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**Key indicators**

Single-crystal X-ray study  
 T = 298 K  
 Mean  $\sigma(\text{C}-\text{C}) = 0.016 \text{ \AA}$   
 Disorder in solvent or counterion  
 R factor = 0.054  
 wR factor = 0.166  
 Data-to-parameter ratio = 14.8

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

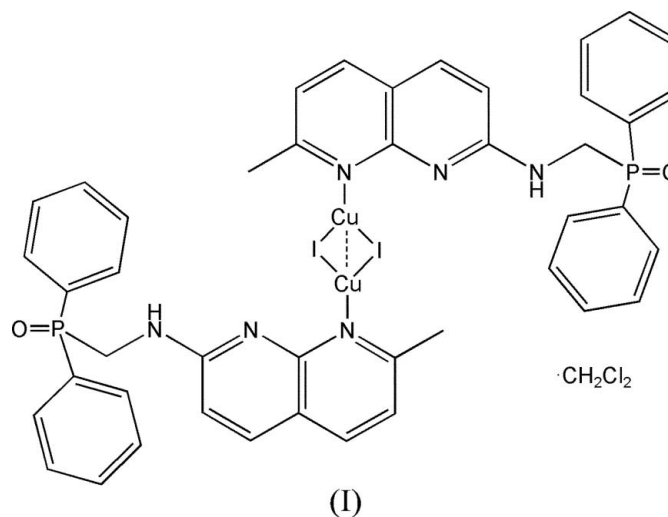
**Di- $\mu$ -iodo-bis({2-[(diphenylphosphoryl)methyl-amino]-7-methyl-1,8-naphthyridine- $\kappa\text{N}^8$ })copper(I)} dichloromethane solvate**

The title complex,  $[\text{Cu}_2\text{I}_2(\text{C}_{22}\text{H}_{20}\text{N}_3\text{OP})_2]\cdot\text{CH}_2\text{Cl}_2$ , has a dimeric structure with a central  $\text{Cu}_2\text{I}_2$  core formed about a twofold rotation axis. Each  $\text{Cu}^{\text{I}}$  centre is coordinated by an N atom at the 8-position of 1,8-naphthyridine to give an approximately planar triangular coordination geometry. Metal-metal interactions are also present, with a  $\text{Cu}\cdots\text{Cu}$  distance of  $2.539(2) \text{ \AA}$ . Complex molecules are connected into chains *via* intermolecular  $\text{N}-\text{H}\cdots\text{O}$  hydrogen bonds.

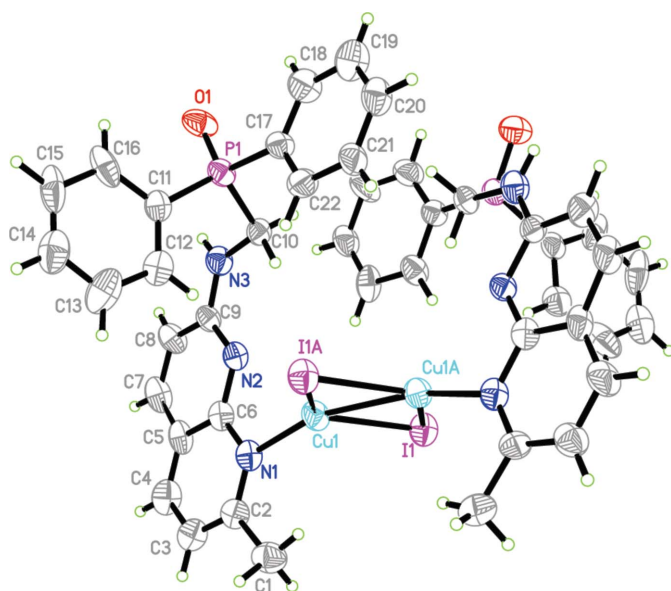
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**Comment**

1,8-Naphthyridine (napy) ligands are versatile rigid ligands that have been used for the construction of mononuclear (Pastene *et al.*, 2000), binuclear (Ziessel *et al.*, 2000; He & Lippard, 2000) and multinuclear complexes (Chan *et al.*, 1998). Some  $\text{Cu}^{\text{I}}$  complexes with napy ligands have already been reported (Maekawa *et al.*, 1998; Scott *et al.*, 1998), although there have been none to date containing halide anions.



The title complex, (I) (Fig. 1), comprises twofold-symmetric dinuclear  $\text{Cu}^{\text{I}}$  complexes, with two 2-*N*-(diphenylphosphoryl)methylamino-7-methyl-1,8-naphthyridine (dnpa) ligands bound to two  $\text{Cu}^{\text{I}}$  atoms, which are bridged by I atoms. Of the three potential coordinating N atoms in the dnpa ligand, only N1 is coordinated to  $\text{Cu}^{\text{I}}$ . Several different coordination modes have previously been described for related  $\text{Cu}^{\text{I}}$ -napy complexes (Chan *et al.*, 1998). The  $\text{Cu}\cdots\text{Cu}$  distance of  $2.539(2) \text{ \AA}$  is relatively short for this type of compound (Yim *et al.*, 2003).



**Figure 1**  
The molecular structure of (I), showing displacement ellipsoids at the 30% probability level. The solvent molecule is not shown. [Symmetry code: (A)  $1 - x, y, -z + \frac{1}{2}$ ]

Complex molecules of (I) are connected *via* intermolecular N—H...O hydrogen bonds into chains running along the *c* direction (Fig. 2 and Table 2).

## Experimental

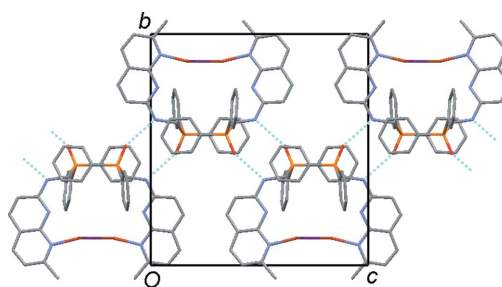
2-*N*-(Diphenylphosphoryl)methylamino-7-methyl-1,8-naphthyridine (dpna) was prepared according to the literature method of Durran *et al.* (2000). An equimolar mixture of dpna (37 mg, 0.1 mmol) and CuI (19 mg, 0.1 mmol) in dichloromethane (30 ml) was stirred for 6 h at room temperature. The resulting solution was filtered and concentrated to 5 ml. Addition of diethyl ether (20 ml) gave the product, (I), as a yellow solid. Recrystallization by slow diffusion of diethyl ether into a solution of the crude product in dichloromethane gave yellow crystals of (I).

### Crystal data

$[\text{Cu}_2\text{I}_2(\text{C}_{22}\text{H}_{20}\text{N}_3\text{OP})_2] \cdot \text{CH}_2\text{Cl}_2$	$Z = 4$
$M_r = 1212.59$	$D_x = 1.656 \text{ Mg m}^{-3}$
Monoclinic, $C2/c$	Mo $K\alpha$ radiation
$a = 19.613 (4) \text{ \AA}$	$\mu = 2.37 \text{ mm}^{-1}$
$b = 16.257 (3) \text{ \AA}$	$T = 298 (2) \text{ K}$
$c = 18.031 (4) \text{ \AA}$	Block, yellow
$\beta = 122.203 (3)^\circ$	$0.29 \times 0.16 \times 0.13 \text{ mm}$
$V = 4864.7 (16) \text{ \AA}^3$	

### Data collection

Bruker SMART APEX CCD area-detector diffractometer	12486 measured reflections
$\omega$ scans	4229 independent reflections
Absorption correction: multi-scan (SADABS; Bruker, 2000)	3001 reflections with $I > 2\sigma(I)$
$T_{\min} = 0.645, T_{\max} = 0.734$	$R_{\text{int}} = 0.054$
	$\theta_{\max} = 25.0^\circ$



**Figure 2**  
A projection of (I) along the *a* axis, showing hydrogen-bonded chains running along *c*. N—H...O hydrogen bonds are shown as dashed lines. H atoms have been omitted.

### Refinement

Refinement on  $F^2$   
 $R[F^2 > 2\sigma(F^2)] = 0.054$   
 $wR(F^2) = 0.166$   
 $S = 1.00$   
 4229 reflections  
 285 parameters  
 H-atom parameters constrained

$$w = 1/[\sigma^2(F_o^2) + (0.0828P)^2 + 10.2228P]$$

$$\text{where } P = (F_o^2 + 2F_c^2)/3$$

$$(\Delta/\sigma)_{\max} = 0.001$$

$$\Delta\rho_{\max} = 0.67 \text{ e \AA}^{-3}$$

$$\Delta\rho_{\min} = -0.72 \text{ e \AA}^{-3}$$

**Table 1**

Selected geometric parameters ( $\text{\AA}, ^\circ$ ).

Cu1—N1	1.991 (7)	Cu1—II <sup>i</sup>	2.5481 (13)
Cu1...Cu1 <sup>i</sup>	2.539 (2)	Cu1—II	2.6187 (14)
N1—Cu1—II <sup>i</sup>	124.5 (2)	II <sup>i</sup> —Cu1—II	121.15 (4)
N1—Cu1—II	112.6 (2)		

Symmetry code: (i)  $-x + 1, y, -z + \frac{1}{2}$ .

**Table 2**

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

$D\text{---}H\cdots A$	$D\text{---}H$	$H\cdots A$	$D\cdots A$	$D\text{---}H\cdots A$
N3—H3...O1 <sup>ii</sup>	0.86	2.07	2.887 (3)	160

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

All H atoms were placed in calculated positions and allowed to ride during subsequent refinement, with C—H distances of 0.93–0.96  $\text{\AA}$  and an N—H distance of 0.86  $\text{\AA}$ , and with  $U_{\text{iso}}(\text{H}) = 1.2U_{\text{eq}}(\text{C}, \text{N})$ . The dichloromethane molecule is disordered around a twofold rotation axis with equal occupancy factors of 0.5 for the two components, and is modelled with one of its Cl atoms lying on the twofold axis. The C—Cl and Cl...Cl distances were restrained to ensure a reasonable geometry. The refined displacement parameters are large, which may indicate partial solvent loss. The highest peak and deepest hole in the difference density map are associated with the disordered  $\text{CH}_2\text{Cl}_2$  molecule.

Data collection: SMART (Bruker, 2000); cell refinement: SAINT (Bruker, 2000); data reduction: SAINT; program(s) used to solve structure: SHELXS97 (Sheldrick, 1997); program(s) used to refine structure: SHELXL97 (Sheldrick, 1997); molecular graphics: SHELXTL (Bruker, 2000); software used to prepare material for publication: SHELXTL.

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