Supporting Information

**Chiral sulfur derivatives in the allylation of acyl hydrazones: C₂-symmetric bis-sulfinamides as enhanced chiral organic promoters**

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General Methods.

All reactions were run under an atmosphere of dry argon using oven-dried glassware and freshly distilled and dried solvents over activated molecular sieves. TLC was performed on Silica Gel GF₂₅₄ (Merck) with detection by charring with phosphomolybdic acid/EtOH. For flash chromatography, silica Gel (Merck 230-400 mesh) was used. Columns were eluted with positive air pressure. Chromatographic eluents are given as volume to volume ratios (v/v). NMR spectra were recorded with a Bruker AMX₅₀₀ (¹H, 500 MHz) and Bruker Avance DRX₅₀₀ (¹H, 500 MHz) spectrometers. Chemical shifts are reported in ppm, and coupling constants are reported in Hz. Routine spectra were referenced to the residual proton or carbon signals of the solvent. High-resolution mass spectra were recorded on a Kratos MS-80RFA 241-MC apparatus. Optical rotations were determined with a Perkin-Elmer 341 polarimeter. The organic extracts were dried over anhydrous sodium sulfate and concentrated in vacuo. Sulfinyl chlorides were obtained by the method reported by Hermann.¹ Opticaly pure alkanesulfinitates were prepared as previously described following DAG methodology.²
Menthyl p-toluenesulfinate was prepared as described by Solladiè³ and used as starting material for the synthesis of N-Alkyl-p-toluenesulfinamides 11 and 12 as previously described.⁴

**General procedure for the synthesis of sulfinamides, 6-9.**

To a solution of sulfinate ester, 2-5 (12.6 mmol) in THF (50 mL), at -78º C was added a 1M solution of LiHMDS (15 mL, 15 mmol). The reaction was stirred for 1 hour, then MeOH (20 mL) was added, followed by silica gel and the mixture was stirred for 15 min. After evaporation of the solvent, the residue was purified by flash chromatography (AcOEt to AcOEt:MeOH, 9:1).

**(S)-Ethanesulfinamide, 6.**
Prepared from (S)-DAG ethanesulfinate, 2, and purified by column chromatography (AcOEt). Obtained in quantitative yield as a colourless oil. [α]D²⁰: -18 (c 0.7, CHCl₃). ¹H-NMR (500 MHz, CDCl₃) δ: 3.86 (brs, 2H), 2.75 (c, 2H), 1.31 (t, J= 5.5 Hz, 3H). ¹³C-NMR (125 MHz, CDCl₃) δ: 54.9, 14.5. The enantiomeric excess was determined by HPLC analysis using chiralpak AD column (flow rate 1 mL/min, iPrOH:Hexane 2:98, tR= 49.8 min (6R) and tR= 57.7 min (6S)).

**(S)-p-Toluenesulfinamide, 7.**⁵
Prepared from (S)-Menthyl p-toluenesulfinate, 5, and purified by column chromatography (AcOEt:Hexane, from 1:2 to 1:1). Obtained in quantitative yield as a white solid. m.p.: 113º C, [ Lit: m.p.:115º C]. [α]D²⁰:+86 (c 0.2, CHCl₃), [Lit [α]D²⁰: (S) +85 (c 1.0, CHCl₃)]. ¹H-NMR (500 MHz, CDCl₃) δ: 7.62 - 7.31 (m, 4H), 2.41 (s, 3H). ¹³C-NMR (125 MHz, CDCl₃) δ: 143.4, 141.5, 129.6, 125.3, 29.7. The enantiomeric excess was determined by HPLC analysis using Daicel Chiracel OD column (flow rate 1 mL/min, iPrOH:Hexane 5:95, tR=29.1 min (7R) and tR= 34.3 min (7S)).

**(S)-Isopropylsulfinamide, 8.**²⁵
Prepared from (S)-DCG isopropylsulfinate, 3, and purified by column chromatography, from AcOEt to AcOEt: MeOH, 9:1). Obtained as a white solid with a low melting point, in quantitative yield. [α]D²⁰: -16 (c 1.1, CHCl₃), Lit²⁵ [α]D²⁰ = -18 (c SI-3
0.7 CHCl₃). ¹H-NMR (500 MHz, CDCl₃) δ: 3.96 (brs, 2H), 2.72 (m, J= 6.9 Hz, 1H), 1.27 (d, J= 6.9 Hz, 3H), 1.20 (d, J= 6.9 Hz, 3H). ¹³C-NMR (125 MHz, CDCl₃) δ: 54.6, 15.7, 15.6. HRMS Calc. for C₃H₉NOS [M⁺]: 107.0405, Found: 107.0406. The enantiomeric excess was determined by HPLC analysis using Daicel Chiracel AD column (flow rate 1 mL/min, iPrOH:Hexane 5:95, tᵣ=13.3 min (8R) and tᵣ= 16.8 min (8S)).

(R)-tert-Butylsulfinamide, 9.⁶

Prepared from (R)-DCG tert-butylsulfinate, 4. In this case, 5 equiv of LiHMDS and a longer time of reaction, 48 hours, was need. Purified by flash chromatography: AcOEt:Hexano 1:4 to AcOEt. Obtained as a white solid in 80% yield. [α]D₂₀: +4.0 (c 1.0, CHCl₃). [Lit⁶ [α]D₂₀: +4.9 (c 1.0, CHCl₃)]. ¹H-NMR (500 MHz, CDCl₃) δ: 3.82 (brs, 2H), 1.18 (s, 9H). ¹³C-NMR (125 MHz, CDCl₃) δ: 55.3, 22.1.

General procedure for the Synthesis of N-Alkyl Alkanesulfinamides, 10, 13-16.

To a solution of the corresponding amine (2.2 eq.) in THF at -78°C, n-BuLi (in hexane, 2.0 eq.) was added. The solution was stirred at -78°C for 30 min. and then it was added on a solution of the corresponding alkanesulfinate 2-4 (1 eq.) in THF, and it was stirred until all the starting material is consumed (observed by TLC, AcOEt:CH₂Cl₂, 1:4), from 0.5 to 1 h. Then it was quenched with saturated NH₄Cl aqueous solution, extracted with AcOEt, washed with saturated NaHCO₃ aqueous solution and brine. The organic layer was dried over Na₂SO₄ and the solvent evaporated. The residue was purified by flash chromatography.

(S)-N-tert-Butyl Ethanesulfinamide, 10.

Prepared from tert-butylamine and (S)-DAG ethanesulfinate 2. Time of reaction: 45 min. Purified by cc: AcOEt:Hexano, 1:1, to AcOEt. 67 % yield, white solid. M.p.: 72-75° C. [α]D₂₀: +107.2 (c 0.5, CHCl₃). ¹H-NMR (500 MHz, CDCl₃) δ: 3.45 (brs, 1H), 2.73-2.68 (m, 2H), 1.58 (s, 9H), 1.25 (t, J=7.5 Hz, 3H). ¹³C-NMR (125 MHz, CDCl₃) δ: 53.6, 50.8, 31.0, 7.4. HRMS Calc. for C₆H₁₆NOS (M+H)+: 150.1031, Found: 150.0952. The enantiomeric excess was determined by HPLC analysis using Daicel Chiracel AD column (flow rate 1 mL/min, iPrOH:Hexane 4:96, tᵣ=10.7 min (10R) and tᵣ= 11.9 min (10S)).
(S)-N-Benzyl Isopropylsulfinamide, 13.

Prepared from benzylamine and (S)-DCG isopropanesulfinate 3. Time of reaction: 45 min. Purified by cc: AcOEt:Hexano, 1:2, to AcOEt. 89% Yield, white solid. M.p.: 57-59°C. $[\alpha]_D^{20}$: +65.5 (c 0.2, CHCl₃). $^1$H-NMR (500 MHz, CDCl₃) δ: 7.34-7.26 (m, 5H), 4.27 (m, 2H), 3.81 (s, 1H), 2.84-2.79 (m, J= 6.9 Hz, 1H), 1.29 (d, J= 6.9 Hz, 3H), 1.26 (d, J= 6.9 Hz, 3H). $^{13}$C-NMR (125 MHz, CDCl₃) δ: 138.2, 128.6, 128.1, 127.7, 53.6, 47.3, 15.6. HRMS Calc. for C_{10}H_{15}NO (M)+: 197.0873, Found: 197.0874. The enantiomeric excess was determined by HPLC analysis using Daicel Chiracel OJ column (flow rate 1 mL/min, iPrOH:Hexane 2:98, $t_R=19.2$ min (13S) and $t_R= 22.6$ min (13R)).

(S)-N-tert-Butyl Isopropylsulfinamide, 14.

Prepared from tert-butylamine and (S)-DCG isopropanesulfinate 3. Time of reaction: 60 min. Purified by cc: Ether:Hexano, 1:1, to ether. 50% Yield, yellow oil. $[\alpha]_D^{20}$: +109.2 (c 0.2, CHCl₃). $^1$H-NMR (500 MHz, CDCl₃) δ: 3.26 (brs, 1H), 2.68-2.60 (m, 1H) 1.29 (s, 9H), 1.22 (d, J= 6.8 Hz, 3H), 1.21 (d, J= 6.8 Hz, 3H). $^{13}$C-NMR (125 MHz, CDCl₃) δ: 54.5, 53.3, 31.0, 15.5, 14.9. HRMS Calc. for C_{7}H_{18}NO (M+H)+: 164.1111, Found: 164.1113.

(R)-N-Benzyl tert-butylsulfinamide, 15.

Prepared from benzylamine and (R)-DAG tert-butylsulfinate 4. Time of reaction: 45 min. Purified by cc: AcOEt:Hexano, 1:1, to AcOEt. 62% yield. White solid, m.p. 64-65°C. $[\alpha]_D^{20}$: -38 (c 2.0, CHCl₃). $^1$H-NMR (500 MHz, CDCl₃) δ: 7.38-7.30 (m, 5H), 4.39 (dd, J= 13.7 Hz, J= 4.7 Hz, 1H), 4.29 ( dd, J= 13.7 Hz, J= 4.7 Hz, 1H), 3.49 (s, 1H), 1.29 (s, 9H). HRMS Calc. for C_{7}H_{17}NO (M+H)+: 212.1110, Found: 212.1109. The enantiomeric excess was determined by HPLC analysis using Daicel Chiracel AD column (flow rate 1 mL/min, iPrOH:Hexane 2:98, $t_R=19.8$ min (15R) and $t_R= 24.1$ min (15S)).

(R)-N-tert-Butyl tert-butylsulfinamide, 16.

Prepared from tert-butylamine and (R)-DAG tert-butylsulfinate 4. Time of reaction: 45 min. Purified by cc: AcOEt:Hexano, 1:1, to AcOEt. 50% Yield, white solid. M.p. 79-81°C. $[\alpha]_D^{20}$: -38 (c 2.0, CHCl₃). $^1$H-NMR (500 MHz, CDCl₃) δ: 3.01 (brs, 1H), 1.31 (s, 9H), 1.20 (s, 9H). $^{13}$C-NMR (125 MHz, CDCl₃) δ: 55.1, 53.1, 31.0, 22.4. HRMS Calc. for C_{8}H_{20}NO (M+H)+: 178.1266, Found 178.1265.
General procedure for the synthesis of C$_2$-Symmetric Bis-(sulfinyl)isophthaldimines, 19-21.

To a solution of the corresponding sulfinamide, 6-9, (2 eq.) and isophtaldehyde in THF was added Ti(OiPr)$_4$ (4 eq.). When the starting material is consumed, the reaction is poured into water, and after stirring, filtered through a plug of celite, and the filter cake was washed with CH$_2$Cl$_2$. The solvent is removed at vacuo and the residue purified by flash chromatography (AcOEt:Hexane, 1:1, to AcOEt).

(S,S)-N,N'-Bis-(p-toluenesulfinyl)isophthaldimine,19. 8

77% Yield, white solid. M.p.: 129-131°C. [α]$_D^{20}$: + 82.2 (c 0.4, CHCl$_3$). [Lit [α]$_D^{20}$:+ 82.6 (c 0.6, CHCl$_3$)]. $^1$H-NMR (300 MHz, CDCl$_3$) δ: 8.77 (s, 2H), 8.30 (s, 1H), 7.96 (dd, $J= 7.6$ Hz, $J= 1.4$ Hz, 2H), 7.62 (m, 4H), 7.54 (t, $J= 7.8$ Hz, 1H), 7.32 (m, 4H), 2.20 (s, 6H). $^{13}$C-NMR (125 MHz, CDCl$_3$) δ: 159.6, 141.9, 141.4, 134.6, 133.0, 130.3, 129.9, 129.5, 124.7, 21.4. HRMS Calc. for C$_{22}$H$_{21}$N$_2$O$_2$S$_2$ (M+H)$^+$: 409.1046, Found: 409.1057.

(S,S)-N,N'-Bis-(isopropylsulfinyl)isophthaldimine, 20.

60% Yield, white solid. M.p.: 43-45°C. [α]$_D^{20}$: +14.6 (c 1.1, CHCl$_3$). $^1$H-NMR (500 MHz, CDCl$_3$) δ: 8.61 (s, 2H), 8.31 (d, $J= 1.6$ Hz, 1H), 7.97 (dd, $J= 7.7$ Hz, $J= 1.6$ Hz, 2H), 7.58 (t, $J= 7.7$ Hz, 1H), 2.98 (m, $J= 6.9$ Hz, 2H), 1.30 (d, $J= 6.9$ Hz, 6H), 1.21 (d, $J= 6.8$ Hz, 6H). $^{13}$C-NMR (125 MHz, CDCl$_3$) δ: 161.6, 134.6, 132.8, 129.8, 53.9, 14.7, 13.5. HRMS Calc. for C$_{14}$H$_{21}$N$_2$O$_2$S$_2$ (M+H)$^+$: 313.1045, Found: 313.1044.

(R,R)-N,N'-Bis-(tert-butylsulfinyl)-isophthaldimine, 21. 9

72% Yield, foam. [α]$_D^{20}$: -34 (c 0.3, CHCl$_3$). $^1$H-NMR (500 MHz, CDCl$_3$) δ: 8.65 (s, 2H), 8.32 (s,1H), 8.03 (dd, $J= 1.5$ Hz, $J= 7.6$ Hz, 2H), 7.61 (t, $J= 7.7$ Hz, 1H), 1.27 (s, 18H). $^{13}$C-NMR (125 MHz, CDCl$_3$) δ: 161.7, 134.8, 132.6, 130.1, 129.6, 58.0, 22.6. HRMS Calc. for C$_{16}$H$_{25}$N$_2$O$_2$S$_2$ (M+H)$^+$: 341.1358. Found: 341.1357.

Synthesis of hexanedialdehyde. 10

A solution of cyclohexene (3.0 g, 36.5 mmol) in CH$_2$Cl$_2$ (100mL) at -78°C was purged with oxygen for 5 min. Then, ozone was bubbled through the reaction for 4 h. Triphenylphosphine (9.6 g, 36.5 mmol) was then added, and the reaction was allowed to warm to room temperature overnight. The solvent was removed at the rotary evaporator, cooling at 0°C, and a mixture of ether:pentane, 3:2, was added to the residue and filtered.

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through a pad of celite. The solvent was removed at vacuo and the residue purified by flash chromatography (ether:pentane, 3:2) to give the corresponding dialdehyde.

**General procedure for the synthesis of C₂-symmetric Bis-(sulfinyl)hexanediimines, 22,23.**

To a solution of the corresponding sulfinamide, 4-7, (2 eq.) in THF was added Ti(O/Pr)₄ (4 eq.), and then 1,6-hexanediadldehyde (1 eq.). When the starting material is consumed (24 h.), the reaction is poured into water, and after stirring, filtered through a plug of celite, and the filter cake was washed with AcOEt. The solvent is removed at vacuo and the residue purified by flash chromatography (AcOEt:Hexane, 1:1, to AcOEt).

- **(S,S)-N,N'-Bis-(isopropylsulfinyl)-1,6-hexanediimine, 22.**
  64 % Yield, colourless oil. [α]D²⁰: + 228 (c 1.0, CHCl₃). ¹H-NMR (500 MHz, CDCl₃) δ: 8.10 ( t, J= 4.5 Hz, 2H), 2.82 (m, 2H), 2.60-2.56 (m, 4H), 1.76-1.73 (m, 4H), 1.28 (d, J= 6.9 Hz, 6H), 1.17 (d, J= 6.9 Hz, 6H). ¹³C-NMR (125 MHz, CDCl₃) δ: 168.5, 53.2, 35.6, 24.8, 14.6, 13.2. HRMS calc. for C₁₂H₂₅N₂O₂S₂ (M+H)⁺: 293.1358, Found: 293.1357.

- **(R,R)-N,N'-Bis-(tert-butylsulfinyl)-1,6-hexanediimine, 23.**
  60% Yield, colourless oil. [α]D²⁰: - 262 (c 0.3, CHCl₃). ¹H-NMR (500 MHz CDCl₃) δ: 8.10 (t, J= 4.5 Hz, 2H), 2.61-2.58 (m, 4H), 1.77-1.74 (m, 4H ), 1.22(s, 18H). ¹³C-NMR (125 MHz, CDCl₃) δ: 168.8, 56.5, 35.7, 24.9, 22.3.

**General procedure for the synthesis of C₂-symmetric Bis-sulfinamides, 24-28.**

To a solution of the corresponding C₂-symmetric Bis-sulfinylimine, 19-23, in MeOH is added at 0°C, sodium borohydride (2 eq.). After stirring for 30 min, acetone is added and the reaction is stirred another 5 min. The solvent is removed at vacuo and the residue is purified by flash chromatography.

- **(S,S)-1,3-Bis-(p-tolysulfamidemethyl)benzene, 24.**
  91% Yield, white solid. M.p.: 199-201°C. [α]D²⁰: +45 (c 0.9, CHCl₃). ¹H-NMR (300 MHz, CDCl₃) δ: 7.65-7.55 (m, 4H), 7.44-7.08 (m, 8H), 4.55 (m, 2H), 4.20-3.78 (m, 4H), 2.41 (s, 6H). ¹³C-NMR (125 MHz, CDCl₃) δ: 141.5, 140.9, 138.4, 129.7, 129.0, 128.2, 127.7, 126.0, 44.4, 21.2. HRMS Calc for C₂₂H₂₅N₂O₂S₂(M+H)⁺: 413.1358, Found: 413.1357.
(S,S)-1,3-Bis-(isopropylsulfinamidemethyl)benzene, 25.
85 % Yield, colourless oil. [α]D20: + 43 (c 1.5, CHCl3). 1H-NMR (500 MHz, CDCl3) δ:
7.35-7.26 (m, 4H), 4.28 (d, J= 5.5 Hz, 2H), 4.27 (d, J= 6.7 Hz, 2H), 3.70 (bs, 2H), 2.85-
2.79 (m, J= 6.9 Hz, 2H), 1.30 (d, J= 6.9 Hz, 6H), 1.27 (d, J= 6.9 Hz, 6H). 13C-NMR
(125 MHz, CDCl3) δ: 133.5, 123.9, 122.7, 122.4, 48.5, 42.1, 10.4. HRMS Calc. for

(R,R)-1,3-Bis-(tert-butylsulfinamidemethyl)benzene, 26.
85% Yield, colourless oil. [α]D20: -33 (c 1.0, CHCl3). 1H-NMR (500 MHz, CDCl3)
δ: 7.35-7.29 (m, 4H), 4.39 (dd, J= 13.8 Hz, J= 4.7 Hz, 2H), 4.29 (dd, J= 13.8 Hz, J= 5.3
Hz, 2H), 3.57 (m, 2H,), 1.27 (s, 18H). 13C-NMR (125 MHz, CDCl3) δ: 139.0, 128.9,
127.7, 127.4, 49.2, 29.6, 22.6. HRMS Calc. For C16H29N2O2S2 (M+H)+: 345.1671.
Found: 345.1670.

(S,S)-N,N'-Bis-(isopropylsulfinyl)-1,6-hexanediamine, 27.
82 % Yield, colourless oil. [α]D20: + 56 (c 1.1, CHCl3). 1H-NMR (500 MHz CDCl3) δ:
3.43 (bs, 2H), 3.08-3.00 (m, 4H), 2.68 (m, J= 6.9 Hz, 2H), 1.53-1.48 (m, 4H), 1.32-1.30
(m, 4H), 1.19 (d, J= 6.9 Hz, 6H), 1.16 (d, J= 6.9 Hz, 6H). 13C-NMR (125 MHz, CDCl3)
δ: 55.6, 45.0, 30.9, 26.3, 15.5.

(R,R)-N,N'-Bis-(tert-butylsulfinyl)-1,6-hexanediamine, 28.
79% Yield, white solid. M.p.: 79-82ºC. 1H-NMR (500 MHz, CDCl3) δ: 3.25-3.06 (m,
6H), 1.59 (m, 4H), 1.35 (m, 4H), 1.20 (s, 18H). 13C-NMR (125 MHz, CDCl3) δ: 55.6,
45.6, 30.9, 26.3, 22.6. HRMS Calc. for C14H33N2O2S2 (M+H)+: 325.2064. Found:

Enantioselective allylation of N-(benzoyl)isobutylhydrazone. General method:
(Kobayashi conditions) To a solution of N-(benzoyl)isobutylhydrazone 17 (20.5 mg,
0.108 mmol), the chiral sulfamamide 6-16 (0.324 mmol) or chiral C2-symmetric
bissulfamidemide 24-28 (0.108 mmol), and 2-methyl-2-butene (27 µL, 0.054 mmol) in
dichloromethane (0.7 mL) was added allyltrichlorosilane 2 (23 µL, 0.162 mmol) at
-78ºC. After stirred at -78ºC for the time indicated in Tables 1 and 2, the reaction was
quenched by adding saturated aqueous NaHCO3 (1 mL). After warmed to room
temperature, saturated NaCl aqueous solution was added, and the mixture was extracted
dichloromethane (three times). The combined organic layers were dried over
Na2SO4, filtered and concentrated in vacuo. The residue was purified by column
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chromatography (AcOEt: hexanes, 1:4) to afford the corresponding N’-(1-isopropylbut-3-enyl)benzohydrazide 18 in high chemical yields as a white solid, mp 73-74°C.

The enantiomeric ratios of the obtained hydrazides were determined by HPLC analysis using chiralpack AD column, under the following conditions: N’-(1-isopropylbut-3-enyl)benzohydrazide, 18: flow rate 1 mL/min, iPrOH:Hexane 3:97, 30°C, $t_R$= 27.9 min. ($18R$) and $t_R$= 33.2 min ($18S$); N’-(1-cyclohexylbut-3-enyl)benzohydrazide, 33: flow rate 1 mL/min, iPrOH:Hexane 10:90, 30ºC, $t_R$= 9.2 min. ($33R$) and $t_R$= 23.3 min ($33S$); N’-(1-phenylbut-3-enyl)benzohydrazide, 34: flow rate 0.5 mL/min, iPrOH:Hexane 3:97, 30ºC, $t_R$= 128.2 min. ($34R$) and $t_R$= 136.3 min ($34S$); N’-[1-(p-chlorophenyl)but-3-enyl]benzohydrazide, 35: flow rate 0.7 mL/min, iPrOH:Hexane 3:97, 30ºC, $t_R$= 59.4 min. ($35R$) and $t_R$= 65.6 min ($35S$).

References:


$^1$H NMR (500 MHz, CDCl\textsubscript{3})

$^{13}$C NMR (125.5 MHz, CDCl\textsubscript{3})
SI-11
$^1$H NMR (500 MHz, CDCl$_3$)

$^{13}$C NMR (125.5 MHz, CDCl$_3$)
$^1$H NMR (500 MHz, CDCl$_3$)

$^{13}$C NMR (125.5 MHz, CDCl$_3$)
$^{1}H$ NMR (500 MHz, CDCl$_3$)

$^{13}C$ NMR (125.5 MHz, CDCl$_3$)
$^1$H NMR (500 MHz, CDCl$_3$)

$^{13}$C NMR (125.5 MHz, CDCl$_3$)
\( \text{H NMR (500 MHz, CDCl}_3\text{)} \)

\( \text{C NMR (125.5 MHz, CDCl}_3\text{)} \)
\(^1\)H NMR (500 MHz, CDCl\(_3\))

\(^{13}\)C NMR (125.5 MHz, CDCl\(_3\))
$^{1}^H$ NMR (500 MHz, CDCl$_3$)

$^{13}C$ NMR (125.5 MHz, CDCl$_3$)
\[ \text{SI-21} \]
$^1$H NMR (500 MHz, CDCl$_3$)

$^{13}$C NMR (125.5 MHz, CDCl$_3$)

SI-22
$^1$H NMR (500 MHz, CDCl$_3$)

$^{13}$C NMR (125.5 MHz, CDCl$_3$)
$^1$H NMR (500 MHz, CDCl$_3$)

$^{13}$C NMR (125.5 MHz, CDCl$_3$)

SI-24
$^{1}H$ NMR (500 MHz, CDCl$_3$)

$^{13}C$ NMR (125.5 MHz, CDCl$_3$)
$^{1}H$ NMR (500 MHz, CDCl$_3$)

$^{13}$C NMR (125.5 MHz, CDCl$_3$)
SI-28
HPLC data for the allylation of hydrazone 17 with ligand 28.

Auto-Scaled Chromatogram

Processed Channel: PDA 210.0 nm

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