.4, 23.3. HRMS (ESI) m/z calcd for C$_{21}$H$_{23}$ClN$_2$O$_4$S [M+H$^+$]: 435.1140, found 435.1136.
(E)-N-benzyl-N-(1-(3-chlorophenyl)-2-(morpholinosulfonyl)vinyl)acetamide  (3j, 73.0 mg, 84%), yellow oil; ¹H NMR (400 MHz, CDCl₃) δ 7.62-7.60 (m, 1H), 7.51 (s, 1H), 7.40-7.29 (m, 5H), 7.16-7.14 (m, 2H), 6.07 (s, 1H), 4.58 (s, 2H), 3.60 (t, J = 4.6 Hz, 4H), 2.98 (t, J = 4.7Hz, 4H), 2.25 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 170.1, 149.4, 136.2, 134.6, 134.0, 132.2, 129.9, 129.0, 128.8, 128.2, 128.1, 123.9, 122.5, 66.2, 50.7, 45.4, 23.3. HRMS (ESI) m/z calcd for C₂₁H₂₄ClN₂O₄S [M+H⁺]: 435.1140, found 435.1138.

(E)-N-benzyl-N-(1-(3,4-dichlorophenyl)-2-(morpholinosulfonyl)vinyl)acetamide (3k, 60.2 mg, 64%), yellow oil; ¹H NMR (400 MHz, CDCl₃) δ 7.51-7.45 (m, 2H), 7.37-7.27 (m, 4H), 7.15-7.13 (m, 2H), 6.09 (s, 1H), 4.58 (s, 2H), 3.63 (t, J = 4.3 Hz, 4H), 3.00 (t, J = 4.0, 4H), 2.25 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 170.1, 148.6, 136.1, 135.4, 132.9, 132.5, 131.2, 130.4, 129.3, 129.0, 128.2, 128.1, 66.2, 50.8, 45.4, 29.7, 23.2. HRMS (ESI) m/z calcd for C₂₁H₂₃Cl₂N₂O₄S [M+H⁺]: 469.0750, found 469.0757.

(E)-N-benzyl-N-(1-(3-bromophenyl)-2-(morpholinosulfonyl)vinyl)acetamide (3l, 80.2 mg, 84%), yellow oil; ¹H NMR (400 MHz, CDCl₃) δ 7.48-7.45 (m, 1H), 7.40-7.29 (m, 6H), 7.17-7.14 (m, 2H), 6.07 (s, 1H), 4.58 (s, 2H), 3.60 (t, J = 4.6 Hz, 4H), 2.98 (t, J = 4.7 Hz, 4H), 2.25 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 170.1, 149.5, 136.2, 134.5, 134.3, 131.2, 129.7, 129.4, 129.0, 128.3, 128.2, 128.1, 66.2, 50.7, 45.4, 23.2. HRMS (ESI) m/z calcd for C₂₁H₂₄BrN₂O₄S [M+H⁺]: 479.0635, found 479.0629.
(E)-N-benzyl-N-(1-(2-fluorophenyl)-2-(morpholinosulfonyl)vinyl)acetamide (3m, 57 mg, 56%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.40-7.35 (m, 1H), 7.26-7.17 (m, 4H), 7.12-7.01 (m, 4H), 6.08 (s, 1H), 4.48 (s, 2H), 3.55 (t, $J$ = 4.6 Hz, 4H), 2.95 (t, $J$ = 4.7 Hz, 4H), 2.24 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.2, 160.0 (d, $J_{C-F}$ = 248.6 Hz), 145.6, 136.4, 132.7 (d, $J_{C-F}$ = 8.5 Hz), 132.2 (d, $J_{C-F}$ = 2.2 Hz), 128.8, 127.9, 127.8, 124.4, 124.0 (d, $J_{C-F}$ = 3.4 Hz), 115.9 (d, $J_{C-F}$ = 21.2 Hz), 66.3, 50.0, 45.4, 23.1, 23.0. HRMS (ESI) m/z calcd for C$_{21}$H$_{24}$FN$_2$O$_4$S [M+H$^+$]: 419.1435, found 419.1437.

(3n) $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.78-7.75 (m, 2H), 7.36-7.28 (m, 3H), 7.18-7.13 (m, 4H), 6.02 (s, 1H), 4.57 (s, 2H), 3.60 (t, $J$ = 4.6 Hz, 4H), 2.97 (t, $J$ = 4.7 Hz, 4H), 2.22 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.2, 150.2, 137.7, 136.3, 132.1, 131.3, 128.9, 128.2, 128.1, 98.0, 66.2, 50.8, 45.4, 23.3. HRMS (ESI) m/z calcd for C$_{21}$H$_{24}$IN$_2$O$_4$S [M+H$^+$]: 527.0496, found 527.0485.

(3o) $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.31-7.29 (m, 2H), 7.26-7.16 (m, 5H), 7.11-7.08 (m, 2H), 5.88 (s, 1H), 4.54 (s, 2H), 3.51 (t, $J$ = 4.6 Hz, 4H), 2.89 (t, $J$ = 4.7 Hz, 4H), 2.44 (s, 3H), 2.13 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.3, 151.0, 143.6, 136.5, 130.2, 128.9, 128.5, 128.3, 128.0, 125.1, 122.1, 66.2, 50.8, 45.4, 23.3, 14.9. HRMS (ESI) m/z calcd for C$_{22}$H$_{27}$N$_2$O$_4$S$_2$ [M+H$^+$]: 447.1407, found 447.1411.

(3p) $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.31-7.29 (m, 2H), 7.26-7.16 (m, 5H), 7.11-7.08 (m, 2H), 5.88 (s, 1H), 4.54 (s, 2H), 3.51 (t, $J$ = 4.6 Hz, 4H), 2.89 (t, $J$ = 4.7 Hz, 4H), 2.44 (s, 3H), 2.13 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.3, 151.0, 143.6, 136.5, 130.2, 128.9, 128.5, 128.3, 128.0, 125.1, 122.1, 66.2, 50.8, 45.4, 23.3, 14.9. HRMS (ESI) m/z calcd for C$_{22}$H$_{27}$N$_2$O$_4$S$_2$ [M+H$^+$]: 447.1407, found 447.1411.
(E)-N-benzyl-N-(1-(4-cyanophenyl)-2-(morpholinosulfonyl)vinyl)acetamide (3p, 61.3 mg, 72%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.71 (d, $J = 8.3$ Hz, 2H), 7.51 (d, $J = 8.2$ Hz, 2H), 7.38-7.30 (m, 3H), 7.14-7.12 (m, 2H), 6.17 (s, 1H), 4.57 (s, 2H), 3.64 (t, $J = 4.5$ Hz, 4H), 3.01 (t, $J = 4.8$ Hz, 4H), 2.27 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.2, 148.9, 137.2, 135.9, 132.0, 130.5, 132.9, 129.1, 128.3, 127.9, 124.2, 118.0, 114.4, 66.2, 51.0, 45.4, 23.2. HRMS (ESI) m/z calcd for C$_{22}$H$_{24}$N$_3$O$_4$S [M+H$^+$]: 426.1482, found 426.1479.

(3q, 57.8 mg, 62%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.67 (d, $J = 8.2$ Hz, 2H), 7.52 (d, $J = 8.0$ Hz, 2H), 7.36-7.27 (m, 3H), 7.14-7.11 (m, 2H), 6.13 (s, 1H), 4.55 (s, 2H), 3.60 (t, $J = 4.6$ Hz, 4H), 2.98 (t, $J = 4.8$ Hz, 4H), 2.25 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.1, 149.5, 136.3, 136.1, 132.9 (q, $J_{C-F} = 32.7$ Hz), 132.2, 129.0, 128.1, 126.3 (q, $J_{C-F} = 270.9$ Hz), 125.4 (q, $J_{C-F} = 3.7$ Hz), 66.2, 50.7, 45.4, 23.2. HRMS (ESI) m/z calcd for C$_{22}$H$_{24}$F$_3$N$_2$O$_4$S [M+H$^+$]: 469.1403, found 469.1409.

(3r, 77.4 mg, 83%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.72 (d, $J = 7.6$ Hz, 1H), 7.61-7.53 (m, 3H), 7.35-7.29 (m, 3H), 7.15-7.10 (m, 2H), 6.13 (s, 1H), 4.57 (s, 2H), 3.58 (t, $J = 4.6$ Hz, 4H), 2.97 (t, $J = 4.7$ Hz, 4H), 2.26 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.2, 149.4, 136.0, 133.4, 133.2, 131.2 (q, $J_{C-F} = 32.5$ Hz), 128.9, 128.1, 127.6 (q, $J_{C-F} = 3.7$ Hz), 126.5 (q, $J_{C-F} = 3.6$ Hz), 124.1, 123.6 (q, $J_{C-F} = 269.5$ Hz) 66.2, 50.7, 45.4, 23.2. HRMS (ESI) m/z calcd for C$_{22}$H$_{24}$F$_3$N$_2$O$_4$S [M+H$^+$]: 469.1403, found 469.1407.
(E)-N-benzyl-N-(2-(morpholinosulfonyl)-1-(naphthalen-2-yl)vinyl)acetamide (3s, 45.1 mg, 50%), yellow oil; ¹H NMR (400 MHz, CDCl₃) δ 7.98 (d, J = 1.8 Hz, 1H), 7.91-7.87 (m, 3H), 7.61-7.53 (m, 2H), 7.51-7.48 (m, 1H), 7.37-7.28 (m, 3H), 7.20-7.17 (m, 2H), 6.12 (s, 1H), 4.63 (s, 2H), 3.51 (t, J = 4.6 Hz, 4H), 2.95 (t, J = 4.8 Hz, 4H), 2.27 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 170.4, 151.3, 136.5, 134.3, 132.5, 130.7, 129.8, 128.9, 128.8, 128.3, 128.0, 128.0, 127.9, 66.2, 50.9, 45.4, 23.4. HRMS (ESI) m/z calcd for C₂₅H₂₇N₂O₄S [M+H⁺]: 451.1686, found 451.1692.

(E)-N-benzyl-N-(2-(morpholinosulfonyl)-1-(pyridin-2-yl)vinyl)acetamide (3t, 67 mg, 83%), colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 8.68-8.66 (m, 1H), 7.75-7.71 (m, 1H), 7.51-7.48 (m, 1H), 7.37-7.28 (m, 4H), 7.24-7.21 (m, 2H), 6.10 (s, 1H), 4.65 (s, 2H), 3.59 (t, J = 4.6 Hz, 4H), 2.98 (t, J = 4.8 Hz, 4H), 2.24 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 170.4, 151.3, 150.1, 149.5, 136.5, 136.0, 128.9, 128.3, 128.0, 127.9, 126.2, 124.8, 124.0, 66.2, 50.7, 45.5, 23.1. HRMS (ESI) m/z calcd for C₂₀H₂₄N₃O₄S [M+H⁺]: 402.1482, found 402.1480.

(E)-N-benzyl-N-(2-(morpholinosulfonyl)-1-(thiophen-2-yl)vinyl)acetamide (3u, 48.6 mg, 60%), yellow oil; ¹H NMR (400 MHz, CDCl₃) δ 7.78 (dd, J = 3.8, 1.2 Hz, 1H), 7.61-7.60 (m, 1H), 7.35-7.24 (m, 5H), 7.16-7.13 (m, 1H), 5.75 (s, 1H), 4.73 (s, 2H), 3.58 (t, J = 4.6 Hz, 4H), 2.90 (t, J = 4.6 Hz, 4H), 2.17 (s, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 169.9, 143.9, 136.6, 135.2, 134.0, 131.4, 129.0, 128.9, 128.5, 128.1, 122.6, 66.1, 50.9, 45.4, 22.6. HRMS (ESI) m/z calcd for C₁₀H₂₃N₂O₄S₂ [M+H⁺]: 407.1094, found 407.1091.
(E)-N-(4-chlorobenzyl)-N-(2-(morpholinosulfonyl)-1-phenylvinyl)acetamide (3w, 72.4 mg, 83%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.53-7.45 (m, 5H), 7.31-7.27 (m, 2H), 7.11-7.09 (m, 2H), 6.02 (s, 1H), 4.51 (s, 2H), 3.58 (t, $J = 4.5$ Hz, 4H), 2.99 (t, $J = 4.8$ Hz, 4H), 2.27 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.1, 151.1, 134.9, 133.8, 132.3, 131.4, 129.9, 129.8, 129.0, 128.6, 123.4, 66.2, 49.7, 45.4, 23.2. HRMS (ESI) m/z calcd for C$_{21}$H$_{24}$ClN$_2$O$_4$S [M+H$^+$]: 435.1140, found 435.1134.

(E)-N-(4-bromobenzyl)-N-(2-(morpholinosulfonyl)-1-phenylvinyl)acetamide (3x, 77.4 mg, 81%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.54-7.44 (m, 7H), 7.04 (d, $J = 8.4$ Hz, 2H), 6.02 (s, 1H), 4.49 (s, 2H), 3.58 (t, $J = 4.6$ Hz, 4H), 2.99 (t, $J = 4.7$ Hz, 4H), 2.27 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.1, 151.1, 135.4, 132.3, 131.9, 131.4, 130.2, 129.8, 128.6, 123.4, 122.0, 66.2, 49.8, 45.4, 23.2. HRMS (ESI) m/z calcd for C$_{21}$H$_{24}$BrN$_2$O$_4$S [M+H$^+$]: 479.0635, found 479.0642.

(E)-N-(2-bromobenzyl)-N-(2-(morpholinosulfonyl)-1-phenylvinyl)acetamide (3y, 86.6 mg, 90%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.55 (dd, $J = 8.0$, 1.2 Hz, 1H), 7.51-7.39 (m, 5H), 7.31-7.27 (m, 1H), 7.19-7.15 (m, 1H), 7.08 (dd, $J = 7.7$, 1.6 Hz, 1H), 6.22 (s, 1H), 4.75 (s, 2H), 3.57 (t, $J = 4.5$Hz, 4H), 2.97 (t, $J = 4.7$ Hz, 4H), 2.24 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.5, 151.3, 135.2, 133.2, 132.4, 131.2, 129.9, 129.8, 129.5, 128.5, 127.8, 123.3, 122.5, 66.2, 51.3, 45.5, 23.3. HRMS (ESI) m/z calcd for C$_{21}$H$_{24}$BrN$_2$O$_4$S [M+H$^+$]: 479.0635, found 479.0639.
Tert-butyl \((E)\)-acetyl(2-(morpholinosulfonyl)-1-phenylvinyl)carbamate (3z, 54 mg, 66%), yellow oil; \(^1\)H NMR \((400 \text{ MHz, CDCl}_3\) \(\delta 7.51-7.49 \text{ (m, 2H)}, 7.41-7.37 \text{ (m, 3H)}, 6.29 \text{ (s, 1H)}, 3.54 \text{ (t, } J = 4.6 \text{ Hz, 4H)}, 3.10 \text{ (t, } J = 4.8 \text{ Hz, 4H}), 2.61 \text{ (s, 3H)}, 1.24 \text{ (s, 9H)}\); \(^{13}\)C NMR \((101 \text{ MHz, CDCl}_3\) \(\delta 172.9, 151.1, 147.5, 133.9, 130.4, 130.0, 127.7, 126.2, 84.8, 66.2, 45.3, 27.5, 26.4\). HRMS (ESI) \(m/z\) calcd for C\(_{19}\)H\(_{27}\)N\(_2\)O\(_6\)S [M+H\(^+\)]: 411.1584, found 411.1581.

\(\text{(E)}\)-N-allyl-N-(2-(morpholinosulfonyl)-1-phenylvinyl)acetamide (3aa, 46.2 mg, 66%) yellow oil; \(^1\)H NMR \((400 \text{ MHz, CDCl}_3\) \(\delta 7.49-7.43 \text{ (m, 5H)}, 6.29 \text{ (s, 1H)}, 5.82-5.72 \text{ (m, 1H)}, 5.22-5.19 \text{ (m, 1H)}, 5.10-5.05 \text{ (m, 1H)}, 4.00 \text{ (dd, } J = 6.0, 1.6 \text{ Hz, 2H)}, 3.63 \text{ (t, } J = 4.6 \text{ Hz, 4H)}, 3.10 \text{ (t, } J = 4.8 \text{ Hz, 4H)}, 2.17 \text{ (s, 3H)}\); \(^{13}\)C NMR \((101 \text{ MHz, CDCl}_3\) \(\delta 170.1, 151.7, 132.9, 132.4, 131.1, 129.8, 128.4, 122.1, 118.6, 66.3, 50.6, 45.5, 23.3\). HRMS (ESI) \(m/z\) calcd for C\(_{17}\)H\(_{23}\)N\(_2\)O\(_4\)S [M+H\(^+\)]: 351.1373, found 351.1374.

\(\text{(E)}\)-N-(2-(morpholinosulfonyl)-1-phenylvinyl)-N-(prop-2-yn-1-yl)acetamide (3ab, 56.8 mg, 82%), yellow oil; \(^1\)H NMR \((400 \text{ MHz, CDCl}_3\) \(\delta 7.56-7.42 \text{ (m, 5H)}, 6.43 \text{ (s, 1H)}, 4.29 \text{ (d, } J = 2.4 \text{ Hz, 2H)}, 3.64 \text{ (t, } J = 4.7 \text{ Hz, 4H)}, 3.14 \text{ (t, } J = 4.6 \text{ Hz, 4H)}, 2.34 \text{ (t, } J = 2.4 \text{ Hz, 1H)}, 2.11 \text{ (s, 3H)}\); \(^{13}\)C NMR \((101 \text{ MHz, CDCl}_3\) \(\delta 169.9, 151.2, 132.6, 131.4, 129.9, 128.5, 122.4, 78.2, 73.1, 66.3, 45.6, 37.5, 23.3\). HRMS (ESI) \(m/z\) calcd for C\(_{17}\)H\(_{21}\)N\(_2\)O\(_4\)S [M+H\(^+\)]: 349.1217, found 349.1221.
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(E)-N-benzyl-N-(2-(morpholinosulfonyl)-1-phenylvinyl)propionamide (3ac, 44 mg, 53%), yellow oil; 1H NMR (400 MHz, CDCl₃) δ 7.50-7.40 (m, 5H), 7.36-7.27 (m, 3H), 7.19-7.16 (m, 2H), 6.04 (s, 1H), 4.61 (s, 2H), 3.54 (t, J = 4.5 Hz, 4H), 2.93 (t, J = 4.7 Hz, 4H), 2.48-2.43 (m, 2H), 1.17 (t, J = 7.4 Hz, 3H); 13C NMR (101 MHz, CDCl₃) δ 174.0, 151.1, 136.7, 132.8, 131.1, 129.8, 128.9, 128.5, 128.3, 127.9, 122.7, 66.2, 50.8, 45.4, 28.4, 10.1. HRMS (ESI) m/z calcd for C₂₂H₂₇N₂O₄S [M+H⁺]: 415.1686, found 415.1684.

(E)-N-benzyl-N-(2-(morpholinosulfonyl)-1-phenylvinyl)benzamide (3ad, 70.8 mg, 77%), colorless oil; 1H NMR (400 MHz, CDCl₃) δ 7.57-7.55 (m, 2H), 7.46-7.44 (m, 2H), 7.40-7.27 (m, 11H), 5.78 (s, 1H), 4.85 (s, 2H), 3.36 (t, J = 4.7 Hz, 4H), 2.46 (t, J = 4.7 Hz, 4H); 13C NMR (101 MHz, CDCl₃) δ 171.9, 153.1, 136.4, 135.9, 133.0, 131.0, 130.9, 130.2, 128.8, 128.6, 128.4, 128.2, 128.0, 66.0, 52.3, 44.8. HRMS (ESI) m/z calcd for C₂₆H₂₇N₂O₄S [M+H⁺]: 463.1686, found 463.1691.

(E)-N-benzyl-N-(2-(N,N-dimethylsulfamoyl)-1-phenylvinyl)acetamide (3ae, 53.1 mg, 74%), yellow oil; 1H NMR (400 MHz, CDCl₃) δ 7.51-7.41 (m, 5H), 7.35-7.27 (m, 3H), 7.19-7.17 (m, 2H), 6.01 (s, 1H), 4.58 (s, 2H), 2.61 (s, 6H), 2.26-2.24 (m, 3H); 13C NMR (101 MHz, CDCl₃) δ 170.2, 150.7, 136.6, 132.6, 131.1, 129.8, 128.8, 128.5, 128.4, 127.9, 123.1, 50.5, 37.2, 23.2. HRMS (ESI) m/z calcd for C₁₉H₂₃N₂O₃S [M+H⁺]: 359.1424, found 359.1423.
(E)-N-benzyl-N-(2-((4-methylpiperidin-1-yl)sulfonyl)-1-phenylvinyl)acetamide
(3af, 44.6 mg, 52%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.49-7.41 (m, 5H), 7.35-7.28 (m, 3H), 7.20-7.16 (m, 2H), 6.00 (s, 1H), 4.57 (s, 2H), 3.51-3.47 (m, 2H), 2.38-2.32 (m, 2H), 2.24 (s, 3H), 1.59-1.54 (m, 2H), 1.35-1.29 (m, 1H), 1.09-0.99 (m, 2H), 0.89 (d, $J = 6.6$ Hz, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.2, 150.2, 136.6, 132.6, 131.0, 129.8, 128.8, 128.4, 127.8, 124.5, 50.4, 45.8, 33.5, 30.2, 23.2, 21.5. HRMS (ESI) $m/z$ calcd for C$_{23}$H$_{29}$N$_2$O$_3$S [M+H$^+$]: 413.1893, found 413.1899.

(E)-N-benzyl-N-(1-phenyl-2-(piperidin-1-ylsulfonyl)vinyl)acetamide (3ag, 66.2 mg, 83%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.49-7.41 (m, 5H), 7.35-7.27 (m, 3H), 7.19-7.17 (m, 2H), 5.99 (s, 1H), 4.57 (s, 2H), 2.91 (t, $J = 4.7$ Hz, 4H), 2.25 (s, 3H), 1.50-1.42 (m, 6H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.2, 150.1, 136.6, 132.6, 131.0, 129.8, 128.8, 128.4, 127.8, 124.5, 50.3, 46.3, 25.3, 23.6, 23.1. HRMS (ESI) $m/z$ calcd for C$_{22}$H$_{27}$N$_2$O$_3$S [M+H$^+$]: 399.1737, found 399.1732.

(E)-N-benzyl-N-(1-phenyl-2-tosylvinyl)acetamide (3ah, 61.4 mg, 76%), yellow oil; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.52-7.47 (m, 1H), 7.41-7.29 (m, 7H), 7.26-7.22 (m, 4H), 7.17-7.15 (m, 2H), 7.11-7.06 (m, 2H), 6.20 (s, 1H), 4.49 (s, 2H), 2.38 (s, 3H), 2.00 (s, 3H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 170.1, 151.4, 144.4, 137.9, 136.3, 132.0, 131.4, 130.2, 129.6, 129.0, 128.7, 128.5, 128.4, 127.8, 127.4, 50.1, 23.1, 21.6.
(E)-N-benzyl-N-(1-phenyl-2-(phenylsulfonfonyl)vinyl)acetamide (3ai, 68.1 mg, 87%), colorless oil; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 7.53-7.47 (m, 4H), 7.40-7.31 (m, 6H), 7.28-7.24 (m, 3H), 7.09-7.07 (m, 2H), 6.22 (s, 1H), 4.50 (s, 2H), 2.00 (s, 3H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 170.2, 151.8, 140.8, 136.3, 133.4, 132.0, 131.5, 130.1, 129.0, 128.7, 128.6, 128.5, 128.4, 127.8, 127.3, 50.2, 23.1.

(3aj, 75.8 mg, 89%), yellow oil; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 7.52-7.48 (m, 1H), 7.40-7.36 (m, 4H), 7.32-7.26 (m, 7H), 7.10-7.08 (m, 2H), 6.25 (s, 1H), 4.53 (s, 2H), 2.01 (s, 3H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 170.2, 152.3, 140.0, 139.3, 136.3, 132.1, 131.6, 130.1, 129.2, 128.8, 128.8, 128.5, 128.4, 128.0, 127.9, 50.4, 23.3.

(3ak, 51.4 mg, 75%), yellow oil, \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 7.52-7.44 (m, 5H), 7.33-7.28 (m, 3H), 7.17-7.15 (m, 2H), 6.10 (s, 1H), 4.60 (s, 2H), 2.78-2.73 (m, 2H), 2.22 (s, 3H), 1.18 (t, \(J = 7.4\) Hz, 3H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 170.3, 152.4, 136.4, 132.2, 131.6, 129.8, 128.8, 128.7, 128.3, 127.9, 125.5, 50.6, 49.7, 23.3, 6.8.

(3al, 60.8 mg, 82%), yellow oil; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 7.55-7.43 (m, 5H), 7.35-7.26 (m, 3H),
7.19-7.16 (m, 2H), 6.11 (s, 1H), 4.62 (s, 2H), 2.73-2.68 (m, 2H), 2.21 (s, 3H), 1.61-1.53 (m, 2H), 1.32-1.23 (m, 2H), 0.82 (t, J = 7.3 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 170.3, 152.0, 136.4, 132.3, 131.6, 129.8, 128.8, 128.7, 128.4, 127.9, 126.1, 55.0, 50.6, 24.0, 23.3, 21.5, 13.5. HRMS (ESI) m/z calcd for C₂₁H₂₆NO₃S [M+H⁺]: 372.1628, found 372.1631.

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\begin{array}{c}
\text{(E)-N-benzyl-N-(2-(cyclopropylsulfonyl)-1-phenylvinyl)acetamide (3am, 62.2 mg, 88%)}, \text{ yellow oil; } ^1\text{H NMR (400 MHz, CDCl₃) } \delta 7.55-7.43 (m, 5H), 7.34-7.27 (m, 3H), 7.19-7.16 (m, 2H), 6.21 (s, 1H), 4.59 (s, 2H), 2.25 (s, 3H), 2.18-2.12 (m, 1H), 1.10-1.06 (m, 2H), 0.89-0.84 (m, 2H); ^1³C NMR (101 MHz, CDCl₃) δ 170.2, 151.3, 136.4, 132.4, 131.6, 130.0, 128.7, 128.6, 128.6, 127.9, 127.5, 50.3, 31.9, 23.1, 5.2.}
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\begin{array}{c}
\text{N-benzyl-N-((E)-2-(((1S,4R)-7,7-dimethyl-2-oxobicyclo[2.2.1]heptan-1-yl)methyl sulfonyl)-1-phenylvinyl)acetamide (3an, 62.2 mg, 67%), yellow oil; } ^1\text{H NMR (400 MHz, CDCl₃) } \delta 7.53-7.42 (m, 5H), 7.33-7.27 (m, 3H), 7.20-7.17 (m, 2H), 6.47 (s, 1H), 4.77 (d, J = 14.9 Hz, 1H), 4.55 (d, J = 15.0 Hz, 1H), 3.34 (d, J = 14.8 Hz, 1H), 2.62 (d, J = 14.8 Hz, 1H), 2.39-2.30 (m, 2H), 2.23 (s, 3H), 2.08-2.05 (m, 1H), 1.98-1.95 (m, 1H), 1.89 (d, J = 18.5 Hz, 1H), 1.49-1.44 (m, 1H), 1.39-1.33 (m, 1H), 0.95 (s, 3H), 0.73 (s, 3H); ^1³C NMR (101 MHz, CDCl₃) δ 215.0, 170.5, 151.4, 136.6, 132.6, 131.4, 129.9, 128.7, 128.6, 128.2, 127.7, 127.6, 58.7, 52.7, 50.5, 48.4, 42.7, 42.6, 42.3, 27.1, 24.6, 23.3, 19.7, 19.6. HRMS (ESI) m/z calcd for C₂₇H₃₂NO₄S [M+H⁺]: 466.2047, found 466.2053.}
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\begin{array}{c}
\text{(E)-N-(2-(morpholinosulfonyl)-1-phenylvinyl)acetamide (4, ), yellow oil; } ^1\text{H NMR (400 MHz, CDCl₃) } \delta 7.50 (s, 1H), 7.47-7.39 (m, 5H), 6.97 (s, 1H), 3.66 (t, J = 4.6 Hz, 4H), 3.03 (t, J = 4.7 Hz, 4H), 2.13 (s, 3H); ^1³C NMR (101 MHz, CDCl₃) δ 169.5,}
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147.1, 134.1, 130.2, 128.8, 128.4, 107.5, 66.2, 45.6, 24.9. HRMS (ESI) m/z calcd for C_{14}H_{19}N_{2}O_{4}S [M+H^+] : 311.1060, found 311.1058.

(Z)-N-benzyl-N-(2-(N,N-dimethylsulfamoyl)-1-phenylvinyl)acetamide (Z-3ae), yellow oil; \(^1^H\) NMR (400 MHz, CDCl\(_3\)) \(\delta\) 7.49 (t, \(J = 7.3\) Hz, 1H), 7.41 (t, \(J = 7.5\) Hz, 2H), 7.30-7.27 (m, 2H), 7.24-7.18 (m, 5H), 6.23 (s, 1H), 5.17 (d, \(J = 14.3\) Hz, 1H), 4.31 (d, \(J = 14.3\) Hz, 1H), 2.55 (s, 6H), 2.26 (s, 3H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 170.6, 150.5, 136.3, 135.2, 131.3, 130.6, 129.3, 128.2, 127.7, 127.4, 118.6, 51.0, 37.2, 22.2. HRMS (ESI) m/z calcd for C_{19}H_{23}N_{2}O_{3}S [M+H^+] : 359.1424, found 359.1423.

N,N-dimethyl-2-oxo-2-phenylethane-1-sulfonamide (5), \(^3\) white solid; \(^1^H\) NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.04 (d, \(J = 7.4\) Hz, 2H), 7.64 (d, \(J = 7.4\) Hz, 1H), 7.51 (d, \(J = 7.9\) Hz, 2H), 4.58 (s, 2H), 2.92 (s, 6H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 189.6, 135.8, 134.4, 129.5, 128.9, 56.5, 38.0.

3-Phenylisoquinoline (6), \(^4\) yellow oil; \(^1^H\) NMR (400 MHz, CDCl\(_3\)) \(\delta\) 9.35 (s, 1H), 8.14 (d, \(J = 7.5\) Hz, 2H), 8.08 (s, 1H), 7.98 (d, \(J = 8.2\) Hz, 1H), 7.86 (d, \(J = 8.2\) Hz, 1H), 7.69 (d, \(J = 7.4\) Hz, 1H), 7.59-7.50 (m, 3H), 7.43 (t, \(J = 7.3\) Hz, 1H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 152.5, 151.3, 139.6, 136.7, 130.6, 128.9, 128.6, 127.8, 127.6, 127.1, 127.1, 126.9, 116.6.

2-(Morphollnosulfonyl)-1-phenylethan-1-one (8) (24.8 mg, 46%), \(^3\) white solid; \(^1^H\) NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.03-7.97 (m, 2H), 7.66-7.61 (m, 1H), 7.53-7.49 (m, 2H), 4.57 (s, 2H), 3.71 (t, \(J = 4.6\) Hz, 4H), 3.34 (t, \(J = 4.8\) Hz, 4H); \(^{13}\)C NMR (101 MHz, CDCl\(_3\)) \(\delta\) 189.1, 135.7, 134.5, 129.4, 129.0, 66.6, 57.2, 46.2.
5. References


6. Copies of the $^1$H NMR and $^{13}$C NMR Spectra
Ac-N-Bn
Ph-\(\text{O=S=O}\)
Bu

3al

Ac-N-Bn
Ph-\(\text{O=S=O}\)
Bu

3al