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# (4,4′-Dimethyl-2,2′-bipyridine-$\kappa^2N,N'$)(dimethylformamide-$\kappa O$)diiodidocadmium

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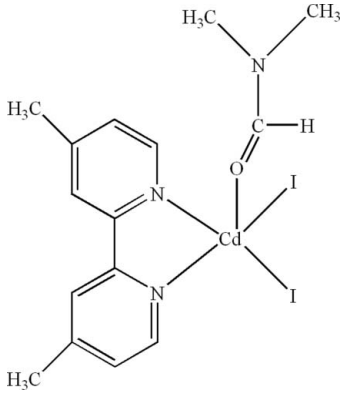
Key indicators: single-crystal X-ray study; $T$ = 298 K; mean $\sigma$(C–C) = 0.008 Å; $R$ factor = 0.040; $wR$ factor = 0.084; data-to-parameter ratio = 19.6.

In the title compound, $[CdI_2(C_{12}H_{12}N_2)(C_3H_7NO)]$, the $Cd^{II}$ cation is five-coordinated in a distorted trigonal–bipyramidal configuration by two N atoms from a 4,4′-dimethyl-2,2′-bipyridine ligand, one O atom from a dimethylformamide ligand and two $I^-$ anions. $\pi$–$\pi$ stacking between pyridine rings of adjacent molecules [centroid–centroid distance = 3.666 (3) and 3.709 (4) Å] stabilizes the three-dimensional structure

## Related literature

For related structures, see: Ahmadi *et al.* (2008); Alizadeh *et al.* (2010); Amani *et al.* (2009); Bellusci *et al.* (2008); Hojjat Kashani *et al.* (2008); Kalateh *et al.* (2008, 2010); Shirvan & Haydari Dezfuli (2012); Sofetis *et al.* (2006); Willett *et al.* (2001); Yousefi *et al.* (2008).




## Experimental

### Crystal data

$[CdI_2(C_{12}H_{12}N_2)(C_3H_7NO)]$ $M_r$ = 623.54
Monoclinic, $P2_1/c$
$a$ = 8.6103 (6) Å
$b$ = 15.1325 (8) Å
$c$ = 15.4263 (10) Å
$\beta$ = 98.347 (5)°
$V$ = 1988.7 (2) Å$^3$
$Z$ = 4
Mo $K\alpha$ radiation
$\mu$ = 4.21 mm$^{-1}$
$T$ = 298 K
0.45 × 0.40 × 0.35 mm

### Data collection

Bruker APEXII CCD area-detector diffractometer
Absorption correction: multi-scan (*SADABS*; Bruker, 2001)
$T_{min}$ = 0.188, $T_{max}$ = 0.223
12059 measured reflections
3907 independent reflections
2859 reflections with $I > 2\sigma(I)$
$R_{int}$ = 0.052

### Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.040
$wR(F^2)$ = 0.084
$S$ = 0.98
3907 reflections
199 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 0.85 e Å$^{-3}$
$\Delta\rho_{min}$ = −1.08 e Å$^{-3}$

**Table 1**
Selected bond lengths (Å).

| | | | |
|---|---|---|---|
| Cd1—N1 | 2.327 (4) | Cd1—I1 | 2.7523 (7) |
| Cd1—N2 | 2.365 (4) | Cd1—I2 | 2.7635 (6) |
| Cd1—O1 | 2.345 (5) | | |

Data collection: *APEX2* (Bruker, 2007); cell refinement: *SAINT* (Bruker, 2007); data reduction: *SAINT*; program(s) used to solve structure: *SHELXTL* (Sheldrick, 2008); program(s) used to refine structure: *SHELXTL*; molecular graphics: *SHELXTL*; software used to prepare material for publication: *SHELXTL*.

We are grateful to the Islamic Azad University, Omidieh Branch, for financial support.

Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: XU5650).

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# supporting information

*Acta Cryst.* (2012). E**68**, m1495 [doi:10.1107/S1600536812046648]

# (4,4′-Dimethyl-2,2′-bipyridine-$\kappa^2N,N'$)(dimethylformamide-$\kappa O$)diiodidocadmium

**Sadif A. Shirvan, Sara Haydari Dezfuli, Fereydoon Khazali and Ali Borsalani**

## S1. Comment

Recently, we reported the synthes and crystal structure of [$CdBr_2$(4,4′-dmbpy)(DMSO)] (Shirvan & Haydari Dezfuli, 2012) [where 4,4′-dmbpy is 4,4′-dimethyl-2,2′-bipyridine and DMSO is dimethyl sulfoxide]. 4,4′-Dimethyl-2,2′-bipyridine is a good bidentate ligand, and numerous complexes with 4,4′-dmbipy have been prepared, such as that of mercury (Kalateh *et al.*, 2008; Yousefi *et al.*, 2008), indium (Ahmadi *et al.*, 2008), iron (Amani *et al.*, 2009), platin (Hojjat Kashani *et al.*, 2008), silver (Bellusci *et al.*, 2008), gallium (Sofetis *et al.*, 2006), copper (Willett *et al.*, 2001), cadmium (Kalateh *et al.*, 2010) and zinc (Alizadeh *et al.*, 2010). Here, we report the synthesis and structure of the title compound.

In the title compound, (Fig. 1), the $Cd^{II}$ atom is five-coordinated in a distorted trigonal-bipyramidal configuration by two N atoms from one 4,4′-dimethyl-2,2′-bipyridine, one O atom from one dimethylformamide and two I atoms. The Cd—N, Cd—I and Cd—O bond lengths and angles are collected in Table 1.

In the crystal structure, $\pi$-$\pi$ contacts (Fig. 2) between the pyridine rings, *Cg*2—*Cg*2$^{i}$ and *Cg*2—*Cg*3$^{ii}$ [symmetry cods: (i) 1-*X*,-Y,-*Z* and (ii) 2-*X*,-Y,-*Z*, where *Cg*2 and *Cg*3 are centroids of the rings (N1/C1—C3/C5—C6) and (N2/C7—C9/C11—C12), respectively] stabilize the structure, with centroid-centroid distance of 3.666 (3) and 3.709 (4) Å.

## S2. Experimental

For the preparation of the title compound, a solution of 4,4′-dimethyl-2,2′-bipyridine (0.15 g, 0.80 mmol) in methanol (10 ml) was added to a solution of $CdI_2$, (0.29 g, 0.80 mmol) in methanol (5 ml) at room temperature. The suitable crystals for X-ray diffraction experiment were obtained by methanol diffusion to a colorless solution in dimethylformamide. Suitable crystals were isolated after one week (yield; 0.37 g, 74.2%).

## S3. Refinement

H atoms were positioned geometrically with C—H = 0.93– 0.96 Å and constrained to ride on their parent atoms, with $U_{iso}$(H) = 1.2$U_{eq}$(C).

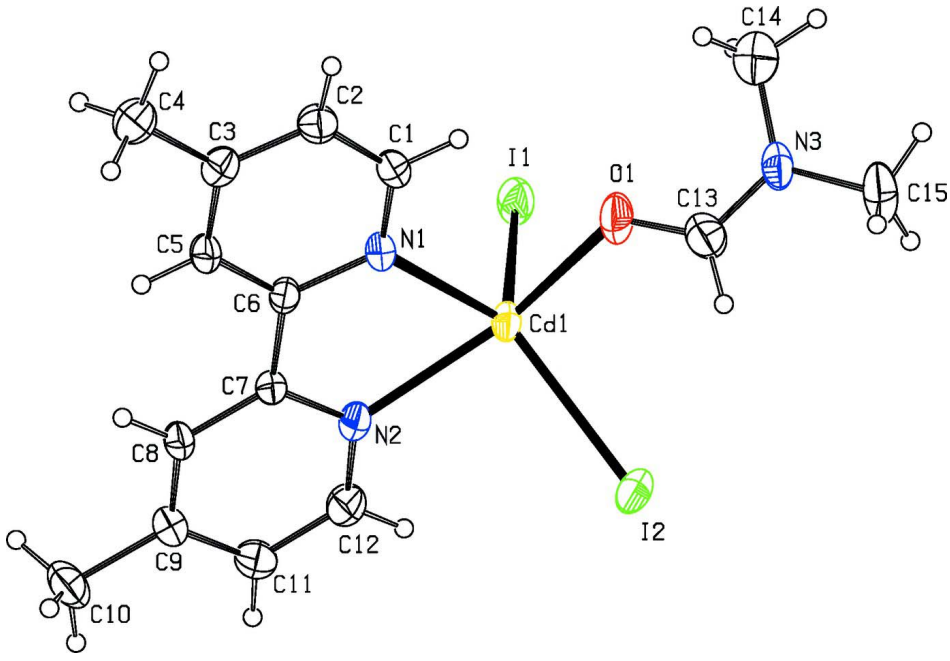


**Figure 1**

The molecular structure of the title molecule, with the atom-numbering scheme. Displacement ellipsoids are drawn at the 30% probability level.

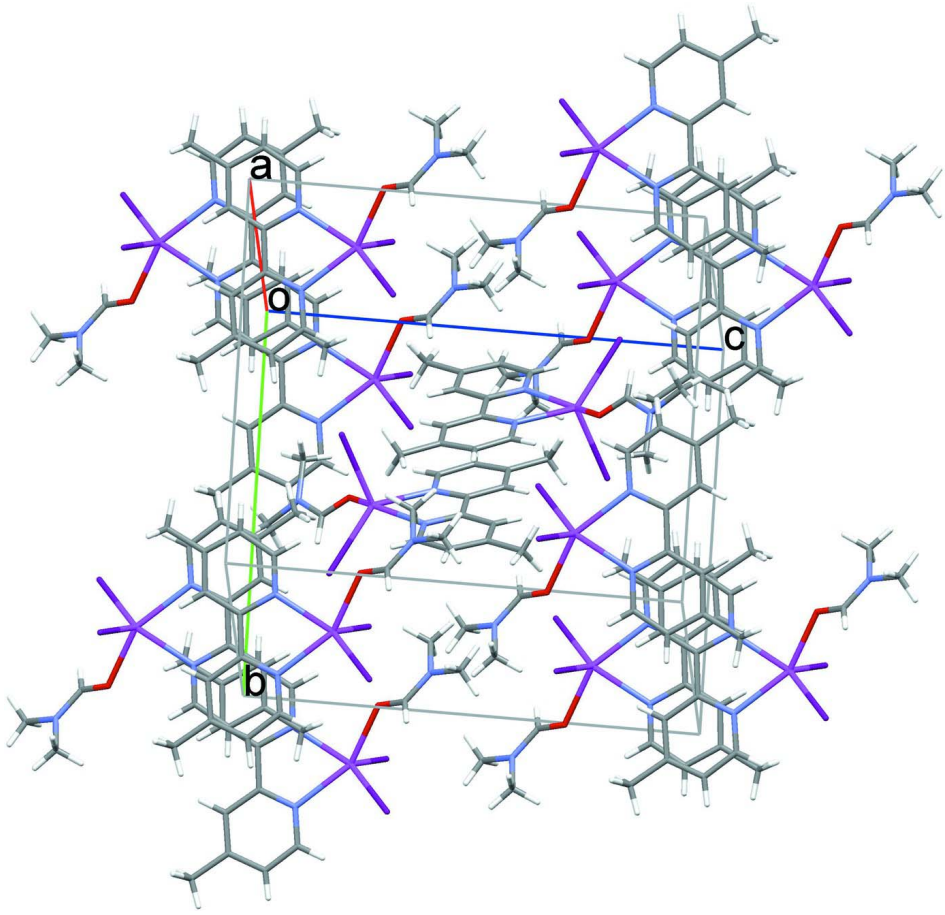


**Figure 2**

Unit-cell packing diagram for title molecule.

**(4,4′-Dimethyl-2,2′-bipyridine-$\kappa^2N,N'$)(dimethylformamide- $\kappa O$)diiodidocadmium**

*Crystal data*

$[CdI_2(C_{12}H_{12}N_2)(C_3H_7NO)]$
$M_r = 623.54$
Monoclinic, $P2_1/c$
Hall symbol: -P 2ybc
$a = 8.6103$ (6) Å
$b = 15.1325$ (8) Å
$c = 15.4263$ (10) Å
$\beta = 98.347$ (5)°
$V = 1988.7$ (2) Å$^3$
$Z = 4$
$F(000) = 1168$
$D_x = 2.083$ Mg m$^{-3}$
Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å
Cell parameters from 12059 reflections
$\theta = 2.4$–26.0°
$\mu = 4.21$ mm$^{-1}$
$T = 298$ K
Prism, colorless
0.45 × 0.40 × 0.35 mm

*Data collection*

Bruker APEXII CCD area-detector diffractometer
Radiation source: fine-focus sealed tube
Graphite monochromator
$\omega$ scans
Absorption correction: multi-scan (*SADABS*; Bruker, 2001)
$T_{min} = 0.188$, $T_{max} = 0.223$
12059 measured reflections
3907 independent reflections
2859 reflections with $I > 2\sigma(I)$

$R_{int}$ = 0.052
$\theta_{max}$ = 26.0°, $\theta_{min}$ = 2.4°
$h$ = −10→9
$k$ = −18→17
$l$ = −19→19

*Refinement*

Refinement on $F^2$
Least-squares matrix: full
$R[F^2 > 2\sigma(F^2)]$ = 0.040
$wR(F^2)$ = 0.084
$S$ = 0.98
3907 reflections
199 parameters
0 restraints
Primary atom site location: structure-invariant direct methods
Secondary atom site location: difference Fourier map
Hydrogen site location: inferred from neighbouring sites
H-atom parameters constrained
$w = 1/[\sigma^2(F_o^2) + (0.0426P)^2]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max}$ = 0.007
$\Delta\rho_{max}$ = 0.85 e Å$^{-3}$
$\Delta\rho_{min}$ = −1.08 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 (Å²)*

| | $x$ | $y$ | $z$ | $U_{iso}$*/$U_{eq}$ |
|---|---|---|---|---|
| C1 | 0.8789 (8) | −0.0736 (4) | 0.0980 (3) | 0.0488 (15) |
| H1 | 0.9275 | −0.0965 | 0.1510 | 0.059* |
| C2 | 0.9026 (7) | −0.1170 (4) | 0.0221 (4) | 0.0477 (15) |
| H2 | 0.9664 | −0.1668 | 0.0242 | 0.057* |
| C3 | 0.8286 (7) | −0.0843 (4) | −0.0571 (3) | 0.0444 (14) |
| C4 | 0.8494 (9) | −0.1285 (5) | −0.1415 (4) | 0.0619 (19) |
| H4A | 0.8981 | −0.0881 | −0.1774 | 0.074* |
| H4B | 0.7488 | −0.1460 | −0.1719 | 0.074* |
| H4C | 0.9147 | −0.1797 | −0.1295 | 0.074* |
| C5 | 0.7387 (7) | −0.0090 (4) | −0.0555 (3) | 0.0404 (14) |
| H5 | 0.6901 | 0.0149 | −0.1080 | 0.049* |
| C6 | 0.7189 (7) | 0.0318 (4) | 0.0225 (3) | 0.0353 (12) |
| C7 | 0.6243 (6) | 0.1118 (4) | 0.0260 (3) | 0.0346 (12) |
| C8 | 0.5479 (7) | 0.1536 (4) | −0.0481 (3) | 0.0412 (14) |
| H8 | 0.5560 | 0.1305 | −0.1031 | 0.049* |
| C9 | 0.4610 (8) | 0.2282 (4) | −0.0416 (4) | 0.0500 (16) |
| C10 | 0.3786 (10) | 0.2740 (5) | −0.1238 (4) | 0.070 (2) |
| H10A | 0.3051 | 0.2340 | −0.1559 | 0.083* |
| H10B | 0.4550 | 0.2917 | −0.1600 | 0.083* |
| H10C | 0.3238 | 0.3252 | −0.1074 | 0.083* |
| C11 | 0.4523 (8) | 0.2614 (5) | 0.0406 (4) | 0.0552 (17) |
| H11 | 0.3936 | 0.3118 | 0.0477 | 0.066* |

| | | | | |
|---|---|---|---|---|
| C12 | 0.5324 (8) | 0.2183 (5) | 0.1124 (4) | 0.0546 (17) |
| H12 | 0.5279 | 0.2417 | 0.1677 | 0.066* |
| C13 | 1.0539 (9) | −0.0020 (5) | 0.3557 (4) | 0.0620 (19) |
| H13 | 1.0829 | 0.0570 | 0.3635 | 0.074* |
| C14 | 1.0840 (14) | −0.1519 (7) | 0.4055 (6) | 0.116 (4) |
| H14A | 1.1070 | −0.1741 | 0.3504 | 0.140* |
| H14B | 0.9743 | −0.1597 | 0.4087 | 0.140* |
| H14C | 1.1450 | −0.1836 | 0.4525 | 0.140* |
| C15 | 1.2436 (9) | −0.0323 (6) | 0.4837 (4) | 0.077 (3) |
| H15A | 1.2016 | 0.0111 | 0.5193 | 0.092* |
| H15B | 1.3308 | −0.0074 | 0.4597 | 0.092* |
| H15C | 1.2782 | −0.0828 | 0.5188 | 0.092* |
| N1 | 0.7921 (6) | −0.0018 (3) | 0.1005 (3) | 0.0413 (12) |
| N2 | 0.6153 (6) | 0.1455 (3) | 0.1065 (3) | 0.0408 (12) |
| N3 | 1.1228 (6) | −0.0590 (4) | 0.4127 (3) | 0.0526 (14) |
| O1 | 0.9541 (6) | −0.0201 (4) | 0.2930 (3) | 0.0708 (15) |
| Cd1 | 0.74180 (5) | 0.06619 (3) | 0.22889 (2) | 0.04265 (13) |
| I1 | 0.51473 (6) | −0.03208 (3) | 0.29304 (2) | 0.05923 (15) |
| I2 | 0.84760 (6) | 0.21673 (3) | 0.32035 (3) | 0.06213 (16) |

*Atomic displacement parameters (Å²)*

| | $U^{11}$ | $U^{22}$ | $U^{33}$ | $U^{12}$ | $U^{13}$ | $U^{23}$ |
|---|---|---|---|---|---|---|
| C1 | 0.066 (4) | 0.042 (4) | 0.035 (3) | 0.010 (3) | −0.003 (3) | 0.003 (2) |
| C2 | 0.051 (4) | 0.045 (4) | 0.047 (3) | 0.010 (3) | 0.006 (3) | −0.002 (3) |
| C3 | 0.046 (3) | 0.047 (4) | 0.041 (3) | −0.004 (3) | 0.008 (2) | −0.006 (2) |
| C4 | 0.082 (5) | 0.059 (5) | 0.047 (3) | 0.011 (4) | 0.016 (3) | −0.012 (3) |
| C5 | 0.049 (4) | 0.046 (4) | 0.025 (2) | 0.001 (3) | 0.004 (2) | 0.001 (2) |
| C6 | 0.038 (3) | 0.039 (3) | 0.028 (2) | −0.006 (3) | 0.001 (2) | −0.001 (2) |
| C7 | 0.040 (3) | 0.034 (3) | 0.029 (2) | −0.002 (3) | 0.001 (2) | 0.001 (2) |
| C8 | 0.052 (4) | 0.043 (4) | 0.026 (2) | 0.004 (3) | 0.000 (2) | 0.002 (2) |
| C9 | 0.062 (4) | 0.047 (4) | 0.038 (3) | 0.002 (3) | −0.003 (3) | 0.007 (2) |
| C10 | 0.090 (6) | 0.066 (5) | 0.050 (3) | 0.028 (4) | 0.000 (3) | 0.015 (3) |
| C11 | 0.063 (4) | 0.044 (4) | 0.057 (4) | 0.015 (3) | 0.000 (3) | −0.001 (3) |
| C12 | 0.069 (5) | 0.052 (4) | 0.043 (3) | 0.008 (4) | 0.007 (3) | −0.009 (3) |
| C13 | 0.063 (5) | 0.062 (5) | 0.057 (4) | −0.001 (4) | −0.004 (3) | 0.011 (3) |
| C14 | 0.162 (11) | 0.083 (7) | 0.085 (6) | −0.012 (7) | −0.044 (7) | 0.003 (5) |
| C15 | 0.067 (5) | 0.115 (7) | 0.042 (3) | −0.008 (5) | −0.012 (3) | 0.009 (4) |
| N1 | 0.048 (3) | 0.044 (3) | 0.029 (2) | 0.001 (2) | −0.0041 (19) | 0.0007 (19) |
| N2 | 0.047 (3) | 0.044 (3) | 0.031 (2) | 0.000 (2) | 0.0004 (19) | −0.0054 (19) |
| N3 | 0.058 (3) | 0.067 (4) | 0.029 (2) | 0.004 (3) | −0.003 (2) | 0.000 (2) |
| O1 | 0.077 (4) | 0.077 (4) | 0.048 (2) | 0.011 (3) | −0.025 (2) | −0.007 (2) |
| Cd1 | 0.0527 (3) | 0.0474 (3) | 0.02556 (18) | −0.0051 (2) | −0.00212 (15) | −0.00121 (16) |
| I1 | 0.0755 (3) | 0.0669 (3) | 0.03425 (19) | −0.0214 (2) | 0.00443 (18) | 0.00662 (17) |
| I2 | 0.0806 (3) | 0.0571 (3) | 0.0446 (2) | −0.0157 (2) | −0.0047 (2) | −0.01291 (18) |

*Geometric parameters (Å, º)*

| | | | |
|---|---|---|---|
| C1—N1 | 1.322 (8) | C10—H10C | 0.9600 |
| C1—C2 | 1.383 (8) | C11—C12 | 1.380 (8) |
| C1—H1 | 0.9300 | C11—H11 | 0.9300 |
| C2—C3 | 1.385 (8) | C12—N2 | 1.323 (8) |
| C2—H2 | 0.9300 | C12—H12 | 0.9300 |
| C3—C5 | 1.379 (9) | C13—O1 | 1.229 (8) |
| C3—C4 | 1.498 (8) | C13—N3 | 1.310 (8) |
| C4—H4A | 0.9600 | C13—H13 | 0.9300 |
| C4—H4B | 0.9600 | C14—N3 | 1.445 (11) |
| C4—H4C | 0.9600 | C14—H14A | 0.9600 |
| C5—C6 | 1.384 (7) | C14—H14B | 0.9600 |
| C5—H5 | 0.9300 | C14—H14C | 0.9600 |
| C6—N1 | 1.373 (6) | C15—N3 | 1.454 (8) |
| C6—C7 | 1.464 (8) | C15—H15A | 0.9600 |
| C7—N2 | 1.355 (6) | C15—H15B | 0.9600 |
| C7—C8 | 1.386 (7) | C15—H15C | 0.9600 |
| C8—C9 | 1.367 (9) | Cd1—N1 | 2.327 (4) |
| C8—H8 | 0.9300 | Cd1—N2 | 2.365 (4) |
| C9—C11 | 1.377 (9) | Cd1—O1 | 2.345 (5) |
| C9—C10 | 1.527 (8) | Cd1—I1 | 2.7523 (7) |
| C10—H10A | 0.9600 | Cd1—I2 | 2.7635 (6) |
| C10—H10B | 0.9600 | | |
| | | | |
| N1—C1—C2 | 124.6 (5) | N2—C12—C11 | 123.4 (5) |
| N1—C1—H1 | 117.7 | N2—C12—H12 | 118.3 |
| C2—C1—H1 | 117.7 | C11—C12—H12 | 118.3 |
| C1—C2—C3 | 118.1 (6) | O1—C13—N3 | 125.3 (7) |
| C1—C2—H2 | 120.9 | O1—C13—H13 | 117.3 |
| C3—C2—H2 | 120.9 | N3—C13—H13 | 117.3 |
| C5—C3—C2 | 117.8 (5) | N3—C14—H14A | 109.5 |
| C5—C3—C4 | 121.6 (5) | N3—C14—H14B | 109.5 |
| C2—C3—C4 | 120.6 (6) | H14A—C14—H14B | 109.5 |
| C3—C4—H4A | 109.5 | N3—C14—H14C | 109.5 |
| C3—C4—H4B | 109.5 | H14A—C14—H14C | 109.5 |
| H4A—C4—H4B | 109.5 | H14B—C14—H14C | 109.5 |
| C3—C4—H4C | 109.5 | N3—C15—H15A | 109.5 |
| H4A—C4—H4C | 109.5 | N3—C15—H15B | 109.5 |
| H4B—C4—H4C | 109.5 | H15A—C15—H15B | 109.5 |
| C3—C5—C6 | 121.7 (5) | N3—C15—H15C | 109.5 |
| C3—C5—H5 | 119.2 | H15A—C15—H15C | 109.5 |
| C6—C5—H5 | 119.2 | H15B—C15—H15C | 109.5 |
| N1—C6—C5 | 119.9 (5) | C1—N1—C6 | 117.9 (5) |
| N1—C6—C7 | 117.4 (4) | C1—N1—Cd1 | 124.4 (3) |
| C5—C6—C7 | 122.7 (5) | C6—N1—Cd1 | 117.6 (4) |
| N2—C7—C8 | 120.0 (5) | C12—N2—C7 | 118.7 (5) |
| N2—C7—C6 | 116.8 (4) | C12—N2—Cd1 | 123.9 (4) |

| | | | |
|---|---|---|---|
| C8—C7—C6 | 123.1 (5) | C7—N2—Cd1 | 117.4 (4) |
| C9—C8—C7 | 121.1 (5) | C13—N3—C14 | 120.8 (6) |
| C9—C8—H8 | 119.5 | C13—N3—C15 | 121.7 (7) |
| C7—C8—H8 | 119.5 | C14—N3—C15 | 117.4 (6) |
| C8—C9—C11 | 118.2 (5) | C13—O1—Cd1 | 128.4 (5) |
| C8—C9—C10 | 120.5 (5) | N1—Cd1—O1 | 83.23 (16) |
| C11—C9—C10 | 121.3 (6) | N1—Cd1—N2 | 70.51 (16) |
| C9—C10—H10A | 109.5 | O1—Cd1—N2 | 149.27 (18) |
| C9—C10—H10B | 109.5 | N1—Cd1—I1 | 107.25 (13) |
| H10A—C10—H10B | 109.5 | O1—Cd1—I1 | 95.65 (14) |
| C9—C10—H10C | 109.5 | N2—Cd1—I1 | 106.98 (12) |
| H10A—C10—H10C | 109.5 | N1—Cd1—I2 | 135.29 (13) |
| H10B—C10—H10C | 109.5 | O1—Cd1—I2 | 93.72 (12) |
| C9—C11—C12 | 118.7 (6) | N2—Cd1—I2 | 93.95 (12) |
| C9—C11—H11 | 120.7 | I1—Cd1—I2 | 117.42 (2) |
| C12—C11—H11 | 120.7 | | |

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| N1—C1—C2—C3 | −1.1 (11) | C6—C7—N2—C12 | 179.2 (6) |
| C1—C2—C3—C5 | 1.5 (9) | C8—C7—N2—Cd1 | 177.8 (4) |
| C1—C2—C3—C4 | −179.9 (6) | C6—C7—N2—Cd1 | −3.2 (6) |
| C2—C3—C5—C6 | −1.6 (9) | O1—C13—N3—C14 | −0.2 (13) |
| C4—C3—C5—C6 | 179.8 (6) | O1—C13—N3—C15 | 178.0 (7) |
| C3—C5—C6—N1 | 1.1 (9) | N3—C13—O1—Cd1 | 147.5 (6) |
| C3—C5—C6—C7 | 179.9 (6) | C1—N1—Cd1—O1 | 16.0 (5) |
| N1—C6—C7—N2 | −0.8 (8) | C6—N1—Cd1—O1 | −168.1 (4) |
| C5—C6—C7—N2 | −179.6 (5) | C1—N1—Cd1—N2 | 179.8 (6) |
| N1—C6—C7—C8 | 178.2 (5) | C6—N1—Cd1—N2 | −4.4 (4) |
| C5—C6—C7—C8 | −0.6 (9) | C1—N1—Cd1—I1 | −77.8 (5) |
| N2—C7—C8—C9 | −0.9 (9) | C6—N1—Cd1—I1 | 98.0 (4) |
| C6—C7—C8—C9 | −179.9 (6) | C1—N1—Cd1—I2 | 104.5 (5) |
| C7—C8—C9—C11 | 0.6 (10) | C6—N1—Cd1—I2 | −79.7 (4) |
| C7—C8—C9—C10 | 179.5 (6) | C13—O1—Cd1—N1 | 146.2 (7) |
| C8—C9—C11—C12 | 0.5 (11) | C13—O1—Cd1—N2 | 115.2 (6) |
| C10—C9—C11—C12 | −178.4 (7) | C13—O1—Cd1—I1 | −107.0 (6) |
| C9—C11—C12—N2 | −1.3 (11) | C13—O1—Cd1—I2 | 11.0 (6) |
| C2—C1—N1—C6 | 0.6 (10) | C12—N2—Cd1—N1 | −178.6 (6) |
| C2—C1—N1—Cd1 | 176.4 (5) | C7—N2—Cd1—N1 | 4.0 (4) |
| C5—C6—N1—C1 | −0.6 (8) | C12—N2—Cd1—O1 | −145.7 (5) |
| C7—C6—N1—C1 | −179.4 (6) | C7—N2—Cd1—O1 | 36.9 (6) |
| C5—C6—N1—Cd1 | −176.7 (4) | C12—N2—Cd1—I1 | 78.7 (5) |
| C7—C6—N1—Cd1 | 4.5 (6) | C7—N2—Cd1—I1 | −98.8 (4) |
| C11—C12—N2—C7 | 0.9 (10) | C12—N2—Cd1—I2 | −41.6 (5) |
| C11—C12—N2—Cd1 | −176.5 (5) | C7—N2—Cd1—I2 | 140.9 (4) |
| C8—C7—N2—C12 | 0.2 (9) | | |