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### Title

BIS[BIS(PENTAMETHYLCYCLOPENTADIENYL)YTTERBIUM( III)]DITELLURIDE

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# Lawrence Berkeley Laboratory

UNIVERSITY OF CALIFORNIA

## Materials & Chemical Sciences Division

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### **Bis[bis(pentamethylcyclopentadienyl) ytterbium(III)]ditelluride**

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March 1988

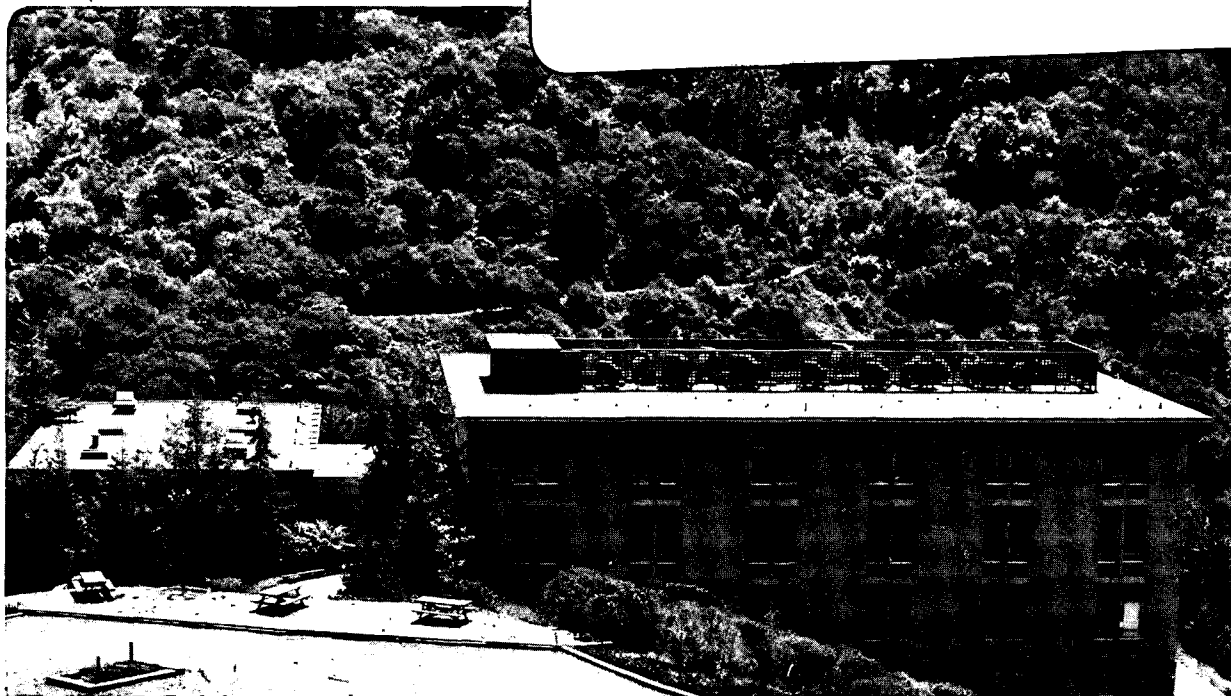
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Bis[bis(pentamethylcyclopentadienyl)ytterbium(III)]ditelluride

By Allan Zalkin and David J. Berg

Molecular and Chemical Sciences Division, Lawrence Berkeley Laboratory,  
University of California, Berkeley, California 94720 USA

Abstract.  $[(\text{Me}_5\text{C}_5)_2\text{Yb}]_2\text{Te}_2$ ,  $\text{C}_{40}\text{H}_{60}\text{Te}_2\text{Yb}_2$ ,  $M_r = 1142.20$ , monoclinic,  $P2_1/n$ ,  $a = 15.517(3) \text{ \AA}$ ,  $b = 10.611(2) \text{ \AA}$ ,  $c = 13.166(3) \text{ \AA}$ ,  $\beta = 114.34(2)^\circ$ ,  $V = 1975.1 \text{ \AA}^3$ ,  $Z = 2$ ,  $D_x = 1.92 \text{ g cm}^{-3}$ ,  $\lambda(\text{MoK}\alpha) = 0.71073 \text{ \AA}$ ,  $\mu = 61.71 \text{ cm}^{-1}$ ,  $F(000) = 1088$ ,  $T = 296^\circ\text{K}$ ,  $R = 0.036$  for 3330 [ $F^2 > 2\sigma(F^2)$ ] of 4560 total unique data. The  $\text{Te}_2^{-2}$  ion is on a center of symmetry and lies perpendicular to and in between the two Yb atoms. Each Yb atom is bonded approximately tetrahedrally to two cyclopentadienyl rings centers and the  $\text{Te}_2^{-2}$  ion. Distances ( $\text{\AA}$ ) are: ave. Yb-C 2.626(17), ave. Yb-Cp(centroid) 2.332(18), Te-Te 2.7686(11)  $\text{\AA}$ .

Experimental. The complex was isolated from the reaction of  $\text{Yb}[\text{C}_5(\text{CH}_3)_5]_2 \cdot \text{O}(\text{C}_2\text{H}_5)_2$  with a large excess of tellurium powder in hexane after stirring for 2 days at room temperature. Black air-sensitive crystals were sealed inside quartz capillaries under argon. Crystal,  $0.25 \times 0.25 \times 0.33$  mm with eight faces; modified Picker automatic diffractometer, graphite monochromator; cell dimensions from 28 reflections,  $20 < 2\theta < 54^\circ$ ; analytical absorption correction, range 2.4-3.8; max.  $(\sin\theta/\lambda) = 0.65 \text{ \AA}^{-1}$ ; h -20 to 20, k 0 to 13, l -17 to 17; three standard reflections, average decay 0.8%, intensities adjusted accordingly; 8993 data, 4560 unique,  $R_{\text{int}} = 0.023$ ; structure solved by Patterson and Fourier methods; refined on F, f' and f'' terms included, 199 parameters; hydrogen atoms not observed in difference maps and were not included; anisotropic thermal parameters for all atoms refined;  $R = 0.036$  for 3330 reflections for which  $F^2 > 2\sigma(F^2)$ ;  $R = 0.055$  all data;  $wR = 0.052$ ;  $S = 1.38$ ;  $w = 4F_o / [\sigma^2(F_o^2) + (0.06F_o^2)^2]$ ; max.  $(\text{shift}/\sigma) < 0.05$ ; extinction correction  $F_{\text{corr}} = (1 + 4.8 \times 10^{-8} I) F_o$ , extinction parameter estimated after each series of refinements, max correction 11%; max. and min. of  $\Delta F$  synthesis 1.6 and  $-1.4 \text{ e \AA}^{-3}$ ; atomic f, f' and f'' for neutral Yb, Te and C from International Tables for X-ray Crystallography (1974); local unpublished programs and ORTEP (Johnson, 1965).

Atomic parameters are listed in Table 1, and distances and angles are listed in Table 2.\* Fig. 1 shows the molecule and numbering scheme.

\* Lists of structure factors, anisotropic thermal parameters, additional distances and angles, and least-squares planes have been deposited with the British Library Document Supply Centre as Supplementary Publication No. (13 pp). Copies may be obtained through The Executive Secretary International Union of Crystallography, 5 Abbey Square, Chester CH1 2HU, England.

Related Literature. Comparable distance for Te-Te is  $2.78 \text{ \AA}$  in  $\text{AuTe}_2\text{X}$ , X = Cl or I (Haendler, Mootz, Rabenau & Rosenstein, 1974) and  $2.802(1) \text{ \AA}$  in

$[(\text{CH}_3\text{C}(\text{CH}_2\text{P}(\text{C}_6\text{H}_5)_2)_3\text{Ni}]_2[\mu\text{-Te}_2]\cdot 2\text{C}_4\text{H}_8\text{O}$  (Di Vaira, Peruzzini & Stoppioni, 1986). The latter is the only structurally characterized compound with the same geometry for the  $\text{Te}_2$  unit as that found in the present work. A comparable distance for Yb-Cp is 2.347(2) Å in  $(\text{Me}_5\text{C}_5)_2\text{Yb}(\text{C}_6\text{H}_5\text{S})(\text{NH}_3)$  (Zalkin, Henly & Andersen, 1987).

This work was supported by the Director, Office of Energy Research, Office of Basic Energy Sciences, Chemical Sciences Division of the US Department of Energy under Contract No. DE-AC03-76SF00098.

#### References

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- Haendler, H. M., Mootz, D., Rabenau, A. & Rosenstein, G. (1974) J. Solid State Chem., 10, 175-181.
- International Tables for X-ray Crystallography (1974). Vol. IV, Table 2.2, pp. 71-102. Birmingham: Kynoch Press. (present distributor D. Reidel, Dordrecht.)
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- Zalkin, A., Henly, T.J. & Andersen, R. A. (1987). Acta Cryst. C43, 233-236.

Table 1. Atomic Parameters

$$\text{Beq} = \sum_{ij} B_{ij} a_i^* a_j^* a_i \cdot a_j / 3$$

Atom	x	y	z	Beq
Yb	0.16540(2)	0.07854(3)	-0.02377(2)	2.656(9)
Te	0.05403(3)	-0.07689(4)	0.08828(4)	3.43(2)
C1	0.1697(6)	0.2522(7)	0.1192(7)	3.7(2)
C2	0.1706(5)	0.3167(6)	0.0264(7)	3.6(2)
C3	0.2584(6)	0.2928(7)	0.0192(7)	4.1(3)
C4	0.3112(6)	0.2094(7)	0.1103(8)	4.4(3)
C5	0.2554(6)	0.1844(7)	0.1702(7)	4.2(3)
C6	0.1835(5)	0.0476(7)	-0.2110(6)	3.5(2)
C7	0.2764(5)	0.0245(8)	-0.1270(6)	3.5(2)
C8	0.2717(6)	-0.0846(7)	-0.0692(7)	3.7(2)
C9	0.1786(6)	-0.1345(7)	-0.1208(7)	3.8(3)
C10	0.1232(5)	-0.0508(7)	-0.2093(6)	3.5(2)
C11	0.0950(8)	0.2726(10)	0.1658(10)	6.3(4)
C12	0.0970(9)	0.4095(8)	-0.0467(10)	6.7(4)
C13	0.2962(10)	0.3655(10)	-0.0528(12)	7.8(6)
C14	0.4163(7)	0.1799(12)	0.1501(12)	8.1(5)
C15	0.2877(10)	0.1090(11)	0.2775(9)	7.0(5)
C16	0.1544(7)	0.1523(9)	-0.2991(8)	5.1(3)
C17	0.3649(7)	0.0846(9)	-0.1232(9)	5.5(4)
C18	0.3546(7)	-0.1478(10)	0.0237(7)	5.5(3)
C19	0.1504(7)	-0.2631(7)	-0.0948(9)	5.1(4)
C20	0.0263(6)	-0.0778(9)	-0.2988(7)	4.8(3)

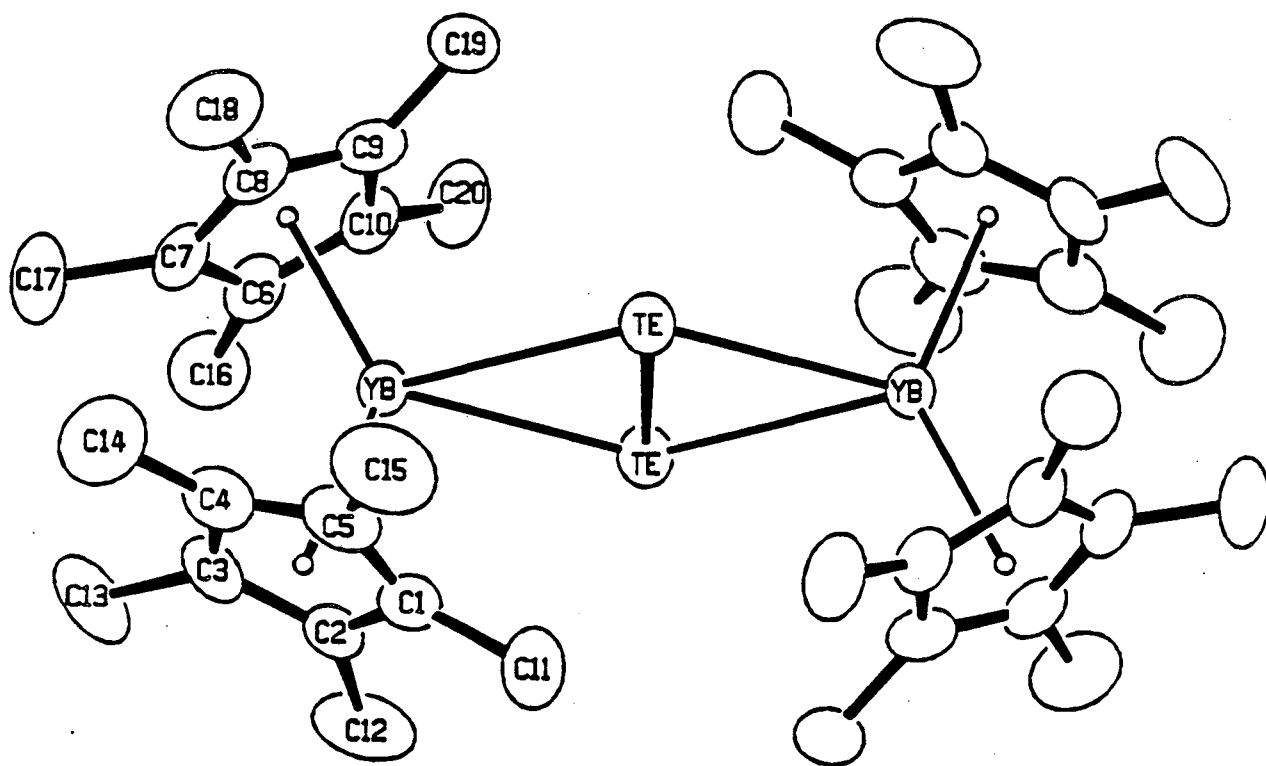
Table 2. Selected Distances (Å) and Angles (°)

Cp1 - Yb	2.319	Te - Yb - Cp1	107.67
Cp2 - Yb	2.344	Te - Yb - Cp2	113.83
C1 - Yb	2.616(7)	Te - Yb - Cp1	109.31
C2 - Yb	2.605(7)	Te - Yb - Cp2	112.59
C3 - Yb	2.627(7)	Cp1 - Yb - Cp2	133.32
C4 - Yb	2.621(8)	Te - Yb - Te	52.04(2)
C5 - Yb	2.607(8)	Yb - Te - Yb	127.96(2)
C6 - Yb	2.614(7)	Yb - Te - Te	63.82(2)
C7 - Yb	2.659(7)	Yb - Te - Te	64.14(2)
C8 - Yb	2.625(7)		
C9 - Yb	2.646(7)		
C10 - Yb	2.638(7)		
Te - Yb	3.1513(9)		
Te - Yb	3.1598(7)		
Te - Te	2.7686(11)		

Cp1 and Cp2 represent the centroids of cyclopentadienyl atoms C1-C5 and C6-C(10) respectively.



Fig 1. ORTEP (Johnson, 1965) drawing of molecule; 50% probability ellipsoids.



Supplemental Materials

Bis[bis(pentamethylcyclopentadienyl)ytterbium(III)]ditelluride

By Allan Zalkin and David J. Berg

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University of California, Berkeley, California 94720 USA

Abstract.  $[(Me_5C_5)_2Yb]_2Te_2$ ,  $C_{40}H_{60}Te_2Yb_2$ ,  $M_r = 1142.20$ , monoclinic,  $P2_1/n$ ,  $a = 15.517(3)$  Å,  $b = 10.611(2)$  Å,  $c = 13.166(3)$  Å,  $\beta = 114.34(2)^\circ$ ,  $V = 1975.1$  Å<sup>3</sup>,  $Z = 2$ ,  $D_x = 1.92$  g cm<sup>-3</sup>,  $\lambda(MoK\alpha) = 0.71073$  Å,  $\mu = 61.71$  cm<sup>-1</sup>,  $F(000) = 1088$ ,  $T = 296^\circ K$ ,  $R = 0.036$  for 3330 [ $F^2 > 2\sigma(F^2)$ ] of 4560 total unique data. The  $Te_2^{-2}$  ion is on a center of symmetry and lies perpendicular to and in between the two Yb atoms. Each Yb atom is bonded approximately tetrahedrally to two cyclopentadienyl rings centers and the  $Te_2^{-2}$  ion. Distances (Å) are: ave. Yb-C 2.626(17), ave. Yb-Cp(centroid) 2.332(18), Te-Te 2.7686(11) Å.

Supplemental Table 1. Anisotropic Thermal Parameters<sup>a</sup>

Atom	B11	B22	B33	B12	B13	B23
Yb	2.861(13)	2.530(13)	3.053(14)	-0.253(10)	1.696(10)	-0.104(10)
Te	3.601(22)	3.206(20)	4.014(23)	-0.047(16)	2.112(18)	0.344(16)
C1	4.4(3)	2.99(28)	4.3(3)	-0.57(26)	2.27(29)	-1.19(26)
C2	3.9(3)	2.28(25)	4.8(4)	-0.53(23)	2.2(3)	-0.32(25)
C3	4.6(4)	3.2(3)	4.9(4)	-1.86(28)	2.4(3)	-1.09(28)
C4	3.6(3)	3.6(3)	5.3(4)	-0.74(27)	1.2(3)	-1.1(3)
C5	5.4(4)	3.4(3)	3.3(3)	-0.9(3)	1.1(3)	-0.67(26)
C6	3.9(3)	4.4(3)	3.07(29)	0.44(26)	2.26(27)	0.29(25)
C7	3.6(3)	4.4(3)	3.7(3)	0.23(27)	2.56(27)	-0.24(27)
C8	3.9(3)	3.9(3)	4.0(3)	0.85(27)	2.44(28)	-0.13(27)
C9	5.5(4)	2.92(28)	4.2(4)	0.69(27)	3.1(3)	-0.20(25)
C10	3.4(3)	4.2(3)	3.3(3)	0.00(25)	1.95(26)	-0.54(24)
C11	6.9(6)	6.8(5)	7.9(6)	-2.8(5)	5.5(5)	-3.6(5)
C12	7.2(6)	3.2(4)	7.4(6)	0.9(4)	0.7(5)	0.9(4)
C13	11.8(9)	5.1(5)	10.3(9)	-3.8(6)	8.3(8)	-0.8(5)
C14	2.8(4)	8.0(7)	11.5(9)	-0.2(4)	1.0(5)	-2.7(6)
C15	9.8(8)	6.2(5)	4.0(4)	0.0(5)	1.7(5)	1.1(4)
C16	6.1(5)	4.8(4)	4.8(4)	1.0(4)	2.5(4)	1.7(3)
C17	4.4(4)	7.5(6)	6.2(5)	-1.5(4)	3.7(4)	-0.9(4)
C18	5.7(5)	6.3(5)	3.7(4)	2.1(4)	1.1(4)	0.7(4)
C19	7.4(5)	2.9(3)	7.3(5)	-0.2(3)	5.1(5)	-0.3(3)
C20	3.6(3)	7.3(5)	3.8(3)	-0.5(3)	1.64(29)	-0.9(4)

<sup>a</sup> The isotropic temperature factor has the form

$$T = -\sum(h_i h_j B_{ij} a_i^* a_j^*)/4 \text{ in units of } \text{\AA}^2.$$

Supplemental Table 2. Additional Angles in  $[(\text{CH}_3)_5\text{C}_5]_2\text{YbTe}_2\text{Yb}[\text{C}_5(\text{CH}_3)_5]_2$ 

C2 -C1	1.406(11)	C2 -C1-C5	108.5(7)	C7 -C6 -C10	109.0(7)
C5 -C1	1.415(12)	C2 -C1-C11	123.9(8)	C7 -C6 -C16	126.7(7)
C11-C1	1.535(11)	C5 -C1-C11	126.8(8)	C10-C6 -C16	123.9(7)
C3 -C2	1.427(11)	C1 -C2-C3	108.8(7)	C6 -C7 -C8	107.4(7)
C12-C2	1.514(12)	C1 -C2-C12	126.5(8)	C6 -C7 -C17	124.8(8)
C4 -C3	1.443(12)	C3 -C2-C12	124.3(8)	C8 -C7 -C17	125.8(8)
C13-C3	1.515(12)	C2 -C3-C4	106.5(7)	C7 -C8 -C9	108.5(7)
C5 -C4	1.416(12)	C2 -C3-C13	125.3(9)	C7 -C8 -C18	125.8(8)
C14-C4	1.526(12)	C4 -C3-C13	126.8(9)	C9 -C8 -C18	125.3(8)
C15-C5	1.517(12)	C3 -C4-C5	108.1(8)	C8 -C9 -C10	107.9(7)
C10-C6	1.408(10)	C3 -C4-C14	124.8(9)	C8 -C9 -C19	124.0(8)
C16-C6	1.534(11)	C5 -C4-C14	125.6(10)	C10-C9 -C19	127.5(8)
C8 -C7	1.404(10)	C1 -C5-C4	108.1(7)	C6 -C10-C9	107.0(7)
C17-C7	1.496(11)	C1 -C5-C15	126.5(9)	C6 -C10-C20	125.8(7)
C9 -C8	1.422(12)	C4 -C5-C15	125.1(9)	C9 -C10-C20	126.0(8)
C18-C8	1.517(11)				
C10-C9	1.436(11)				
C19-C9	1.515(11)				
C20-C10	1.506(11)				

Least-Squares Planes

Plane No.1

Equation of the Plane:  $0.18590 a + 0.78983 b + 0.45991 c = 3.31170$

Distance to the plane from

atoms in plane			atoms not in plane		
Atom	d(Å)	$\sigma(d)$	Atom	d(Å)	$\sigma(d)$
C1	0.008	0.011	Yb	-2.319	0.004
C2	-0.007	0.012	C11	0.243	0.019
C3	0.003	0.012	C12	0.120	0.020
C4	0.003	0.013	C13	0.289	0.021
C5	-0.008	0.013	C14	0.298	0.022
			C15	0.097	0.021

Plane No. 2

Equation of the Plane:  $-0.55554 a + 0.53294b + 0.81048 c = -3.57876$

Distance to the plane from

atoms in plane			atoms not in plane		
Atom	d(Å)	$\sigma(d)$	Atom	d(Å)	$\sigma(d)$
C6	0.015	0.011	Yb	2.344	0.004
C7	-0.020	0.011	C16	-0.083	0.017
C8	0.020	0.011	C17	-0.403	0.017
C9	-0.011	0.012	C18	-0.062	0.017
C10	-0.004	0.010	C19	-0.218	0.018
			C20	-0.276	0.016

Angle between the planes = 46.3(4)

OBSERVED STRUCTURE AMPLITUDES, STANDARD DEVIATIONS, AND DIFFERENCES (ALL X 2.0)  
 (MESC5)2YB TE YB(MESC5)2 F(0,0,0) = 1924

SG = Estimated standard deviation of Fob. DEL = /Fob/- /Fca/, where  
 Fob and Fca are the observed and calculated structure amplitudes.  
 F000 = 2.0 x (no. of electrons in the unit cell adjusted for dispersion and omitted atoms).  
 \* indicates zero weighted data.

H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL				
K,L= 0, 0	-14	278	12	-16	11	29	7	-5	-18	30	6	-9	11	0	21	-9*	4	220	7	-11	-2	370	13	16	-6	260	8	-2			
2 264	8	-14	-12	163	5	14	13	61	3	2	-16	137	4	-6	12	26	8	-7*	5	150	5	-8	-1	44	2	-10	-5	334	10	-7	
4 265	8	18	-10	63	3	-1	K,L= 0, 8	-14	143	5	-13	13	40	3	-0	6	55	2	3	0	260	8	7	-4	103	3	0				
6 299	9	-22	-8	120	4	-7	-20	145	5	4	-12	76	3	-2	14	118	4	-1	7	24	3	7	1	130	4	-1	-3	334	10	-20	
8 312	10	-30	-6	617	24	-56	-18	65	3	-2	-10	53	3	0	15	90	3	-2	8	159	5	-12	2	196	6	-5	-2	126	4	-4	
10 309	10	-13	-4	198	8	-1	-16	138	4	-1	-8	198	6	-2	16	18	22	-14*	9	260	8	-7	3	484	15	-31	-1	314	10	-7	
12 151	5	7	-2	434	15	18	-14	99	3	-9	-6	88	3	-4	17	78	3	3	10	19	21	11*	4	10	17	-9*	0	160	5	-2	
14 75	3	2	0	139	4	1	-12	259	12	-14	-4	262	8	-3	18	0	25	-8*	11	41	3	-1	5	117	4	-8	1	127	4	4	
16 34	4	1	2	162	5	-21	-10	185	8	-5	-2	32	3	-3	K,L= 1, 1	12	34	6	2	6	19	10	7*	2	230	7	-12				
18 132	4	11	4	459	14	-31	-8	319	14	-28	0	0	21	-6*	-18	118	4	8	13	152	5	0	7	186	6	-5	3	221	7	-7	
K,L= 0, 1	6	138	4	-7	-6	11	19	4*	2	164	5	5	-17	16	23	-4*	14	68	3	-1	8	164	5	8	4	52	3	-1			
-17 87	3	-3	8	89	3	-2	-4	52	2	-1	4	80	3	3	-16	41	3	-3	15	28	8	-10*	9	60	3	13	5	31	6	-7	
-15 173	5	2	10	83	3	-8	-2	461	14	-14	6	58	3	0	-15	27	9	-6*	16	25	11	-3*	10	12	20	0*	6	54	3	3	
-13 14	19	8*	12	175	8	0	0	70	3	6	K,L= 0, 13	-14	108	4	-4	17	33	9	3	11	38	3	2	7	242	8	3				
-11 12	22	4*	14	57	3	-1	2	180	6	0	-17	78	3	-7	-13	134	4	-11	K,L= 1, 3	3	12	41	3	-2	8	111	4	-5			
-9 548	17	-33	K,L= 0, 5	4	83	3	9	-15	10	24	7*	-12	57	3	20	-19	72	3	6	13	154	5	4	9	15	20	5*				
-7 104	3	2	-19	58	3	1	6	158	5	-1	-13	209	7	-12	-11	93	3	2	-18	82	3	-2	14	19	20	-8*	10	26	8	-5*	
-5 420	14	-8	-17	64	3	-1	8	110	4	-6	-11	29	4	3	-10	240	8	-15	-17	21	7	1*	15	34	4	2	11	8	21	-2*	
-3 201	6	-18	-15	199	6	-11	10	84	3	-1	-9	6	22	-14*	-9	79	3	-8	-16	99	3	1	K,L= 1, 5	12	61	3	2				
1 598	18	-49	-13	68	3	-7	12	0	23	-6*	-7	159	5	-3	-8	288	9	-12	-15	22	18	4*	-19	67	3	3	13	79	3	1	
3 421	13	-32	-11	359	11	1	K,L= 0, 9	-5	178	6	4	-7	17	7	5*	-14	208	7	-13	-18	29	5	-3	14	14	23	1*				
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H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL						
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	K,L= 5, 4			-11	258	8	4	0	43	3	10	-11	131	4	6	-5	74	3	0	-16	64	3	3	-8	84	3	18	0	36	3	-7	
-18	57	3	1	-10	153	5	8	1	137	4	6	-10	43	3	0	-4	0	23	0*	-15	0	21	-6*	-7	71	3	2	1	29	3	5	
-17	11	22	-21*	-9	13	19	2*	2	160	5	-4	-9	127	4	-2	-3	83	3	-4	-14	143	5	6	-6	372	11	2	2	46	3	7	
-16	68	3	1	-8	66	2	-3	3	10	20	6*	-8	187	6	3	-2	27	9	0*	-13	8	20	-5*	-5	23	6	3	3	53	3	2	
-15	163	5	-1	-7	24	4	2	4	35	5	-5	-7	13	20	8*	-1	57	3	0	-12	75	3	-4	-4	153	5	-2	4	199	6	-5	
-14	9	18	3*	-6	273	8	-3	5	9	20	-3*	-6	67	3	-3	0	68	3	2	-11	11	16	5*	-3	45	2	-1	5	10	17	-5*	
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3	286	9	-5	11	19	21	7*	-8	200	6	7	-15	22	11	5*	1	80	3	7	6	53	2	15	14	45	4	0	-10	12	17	-4*	
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8	157	5	-6	-16	28	4	-4	-3	230	7	3	-10	20	13	4*	6	190	6	-2	11	0	20	-14*	-15	157	5	2	-5	159	5	21	
9	66	3	-2	-15	135	4	6	-2	185	6	6	-9	42	3	5	7	38	3	0	12	149	5	1	-14	17	18	-2*	-4	24	7	7	
10	16	20	9*	-14	85	3	1	-1	51	3	1	-8	126	4	3	8	213	7	11	13	22	12	3*	-13	37	3	1	-3	239	7	14	
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-18	35	4	-1	-8	162	5	24	5	73	3	1	-2	66	3	1	14	40	3	-4	-15	185	6	5	-7	100	3	0	3	66	3	-1	
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H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL				
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3	41	3	5	-4	18	14	-2*	-4	9	21	-1*	8	60	2	-1	-15	14	21	-9*	-1	56	3	2	-8	0	21	-3*	-10	10	23	4*
4	81	3	0	-3	25	7	5*	K,L= 7, 0				9	189	6	-2	-14	144	5	2	0	19	18	4*	-7	220	7	-1	-9	38	6	-4
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4	0	21	-7*	2	111	4	1	-4	18	14	5*	5	45	3	6	-16	51	3	5	0	44	3	0	-1	17	20	15*	-12	0	20	-4*
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6	20	17	-6*	4	63	3	1	-2	16	9	4*	7	42	3	-1	-14	5	20	3*	2	58	3	-3	1	17	19	-1*	-10	105	4	-2
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8	0	23	-3*	-15	14	20	10*	0	426	13	4	9	45	3	5	-12	13	19	3*	4	22	13	3*	3	22	10	3*	-8	63	2	1
9	24	6	4	-14	0	23	-17*	1	21	6	-4	10	84	3	-4	-11	255	8	-4	5	0	21	-16*	4	54	3	1	-7	26	4	-2
K,L= 6, 10				-13	175	6	2	2	49	2	-1	11	27	4	2	-10	67	3	-2	6	28	8	0	5	0	23	-11*	-6	71	3	0
-17	14	24	-3*	-12	0	23	-12*	3	12	17	-2*	12	130	4	-1	-9	18	5	5*	7	136	4	2	K,L= 7, 12				-5	149	5	7
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-15	15	19	3*	-10	19	21	-3*	5	103	3	3	14	36	4	0	-7	15	19	7*	9	23	10	15*	-14	20	22	13*	-3	80	3	21
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-11	52	3	1	-6	14	21	5*	9	18	12	6*	-15	165	5	2	-3	230	7	12	-14	65	3	-2	-10	16	9	-4*	1	176	5	11
-10	73	3	-2	-5	128	4	1	10	154	5	0	-14	15	20	9*	-2	22	8	1*	-13	48	3	-2	-9	58	3	-1	2	48	2	13
-9	56	3	-2	-4	17	22	2*	11	14	19	5*	-13	46	3	-1	-1	242	8	6	-12	100	3	1	-8	24	13	-6*	3	146	5	15
-8	242	7	-3	-3	103	4	-1	12	114	4	-1	-12	2	19	-2*	0	90	3	5	-11	20	20	4*	-7	140	4	2	4	198	6	8
-7	23	5	-1	-2	6	22	4*	13	29	4	1	-11	156	5	-3	1	135	4	8	-10	117	4	1	-6	20	12	-8*	5	26	4	4
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-5	5	19	3*	0	29	8	5	15	24	6	5	-9	106	3	3	3	169	5	-6	-8	222	7	-6	-4	16	19	-8*	7	12	18	4*
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-3	68	3	-1	2	0	20	-8*	-16	13	15	4*	-7	140	4	-3	5	25	7	-6*	-6	58	3	1	-2	37	3	-2	9	162	5	-1
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H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL									
-5	18	19	12*	-8	17	19	3*	-5	24	9	-8*	1	91	3	4	6	34	3	1	-4	0	20	-15*	-8	64	3	-1	-1	28	4	-3	
-4	231	7	-4	-7	132	4	-1	-4	82	3	-5	2	64	3	-3	7	84	3	0	-3	68	3	-2	-7	16	20	7*	0	0	21	-12*	
-3	19	10	-8*	-6	49	2	4	-3	36	3	7	3	53	3	-2	8	18	18	14*	-2	107	4	0	-6	144	5	-2	1	22	14	0*	
-2	119	4	-2	-5	25	4	1	-2	13	20	12*	4	176	6	-3	9	55	3	3	-1	53	3	-3	-5	31	6	-7	2	6	21	-5*	
-1	50	2	2	-4	13	18	1*	-1	27	4	2	5	19	12	-4*	K,L= 11, 4		0	20	17	11*	-4	8	20	5*	3	32	7	-4			
0	72	3	-1	-3	16	18	5*	0	51	3	-4	6	43	3	1	-12	12	21	7*	1	43	3	4	-3	0	19	-10*	K,L= 12, 7				
1	13	18	-4*	-2	37	3	0	1	18	20	2*	7	26	7	-5	-11	49	3	-4	2	27	8	-6*	-2	18	13	-4*	-8	20	13	-3*	
2	62	2	1	-1	248	8	-2	2	161	5	1	8	52	3	0	-10	123	4	0	3	108	4	-1	-1	79	3	2	-7	35	4	1	
3	25	7	0	0	30	3	-1	3	0	21	-3*	9	102	3	-1	-9	52	3	-1	4	56	3	-1	0	146	5	0	-6	48	3	2	
4	210	7	1	1	23	7	2*	4	44	3	-1	10	50	3	-5	-8	15	18	-6*	K,L= 11, 8		0	14	17	7*	-5	70	3	-5			
5	14	19	12*	2	14	19	11*	5	8	19	-11*	11	14	21	9*	-7	45	3	4	-10	25	9	-8*	2	41	3	0	-4	19	21	-1*	
6	72	3	-2	3	84	3	0	6	63	3	-4	K,L= 11, 1		-6	61	3	-3	-9	13	19	0*	3	0	21	-16*	-3	94	3	-3			
7	13	19	-1*	4	36	3	2	K,L= 10, 8		-11	52	3	-3	-5	119	4	0	-8	44	3	3	4	119	4	2	-2	8	21	3	3*		
8	131	4	-3	5	68	3	-5	-13	87	3	-4	-10	71	3	1	-4	55	3	1	-7	66	3	0	5	36	3	-5	-1	87	3	2	
9	32	3	4	6	21	10	8*	-12	9	22	-10*	-9	43	3	1	-3	43	3	-2	-6	114	4	0	6	40	3	-3	0	11	21	-1*	
10	34	4	-8	7	98	3	2	-11	44	3	-3	-8	56	3	1	-2	109	4	-1	-5	52	3	-5	7	31	7	-3	1	66	3	-1	
11	0	21	-4*	8	0	22	-5*	-10	17	18	-2*	-7	30	6	-6	-1	42	3	2	-4	74	3	-4	K,L= 12, 3		K,L= 12, 8						
12	30	7	2	9	92	3	-1	-9	51	3	-4	-6	80	3	-1	0	111	4	-1	-3	63	3	-1	-9	77	3	-4	-6	3	21	-10*	
K,L= 10, 2		10	16	22	-3*	-8	15	19	-2*	-5	150	5	-1	1	61	3	-1	-2	41	3	1	-8	10	21	0*	-5	12	21	8*			
-13	95	3	1	K,L= 10, 5		-7	176	6	-1	-4	20	9	12*	2	87	3	-2	-1	65	3	-1	-7	57	3	-2	-4	7	21	-2*			
-12	11	21	-5*	-13	1	19	-10*	-6	13	18	1*	-3	34	3	1	3	102	3	-1	0	30	7	-9	-6	21	16	14*	-3	36	4	2	
-11	110	4	1	-12	4	21	-14*	-5	41	3	0	-2	0	19	-7*	4	0	20	-8*	1	59	3	-1	-5	142	5	0	-2	122	4	1	
-10	24	12	5*	-11	19	12	-6*	-4	0	20	-9*	-1	105	3	-2	5	32	4	-7	2	94	3	-2	-4	41	3	-2	-1	11	21	8*	
-9	95	3	0	-10	163	5	0	-3	141	4	-3	0	144	5	2	6	16	19	4*	3	0	22	-2*	-3	61	3	-3	K,L= 13, 0				
-8	5	19	-8*	-9	35	3	-3	-2	41	3	-2	1	27	6	-1	7	56	3	0	K,L= 11, 9		-2	70	3	0	1	103	3	-1			
-7	52	3	-4	-8	61	3	-1	-1	40	3	-5	2	30	3	-1	8	98	3	1	-9	35	4	1	-1	24	5	0	2	22	9	-3*	
-6	31	3	-1	-7	27	7	-1	0	20	16	19*	3	49	3	4	K,L= 11, 5		-8	76	3	1	0	42	3	-3	3	70	3	-4			
-5	152	5	-1	-6	142	4	-1	1	41	3	4	4	61	3	-2	-12	58	3	1	-7	76	3	2	1	79	3	-5	4	16	18	-2*	
-4	9	16	2*	-5	43	3	-3	2	17	22	0*	5	146	5	-1	-11	54	3	4	-6	16	20	4*	2	24	8	-2*	5	44	3	-1	
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-2	19	10	-3*	-3	43	3	-1	4	19	21	4*	7	70	3	1	-9	77	3	-1	-4	19	13	-2*	4	14	21	-11*	K,L= 13, 1				
-1	239	7	0	-2	117	4	0	5	67	3	3	8	36	3	-4	-8	49	3	-2	-3	106	4	1	5	43	3	1	-6	97	3	0	
0	64	2	-1	-1	11	17	6*	K,L= 10, 9		9	25	5	1	-7	122	4	-3	-2	73	3	1	6	14	19	10*	-5	27	5	1			
1	21	4	8	0	137	4	-2	-12	142	5	-3	10	69	3	3	-6	97	3	-1	-1	3	21	-10*	7	39	3	0	-4	0	18	-4*	
2	12	16	3*	1	26	7	-2	-11	27	5	2	K,L= 11, 2		-5	19	12	-9*	0	0	22	-2*	K,L= 12, 4		-3	11	20	0*					
3	35	3	3	2	156	5	0	-10	28	7	-1	-11	5	21	-6*	-4	43	3	3	1	12	20	5*	-9	40	3	-1	-2	21	14	10*	
4	40	3	-1	3	38	3	0	-9	0	21	-3*	-10	107	4	2	-3	17	19	4*	K,L= 11, 10		-8	52	3	-3	-1	21	11	6*			
5	177	6	-1	4	35	3	2	-8	20	11	7*	-9	99	3	2	-2	105	3	3	-7	75	3	1	-7	46	3	2	0	149	5	-2	
6	16	17	0*	5	0	20	-5*	-7	15	21	-12*	-8	10	20	3*	-1	135	4	-3	-6	50	3	-2	-6	147	5	-6	1	24	5	11	
7	116	4	1	6	21	10	-5*	-6	143	5	-2	-7	43	3	-1	0	6	20	-12*	-5	31	4	-4	-5	6	20	5*	2	21	12	-5*	
8	0	21	0*	7	9	19	-13*	-5	25	5	-1	-6	24	7	5*	1	35	3	4	-4	80	3	0	-4	35	6	-4	3	8	18	-2*	
9	87	3	3	8	121	4	1	-4	120	4	-3	-5	103	3	2	2	0	20	-13*	-3	22	17	7*	-3	3	19	0*	4	70	3	0	
10	24	13	-5*	9	21	22	10*	-3	12	18	2*	-4	118	4	-2	3	90	3	-2	-2	57	3	0	-2	97	3	-3	5	19	18	3*	
11	28	8	-8	K,L= 10, 6		-2	89	3	3	-3	48	3	1	4	86	3	-1	5	86	3	-1	K,L= 12, 0		-1	76	3	-3	K,L= 13, 2				
K,L= 10, 3		-13	52	3	-1	-1	38	3	1	-2	115	4	-1	5	32	4	0	0	183	6	-4	0	54	3	-4	-6	17	21	15*			
-13	10	22	8*	-12	34	3	-1	0	54	3	-1	-1	66	3	5	6	31	4	-3	1	26	7	-1	1	17	20	4*	-5	106	4	0	
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-11	15	21	-2*	-10	6	20	5*	2	90	3	2	1	75	3	-2	K,L= 11, 6		3	24	7	0*	3	17	18	-4*	-3	42	3	-3			
-10	187	6	-1	-9	78	3	-1	3	21	14	3*	2	37	3	-1	-12	38	5	3	4	57	3	-1	4	125	4	1	-2	24	5	9	
-9	42	3	-4	-8	12	19	-4*	K,L= 10, 10		3	115	4	3	-11	97	3	3	5	69	3	0	5	0	21	-13*	-1	64	3	0			
-8	18	11	6*	-7	196	6	-5	-11	86	3	0	4	108	4	0	-10	84	3	0	6	81	3	-3	6	38	3	-5	0	17	21	11*	
-7	26	4	-3	-6	44	3	3	-10	19	19	-3*	5	39	3	6	-9	13	20	3*	7	23	9	0*	K,L= 12, 5		1	77	3	-3			
-6	37	3	2	-5	64	3	0	-9	70	3	-5	6	17	20	-5*	-8	55	3	1	8	76	3	2	-9	26	5	-2	2	24	5	5	
-5	42	3	-1	-4	0	19	-5*	-8	21	12	-7*	7	38	3	-2	-7	14	20	1*	9	0	23	-9*	-8	21	10	3*	3	122	4	0	
-4	132	4	-1	-3	54	3	-4	-7	59	3	-2	8	105	4	3	-6	125	4	-1	K,L= 12, 1		-7	30	7	0	4	2	19	-8*			
-3	42	3	-5	-2	35	3	-2	-6	4	21	-8*	9	68	3	1	-5	85	3	-2	-9	127	4	2	-6	55	3	1	K,L=				

H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL	H	FOB	SG	DEL
2	17	20	9*																				
	K,L=		13, 5																				
-5	5	21	-7*																				
-4	11	22	-11*																				
-3	0	19	-5*																				
-2	111	4	0																				
-1	18	19	2*																				
0	16	19	-9*																				

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