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Dimethyl[2-oxido-1-naphthaldehyde (4-hydroxylbenzoyl)hydrazonato]tin(IV) dichloromethane solvate

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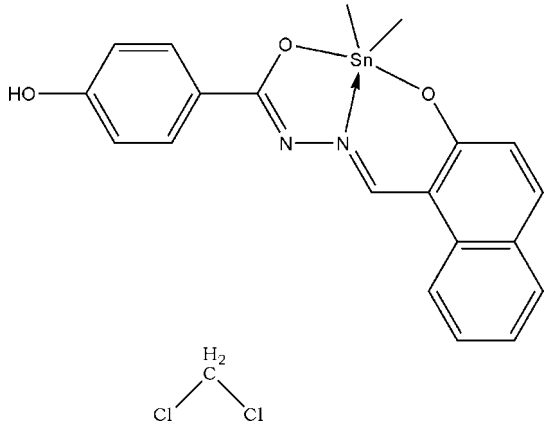
Key indicators: single-crystal X-ray study; T = 298 K; mean σ(C–C) = 0.005 Å; R factor = 0.029; wR factor = 0.087; data-to-parameter ratio = 14.4.

In the molecular structure of the title complex, $[Sn(CH_3)_2(C_{18}H_{12}N_2O_3)]\cdot CH_2Cl_2$, the Sn atom is in a distorted trigonal–bipyramidal environment, with Sn—O distances of 2.083 (3) and 2.143 (2) Å. In the crystal structure, the molecules are stabilized by intermolecular O—H···N hydrogen bonds, giving rise to the formation of one-dimensional chains.

Related literature

For the structure of a similar compound, $[Sn(C_6H_5)_2(C_{14}H_{10}N_2O_3)]\cdot C_2H_6O$, see: Hong *et al.* (2006).



Experimental

Crystal data

$[Sn(CH_3)_2(C_{18}H_{12}N_2O_3)]\cdot CH_2Cl_2$
M_r = 537.98
Monoclinic, $P2_1/n$
a = 11.982 (2) Å
b = 9.5097 (18) Å
c = 19.546 (4) Å
β = 103.695 (2)°
V = 2163.9 (7) Å^3
Z = 4
Mo $K\alpha$ radiation
μ = 1.45 mm^{-1}
T = 298 (2) K
0.55 × 0.41 × 0.29 mm

Data collection

Siemens SMART CCD area-detector diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996)
T_{min} = 0.502, T_{max} = 0.678
10791 measured reflections
3777 independent reflections
3000 reflections with $I > 2\sigma(I)$
R_{int} = 0.035

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.029
$wR(F^2)$ = 0.087
S = 1.00
3777 reflections
262 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 0.58 e Å^{-3}
$\Delta\rho_{min}$ = −0.63 e Å^{-3}

Table 1
Selected geometric parameters (Å, °).

Sn1—O1	2.083 (3)	Sn1—C20	2.109 (4)
Sn1—O2	2.143 (2)	Sn1—C19	2.114 (4)
Sn1—N1	2.166 (3)		
O1—Sn1—C20	94.20 (15)	C19—Sn1—O2	97.27 (15)
O1—Sn1—C19	95.68 (15)	O1—Sn1—N1	82.46 (10)
C20—Sn1—C19	123.96 (18)	C20—Sn1—N1	124.14 (14)
O1—Sn1—O2	154.97 (10)	C19—Sn1—N1	111.82 (16)
C20—Sn1—O2	96.18 (14)	O2—Sn1—N1	72.86 (9)

Table 2
Hydrogen-bond geometry (Å, °).

D—H···A	D—H	H···A	D···A	D—H···A
O3—H3···N2^{i}	0.82	2.03	2.802 (4)	158

Symmetry code: (i) $-x+\frac{3}{2}, y-\frac{1}{2}, -z+\frac{3}{2}$.

Data collection: *SMART* (Siemens, 1996); cell refinement: *SAINT* (Siemens, 1996); data reduction: *SAINT*; program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997*a*); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997*a*); molecular graphics: *SHELXTL* (Sheldrick, 1997*b*); software used to prepare material for publication: *SHELXTL*.

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Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: SU2025).

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supplementary materials

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Dimethyl[2-oxido-1-naphthaldehyde (4-hydroxylbenzoyl)hydrazonato]tin(IV) dichloromethane solvate

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Comment

The molecular structure of the title compound, (I), is shown in Fig. 1. The Sn atom has a distorted trigonal-bipyramidal geometry, with atoms O1 and O3 in axial positions [O1—Sn1—O2 = 154.97 (10)°], and atoms C19, C20 and N1 in equatorial positions. The sum of the equatorial angles C19—Sn1—C20, C19—Sn1—N1 and C20—Sn—N1 is 359.92 °, indicating approximate coplanarity for these atoms (Table 1). The Sn1—N1 bond length of 2.166 (3) Å is close to the sum of the non-polar covalent radii [2.15 Å], indicating a strong Sn—N interaction. The O atoms coordinate to the Sn atom with one short [2.083 (3) Å] and one long [2.143 (2) Å] bond. These distances are similar to those reported for compound $[Sn(C_6H_5)_2(C_{14}H_{10}N_2O_3)]\cdot C_2H_6O$ (*M*. Hong *et al.*, 2006)

The crystal packing in the unit cell (Fig. 2) shows that symmetry related molecules are connected by intermolecular O—H···N hydrogen bonds to form one-dimensional chains (Table 2).

Experimental

The reaction was carried out under a nitrogen atmosphere. 2-hydroxy-1-naphthaldehyde 4-hydroxybenzhydrazone (1 mmol) and sodium ethoxide (1.2 mmol) were added to 30 ml of benzene in a Schlenk flask and stirred for 0.5 h. Dimethyltin dichloride (1 mmol) was then added and the mixture stirred for 4 h at 313 K. The resulting clear solution was evaporated under vacuum. The product was crystallized from a mixture of dichloromethane/methanol (1:1). Analysis calculated for $C_{21}H_{20}Cl_2N_2O_3Sn$ (Mr = 538.01): C, 46.88; H, 3.75; N, 5.21, found: C, 46.75; H, 3.70; N, 5.34.

Refinement

The H atoms were fixed geometrically and treated as riding atoms: O—H = 0.82 Å, with U_{iso}(H) = 1.5U_{eq}(O), and C—H distances = 0.93 − 0.97 Å, with U_{iso}(H) = 1.2 or 1.5U_{eq}(C).

Figures

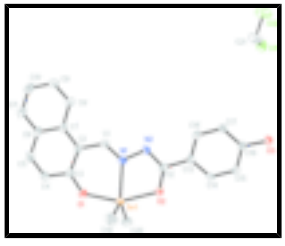

Fig. 1. The molecular structure of complex (I), showing 30% probability displacement ellipsoids and the atom-numbering scheme. H atoms have been omitted for clarity.

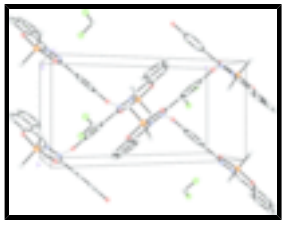

Fig. 2. The crystal packing of the complex (I), showing the hydrogen bonds as dashed lines. H atoms not involved in hydrogen bonding have been omitted for clarity.

Dimethyl[2-oxido-1-naphthaldehyde (4-hydroxylbenzoyl)hydrazonato]tin(IV) dichloromethane solvate

Crystal data

$[Sn(CH_3)_2(C_{18}H_{12}N_2O_3)]\cdot CH_2Cl_2$	F_{000} = 1072
M_r = 537.98	D_x = 1.651 Mg m^{-3}
Monoclinic, $P2_1/n$	Mo $K\alpha$ radiation λ = 0.71073 Å
Hall symbol: -P 2yn	Cell parameters from 5069 reflections
a = 11.982 (2) Å	θ = 2.3–27.1º
b = 9.5097 (18) Å	μ = 1.45 mm^{-1}
c = 19.546 (4) Å	T = 298 (2) K
β = 103.695 (2)º	Block, orange
V = 2163.9 (7) Å^3	0.55 × 0.41 × 0.29 mm
Z = 4	

Data collection

Siemens SMART CCD area-detector diffractometer	3777 independent reflections
Radiation source: fine-focus sealed tube	3000 reflections with $I > 2\sigma(I)$
Monochromator: graphite	R_{int} = 0.035
T = 298(2) K	θ_{max} = 25.0º
phi and ω scans	θ_{min} = 1.8º
Absorption correction: multi-scan (SADABS; Sheldrick, 1996)	h = −11→14
T_{min} = 0.502, T_{max} = 0.678	k = −11→10
10791 measured reflections	l = −23→22

Refinement

Refinement on F^2	Secondary atom site location: difference Fourier map
Least-squares matrix: full	Hydrogen site location: inferred from neighbouring sites
$R[F^2 > 2\sigma(F^2)]$ = 0.029	H-atom parameters constrained
$wR(F^2)$ = 0.087	$w = 1/[\sigma^2(F_o^2) + (0.0484P)^2 + 1.2287P]$ where $P = (F_o^2 + 2F_c^2)/3$
S = 1.00	$(\Delta/\sigma)_{max}$ = 0.001
3777 reflections	$\Delta\rho_{max}$ = 0.58 e Å^{-3}
262 parameters	$\Delta\rho_{min}$ = −0.63 e Å^{-3}

Primary atom site location: structure-invariant direct methods

Extinction correction: none

Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å^2)

	x	*y*	*z*	U_{iso}*/U_{eq}
Sn1	0.69105 (2)	0.12092 (3)	1.031909 (12)	0.03692 (11)
Cl1	0.48588 (13)	0.75043 (17)	0.18170 (7)	0.0890 (4)
Cl2	0.67495 (19)	0.5571 (2)	0.18748 (11)	0.1248 (7)
N1	0.8191 (2)	0.1238 (3)	0.97009 (13)	0.0334 (7)
N2	0.7961 (2)	0.0389 (3)	0.90942 (14)	0.0340 (7)
O1	0.8042 (2)	0.2621 (3)	1.09417 (14)	0.0538 (8)
O2	0.6263 (2)	−0.0054 (3)	0.94030 (13)	0.0436 (6)
O3	0.5513 (2)	−0.4064 (3)	0.67608 (13)	0.0416 (6)
H3	0.6052	−0.4350	0.6607	0.062*
C1	0.9167 (3)	0.1905 (4)	0.98265 (18)	0.0344 (8)
H1	0.9620	0.1750	0.9507	0.041*
C2	0.9629 (3)	0.2840 (4)	1.03904 (17)	0.0332 (8)
C3	0.9035 (3)	0.3163 (4)	1.09172 (19)	0.0376 (8)
C4	0.9531 (3)	0.4126 (4)	1.1455 (2)	0.0429 (9)
H4	0.9132	0.4363	1.1792	0.051*
C5	1.0565 (3)	0.4709 (4)	1.14893 (19)	0.0415 (9)
H5	1.0868	0.5322	1.1857	0.050*
C6	1.1205 (3)	0.4416 (4)	1.09835 (19)	0.0361 (8)
C7	1.0735 (3)	0.3485 (3)	1.04206 (18)	0.0322 (8)
C8	1.1405 (3)	0.3236 (5)	0.9928 (2)	0.0473 (10)
H8	1.1117	0.2658	0.9543	0.057*
C9	1.2465 (4)	0.3825 (5)	1.0005 (2)	0.0532 (11)
H9	1.2887	0.3635	0.9673	0.064*
C10	1.2928 (4)	0.4705 (4)	1.0569 (2)	0.0525 (11)
H10	1.3658	0.5084	1.0619	0.063*
C11	1.2306 (3)	0.5003 (4)	1.1045 (2)	0.0449 (9)
H11	1.2608	0.5604	1.1419	0.054*
C12	0.6966 (3)	−0.0228 (4)	0.89995 (17)	0.0314 (8)
C13	0.6610 (3)	−0.1220 (3)	0.83962 (17)	0.0315 (7)
C14	0.5467 (3)	−0.1606 (4)	0.81672 (18)	0.0379 (9)
H14	0.4929	−0.1227	0.8389	0.045*
C15	0.5108 (3)	−0.2539 (4)	0.76193 (18)	0.0376 (8)
H15	0.4335	−0.2773	0.7470	0.045*
C16	0.5909 (3)	−0.3127 (4)	0.72916 (17)	0.0326 (8)
C17	0.7056 (3)	−0.2758 (4)	0.75147 (17)	0.0334 (8)
H17	0.7595	−0.3153	0.7299	0.040*
C18	0.7399 (3)	−0.1811 (4)	0.80529 (18)	0.0343 (8)
H18	0.8169	−0.1558	0.8192	0.041*
C19	0.7199 (4)	−0.0443 (5)	1.1064 (2)	0.0606 (12)
H19A	0.7891	−0.0933	1.1043	0.091*
H19B	0.6563	−0.1085	1.0959	0.091*
H19C	0.7274	−0.0063	1.1528	0.091*
C20	0.5496 (3)	0.2591 (4)	1.0161 (2)	0.0506 (10)

H20A	0.5543	0.3256	0.9800	0.076*
H20B	0.5506	0.3083	1.0592	0.076*
H20C	0.4796	0.2063	1.0021	0.076*
C21	0.5843 (6)	0.6352 (6)	0.2328 (3)	0.095 (2)
H21A	0.6301	0.6862	0.2726	0.114*
H21B	0.5427	0.5623	0.2510	0.114*

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Sn1	0.03455 (16)	0.04512 (18)	0.03349 (15)	−0.00971 (11)	0.01285 (11)	−0.00709 (11)
Cl1	0.0785 (10)	0.1087 (12)	0.0733 (8)	0.0103 (8)	0.0050 (7)	−0.0048 (8)
Cl2	0.1263 (16)	0.1530 (17)	0.1148 (14)	0.0467 (14)	0.0675 (12)	0.0267 (13)
N1	0.0377 (17)	0.0354 (17)	0.0292 (14)	−0.0092 (13)	0.0118 (13)	−0.0069 (12)
N2	0.0364 (17)	0.0380 (17)	0.0280 (14)	−0.0083 (13)	0.0089 (13)	−0.0077 (12)
O1	0.0437 (16)	0.073 (2)	0.0493 (15)	−0.0244 (15)	0.0208 (13)	−0.0268 (15)
O2	0.0368 (14)	0.0573 (17)	0.0403 (14)	−0.0180 (13)	0.0164 (12)	−0.0172 (13)
O3	0.0390 (15)	0.0496 (16)	0.0367 (13)	−0.0041 (12)	0.0101 (11)	−0.0129 (12)
C1	0.0289 (19)	0.039 (2)	0.0370 (18)	−0.0049 (16)	0.0116 (15)	−0.0013 (16)
C2	0.0305 (19)	0.0351 (19)	0.0321 (17)	−0.0005 (15)	0.0039 (15)	−0.0008 (15)
C3	0.033 (2)	0.041 (2)	0.0395 (19)	−0.0044 (17)	0.0109 (16)	−0.0063 (16)
C4	0.041 (2)	0.048 (2)	0.040 (2)	−0.0049 (18)	0.0113 (17)	−0.0133 (17)
C5	0.042 (2)	0.038 (2)	0.041 (2)	−0.0043 (17)	0.0037 (17)	−0.0075 (16)
C6	0.035 (2)	0.0258 (18)	0.042 (2)	−0.0033 (15)	−0.0009 (16)	0.0030 (15)
C7	0.0312 (18)	0.0283 (18)	0.0344 (17)	0.0018 (15)	0.0027 (15)	0.0053 (14)
C8	0.041 (2)	0.057 (3)	0.044 (2)	−0.0080 (19)	0.0109 (18)	−0.0068 (19)
C9	0.038 (2)	0.066 (3)	0.060 (3)	−0.004 (2)	0.020 (2)	−0.003 (2)
C10	0.038 (2)	0.054 (3)	0.064 (3)	−0.016 (2)	0.009 (2)	0.004 (2)
C11	0.038 (2)	0.041 (2)	0.052 (2)	−0.0076 (17)	0.0029 (19)	0.0002 (19)
C12	0.0326 (19)	0.0326 (19)	0.0293 (17)	−0.0019 (15)	0.0078 (15)	0.0018 (14)
C13	0.0341 (19)	0.0301 (18)	0.0292 (16)	−0.0038 (15)	0.0057 (14)	0.0046 (14)
C14	0.036 (2)	0.047 (2)	0.0358 (18)	−0.0066 (17)	0.0173 (16)	−0.0112 (16)
C15	0.0292 (19)	0.046 (2)	0.0375 (18)	−0.0079 (16)	0.0087 (15)	−0.0061 (17)
C16	0.0353 (19)	0.0326 (19)	0.0293 (17)	−0.0009 (15)	0.0063 (15)	0.0005 (14)
C17	0.033 (2)	0.035 (2)	0.0331 (17)	0.0032 (15)	0.0093 (15)	−0.0008 (15)
C18	0.0287 (18)	0.0341 (19)	0.0380 (18)	−0.0020 (15)	0.0040 (15)	0.0019 (15)
C19	0.074 (3)	0.059 (3)	0.050 (2)	−0.005 (2)	0.016 (2)	0.004 (2)
C20	0.045 (2)	0.054 (3)	0.057 (2)	−0.002 (2)	0.019 (2)	−0.002 (2)
C21	0.121 (6)	0.093 (4)	0.083 (4)	0.028 (4)	0.049 (4)	0.017 (3)

Geometric parameters (Å, °)

Sn1—O1	2.083 (3)	C8—C9	1.364 (6)
Sn1—O2	2.143 (2)	C8—H8	0.9300
Sn1—N1	2.166 (3)	C9—C10	1.391 (6)
Sn1—C20	2.109 (4)	C9—H9	0.9300
Sn1—C19	2.114 (4)	C10—C11	1.353 (6)
Cl1—C21	1.741 (6)	C10—H10	0.9300
Cl2—C21	1.723 (6)	C11—H11	0.9300

N1—C1	1.302 (4)	C12—C13	1.492 (5)
N1—N2	1.407 (4)	C13—C14	1.386 (5)
N2—C12	1.302 (4)	C13—C18	1.400 (5)
O1—C3	1.308 (4)	C14—C15	1.378 (5)
O2—C12	1.294 (4)	C14—H14	0.9300
O3—C16	1.365 (4)	C15—C16	1.391 (5)
O3—H3	0.8200	C15—H15	0.9300
C1—C2	1.422 (5)	C16—C17	1.384 (5)
C1—H1	0.9300	C17—C18	1.372 (5)
C2—C3	1.417 (5)	C17—H17	0.9300
C2—C7	1.450 (5)	C18—H18	0.9300
C3—C4	1.414 (5)	C19—H19A	0.9600
C4—C5	1.343 (5)	C19—H19B	0.9600
C4—H4	0.9300	C19—H19C	0.9600
C5—C6	1.415 (5)	C20—H20A	0.9600
C5—H5	0.9300	C20—H20B	0.9600
C6—C11	1.411 (5)	C20—H20C	0.9600
C6—C7	1.420 (5)	C21—H21A	0.9700
C7—C8	1.411 (5)	C21—H21B	0.9700
O1—Sn1—C20	94.20 (15)	C11—C10—H10	120.3
O1—Sn1—C19	95.68 (15)	C9—C10—H10	120.3
C20—Sn1—C19	123.96 (18)	C10—C11—C6	120.9 (4)
O1—Sn1—O2	154.97 (10)	C10—C11—H11	119.5
C20—Sn1—O2	96.18 (14)	C6—C11—H11	119.5
C19—Sn1—O2	97.27 (15)	O2—C12—N2	124.2 (3)
O1—Sn1—N1	82.46 (10)	O2—C12—C13	117.2 (3)
C20—Sn1—N1	124.14 (14)	N2—C12—C13	118.6 (3)
C19—Sn1—N1	111.82 (16)	C14—C13—C18	117.8 (3)
O2—Sn1—N1	72.86 (9)	C14—C13—C12	119.9 (3)
C1—N1—N2	115.2 (3)	C18—C13—C12	122.3 (3)
C1—N1—Sn1	128.6 (2)	C15—C14—C13	121.6 (3)
N2—N1—Sn1	116.09 (19)	C15—C14—H14	119.2
C12—N2—N1	111.6 (3)	C13—C14—H14	119.2
C3—O1—Sn1	134.8 (2)	C14—C15—C16	119.6 (3)
C12—O2—Sn1	114.9 (2)	C14—C15—H15	120.2
C16—O3—H3	109.5	C16—C15—H15	120.2
N1—C1—C2	128.1 (3)	O3—C16—C17	123.1 (3)
N1—C1—H1	115.9	O3—C16—C15	117.3 (3)
C2—C1—H1	115.9	C17—C16—C15	119.6 (3)
C3—C2—C1	121.9 (3)	C18—C17—C16	120.2 (3)
C3—C2—C7	119.4 (3)	C18—C17—H17	119.9
C1—C2—C7	118.7 (3)	C16—C17—H17	119.9
O1—C3—C4	117.0 (3)	C17—C18—C13	121.1 (3)
O1—C3—C2	123.9 (3)	C17—C18—H18	119.4
C4—C3—C2	119.0 (3)	C13—C18—H18	119.4
C5—C4—C3	121.6 (4)	Sn1—C19—H19A	109.5
C5—C4—H4	119.2	Sn1—C19—H19B	109.5
C3—C4—H4	119.2	H19A—C19—H19B	109.5
C4—C5—C6	122.0 (3)	Sn1—C19—H19C	109.5

C4—C5—H5	119.0	H19A—C19—H19C	109.5
C6—C5—H5	119.0	H19B—C19—H19C	109.5
C11—C6—C5	120.8 (3)	Sn1—C20—H20A	109.5
C11—C6—C7	120.2 (4)	Sn1—C20—H20B	109.5
C5—C6—C7	118.9 (3)	H20A—C20—H20B	109.5
C8—C7—C6	116.6 (3)	Sn1—C20—H20C	109.5
C8—C7—C2	124.3 (3)	H20A—C20—H20C	109.5
C6—C7—C2	119.1 (3)	H20B—C20—H20C	109.5
C9—C8—C7	121.4 (4)	Cl2—C21—Cl1	113.6 (3)
C9—C8—H8	119.3	Cl2—C21—H21A	108.8
C7—C8—H8	119.3	Cl1—C21—H21A	108.8
C8—C9—C10	121.3 (4)	Cl2—C21—H21B	108.8
C8—C9—H9	119.3	Cl1—C21—H21B	108.8
C10—C9—H9	119.3	H21A—C21—H21B	107.7
C11—C10—C9	119.4 (4)		
O1—Sn1—N1—C1	2.6 (3)	C11—C6—C7—C8	−2.2 (5)
C20—Sn1—N1—C1	92.6 (3)	C5—C6—C7—C8	179.6 (3)
C19—Sn1—N1—C1	−90.5 (3)	C11—C6—C7—C2	176.8 (3)
O2—Sn1—N1—C1	178.4 (3)	C5—C6—C7—C2	−1.4 (5)
O1—Sn1—N1—N2	−179.8 (2)	C3—C2—C7—C8	179.7 (4)
C20—Sn1—N1—N2	−89.8 (3)	C1—C2—C7—C8	−0.8 (5)
C19—Sn1—N1—N2	87.1 (3)	C3—C2—C7—C6	0.7 (5)
O2—Sn1—N1—N2	−4.0 (2)	C1—C2—C7—C6	−179.7 (3)
C1—N1—N2—C12	−179.2 (3)	C6—C7—C8—C9	2.1 (6)
Sn1—N1—N2—C12	2.8 (4)	C2—C7—C8—C9	−176.8 (4)
C20—Sn1—O1—C3	−124.8 (4)	C7—C8—C9—C10	−0.5 (7)
C19—Sn1—O1—C3	110.5 (4)	C8—C9—C10—C11	−1.2 (7)
O2—Sn1—O1—C3	−10.4 (6)	C9—C10—C11—C6	1.1 (6)
N1—Sn1—O1—C3	−0.9 (4)	C5—C6—C11—C10	178.8 (4)
O1—Sn1—O2—C12	14.6 (4)	C7—C6—C11—C10	0.6 (6)
C20—Sn1—O2—C12	128.6 (3)	Sn1—O2—C12—N2	−5.3 (4)
C19—Sn1—O2—C12	−106.0 (3)	Sn1—O2—C12—C13	173.7 (2)
N1—Sn1—O2—C12	4.7 (2)	N1—N2—C12—O2	1.6 (5)
N2—N1—C1—C2	179.4 (3)	N1—N2—C12—C13	−177.3 (3)
Sn1—N1—C1—C2	−2.9 (6)	O2—C12—C13—C14	17.9 (5)
N1—C1—C2—C3	0.5 (6)	N2—C12—C13—C14	−163.1 (3)
N1—C1—C2—C7	−179.1 (3)	O2—C12—C13—C18	−160.8 (3)
Sn1—O1—C3—C4	179.3 (3)	N2—C12—C13—C18	18.2 (5)
Sn1—O1—C3—C2	−0.8 (6)	C18—C13—C14—C15	−0.1 (5)
C1—C2—C3—O1	1.5 (6)	C12—C13—C14—C15	−178.9 (3)
C7—C2—C3—O1	−179.0 (3)	C13—C14—C15—C16	0.9 (6)
C1—C2—C3—C4	−178.6 (3)	C14—C15—C16—O3	178.8 (3)
C7—C2—C3—C4	1.0 (5)	C14—C15—C16—C17	−0.7 (5)
O1—C3—C4—C5	177.9 (4)	O3—C16—C17—C18	−179.8 (3)
C2—C3—C4—C5	−2.0 (6)	C15—C16—C17—C18	−0.4 (5)
C3—C4—C5—C6	1.3 (6)	C16—C17—C18—C13	1.2 (5)
C4—C5—C6—C11	−177.8 (4)	C14—C13—C18—C17	−1.0 (5)
C4—C5—C6—C7	0.4 (6)	C12—C13—C18—C17	177.8 (3)

Hydrogen-bond geometry (Å, °)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
O3—H3···N2^{i}	0.82	2.03	2.802 (4)	158

Symmetry codes: (i) −*x*+3/2, *y*−1/2, −*z*+3/2.

Fig. 1

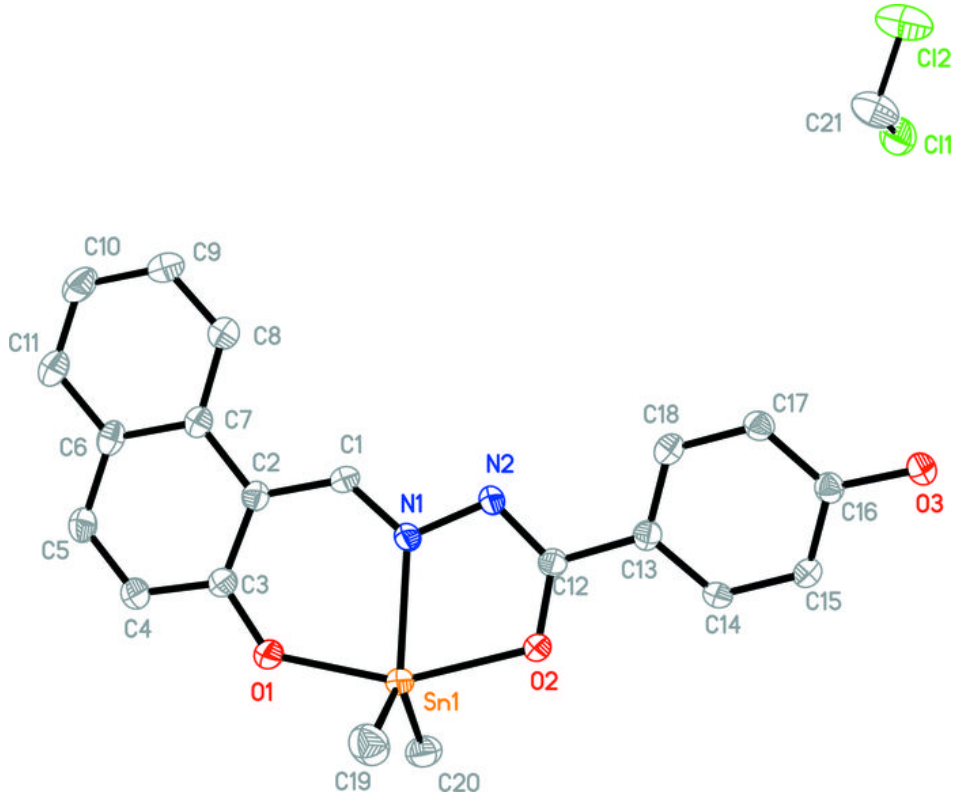
Cl2
C21
Cl1
C10
C9
C11
C8
C7
C6
C2
C1
N1
N2
C18
C17
O3
C16
C5
C3
C12
C13
C15
C4
C14
O1
Sn1
O2
C19
C20

Fig. 2