(Deacon, Patrick, Skelton, Thomas & White, 1984), the terpyridine ligand was bonded in a bidentate fashion.

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Structure of Bis(ethylenediamine)platinum(II) Dichloride

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Abstract. $[Pt(C_2H_8N_2)_2]Cl_2$, $M_r = 386{\cdot}2$, triclinic, $P\bar{1}$, $a = 6{\cdot}918\ (4)$, $b = 8{\cdot}378\ (5)$ $c = 4{\cdot}951\ (2)$ Å, $\alpha = 98{\cdot}00\ (6)$, $\beta = 100{\cdot}15\ (6)$, $\gamma = 108{\cdot}57\ (6)^\circ$, $V = 261{\cdot}8\ (2)$ Å^3, $Z = 1$, $D_x = 2{\cdot}25$ Mg m^{-3}, $\lambda(\text{Ag } K\alpha) = 0{\cdot}56087$ Å, $\mu = 7{\cdot}5$ mm^{-1}, $F(000) = 180$, $T = 298$ K. $R = 0{\cdot}022$ for 3111 unique reflections. The ethylenediamine moieties coordinate in a square planar manner with amino N atoms attached to the Pt atom at the center of symmetry. The five-membered chelate rings adopt the *meso* form with the ligands in almost symmetric *gauche* (synclinal) conformations. The C atoms are shifted about 0·35 Å above and below the PtNN plane. The complex cations are linked two-dimensionally along the (010) plane by N—H···Cl hydrogen bonds. No short contacts are observed along **b**.

Experimental. Crystals prepared by recrystallization from an aqueous solution of the title compound (Bekaroglu, Breer, Endres, Keller & Nam Gung, 1977). The details of data collection and structure refinement are summarized in Table 1. The structure was solved by the heavy-atom method, and refined by full-matrix least squares. The H atoms were deduced clearly from difference Fourier maps, and included in the refinement. Thermal parameters were anisotropic for the non-H atoms and isotropic for the H atoms. Since two space groups, $P1$ and $P\bar{1}$, were possible, refinements were attempted for both space groups; they converged in quite similar structures with nearly the same R values. Therefore, the centrosymmetric space group $P\bar{1}$ was selected.

A projection of the structure along **c** (in which direction the cations are obliquely stacked) is shown in Fig. 1. The final atomic coordinates and equivalent isotropic thermal parameters are listed in Table 2.† Bond lengths, angles, hydrogen bonds and torsion angles are tabulated in Table 3.

Atomic form factors and f', f'' values taken from *International Tables for X-ray Crystallography* (1974). Calculations performed on a FACOM

Table 1. *Experimental details*

Crystal	Colourless, transparent, plate like; shaped to a sphere ($d = 0{\cdot}37$ mm)
Diffractometer	Rigaku AFC-3, graphite monochromator
Scan	ω mode, width $(2{\cdot}4 + 0{\cdot}8\tan\theta)^\circ$, speed 2°min^{-1}, $2\theta < 60^\circ$
Standards	$06\bar{2}$, 054, 710, $3\bar{7}4$, $4\bar{8}3$; every 50 reflections, no significant fluctuation
Range of *hkl*	h $0\rightarrow12$, k $-14\rightarrow14$, l $-8\rightarrow8$
Reflections	Measured 3113 Observed 3111, $\lvert F_o\rvert > 3\sigma(\lvert F_o\rvert)$
Corrections	Lp, absorption ($\mu r = 1{\cdot}39$)
Transmission	$0{\cdot}15 - 0{\cdot}19$
Unit cell	68 reflections, $19{\cdot}5 < \theta < 21{\cdot}5^\circ$
Function minimized	$\sum w(F_o - F_c)^2$, $w = [\sigma^2(F_o) + (0{\cdot}015\lvert F_o\rvert)^2]^{-1}$
Parameters refined	66
R, wR, S	0·022, 0·028, 1·04
Max. Δ/σ	0·04
Min. and max. $\Delta\rho$	$-1{\cdot}8$ and $3{\cdot}0$ e Å^{-3} near the Pt atom ($-0{\cdot}5$ and $0{\cdot}4$ e Å^{-3} elsewhere)

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† Lists of structure factors, anisotropic thermal parameters, H-atom parameters and bond lengths involving H atoms have been deposited with the British Library Document Supply Centre as Supplementary Publication No. SUP 52624 (8 pp.). Copies may be obtained through The Technical Editor, International Union of Crystallography, 5 Abbey Square, Chester CH1 2HU, England.

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Table 2. *Positional and thermal parameters with e.s.d.'s in parentheses*

$U_{eq} = (1/3)\sum_i\sum_j U_{ij}a_i^*a_j^*\mathbf{a}_i.\mathbf{a}_j.$

	x	y	z	U_{eq}(Å^2)
Pt	0·0	0·0	0·0	0·02110 (4)
N(1)	−0·0283 (4)	0·2332 (3)	−0·0207 (5)	0·0307 (7)
N(2)	0·2755 (4)	0·1077 (3)	−0·1136 (6)	0·0308 (7)
C(1)	0·1778 (6)	0·3583 (4)	−0·0316 (8)	0·0386 (10)
C(2)	0·2724 (6)	0·2642 (4)	−0·2196 (7)	0·0372 (10)
Cl	0·6806 (1)	0·2601 (1)	0·4178 (2)	0·0390 (3)

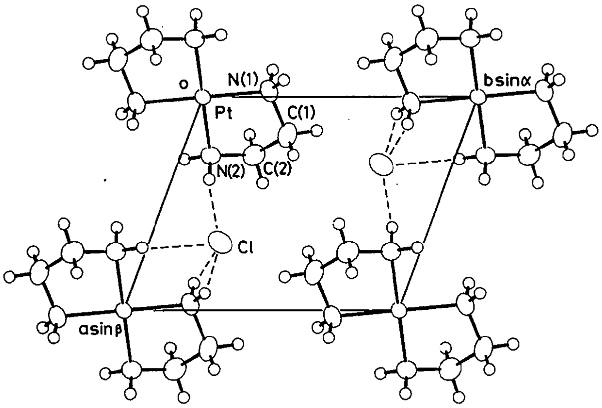

Fig. 1. A projection of the structure along **c** with the atomic numbering scheme. Thermal ellipsoids are drawn at the 60% probability level; a value of 0·8 Å^2 is given for the B_{iso} of the H atoms in this figure. Broken lines indicate N—H···Cl hydrogen bonds.

M-380R computer at ISSP, The University of Tokyo. Computational programs used were *UNICS*II (Sakurai, 1967), *RADIEL* (Coppens, Guru Row, Leung, Stevens, Becker & Yang, 1979) and *ORTEP*II (Johnson, 1971).

Table 3. *Bond lengths* (Å), *angles* (°), N—H···Cl *hydrogen bonds* (Å) *and torsion angles* (°)

Pt—N(1)	2·039 (3)	Pt—N(2)	2·046 (3)
N(1)—C(1)	1·492 (4)	N(2)—C(2)	1·483 (5)
C(1)—C(2)	1·502 (6)		
N(1)···Cl^{i}	3·242 (4)	N(1)···Cl^{ii}	3·213 (3)
N(2)···Cl	3·255 (4)	N(2)···Cl^{iii}	3·365 (4)
N(1)—Pt—N(2)	83·1 (1)	Pt—N(1)—C(1)	109·3 (2)
Pt—N(2)—C(2)	109·0 (2)	N(1)—C(1)—C(2)	107·3 (3)
N(2)—C(2)—C(1)	107·5 (3)		
N(2)—Pt—N(1)—C(1)	14·0	N(1)—Pt—N(2)—C(2)	15·2
Pt—N(1)—C(1)—C(2)	−40·2	Pt—N(2)—C(2)—C(1)	−41·2
N(1)—C(1)—C(2)—N(2)	53·4		

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

Related literature. The geometry and conformation of the en ring (en = ethylenediamine) are very similar to those in $[PtCl_2(en)_2](ClO_4)_2$ (Sato, Haruki, Wachter & Kurita, 1990).

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Structure of an Optically Active Organoaluminium Naphthylethylamine Dimer

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Abstract. Bis-μ-[1-(1-naphthyl)ethylaminato-*N*]-bis[dimethylaluminium(III)], $[Al_2(CH_3)_4(C_{12}H_{12}N)_2]$, $M_r = 454{\cdot}62$, monoclinic, $P2_1$, $a = 10{\cdot}925\ (4)$, $b = 11{\cdot}129\ (4)$, $c = 11{\cdot}212\ (4)$ Å, $\beta = 94{\cdot}18\ (3)°$, $V = 1359{\cdot}6\ (8)$ Å^3, $Z = 2$, $D_x = 1{\cdot}11$ g cm^{-3}, Mo $K\alpha$, $\lambda = 0{\cdot}71073$ Å, $\mu = 1{\cdot}19$ cm^{-1}, $F(000) = 488$, $T = 294$ K, $R = 0{\cdot}0355$ for 1615 observed reflections. The reaction of trimethlyaluminium with (*R*)-(+)-1-(1-naphthyl)ethylamine involves cleavage of Al—C_{Me} and N—H bonds resulting in elimination of methane and formation of an asymmetric Al_2N_2 fragment, as the core of a dimeric molecule consisting of two $(C_{10}H_7)CH(CH_3)NHAl(CH_3)_2$ units. The molecule has approximate C_2 symmetry, with an average Al—N bond distance of 1·96 (1) Å.

Experimental. The title compound results from the slow addition of a trimethylaluminium/toluene solu-

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