Supporting Information

Boron-Mediated Stereoselective Syntheses of γ,γ -Disubstituted Allenamides
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(4S,5R)-3-((2S,4S)-4-hydroxy-5-methyl-3-(trimethylsilyl)hexa-1,2-dienyl)-4,5-

diphenyloxazolidin-2-one 8a. This compound was made according to the general procedure, using isobutyraldehyde at 0.5 M concentration, which gave allenylcarbinol **8a** (145 mg) and the minor diastereoisomer **8b** (68 mg) (combined yield 87%) both as white solids. **8a.** Mp: 129-131 °C. $[\alpha]_D^{23} = +180.4$ (c 0.51, CHCl₃); ¹H NMR (300 MHz, CDCl₃) δ: 7.06-7.10 (m, 6H), 6.95-6.97 (m, 2H), 6.77-6.81 (m, 3H), 5.92 (d, *J*=8.8 Hz, 1H), 5.03 (d, *J*=8.8 Hz, 1H), 3.01 (dt, *J*=5.9, 2.2 Hz, 1H), 1.23-1.39 (m, 1H), 0.68 (d, *J*=5.9 Hz, 1H), 0.61 (d, *J*=6.6 Hz, 3H), 0.58 (d, *J*=6.6 Hz, 3H), 0.11 (s, 9H); ¹³C NMR (100 MHz, CDCl₃) δ: 199.2, 155.4, 134.2, 134.1, 128.4, 128.2, 127.7, 126.5, 116.9, 93.5, 80.2, 79.4, 64.7, 32.9, 19.9, 17.2, -0.0; IR 3490, 1748 cm⁻¹. Anal. Calc'd for C₂₅H₃₁NO₃Si C, 71.22; H, 7.41; N 3.32. Found: C, 71.40; H, 7.58; N, 3.37. **8b:** ¹H NMR (300 MHz, CDCl₃) δ: 7.02-7.07 (m, 6H), 6.90-6.95 (m, 2H), 6.79 (m, 3H), 5.91 (d, *J*=8.1 Hz, 1H), 5.00 (d, *J*=8.1 Hz, 1H), 3.98 (m, 1H), 1.83-1.85 (m, 1H), 1.70-1.76 (m, 1H), 1.03 (d, *J*=6.6 Hz, 3H), 0.83 (d, *J*=6.6 Hz, 3H), -0.40 (s, 9H); ¹³C NMR (100 MHz, CDCl₃) δ: 195.8, 155.4, 133.9, 133.8, 128.6, 128.5, 128.1, 127.3, 126.6, 119.0, 96.5, 80.9, 75.2, 64.3, 33.3, 20.6, 15.3, -1.5; IR 3457, 1753 cm⁻¹

(4S,5R)-3-((2S,4S)-4-hydroxy-3-(trimethylsilyl)nona-1,2-dienyl)-4,5-diphenyloxazolidin-2-

one 9b. This compound was made according to the general procedure, using hexanal at 0.5 M concentration, to give allenylcarbinol **9a** (72 mg) and the minor diastereoisomer **9b** (10 mg) (combined yield 65%) both as white solids. **9a.** Mp: 144-147 °C. $[\alpha]_D^{23} = +190.3$ (c 0.30, CHCl₃); ¹H NMR (300 MHz, CDCl₃) δ: 7.09-7.11 (m, 6H), 6.95-6.97 (m, 2H), 6.81-6.87 (m, 2H), 5.92 (d, *J*=9.0 Hz, 1H), 5.00 (d, *J*=7.0 Hz, 1H), 3.34-3.48 (m, 1H), 0.52-1.25 (m, 11H), 0.12 (s, 9H);

^{13}C NMR (100 MHz, CDCl_3) δ : 197.4, 155.2, 134.1, 133.9, 128.5, 128.4, 128.1, 127.5, 126.4, 118.2, 94.7, 80.3, 72.9, 64.7, 37.2, 31.8, 25.8, 22.9, 14.4, -0.1; IR 3545, 1743 cm^{-1} . Anal. Calc'd for $\text{C}_{27}\text{H}_{35}\text{NO}_3\text{Si}$ C, 72.12; H, 7.85; N 3.11. Found: C, 72.05; H, 7.78; N, 2.91. **9b**: ^1H NMR (300 MHz, CDCl_3) δ : 7.02-7.08 (m, 7H), 6.91-6.95 (m, 2H), 6.78-6.81 (m, 2H), 5.91 (d, $J=8.1$ Hz, 1H), 4.98 (d, $J=8.1$ Hz, 1H), 4.13-4.16 (m, 1H), 1.25-1.61 (m, 8H), 0.93 (t, $J=6.6$ Hz, 3H), -0.33 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 195.6, 155.3, 134.1, 133.9, 128.5, 128.4, 128.3, 128.0, 127.3, 126.5, 119.4, 94.5, 80.9, 70.8, 64.5, 37.7, 32.1, 25.3, 23.1, 14.5, -1.3; IR 3432, 1757 cm^{-1}

(4S,5R)-3-((2S,4S,E)-4-hydroxy-3-(trimethylsilyl)hepta-1,2,5-trienyl)-4,5-

diphenyloxazolidin-2-one 10a. This compound was made according to the general procedure, using crotonaldehyde at 0.3 M concentration, to give allenylcarbinol **10a** (103 mg) and the minor diastereoisomer **10b** (26 mg) (combined yield 72%) both as white solids. **10a**. Mp: 127-129 $^{\circ}\text{C}$. $[\alpha]_{\text{D}}^{22} = +223.2$ (c 0.65, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ : 7.07-7.14 (m, 6H), 6.96-6.98 (m, 3H), 6.82-6.95 (m, 2H), 5.94 (d, $J=8.4$ Hz, 1H), 5.31-5.38 (m, 1H), 5.02 (d, $J=8.4$ Hz, 1H), 4.51 (ddd, $J=15.3, 7.5, 1.8$ Hz, 1H), 3.99 (m, 1H), 1.53 (dd, $J=6.0, 0.9$ Hz, 1H), 0.91 (d, $J=6.9$ Hz, 1H), 0.10 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 197.1, 155.3, 134.1, 133.9, 132.1, 128.7, 128.6, 128.5, 128.2, 127.5, 126.5, 117.6, 95.8, 80.4, 73.1, 64.6, 17.7, -0.5; IR 3457, 1751 cm^{-1} . Anal. Calc'd for $\text{C}_{25}\text{H}_{29}\text{NO}_3\text{Si}$ C, 71.56; H, 6.97; N 3.34. Found: C, 71.56; H, 6.81; N, 3.56. **10b**: ^1H NMR (300 MHz, CDCl_3) δ : 7.04-7.07 (m, 6H), 6.92-6.95 (m, 3H), 6.80-6.82 (m, 2H), 5.91 (d, $J=8.1$ Hz, 1H), 5.67 (dq, $J=15.0, 6.6$ Hz, 1H), 5.31 (ddd, $J=15.3, 8.1, 1.5$ Hz, 1H), 4.98 (d, $J=8.1$ Hz, 1H), 4.53 (dd, $J=8.1, 2.4$ Hz, 1H), 2.11 (br s, 1H), 1.72 (dd, $J=6.3, 0.9$ Hz, 3H), -0.64 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 195.7, 155.4, 134.4, 134.0, 132.6, 128.6, 128.5, 128.4, 128.1, 127.3, 126.5, 118.5, 97.0, 80.9, 72.1, 64.5, 17.9, -1.5; IR 3439, 1753 cm^{-1}

(4S,5R)-3-((2S,4S)-4-hydroxy-4-(5-methylfuran-2-yl)-3-(trimethylsilyl)buta-1,2-dienyl)-4,5-diphenyloxazolidin-2-one 11a. This compound was made according to the general procedure, using 5-methylfurfural at 0.3 M concentration but at -25 °C, to give allenylcarbinol **11a** (34 mg) and the minor diastereoisomer **11b** (15 mg) (combined yield 61%) both as white solids. **11a.** Mp: 149-150 °C. $[\alpha]_D^{22}=+279.6$ (c 0.25, CHCl₃); ¹H NMR (300 MHz, CDCl₃) δ: 7.08-7.11 (m, 6H), 6.98-7.01 (m, 3H), 6.85-6.97 (m, 2H), 5.96 (d, *J*=7.8 Hz, 1H), 5.78-5.98 (m, 2H), 5.10 (d, *J*=8.4 Hz, 1H), 4.57 (dd, *J*=8.1, 2.7 Hz, 1H), 2.24 (s, 3H), 0.88 (d, *J*=8.1 Hz, 1H), -0.01 (s, 9H); ¹³C NMR (100 MHz, CDCl₃) δ: 198.4, 155.2, 152.4, 151.6, 134.0, 133.5, 128.7, 128.5, 128.4, 128.1, 127.7, 126.4, 115.8, 108.2, 106.3, 95.9, 80.4, 68.4, 64.7, 13.9, -0.7; IR 1751 cm⁻¹. Anal. Calc'd for C₂₇H₂₉NO₃Si C, 70.56; H, 6.36; N 3.05. Found: C, 70.70; H, 6.26; N, 3.06. **11b:** ¹H NMR (300 MHz, CDCl₃) δ: 7.19 (d, *J*=2.9 Hz), 7.03-7.09 (m, 6H), 6.83-6.85 (m, 2H), 6.92-6.95 (m, 2H), 6.09 (d, *J*=2.9 Hz, 1H), 5.92-5.95 (m, 2H), 5.15 (d, *J*=8.4 Hz, 1H), 5.07-5.09 (m, 1H), 2.58 (d, *J*=5.4 Hz), 2.34 (s, 3H), -0.50 (s, 9H); ¹³C NMR (100 MHz, CDCl₃) δ: 195.8, 155.3, 152.4, 152.3, 134.3, 133.9, 128.6, 128.4, 128.1, 127.4, 126.6, 117.0, 109.4, 106.6, 97.9, 81.1, 66.3, 64.1, 14.1, -2.2; IR 3432, 1758 cm⁻¹

(4S,5R)-3-((2S,4S)-4-hydroxy-3-(trimethylsilyl)octa-1,2,7-trienyl)-4,5-diphenyloxazolidin-2-one 12a. This compound was made according to the general procedure, using 4-pentenal at 0.5 M, to give allenylcarbinol **12a** (187 mg) and the minor diastereoisomer **12b** (81 mg) (combined yield 86 %) both as white solids. **12a.** Mp: 129-130 °C. $[\alpha]_D^{22}=+215$ (c 0.14, CHCl₃); ¹H NMR (300 MHz, CDCl₃) δ: 7.01-7.05 (m, 6H), 6.94-6.97 (m, 2H), 6.89 (d, *J*=2.2 Hz, 1H), 6.79-6.82 (m, 2H), 5.92 (d, *J*=8.8 Hz, 1H), 5.53-5.70 (m, 1H), 5.10 (d, *J*=8.8 Hz, 1H), 4.86-4.91 (m, 2H),

3.37-3.47 (m, 1H), 1.67-1.91 (m, 2H), 1.06-1.16 (m, 1H), 0.72-0.83 (m, 1H), 0.70 (d, $J=7.3$ Hz, 1H), -0.12 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 197.6, 155.3, 138.2, 134.2, 134.0, 128.6, 128.5, 128.2, 127.6, 126.5, 118.1, 115.1, 95.0, 80.3, 72.1, 64.6, 36.2, 30.3, -0.3; IR 3471, 1744 cm^{-1} . Anal. Calc'd for $\text{C}_{26}\text{H}_{31}\text{NO}_3\text{Si}$ C, 72.02; H, 7.21; N 3.23. Found: C, 71.93; H, 6.99; N, 3.21. **12b**: ^1H NMR (300 MHz, CDCl_3) δ : 7.02-7.07 (m, 7H), 6.91-6.95 (m, 2H), 6.79-6.81 (m, 2H), 5.91 (d, $J=8.1$ Hz, 1H), 5.78-5.97 (m, 1H), 5.00-5.10 (m, 2H), 4.99 (d, $J=8.1$ Hz, 1H), 4.16-4.18 (m, 1H), 2.15-2.23 (m, 2H), 2.02 (br s, 1H), 1.64-1.75 (m, 1H), 1.43-1.54 (m, 1H), -0.33 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 196.0, 155.4, 138.3, 134.2, 133.9, 128.6, 128.5, 128.4, 128.1, 127.4, 127.2, 126.6, 119.3, 115.4, 96.6, 80.9, 70.1, 64.4, 36.8, 29.7, -1.4; IR 1741 cm^{-1}

(4S,5R)-3-((2S,4S,5R)-5-(benzyloxy)-4-hydroxy-3-(trimethylsilyl)hexa-1,2-dienyl)-4,5-diphenyloxazolidin-2-one 13a. This compound was made according to the general procedure, using (+)-(*R*)-2-(benzyloxy)propanal¹ at 0.5M concentration but at -35°C , to give allenylcarbinol **13a** (49 mg) and the minor diastereoisomer **13b** (10 mg) (combined yield 81%) both as white solids. **13a**. Mp: 110-111 $^\circ\text{C}$. $[\alpha]_{\text{D}}^{22}=+62.5$ (c 0.08, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ : 7.22-7.34 (m, 5H), 7.06-7.09 (m, 6H), 6.97-6.98 (m, 2H), 6.78-6.79 (m, 2H), 6.71 (d, $J=2.9$ Hz, 1H), 5.92 (d, $J=8.8$ Hz, 1H), 4.98 (d, $J=8.8$ Hz, 1H), 4.44 (d, $J=11.7$ Hz, 1H), 4.27 (d, $J=11.7$ Hz, 1H), 2.93-3.06 (m, 2H), 2.19 (d, $J=5.9$ Hz, 1H), 0.80 (d, $J=5.9$ Hz, 3H), -0.12 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 198.9, 155.1, 138.3, 134.2, 134.0, 128.6, 128.3, 128.3, 128.1, 128.0, 127.9, 127.7, 126.3, 116.0, 93.9, 80.2, 76.5, 75.9, 71.3, 64.7, 16.5, 0.0; IR 3477, 1755 cm^{-1} . Anal. Calc'd for $\text{C}_{31}\text{H}_{35}\text{NO}_4\text{Si}$ C, 72.48; H, 6.87; N 2.73. Found: C, 72.52; H, 6.79; N, 2.64. **13b**: ^1H NMR (300 MHz, CDCl_3) δ : 7.26-7.37 (m, 5H), 7.00-7.02 (m, 7H), 6.78-6.80 (m, 2H), 6.71 (br s, 1H), 5.45 (d, $J=8.5$ Hz, 1H), 4.88 (d, $J=8.5$ Hz, 1H), 4.64 (d, $J=11.5$ Hz, 1H), 4.56 (d, $J=11.5$ Hz,

1H), 4.29-4.34 (m, 1H), 3.56-3.63 (m, 1H), 2.28-2.33 (m, 1H), 1.07 (d, $J=6.8$ Hz, 3H), -0.43 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 198.6, 155.2, 138.6, 134.2, 133.9, 128.8, 128.5, 128.3, 128.2, 128.1, 128.0, 127.9, 127.2, 126.5, 114.5, 95.6, 80.7, 77.1, 72.6, 71.2, 63.9, 13.9, -1.5; IR 3439, 1754 cm^{-1}

(4S,5R)-3-((2S,4S,5S)-5-(benzyloxy)-4-hydroxy-3-(trimethylsilyl)hexa-1,2-dienyl)-4,5-

diphenyloxazolidin-2-one 14a. This compound was prepared by the general method above, using (-)-(*S*)-2-(benzyloxy)propanal¹ at 0.5M concentration but at -35°C , to give allenylcarbinol **14a** (85 mg) and the minor diastereoisomer **14b** (30 mg) (combined yield 78%) both as clear oils. **14a**: $[\alpha]_{\text{D}}^{22}=+112$ (c 0.75, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ : 7.18-7.32 (m, 5H), 7.06-7.09 (m, 6H), 6.95-6.98 (2H, m), 6.76-6.79 (2H, m), 6.71 (d, $J=2.9$ Hz, 1H), 5.91 (d, $J=8.5$ Hz, 1H), 4.97 (d, $J=8.5$ Hz, 1H), 4.18 (d, $J=11.5$ Hz, 1H), 4.07 (d, $J=11.5$ Hz, 1H), 3.45-3.47 (m, 1H), 2.90-2.95 (m, 1H), 1.63 (br s, 1H), 0.86 (d, $J=6.8$ Hz, 3H), -0.10 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 197.9, 155.2, 138.6, 134.1, 128.6, 128.5, 128.4, 128.1, 127.8, 127.7, 126.4, 115.4, 94.1, 80.2, 78.0, 72.7, 70.6, 64.6, 13.3, -0.2; IR 3467, 1752 cm^{-1} . Anal. Calc'd for $\text{C}_{31}\text{H}_{35}\text{NO}_4\text{Si}$ C, 72.48; H, 6.87; N 2.73. Found: C, 72.56; H, 7.00; N, 2.66. **14b**: ^1H NMR (300 MHz, CDCl_3) δ : 7.29-7.43 (m, 5H), 7.00-7.09 (m, 7H), 6.93 (d, $J=2.2$ Hz, 1H), 6.70-6.82 (m, 3H), 5.70 (d, $J=8.1$ Hz, 1H), 4.88 (d, $J=8.1$ Hz, 1H), 4.70 (d, $J=11.7$ Hz, 1H), 4.46 (d, $J=11.7$ Hz, 1H), 4.07-4.11 (m, 1H), 3.56 (dt, $J=11.7, 5.9$ Hz, 1H), 2.70 (d, $J=4.4$ Hz, 1H), 1.23 (d, $J=5.9$ Hz, 3H), -0.35 (s, 9H); ^{13}C NMR (100 MHz, CDCl_3) δ : 198.8, 155.3, 134.5, 134.1, 133.8, 128.8, 128.5, 128.4, 128.2, 128.1, 128.0, 127.8, 127.4, 126.4, 115.5, 94.9, 80.7, 77.4, 75.5, 70.9, 64.0, 16.1, -1.1; IR 3459, 1755 cm^{-1}

Table 1. Crystal data and structure refinement for lsh152m.

Identification code	lsh152m, 7a	
Empirical formula	C ₂₈ H ₂₉ N O ₃ Si	
Formula weight	455.61	
Temperature	173(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	Fdd2	
Unit cell dimensions	a = 29.217(3) Å	α = 90°.
	b = 54.471(5) Å	β = 90°.
	c = 6.1768(6) Å	γ = 90°.
Volume	9830.2(16) Å ³	
Z	16	
Density (calculated)	1.231 Mg/m ³	
Absorption coefficient	0.125 mm ⁻¹	
F(000)	3872	
Crystal size	0.30 x 0.14 x 0.14 mm ³	
Theta range for data collection	1.58 to 25.02°.	
Index ranges	-34 ≤ h ≤ 34, -64 ≤ k ≤ 64, -7 ≤ l ≤ 7	
Reflections collected	18295	
Independent reflections	4344 [R(int) = 0.1015]	
Completeness to theta = 25.02°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.9827 and 0.9635	
Refinement method	Full-matrix least-squares on F ²	
Data / restraints / parameters	4344 / 1 / 303	
Goodness-of-fit on F ²	0.999	
Final R indices [I > 2σ(I)]	R1 = 0.0489, wR2 = 0.0850	
R indices (all data)	R1 = 0.0815, wR2 = 0.0946	
Absolute structure parameter	0.08(15)	

Extinction coefficient	0.00234(10)
Largest diff. peak and hole	0.199 and -0.201 e.Å ⁻³

Table 2. Atomic coordinates ($\times 10^4$) and equivalent isotropic displacement parameters ($\text{\AA}^2 \times 10^3$) for lsh152m. $U(\text{eq})$ is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	$U(\text{eq})$
Si(1)	2170(1)	916(1)	3878(2)	33(1)
O(1)	2771(1)	-128(1)	6900(3)	34(1)
O(2)	3126(1)	-178(1)	3701(3)	30(1)
O(3)	3465(1)	945(1)	7023(4)	38(1)
N(1)	3069(1)	200(1)	5010(4)	24(1)
C(1)	2969(1)	-40(1)	5352(5)	26(1)
C(2)	3317(1)	-24(1)	2005(5)	27(1)
C(3)	3794(1)	-106(1)	1515(5)	25(1)
C(4)	4078(1)	-207(1)	3050(5)	39(1)
C(5)	4518(1)	-280(1)	2554(6)	47(1)
C(6)	4684(1)	-253(1)	483(6)	43(1)
C(7)	4406(1)	-151(1)	-1088(6)	46(1)
C(8)	3964(1)	-80(1)	-574(5)	38(1)
C(9)	3253(1)	246(1)	2843(4)	24(1)
C(10)	3676(1)	407(1)	2832(5)	25(1)
C(11)	3766(1)	550(1)	1045(5)	33(1)
C(12)	4154(1)	699(1)	982(6)	42(1)
C(13)	4445(1)	709(1)	2729(6)	44(1)
C(14)	4354(1)	569(1)	4542(6)	40(1)
C(15)	3972(1)	419(1)	4587(5)	33(1)
C(16)	2852(1)	383(1)	6242(5)	26(1)
C(17)	2819(1)	615(1)	5698(5)	26(1)
C(18)	2729(1)	846(1)	5281(5)	25(1)
C(19)	3052(1)	1045(1)	6150(5)	29(1)
C(20)	3160(1)	1245(1)	4516(5)	26(1)
C(21)	3325(1)	1188(1)	2478(5)	33(1)
C(22)	3435(1)	1372(1)	1028(5)	39(1)
C(23)	3373(1)	1615(1)	1572(6)	42(1)
C(24)	3205(1)	1674(1)	3585(6)	39(1)
C(25)	3100(1)	1491(1)	5042(5)	34(1)
C(26)	2249(1)	911(1)	900(6)	89(2)

C(27)	1971(1)	1223(1)	4791(8)	65(1)
C(28)	1757(1)	675(1)	4684(6)	44(1)

Table 3. Bond lengths [Å] and angles [°] for lsh152m.

Si(1)-C(28)	1.851(3)	C(7)-C(8)	1.383(4)
Si(1)-C(26)	1.854(4)	C(9)-C(10)	1.514(4)
Si(1)-C(27)	1.857(3)	C(10)-C(11)	1.378(4)
Si(1)-C(18)	1.888(3)	C(10)-C(15)	1.389(4)
O(1)-C(1)	1.216(3)	C(11)-C(12)	1.395(4)
O(2)-C(1)	1.349(3)	C(12)-C(13)	1.374(5)
O(2)-C(2)	1.453(3)	C(13)-C(14)	1.381(4)
O(3)-C(19)	1.428(3)	C(14)-C(15)	1.381(4)
N(1)-C(1)	1.352(3)	C(16)-C(17)	1.308(4)
N(1)-C(16)	1.409(3)	C(17)-C(18)	1.311(4)
N(1)-C(9)	1.465(3)	C(18)-C(19)	1.534(4)
C(2)-C(3)	1.496(4)	C(19)-C(20)	1.519(4)
C(2)-C(9)	1.570(4)	C(20)-C(21)	1.384(4)
C(3)-C(4)	1.374(4)	C(20)-C(25)	1.387(4)
C(3)-C(8)	1.390(4)	C(21)-C(22)	1.383(4)
C(4)-C(5)	1.380(4)	C(22)-C(23)	1.377(4)
C(5)-C(6)	1.377(5)	C(23)-C(24)	1.374(5)
C(6)-C(7)	1.382(5)	C(24)-C(25)	1.380(4)

C(28)-Si(1)-C(26)	109.76(19)
C(28)-Si(1)-C(27)	110.60(16)
C(26)-Si(1)-C(27)	110.7(2)
C(28)-Si(1)-C(18)	107.32(14)
C(26)-Si(1)-C(18)	110.17(16)
C(27)-Si(1)-C(18)	108.23(15)
C(1)-O(2)-C(2)	110.6(2)
C(1)-N(1)-C(16)	120.3(2)
C(1)-N(1)-C(9)	112.8(2)
C(16)-N(1)-C(9)	122.5(2)
O(1)-C(1)-O(2)	122.5(2)
O(1)-C(1)-N(1)	127.1(3)
O(2)-C(1)-N(1)	110.4(3)
O(2)-C(2)-C(3)	109.3(2)
O(2)-C(2)-C(9)	105.0(2)
C(3)-C(2)-C(9)	117.1(2)
C(4)-C(3)-C(8)	117.8(3)
C(4)-C(3)-C(2)	122.8(3)
C(8)-C(3)-C(2)	119.4(3)
C(3)-C(4)-C(5)	121.6(3)
C(6)-C(5)-C(4)	120.2(3)
C(5)-C(6)-C(7)	119.3(3)
C(6)-C(7)-C(8)	119.9(3)
C(7)-C(8)-C(3)	121.2(3)
N(1)-C(9)-C(10)	113.8(2)
N(1)-C(9)-C(2)	100.6(2)
C(10)-C(9)-C(2)	116.4(2)
C(11)-C(10)-C(15)	118.6(3)
C(11)-C(10)-C(9)	119.2(3)
C(15)-C(10)-C(9)	122.2(3)
C(10)-C(11)-C(12)	120.5(3)
C(13)-C(12)-C(11)	120.1(3)
C(12)-C(13)-C(14)	119.8(3)
C(13)-C(14)-C(15)	119.8(3)
C(14)-C(15)-C(10)	121.1(3)
C(17)-C(16)-N(1)	125.4(3)

C(16)-C(17)-C(18)	172.0(3)
C(17)-C(18)-C(19)	119.1(2)
C(17)-C(18)-Si(1)	117.1(2)
C(19)-C(18)-Si(1)	123.39(19)
O(3)-C(19)-C(20)	110.5(2)
O(3)-C(19)-C(18)	112.4(2)
C(20)-C(19)-C(18)	113.7(2)
C(21)-C(20)-C(25)	118.3(3)
C(21)-C(20)-C(19)	121.0(3)
C(25)-C(20)-C(19)	120.7(3)
C(22)-C(21)-C(20)	120.4(3)
C(23)-C(22)-C(21)	120.6(3)
C(24)-C(23)-C(22)	119.5(3)
C(23)-C(24)-C(25)	120.0(3)
C(24)-C(25)-C(20)	121.2(3)

Table 4. Anisotropic displacement parameters ($\text{\AA}^2 \times 10^3$) for lsh152m. The anisotropic displacement factor exponent takes the form: $-2\pi^2 [h^2 a^{*2} U^{11} + \dots + 2 h k a^* b^* U^{12}]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
Si(1)	26(1)	39(1)	33(1)	8(1)	1(1)	1(1)
O(1)	30(1)	29(1)	42(2)	9(1)	5(1)	-3(1)
O(2)	32(1)	21(1)	37(1)	0(1)	8(1)	-3(1)
O(3)	35(1)	34(1)	46(2)	2(1)	-14(1)	0(1)
N(1)	26(1)	20(1)	28(1)	4(1)	3(1)	-2(1)
C(1)	15(2)	23(2)	39(2)	2(2)	-4(1)	-4(1)
C(2)	29(2)	25(2)	27(2)	-2(1)	-3(1)	-5(1)
C(3)	27(2)	18(2)	30(2)	-3(1)	-1(2)	-4(1)
C(4)	37(2)	43(2)	37(2)	4(2)	3(2)	9(2)
C(5)	34(2)	45(2)	60(3)	16(2)	1(2)	12(2)
C(6)	32(2)	37(2)	61(3)	3(2)	10(2)	1(2)
C(7)	39(2)	56(2)	42(2)	1(2)	13(2)	-5(2)
C(8)	38(2)	42(2)	35(2)	0(2)	-2(2)	-3(2)
C(9)	25(2)	25(2)	23(2)	4(1)	1(1)	2(1)
C(10)	26(2)	19(2)	30(2)	0(2)	3(1)	3(1)
C(11)	39(2)	28(2)	32(2)	2(2)	4(2)	3(1)
C(12)	43(2)	31(2)	52(2)	6(2)	14(2)	-7(2)
C(13)	34(2)	34(2)	65(3)	-5(2)	9(2)	-10(2)
C(14)	28(2)	46(2)	46(2)	-4(2)	0(2)	-3(2)
C(15)	31(2)	35(2)	33(2)	4(2)	2(2)	-4(1)
C(16)	24(2)	29(2)	25(2)	0(2)	2(1)	0(1)
C(17)	21(2)	31(2)	25(2)	-3(1)	3(1)	-4(1)
C(18)	26(2)	22(2)	27(2)	-1(1)	6(1)	2(1)
C(19)	29(2)	26(2)	30(2)	2(2)	1(2)	0(1)
C(20)	21(2)	24(2)	32(2)	0(1)	0(1)	0(1)
C(21)	33(2)	29(2)	36(2)	-3(2)	6(2)	-1(1)
C(22)	38(2)	46(2)	32(2)	-1(2)	7(2)	-4(2)
C(23)	45(2)	40(2)	40(2)	8(2)	-2(2)	-9(2)
C(24)	50(2)	23(2)	44(2)	1(2)	2(2)	-1(2)
C(25)	39(2)	31(2)	31(2)	0(2)	4(2)	2(1)
C(26)	53(2)	180(5)	32(2)	26(3)	0(2)	-18(3)

C(27)	37(2)	37(2)	120(4)	11(2)	-2(2)	9(2)
C(28)	30(2)	46(2)	58(2)	4(2)	-5(2)	-2(2)

Table 5. Hydrogen coordinates ($\times 10^4$) and isotropic displacement parameters ($\text{\AA}^2 \times 10^{-3}$) for lsh152m.

	x	y	z	U(eq)
H(3A)	3586	856	6118	57
H(2)	3131	-45	697	32
H(4)	3970	-227	4457	47
H(5)	4702	-349	3622	56
H(6)	4980	-302	145	52
H(7)	4515	-130	-2490	55
H(8)	3778	-14	-1646	46
H(9)	3016	326	1971	29
H(11)	3566	548	-128	39
H(12)	4216	792	-245	50
H(13)	4702	809	2690	53
H(14)	4549	575	5730	48
H(15)	3913	325	5813	40
H(16)	2721	336	7550	31
H(19)	2892	1125	7354	34
H(21)	3363	1024	2081	39
H(22)	3551	1332	-327	46
H(23)	3444	1738	586	50
H(24)	3162	1838	3965	46
H(25)	2988	1532	6402	40
H(26A)	2380	757	475	133
H(26B)	2450	1042	480	133
H(26C)	1958	932	202	133
H(27A)	2167	1347	4197	97
H(27B)	1981	1230	6343	97
H(27C)	1663	1249	4305	97
H(28A)	1462	711	4073	67
H(28B)	1734	671	6234	67
H(28C)	1861	519	4163	67

Table 1. Crystal data and structure refinement for lsh151m.

Identification code	lsh151m, 7b	
Empirical formula	C ₂₉ H ₃₁ Cl ₂ N O ₃ Si	
Formula weight	540.54	
Temperature	173(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P-1	
Unit cell dimensions	a = 9.9277(11) Å	α = 79.483(2)°.
	b = 11.5704(12) Å	β = 87.858(2)°.
	c = 13.2704(14) Å	γ = 72.576(2)°.
Volume	1429.7(3) Å ³	
Z	2	
Density (calculated)	1.256 Mg/m ³	
Absorption coefficient	0.299 mm ⁻¹	
F(000)	568	
Crystal size	0.45 x 0.30 x 0.18 mm ³	
Theta range for data collection	1.88 to 27.88°.	
Index ranges	-13 ≤ h ≤ 13, -15 ≤ k ≤ 15, -17 ≤ l ≤ 17	
Reflections collected	13412	
Independent reflections	6690 [R(int) = 0.0262]	
Completeness to theta = 27.88°	98.2 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.9482 and 0.8773	
Refinement method	Full-matrix least-squares on F ²	
Data / restraints / parameters	6690 / 0 / 329	
Goodness-of-fit on F ²	1.030	
Final R indices [I > 2σ(I)]	R1 = 0.0499, wR2 = 0.1126	
R indices (all data)	R1 = 0.0778, wR2 = 0.1251	
Largest diff. peak and hole	0.564 and -0.540 e.Å ⁻³	

Table 2. Atomic coordinates ($\times 10^4$) and equivalent isotropic displacement parameters ($\text{\AA}^2 \times 10^3$) for lsh151m. $U(\text{eq})$ is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	$U(\text{eq})$
Si(1)	1457(1)	2716(1)	2459(1)	32(1)
O(1)	25(2)	-1990(1)	1170(1)	47(1)
O(2)	2263(2)	-3147(1)	1586(1)	38(1)
O(3)	2659(2)	2005(2)	-524(1)	41(1)
N(1)	1778(2)	-1123(1)	1383(1)	29(1)
C(1)	1234(2)	-2061(2)	1356(1)	34(1)
C(2)	3620(2)	-2911(2)	1611(1)	31(1)
C(3)	4592(2)	-3863(2)	2390(2)	30(1)
C(4)	4106(2)	-4618(2)	3161(2)	37(1)
C(5)	5054(2)	-5488(2)	3866(2)	46(1)
C(6)	6470(2)	-5596(2)	3814(2)	49(1)
C(7)	6957(2)	-4850(2)	3053(2)	47(1)
C(8)	6032(2)	-3991(2)	2339(2)	38(1)
C(9)	3227(2)	-1548(2)	1772(1)	27(1)
C(10)	3359(2)	-1377(2)	2864(1)	25(1)
C(11)	4596(2)	-1220(2)	3189(2)	33(1)
C(12)	4780(2)	-1153(2)	4207(2)	39(1)
C(13)	3722(2)	-1210(2)	4900(2)	40(1)
C(14)	2473(2)	-1329(2)	4575(2)	39(1)
C(15)	2296(2)	-1419(2)	3563(2)	33(1)
C(16)	964(2)	125(2)	1140(1)	29(1)
C(17)	1446(2)	1049(2)	1198(1)	27(1)
C(18)	1853(2)	2007(2)	1261(1)	27(1)
C(19)	2591(2)	2575(2)	350(1)	31(1)
C(20)	4095(2)	2456(2)	650(1)	30(1)
C(21)	5109(2)	1312(2)	782(1)	34(1)
C(22)	6479(2)	1176(2)	1065(2)	44(1)
C(23)	6848(2)	2186(3)	1241(2)	51(1)
C(24)	5847(2)	3325(2)	1123(2)	51(1)
C(25)	4480(2)	3465(2)	822(2)	39(1)
C(26)	3072(2)	2316(2)	3274(2)	48(1)

C(27)	753(3)	4419(2)	2035(2)	50(1)
C(28)	108(2)	2109(2)	3199(2)	43(1)
Cl(1)	9792(1)	6446(1)	4246(1)	81(1)
Cl(2)	8385(1)	9024(1)	3495(1)	79(1)
C(29)	8541(3)	7498(2)	3391(2)	54(1)

Table 3. Bond lengths [Å] and angles [°] for lsh151m.

Si(1)-C(26)	1.859(2)	C(9)-C(10)	1.514(2)
Si(1)-C(28)	1.861(2)	C(10)-C(15)	1.385(3)
Si(1)-C(27)	1.867(2)	C(10)-C(11)	1.389(3)
Si(1)-C(18)	1.8949(19)	C(11)-C(12)	1.388(3)
O(1)-C(1)	1.211(2)	C(12)-C(13)	1.379(3)
O(2)-C(1)	1.353(3)	C(13)-C(14)	1.380(3)
O(2)-C(2)	1.455(2)	C(14)-C(15)	1.387(3)
O(3)-C(19)	1.426(2)	C(16)-C(17)	1.311(3)
N(1)-C(1)	1.355(2)	C(17)-C(18)	1.305(3)
N(1)-C(16)	1.412(2)	C(18)-C(19)	1.537(3)
N(1)-C(9)	1.455(2)	C(19)-C(20)	1.519(3)
C(2)-C(3)	1.495(3)	C(20)-C(21)	1.388(3)
C(2)-C(9)	1.559(3)	C(20)-C(25)	1.391(3)
C(3)-C(4)	1.389(3)	C(21)-C(22)	1.380(3)
C(3)-C(8)	1.393(3)	C(22)-C(23)	1.384(3)
C(4)-C(5)	1.389(3)	C(23)-C(24)	1.378(4)
C(5)-C(6)	1.373(3)	C(24)-C(25)	1.383(3)
C(6)-C(7)	1.376(3)	Cl(1)-C(29)	1.735(3)
C(7)-C(8)	1.380(3)	Cl(2)-C(29)	1.757(3)
C(26)-Si(1)-C(28)	109.03(11)	O(2)-C(2)-C(9)	103.94(15)
C(26)-Si(1)-C(27)	110.64(11)	C(3)-C(2)-C(9)	117.13(15)
C(28)-Si(1)-C(27)	110.47(11)	C(4)-C(3)-C(8)	119.16(19)
C(26)-Si(1)-C(18)	111.02(9)	C(4)-C(3)-C(2)	122.26(18)
C(28)-Si(1)-C(18)	108.44(9)	C(8)-C(3)-C(2)	118.58(17)
C(27)-Si(1)-C(18)	107.21(10)	C(3)-C(4)-C(5)	119.9(2)
C(1)-O(2)-C(2)	109.08(14)	C(6)-C(5)-C(4)	120.3(2)
C(1)-N(1)-C(16)	122.51(16)	C(5)-C(6)-C(7)	120.0(2)
C(1)-N(1)-C(9)	112.70(16)	C(6)-C(7)-C(8)	120.4(2)
C(16)-N(1)-C(9)	124.58(14)	C(7)-C(8)-C(3)	120.2(2)
O(1)-C(1)-O(2)	122.87(17)	N(1)-C(9)-C(10)	113.41(15)
O(1)-C(1)-N(1)	127.6(2)	N(1)-C(9)-C(2)	99.06(13)
O(2)-C(1)-N(1)	109.54(16)	C(10)-C(9)-C(2)	115.44(15)
O(2)-C(2)-C(3)	110.61(15)	C(15)-C(10)-C(11)	118.83(17)

C(15)-C(10)-C(9)	121.61(16)	O(3)-C(19)-C(20)	107.46(15)
C(11)-C(10)-C(9)	119.51(16)	O(3)-C(19)-C(18)	113.04(15)
C(12)-C(11)-C(10)	120.36(18)	C(20)-C(19)-C(18)	110.24(15)
C(13)-C(12)-C(11)	120.38(19)	C(21)-C(20)-C(25)	118.69(18)
C(12)-C(13)-C(14)	119.55(19)	C(21)-C(20)-C(19)	119.78(17)
C(13)-C(14)-C(15)	120.20(19)	C(25)-C(20)-C(19)	121.51(18)
C(10)-C(15)-C(14)	120.62(18)	C(22)-C(21)-C(20)	120.92(19)
C(17)-C(16)-N(1)	123.84(17)	C(21)-C(22)-C(23)	119.9(2)
C(18)-C(17)-C(16)	176.8(2)	C(24)-C(23)-C(22)	119.8(2)
C(17)-C(18)-C(19)	119.78(17)	C(23)-C(24)-C(25)	120.3(2)
C(17)-C(18)-Si(1)	119.25(14)	C(24)-C(25)-C(20)	120.4(2)
C(19)-C(18)-Si(1)	120.93(13)	Cl(1)-C(29)-Cl(2)	111.89(14)

Table 4. Anisotropic displacement parameters ($\text{\AA}^2 \times 10^3$) for lsh151m. The anisotropic displacement factor exponent takes the form: $-2\pi^2 [h^2 a^{*2}U^{11} + \dots + 2 h k a^* b^* U^{12}]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
Si(1)	33(1)	33(1)	33(1)	-10(1)	3(1)	-12(1)
O(1)	44(1)	51(1)	51(1)	6(1)	-19(1)	-30(1)
O(2)	45(1)	31(1)	43(1)	-2(1)	-12(1)	-21(1)
O(3)	42(1)	66(1)	26(1)	-10(1)	1(1)	-30(1)
N(1)	30(1)	30(1)	30(1)	-5(1)	-5(1)	-14(1)
C(1)	45(1)	36(1)	26(1)	-1(1)	-7(1)	-23(1)
C(2)	39(1)	30(1)	28(1)	-9(1)	3(1)	-16(1)
C(3)	36(1)	26(1)	33(1)	-12(1)	4(1)	-11(1)
C(4)	36(1)	35(1)	40(1)	-5(1)	3(1)	-13(1)
C(5)	51(1)	37(1)	46(1)	4(1)	-1(1)	-14(1)
C(6)	45(1)	36(1)	60(2)	-4(1)	-10(1)	-4(1)
C(7)	33(1)	38(1)	69(2)	-15(1)	1(1)	-7(1)
C(8)	40(1)	31(1)	45(1)	-12(1)	9(1)	-13(1)
C(9)	28(1)	27(1)	27(1)	-5(1)	0(1)	-12(1)
C(10)	26(1)	22(1)	28(1)	-4(1)	-2(1)	-8(1)
C(11)	29(1)	35(1)	37(1)	-10(1)	0(1)	-11(1)
C(12)	34(1)	44(1)	42(1)	-12(1)	-10(1)	-12(1)
C(13)	51(1)	40(1)	27(1)	-8(1)	-6(1)	-9(1)
C(14)	42(1)	42(1)	32(1)	-7(1)	7(1)	-13(1)
C(15)	30(1)	38(1)	34(1)	-6(1)	0(1)	-15(1)
C(16)	27(1)	35(1)	25(1)	-2(1)	-5(1)	-11(1)
C(17)	25(1)	32(1)	23(1)	-3(1)	-3(1)	-6(1)
C(18)	23(1)	30(1)	26(1)	-3(1)	-3(1)	-7(1)
C(19)	33(1)	33(1)	29(1)	-3(1)	-1(1)	-13(1)
C(20)	34(1)	37(1)	24(1)	-7(1)	3(1)	-16(1)
C(21)	37(1)	37(1)	30(1)	-7(1)	3(1)	-15(1)
C(22)	36(1)	51(1)	40(1)	-8(1)	0(1)	-8(1)
C(23)	36(1)	76(2)	48(1)	-24(1)	-1(1)	-21(1)
C(24)	49(1)	67(2)	57(2)	-37(1)	13(1)	-35(1)
C(25)	36(1)	40(1)	47(1)	-20(1)	10(1)	-16(1)
C(26)	53(1)	60(2)	37(1)	-15(1)	-5(1)	-20(1)

C(27)	50(1)	36(1)	64(2)	-15(1)	14(1)	-13(1)
C(28)	48(1)	48(1)	38(1)	-13(1)	12(1)	-20(1)
Cl(1)	103(1)	63(1)	70(1)	-14(1)	-24(1)	-7(1)
Cl(2)	45(1)	54(1)	140(1)	-26(1)	8(1)	-13(1)
C(29)	48(1)	53(2)	62(2)	-12(1)	0(1)	-18(1)

Table 5. Hydrogen coordinates ($\times 10^4$) and isotropic displacement parameters ($\text{\AA}^2 \times 10^{-3}$) for lsh151m.

	x	y	z	U(eq)
H(3)	1853	1969	-656	62
H(2)	4054	-2958	922	37
H(4)	3126	-4539	3205	44
H(5)	4722	-6010	4387	55
H(6)	7113	-6185	4303	59
H(7)	7937	-4927	3018	56
H(8)	6377	-3484	1812	45
H(9)	3810	-1108	1315	32
H(11)	5321	-1158	2713	39
H(12)	5639	-1067	4426	47
H(13)	3852	-1169	5597	48
H(14)	1732	-1349	5046	46
H(15)	1437	-1510	3348	39
H(16)	11	306	922	35
H(19)	2063	3469	154	38
H(21)	4857	613	675	40
H(22)	7167	391	1140	52
H(23)	7787	2095	1443	61
H(24)	6097	4017	1248	61
H(25)	3800	4255	733	46
H(26A)	2849	2720	3873	73
H(26B)	3804	2596	2877	73
H(26C)	3414	1422	3501	73
H(27A)	-82	4610	1591	74
H(27B)	1478	4725	1654	74
H(27C)	491	4814	2636	74
H(28A)	451	1207	3347	64
H(28B)	-773	2376	2796	64
H(28C)	-63	2424	3844	64
H(29A)	7615	7347	3524	64

H(29B)

8809

7375

2683

64

¹ Enders, D.; von Berg, S.; Jandeleit, B. In *Organic Syntheses*; Wiley & Sons: New York, 2003; Collect. Vol. 10, pp