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Bis(2,4,6-trimethylpyridinium) hexachloridoplatinate(IV)

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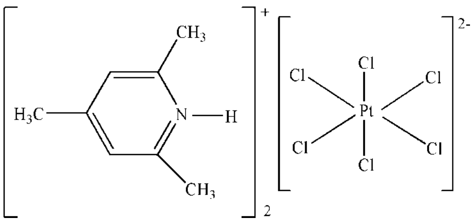
Key indicators: single-crystal X-ray study; T = 298 K; mean σ(C–C) = 0.009 Å; R factor = 0.037; wR factor = 0.088; data-to-parameter ratio = 25.5.

The asymmetric unit of the title compound, $(C_8H_{12}N)_2[PtCl_6]$, contains one independent protonated 2,4,6-trimethylpyridinium cation and one half of a centrosymmetric $[PtCl_6]^{2-}$ anion. The Pt ion has an almost ideal octahedral coordination. In the crystal structure, intramolecular N—H⋯Cl and intermolecular C—H⋯Cl hydrogen bonds result in the formation of a supramolecular structure.

Related literature

For general background, see: Rafizadeh *et al.* (2006); Yousefi, Amani & Khavasi (2007); Abedi *et al.* (2008); Hojjat Kashani *et al.* (2008). For related literature, see: Biradha & Zaworotko (1998); Hallfeldt & Urland (2002); Foces-Foces *et al.* (1999); Zordan & Brammer (2004); Hasan *et al.* (2001); Juan *et al.* (1998); Li & Liu (2003); Hu *et al.* (2003); Terzis & Mentzafos (1983); Zordan *et al.* (2005); Yousefi, Ahmadi *et al.* (2007); Yousefi *et al.* (2007*a*,*b*); Amani *et al.* (2008).



Experimental

Crystal data

$(C_8H_{12}N)_2[PtCl_6]$
M_r = 652.15
Triclinic, $P\bar{1}$
a = 7.6302 (8) Å
b = 9.1328 (9) Å
c = 9.4599 (10) Å
α = 99.201 (8)°
β = 109.683 (8)°
γ = 108.471 (8)°
V = 561.87 (12) Å^3
Z = 1
Mo $K\alpha$ radiation
μ = 6.96 mm^{-1}
T = 298 (2) K
0.32 × 0.30 × 0.25 mm

Data collection

Bruker SMART CCD area-detector diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1998)
T_{min} = 0.121, T_{max} = 0.176
6510 measured reflections
2962 independent reflections
2952 reflections with $I > 2\sigma(I)$
R_{int} = 0.099

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.037
$wR(F^2)$ = 0.088
S = 1.18
2962 reflections
116 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 1.20 e Å^{-3}
$\Delta\rho_{min}$ = −1.44 e Å^{-3}

Table 1
Selected geometric parameters (Å, °).

Pt1—Cl1	2.3225 (11)	Pt1—Cl3	2.3197 (13)
Pt1—Cl2	2.3199 (12)		
Cl2—Pt1—Cl1^{i}	89.35 (5)	Cl3—Pt1—Cl1^{i}	89.90 (5)
Cl2—Pt1—Cl1	90.65 (5)	Cl3—Pt1—Cl2	90.45 (6)
Cl3—Pt1—Cl1	90.10 (5)	Cl3—Pt1—Cl2^{i}	89.55 (6)

Symmetry code: (i) $-x, -y+1, -z$.

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

D—H⋯A	D—H	H⋯A	D⋯A	D—H⋯A
N1—H1D⋯Cl2	0.86	2.45	3.301 (5)	173
C1—H1C⋯Cl1^{ii}	0.96	2.81	3.743 (6)	165
C8—H8A⋯Cl3^{iii}	0.96	2.80	3.731 (10)	163

Symmetry codes: (ii) $-x, -y+1, -z+1$; (iii) $-x-1, -y+1, -z$.

Data collection: *SMART* (Bruker, 1998); cell refinement: *SAINT* (Bruker, 1998); data reduction: *SAINT*; program(s) used to solve structure: *SHELXTL* (Sheldrick, 2008); program(s) used to refine structure: *SHELXTL*; molecular graphics: *ORTEP-3 for Windows* (Farrugia, 1997); software used to prepare material for publication: *WinGX* (Farrugia, 1999).

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Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: HK2526).

References

Abedi, A., Bahrami Shabestari, A. & Amani, V. (2008). *Acta Cryst.* E**64**, o990.
Amani, V., Rahimi, R. & Khavasi, H. R. (2008). *Acta Cryst.* E**64**, m1143–m1144.
Biradha, K. & Zaworotko, M. J. (1998). *Cryst. Eng.* **1**, 67–78.
Bruker (1998). *SMART* and *SAINT*. Bruker AXS Inc., Madison, Wisconsin, USA.
Farrugia, L. J. (1997). *J. Appl. Cryst.* **30**, 565.
Farrugia, L. J. (1999). *J. Appl. Cryst.* **32**, 837–838.
Foces-Foces, C., Llamas-Saiz, A. L., Lorente, P., Golubev, N. S. & Limbach, H.-H. (1999). *Acta Cryst.* C**55**, 377–381.
Hallfeldt, J. & Urland, W. (2002). *Z. Anorg. Allg. Chem.* **628**, 2661–2664.

Hasan, M., Kozhevnikov, I. V., Siddiqui, M. R. H., Femoni, C., Steiner, A. & Winterton, N. (2001). *Inorg. Chem.* **40**, 795–800.
Hojjat Kashani, L., Yousefi, M., Amani, V. & Khavasi, H. R. (2008). *Acta Cryst.* E**64**, m840–m841.
Hu, N. H., Norifusa, T. & Aoki, K. (2003). *Dalton Trans.* pp. 335–341.
Juan, C., Mareque, R. & Lee, B. (1998). *Inorg. Chem.* **37**, 4756–4757.
Li, D. & Liu, D. (2003). *Anal. Sci.* **19**, 1089–1090.
Rafizadeh, M., Aghayan, H. & Amani, V. (2006). *Acta Cryst.* E**62**, o5034–o5035.
Sheldrick, G. M. (1998). *SADABS*. Bruker AXS, Madison, Wisconsin, USA.
Sheldrick, G. M. (2008). *Acta Cryst.* A**64**, 112–122.
Terzis, A. & Mentzafos, D. (1983). *Inorg. Chem.* **22**, 1140–1143.
Yousefi, M., Ahmadi, R., Amani, V. & Khavasi, H. R. (2007). *Acta Cryst.* E**63**, m3114–m3115.
Yousefi, M., Amani, V. & Khavasi, H. R. (2007). *Acta Cryst.* E**63**, o3782.
Yousefi, M., Teimouri, S., Amani, V. & Khavasi, H. R. (2007*a*). *Acta Cryst.* E**63**, m2460–m2461.
Yousefi, M., Teimouri, S., Amani, V. & Khavasi, H. R. (2007*b*). *Acta Cryst.* E**63**, m2748–m2749.
Zordan, F. & Brammer, L. (2004). *Acta Cryst.* B**60**, 512–519.
Zordan, F., Purver, S. L., Adams, H. & Brammer, L. (2005). *CrystEngComm*, **7**, 350–354.

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Bis(2,4,6-trimethylpyridinium) hexachloridoplatinate(IV)

Khadijeh Kalateh, Amin Ebadi, Anita Abedi, Vahid Amani and Hamid Reza Khavasi

S1. Comment

In recent years, there has been considerable interest in proton transfer systems and their structures (Rafizadeh *et al.*, 2006; Yousefi, Amani & Khavasi, 2007; Abedi *et al.*, 2008; Hojjat Kashani *et al.*, 2008). Several proton transfer systems using 2,4,6-trimethylpyridine, with proton donor molecules, such as [2,4,6-tmpy.H]$_2$[H$_2$BTEC], (II), (Biradha & Zaworotko, 1998), {[2,4,6-tmpy.H]$_{10}$[Er(H$_2$O)Cl$_5$]$_2$[ErCl$_6$]3Cl}, (III), (Hallfeldt & Urland, 2002), [2,4,6-tmpy.H][2-NBA], (IV) and [2,4,6-tmpy.H][3,5-NBA], (V), (Foces-Foces *et al.*, 1999) [where 2,4,6-tmpy.H is 2,4,6-trimethylpyridinium, H$_2$BTEC is dihydrogen-1,2,4,5-benzenetetracarboxylate, 2-NBA is 2-nitrobenzoate and 3,5-NBA is 3,5- nitrobenzoate] have been synthesized and characterized by single-crystal X-ray diffraction methods.

There are also several proton transfer systems using H$_2$[PtCl$_6$] with proton acceptor molecules, such as [HpyBr-3]$_2$[PtCl$_6$].2H$_2$O, (VI), and [HpyI-3]$_2$[PtCl$_6$].2H$_2$O, (VII),(Zordan & Brammer, 2004), [BMIM]$_2$[PtCl$_6$], (VIII), and [EMIM]$_2$[PtCl$_6$], (IX), (Hasan *et al.*, 2001), {(DABCO)H$_2$[PtCl$_6$]}, (*X*), (Juan *et al.*, 1998), {*p*-C$_6$H$_4$(CH$_2$ImMe)$_2$[PtCl$_6$]}, (XI), (Li & Liu, 2003), [het][PtCl$_6$].2H$_2$O, (XII), (Hu *et al.*, 2003), [9-MeGuaH]$_2$[PtCl$_6$].2H$_2$O, (XIII), (Terzis & Mentzafos, 1983), [HpyCl-3]$_3$[PtCl$_6$]Cl, (XIV), (Zordan *et al.*, 2005), [2,9-dmphen.H]$_2$[PtCl$_6$], (XV), (Yousefi, Ahmadi *et al.*, 2007), [H$_2$DA18C6][PtCl$_6$].2H$_2$O, (XVI), (Yousefi *et al.*, 2007a), [2,6-dmpy.H]$_2$[PtCl$_6$], (XVII), (Amani *et al.*, 2008) and [TBA]$_3$[PtCl$_6$]Cl, (XVIII), (Yousefi *et al.*, 2007b) [where hpy is halo-pyridinium, BMIM^+ is 1-*n*-butyl-3-methylimidazolium, EMIM^+ is 1-ethyl-3-methyl- imidazolium, DABCO is 1,4-diazabicyclooctane, Im is imidazolium, het is 2-(α-hydroxyethyl)thiamine, 9-MeGuaH is 9-methylguaninium, 2,9-dmphen.H is 2,9-dimethyl-1,10-phenanthrolinium, H$_2$DA18C6 is 1,10-Diazonia-18-crown-6, 2,6-dmpy.H is 2,6-dimethylpyridinium and TBA is tri-benzylammonium] have been synthesized and characterized by single-crystal X-ray diffraction methods. We report herein the synthesis and crystal structure of the title compound, (I).

The asymmetric unit of (I), (Fig. 1) contains one independent protonated 2,4,6-trimethylpyridinium cation and one half of a centrosymmetric [PtCl$_6$]$^{2-}$ anion. The Pt ion has an octahedral coordination. In cation, the bond lengths and angles are in good agreement with the corresponding values in (II) and (IV). In [PtCl$_6$]$^{2-}$ anion, the Pt—Cl bond lengths and Cl—Pt—Cl bond angles (Table 1) are also within normal ranges, as in (XVI), (XVII) and (XVIII).

In the crystal structure (Fig. 2), intramolecular N—H···Cl and intermolecular C—H···Cl hydrogen bonds (Table 2) result in the formation of a supramolecular structure, in which they may be effective in the stabilization of the structure.

S2. Experimental

For the preparation of the title compound, (I), a solution of 2,4,6-trimethylpyridine (0.18 g, 1.48 mmol) in methanol (15 ml) was added to a solution of H$_2$PtCl$_6$.6H$_2$O, (0.38 g, 0.74 mmol) in acetonitrile (25 ml) and the resulting yellow solution was stirred for 10 min at 313 K. Then, it was left to evaporate slowly at room temperature. After one week, orange prismatic crystals of (I) were isolated (yield; 0.35 g; 72.5%).

S3. Refinement

H atoms were positioned geometrically, with N—H = 0.86 Å (for NH) and C—H = 0.93 and 0.96 Å for aromatic and methyl H, respectively, and constrained to ride on their parent atoms with $U_{iso}(H) = 1.2U_{eq}(C,N)$.

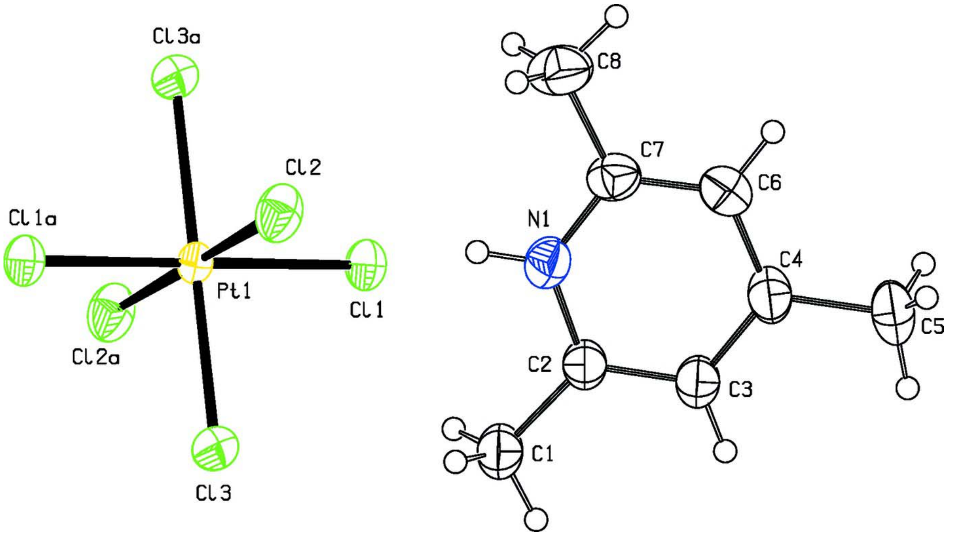

Figure 1

The molecular structure of the title molecule with the atom-numbering scheme. Displacement ellipsoids are drawn at the 40% probability level [symmetry code: (a) x, y + 1, z].

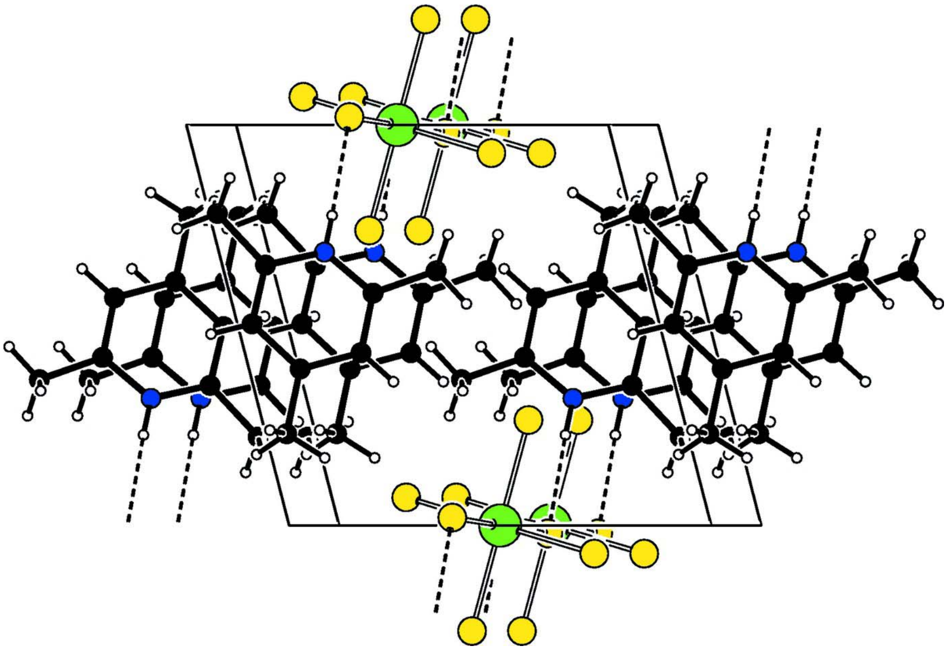

Figure 2

A packing diagram of the title compound. Hydrogen bonds are shown as dashed lines.

Bis(2,4,6-trimethylpyridinium)hexachloridoplatinate(IV)

Crystal data

$(C_8H_{12}N)_2[PtCl_6]$	$Z = 1$
$M_r = 652.15$	$F(000) = 314$
Triclinic, $P\overline{1}$	$D_x = 1.927$ Mg m^{-3}
Hall symbol: -P 1	Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å
$a = 7.6302$ (8) Å	Cell parameters from 1715 reflections
$b = 9.1328$ (9) Å	$\theta = 3.0$–$29.1°$
$c = 9.4599$ (10) Å	$\mu = 6.96$ mm^{-1}
$\alpha = 99.201$ (8)°	$T = 298$ K
$\beta = 109.683$ (8)°	Prism, orange
$\gamma = 108.471$ (8)°	0.32 × 0.30 × 0.25 mm
$V = 561.87$ (12) Å^3	

Data collection

Bruker SMART CCD area-detector diffractometer	6510 measured reflections
Radiation source: fine-focus sealed tube	2962 independent reflections
Graphite monochromator	2952 reflections with $I > 2\sigma(I)$
φ and ω scans	$R_{\text{int}} = 0.099$
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1998)	$\theta_{\max} = 29.1°$, $\theta_{\min} = 3.0°$
$T_{\min} = 0.121$, $T_{\max} = 0.176$	$h = -10 \rightarrow 10$
	$k = -12 \rightarrow 12$
	$l = -12 \rightarrow 12$

Refinement

Refinement on F^2	Hydrogen site location: inferred from neighbouring sites
Least-squares matrix: full	H-atom parameters constrained
$R[F^2 > 2\sigma(F^2)] = 0.037$	$w = 1/[\sigma^2(F_o^2) + (0.0557P)^2]$ where $P = (F_o^2 + 2F_c^2)/3$
$wR(F^2) = 0.088$	$(\Delta/\sigma)_{\max} = 0.010$
$S = 1.18$	$\Delta\rho_{\max} = 1.20$ e Å^{-3}
2962 reflections	$\Delta\rho_{\min} = -1.44$ e Å^{-3}
116 parameters	Extinction correction: *SHELXTL* (Sheldrick, 1998), $Fc^* = kFc[1+0.001xFc^2\lambda^3/\sin(2\theta)]^{-1/4}$
0 restraints	Extinction coefficient: 0.115 (6)
Primary atom site location: structure-invariant direct methods	
Secondary atom site location: difference Fourier map	

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	$U_{\text{iso}}*/U_{\text{eq}}$
Pt1	0.0000	0.5000	0.0000	0.03163 (12)
Cl1	0.1751 (2)	0.65180 (16)	0.26337 (11)	0.0496 (3)

Cl2	−0.2671 (2)	0.5772 (2)	−0.01978 (15)	0.0522 (3)
Cl3	−0.1501 (2)	0.27660 (16)	0.07023 (13)	0.0486 (3)
N1	−0.2844 (7)	0.7163 (6)	0.3174 (5)	0.0473 (9)
H1D	−0.2918	0.6752	0.2261	0.057*
C1	−0.2767 (12)	0.4641 (8)	0.3642 (6)	0.0567 (14)
H1A	−0.1645	0.4737	0.3364	0.068*
H1B	−0.4017	0.3993	0.2738	0.068*
H1C	−0.2670	0.4137	0.4465	0.068*
C2	−0.2721 (8)	0.6278 (7)	0.4197 (5)	0.0448 (10)
C3	−0.2540 (10)	0.6948 (7)	0.5686 (6)	0.0496 (11)
H3	−0.2448	0.6366	0.6410	0.059*
C4	−0.2496 (10)	0.8492 (8)	0.6091 (6)	0.0533 (12)
C5	−0.2300 (17)	0.9231 (11)	0.7709 (8)	0.077 (2)
H5A	−0.3464	0.9469	0.7620	0.092*
H5B	−0.1094	1.0211	0.8227	0.092*
H5C	−0.2215	0.8483	0.8310	0.092*
C6	−0.2651 (10)	0.9340 (7)	0.4965 (7)	0.0540 (12)
H6	−0.2611	1.0380	0.5221	0.065*
C7	−0.2858 (9)	0.8639 (7)	0.3499 (6)	0.0493 (11)
C8	−0.3106 (14)	0.9436 (10)	0.2211 (9)	0.0687 (18)
H8A	−0.4370	0.8775	0.1325	0.082*
H8B	−0.2007	0.9562	0.1898	0.082*
H8C	−0.3100	1.0478	0.2589	0.082*

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Pt1	0.03766 (15)	0.03245 (15)	0.02614 (14)	0.01452 (9)	0.01484 (8)	0.00745 (7)
Cl1	0.0642 (7)	0.0451 (6)	0.0288 (4)	0.0166 (5)	0.0150 (4)	0.0042 (3)
Cl2	0.0546 (6)	0.0726 (8)	0.0457 (5)	0.0397 (6)	0.0252 (5)	0.0200 (5)
Cl3	0.0621 (7)	0.0406 (6)	0.0440 (5)	0.0148 (5)	0.0274 (5)	0.0148 (4)
N1	0.049 (2)	0.052 (2)	0.0380 (16)	0.0178 (18)	0.0172 (15)	0.0113 (15)
C1	0.076 (4)	0.061 (3)	0.045 (2)	0.039 (3)	0.028 (2)	0.016 (2)
C2	0.052 (2)	0.047 (2)	0.0385 (18)	0.024 (2)	0.0190 (17)	0.0110 (16)
C3	0.062 (3)	0.052 (3)	0.041 (2)	0.028 (2)	0.0239 (19)	0.0121 (18)
C4	0.062 (3)	0.054 (3)	0.044 (2)	0.026 (2)	0.023 (2)	0.0060 (19)
C5	0.116 (7)	0.067 (5)	0.052 (3)	0.044 (5)	0.039 (4)	0.005 (3)
C6	0.059 (3)	0.042 (3)	0.057 (3)	0.018 (2)	0.023 (2)	0.012 (2)
C7	0.046 (2)	0.047 (3)	0.049 (2)	0.0134 (19)	0.0164 (18)	0.0172 (19)
C8	0.074 (4)	0.063 (4)	0.067 (3)	0.025 (3)	0.024 (3)	0.033 (3)

Geometric parameters (Å, º)

Pt1—Cl1	2.3225 (11)	C3—H3	0.9300
Pt1—Cl1$^{\rm i}$	2.3225 (11)	C4—C6	1.409 (9)
Pt1—Cl2	2.3199 (12)	C4—C5	1.507 (8)
Pt1—Cl2$^{\rm i}$	2.3199 (12)	C5—H5A	0.9600
Pt1—Cl3$^{\rm i}$	2.3197 (13)	C5—H5B	0.9600

Pt1—Cl3	2.3197 (13)	C5—H5C	0.9600
N1—H1D	0.8600	C6—C7	1.365 (9)
C1—C2	1.488 (8)	C6—H6	0.9300
C1—H1A	0.9600	C7—N1	1.338 (8)
C1—H1B	0.9600	C7—C8	1.505 (8)
C1—H1C	0.9600	C8—H8A	0.9600
C2—N1	1.355 (7)	C8—H8B	0.9600
C2—C3	1.385 (6)	C8—H8C	0.9600
C3—C4	1.388 (8)		

Cl1—Pt1—Cl1^{i}	180.0	C2—C3—C4	119.7 (5)
Cl2—Pt1—Cl1^{i}	89.35 (5)	C2—C3—H3	120.2
Cl2^{i}—Pt1—Cl1^{i}	90.65 (5)	C4—C3—H3	120.2
Cl2—Pt1—Cl1	90.65 (5)	C3—C4—C6	118.9 (5)
Cl2—Pt1—Cl2^{i}	180.0	C3—C4—C5	120.0 (6)
Cl3—Pt1—Cl1	90.10 (5)	C6—C4—C5	121.1 (6)
Cl3^{i}—Pt1—Cl1^{i}	90.10 (5)	C4—C5—H5A	109.5
Cl3—Pt1—Cl1^{i}	89.90 (5)	C4—C5—H5B	109.5
Cl3—Pt1—Cl2	90.45 (6)	H5A—C5—H5B	109.5
Cl3^{i}—Pt1—Cl2^{i}	90.45 (6)	C4—C5—H5C	109.5
Cl3—Pt1—Cl2^{i}	89.55 (6)	H5A—C5—H5C	109.5
Cl3^{i}—Pt1—Cl3	180.0	H5B—C5—H5C	109.5
C2—N1—H1D	118.0	C7—C6—C4	120.1 (5)
C7—N1—C2	123.9 (5)	C7—C6—H6	119.9
C7—N1—H1D	118.0	C4—C6—H6	119.9
C2—C1—H1A	109.5	N1—C7—C6	118.9 (5)
C2—C1—H1B	109.5	N1—C7—C8	117.6 (6)
H1A—C1—H1B	109.5	C6—C7—C8	123.5 (6)
C2—C1—H1C	109.5	C7—C8—H8A	109.5
H1A—C1—H1C	109.5	C7—C8—H8B	109.5
H1B—C1—H1C	109.5	H8A—C8—H8B	109.5
N1—C2—C3	118.5 (5)	C7—C8—H8C	109.5
N1—C2—C1	117.3 (4)	H8A—C8—H8C	109.5
C3—C2—C1	124.2 (5)	H8B—C8—H8C	109.5

C1—C2—N1—C7	178.8 (6)	C3—C4—C6—C7	0.6 (10)
C3—C2—N1—C7	−1.9 (9)	C5—C4—C6—C7	−179.0 (7)
N1—C2—C3—C4	0.2 (9)	C4—C6—C7—N1	−2.2 (10)
C1—C2—C3—C4	179.5 (6)	C4—C6—C7—C8	177.8 (7)
C2—C3—C4—C6	0.4 (10)	C6—C7—N1—C2	2.9 (9)
C2—C3—C4—C5	180.0 (7)	C8—C7—N1—C2	−177.0 (6)

Symmetry code: (i) $-x, -y+1, -z$.

Hydrogen-bond geometry (Å, º)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
N1—H1*D*···Cl2	0.86	2.45	3.301 (5)	173

C1—H1*C*···Cl1^{ii}	0.96	2.81	3.743 (6)	165
C8—H8*A*···Cl3^{iii}	0.96	2.80	3.731 (10)	163

Symmetry codes: (ii) −*x*, −*y*+1, −*z*+1; (iii) −*x*−1, −*y*+1, −*z*.