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# Chloridocyclohexyl[(1,2,5,6-$\eta$)-cycloocta-1,5-diene]platinum(II)

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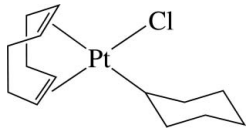
Key indicators: single-crystal X-ray study; $T$ = 296 K; mean $\sigma$(C–C) = 0.014 Å; $R$ factor = 0.034; $wR$ factor = 0.083; data-to-parameter ratio = 24.0.

In the title complex, $[Pt(C_6H_{11})Cl(C_8H_{12})]$, the $Pt^{II}$ ion lies in a distorted square-planar environment defined by the Cl and cyclohexyl C atoms and the mid-points of the two $\pi$-coordinated double bonds of cycloocta-1,5-diene. As a result of the different *trans* influences of the Cl atom and the cyclohexyl group, the Pt—C bonds *trans* to the cyclohexyl group are longer than those *trans* to the Cl atom.

## Related literature

For the crystal structure of $[(cod)PtCl_2]$ (cod = cycloocta-1,5-diene), see: Goel *et al.* (1982); Syed *et al.* (1984). For the crystal structures of $[(cod)Pt(CH_3)L]$ ($L$ = OH, $CH_3$ or Cl), see: Klein *et al.* (1999).




## Experimental

### Crystal data

$[Pt(C_6H_{11})Cl(C_8H_{12})]$ $M_r$ = 421.86
Monoclinic, $P2_1/n$
$a$ = 10.6505 (5) Å
$b$ = 12.3514 (6) Å
$c$ = 11.1609 (6) Å
$\beta$ = 105.175 (1)°
$V$ = 1417.01 (12) Å$^3$
$Z$ = 4
Mo $K\alpha$ radiation
$\mu$ = 10.06 mm$^{-1}$
$T$ = 296 K
0.20 × 0.16 × 0.15 mm

### Data collection

Bruker SMART 1000 CCD diffractometer
Absorption correction: multi-scan (*SADABS*; Bruker, 2000)
$T_{min}$ = 0.122, $T_{max}$ = 0.221
10108 measured reflections
3481 independent reflections
2343 reflections with $I > 2\sigma(I)$
$R_{int}$ = 0.050

### Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.034
$wR(F^2)$ = 0.083
$S$ = 1.12
3481 reflections
145 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 1.12 e Å$^{-3}$
$\Delta\rho_{min}$ = −1.79 e Å$^{-3}$

Data collection: *SMART* (Bruker, 2000); cell refinement: *SAINT* (Bruker, 2000); data reduction: *SAINT*; program(s) used to solve structure: *SHELXS97* (Sheldrick, 2008); program(s) used to refine structure: *SHELXL97* (Sheldrick, 2008); molecular graphics: *ORTEP-3* (Farrugia, 1997) and *PLATON* (Spek, 2009); software used to prepare material for publication: *SHELXL97*.

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Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: NG2696).

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# supplementary materials

*Acta Cryst.* (2009). E**65**, m1707 [ **doi:10.1107/S1600536809050910** ]

# Chloridocyclohexyl[(1,2,5,6-$\eta$)-cycloocta-1,5-diene]platinum(II)

**K. Ha**

## Comment

In the title complex, [Pt($C_6H_{11}$)Cl($C_8H_{12}$)], the central $Pt^{II}$ ion lies in a distorted square-planar environment defined by the Cl and cyclohexyl C atoms and the two mid-points (M1, M2) of the π-coordinated double bonds of cycloocta-1,5-diene (cod) ligand (M1 and M2 denote the mid-points of the olefinic bonds C1—C2 and C5—C6, respectively) (Fig. 1 and Fig. 2). The Pt, Cl, C9 atoms and the mid-points lie in a coordination plane with the largest deviation of 0.021 Å (C9) from the least-squares plane, and with bond angles in the range of 85.2°–92.2°. Because of the different *trans* influences of the Cl atom and the cyclohexyl group, the Pt—C bonds *trans* to C9 of the cyclohexyl group are on average 0.215 Å longer than those *trans* to the Cl atom (Pt1—C1/C2 = 2.316 (7) and 2.337 (8) Å, Pt1—C5/C6 = 2.111 (8) and 2.112 (8) Å). The distances between the Pt atom and the mid-points are 2.228 Å (M1) and 1.992 Å (M2). The cod ligand coordinates to the Pt atom in the twist-boat conformation with the coordinated double-bond lengths of 1.339 (11) and 1.402 (12) Å, and the cod ring angles lie in the range of 113.0 (8)°–127.1 (8)°. The σ-bonded cyclohexyl ring is in the chair conformation with the ring angles of 109.9 (8)°–112.0 (8)°.

## Experimental

To a suspension of [(cod)$PtCl_2$] (0.5015 g, 1.34 mmol) in ether (30 ml) was added cyclohexylmagnesium chloride (2.0 *M* solution in ether, 4.1 ml, 8.04 mmol) and stirred for 24 h at -5 °C. After methanolysis with 1 ml MeOH, the resulting mixture was diluted with ether (20 ml), and then filtered directly through a plug of $Al_2O_3$ (3 cm *x* 2 cm) and eluted with ether (80 ml). The solvent was removed under vacuum and the residue was dried, to give a white powder (0.3655 g). Crystals suitable for X-ray analysis were obtained by slow evaporation from an ethyl acetate solution.

## Refinement

H atoms were positioned geometrically and allowed to ride on their respective parent atoms [C—H = 0.98 (CH) or 0.97 ($CH_2$) Å and $U_{iso}$(H) = 1.2$U_{eq}$(C)].

## Figures

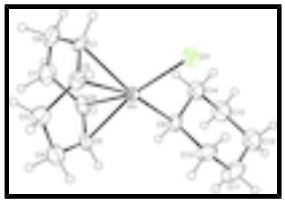

Fig. 1. The structure of the title compound, with displacement ellipsoids drawn at the 30% probability level for non-H atoms.

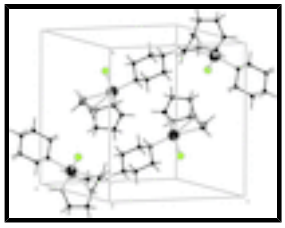

Fig. 2. View of the unit-cell contents of the title compound.

**Chloridocyclohexyl[(1,2,5,6-η)-cycloocta-1,5-diene]platinum(II)**

*Crystal data*

| | |
|---|---|
| $[Pt(C_6H_{11})Cl(C_8H_{12})]$ | $F(000) = 808$ |
| $M_r = 421.86$ | $D_x = 1.977$ Mg m$^{-3}$ |
| Monoclinic, $P2_1/n$ | Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å |
| Hall symbol: -P 2yn | Cell parameters from 3669 reflections |
| $a = 10.6505$ (5) Å | $\theta = 2.4$–$27.8°$ |
| $b = 12.3514$ (6) Å | $\mu = 10.06$ mm$^{-1}$ |
| $c = 11.1609$ (6) Å | $T = 296$ K |
| $\beta = 105.1750$ (10)° | Block, colorless |
| $V = 1417.01$ (12) Å$^3$ | 0.20 × 0.16 × 0.15 mm |
| $Z = 4$ | |

*Data collection*

| | |
|---|---|
| Bruker SMART 1000 CCD diffractometer | 3481 independent reflections |
| Radiation source: fine-focus sealed tube | 2343 reflections with $I > 2\sigma(I)$ |
| graphite | $R_{int} = 0.050$ |
| φ and ω scans | $\theta_{max} = 28.3°$, $\theta_{min} = 2.4°$ |
| Absorption correction: multi-scan (*SADABS*; Bruker, 2000) | $h = -14 \rightarrow 14$ |
| $T_{min} = 0.122$, $T_{max} = 0.221$ | $k = -8 \rightarrow 16$ |
| 10108 measured reflections | $l = -14 \rightarrow 14$ |

*Refinement*

| | |
|---|---|
| Refinement on $F^2$ | Primary atom site location: structure-invariant direct methods |
| Least-squares matrix: full | Secondary atom site location: difference Fourier map |
| $R[F^2 > 2\sigma(F^2)] = 0.034$ | Hydrogen site location: inferred from neighbouring sites |
| $wR(F^2) = 0.083$ | H-atom parameters constrained |
| $S = 1.12$ | $w = 1/[\sigma^2(F_o^2) + (0.0112P)^2 + 4.7457P]$ where $P = (F_o^2 + 2F_c^2)/3$ |
| 3481 reflections | $(\Delta/\sigma)_{max} < 0.001$ |
| 145 parameters | $\Delta\rho_{max} = 1.12$ e Å$^{-3}$ |
| 0 restraints | $\Delta\rho_{min} = -1.79$ e Å$^{-3}$ |

*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* | $U_{iso}$*/$U_{eq}$ |
|---|---|---|---|---|
| Pt1 | 0.23435 (3) | 0.38659 (3) | 0.59178 (3) | 0.03388 (11) |
| Cl1 | 0.0531 (2) | 0.2747 (2) | 0.5501 (2) | 0.0491 (6) |
| C1 | 0.1992 (9) | 0.4337 (7) | 0.7812 (7) | 0.043 (2) |
| H1 | 0.1372 | 0.3870 | 0.8078 | 0.051* |
| C2 | 0.1440 (8) | 0.5121 (8) | 0.7019 (8) | 0.044 (2) |
| H2 | 0.0487 | 0.5132 | 0.6801 | 0.052* |
| C3 | 0.2067 (9) | 0.6204 (8) | 0.6984 (8) | 0.053 (2) |
| H3A | 0.2625 | 0.6364 | 0.7802 | 0.064* |
| H3B | 0.1396 | 0.6755 | 0.6785 | 0.064* |
| C4 | 0.2864 (10) | 0.6255 (8) | 0.6048 (9) | 0.063 (3) |
| H4A | 0.2299 | 0.6477 | 0.5256 | 0.076* |
| H4B | 0.3522 | 0.6812 | 0.6308 | 0.076* |
| C5 | 0.3523 (8) | 0.5229 (7) | 0.5861 (8) | 0.043 (2) |
| H5 | 0.3865 | 0.5243 | 0.5128 | 0.052* |
| C6 | 0.4195 (8) | 0.4513 (8) | 0.6782 (9) | 0.052 (3) |
| H6 | 0.4921 | 0.4135 | 0.6578 | 0.062* |
| C7 | 0.4382 (10) | 0.4719 (9) | 0.8158 (9) | 0.068 (3) |
| H7A | 0.5169 | 0.4351 | 0.8607 | 0.082* |
| H7B | 0.4522 | 0.5489 | 0.8307 | 0.082* |
| C8 | 0.3306 (11) | 0.4376 (9) | 0.8696 (8) | 0.065 (3) |
| H8A | 0.3276 | 0.4870 | 0.9364 | 0.078* |
| H8B | 0.3510 | 0.3663 | 0.9058 | 0.078* |
| C9 | 0.3060 (8) | 0.3085 (8) | 0.4561 (8) | 0.044 (2) |
| H9 | 0.3882 | 0.3438 | 0.4554 | 0.053* |
| C10 | 0.2166 (11) | 0.3210 (9) | 0.3290 (8) | 0.064 (3) |
| H10A | 0.2023 | 0.3974 | 0.3099 | 0.076* |
| H10B | 0.1332 | 0.2883 | 0.3267 | 0.076* |
| C11 | 0.2741 (13) | 0.2672 (11) | 0.2310 (10) | 0.087 (4) |
| H11A | 0.2116 | 0.2718 | 0.1504 | 0.105* |
| H11B | 0.3517 | 0.3060 | 0.2262 | 0.105* |
| C12 | 0.3075 (11) | 0.1516 (9) | 0.2608 (10) | 0.071 (3) |
| H12A | 0.3513 | 0.1227 | 0.2017 | 0.085* |
| H12B | 0.2282 | 0.1105 | 0.2530 | 0.085* |

| | | | | |
|---|---|---|---|---|
| C13 | 0.3945 (10) | 0.1387 (9) | 0.3909 (9) | 0.067 (3) |
| H13A | 0.4785 | 0.1713 | 0.3952 | 0.080* |
| H13B | 0.4083 | 0.0622 | 0.4096 | 0.080* |
| C14 | 0.3359 (9) | 0.1916 (8) | 0.4883 (8) | 0.051 (2) |
| H14A | 0.2567 | 0.1540 | 0.4911 | 0.061* |
| H14B | 0.3968 | 0.1863 | 0.5696 | 0.061* |

*Atomic displacement parameters (Å$^2$)*

| | $U^{11}$ | $U^{22}$ | $U^{33}$ | $U^{12}$ | $U^{13}$ | $U^{23}$ |
|---|---|---|---|---|---|---|
| Pt1 | 0.03384 (17) | 0.03547 (19) | 0.03338 (16) | −0.00364 (17) | 0.01065 (11) | −0.00381 (18) |
| Cl1 | 0.0403 (12) | 0.0527 (15) | 0.0538 (13) | −0.0132 (10) | 0.0116 (10) | −0.0063 (12) |
| C1 | 0.070 (6) | 0.037 (5) | 0.028 (4) | 0.006 (5) | 0.025 (4) | −0.004 (4) |
| C2 | 0.042 (5) | 0.048 (6) | 0.043 (5) | 0.007 (4) | 0.015 (4) | −0.006 (5) |
| C3 | 0.056 (6) | 0.054 (7) | 0.048 (5) | 0.012 (5) | 0.010 (4) | 0.002 (5) |
| C4 | 0.075 (7) | 0.046 (7) | 0.072 (7) | −0.006 (5) | 0.026 (6) | −0.009 (6) |
| C5 | 0.049 (5) | 0.044 (6) | 0.049 (5) | −0.020 (4) | 0.031 (4) | −0.019 (5) |
| C6 | 0.030 (5) | 0.053 (6) | 0.068 (6) | −0.015 (4) | 0.005 (4) | −0.018 (6) |
| C7 | 0.062 (7) | 0.067 (8) | 0.058 (6) | 0.000 (6) | −0.014 (5) | −0.007 (6) |
| C8 | 0.096 (9) | 0.055 (7) | 0.035 (5) | 0.017 (6) | 0.000 (5) | −0.006 (5) |
| C9 | 0.049 (5) | 0.047 (6) | 0.042 (5) | −0.008 (4) | 0.022 (4) | −0.018 (4) |
| C10 | 0.096 (8) | 0.056 (7) | 0.046 (6) | 0.018 (6) | 0.033 (6) | 0.007 (5) |
| C11 | 0.121 (11) | 0.108 (12) | 0.047 (6) | 0.015 (9) | 0.046 (7) | −0.009 (7) |
| C12 | 0.084 (8) | 0.061 (8) | 0.080 (8) | 0.000 (6) | 0.042 (7) | −0.024 (7) |
| C13 | 0.072 (7) | 0.064 (8) | 0.072 (7) | 0.010 (6) | 0.032 (6) | −0.012 (6) |
| C14 | 0.056 (6) | 0.045 (6) | 0.057 (6) | 0.008 (5) | 0.026 (5) | −0.013 (5) |

*Geometric parameters (Å, °)*

| | | | |
|---|---|---|---|
| Pt1—C9 | 2.100 (8) | C7—H7A | 0.9700 |
| Pt1—C5 | 2.111 (8) | C7—H7B | 0.9700 |
| Pt1—C6 | 2.112 (8) | C8—H8A | 0.9700 |
| Pt1—C1 | 2.316 (7) | C8—H8B | 0.9700 |
| Pt1—Cl1 | 2.320 (2) | C9—C10 | 1.495 (12) |
| Pt1—C2 | 2.337 (8) | C9—C14 | 1.502 (12) |
| C1—C2 | 1.339 (11) | C9—H9 | 0.9800 |
| C1—C8 | 1.487 (13) | C10—C11 | 1.538 (12) |
| C1—H1 | 0.9800 | C10—H10A | 0.9700 |
| C2—C3 | 1.500 (13) | C10—H10B | 0.9700 |
| C2—H2 | 0.9800 | C11—C12 | 1.488 (15) |
| C3—C4 | 1.510 (12) | C11—H11A | 0.9700 |
| C3—H3A | 0.9700 | C11—H11B | 0.9700 |
| C3—H3B | 0.9700 | C12—C13 | 1.513 (14) |
| C4—C5 | 1.490 (13) | C12—H12A | 0.9700 |
| C4—H4A | 0.9700 | C12—H12B | 0.9700 |
| C4—H4B | 0.9700 | C13—C14 | 1.534 (11) |
| C5—C6 | 1.402 (12) | C13—H13A | 0.9700 |
| C5—H5 | 0.9800 | C13—H13B | 0.9700 |
| C6—C7 | 1.517 (12) | C14—H14A | 0.9700 |

| | | | |
|---|---|---|---|
| C6—H6 | 0.9800 | C14—H14B | 0.9700 |
| C7—C8 | 1.487 (14) | | |
| C9—Pt1—C5 | 90.8 (3) | Pt1—C6—H6 | 114.4 |
| C9—Pt1—C6 | 91.8 (4) | C8—C7—C6 | 116.8 (8) |
| C5—Pt1—C6 | 38.8 (3) | C8—C7—H7A | 108.1 |
| C9—Pt1—C1 | 161.8 (3) | C6—C7—H7A | 108.1 |
| C5—Pt1—C1 | 93.8 (3) | C8—C7—H7B | 108.1 |
| C6—Pt1—C1 | 80.9 (4) | C6—C7—H7B | 108.1 |
| C9—Pt1—Cl1 | 91.3 (2) | H7A—C7—H7B | 107.3 |
| C5—Pt1—Cl1 | 159.9 (3) | C7—C8—C1 | 115.6 (8) |
| C6—Pt1—Cl1 | 160.9 (3) | C7—C8—H8A | 108.4 |
| C1—Pt1—Cl1 | 90.5 (2) | C1—C8—H8A | 108.4 |
| C9—Pt1—C2 | 164.0 (3) | C7—C8—H8B | 108.4 |
| C5—Pt1—C2 | 79.5 (3) | C1—C8—H8B | 108.4 |
| C6—Pt1—C2 | 88.4 (4) | H8A—C8—H8B | 107.4 |
| C1—Pt1—C2 | 33.5 (3) | C10—C9—C14 | 111.7 (8) |
| Cl1—Pt1—C2 | 93.7 (2) | C10—C9—Pt1 | 112.0 (6) |
| C2—C1—C8 | 126.1 (9) | C14—C9—Pt1 | 111.3 (6) |
| C2—C1—Pt1 | 74.1 (5) | C10—C9—H9 | 107.2 |
| C8—C1—Pt1 | 105.4 (6) | C14—C9—H9 | 107.2 |
| C2—C1—H1 | 114.3 | Pt1—C9—H9 | 107.2 |
| C8—C1—H1 | 114.3 | C9—C10—C11 | 110.9 (9) |
| Pt1—C1—H1 | 114.3 | C9—C10—H10A | 109.5 |
| C1—C2—C3 | 122.7 (8) | C11—C10—H10A | 109.5 |
| C1—C2—Pt1 | 72.4 (5) | C9—C10—H10B | 109.5 |
| C3—C2—Pt1 | 109.3 (6) | C11—C10—H10B | 109.5 |
| C1—C2—H2 | 114.9 | H10A—C10—H10B | 108.0 |
| C3—C2—H2 | 114.9 | C12—C11—C10 | 111.9 (9) |
| Pt1—C2—H2 | 114.9 | C12—C11—H11A | 109.2 |
| C2—C3—C4 | 113.0 (8) | C10—C11—H11A | 109.2 |
| C2—C3—H3A | 109.0 | C12—C11—H11B | 109.2 |
| C4—C3—H3A | 109.0 | C10—C11—H11B | 109.2 |
| C2—C3—H3B | 109.0 | H11A—C11—H11B | 107.9 |
| C4—C3—H3B | 109.0 | C11—C12—C13 | 111.5 (10) |
| H3A—C3—H3B | 107.8 | C11—C12—H12A | 109.3 |
| C5—C4—C3 | 115.5 (9) | C13—C12—H12A | 109.3 |
| C5—C4—H4A | 108.4 | C11—C12—H12B | 109.3 |
| C3—C4—H4A | 108.4 | C13—C12—H12B | 109.3 |
| C5—C4—H4B | 108.4 | H12A—C12—H12B | 108.0 |
| C3—C4—H4B | 108.4 | C12—C13—C14 | 112.0 (8) |
| H4A—C4—H4B | 107.5 | C12—C13—H13A | 109.2 |
| C6—C5—C4 | 127.1 (8) | C14—C13—H13A | 109.2 |
| C6—C5—Pt1 | 70.7 (5) | C12—C13—H13B | 109.2 |
| C4—C5—Pt1 | 111.6 (6) | C14—C13—H13B | 109.2 |
| C6—C5—H5 | 113.2 | H13A—C13—H13B | 107.9 |
| C4—C5—H5 | 113.2 | C9—C14—C13 | 109.9 (8) |
| Pt1—C5—H5 | 113.2 | C9—C14—H14A | 109.7 |
| C5—C6—C7 | 122.9 (9) | C13—C14—H14A | 109.7 |
| C5—C6—Pt1 | 70.6 (5) | C9—C14—H14B | 109.7 |

| | | | |
|---|---|---|---|
| C7—C6—Pt1 | 112.7 (6) | C13—C14—H14B | 109.7 |
| C5—C6—H6 | 114.4 | H14A—C14—H14B | 108.2 |
| C7—C6—H6 | 114.4 | | |
| C9—Pt1—C1—C2 | 168.5 (9) | C9—Pt1—C6—C5 | 89.0 (6) |
| C5—Pt1—C1—C2 | 64.3 (6) | C1—Pt1—C6—C5 | −107.8 (5) |
| C6—Pt1—C1—C2 | 101.0 (6) | Cl1—Pt1—C6—C5 | −171.9 (6) |
| Cl1—Pt1—C1—C2 | −96.1 (6) | C2—Pt1—C6—C5 | −75.0 (5) |
| C9—Pt1—C1—C8 | 44.6 (14) | C9—Pt1—C6—C7 | −152.5 (8) |
| C5—Pt1—C1—C8 | −59.5 (7) | C5—Pt1—C6—C7 | 118.5 (10) |
| C6—Pt1—C1—C8 | −22.8 (7) | C1—Pt1—C6—C7 | 10.6 (7) |
| Cl1—Pt1—C1—C8 | 140.1 (6) | Cl1—Pt1—C6—C7 | −53.4 (13) |
| C2—Pt1—C1—C8 | −123.8 (9) | C2—Pt1—C6—C7 | 43.4 (8) |
| C8—C1—C2—C3 | −4.3 (14) | C5—C6—C7—C8 | 84.8 (12) |
| Pt1—C1—C2—C3 | −102.0 (8) | Pt1—C6—C7—C8 | 4.0 (12) |
| C8—C1—C2—Pt1 | 97.7 (9) | C6—C7—C8—C1 | −26.2 (14) |
| C9—Pt1—C2—C1 | −166.9 (10) | C2—C1—C8—C7 | −49.3 (13) |
| C5—Pt1—C2—C1 | −113.8 (6) | Pt1—C1—C8—C7 | 32.0 (10) |
| C6—Pt1—C2—C1 | −75.9 (6) | C5—Pt1—C9—C10 | −97.5 (7) |
| Cl1—Pt1—C2—C1 | 85.2 (6) | C6—Pt1—C9—C10 | −136.2 (7) |
| C9—Pt1—C2—C3 | −47.6 (15) | C1—Pt1—C9—C10 | 157.9 (9) |
| C5—Pt1—C2—C3 | 5.4 (6) | Cl1—Pt1—C9—C10 | 62.6 (7) |
| C6—Pt1—C2—C3 | 43.4 (6) | C2—Pt1—C9—C10 | −45.7 (15) |
| C1—Pt1—C2—C3 | 119.3 (9) | C5—Pt1—C9—C14 | 136.7 (7) |
| Cl1—Pt1—C2—C3 | −155.5 (6) | C6—Pt1—C9—C14 | 98.0 (7) |
| C1—C2—C3—C4 | 93.5 (10) | C1—Pt1—C9—C14 | 32.1 (14) |
| Pt1—C2—C3—C4 | 12.5 (9) | Cl1—Pt1—C9—C14 | −63.2 (6) |
| C2—C3—C4—C5 | −33.3 (12) | C2—Pt1—C9—C14 | −171.5 (10) |
| C3—C4—C5—C6 | −43.5 (13) | C14—C9—C10—C11 | −56.8 (11) |
| C3—C4—C5—Pt1 | 38.1 (10) | Pt1—C9—C10—C11 | 177.6 (7) |
| C9—Pt1—C5—C6 | −91.9 (6) | C9—C10—C11—C12 | 54.8 (14) |
| C1—Pt1—C5—C6 | 70.4 (6) | C10—C11—C12—C13 | −53.3 (14) |
| Cl1—Pt1—C5—C6 | 172.3 (6) | C11—C12—C13—C14 | 54.1 (13) |
| C2—Pt1—C5—C6 | 100.8 (6) | C10—C9—C14—C13 | 56.9 (10) |
| C9—Pt1—C5—C4 | 144.8 (7) | Pt1—C9—C14—C13 | −177.1 (6) |
| C6—Pt1—C5—C4 | −123.2 (9) | C12—C13—C14—C9 | −55.3 (12) |
| C1—Pt1—C5—C4 | −52.8 (7) | C1—C2—C5—C6 | −7.2 (7) |
| Cl1—Pt1—C5—C4 | 49.1 (11) | C3—C4—C7—C8 | 22.4 (8) |
| C2—Pt1—C5—C4 | −22.5 (7) | C3—C2—C1—C8 | −4.3 (14) |
| C4—C5—C6—C7 | −2.0 (14) | C4—C5—C6—C7 | −2.0 (14) |
| Pt1—C5—C6—C7 | −105.0 (9) | C2—C3—C4—C5 | −33.3 (12) |
| C4—C5—C6—Pt1 | 103.0 (9) | C6—C7—C8—C1 | −26.2 (14) |

**Fig. 1**

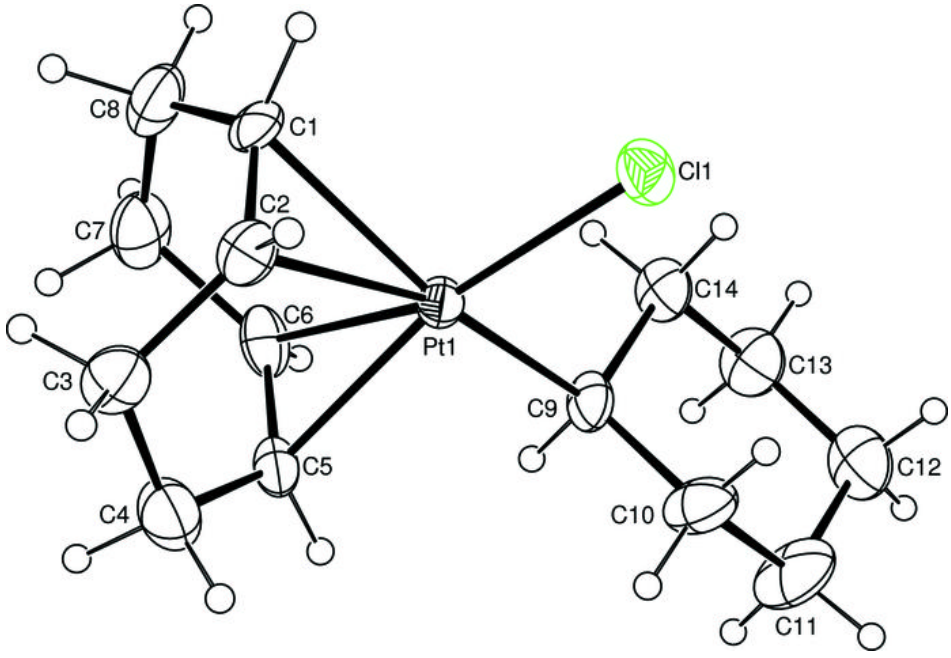

**Fig. 2**