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Tetrapotassium diantimony(III) tin(IV) tetradecafluoride

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Key indicators: single-crystal X-ray study; T = 298 K; mean σ(Sn–F) = 0.002 Å; R factor = 0.038; wR factor = 0.091; data-to-parameter ratio = 47.3.

The title compound, $K_4Sb_2SnF_{14}$, is built from anionic layers, with an overall composition of $[Sb_2SnF_{14}]^{4-}$ extending parallel to the *ac* plane, and K^+ cations. The layers are made up from vertex-sharing centrosymmetric SnF_6 octahedra and Sb_2F_{12} dimers. The Sn—F distances are in the range 1.9581 (14)–1.9611 (17) Å. The Sb polyhedra contain three short terminal Sb—F bonds [1.9380 (14)–2.0696 (15) Å], one short bridging bond [2.0609 (17) Å], one bridging bond of medium length [2.7516 (15) Å], and two longer bridging bonds [3.0471 (18) and 3.117 (2) Å]. The K^+ ions are coordinated by F atoms with coordination numbers 10 and 8, and K—F bond lengths are in the range 2.6235 (16)–3.122 (2) Å.

Related literature

For related literature, see: Blatov (2004); Davidovich & Zemnukhova (1975); Gillespie (1970); Kriegsmann & Kessler (1962); Serezhkin *et al.* (1997).

Experimental

Crystal data

$K_4Sb_2SnF_{14}$
M_r = 784.59
Triclinic, $P\bar{1}$
a = 6.7356 (2) Å
b = 7.4704 (2) Å
c = 7.6370 (2) Å
α = 92.691 (1)°
β = 91.461 (1)°
γ = 115.323 (1)°
V = 346.53 (2) Å^3
Z = 1
Mo $K\alpha$ radiation
μ = 7.00 mm^{-1}
T = 298 (2) K
0.4 × 0.35 × 0.28 mm

Data collection

Bruker SMART 1000 CCD area-detector diffractometer
Absorption correction: Gaussian (*XPREP* and *SADABS*; Bruker, 2003)
T_{min} = 0.136, T_{max} = 0.291
7147 measured reflections
4635 independent reflections
4250 reflections with $I > 2\sigma(I)$
R_{int} = 0.024

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.037
$wR(F^2)$ = 0.090
S = 1.30
4635 reflections
98 parameters
$\Delta\rho_{max}$ = 1.91 e Å^{-3}
$\Delta\rho_{min}$ = −3.69 e Å^{-3}

Table 1
Selected bond lengths (Å).

Sb—F1	1.9380 (14)	K1—F3^{iv}	2.8390 (18)
Sb—F3	1.9539 (13)	K1—F5^{iv}	2.8578 (16)
Sb—F4	2.0609 (17)	K1—F1	2.9262 (15)
Sb—F2	2.0696 (15)	K1—F3	2.9485 (18)
Sb—F4^{i}	2.7516 (15)	K1—F4^{vi}	2.982 (2)
Sb—F5^{ii}	3.0471 (18)	K1—F7^{vi}	3.122 (2)
Sb—F6	3.117 (2)	K2—F2^{vii}	2.6662 (15)
Sn—F5	1.9581 (14)	K2—F2^{v}	2.6777 (18)
Sn—F7	1.9611 (17)	K2—F3^{iv}	2.7136 (15)
Sn—F6	1.9611 (16)	K2—F1	2.7216 (15)
K1—F4^{iv}	2.6235 (16)	K2—F7^{viii}	2.7620 (19)
K1—F2	2.7086 (14)	K2—F7^{ix}	2.8795 (17)
K1—F1^{v}	2.7268 (16)	K2—F6^{i}	2.8943 (16)
K1—F6^{vi}	2.811 (2)	K2—F5^{iv}	2.9912 (18)

Symmetry codes: (i) $-x+1, -y, -z+1$; (ii) $x-1, y, z$; (iii) $-x+2, -y, -z$; (iv) $-x+2, -y+1, -z+1$; (v) $-x+1, -y+1, -z+1$; (vi) $x, y+1, z$; (vii) $x, y, z+1$; (viii) $-x+2, -y, -z+1$; (ix) $x, y+1, z+1$.

Data collection: *SMART* (Bruker, 1998); cell refinement: *SAINT* (Bruker, 2003); data reduction: *SAINT*; program(s) used to solve structure: *SHELXTL* (Sheldrick, 2008); program(s) used to refine structure: *SHELXTL*; molecular graphics: *XP* in *SHELXTL*; software used to prepare material for publication: *publCIF* (Westrip, 2008).

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Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: FI2062).

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supporting information

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Tetrapotassium diantimony(III) tin(IV) tetradecafluoride

A. V. Gerasimenko, E. B. Merkulov and T. I. Usol'tseva

S1. Comment

The asymmetric unit of the title compound, $K_4Sb_2SnF_{14}$, (I), contains one crystallographically independent Sb atom, one Sn atom on a special position (Wyckoff position 1a), seven fluorine atoms and two potassium cations. The Sn atoms are coordinated by six F atoms in a centrosymmetric, slightly distorted octahedral environment (Fig. 1a), with Sn—F distances ranging from 1.9581 (14) to 1.9611 (17) Å (Table 1). The nearest environment of the Sb atom is formed by four fluorine atoms with Sb—F bond distances ranging from 1.9380 (14) to 2.0696 (15) Å. Taking into account a lone electron pair (E), the coordination polyhedron of Sb(III) can be described as a trigonal bipyramid (Gillespie, 1970). Three fluorine atoms, $F4^{i}$, $F5^{ii}$ and F6, are involved in the second coordination sphere of Sb with Sb—F bond distances of 2.7516 (15), 3.0471 (18) and 3.117 (2) Å, respectively. Two Sb polyhedra are linked by double fluorine bridges (F4 and $F4^{i}$) to form a centrosymmetric dimer (Fig. 1 b), with an Sb···Sb^{i} distance of 3.9925 (2) Å.

The Sn(IV) and Sb(III) complexes are bound via fluorine bridges yielding the anionic layers $[Sb_2SnF_{14}]^{4-}$ parallel to the *ac* plane (Fig. 2), with Sn···Sb distances of 4.21660 (15) and 4.33908 (16) Å. Such layers alternate with layers of potassium cations (Fig.3).

The coordination numbers (CN) of the potassium cations were calculated by the method of intersecting spheres (Serezhkin *et al.*, 1997) with use of the program package *TOPOS* (Blatov, 2004). For the K1 (Fig. 4a), the CN is 10 [K1—F, 2.6235 (16) – 3.122 (2) Å] and for the K2 (Fig. 4 b), the CN is 8 [K2—F, 2.6662 (15) – 2.9912 (18) Å].

S2. Experimental

$KSbF_4$ (5.94 g, 0.025 mol) was reacted with $K_2SnF_6.H_2O$ (8.21 g, 0.025 mol) in a solution of hydrofluoric acid (10%, 200 ml; Reachem(Russia), 99.99% purity). The solution obtained was evaporated in air at room temperature down to 1/3 of the initial volume. Then the precipitate was separated from solution and dried to constant weight (1.98 g). The complexes $KSbF_4$ and $K_2SnF_6.H_2O$ were prepared according to (Davidovich & Zemnukhova, 1975; Kriegsmann & Kessler, 1962).

S3. Refinement

The maximum peak and deepest hole are located 0.70 Å and 0.96 Å, respectively, from Sn.

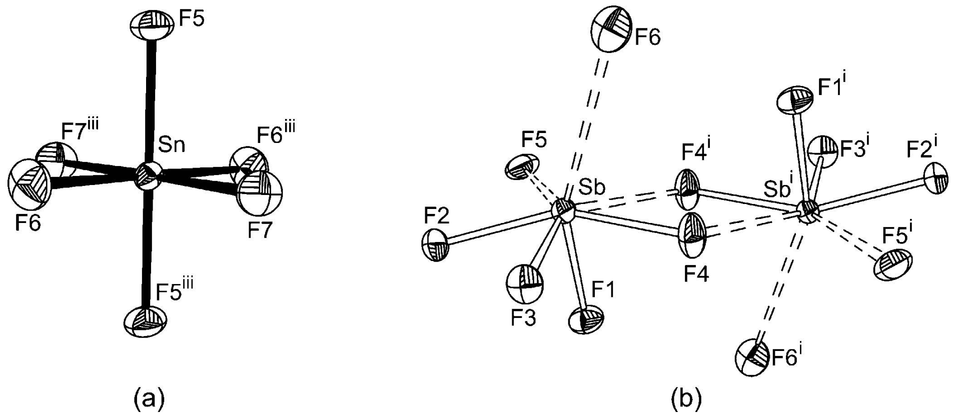

Figure 1

(*a*) the Sn and (*b*) Sb coordination polyhedra, with displacement ellipsoids drawn at the 50% probability level. Symmetry codes are given in Table 1.

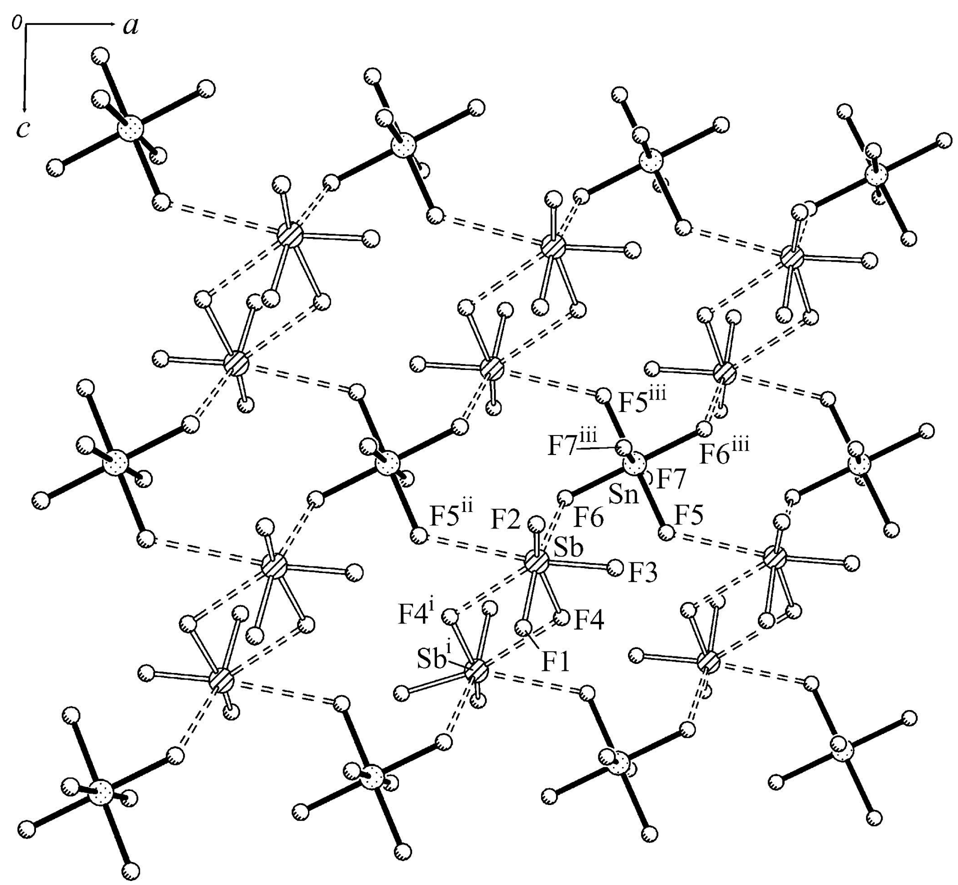

Figure 2

Fragment of the anionic layer $[Sb_2SnF_{14}]^{4-}$ viewed along the *b* axis.

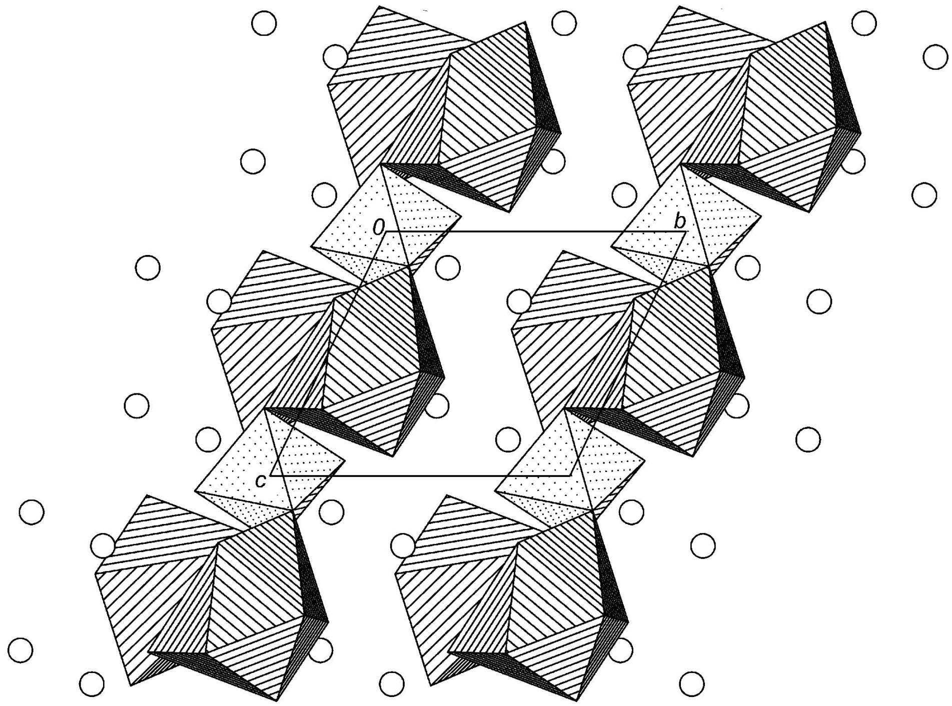

Figure 3

The structure of (I), viewed along the *a* axis. Sn octahedra are shown as dotted, Sb dimers as parallel lines and K atoms as white spheres.

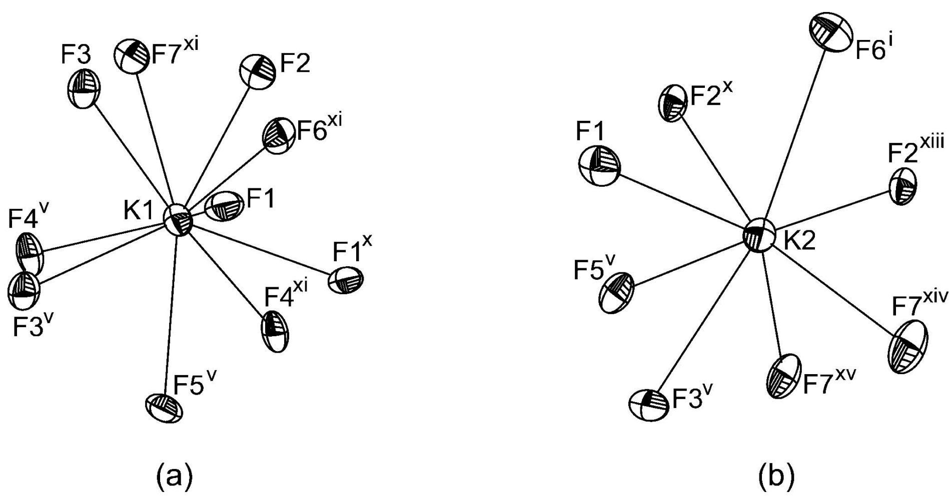

Figure 4

(*a*) the K1 and (*b*) K2 coordination polyhedra, with displacement ellipsoids drawn at the 50% probability level. Symmetry codes are given in Table 1.

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Crystal data

$K_4Sb_2SnF_{14}$	a = 6.7356 (2) Å
M_r = 784.59	b = 7.4704 (2) Å
Triclinic, $P\overline{1}$	c = 7.6370 (2) Å

α = 92.691 (1)°
β = 91.461 (1)°
γ = 115.323 (1)°
V = 346.53 (2) Å^3
Z = 1
F(000) = 354
D_x = 3.760 Mg m^{-3}
Mo $K\alpha$ radiation, λ = 0.71073 Å
Cell parameters from 2472 reflections
θ = 3.4–46.9°
μ = 7.00 mm^{-1}
T = 298 K
Prism, colourless
0.4 × 0.35 × 0.28 mm

Data collection

Bruker SMART 1000 CCD area-detector diffractometer
Radiation source: fine-focus sealed tube
Graphite monochromator
Detector resolution: 8.33 pixels mm^{-1}
φ and ω scans
Absorption correction: gaussian (*XPREP* and *SADABS*; Bruker, 2003)
T_{min} = 0.136, T_{max} = 0.291
7147 measured reflections
4635 independent reflections
4250 reflections with $I > 2\sigma(I)$
R_{int} = 0.024
θ_{max} = 47.0°, θ_{min} = 3.4°
$h = -9 \rightarrow 13$
$k = -15 \rightarrow 9$
$l = -15 \rightarrow 11$

Refinement

Refinement on F^2
Least-squares matrix: full
$R[F^2 > 2\sigma(F^2)]$ = 0.037
$wR(F^2)$ = 0.090
S = 1.30
4635 reflections
98 parameters
0 restraints
Primary atom site location: structure-invariant direct methods
Secondary atom site location: difference Fourier map
$w = 1/[\sigma^2(F_o^2) + (0.0258P)^2 + 0.7101P]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max}$ = 0.003
$\Delta\rho_{max}$ = 1.91 e Å^{-3}
$\Delta\rho_{min}$ = −3.69 e Å^{-3}
Extinction correction: *SHELXTL* (Sheldrick, 2008), $Fc^*=kFc[1+0.001xFc^2\lambda^3/\sin(2\theta)]^{-1/4}$
Extinction coefficient: 0.0782 (13)

Special details

Geometry. All e.s.d.'s (except the e.s.d. in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell e.s.d.'s are taken into account individually in the estimation of e.s.d.'s in distances, angles and torsion angles; correlations between e.s.d.'s in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell e.s.d.'s is used for estimating e.s.d.'s involving l.s. planes.

Refinement. Refinement of F^2 against ALL reflections. The weighted R-factor wR and goodness of fit S are based on F^2, conventional R-factors R are based on F, with F set to zero for negative F^2. The threshold expression of $F^2 > \sigma(F^2)$ is used only for calculating R-factors(gt) *etc*. and is not relevant to the choice of reflections for refinement. R-factors based on F^2 are statistically about twice as large as those based on F, and R- factors based on ALL data will be even larger.

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

	x	y	z	U_{iso}*/U_{eq}
Sb	0.611210 (19)	0.191057 (16)	0.312309 (15)	0.01531 (2)
Sn	1.0000	0.0000	0.0000	0.01467 (3)
K1	0.85162 (7)	0.73682 (7)	0.41457 (6)	0.02301 (9)
K2	0.71347 (7)	0.44513 (8)	0.85599 (6)	0.02309 (8)
F1	0.5699 (2)	0.3363 (2)	0.51424 (18)	0.0247 (3)
F2	0.5990 (2)	0.4270 (2)	0.18860 (19)	0.0237 (3)
F3	0.9214 (2)	0.3796 (2)	0.3294 (2)	0.0252 (3)
F4	0.7266 (2)	0.0671 (2)	0.5021 (2)	0.0300 (3)
F5	1.1417 (3)	0.1313 (2)	0.22704 (19)	0.0297 (3)

F6	0.7209 (3)	−0.1279 (3)	0.1151 (2)	0.0332 (4)
F7	1.0620 (3)	−0.2265 (2)	0.0506 (2)	0.0322 (3)

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Sb	0.01754 (4)	0.01469 (4)	0.01477 (4)	0.00794 (3)	0.00034 (3)	0.00109 (3)
Sn	0.01815 (5)	0.01411 (5)	0.01377 (5)	0.00878 (4)	0.00109 (4)	0.00153 (4)
K1	0.01943 (14)	0.02305 (16)	0.02459 (16)	0.00756 (12)	−0.00196 (13)	0.00015 (13)
K2	0.02202 (15)	0.02791 (16)	0.02086 (15)	0.01186 (12)	0.00175 (13)	0.00452 (13)
F1	0.0254 (5)	0.0286 (5)	0.0191 (5)	0.0108 (4)	0.0045 (4)	−0.0032 (4)
F2	0.0302 (5)	0.0201 (4)	0.0233 (5)	0.0131 (4)	−0.0020 (5)	0.0048 (4)
F3	0.0174 (4)	0.0274 (6)	0.0294 (6)	0.0079 (4)	0.0038 (4)	0.0046 (5)
F4	0.0215 (5)	0.0312 (6)	0.0363 (7)	0.0093 (5)	−0.0031 (5)	0.0159 (5)
F5	0.0381 (6)	0.0344 (6)	0.0195 (5)	0.0197 (5)	−0.0083 (5)	−0.0074 (5)
F6	0.0254 (6)	0.0395 (8)	0.0323 (7)	0.0105 (5)	0.0098 (5)	0.0086 (6)
F7	0.0449 (7)	0.0240 (5)	0.0353 (7)	0.0226 (5)	−0.0084 (6)	0.0009 (5)

Geometric parameters (Å, º)

Sb—F1	1.9380 (14)	K2—F2^{xi}	2.6777 (18)
Sb—F3	1.9539 (13)	K2—F3^{v}	2.7136 (15)
Sb—F4	2.0609 (17)	K2—F1	2.7216 (15)
Sb—F2	2.0696 (15)	K2—F7^{xv}	2.7620 (19)
Sb—F4^{i}	2.7516 (15)	K2—F7^{xvi}	2.8795 (17)
Sb—F5^{ii}	3.0471 (18)	K2—F6^{i}	2.8943 (16)
Sb—F6	3.117 (2)	K2—F5^{v}	2.9912 (18)
Sb—F7^{iii}	3.5325 (19)	K2—F6^{xvi}	3.655 (2)
Sb—K1	3.7207 (5)	K2—Sn^{xvi}	3.8388 (5)
Sb—F6^{iv}	3.8032 (18)	K2—F4	3.847 (2)
Sb—F5	3.8531 (19)	K2—K1^{xi}	3.9388 (7)
Sb—F1^{i}	3.9018 (16)	K2—F3^{xiv}	3.9710 (17)
Sb—K1^{v}	3.9464 (5)	K2—Sb^{xiv}	3.9808 (5)
Sb—K2^{vi}	3.9808 (5)	K2—K2^{xvii}	3.9938 (10)
Sb—Sb^{i}	3.9925 (2)	K2—K2^{xviii}	4.1352 (10)
Sn—F5	1.9581 (14)	K2—F1^{xi}	4.1386 (18)
Sn—F5^{iii}	1.9581 (14)	K2—K1^{v}	4.2602 (8)
Sn—F7^{iii}	1.9611 (17)	K2—Sb^{xi}	4.3692 (6)
Sn—F7	1.9611 (17)	F1—K1^{xi}	2.7268 (16)
Sn—F6^{iii}	1.9611 (16)	F1—Sb^{i}	3.9018 (16)
Sn—F6	1.9611 (16)	F1—K2^{xi}	4.1386 (18)
Sn—K1^{vii}	3.7354 (5)	F1—Sb^{xi}	4.3632 (17)
Sn—K1^{viii}	3.7354 (5)	F2—K2^{vi}	2.6662 (15)
Sn—K2^{ix}	3.8388 (5)	F2—K2^{xi}	2.6777 (18)
Sn—K2^{v}	3.8388 (5)	F3—K2^{v}	2.7136 (14)
Sb—Sn	4.2166 (2)	F3—K1^{v}	2.8390 (18)
Sn—Sb^{iii}	4.2166 (2)	F3—K2^{vi}	3.9710 (17)
Sn—Sb^{iv}	4.3391 (2)	F3—Sb^{v}	4.2172 (14)

Sn—Sb^{x}	4.3391 (2)	F4—K1^{v}	2.6235 (15)
K1—F4^{v}	2.6235 (16)	F4—Sb^{i}	2.7516 (15)
K1—F2	2.7086 (14)	F4—K1^{viii}	2.982 (2)
K1—F1^{xi}	2.7268 (16)	F5—K1^{v}	2.8578 (16)
K1—F6^{xii}	2.811 (2)	F5—K2^{v}	2.9912 (18)
K1—F3^{v}	2.8390 (18)	F5—Sb^{x}	3.0471 (18)
K1—F5^{v}	2.8578 (16)	F5—K1^{viii}	3.1882 (17)
K1—F1	2.9262 (15)	F5—Sb^{xv}	4.9869 (18)
K1—F3	2.9485 (18)	F6—K1^{viii}	2.811 (2)
K1—F4^{xii}	2.982 (2)	F6—K2^{i}	2.8943 (16)
K1—F7^{xii}	3.122 (2)	F6—K2^{ix}	3.655 (2)
K1—F5^{xii}	3.1882 (17)	F6—Sb^{iv}	3.8032 (18)
K1—K1^{xiii}	3.7178 (9)	F6—Sb^{i}	4.9129 (17)
K1—Sn^{xii}	3.7354 (5)	F6—Sb^{viii}	5.124 (2)
K1—K2^{xi}	3.9388 (7)	F7—K2^{xv}	2.7620 (19)
K1—Sb^{v}	3.9464 (5)	F7—K2^{ix}	2.8795 (16)
K1—Sb^{xi}	4.0028 (5)	F7—K1^{viii}	3.1222 (19)
K1—K2	4.0117 (7)	F7—Sb^{iii}	3.5325 (19)
K1—K2^{v}	4.2602 (8)	F7—Sb^{x}	4.0712 (16)
K1—Sb^{xii}	4.4308 (6)	F7—Sb^{viii}	4.6870 (16)
K2—F2^{xiv}	2.6662 (15)		

F1—Sb—F3	87.64 (6)	Sn^{xii}—K1—K2^{v}	70.956 (11)
F1—Sb—F4	82.57 (7)	K2^{xi}—K1—K2^{v}	110.414 (15)
F3—Sb—F4	80.01 (6)	Sb^{v}—K1—K2^{v}	64.623 (11)
F1—Sb—F2	80.77 (6)	Sb^{xi}—K1—K2^{v}	170.056 (15)
F3—Sb—F2	79.13 (6)	K2—K1—K2^{v}	106.442 (15)
F4—Sb—F2	153.71 (6)	F4^{v}—K1—Sb^{xii}	105.98 (4)
F1—Sb—F4^{i}	71.19 (6)	F2—K1—Sb^{xii}	103.48 (4)
F3—Sb—F4^{i}	143.84 (6)	F1^{xi}—K1—Sb^{xii}	60.65 (4)
F4—Sb—F4^{i}	68.69 (6)	F6^{xii}—K1—Sb^{xii}	44.34 (4)
F2—Sb—F4^{i}	123.67 (6)	F3^{v}—K1—Sb^{xii}	142.69 (4)
F1—Sb—F5^{ii}	80.34 (5)	F5^{v}—K1—Sb^{xii}	83.36 (4)
F3—Sb—F5^{ii}	145.85 (6)	F1—K1—Sb^{xii}	123.89 (4)
F4—Sb—F5^{ii}	129.10 (5)	F3—K1—Sb^{xii}	155.13 (3)
F2—Sb—F5^{ii}	67.49 (5)	F4^{xii}—K1—Sb^{xii}	23.27 (3)
F4^{i}—Sb—F5^{ii}	60.42 (5)	F7^{xii}—K1—Sb^{xii}	92.88 (4)
F1—Sb—F6	156.26 (6)	F5^{xii}—K1—Sb^{xii}	58.05 (4)
F3—Sb—F6	91.23 (6)	K1^{xiii}—K1—Sb^{xii}	57.132 (15)
F4—Sb—F6	73.89 (6)	Sb—K1—Sb^{xii}	132.635 (13)
F2—Sb—F6	122.29 (5)	Sn^{xii}—K1—Sb^{xii}	61.479 (8)
F4^{i}—Sb—F6	96.84 (5)	K2^{xi}—K1—Sb^{xii}	63.210 (12)
F5^{ii}—Sb—F6	112.19 (4)	Sb^{v}—K1—Sb^{xii}	127.696 (11)
F1—Sb—F7^{iii}	144.50 (5)	Sb^{xi}—K1—Sb^{xii}	56.236 (8)
F3—Sb—F7^{iii}	60.78 (5)	K2—K1—Sb^{xii}	121.076 (15)
F4—Sb—F7^{iii}	105.41 (6)	K2^{v}—K1—Sb^{xii}	132.216 (14)
F2—Sb—F7^{iii}	77.82 (5)	F2^{xiv}—K2—F2^{xi}	83.28 (5)
F4^{i}—Sb—F7^{iii}	144.19 (5)	F2^{xiv}—K2—F3^{v}	138.86 (5)

F5^{ii}—Sb—F7^{iii}	116.08 (4)	F2^{xi}—K2—F3^{v}	116.46 (5)
F6—Sb—F7^{iii}	49.35 (4)	F2^{xiv}—K2—F1	145.86 (5)
F1—Sb—K1	51.20 (4)	F2^{xi}—K2—F1	75.98 (5)
F3—Sb—K1	51.92 (5)	F3^{v}—K2—F1	75.22 (4)
F4—Sb—K1	108.38 (5)	F2^{xiv}—K2—F7^{xv}	85.87 (5)
F2—Sb—K1	45.52 (4)	F2^{xi}—K2—F7^{xv}	163.17 (5)
F4^{i}—Sb—K1	121.51 (4)	F3^{v}—K2—F7^{xv}	80.02 (5)
F5^{ii}—Sb—K1	97.07 (3)	F1—K2—F7^{xv}	107.02 (6)
F6—Sb—K1	140.19 (3)	F2^{xiv}—K2—F7^{xvi}	73.56 (5)
F7^{iii}—Sb—K1	94.15 (3)	F2^{xi}—K2—F7^{xvi}	103.37 (5)
F1—Sb—F6^{iv}	119.92 (6)	F3^{v}—K2—F7^{xvi}	67.03 (5)
F3—Sb—F6^{iv}	118.94 (5)	F1—K2—F7^{xvi}	137.34 (5)
F4—Sb—F6^{iv}	149.10 (6)	F7^{xv}—K2—F7^{xvi}	85.75 (5)
F2—Sb—F6^{iv}	56.92 (5)	F2^{xiv}—K2—F6^{i}	69.80 (5)
F4^{i}—Sb—F6^{iv}	97.15 (4)	F2^{xi}—K2—F6^{i}	68.66 (5)
F5^{ii}—Sb—F6^{iv}	46.60 (4)	F3^{v}—K2—F6^{i}	149.54 (5)
F6—Sb—F6^{iv}	81.11 (5)	F1—K2—F6^{i}	77.45 (5)
F7^{iii}—Sb—F6^{iv}	69.52 (4)	F7^{xv}—K2—F6^{i}	95.51 (6)
K1—Sb—F6^{iv}	102.43 (3)	F7^{xvi}—K2—F6^{i}	143.13 (5)
F1—Sb—F5	124.91 (5)	F2^{xiv}—K2—F5^{v}	105.63 (5)
F3—Sb—F5	47.69 (6)	F2^{xi}—K2—F5^{v}	62.58 (5)
F4—Sb—F5	62.29 (5)	F3^{v}—K2—F5^{v}	61.36 (5)
F2—Sb—F5	112.55 (5)	F1—K2—F5^{v}	88.59 (5)
F4^{i}—Sb—F5	123.65 (5)	F7^{xv}—K2—F5^{v}	133.22 (5)
F5^{ii}—Sb—F5	154.74 (5)	F7^{xvi}—K2—F5^{v}	56.44 (5)
F6—Sb—F5	44.86 (4)	F6^{i}—K2—F5^{v}	131.19 (6)
F7^{iii}—Sb—F5	43.91 (4)	F2^{xiv}—K2—F6^{xvi}	57.19 (4)
K1—Sb—F5	99.51 (3)	F2^{xi}—K2—F6^{xvi}	58.00 (4)
F6^{iv}—Sb—F5	110.73 (4)	F3^{v}—K2—F6^{xvi}	101.14 (4)
F1—Sb—F1^{i}	101.60 (5)	F1—K2—F6^{xvi}	126.75 (5)
F3—Sb—F1^{i}	119.88 (6)	F7^{xv}—K2—F6^{xvi}	124.94 (5)
F4—Sb—F1^{i}	43.93 (5)	F7^{xvi}—K2—F6^{xvi}	47.89 (5)
F2—Sb—F1^{i}	160.78 (5)	F6^{i}—K2—F6^{xvi}	105.87 (4)
F4^{i}—Sb—F1^{i}	42.52 (5)	F5^{v}—K2—F6^{xvi}	48.52 (4)
F5^{ii}—Sb—F1^{i}	93.92 (4)	F2^{xiv}—K2—Sn^{xvi}	80.82 (3)
F6—Sb—F1^{i}	58.86 (4)	F2^{xi}—K2—Sn^{xvi}	75.59 (3)
F7^{iii}—Sb—F1^{i}	107.93 (3)	F3^{v}—K2—Sn^{xvi}	71.04 (4)
K1—Sb—F1^{i}	147.81 (2)	F1—K2—Sn^{xvi}	118.69 (4)
F6^{iv}—Sb—F1^{i}	107.05 (3)	F7^{xv}—K2—Sn^{xvi}	115.30 (4)
F5—Sb—F1^{i}	82.00 (3)	F7^{xvi}—K2—Sn^{xvi}	29.81 (4)
F1—Sb—K1^{v}	83.19 (5)	F6^{i}—K2—Sn^{xvi}	135.57 (4)
F3—Sb—K1^{v}	42.71 (5)	F5^{v}—K2—Sn^{xvi}	30.19 (3)
F4—Sb—K1^{v}	37.30 (4)	F6^{xvi}—K2—Sn^{xvi}	30.21 (2)
F2—Sb—K1^{v}	120.02 (4)	F2^{xiv}—K2—F4	134.72 (4)
F4^{i}—Sb—K1^{v}	104.20 (4)	F2^{xi}—K2—F4	116.59 (4)
F5^{ii}—Sb—K1^{v}	160.47 (3)	F3^{v}—K2—F4	70.89 (4)
F6—Sb—K1^{v}	79.99 (3)	F1—K2—F4	43.32 (5)
F7^{iii}—Sb—K1^{v}	83.45 (3)	F7^{xv}—K2—F4	63.76 (5)

K1—Sb—K1^{v}	80.495 (13)	F7^{xvi}—K2—F4	131.42 (5)
F6^{iv}—Sb—K1^{v}	152.92 (3)	F6^{i}—K2—F4	80.07 (5)
F5—Sb—K1^{v}	42.97 (2)	F5^{v}—K2—F4	119.65 (4)
F1^{i}—Sb—K1^{v}	79.15 (2)	F6^{xvi}—K2—F4	167.89 (4)
F1—Sb—K2^{vi}	117.92 (5)	Sn^{xvi}—K2—F4	141.35 (3)
F3—Sb—K2^{vi}	75.50 (5)	F2^{xiv}—K2—K1^{xi}	103.45 (4)
F4—Sb—K2^{vi}	146.86 (5)	F2^{xi}—K2—K1^{xi}	43.32 (3)
F2—Sb—K2^{vi}	37.79 (4)	F3^{v}—K2—K1^{xi}	115.64 (4)
F4^{i}—Sb—K2^{vi}	140.23 (4)	F1—K2—K1^{xi}	43.76 (3)
F5^{ii}—Sb—K2^{vi}	82.15 (3)	F7^{xv}—K2—K1^{xi}	128.37 (4)
F6—Sb—K2^{vi}	84.58 (3)	F7^{xvi}—K2—K1^{xi}	145.82 (4)
F7^{iii}—Sb—K2^{vi}	42.62 (3)	F6^{i}—K2—K1^{xi}	45.47 (4)
K1—Sb—K2^{vi}	72.944 (11)	F5^{v}—K2—K1^{xi}	93.55 (3)
F6^{iv}—Sb—K2^{vi}	43.58 (2)	F6^{xvi}—K2—K1^{xi}	101.07 (3)
F5—Sb—K2^{vi}	84.66 (3)	Sn^{xvi}—K2—K1^{xi}	116.309 (16)
F1^{i}—Sb—K2^{vi}	138.75 (2)	F4—K2—K1^{xi}	75.33 (3)
K1^{v}—Sb—K2^{vi}	115.096 (10)	F2^{xiv}—K2—F3^{xiv}	39.66 (4)
F1—Sb—Sb^{i}	73.20 (5)	F2^{xi}—K2—F3^{xiv}	121.93 (4)
F3—Sb—Sb^{i}	117.83 (5)	F3^{v}—K2—F3^{xiv}	106.25 (4)
F4—Sb—Sb^{i}	39.94 (4)	F1—K2—F3^{xiv}	155.67 (5)
F2—Sb—Sb^{i}	147.66 (4)	F7^{xv}—K2—F3^{xiv}	50.88 (5)
F4^{i}—Sb—Sb^{i}	28.74 (4)	F7^{xvi}—K2—F3^{xiv}	59.33 (4)
F5^{ii}—Sb—Sb^{i}	89.16 (3)	F6^{i}—K2—F3^{xiv}	93.31 (4)
F6—Sb—Sb^{i}	86.50 (3)	F5^{v}—K2—F3^{xiv}	113.77 (4)
F7^{iii}—Sb—Sb^{i}	134.11 (3)	F6^{xvi}—K2—F3^{xiv}	77.30 (4)
K1—Sb—Sb^{i}	121.530 (9)	Sn^{xvi}—K2—F3^{xiv}	83.69 (2)
F6^{iv}—Sb—Sb^{i}	121.92 (2)	F4—K2—F3^{xiv}	113.32 (4)
F5—Sb—Sb^{i}	98.15 (3)	K1^{xi}—K2—F3^{xiv}	137.39 (2)
F1^{i}—Sb—Sb^{i}	28.39 (2)	F2^{xiv}—K2—Sb^{xiv}	28.40 (3)
K1^{v}—Sb—Sb^{i}	76.021 (8)	F2^{xi}—K2—Sb^{xiv}	106.25 (3)
K2^{vi}—Sb—Sb^{i}	164.150 (8)	F3^{v}—K2—Sb^{xiv}	132.62 (4)
F5—Sn—F5^{iii}	180.00 (5)	F1—K2—Sb^{xiv}	137.36 (3)
F5—Sn—F7^{iii}	90.26 (7)	F7^{xv}—K2—Sb^{xiv}	59.99 (4)
F5^{iii}—Sn—F7^{iii}	89.74 (7)	F7^{xvi}—K2—Sb^{xiv}	84.57 (4)
F5—Sn—F7	89.74 (7)	F6^{i}—K2—Sb^{xiv}	64.94 (4)
F5^{iii}—Sn—F7	90.26 (7)	F5^{v}—K2—Sb^{xiv}	131.15 (3)
F7^{iii}—Sn—F7	180.00 (14)	F6^{xvi}—K2—Sb^{xiv}	84.19 (3)
F5—Sn—F6^{iii}	91.07 (7)	Sn^{xvi}—K2—Sb^{xiv}	102.504 (11)
F5^{iii}—Sn—F6^{iii}	88.93 (7)	F4—K2—Sb^{xiv}	107.92 (3)
F7^{iii}—Sn—F6^{iii}	88.84 (8)	K1^{xi}—K2—Sb^{xiv}	109.172 (12)
F7—Sn—F6^{iii}	91.16 (8)	F3^{xiv}—K2—Sb^{xiv}	28.449 (19)
F5—Sn—F6	88.93 (7)	F2^{xiv}—K2—K2^{xvii}	41.75 (4)
F5^{iii}—Sn—F6	91.07 (7)	F2^{xi}—K2—K2^{xvii}	41.53 (3)
F7^{iii}—Sn—F6	91.16 (8)	F3^{v}—K2—K2^{xvii}	143.27 (4)
F7—Sn—F6	88.84 (8)	F1—K2—K2^{xvii}	112.96 (4)
F6^{iii}—Sn—F6	180.00 (16)	F7^{xv}—K2—K2^{xvii}	126.42 (4)
F5—Sn—K1^{vii}	121.41 (5)	F7^{xvi}—K2—K2^{xvii}	88.06 (4)
F5^{iii}—Sn—K1^{vii}	58.59 (5)	F6^{i}—K2—K2^{xvii}	61.68 (4)

$F7^{iii}$—Sn—$K1^{vii}$	56.67 (6)	$F5^{v}$—K2—$K2^{xvii}$	82.59 (4)
F7—Sn—$K1^{vii}$	123.33 (6)	$F6^{xvi}$—K2—$K2^{xvii}$	44.19 (3)
$F6^{iii}$—Sn—$K1^{vii}$	47.50 (6)	Sn^{xvi}—K2—$K2^{xvii}$	74.136 (15)
F6—Sn—$K1^{vii}$	132.50 (6)	F4—K2—$K2^{xvii}$	140.33 (3)
F5—Sn—$K1^{viii}$	58.59 (5)	$K1^{xi}$—K2—$K2^{xvii}$	70.576 (15)
$F5^{iii}$—Sn—$K1^{viii}$	121.41 (5)	$F3^{xiv}$—K2—$K2^{xvii}$	80.83 (3)
$F7^{iii}$—Sn—$K1^{viii}$	123.33 (6)	Sb^{xiv}—K2—$K2^{xvii}$	66.445 (12)
F7—Sn—$K1^{viii}$	56.67 (6)	$F2^{xiv}$—K2—K1	149.45 (4)
$F6^{iii}$—Sn—$K1^{viii}$	132.50 (6)	$F2^{xi}$—K2—K1	74.53 (3)
F6—Sn—$K1^{viii}$	47.50 (6)	$F3^{v}$—K2—K1	44.99 (4)
$K1^{vii}$—Sn—$K1^{viii}$	180.000 (14)	F1—K2—K1	46.84 (3)
F5—Sn—$K2^{ix}$	129.80 (5)	$F7^{xv}$—K2—K1	119.96 (4)
$F5^{iii}$—Sn—$K2^{ix}$	50.20 (5)	$F7^{xvi}$—K2—K1	91.21 (4)
$F7^{iii}$—Sn—$K2^{ix}$	133.12 (5)	$F6^{i}$—K2—K1	118.92 (4)
F7—Sn—$K2^{ix}$	46.88 (5)	$F5^{v}$—K2—K1	45.32 (3)
$F6^{iii}$—Sn—$K2^{ix}$	110.30 (6)	$F6^{xvi}$—K2—K1	92.86 (3)
F6—Sn—$K2^{ix}$	69.70 (6)	Sn^{xvi}—K2—K1	73.573 (11)
$K1^{vii}$—Sn—$K2^{ix}$	105.549 (10)	F4—K2—K1	75.05 (3)
$K1^{viii}$—Sn—$K2^{ix}$	74.451 (10)	$K1^{xi}$—K2—K1	74.327 (13)
F5—Sn—$K2^{v}$	50.20 (5)	$F3^{xiv}$—K2—K1	147.77 (2)
$F5^{iii}$—Sn—$K2^{v}$	129.80 (5)	Sb^{xiv}—K2—K1	175.774 (15)
$F7^{iii}$—Sn—$K2^{v}$	46.88 (5)	$K2^{xvii}$—K2—K1	113.33 (2)
F7—Sn—$K2^{v}$	133.12 (5)	$F2^{xiv}$—K2—$K2^{xviii}$	75.81 (4)
$F6^{iii}$—Sn—$K2^{v}$	69.70 (6)	$F2^{xi}$—K2—$K2^{xviii}$	143.16 (4)
F6—Sn—$K2^{v}$	110.30 (6)	$F3^{v}$—K2—$K2^{xviii}$	67.21 (4)
$K1^{vii}$—Sn—$K2^{v}$	74.451 (10)	F1—K2—$K2^{xviii}$	135.04 (4)
$K1^{viii}$—Sn—$K2^{v}$	105.549 (10)	$F7^{xv}$—K2—$K2^{xviii}$	43.98 (3)
$K2^{ix}$—Sn—$K2^{v}$	180.000 (9)	$F7^{xvi}$—K2—$K2^{xviii}$	41.77 (4)
F5—Sn—Sb	65.81 (5)	$F6^{i}$—K2—$K2^{xviii}$	128.40 (5)
$F5^{iii}$—Sn—Sb	114.19 (5)	$F5^{v}$—K2—$K2^{xviii}$	94.15 (4)
$F7^{iii}$—Sn—Sb	56.42 (6)	$F6^{xvi}$—K2—$K2^{xviii}$	85.16 (3)
F7—Sn—Sb	123.58 (6)	Sn^{xvi}—K2—$K2^{xviii}$	71.414 (13)
$F6^{iii}$—Sn—Sb	136.06 (6)	F4—K2—$K2^{xviii}$	99.52 (3)
F6—Sn—Sb	43.94 (6)	$K1^{xi}$—K2—$K2^{xviii}$	172.16 (2)
$K1^{vii}$—Sn—Sb	112.591 (9)	$F3^{xiv}$—K2—$K2^{xviii}$	39.05 (2)
$K1^{viii}$—Sn—Sb	67.409 (9)	Sb^{xiv}—K2—$K2^{xviii}$	66.425 (12)
$K2^{ix}$—Sn—Sb	113.168 (8)	$K2^{xvii}$—K2—$K2^{xviii}$	111.90 (2)
$K2^{v}$—Sn—Sb	66.832 (8)	K1—K2—$K2^{xviii}$	110.379 (17)
F5—Sn—Sb^{iii}	114.19 (5)	$F2^{xiv}$—K2—$F1^{xi}$	120.78 (4)
$F5^{iii}$—Sn—Sb^{iii}	65.81 (5)	$F2^{xi}$—K2—$F1^{xi}$	37.66 (4)
$F7^{iii}$—Sn—Sb^{iii}	123.58 (6)	$F3^{v}$—K2—$F1^{xi}$	83.92 (4)
F7—Sn—Sb^{iii}	56.42 (6)	F1—K2—$F1^{xi}$	46.14 (5)
$F6^{iii}$—Sn—Sb^{iii}	43.94 (6)	$F7^{xv}$—K2—$F1^{xi}$	151.93 (5)
F6—Sn—Sb^{iii}	136.06 (6)	$F7^{xvi}$—K2—$F1^{xi}$	108.92 (4)
$K1^{vii}$—Sn—Sb^{iii}	67.409 (9)	$F6^{i}$—K2—$F1^{xi}$	86.80 (5)
$K1^{viii}$—Sn—Sb^{iii}	112.591 (9)	$F5^{v}$—K2—$F1^{xi}$	52.66 (4)
$K2^{ix}$—Sn—Sb^{iii}	66.832 (8)	$F6^{xvi}$—K2—$F1^{xi}$	80.65 (4)
$K2^{v}$—Sn—Sb^{iii}	113.168 (8)	Sn^{xvi}—K2—$F1^{xi}$	80.33 (2)

Sb—Sn—Sb^{iii}	180.0	F4—K2—F1^{xi}	89.28 (3)
F4^{v}—K1—F2	135.92 (6)	K1^{xi}—K2—F1^{xi}	42.39 (2)
F4^{v}—K1—F1^{xi}	148.39 (5)	F3^{xiv}—K2—F1^{xi}	157.10 (4)
F2—K1—F1^{xi}	75.39 (5)	Sb^{xiv}—K2—F1^{xi}	142.70 (2)
F4^{v}—K1—F6^{xii}	112.69 (5)	K2^{xvii}—K2—F1^{xi}	79.10 (3)
F2—K1—F6^{xii}	69.51 (5)	K1—K2—F1^{xi}	39.05 (2)
F1^{xi}—K1—F6^{xii}	78.81 (5)	K2^{xviii}—K2—F1^{xi}	144.60 (3)
F4^{v}—K1—F3^{v}	56.26 (5)	F2^{xiv}—K2—K1^{v}	132.57 (4)
F2—K1—F3^{v}	111.27 (5)	F2^{xi}—K2—K1^{v}	143.70 (4)
F1^{xi}—K1—F3^{v}	115.30 (5)	F3^{v}—K2—K1^{v}	43.33 (4)
F6^{xii}—K1—F3^{v}	165.82 (5)	F1—K2—K1^{v}	69.71 (4)
F4^{v}—K1—F5^{v}	77.12 (5)	F7^{xv}—K2—K1^{v}	47.07 (4)
F2—K1—F5^{v}	138.76 (5)	F7^{xvi}—K2—K1^{v}	94.17 (4)
F1^{xi}—K1—F5^{v}	73.05 (5)	F6^{i}—K2—K1^{v}	113.54 (4)
F6^{xii}—K1—F5^{v}	127.69 (6)	F5^{v}—K2—K1^{v}	104.38 (4)
F3^{v}—K1—F5^{v}	61.68 (5)	F6^{xvi}—K2—K1^{v}	140.15 (3)
F4^{v}—K1—F1	125.45 (5)	Sn^{xvi}—K2—K1^{v}	110.896 (12)
F2—K1—F1	54.76 (4)	F4—K2—K1^{v}	37.32 (2)
F1^{xi}—K1—F1	63.69 (6)	K1^{xi}—K2—K1^{v}	110.414 (15)
F6^{xii}—K1—F1	117.92 (5)	F3^{xiv}—K2—K1^{v}	94.36 (3)
F3^{v}—K1—F1	70.23 (4)	Sb^{xiv}—K2—K1^{v}	106.861 (15)
F5^{v}—K1—F1	87.34 (4)	K2^{xvii}—K2—K1^{v}	172.75 (2)
F4^{v}—K1—F3	89.08 (5)	K1—K2—K1^{v}	73.558 (15)
F2—K1—F3	53.71 (5)	K2^{xviii}—K2—K1^{v}	66.149 (15)
F1^{xi}—K1—F3	114.74 (4)	F1^{xi}—K2—K1^{v}	106.60 (2)
F6^{xii}—K1—F3	111.78 (5)	F2^{xiv}—K2—Sb^{xi}	96.86 (4)
F3^{v}—K1—F3	62.17 (5)	F2^{xi}—K2—Sb^{xi}	20.08 (3)
F5^{v}—K1—F3	119.86 (5)	F3^{v}—K2—Sb^{xi}	96.64 (4)
F1—K1—F3	54.61 (4)	F1—K2—Sb^{xi}	71.72 (4)
F4^{v}—K1—F4^{xii}	97.18 (5)	F7^{xv}—K2—Sb^{xi}	176.66 (4)
F2—K1—F4^{xii}	121.36 (5)	F7^{xvi}—K2—Sb^{xi}	93.17 (4)
F1^{xi}—K1—F4^{xii}	58.73 (4)	F6^{i}—K2—Sb^{xi}	87.26 (4)
F6^{xii}—K1—F4^{xii}	67.58 (5)	F5^{v}—K2—Sb^{xi}	44.16 (3)
F3^{v}—K1—F4^{xii}	120.01 (5)	F6^{xvi}—K2—Sb^{xi}	55.73 (3)
F5^{v}—K1—F4^{xii}	60.16 (5)	Sn^{xvi}—K2—Sb^{xi}	63.440 (9)
F1—K1—F4^{xii}	119.49 (5)	F4—K2—Sb^{xi}	115.04 (3)
F3—K1—F4^{xii}	173.45 (4)	K1^{xi}—K2—Sb^{xi}	52.902 (10)
F4^{v}—K1—F7^{xii}	77.31 (5)	F3^{xiv}—K2—Sb^{xi}	130.95 (3)
F2—K1—F7^{xii}	69.12 (4)	Sb^{xiv}—K2—Sb^{xi}	123.080 (12)
F1^{xi}—K1—F7^{xii}	128.67 (5)	K2^{xvii}—K2—Sb^{xi}	56.635 (14)
F6^{xii}—K1—F7^{xii}	54.82 (5)	K1—K2—Sb^{xi}	56.866 (11)
F3^{v}—K1—F7^{xii}	111.57 (5)	K2^{xviii}—K2—Sb^{xi}	134.85 (2)
F5^{v}—K1—F7^{xii}	152.00 (5)	F1^{xi}—K2—Sb^{xi}	26.15 (2)
F1—K1—F7^{xii}	117.02 (4)	K1^{v}—K2—Sb^{xi}	129.978 (13)
F3—K1—F7^{xii}	70.83 (4)	Sb—F1—K2	140.58 (8)
F4^{xii}—K1—F7^{xii}	112.37 (5)	Sb—F1—K1^{xi}	117.20 (6)
F4^{v}—K1—F5^{xii}	59.59 (5)	K2—F1—K1^{xi}	92.59 (5)
F2—K1—F5^{xii}	113.82 (4)	Sb—F1—K1	97.72 (5)

$F1^{xi}$—K1—$F5^{xii}$	118.46 (5)	K2—F1—K1	90.44 (4)
$F6^{xii}$—K1—$F5^{xii}$	54.02 (4)	$K1^{xi}$—F1—K1	116.31 (6)
$F3^{v}$—K1—$F5^{xii}$	115.85 (4)	Sb—F1—Sb^{i}	78.40 (5)
$F5^{v}$—K1—$F5^{xii}$	104.33 (4)	K2—F1—Sb^{i}	81.29 (4)
F1—K1—$F5^{xii}$	168.30 (4)	$K1^{xi}$—F1—Sb^{i}	81.82 (3)
F3—K1—$F5^{xii}$	118.02 (5)	K1—F1—Sb^{i}	160.56 (6)
$F4^{xii}$—K1—$F5^{xii}$	67.26 (5)	Sb—F1—$K2^{xi}$	83.58 (5)
$F7^{xii}$—K1—$F5^{xii}$	51.96 (4)	K2—F1—$K2^{xi}$	133.86 (5)
$F4^{v}$—K1—$K1^{xiii}$	52.74 (4)	$K1^{xi}$—F1—$K2^{xi}$	67.96 (4)
F2—K1—$K1^{xiii}$	157.57 (4)	K1—F1—$K2^{xi}$	65.15 (3)
$F1^{xi}$—K1—$K1^{xiii}$	100.64 (4)	Sb^{i}—F1—$K2^{xi}$	132.27 (4)
$F6^{xii}$—K1—$K1^{xiii}$	88.06 (4)	Sb—F1—Sb^{xi}	145.08 (7)
$F3^{v}$—K1—$K1^{xiii}$	90.53 (3)	K2—F1—Sb^{xi}	71.96 (3)
$F5^{v}$—K1—$K1^{xiii}$	56.19 (4)	$K1^{xi}$—F1—Sb^{xi}	57.94 (3)
F1—K1—$K1^{xiii}$	143.52 (4)	K1—F1—Sb^{xi}	63.04 (3)
F3—K1—$K1^{xiii}$	141.78 (4)	Sb^{i}—F1—Sb^{xi}	129.25 (3)
$F4^{xii}$—K1—$K1^{xiii}$	44.44 (3)	$K2^{xi}$—F1—Sb^{xi}	62.18 (3)
$F7^{xii}$—K1—$K1^{xiii}$	98.64 (3)	Sb—F2—$K2^{vi}$	113.81 (7)
$F5^{xii}$—K1—$K1^{xiii}$	48.14 (3)	Sb—F2—$K2^{xi}$	133.55 (7)
$F4^{v}$—K1—Sb	119.75 (5)	$K2^{vi}$—F2—$K2^{xi}$	96.72 (5)
F2—K1—Sb	33.04 (3)	Sb—F2—K1	101.44 (6)
$F1^{xi}$—K1—Sb	83.66 (3)	$K2^{vi}$—F2—K1	117.00 (5)
$F6^{xii}$—K1—Sb	102.46 (4)	$K2^{xi}$—F2—K1	93.98 (5)
$F3^{v}$—K1—Sb	78.76 (3)	Sb—F3—$K2^{v}$	144.17 (8)
$F5^{v}$—K1—Sb	116.80 (4)	Sb—F3—$K1^{v}$	109.46 (6)
F1—K1—Sb	31.07 (3)	$K2^{v}$—F3—$K1^{v}$	92.49 (5)
F3—K1—Sb	31.44 (3)	Sb—F3—K1	96.64 (6)
$F4^{xii}$—K1—Sb	142.03 (3)	$K2^{v}$—F3—K1	97.51 (5)
$F7^{xii}$—K1—Sb	85.99 (3)	$K1^{v}$—F3—K1	117.83 (5)
$F5^{xii}$—K1—Sb	137.87 (3)	Sb—F3—$K2^{vi}$	76.06 (5)
$K1^{xiii}$—K1—Sb	169.27 (2)	$K2^{v}$—F3—$K2^{vi}$	73.75 (4)
$F4^{v}$—K1—Sn^{xii}	83.78 (4)	$K1^{v}$—F3—$K2^{vi}$	158.09 (6)
F2—K1—Sn^{xii}	82.30 (3)	K1—F3—$K2^{vi}$	81.50 (4)
$F1^{xi}$—K1—Sn^{xii}	109.42 (4)	Sb—F3—Sb^{v}	140.22 (6)
$F6^{xii}$—K1—Sn^{xii}	30.96 (3)	$K2^{v}$—F3—Sb^{v}	75.23 (3)
$F3^{v}$—K1—Sn^{xii}	135.18 (3)	$K1^{v}$—F3—Sb^{v}	59.92 (3)
$F5^{v}$—K1—Sn^{xii}	133.25 (4)	K1—F3—Sb^{v}	63.99 (3)
F1—K1—Sn^{xii}	137.06 (3)	$K2^{vi}$—F3—Sb^{v}	129.27 (4)
F3—K1—Sn^{xii}	101.81 (3)	Sb—F4—$K1^{v}$	114.26 (6)
$F4^{xii}$—K1—Sn^{xii}	80.88 (3)	Sb—F4—Sb^{i}	111.31 (6)
$F7^{xii}$—K1—Sn^{xii}	31.65 (3)	$K1^{v}$—F4—Sb^{i}	130.88 (7)
$F5^{xii}$—K1—Sn^{xii}	31.61 (3)	Sb—F4—$K1^{viii}$	121.86 (8)
$K1^{xiii}$—K1—Sn^{xii}	78.252 (16)	$K1^{v}$—F4—$K1^{viii}$	82.82 (5)
Sb—K1—Sn^{xii}	109.774 (12)	Sb^{i}—F4—$K1^{viii}$	88.45 (5)
$F4^{v}$—K1—$K2^{xi}$	159.66 (4)	Sb—F4—K2	90.97 (6)
F2—K1—$K2^{xi}$	42.70 (4)	$K1^{v}$—F4—K2	79.93 (4)
$F1^{xi}$—K1—$K2^{xi}$	43.65 (3)	Sb^{i}—F4—K2	81.98 (4)
$F6^{xii}$—K1—$K2^{xi}$	47.22 (3)	$K1^{viii}$—F4—K2	146.97 (6)

$F3^{v}—K1—K2^{xi}$	142.68 (3)	$Sn—F5—K1^{v}$	154.71 (8)
$F5^{v}—K1—K2^{xi}$	116.36 (4)	$Sn—F5—K2^{v}$	99.61 (6)
$F1—K1—K2^{xi}$	72.46 (3)	$K1^{v}—F5—K2^{v}$	86.58 (5)
$F3—K1—K2^{xi}$	96.07 (3)	$Sn—F5—Sb^{x}$	118.58 (7)
$F4^{xii}—K1—K2^{xi}$	78.71 (3)	$K1^{v}—F5—Sb^{x}$	85.29 (4)
$F7^{xii}—K1—K2^{xi}$	85.80 (4)	$K2^{v}—F5—Sb^{x}$	92.70 (4)
$F5^{xii}—K1—K2^{xi}$	100.98 (3)	$Sn—F5—K1^{viii}$	89.79 (5)
$K1^{xiii}—K1—K2^{xi}$	120.30 (2)	$K1^{v}—F5—K1^{viii}$	75.67 (4)
$Sb—K1—K2^{xi}$	69.495 (11)	$K2^{v}—F5—K1^{viii}$	154.85 (7)
$Sn^{xii}—K1—K2^{xi}$	75.912 (12)	$Sb^{x}—F5—K1^{viii}$	103.25 (5)
$F4^{v}—K1—Sb^{v}$	28.43 (4)	$Sn—F5—Sb$	86.58 (6)
$F2—K1—Sb^{v}$	127.52 (4)	$K1^{v}—F5—Sb$	70.26 (4)
$F1^{xi}—K1—Sb^{v}$	136.40 (3)	$K2^{v}—F5—Sb$	79.97 (4)
$F6^{xii}—K1—Sb^{v}$	140.46 (3)	$Sb^{x}—F5—Sb$	154.74 (5)
$F3^{v}—K1—Sb^{v}$	27.83 (3)	$K1^{viii}—F5—Sb$	77.35 (4)
$F5^{v}—K1—Sb^{v}$	66.77 (4)	$Sn—F5—Sb^{xv}$	124.19 (7)
$F1—K1—Sb^{v}$	97.55 (3)	$K1^{v}—F5—Sb^{xv}$	61.95 (3)
$F3—K1—Sb^{v}$	73.82 (3)	$K2^{v}—F5—Sb^{xv}$	132.77 (4)
$F4^{xii}—K1—Sb^{v}$	111.02 (3)	$Sb^{x}—F5—Sb^{xv}$	53.18 (3)
$F7^{xii}—K1—Sb^{v}$	94.88 (4)	$K1^{viii}—F5—Sb^{xv}$	52.27 (3)
$F5^{xii}—K1—Sb^{v}$	88.02 (3)	$Sb—F5—Sb^{xv}$	116.05 (4)
$K1^{xiii}—K1—Sb^{v}$	70.564 (14)	$Sn—F6—K1^{viii}$	101.55 (7)
$Sb—K1—Sb^{v}$	99.505 (13)	$Sn—F6—K2^{i}$	152.63 (9)
$Sn^{xii}—K1—Sb^{v}$	110.137 (11)	$K1^{viii}—F6—K2^{i}$	87.31 (5)
$K2^{xi}—K1—Sb^{v}$	168.929 (17)	$Sn—F6—Sb$	110.18 (7)
$F4^{v}—K1—Sb^{xi}$	122.89 (4)	$K1^{viii}—F6—Sb$	96.60 (5)
$F2—K1—Sb^{xi}$	100.69 (4)	$K2^{i}—F6—Sb$	94.19 (5)
$F1^{xi}—K1—Sb^{xi}$	25.51 (3)	$Sn—F6—K2^{ix}$	80.09 (6)
$F6^{xii}—K1—Sb^{xi}$	90.54 (4)	$K1^{viii}—F6—K2^{ix}$	89.28 (6)
$F3^{v}—K1—Sb^{xi}$	103.00 (3)	$K2^{i}—F6—K2^{ix}$	74.13 (4)
$F5^{v}—K1—Sb^{xi}$	49.35 (4)	$Sb—F6—K2^{ix}$	166.72 (6)
$F1—K1—Sb^{xi}$	76.30 (3)	$Sn—F6—Sb^{iv}$	91.99 (6)
$F3—K1—Sb^{xi}$	130.90 (3)	$K1^{viii}—F6—Sb^{iv}$	154.48 (6)
$F4^{xii}—K1—Sb^{xi}$	43.41 (3)	$K2^{i}—F6—Sb^{iv}$	71.48 (4)
$F7^{xii}—K1—Sb^{xi}$	145.36 (4)	$Sb—F6—Sb^{iv}$	98.89 (5)
$F5^{xii}—K1—Sb^{xi}$	110.56 (4)	$K2^{ix}—F6—Sb^{iv}$	71.69 (3)
$K1^{xiii}—K1—Sb^{xi}$	78.484 (17)	$Sn—F6—Sb^{i}$	142.88 (7)
$Sb—K1—Sb^{xi}$	103.188 (10)	$K1^{viii}—F6—Sb^{i}$	54.56 (3)
$Sn^{xii}—K1—Sb^{xi}$	116.563 (15)	$K2^{i}—F6—Sb^{i}$	62.34 (3)
$K2^{xi}—K1—Sb^{xi}$	67.191 (11)	$Sb—F6—Sb^{i}$	54.21 (3)
$Sb^{v}—K1—Sb^{xi}$	115.843 (12)	$K2^{ix}—F6—Sb^{i}$	122.30 (4)
$F4^{v}—K1—K2$	94.67 (4)	$Sb^{iv}—F6—Sb^{i}$	121.86 (4)
$F2—K1—K2$	97.42 (3)	$Sn—F6—Sb^{viii}$	110.68 (7)
$F1^{xi}—K1—K2$	72.99 (4)	$K1^{viii}—F6—Sb^{viii}$	45.15 (3)
$F6^{xii}—K1—K2$	151.21 (4)	$K2^{i}—F6—Sb^{viii}$	58.40 (4)
$F3^{v}—K1—K2$	42.51 (3)	$Sb—F6—Sb^{viii}$	128.37 (5)
$F5^{v}—K1—K2$	48.10 (4)	$K2^{ix}—F6—Sb^{viii}$	50.61 (3)
$F1—K1—K2$	42.72 (3)	$Sb^{iv}—F6—Sb^{viii}$	109.80 (4)

F3—K1—K2	76.00 (3)	Sb^{i}—F6—Sb^{viii}	74.17 (2)
F4^{xii}—K1—K2	101.45 (4)	Sn—F7—K2^{xv}	160.99 (8)
F7^{xii}—K1—K2	145.89 (4)	Sn—F7—K2^{ix}	103.30 (7)
F5^{xii}—K1—K2	148.35 (3)	K2^{xv}—F7—K2^{ix}	94.25 (5)
K1^{xiii}—K1—K2	102.511 (19)	Sn—F7—K1^{viii}	91.68 (7)
Sb—K1—K2	69.152 (11)	K2^{xv}—F7—K1^{viii}	92.57 (5)
Sn^{xii}—K1—K2	177.363 (18)	K2^{ix}—F7—K1^{viii}	99.48 (5)
K2^{xi}—K1—K2	105.673 (13)	Sn—F7—Sb^{iii}	96.03 (6)
Sb^{v}—K1—K2	67.947 (11)	K2^{xv}—F7—Sb^{iii}	77.39 (5)
Sb^{xi}—K1—K2	66.072 (11)	K2^{ix}—F7—Sb^{iii}	87.21 (5)
F4^{v}—K1—K2^{v}	62.75 (4)	K1^{viii}—F7—Sb^{iii}	168.39 (6)
F2—K1—K2^{v}	73.17 (4)	Sn—F7—Sb^{x}	84.28 (5)
F1^{xi}—K1—K2^{v}	148.20 (3)	K2^{xv}—F7—Sb^{x}	77.70 (4)
F6^{xii}—K1—K2^{v}	94.45 (4)	K2^{ix}—F7—Sb^{x}	171.22 (6)
F3^{v}—K1—K2^{v}	72.82 (3)	K1^{viii}—F7—Sb^{x}	84.54 (4)
F5^{v}—K1—K2^{v}	131.10 (4)	Sb^{iii}—F7—Sb^{x}	87.60 (4)
F1—K1—K2^{v}	93.76 (3)	Sn—F7—Sb^{viii}	128.27 (7)
F3—K1—K2^{v}	39.16 (3)	K2^{xv}—F7—Sb^{viii}	67.72 (3)
F4^{xii}—K1—K2^{v}	146.51 (3)	K2^{ix}—F7—Sb^{viii}	57.73 (3)
F7^{xii}—K1—K2^{v}	40.37 (4)	K1^{viii}—F7—Sb^{viii}	52.36 (3)
F5^{xii}—K1—K2^{v}	79.29 (4)	Sb^{iii}—F7—Sb^{viii}	126.52 (4)
K1^{xiii}—K1—K2^{v}	110.234 (19)	Sb^{x}—F7—Sb^{viii}	120.88 (4)
Sb—K1—K2^{v}	67.341 (11)		

Symmetry codes: (i) −*x*+1, −*y*, −*z*+1; (ii) *x*−1, *y*, *z*; (iii) −*x*+2, −*y*, −*z*; (iv) −*x*+1, −*y*, −*z*; (v) −*x*+2, −*y*+1, −*z*+1; (vi) *x*, *y*, *z*−1; (vii) −*x*+2, −*y*+1, −*z*; (viii) *x*, *y*−1, *z*; (ix) *x*, *y*−1, *z*−1; (x) *x*+1, *y*, *z*; (xi) −*x*+1, −*y*+1, −*z*+1; (xii) *x*, *y*+1, *z*; (xiii) −*x*+2, −*y*+2, −*z*+1; (xiv) *x*, *y*, *z*+1; (xv) −*x*+2, −*y*, −*z*+1; (xvi) *x*, *y*+1, *z*+1; (xvii) −*x*+1, −*y*+1, −*z*+2; (xviii) −*x*+2, −*y*+1, −*z*+2.