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***cis*-Dichloridobis(methoxydiphenylphosphino)platinum(II)**

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cis-Dichloridobis(methoxydiphenylphosphino)platinum(II)

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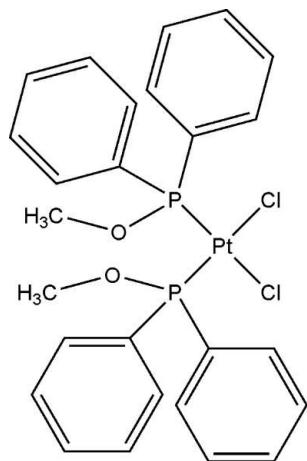
Received 20 June 2007; accepted 25 June 2007

Key indicators: single-crystal X-ray study; $T = 125$ K; mean $\sigma(\text{C}-\text{C}) = 0.006$ Å; R factor = 0.041; wR factor = 0.062; data-to-parameter ratio = 19.5.

The title compound, $[\text{PtCl}_2(\text{C}_{13}\text{H}_{13}\text{OP})_2]$, adopts a *cis*-square-planar geometry. Molecules are linked by $\text{C}-\text{H}\cdots\text{Cl}$ and $\text{C}-\text{H}\cdots\pi(\text{arene})$ interactions.

Related literature

For related literature on PtCl_2L_2 complexes, see: Bao *et al.* (1987); Fun *et al.* (2006); Slawin *et al.* (2007).



Experimental

Crystal data

$[\text{PtCl}_2(\text{C}_{13}\text{H}_{13}\text{OP})_2]$
 $M_r = 698.43$
Monoclinic, $P2_1/n$
 $a = 12.4262$ (6) Å
 $b = 13.6280$ (7) Å
 $c = 15.0494$ (8) Å
 $\beta = 93.5316$ (11)°

$V = 2543.7$ (2) Å³
 $Z = 4$
Mo $K\alpha$ radiation
 $\mu = 5.85$ mm⁻¹
 $T = 125.1$ K
0.25 × 0.15 × 0.12 mm

Data collection

Rigaku SCXmini diffractometer
Absorption correction: multi-scan
(*ABSCOR*; Higashi, 1995)
 $T_{\min} = 0.377$, $T_{\max} = 0.495$
26133 measured reflections
5827 independent reflections
4910 reflections with $F^2 > 2\sigma(F^2)$
 $R_{\text{int}} = 0.057$

Refinement

$R[F^2 > 2\sigma(F^2)] = 0.041$
 $wR(F^2) = 0.062$
 $S = 1.13$
5827 reflections
299 parameters
H-atom parameters constrained
 $\Delta\rho_{\max} = 0.99$ e Å⁻³
 $\Delta\rho_{\min} = -1.02$ e Å⁻³

Table 1

Selected geometric parameters (Å, °).

Pt1—Cl1	2.3693 (12)	Pt1—P1	2.2272 (11)
Pt1—Cl2	2.3533 (12)	Pt1—P2	2.2279 (12)
Cl1—Pt1—Cl2	89.37 (4)	Cl1—Pt1—P2	175.95 (4)
P1—Pt1—P2	98.14 (4)	Cl2—Pt1—P1	168.82 (4)
Cl1—Pt1—P1	83.49 (4)	Cl2—Pt1—P2	89.56 (4)

Table 2

Hydrogen-bond geometry (Å, °).

Cg1 and Cg2 are the centroids of the $\text{C7}-\text{C12}$ and $\text{C20}-\text{C25}$ rings.

$D-\text{H}\cdots A$	$D-\text{H}$	$\text{H}\cdots A$	$D\cdots A$	$D-\text{H}\cdots A$
$\text{C10}-\text{H10}\cdots\text{Cl1}^{\text{i}}$	0.95	2.72	3.642 (6)	165
$\text{C16}-\text{H16}\cdots\text{Cl1}^{\text{ii}}$	0.95	2.72	3.518 (5)	143
$\text{C4}-\text{H4}\cdots\text{Cg1}^{\text{iii}}$	0.95	2.88	3.692 (5)	145
$\text{C19}-\text{H19}\cdots\text{Cg2}^{\text{iv}}$	0.95	2.83	3.641 (4)	144

Symmetry codes: (i) $x + \frac{1}{2}, -y + \frac{1}{2}, z + \frac{1}{2}$; (ii) $-x, -y, -z + 2$; (iii) $-x + 1, -y, -z + 2$; (iv) $-x, -y + 1, -z + 2$.

Data collection: *SCXmini Software* (Rigaku/MSC, 2006); cell refinement: *PROCESS-AUTO* (Rigaku, 1998); data reduction: *PROCESS-AUTO*; program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *CrystalStructure* (Rigaku/MSC, 2006); software used to prepare material for publication: *CrystalStructure*.

Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: GG2017).

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Slawin, A. M. Z., Waddell, P. G. & Woollins, J. D. (2007). *Acta Cryst.* **E63**, m2017.

supplementary materials

Acta Cryst. (2007). E63, m2018 [doi:10.1107/S1600536807031005]

***cis*-Dichloridobis(methoxydiphenylphosphino)platinum(II)**

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Comment

The title complex (I) can be compared to similar platinum dichloride complexes containing trimethoxy phosphite; [PtCl₂(P(OMe)₃)₂] (Bao *et al.*, 1987) and triphenyl phosphine [PtCl₂(PPh₃)₂] (Fun *et al.*, 2006). The geometry at the platinum atom in the title compound (I) bears a closer resemblance to the triphenyl phosphine complex and can be compared with [PtCl₂(P(OMe)₂Ph)₂] (Slawin *et al.*, 2007).

Experimental

0.8 g (2.14 mmol) of PtCl₂(COD) was dissolved in the minimum volume of dichloromethane in a round-bottomed flask. To this, 0.921 ml (4.28 mmol) of methyldiphenylphosphinite was added. The solution was then stirred for 0.5 h at room temperature. The product was precipitated *via* slow diffusion of hexane and was then filtered off and dried under vacuum, [PtCl₂(P(OMe)Ph₂)₂] (1.93 mmol, *ca* 90%. ³¹P-¹H} NMR: δ 85.2 p.p.m. *J*{Pt—P} 4183 Hz.

Refinement

All H atoms were included in calculated positions (C—H distances are 0.96 Å for methyl H atoms, 0.97 Å for methylene H atoms and 0.98 Å for methine H atoms) and were refined as riding atoms with *U*_{iso}(H) = 1.2 *U*_{eq}(parent atom, methylene and methine H atoms) or *U*_{iso}(H) = 1.5 *U*_{eq}(parent atom, methyl H atoms).

Figures

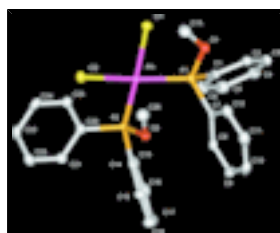


Fig. 1. The structure of (1) with displacement ellipsoids drawn at the 50% probability level, H atoms omitted for clarity.

***cis*-Dichloridobis(methoxydiphenylphosphino)platinum(II)**

Crystal data

[PtCl₂(C₁₃H₁₃OP)₂]

M_r = 698.43

Monoclinic, *P*2₁/*n*

*F*₀₀₀ = 1360.00

D_x = 1.824 Mg m⁻³

Mo *K*α radiation
λ = 0.71075 Å

supplementary materials

Hall symbol: -P 2yn

$a = 12.4262$ (6) Å

$b = 13.6280$ (7) Å

$c = 15.0494$ (8) Å

$\beta = 93.5316$ (11)°

$V = 2543.7$ (2) Å³

$Z = 4$

Cell parameters from 23439 reflections

$\theta = 3.1\text{--}27.6^\circ$

$\mu = 5.85$ mm⁻¹

$T = 125.1$ K

Prism, colorless

$0.25 \times 0.15 \times 0.12$ mm

Data collection

Rigaku SCXmini
diffractometer

ω scans

Absorption correction: multi-scan
(ABSCOR; Higashi, 1995)

$T_{\min} = 0.377$, $T_{\max} = 0.495$

26133 measured reflections

5827 independent reflections

4910 reflections with $F^2 > 2\sigma(F^2)$

$R_{\text{int}} = 0.057$

$\theta_{\max} = 27.5^\circ$

$h = -16 \rightarrow 16$

$k = -17 \rightarrow 17$

$l = -19 \rightarrow 19$

Standard reflections: ?;

every ? reflections

intensity decay: ?

Refinement

Refinement on F^2

$R[F^2 > 2\sigma(F^2)] = 0.041$

$wR(F^2) = 0.062$

$S = 1.13$

5827 reflections

299 parameters

H-atom parameters constrained

$$w = 1/[\sigma^2(F_o^2) + (0.0124P)^2 + 7.7753P]$$

where $P = (F_o^2 + 2F_c^2)/3$

$(\Delta/\sigma)_{\max} = 0.002$

$\Delta\rho_{\max} = 0.99$ e Å⁻³

$\Delta\rho_{\min} = -1.02$ e Å⁻³

Extinction correction: none

Special details

Refinement. Refinement was performed using all reflections. The weighted R -factor (wR) and goodness of fit (S) are based on F^2 . R -factor (gt) are based on F . The threshold expression of $F^2 > 2.0 \sigma(F^2)$ is used only for calculating R -factor (gt).

Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å²)

	x	y	z	$U_{\text{iso}}^*/U_{\text{eq}}$
Pt(1)	0.075336 (15)	0.162861 (13)	0.837844 (12)	0.01364 (4)
Cl(1)	0.10233 (10)	0.03053 (9)	0.73956 (8)	0.0204 (2)
Cl(2)	-0.11089 (10)	0.12977 (9)	0.82742 (9)	0.0229 (2)
P(1)	0.25475 (9)	0.16303 (10)	0.85328 (8)	0.0146 (2)
P(2)	0.04528 (10)	0.29335 (9)	0.92198 (8)	0.0135 (2)
O(1)	0.3161 (2)	0.1781 (2)	0.7644 (2)	0.0205 (7)
O(2)	0.1320 (2)	0.3806 (2)	0.9213 (2)	0.0162 (7)
C(1)	0.3066 (3)	0.0446 (3)	0.8932 (3)	0.0165 (10)

supplementary materials

C(2)	0.4104 (4)	0.0170 (3)	0.8755 (3)	0.0229 (11)
C(3)	0.4538 (4)	-0.0690 (3)	0.9111 (3)	0.0261 (12)
C(4)	0.3943 (4)	-0.1272 (3)	0.9644 (3)	0.0277 (12)
C(5)	0.2914 (4)	-0.0996 (3)	0.9842 (3)	0.0285 (12)
C(6)	0.2473 (4)	-0.0138 (3)	0.9477 (3)	0.0238 (11)
C(7)	0.3255 (3)	0.2451 (3)	0.9318 (3)	0.0161 (10)
C(8)	0.3143 (3)	0.2328 (3)	1.0229 (3)	0.0182 (10)
C(9)	0.3715 (4)	0.2924 (3)	1.0838 (3)	0.0267 (12)
C(10)	0.4417 (4)	0.3621 (3)	1.0537 (4)	0.0279 (13)
C(11)	0.4526 (4)	0.3749 (3)	0.9635 (3)	0.0273 (12)
C(12)	0.3945 (3)	0.3163 (3)	0.9024 (3)	0.0219 (11)
C(13)	0.2720 (4)	0.2348 (4)	0.6905 (3)	0.0297 (13)
C(14)	0.0499 (3)	0.2684 (3)	1.0394 (3)	0.0156 (10)
C(15)	0.0338 (3)	0.1735 (3)	1.0697 (3)	0.0221 (11)
C(16)	0.0487 (4)	0.1518 (4)	1.1591 (3)	0.0287 (12)
C(17)	0.0785 (4)	0.2256 (4)	1.2200 (3)	0.0271 (12)
C(18)	0.0940 (4)	0.3196 (4)	1.1909 (3)	0.0267 (12)
C(19)	0.0800 (3)	0.3427 (3)	1.1010 (3)	0.0193 (10)
C(20)	-0.0821 (3)	0.3548 (3)	0.8926 (3)	0.0167 (10)
C(21)	-0.1502 (4)	0.3860 (3)	0.9576 (3)	0.0201 (11)
C(22)	-0.2438 (4)	0.4369 (3)	0.9331 (3)	0.0264 (12)
C(23)	-0.2699 (4)	0.4580 (3)	0.8444 (3)	0.0251 (12)
C(24)	-0.2024 (4)	0.4278 (3)	0.7794 (3)	0.0246 (12)
C(25)	-0.1105 (4)	0.3757 (3)	0.8035 (3)	0.0206 (11)
C(26)	0.1466 (4)	0.4373 (3)	0.8418 (3)	0.0242 (11)
H(30)	0.2260	0.2868	0.7123	0.036*
H(2)	0.4519	0.0571	0.8389	0.028*
H(3)	0.5249	-0.0879	0.8987	0.031*
H(4)	0.4242	-0.1867	0.9877	0.033*
H(5)	0.2513	-0.1389	1.0225	0.034*
H(6)	0.1762	0.0049	0.9602	0.029*
H(31)	0.2291	0.1921	0.6497	0.036*
H(8)	0.2675	0.1836	1.0432	0.022*
H(9)	0.3625	0.2855	1.1458	0.032*
H(10)	0.4828	0.4014	1.0954	0.033*
H(11)	0.4998	0.4239	0.9435	0.033*
H(12)	0.4021	0.3249	0.8405	0.026*
H(33)	0.3308	0.2642	0.6591	0.036*
H(28)	0.2017	0.4061	0.8075	0.029*
H(15)	0.0125	0.1232	1.0285	0.026*
H(16)	0.0387	0.0866	1.1792	0.034*
H(17)	0.0881	0.2107	1.2816	0.033*
H(18)	0.1144	0.3695	1.2326	0.032*
H(19)	0.0906	0.4079	1.0813	0.023*
H(21)	-0.1321	0.3723	1.0186	0.024*
H(22)	-0.2902	0.4575	0.9774	0.032*
H(23)	-0.3341	0.4932	0.8279	0.030*
H(24)	-0.2197	0.4431	0.7187	0.029*
H(25)	-0.0656	0.3535	0.7587	0.025*

supplementary materials

H(26)	0.1697	0.5039	0.8585	0.029*
H(27)	0.0784	0.4402	0.8057	0.029*

Atomic displacement parameters (\AA^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Pt(1)	0.01313 (9)	0.01225 (9)	0.01551 (9)	0.00037 (9)	0.00053 (6)	-0.00182 (9)
Cl(1)	0.0223 (6)	0.0175 (6)	0.0212 (6)	0.0008 (5)	0.0010 (5)	-0.0066 (4)
Cl(2)	0.0150 (6)	0.0211 (6)	0.0326 (7)	-0.0030 (4)	0.0014 (5)	-0.0064 (5)
P(1)	0.0142 (5)	0.0143 (5)	0.0155 (5)	0.0010 (5)	0.0013 (4)	-0.0010 (5)
P(2)	0.0130 (6)	0.0122 (6)	0.0155 (6)	0.0007 (4)	0.0014 (5)	0.0005 (4)
O(1)	0.0209 (18)	0.024 (2)	0.0172 (17)	0.0041 (15)	0.0050 (14)	0.0029 (14)
O(2)	0.0180 (17)	0.0141 (16)	0.0167 (17)	-0.0023 (14)	0.0024 (14)	0.0011 (13)
C(1)	0.018 (2)	0.015 (2)	0.016 (2)	0.005 (2)	-0.001 (2)	-0.0011 (19)
C(2)	0.023 (2)	0.026 (2)	0.020 (2)	0.005 (2)	-0.001 (2)	-0.006 (2)
C(3)	0.024 (2)	0.028 (3)	0.026 (3)	0.014 (2)	-0.003 (2)	-0.008 (2)
C(4)	0.036 (3)	0.019 (2)	0.027 (3)	0.010 (2)	-0.005 (2)	-0.004 (2)
C(5)	0.041 (3)	0.019 (2)	0.026 (3)	-0.001 (2)	0.002 (2)	0.003 (2)
C(6)	0.021 (2)	0.018 (2)	0.032 (3)	0.006 (2)	0.006 (2)	-0.001 (2)
C(7)	0.012 (2)	0.017 (2)	0.020 (2)	0.0057 (19)	-0.001 (2)	-0.002 (2)
C(8)	0.014 (2)	0.015 (2)	0.025 (2)	0.003 (2)	-0.002 (2)	0.001 (2)
C(9)	0.032 (3)	0.029 (3)	0.018 (2)	0.012 (2)	-0.007 (2)	-0.003 (2)
C(10)	0.021 (2)	0.019 (2)	0.042 (3)	0.004 (2)	-0.012 (2)	-0.015 (2)
C(11)	0.022 (2)	0.017 (2)	0.043 (3)	-0.002 (2)	0.001 (2)	-0.004 (2)
C(12)	0.020 (2)	0.017 (2)	0.029 (2)	0.003 (2)	0.003 (2)	0.001 (2)
C(13)	0.031 (3)	0.040 (3)	0.019 (2)	0.005 (2)	0.005 (2)	0.009 (2)
C(14)	0.013 (2)	0.016 (2)	0.019 (2)	0.0050 (19)	0.0029 (19)	0.0043 (19)
C(15)	0.020 (2)	0.020 (2)	0.027 (2)	-0.002 (2)	0.007 (2)	0.000 (2)
C(16)	0.032 (3)	0.020 (2)	0.035 (3)	-0.004 (2)	0.009 (2)	0.014 (2)
C(17)	0.028 (3)	0.037 (3)	0.017 (2)	0.004 (2)	0.003 (2)	0.010 (2)
C(18)	0.029 (2)	0.033 (3)	0.019 (2)	-0.002 (2)	0.002 (2)	-0.003 (2)
C(19)	0.025 (2)	0.016 (2)	0.017 (2)	0.002 (2)	0.003 (2)	0.001 (2)
C(20)	0.016 (2)	0.010 (2)	0.023 (2)	-0.0010 (19)	-0.001 (2)	-0.0001 (19)
C(21)	0.021 (2)	0.018 (2)	0.021 (2)	0.000 (2)	0.002 (2)	-0.001 (2)
C(22)	0.020 (2)	0.028 (3)	0.032 (3)	0.004 (2)	0.003 (2)	-0.007 (2)
C(23)	0.016 (2)	0.016 (2)	0.042 (3)	0.009 (2)	-0.008 (2)	-0.004 (2)
C(24)	0.025 (2)	0.023 (2)	0.024 (2)	-0.002 (2)	-0.011 (2)	0.000 (2)
C(25)	0.019 (2)	0.021 (2)	0.021 (2)	0.001 (2)	-0.001 (2)	0.000 (2)
C(26)	0.026 (2)	0.022 (2)	0.025 (2)	-0.006 (2)	0.004 (2)	0.004 (2)

Geometric parameters (\AA , $^\circ$)

Pt1—Cl1	2.3693 (12)	C(20)—C(25)	1.395 (6)
Pt1—Cl2	2.3533 (12)	C(21)—C(22)	1.385 (7)
Pt1—P1	2.2272 (11)	C(22)—C(23)	1.385 (7)
Pt1—P2	2.2279 (12)	C(23)—C(24)	1.389 (7)
P(1)—O(1)	1.593 (3)	C(24)—C(25)	1.375 (7)
P(1)—C(1)	1.826 (4)	C(2)—H(2)	0.950
P(1)—C(7)	1.815 (4)	C(3)—H(3)	0.950

supplementary materials

P(2)—O(2)	1.605 (3)	C(4)—H(4)	0.950
P(2)—C(14)	1.797 (4)	C(5)—H(5)	0.950
P(2)—C(20)	1.821 (4)	C(6)—H(6)	0.950
O(1)—C(13)	1.434 (6)	C(8)—H(8)	0.950
O(2)—C(26)	1.444 (6)	C(9)—H(9)	0.950
C(1)—C(2)	1.385 (7)	C(10)—H(10)	0.950
C(1)—C(6)	1.388 (7)	C(11)—H(11)	0.950
C(2)—C(3)	1.384 (7)	C(12)—H(12)	0.950
C(3)—C(4)	1.375 (7)	C(13)—H(30)	0.980
C(4)—C(5)	1.383 (8)	C(13)—H(31)	0.980
C(5)—C(6)	1.390 (7)	C(13)—H(33)	0.980
C(7)—C(8)	1.396 (6)	C(15)—H(15)	0.950
C(7)—C(12)	1.386 (6)	C(16)—H(16)	0.950
C(8)—C(9)	1.387 (7)	C(17)—H(17)	0.950
C(9)—C(10)	1.385 (7)	C(18)—H(18)	0.950
C(10)—C(11)	1.383 (8)	C(19)—H(19)	0.950
C(11)—C(12)	1.387 (7)	C(21)—H(21)	0.950
C(14)—C(15)	1.390 (6)	C(22)—H(22)	0.950
C(14)—C(19)	1.407 (6)	C(23)—H(23)	0.950
C(15)—C(16)	1.379 (7)	C(24)—H(24)	0.950
C(16)—C(17)	1.395 (7)	C(25)—H(25)	0.950
C(17)—C(18)	1.372 (7)	C(26)—H(28)	0.980
C(18)—C(19)	1.389 (6)	C(26)—H(26)	0.980
C(20)—C(21)	1.398 (7)	C(26)—H(27)	0.980
Cl(1) ⁱ ...C(16)	3.518 (5)	H(31) ^x ...H(22)	3.295
O(2) ⁱⁱ ...C(22)	3.542 (6)	H(31) ⁱⁱⁱ ...H(26)	2.863
C(2) ⁱⁱⁱ ...C(26)	3.478 (7)	H(8) ^{iv} ...H(3)	2.974
C(3) ^{iv} ...C(3)	3.412 (7)	H(8) ^{vi} ...H(24)	3.152
C(4) ⁱⁱⁱ ...C(13)	3.557 (7)	H(9) ^{vi} ...Cl(2)	2.968
C(5) ⁱⁱⁱ ...C(13)	3.518 (7)	H(9) ^{vi} ...C(25)	3.236
C(13) ^v ...C(4)	3.557 (7)	H(9) ^{iv} ...H(3)	3.125
C(13) ^v ...C(5)	3.518 (7)	H(9) ⁱⁱ ...H(23)	3.066
C(16) ⁱ ...Cl(1)	3.518 (5)	H(9) ^{vi} ...H(24)	3.477
C(17) ^{vi} ...C(23)	3.589 (7)	H(9) ^{vi} ...H(25)	2.663
C(17) ^{vi} ...C(24)	3.504 (7)	H(10) ^{vi} ...Cl(1)	2.716
C(22) ⁱⁱ ...O(2)	3.542 (6)	H(10) ^{ix} ...C(11)	3.287
C(23) ^{vii} ...C(17)	3.589 (7)	H(10) ⁱⁱ ...C(23)	3.433
C(24) ^{vii} ...C(17)	3.504 (7)	H(10) ^{iv} ...H(4)	3.412
C(26) ^v ...C(2)	3.478 (7)	H(10) ^{vi} ...H(31)	3.369
Cl(1) ^{vii} ...H(10)	2.716	H(10) ^{ix} ...H(11)	2.463
Cl(1) ⁱⁱⁱ ...H(11)	3.298	H(10) ^{xi} ...H(22)	3.508
Cl(1) ⁱⁱⁱ ...H(12)	3.049	H(10) ⁱⁱ ...H(22)	3.210
Cl(1) ⁱⁱⁱ ...H(28)	3.085	H(10) ⁱⁱ ...H(23)	2.660
Cl(1) ⁱ ...H(16)	2.716	H(11) ^v ...Cl(1)	3.298

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Cl(1) ^{viii} ...H(23)	3.462	H(11) ^{ix} ...C(10)	3.005
Cl(1) ⁱⁱⁱ ...H(26)	3.294	H(11) ^{ix} ...C(11)	3.118
Cl(2) ⁱ ...H(5)	2.941	H(11) ^{xi} ...C(22)	3.205
Cl(2) ^{vii} ...H(9)	2.968	H(11) ^{xi} ...C(23)	3.340
Cl(2) ⁱ ...H(16)	3.085	H(11) ^{iv} ...H(4)	3.506
Cl(2) ^{viii} ...H(23)	3.034	H(11) ^{ix} ...H(10)	2.463
Cl(2) ^{viii} ...H(24)	3.347	H(11) ^{ix} ...H(11)	2.682
O(1) ⁱⁱⁱ ...H(26)	3.021	H(11) ^x ...H(17)	3.291
O(2) ⁱⁱ ...H(21)	3.488	H(11) ^{xi} ...H(22)	2.667
O(2) ⁱⁱ ...H(22)	3.270	H(11) ⁱⁱ ...H(22)	3.346
C(1) ⁱⁱⁱ ...H(28)	3.556	H(11) ^{xi} ...H(23)	2.935
C(2) ^{iv} ...H(3)	3.577	H(12) ^v ...Cl(1)	3.049
C(2) ⁱⁱⁱ ...H(28)	3.366	H(12) ^x ...C(16)	3.389
C(2) ⁱⁱⁱ ...H(27)	2.931	H(12) ^x ...C(17)	3.010
C(3) ⁱⁱⁱ ...H(30)	3.434	H(12) ^x ...H(16)	3.276
C(3) ^{iv} ...H(3)	3.570	H(12) ^x ...H(17)	2.572
C(3) ⁱⁱⁱ ...H(25)	3.165	H(33) ^v ...C(4)	3.583
C(3) ⁱⁱⁱ ...H(27)	3.265	H(33) ^v ...C(5)	3.163
C(4) ⁱⁱⁱ ...H(30)	3.192	H(33) ^v ...C(6)	3.534
C(4) ^{iv} ...H(2)	3.554	H(33) ^x ...C(14)	3.385
C(4) ⁱⁱⁱ ...H(31)	3.323	H(33) ^x ...C(15)	3.052
C(4) ⁱⁱⁱ ...H(33)	3.583	H(33) ^x ...C(16)	2.940
C(5) ⁱⁱⁱ ...H(30)	3.334	H(33) ^x ...C(17)	3.160
C(5) ⁱⁱⁱ ...H(31)	3.482	H(33) ^x ...C(18)	3.468
C(5) ⁱⁱⁱ ...H(33)	3.163	H(33) ^x ...C(19)	3.578
C(6) ⁱⁱⁱ ...H(33)	3.534	H(33) ^v ...H(5)	3.148
C(6) ⁱ ...H(15)	3.594	H(33) ^x ...H(15)	3.444
C(7) ^{iv} ...H(4)	3.363	H(33) ^x ...H(16)	3.287
C(8) ^{iv} ...H(3)	2.999	H(33) ^x ...H(21)	2.874
C(8) ^{iv} ...H(4)	3.324	H(33) ⁱⁱⁱ ...H(26)	3.557
C(9) ^{iv} ...H(3)	3.074	H(28) ^v ...Cl(1)	3.085
C(9) ^{iv} ...H(4)	3.166	H(28) ^v ...C(1)	3.556
C(9) ⁱⁱ ...H(23)	3.255	H(28) ^v ...C(2)	3.366
C(9) ^{vi} ...H(25)	3.353	H(28) ^v ...H(2)	3.494
C(10) ^{iv} ...H(4)	3.001	H(15) ⁱ ...C(6)	3.594
C(10) ^{ix} ...H(11)	3.005	H(15) ⁱ ...H(5)	3.327
C(10) ⁱⁱ ...H(22)	3.115	H(15) ⁱ ...H(6)	2.937
C(10) ⁱⁱ ...H(23)	3.024	H(15) ^{xii} ...H(33)	3.444
C(11) ^{iv} ...H(4)	3.054	H(15) ⁱ ...H(15)	3.476
C(11) ^{ix} ...H(10)	3.287	H(16) ⁱ ...Cl(1)	2.716
C(11) ^{ix} ...H(11)	3.118	H(16) ⁱ ...Cl(2)	3.085

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C(11) ^x ...H(17)	3.502	H(16) ^{vi} ...C(23)	3.387
C(11) ^{xi} ...H(22)	3.382	H(16) ^{vi} ...C(24)	3.473
C(11) ⁱⁱ ...H(22)	3.209	H(16) ⁱ ...H(6)	3.521
C(12) ^{iv} ...H(4)	3.235	H(16) ^{xii} ...H(12)	3.276
C(12) ^x ...H(17)	3.125	H(16) ^{xii} ...H(33)	3.287
C(13) ^x ...H(21)	3.259	H(16) ^{vi} ...H(23)	2.873
C(13) ⁱⁱⁱ ...H(26)	3.322	H(16) ^{vi} ...H(24)	3.051
C(14) ^{xii} ...H(33)	3.385	H(17) ^{xii} ...C(11)	3.502
C(15) ⁱ ...H(6)	3.575	H(17) ^{xii} ...C(12)	3.125
C(15) ^{xii} ...H(33)	3.052	H(17) ^{vi} ...C(23)	3.014
C(16) ^{xii} ...H(12)	3.389	H(17) ^{vi} ...C(24)	3.217
C(16) ^{xii} ...H(33)	2.940	H(17) ^{xii} ...H(11)	3.291
C(16) ^{vi} ...H(23)	3.468	H(17) ^{xii} ...H(12)	2.572
C(16) ^{vi} ...H(24)	3.231	H(17) ^{vi} ...H(23)	3.009
C(17) ^{xii} ...H(12)	3.010	H(17) ^{vi} ...H(24)	3.358
C(17) ^{xii} ...H(33)	3.160	H(18) ⁱⁱ ...C(23)	3.298
C(17) ^{vi} ...H(23)	3.534	H(18) ⁱⁱ ...C(24)	2.980
C(17) ^{vi} ...H(24)	3.403	H(18) ⁱⁱ ...C(25)	3.514
C(18) ^{xii} ...H(2)	3.374	H(18) ^{xii} ...H(2)	2.835
C(18) ^{xii} ...H(33)	3.468	H(18) ⁱⁱ ...H(23)	3.477
C(19) ^{xii} ...H(33)	3.578	H(18) ⁱⁱ ...H(24)	2.941
C(20) ⁱⁱ ...H(19)	3.259	H(18) ⁱⁱ ...H(27)	3.553
C(21) ^{xii} ...H(31)	3.503	H(19) ⁱⁱ ...C(20)	3.259
C(21) ⁱⁱ ...H(19)	2.971	H(19) ⁱⁱ ...C(21)	2.971
C(21) ⁱⁱ ...H(26)	3.170	H(19) ⁱⁱ ...C(22)	2.861
C(22) ^{xiii} ...H(11)	3.205	H(19) ⁱⁱ ...C(23)	3.040
C(22) ⁱⁱ ...H(19)	2.861	H(19) ⁱⁱ ...C(24)	3.313
C(22) ⁱⁱ ...H(26)	3.313	H(19) ⁱⁱ ...C(25)	3.422
C(23) ⁱⁱ ...H(10)	3.433	H(19) ⁱⁱ ...H(21)	3.405
C(23) ^{xiii} ...H(11)	3.340	H(19) ⁱⁱ ...H(22)	3.250
C(23) ^{vii} ...H(16)	3.387	H(19) ⁱⁱ ...H(23)	3.511
C(23) ^{vii} ...H(17)	3.014	H(19) ⁱⁱ ...H(27)	3.468
C(23) ⁱⁱ ...H(18)	3.298	H(21) ⁱⁱ ...O(2)	3.488
C(23) ⁱⁱ ...H(19)	3.040	H(21) ^{xii} ...C(13)	3.259
C(24) ^v ...H(3)	3.582	H(21) ⁱⁱ ...C(26)	3.351
C(24) ^{vii} ...H(16)	3.473	H(21) ⁱ ...H(5)	3.546
C(24) ^{vii} ...H(17)	3.217	H(21) ^{xii} ...H(31)	2.837
C(24) ⁱⁱ ...H(18)	2.980	H(21) ^{xii} ...H(33)	2.874
C(24) ⁱⁱ ...H(19)	3.313	H(21) ⁱⁱ ...H(19)	3.405
C(25) ^v ...H(3)	3.322	H(21) ⁱⁱ ...H(26)	2.568
C(25) ^{vii} ...H(9)	3.236	H(22) ⁱⁱ ...O(2)	3.270

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C(25) ⁱⁱ ...H(18)	3.514	H(22) ⁱⁱ ...C(10)	3.115
C(25) ⁱⁱ ...H(19)	3.422	H(22) ^{xiii} ...C(11)	3.382
C(26) ^v ...H(2)	3.340	H(22) ⁱⁱ ...C(11)	3.209
C(26) ⁱⁱ ...H(21)	3.351	H(22) ⁱⁱ ...C(26)	3.471
C(26) ⁱⁱ ...H(22)	3.471	H(22) ^{xii} ...H(31)	3.295
H(30) ^v ...C(3)	3.434	H(22) ^{xiii} ...H(10)	3.508
H(30) ^v ...C(4)	3.192	H(22) ⁱⁱ ...H(10)	3.210
H(30) ^v ...C(5)	3.334	H(22) ^{xiii} ...H(11)	2.667
H(30) ^v ...H(4)	3.461	H(22) ⁱⁱ ...H(11)	3.346
H(2) ^{iv} ...C(4)	3.554	H(22) ⁱⁱ ...H(19)	3.250
H(2) ^x ...C(18)	3.374	H(22) ⁱⁱ ...H(26)	2.858
H(2) ⁱⁱⁱ ...C(26)	3.340	H(23) ^{xiv} ...Cl(1)	3.462
H(2) ^{iv} ...H(4)	3.436	H(23) ^{xiv} ...Cl(2)	3.034
H(2) ⁱⁱⁱ ...H(28)	3.494	H(23) ⁱⁱ ...C(9)	3.255
H(2) ^x ...H(18)	2.835	H(23) ⁱⁱ ...C(10)	3.024
H(2) ⁱⁱⁱ ...H(25)	3.480	H(23) ^{vii} ...C(16)	3.468
H(2) ⁱⁱⁱ ...H(26)	3.329	H(23) ^{vii} ...C(17)	3.534
H(2) ⁱⁱⁱ ...H(27)	2.704	H(23) ⁱⁱ ...H(9)	3.066
H(3) ^{iv} ...C(2)	3.577	H(23) ⁱⁱ ...H(10)	2.660
H(3) ^{iv} ...C(3)	3.570	H(23) ^{xiii} ...H(11)	2.935
H(3) ^{iv} ...C(8)	2.999	H(23) ^{vii} ...H(16)	2.873
H(3) ^{iv} ...C(9)	3.074	H(23) ^{vii} ...H(17)	3.009
H(3) ⁱⁱⁱ ...C(24)	3.582	H(23) ⁱⁱ ...H(18)	3.477
H(3) ⁱⁱⁱ ...C(25)	3.322	H(23) ⁱⁱ ...H(19)	3.511
H(3) ^{iv} ...H(8)	2.974	H(24) ^{xiv} ...Cl(2)	3.347
H(3) ^{iv} ...H(9)	3.125	H(24) ^{vii} ...C(16)	3.231
H(3) ⁱⁱⁱ ...H(24)	3.112	H(24) ^{vii} ...C(17)	3.403
H(3) ⁱⁱⁱ ...H(25)	2.579	H(24) ^v ...H(3)	3.112
H(3) ⁱⁱⁱ ...H(27)	3.281	H(24) ^{vii} ...H(8)	3.152
H(4) ^{iv} ...C(7)	3.363	H(24) ^{vii} ...H(9)	3.477
H(4) ^{iv} ...C(8)	3.324	H(24) ^{vii} ...H(16)	3.051
H(4) ^{iv} ...C(9)	3.166	H(24) ^{vii} ...H(17)	3.358
H(4) ^{iv} ...C(10)	3.001	H(24) ⁱⁱ ...H(18)	2.941
H(4) ^{iv} ...C(11)	3.054	H(25) ^v ...C(3)	3.165
H(4) ^{iv} ...C(12)	3.235	H(25) ^{vii} ...C(9)	3.353
H(4) ⁱⁱⁱ ...H(30)	3.461	H(25) ^v ...H(2)	3.480
H(4) ^{iv} ...H(2)	3.436	H(25) ^v ...H(3)	2.579
H(4) ⁱⁱⁱ ...H(31)	3.185	H(25) ^{vii} ...H(9)	2.663
H(4) ^{iv} ...H(10)	3.412	H(26) ^v ...Cl(1)	3.294
H(4) ^{iv} ...H(11)	3.506	H(26) ^v ...O(1)	3.021
H(5) ⁱ ...Cl(2)	2.941	H(26) ^v ...C(13)	3.322

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H(5) ⁱⁱⁱ ...H(31)	3.486	H(26) ⁱⁱ ...C(21)	3.170
H(5) ⁱⁱⁱ ...H(33)	3.148	H(26) ⁱⁱ ...C(22)	3.313
H(5) ⁱ ...H(15)	3.327	H(26) ^v ...H(2)	3.329
H(5) ⁱ ...H(21)	3.546	H(26) ^v ...H(31)	2.863
H(6) ⁱ ...C(15)	3.575	H(26) ^v ...H(33)	3.557
H(6) ⁱ ...H(15)	2.937	H(26) ⁱⁱ ...H(21)	2.568
H(6) ⁱ ...H(16)	3.521	H(26) ⁱⁱ ...H(22)	2.858
H(31) ^v ...C(4)	3.323	H(27) ^v ...C(2)	2.931
H(31) ^v ...C(5)	3.482	H(27) ^v ...C(3)	3.265
H(31) ^x ...C(21)	3.503	H(27) ^v ...H(2)	2.704
H(31) ^v ...H(4)	3.185	H(27) ^v ...H(3)	3.281
H(31) ^v ...H(5)	3.486	H(27) ⁱⁱ ...H(18)	3.553
H(31) ^{vii} ...H(10)	3.369	H(27) ⁱⁱ ...H(19)	3.468
H(31) ^x ...H(21)	2.837		
C11—Pt1—C12	89.37 (4)	C(1)—C(2)—H(2)	120.0
P1—Pt1—P2	98.14 (4)	C(3)—C(2)—H(2)	120.0
C11—Pt1—P1	83.49 (4)	C(2)—C(3)—H(3)	119.9
C11—Pt1—P2	175.95 (4)	C(4)—C(3)—H(3)	119.9
C12—Pt1—P1	168.82 (4)	C(3)—C(4)—H(4)	119.8
C12—Pt1—P2	89.56 (4)	C(5)—C(4)—H(4)	119.8
Pt(1)—P(1)—O(1)	116.11 (12)	C(4)—C(5)—H(5)	120.3
Pt(1)—P(1)—C(1)	111.37 (16)	C(6)—C(5)—H(5)	120.3
Pt(1)—P(1)—C(7)	120.68 (16)	C(1)—C(6)—H(6)	119.8
O(1)—P(1)—C(1)	102.3 (2)	C(5)—C(6)—H(6)	119.8
O(1)—P(1)—C(7)	103.3 (2)	C(7)—C(8)—H(8)	120.0
C(1)—P(1)—C(7)	100.6 (2)	C(9)—C(8)—H(8)	120.0
Pt(1)—P(2)—O(2)	116.82 (13)	C(8)—C(9)—H(9)	120.3
Pt(1)—P(2)—C(14)	114.29 (15)	C(10)—C(9)—H(9)	120.3
Pt(1)—P(2)—C(20)	113.76 (15)	C(9)—C(10)—H(10)	119.7
O(2)—P(2)—C(14)	99.56 (19)	C(11)—C(10)—H(10)	119.7
O(2)—P(2)—C(20)	103.39 (19)	C(10)—C(11)—H(11)	120.0
C(14)—P(2)—C(20)	107.5 (2)	C(12)—C(11)—H(11)	120.0
P(1)—O(1)—C(13)	122.7 (3)	C(7)—C(12)—H(12)	120.0
P(2)—O(2)—C(26)	121.4 (2)	C(11)—C(12)—H(12)	120.0
P(1)—C(1)—C(2)	119.4 (3)	O(1)—C(13)—H(30)	109.5
P(1)—C(1)—C(6)	120.8 (3)	O(1)—C(13)—H(31)	109.5
C(2)—C(1)—C(6)	119.5 (4)	O(1)—C(13)—H(33)	109.5
C(1)—C(2)—C(3)	120.0 (4)	H(30)—C(13)—H(31)	109.5
C(2)—C(3)—C(4)	120.3 (5)	H(30)—C(13)—H(33)	109.5
C(3)—C(4)—C(5)	120.4 (4)	H(31)—C(13)—H(33)	109.5
C(4)—C(5)—C(6)	119.4 (5)	C(14)—C(15)—H(15)	119.8
C(1)—C(6)—C(5)	120.4 (4)	C(16)—C(15)—H(15)	119.8
P(1)—C(7)—C(8)	119.5 (3)	C(15)—C(16)—H(16)	120.0
P(1)—C(7)—C(12)	120.5 (3)	C(17)—C(16)—H(16)	120.0
C(8)—C(7)—C(12)	119.9 (4)	C(16)—C(17)—H(17)	120.0
C(7)—C(8)—C(9)	120.1 (4)	C(18)—C(17)—H(17)	120.0

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C(8)—C(9)—C(10)	119.5 (4)	C(17)—C(18)—H(18)	119.7
C(9)—C(10)—C(11)	120.7 (4)	C(19)—C(18)—H(18)	119.6
C(10)—C(11)—C(12)	120.0 (4)	C(14)—C(19)—H(19)	120.3
C(7)—C(12)—C(11)	119.9 (4)	C(18)—C(19)—H(19)	120.3
P(2)—C(14)—C(15)	120.1 (3)	C(20)—C(21)—H(21)	120.0
P(2)—C(14)—C(19)	120.2 (3)	C(22)—C(21)—H(21)	120.0
C(15)—C(14)—C(19)	119.4 (4)	C(21)—C(22)—H(22)	119.9
C(14)—C(15)—C(16)	120.4 (4)	C(23)—C(22)—H(22)	119.9
C(15)—C(16)—C(17)	120.1 (4)	C(22)—C(23)—H(23)	120.0
C(16)—C(17)—C(18)	120.0 (4)	C(24)—C(23)—H(23)	120.0
C(17)—C(18)—C(19)	120.7 (4)	C(23)—C(24)—H(24)	120.1
C(14)—C(19)—C(18)	119.4 (4)	C(25)—C(24)—H(24)	120.1
P(2)—C(20)—C(21)	121.6 (3)	C(20)—C(25)—H(25)	119.5
P(2)—C(20)—C(25)	119.5 (3)	C(24)—C(25)—H(25)	119.5
C(21)—C(20)—C(25)	118.8 (4)	O(2)—C(26)—H(28)	109.5
C(20)—C(21)—C(22)	120.1 (4)	O(2)—C(26)—H(26)	109.5
C(21)—C(22)—C(23)	120.2 (5)	O(2)—C(26)—H(27)	109.5
C(22)—C(23)—C(24)	120.1 (4)	H(28)—C(26)—H(26)	109.5
C(23)—C(24)—C(25)	119.7 (4)	H(28)—C(26)—H(27)	109.5
C(20)—C(25)—C(24)	121.0 (4)	H(26)—C(26)—H(27)	109.5
Cl(1)—Pt(1)—P(1)—O(1)	58.22 (15)	O(2)—P(2)—C(20)—C(25)	80.4 (3)
Cl(1)—Pt(1)—P(1)—C(1)	-58.24 (16)	C(20)—P(2)—O(2)—C(26)	-60.0 (3)
Cl(1)—Pt(1)—P(1)—C(7)	-175.70 (19)	C(14)—P(2)—C(20)—C(21)	8.2 (4)
Cl(2)—Pt(1)—P(1)—O(1)	108.8 (2)	C(14)—P(2)—C(20)—C(25)	-174.9 (3)
Cl(2)—Pt(1)—P(1)—C(1)	-7.6 (3)	C(20)—P(2)—C(14)—C(15)	105.2 (4)
Cl(2)—Pt(1)—P(1)—C(7)	-125.1 (2)	C(20)—P(2)—C(14)—C(19)	-80.9 (4)
Cl(2)—Pt(1)—P(2)—O(2)	-154.11 (14)	P(1)—C(1)—C(2)—C(3)	175.0 (3)
Cl(2)—Pt(1)—P(2)—C(14)	90.27 (17)	P(1)—C(1)—C(6)—C(5)	-174.2 (3)
Cl(2)—Pt(1)—P(2)—C(20)	-33.70 (17)	C(2)—C(1)—C(6)—C(5)	-0.2 (6)
P(1)—Pt(1)—P(2)—O(2)	34.03 (14)	C(6)—C(1)—C(2)—C(3)	0.9 (7)
P(1)—Pt(1)—P(2)—C(14)	-81.59 (17)	C(1)—C(2)—C(3)—C(4)	-0.3 (6)
P(1)—Pt(1)—P(2)—C(20)	154.44 (17)	C(2)—C(3)—C(4)—C(5)	-1.2 (8)
P(2)—Pt(1)—P(1)—O(1)	-118.04 (15)	C(3)—C(4)—C(5)—C(6)	1.9 (7)
P(2)—Pt(1)—P(1)—C(1)	125.50 (16)	C(4)—C(5)—C(6)—C(1)	-1.2 (7)
P(2)—Pt(1)—P(1)—C(7)	8.04 (19)	P(1)—C(7)—C(8)—C(9)	177.3 (3)
Pt(1)—P(1)—O(1)—C(13)	30.6 (3)	P(1)—C(7)—C(12)—C(11)	-176.5 (3)
Pt(1)—P(1)—C(1)—C(2)	155.6 (3)	C(8)—C(7)—C(12)—C(11)	0.2 (5)
Pt(1)—P(1)—C(1)—C(6)	-30.4 (4)	C(12)—C(7)—C(8)—C(9)	0.6 (7)
Pt(1)—P(1)—C(7)—C(8)	65.7 (4)	C(7)—C(8)—C(9)—C(10)	-1.8 (7)
Pt(1)—P(1)—C(7)—C(12)	-117.6 (3)	C(8)—C(9)—C(10)—C(11)	2.2 (7)
O(1)—P(1)—C(1)—C(2)	31.0 (4)	C(9)—C(10)—C(11)—C(12)	-1.4 (7)
O(1)—P(1)—C(1)—C(6)	-155.0 (3)	C(10)—C(11)—C(12)—C(7)	0.2 (5)
C(1)—P(1)—O(1)—C(13)	152.1 (3)	P(2)—C(14)—C(15)—C(16)	173.0 (3)
O(1)—P(1)—C(7)—C(8)	-162.6 (3)	P(2)—C(14)—C(19)—C(18)	-173.4 (3)
O(1)—P(1)—C(7)—C(12)	14.1 (4)	C(15)—C(14)—C(19)—C(18)	0.6 (7)
C(7)—P(1)—O(1)—C(13)	-103.8 (3)	C(19)—C(14)—C(15)—C(16)	-1.0 (7)
C(1)—P(1)—C(7)—C(8)	-57.1 (4)	C(14)—C(15)—C(16)—C(17)	1.0 (7)
C(1)—P(1)—C(7)—C(12)	119.6 (4)	C(15)—C(16)—C(17)—C(18)	-0.6 (7)
C(7)—P(1)—C(1)—C(2)	-75.3 (4)	C(16)—C(17)—C(18)—C(19)	0.2 (6)

C(7)—P(1)—C(1)—C(6)	98.7 (4)	C(17)—C(18)—C(19)—C(14)	-0.2 (5)
Pt(1)—P(2)—O(2)—C(26)	65.8 (3)	P(2)—C(20)—C(21)—C(22)	176.7 (3)
Pt(1)—P(2)—C(14)—C(15)	-22.1 (4)	P(2)—C(20)—C(25)—C(24)	-175.6 (3)
Pt(1)—P(2)—C(14)—C(19)	151.8 (3)	C(21)—C(20)—C(25)—C(24)	1.4 (7)
Pt(1)—P(2)—C(20)—C(21)	135.8 (3)	C(25)—C(20)—C(21)—C(22)	-0.2 (5)
Pt(1)—P(2)—C(20)—C(25)	-47.3 (4)	C(20)—C(21)—C(22)—C(23)	-0.6 (7)
O(2)—P(2)—C(14)—C(15)	-147.4 (3)	C(21)—C(22)—C(23)—C(24)	0.2 (6)
O(2)—P(2)—C(14)—C(19)	26.5 (4)	C(22)—C(23)—C(24)—C(25)	1.0 (7)
C(14)—P(2)—O(2)—C(26)	-170.7 (3)	C(23)—C(24)—C(25)—C(20)	-1.8 (7)
O(2)—P(2)—C(20)—C(21)	-96.5 (4)		

Symmetry codes: (i) $-x, -y, -z+2$; (ii) $-x, -y+1, -z+2$; (iii) $-x+1/2, y-1/2, -z+3/2$; (iv) $-x+1, -y, -z+2$; (v) $-x+1/2, y+1/2, -z+3/2$; (vi) $x+1/2, -y+1/2, z+1/2$; (vii) $x-1/2, -y+1/2, z-1/2$; (viii) $-x-1/2, y-1/2, -z+3/2$; (ix) $-x+1, -y+1, -z+2$; (x) $x+1/2, -y+1/2, z-1/2$; (xi) $x+1, y, z$; (xii) $x-1/2, -y+1/2, z+1/2$; (xiii) $x-1, y, z$; (xiv) $-x-1/2, y+1/2, -z+3/2$.

Hydrogen-bond geometry ($\text{\AA}, ^\circ$)

$D-H\cdots A$	$D-H$	$H\cdots A$	$D\cdots A$	$D-H\cdots A$
C10—H10 \cdots Cl1 ^{vi}	0.95	2.72	3.642 (6)	165
C16—H16 \cdots Cl1 ⁱ	0.95	2.72	3.518 (5)	143
C4—H4 \cdots Cg1 ^{iv}	0.95	2.88	3.692 (5)	145
C19—H19 \cdots Cg2 ⁱⁱ	0.95	2.83	3.641 (4)	144

Symmetry codes: (vi) $x+1/2, -y+1/2, z+1/2$; (i) $-x, -y, -z+2$; (iv) $-x+1, -y, -z+2$; (ii) $-x, -y+1, -z+2$.

Fig. 1

