Acta Crystallographica Section E
Structure Reports Online
ISSN 1600-5368

Bis(benzyltriphenylphosphonium) tetrachloridoplatinate(II) trichloromethane disolvate

Nadezhda A. Bokach,[a] Yulia A. Izotova[a] and Matti Haukka[b]*

[a]Department of Chemistry, St Petersburg State University, 198504 Stary Petergof, Russian Federation, and [b]Department of Chemistry, University of Joensuu, PO Box 111, FI-80101 Joensuu, Finland

Correspondence e-mail: matti.haukka@joensuu.fi

Key indicators

Single-crystal X-ray study
T = 120 K
Mean σ(C–C) = 0.005 Å
R factor = 0.032
wR factor = 0.062
Data-to-parameter ratio = 19.9

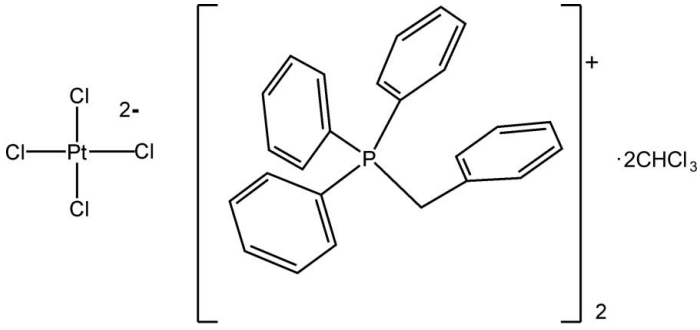
For details of how these key indicators were automatically derived from the article, see http://journals.iucr.org/e.

Received 10 January 2007
Accepted 25 March 2007

In the title compound, $(C_{25}H_{22}P)_2[PtCl_4]\cdot 2CHCl_3$, the Pt^{II} atom lies on an inversion centre and the $[PtCl_4]^{2-}$ anion has a square-planar geometry with Pt—Cl bond lengths of 2.3081 (8) and 2.3136 (7) Å. The benzyltriphenylphosphonium cation has a tetrahedral geometry.

Comment

Complexes $Q_2[PtCl_4]$ with lipophilic cations Q^+, *e.g.* $(Ph_3PCH_2Ph)^+$, are used as starting materials for reactions that take place in non-aqueous media, and are important precursors for a wide range of platinum complexes bearing organic ligands.



(I)

In the title compound, (I) (Fig. 1), the Pt^{II} atom lies on an inversion centre. The $[PtCl_4]^{2-}$ anion has a square-planar geometry, with Cl—Pt—Cl *cis* angles close to the ideal angle of 90° (Table 1). The Pt—Cl bond lengths [2.3081 (8) and 2.3136 (7) Å] in the anion agree with those found in other $[PtCl_4]^{2-}$-containing species [2.272 (1)–2.322 (1) Å; Angeloni *et al.*, 2004; Angeloni & Orpen, 2001; Hasan *et al.*, 2001; Ciccarese *et al.*, 1998; Viossat *et al.*, 1994; Lewis & Orpen, 1998; Gillon *et al.*, 2000; Dung *et al.*, 1994; Brammer *et al.*, 1991; Chandrasekaran, 1994; Kao & Chen, 2004; Sakai *et al.*, 1996]. Pt···Pt interactions between the anions are not observed.

In (I), the $(Ph_3PCH_2Ph)^+$ cation has a tetrahedral geometry, with C—P—C angles in the range 106.05 (13)–112.75 (14)°, similar to the conformation found in $(Ph_3PCH_2Ph)_2[Pt_2Cl_6]$ (Kukushkin *et al.*, 1991). The mean planes of the three phenyl P-bonded rings are inclined at 71.42 (15)–77.81 (17)°, forming a propeller-like conformation.

Experimental

Crystals were obtained by recrystallization of $(Ph_3PCH_2Ph)_2[PtCl_4]$ from $CHCl_3$ at room temperature. Elemental analyses calculated: C 48.70, H 3.62%; found: C 48.67, H 3.60%.

Crystal data

$(C_{25}H_{22}P)_2[PtCl_4]\cdot 2CHCl_3$
M_r = 1282.42
Triclinic, $P\overline{1}$
a = 9.8900 (3) Å
b = 11.2570 (4) Å
c = 13.0180 (3) Å
α = 98.287 (2)°
β = 105.042 (2)°
γ = 108.979 (1)°
V = 1281.45 (7) Å^3
Z = 1
Mo $K\alpha$ radiation
μ = 3.36 mm^{-1}
T = 120 (2) K
0.11 × 0.10 × 0.06 mm

Data collection

Nonius KappaCCD diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 2003)
T_{min} = 0.717, T_{max} = 0.821
25993 measured reflections
5866 independent reflections
5484 reflections with $I > 2\sigma(I)$
R_{int} = 0.048

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.032
$wR(F^2)$ = 0.062
S = 1.05
5866 reflections
295 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 0.86 e Å^{-3}
$\Delta\rho_{min}$ = −0.99 e Å^{-3}

Table 1
Selected geometric parameters (Å, °).

Pt1—Cl1	2.3081 (8)	Pt1—Cl2	2.3126 (7)
Cl1—Pt1—Cl2	89.74 (3)	C9—P1—C21	108.51 (13)
Cl1^{i}—Pt1—Cl2	90.26 (3)	C15—P1—C2	108.15 (14)
C15—P1—C9	106.05 (13)	C9—P1—C2	110.16 (14)
C15—P1—C21	111.02 (14)	C21—P1—C2	112.75 (14)

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

All H atoms were positioned geometrically and constrained to ride on their parent atoms, with C—H = 0.95–1.00 Å, and U_{iso}(H) = 1.2 or 1.5U_{eq}(parent atom).

Data collection: *COLLECT* (Nonius, 2004); cell refinement: *DENZO/SCALEPACK* (Otwinowski & Minor, 1997); data reduction: *DENZO/SCALEPACK*; program(s) used to solve structure: *SIR2004* (Burla *et al.*, 2005); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *DIAMOND* (Brandenburg, 2006); software used to prepare material for publication: *SHELXL97*.

We are grateful to the Russian Fund for Basic Research (grants 05–03-32140 and 06–03-90901) and the Academy of Finland for financial support.

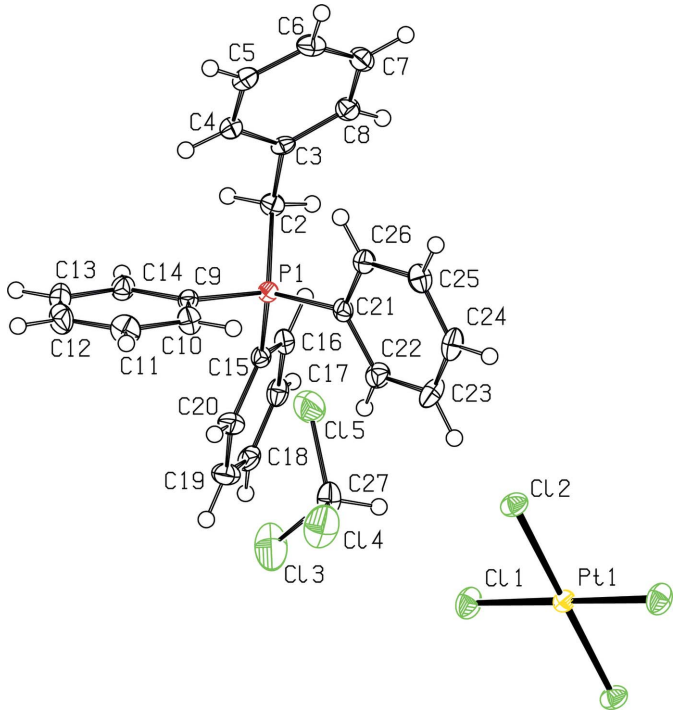


Figure 1
The asymmetric unit of the title compound, showing the atom-labeling scheme. The two symmetry-related Cl atoms are also shown; they are related to the labelled atoms by $(-x, -y, -z)$. Displacement ellipsoids are drawn at the 50% probability level.

References

Angeloni, A., Crawford, P. C., Orpen, A. G., Podesta, T. J. & Shore, B. J. (2004). *Chem. Eur. J.* **10**, 3783–3791.
Angeloni, A. & Orpen, A. G. (2001). *Chem. Commun.* pp. 343–344.
Brammer, L., Charnock, J. M., Goggin, P. L., Goodfellow, R. J., Orpen, A. G. & Koetzle, T. F. (1991). *J. Chem. Soc. Dalton Trans.* pp. 1789–1798.
Brandenburg, K. (2006). *DIAMOND*. Crystal Impact GbR, Bonn, Germany.
Burla, M. C., Caliandro, R., Camalli, M., Carrozzini, B., Cascarano, G. L., De Caro, L., Giacovazzo, C., Polidori, G. & Spagna, R. (2005). *J. Appl. Cryst.* **38**, 381–388.
Chandrasekaran, A. (1994). *Acta Cryst.* C**50,** 1692–1694.
Ciccarese, A., Clemente, D. A., Fanizzi, F. P., Marzotto, A. & Valle, G. (1998). *Inorg. Chim. Acta*, **275,** 419–426.
Dung, N.-H., Rodier, N., Viossat, B. & Lancelot, J. C. (1994). *Acta Cryst.* C**50,** 1574–1576.
Gillon, A. L., Lewis, G. R., Orpen, A. G., Rotter, S., Starbuck, J., Wang, X.-M., Rodriguez-Martin, Y. & Ruiz-Perez, C. (2000). *J. Chem. Soc. Dalton Trans.* pp. 3897–3905.
Hasan, M., Kozhevnikov, I. V., Siddiqui, M. R. H., Femoni, C., Steiner, A. & Winterton, N. (2001). *Inorg. Chem.* **40**, 795–800.
Kao, Y.-Ch. & Chen, J.-D. (2004). *Struct. Chem.* **15**, 269–276.
Kukushkin, V. Yu., Tkachuk, V. M., Crol', I. A., Starikova, Z. A., Zhadanov, B. V. & Kiseleva, N. P. (1991). *Zh. Obshch. Khim. (Russ.) (Russ. J. Gen. Chem.)*, **61**, 51–58.
Lewis, G. R. & Orpen, A. G. (1998). *Chem. Commun.* pp. 1873–1874.
Nonius (2004). *COLLECT*. Nonius BV, Delft, The Netherlands.
Otwinowski, Z. & Minor, W. (1997). *Methods in Enzymology*, Vol. 276, *Macromolecular Crystallography*, Part A, edited by C. W. Carter Jr & R. M. Sweet, pp. 307–326. New York: Academic Press.
Sakai, K., Tanaka, Y. & Tsubomura, T. (1996). *Acta Cryst.* C**52**, 541–543.
Sheldrick, G. M. (1997). *SHELXL97*. University of Göttingen, Germany.
Sheldrick, G. M. (2003). *SADABS*. Bruker AXS Inc., Madison, Wisconsin, USA.
Viossat, B., Dung, N.-H., Daran, J. C. & Lancelot, J. C. (1994). *Acta Cryst.* C**50**, 209–211.