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# Bis[4-(2-hydroxybenzylideneamino)-benzoato-$\kappa O^1$]tetrakis(methanol-$\kappa O$)-cadmium

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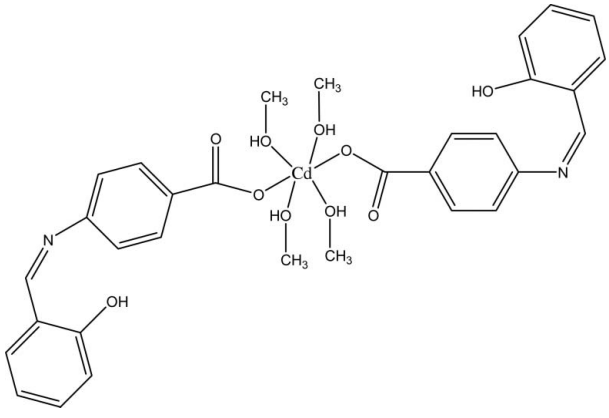
Key indicators: single-crystal X-ray study; $T$ = 293 K; mean $\sigma$(C–C) = 0.012 Å; $R$ factor = 0.072; $wR$ factor = 0.166; data-to-parameter ratio = 13.7.

In the title mononuclear complex, $[Cd(C_{14}H_{10}NO_3)_2(CH_3OH)_4]$, the $Cd^{2+}$ cation is situated on an inversion centre. It exhibits a distorted octahedral coordination, defined by two carboxylate O atoms from two monodentate anions and by four O atoms from four methanol molecules. The crystal structure comprises intramolecular O—H···O and O—H···N, and intermolecular O—H···O hydrogen bonds. The latter help to construct a layered structure extending parallel to (100).

## Related literature

For background to Schiff base ligands, see: Garnovskii *et al.* (1993); Banerjee *et al.* (2004); Zhong *et al.* (2009). For background to cadmium complexes, see: Meng *et al.* (2004); Wang *et al.* (2010).




## Experimental

### Crystal data

$[Cd(C_{14}H_{10}NO_3)_2(CH_4O)_4]$
$M_r$ = 721.04
Monoclinic, $P2_1/c$
$a$ = 15.564 (3) Å
$b$ = 11.937 (2) Å
$c$ = 8.8946 (18) Å
$\beta$ = 99.69 (3)°
$V$ = 1629.0 (6) Å$^3$
$Z$ = 2
Mo $K\alpha$ radiation
$\mu$ = 0.73 mm$^{-1}$
$T$ = 293 K
0.21 × 0.19 × 0.16 mm

### Data collection

Rigaku Saturn diffractometer
Absorption correction: multi-scan (*CrystalClear*; Rigaku/MSC, 2006)
$T_{min}$ = 0.862, $T_{max}$ = 0.892
7793 measured reflections
2760 independent reflections
2137 reflections with $I > 2\sigma(I)$
$R_{int}$ = 0.055

### Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.072
$wR(F^2)$ = 0.166
$S$ = 1.13
2760 reflections
202 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 0.97 e Å$^{-3}$
$\Delta\rho_{min}$ = −0.63 e Å$^{-3}$

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

| | | | |
|---|---|---|---|
| Cd1—O1 | 2.230 (5) | Cd1—O3 | 2.315 (5) |
| Cd1—O4 | 2.295 (5) | | |

**Table 2**
Hydrogen-bond geometry (Å, °).

| $D$—H···$A$ | $D$—H | H···$A$ | $D$···$A$ | $D$—H···$A$ |
|---|---|---|---|---|
| O4—H4···O2 | 0.87 | 1.87 | 2.653 (7) | 150 |
| O5—H5···N1 | 0.82 | 1.90 | 2.632 (9) | 148 |
| O3—H3···O2$^{i}$ | 0.85 | 1.83 | 2.640 (7) | 160 |

Symmetry code: (i) $-x+2, y+\frac{1}{2}, -z+\frac{5}{2}$.

Data collection: *CrystalClear* (Rigaku/MSC, 2006); cell refinement: *CrystalClear*; data reduction: *CrystalClear*; program(s) used to solve structure: *SHELXS97* (Sheldrick, 2008); program(s) used to refine structure: *SHELXL97* (Sheldrick, 2008); molecular graphics: *XP* in *SHELXTL* (Sheldrick, 2008); software used to prepare material for publication: *SHELXTL*.

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Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: WM2478).

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# supporting information

*Acta Cryst.* (2011). E**67**, m685–m686 [doi:10.1107/S1600536811015364]

# Bis[4-(2-hydroxybenzylideneamino)benzoato-$\kappa O^1$]tetrakis(methanol-$\kappa O$)cadmium

**Ying Wang, Xia Wang, Yu-Xian Li, Huai-Xia Yang and Yan-Ju Liu**

## S1. Comment

Schiff base ligands played an important role in the development of coordination chemistry due to their metal binding ability (Garnovskii *et al.*, 1993). Schiff bases and their metal complexes have numerous applications in biological systems and material sciences (Banerjee *et al.*, 2004; Zhong *et al.*, 2009). The $Cd^{2+}$ ion is a good model atom to construct complexes owing to its property to form bonds with different types of donors simultaneously, and to its various coordination modes (Meng *et al.*, 2004; Wang *et al.*, 2010). In this work, we describe the synthesis and structure of the title complex, $[Cd(C_{14}H_{10}NO_3)_2(CH_3OH)_4]$, (I).

In complex (I), the $Cd^{2+}$ ion is situated on an inversion centre and is six-coordinated by two carboxylate O atoms from two monodentate ligands and by four O atoms from four methanol molecules (Fig. 1). The dihedral angle between the phenyl ring and the benzylidenimino moiety is 23.4 (4) °.

The crystal structure of (I) comprises intramolecular O—H···O and O—H···N hydrogen bonds that help to stabilize the molecular conformation. Intermolecular O—H···O hydrogen bonds between methanol molecules and the free carboxylate O atoms of neighbouring molecules construct a layered structure extending parallel to (100), as shown in Fig. 2.

## S2. Experimental

*N*-(4-carboxyphenyl)salicylideneimine (0.04 mmol, 0.0097 g) in methanol (6 ml) was added dropwise to a methanol solution (5 ml) of $CdCl_2$ (0.02 mmol, 0.0037 g) in methanol. The resulting solution was allowed to stand at room temperature. After two weeks good quality crystals with pale yellow colour were obtained and were dried in air.

## S3. Refinement

H atoms bound to C atoms were generated geometrically and refined as riding atoms with C—H = 0.93Å and $U_{iso}(H) = 1.2\times U_{eq}(C)$. H atoms bound to O atoms were found from difference maps and refined with distance restraints between 0.82—0.87 Å and $U_{iso}(H) = 1.5\times U_{eq}(O)$.

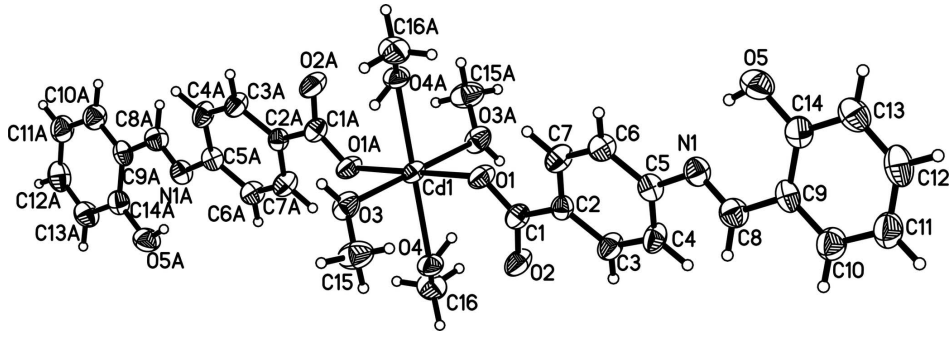


**Figure 1**

View of the molecular structure of (I), showing the labelling of the non-H atoms and atomic displacement parameters at the 30% probability level. [Symmetry code: A) -*x*+2, -*y*+1, -*z*+3.]

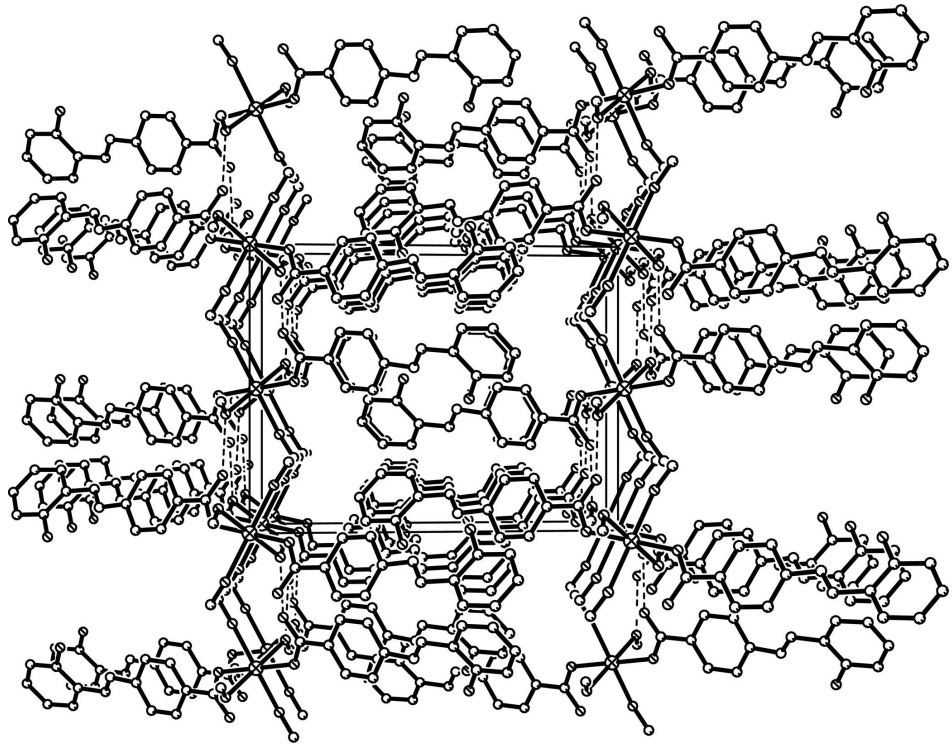

**Figure 2**

View of the packing of the structure of (I), showing intermolecular hydrogen bonding (dotted lines). H atoms have been omited for clarity.

**Bis[4-(2-hydroxybenzylideneamino)benzoato-$\kappa O^1$]tetrakis(methanol- $\kappa O$)cadmium**

*Crystal data*

$[Cd(C_{14}H_{10}NO_3)_2(CH_4O)_4]$
$M_r$ = 721.04
Monoclinic, $P2_1/c$
Hall symbol: -P 2ybc
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$b$ = 11.937 (2) Å
$c$ = 8.8946 (18) Å
$\beta$ = 99.69 (3)°
$V$ = 1629.0 (6) Å$^3$
$Z$ = 2
$F(000)$ = 740
$D_x$ = 1.470 Mg m$^{-3}$
Mo $K\alpha$ radiation, $\lambda$ = 0.71073 Å
Cell parameters from 3109 reflections

$\theta$ = 2.2–28.0°
$\mu$ = 0.73 mm$^{-1}$
$T$ = 293 K

Prism, pale yellow
0.21 × 0.19 × 0.16 mm

*Data collection*

Rigaku Saturn diffractometer
Radiation source: fine-focus sealed tube
Graphite monochromator
Detector resolution: 28.5714 pixels mm$^{-1}$
$\omega$ scans
Absorption correction: multi-scan (*CrystalClear*; Rigaku/MSC, 2006)
$T_{min}$ = 0.862, $T_{max}$ = 0.892

7793 measured reflections
2760 independent reflections
2137 reflections with $I > 2\sigma(I)$
$R_{int}$ = 0.055
$\theta_{max}$ = 25.0°, $\theta_{min}$ = 2.2°
$h$ = −18→18
$k$ = −14→10
$l$ = −10→9

*Refinement*

Refinement on $F^2$
Least-squares matrix: full
$R[F^2 > 2\sigma(F^2)]$ = 0.072
$wR(F^2)$ = 0.166
$S$ = 1.13
2760 reflections
202 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
$w = 1/[\sigma^2(F_o^2) + (0.0483P)^2 + 5.4285P]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max} < 0.001$
$\Delta\rho_{max}$ = 0.97 e Å$^{-3}$
$\Delta\rho_{min}$ = −0.63 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$^2$)*

| | $x$ | $y$ | $z$ | $U_{iso}$*/$U_{eq}$ |
|---|---|---|---|---|
| Cd1 | 1.0000 | 0.5000 | 1.5000 | 0.0478 (3) |
| N1 | 0.5587 (4) | 0.4273 (6) | 0.7851 (7) | 0.0592 (17) |
| O1 | 0.8888 (4) | 0.4749 (4) | 1.3094 (6) | 0.0591 (15) |
| O2 | 0.9173 (4) | 0.3047 (4) | 1.2333 (7) | 0.0740 (18) |
| O3 | 1.0768 (4) | 0.5897 (4) | 1.3338 (6) | 0.0684 (16) |
| H3 | 1.0698 | 0.6603 | 1.3269 | 0.103* |
| O4 | 1.0614 (3) | 0.3361 (4) | 1.4350 (6) | 0.0605 (14) |
| H4 | 1.0252 | 0.3053 | 1.3620 | 0.091* |
| O5 | 0.4108 (4) | 0.5348 (5) | 0.7011 (8) | 0.0810 (19) |
| H5 | 0.4577 | 0.5198 | 0.7542 | 0.122* |
| C1 | 0.8710 (5) | 0.3913 (6) | 1.2257 (8) | 0.0513 (18) |
| C2 | 0.7912 (5) | 0.3969 (6) | 1.1089 (7) | 0.0467 (17) |
| C3 | 0.7585 (5) | 0.3037 (6) | 1.0221 (9) | 0.062 (2) |

| | | | | |
|---|---|---|---|---|
| H3A | 0.7881 | 0.2358 | 1.0373 | 0.075* |
| C4 | 0.6827 (5) | 0.3101 (6) | 0.9135 (9) | 0.066 (2) |
| H4A | 0.6622 | 0.2472 | 0.8570 | 0.079* |
| C5 | 0.6378 (5) | 0.4124 (6) | 0.8902 (8) | 0.0519 (19) |
| C6 | 0.6693 (5) | 0.5042 (7) | 0.9765 (9) | 0.061 (2) |
| H6 | 0.6398 | 0.5722 | 0.9619 | 0.073* |
| C7 | 0.7443 (6) | 0.4964 (6) | 1.0843 (8) | 0.062 (2) |
| H7 | 0.7638 | 0.5592 | 1.1419 | 0.074* |
| C8 | 0.5382 (5) | 0.3639 (7) | 0.6702 (9) | 0.063 (2) |
| H8 | 0.5776 | 0.3100 | 0.6491 | 0.076* |
| C9 | 0.4532 (5) | 0.3738 (7) | 0.5696 (9) | 0.059 (2) |
| C10 | 0.4316 (6) | 0.2979 (8) | 0.4527 (10) | 0.076 (3) |
| H10 | 0.4725 | 0.2449 | 0.4347 | 0.092* |
| C11 | 0.3504 (7) | 0.2990 (8) | 0.3616 (11) | 0.084 (3) |
| H11 | 0.3353 | 0.2445 | 0.2870 | 0.101* |
| C12 | 0.2932 (6) | 0.3808 (9) | 0.3826 (11) | 0.082 (3) |
| H12 | 0.2400 | 0.3841 | 0.3170 | 0.099* |
| C13 | 0.3112 (6) | 0.4603 (8) | 0.4994 (11) | 0.076 (3) |
| H13 | 0.2700 | 0.5136 | 0.5149 | 0.091* |
| C14 | 0.3917 (6) | 0.4568 (7) | 0.5904 (9) | 0.062 (2) |
| C15 | 1.0839 (5) | 0.5457 (5) | 1.1902 (7) | 0.091 (3) |
| H15A | 1.1181 | 0.5955 | 1.1392 | 0.137* |
| H15B | 1.0269 | 0.5378 | 1.1305 | 0.137* |
| H15C | 1.1118 | 0.4738 | 1.2027 | 0.137* |
| C16 | 1.1049 (5) | 0.2536 (5) | 1.5305 (7) | 0.079 (3) |
| H16A | 1.1236 | 0.1942 | 1.4708 | 0.118* |
| H16B | 1.0663 | 0.2241 | 1.5943 | 0.118* |
| H16C | 1.1547 | 0.2867 | 1.5931 | 0.118* |

*Atomic displacement parameters (Å²)*

| | $U^{11}$ | $U^{22}$ | $U^{33}$ | $U^{12}$ | $U^{13}$ | $U^{23}$ |
|---|---|---|---|---|---|---|
| Cd1 | 0.0584 (5) | 0.0351 (4) | 0.0469 (4) | 0.0027 (4) | 0.0006 (3) | −0.0028 (3) |
| N1 | 0.055 (4) | 0.069 (4) | 0.053 (4) | 0.000 (3) | 0.004 (3) | 0.003 (3) |
| O1 | 0.064 (4) | 0.047 (3) | 0.061 (3) | 0.006 (2) | −0.005 (3) | −0.015 (2) |
| O2 | 0.073 (4) | 0.047 (3) | 0.090 (4) | 0.010 (3) | −0.022 (3) | −0.015 (3) |
| O3 | 0.098 (5) | 0.048 (3) | 0.063 (3) | −0.011 (3) | 0.023 (3) | 0.006 (2) |
| O4 | 0.063 (4) | 0.043 (3) | 0.069 (3) | 0.011 (2) | −0.006 (3) | −0.008 (2) |
| O5 | 0.064 (4) | 0.086 (4) | 0.094 (5) | 0.018 (3) | 0.015 (4) | −0.003 (3) |
| C1 | 0.060 (5) | 0.047 (4) | 0.046 (4) | −0.004 (4) | 0.005 (4) | 0.000 (3) |
| C2 | 0.045 (4) | 0.054 (4) | 0.041 (4) | −0.008 (3) | 0.006 (3) | −0.001 (3) |
| C3 | 0.066 (6) | 0.046 (4) | 0.069 (5) | 0.001 (4) | −0.004 (4) | −0.003 (4) |
| C4 | 0.066 (6) | 0.053 (4) | 0.068 (5) | −0.007 (4) | −0.018 (4) | −0.006 (4) |
| C5 | 0.051 (5) | 0.060 (5) | 0.045 (4) | −0.001 (4) | 0.006 (4) | 0.008 (3) |
| C6 | 0.064 (5) | 0.059 (4) | 0.056 (5) | 0.006 (4) | −0.001 (4) | 0.000 (4) |
| C7 | 0.085 (6) | 0.050 (4) | 0.045 (4) | 0.000 (4) | −0.007 (4) | 0.001 (3) |
| C8 | 0.057 (5) | 0.067 (5) | 0.065 (5) | 0.004 (4) | 0.008 (4) | 0.003 (4) |
| C9 | 0.043 (5) | 0.070 (5) | 0.060 (5) | −0.007 (4) | 0.001 (4) | 0.013 (4) |

| | | | | | | |
|---|---|---|---|---|---|---|
| C10 | 0.078 (7) | 0.072 (6) | 0.074 (6) | −0.002 (5) | −0.002 (5) | −0.003 (5) |
| C11 | 0.078 (7) | 0.082 (7) | 0.085 (7) | −0.013 (6) | −0.007 (6) | −0.007 (5) |
| C12 | 0.061 (6) | 0.097 (7) | 0.082 (7) | −0.010 (5) | −0.010 (5) | 0.022 (6) |
| C13 | 0.056 (6) | 0.085 (6) | 0.085 (7) | 0.011 (5) | 0.005 (5) | 0.013 (5) |
| C14 | 0.057 (6) | 0.076 (5) | 0.055 (5) | −0.009 (4) | 0.012 (4) | 0.000 (4) |
| C15 | 0.137 (10) | 0.059 (5) | 0.084 (7) | 0.012 (6) | 0.036 (7) | 0.005 (5) |
| C16 | 0.085 (7) | 0.055 (5) | 0.096 (7) | 0.023 (5) | 0.016 (6) | 0.020 (5) |

*Geometric parameters (Å, º)*

| | | | |
|---|---|---|---|
| Cd1—O1 | 2.230 (5) | C5—C6 | 1.380 (10) |
| Cd1—O1$^{i}$ | 2.230 (5) | C6—C7 | 1.384 (11) |
| Cd1—O4$^{i}$ | 2.295 (5) | C6—H6 | 0.9300 |
| Cd1—O4 | 2.295 (5) | C7—H7 | 0.9300 |
| Cd1—O3$^{i}$ | 2.315 (5) | C8—C9 | 1.472 (10) |
| Cd1—O3 | 2.315 (5) | C8—H8 | 0.9300 |
| N1—C8 | 1.270 (9) | C9—C10 | 1.377 (11) |
| N1—C5 | 1.425 (9) | C9—C14 | 1.412 (11) |
| O1—C1 | 1.248 (8) | C10—C11 | 1.382 (12) |
| O2—C1 | 1.255 (8) | C10—H10 | 0.9300 |
| O3—C15 | 1.403 (8) | C11—C12 | 1.356 (13) |
| O3—H3 | 0.8507 | C11—H11 | 0.9300 |
| O4—C16 | 1.398 (7) | C12—C13 | 1.401 (13) |
| O4—H4 | 0.8668 | C12—H12 | 0.9300 |
| O5—C14 | 1.352 (10) | C13—C14 | 1.373 (12) |
| O5—H5 | 0.8200 | C13—H13 | 0.9300 |
| C1—C2 | 1.481 (9) | C15—H15A | 0.9600 |
| C2—C7 | 1.391 (10) | C15—H15B | 0.9600 |
| C2—C3 | 1.400 (9) | C15—H15C | 0.9600 |
| C3—C4 | 1.395 (10) | C16—H16A | 0.9600 |
| C3—H3A | 0.9300 | C16—H16B | 0.9599 |
| C4—C5 | 1.405 (10) | C16—H16C | 0.9601 |
| C4—H4A | 0.9300 | | |
| | | | |
| O1—Cd1—O1$^{i}$ | 180.000 (1) | C5—C6—C7 | 120.7 (7) |
| O1—Cd1—O4$^{i}$ | 90.19 (17) | C5—C6—H6 | 119.6 |
| O1$^{i}$—Cd1—O4$^{i}$ | 89.81 (17) | C7—C6—H6 | 119.6 |
| O1—Cd1—O4 | 89.81 (17) | C6—C7—C2 | 121.7 (7) |
| O1$^{i}$—Cd1—O4 | 90.19 (17) | C6—C7—H7 | 119.1 |
| O4$^{i}$—Cd1—O4 | 180.000 (1) | C2—C7—H7 | 119.1 |
| O1—Cd1—O3$^{i}$ | 90.3 (2) | N1—C8—C9 | 121.4 (8) |
| O1$^{i}$—Cd1—O3$^{i}$ | 89.7 (2) | N1—C8—H8 | 119.3 |
| O4$^{i}$—Cd1—O3$^{i}$ | 87.23 (19) | C9—C8—H8 | 119.3 |
| O4—Cd1—O3$^{i}$ | 92.77 (19) | C10—C9—C14 | 118.4 (8) |
| O1—Cd1—O3 | 89.7 (2) | C10—C9—C8 | 119.1 (8) |
| O1$^{i}$—Cd1—O3 | 90.3 (2) | C14—C9—C8 | 122.5 (8) |
| O4$^{i}$—Cd1—O3 | 92.77 (19) | C9—C10—C11 | 121.3 (9) |
| O4—Cd1—O3 | 87.23 (19) | C9—C10—H10 | 119.4 |

| | | | |
|---|---|---|---|
| O3$^{i}$—Cd1—O3 | 180.000 (1) | C11—C10—H10 | 119.4 |
| C8—N1—C5 | 121.8 (7) | C12—C11—C10 | 118.9 (9) |
| C1—O1—Cd1 | 128.8 (5) | C12—C11—H11 | 120.5 |
| C15—O3—Cd1 | 122.5 (4) | C10—C11—H11 | 120.5 |
| C15—O3—H3 | 109.5 | C11—C12—C13 | 122.4 (9) |
| Cd1—O3—H3 | 115.5 | C11—C12—H12 | 118.8 |
| C16—O4—Cd1 | 128.8 (4) | C13—C12—H12 | 118.8 |
| C16—O4—H4 | 110.1 | C14—C13—C12 | 117.7 (9) |
| Cd1—O4—H4 | 107.7 | C14—C13—H13 | 121.1 |
| C14—O5—H5 | 109.5 | C12—C13—H13 | 121.1 |
| O1—C1—O2 | 124.0 (7) | O5—C14—C13 | 118.4 (9) |
| O1—C1—C2 | 117.3 (7) | O5—C14—C9 | 120.5 (7) |
| O2—C1—C2 | 118.7 (6) | C13—C14—C9 | 121.0 (8) |
| C7—C2—C3 | 117.3 (7) | O3—C15—H15A | 109.5 |
| C7—C2—C1 | 120.3 (6) | O3—C15—H15B | 109.5 |
| C3—C2—C1 | 122.3 (7) | H15A—C15—H15B | 109.5 |
| C4—C3—C2 | 121.6 (7) | O3—C15—H15C | 109.5 |
| C4—C3—H3A | 119.2 | H15A—C15—H15C | 109.5 |
| C2—C3—H3A | 119.2 | H15B—C15—H15C | 109.5 |
| C3—C4—C5 | 119.4 (7) | O4—C16—H16A | 110.1 |
| C3—C4—H4A | 120.3 | O4—C16—H16B | 109.4 |
| C5—C4—H4A | 120.3 | H16A—C16—H16B | 109.5 |
| C6—C5—C4 | 119.1 (7) | O4—C16—H16C | 108.9 |
| C6—C5—N1 | 116.9 (7) | H16A—C16—H16C | 109.5 |
| C4—C5—N1 | 124.0 (7) | H16B—C16—H16C | 109.5 |

| | | | |
|---|---|---|---|
| O4$^{i}$—Cd1—O1—C1 | −171.4 (7) | C3—C4—C5—N1 | −178.4 (7) |
| O4—Cd1—O1—C1 | 8.6 (7) | C8—N1—C5—C6 | 157.7 (8) |
| O3$^{i}$—Cd1—O1—C1 | −84.2 (7) | C8—N1—C5—C4 | −24.4 (12) |
| O3—Cd1—O1—C1 | 95.8 (7) | C4—C5—C6—C7 | 0.2 (12) |
| O1—Cd1—O3—C15 | −47.5 (5) | N1—C5—C6—C7 | 178.2 (7) |
| O1$^{i}$—Cd1—O3—C15 | 132.5 (5) | C5—C6—C7—C2 | 0.8 (13) |
| O4$^{i}$—Cd1—O3—C15 | −137.7 (5) | C3—C2—C7—C6 | −1.3 (12) |
| O4—Cd1—O3—C15 | 42.3 (5) | C1—C2—C7—C6 | −179.8 (7) |
| O1—Cd1—O4—C16 | −140.8 (6) | C5—N1—C8—C9 | 174.8 (7) |
| O1$^{i}$—Cd1—O4—C16 | 39.2 (6) | N1—C8—C9—C10 | −175.5 (8) |
| O3$^{i}$—Cd1—O4—C16 | −50.5 (6) | N1—C8—C9—C14 | 3.0 (13) |
| O3—Cd1—O4—C16 | 129.5 (6) | C14—C9—C10—C11 | −2.9 (13) |
| Cd1—O1—C1—O2 | −2.5 (12) | C8—C9—C10—C11 | 175.6 (8) |
| Cd1—O1—C1—C2 | 178.8 (5) | C9—C10—C11—C12 | 4.0 (15) |
| O1—C1—C2—C7 | 6.8 (11) | C10—C11—C12—C13 | −4.0 (16) |
| O2—C1—C2—C7 | −171.9 (8) | C11—C12—C13—C14 | 3.0 (15) |
| O1—C1—C2—C3 | −171.6 (7) | C12—C13—C14—O5 | 178.3 (8) |
| O2—C1—C2—C3 | 9.7 (11) | C12—C13—C14—C9 | −1.9 (14) |
| C7—C2—C3—C4 | 1.0 (12) | C10—C9—C14—O5 | −178.3 (8) |
| C1—C2—C3—C4 | 179.4 (7) | C8—C9—C14—O5 | 3.2 (13) |

| | | | |
|---|---|---|---|
| C2—C3—C4—C5 | −0.1 (13) | C10—C9—C14—C13 | 1.9 (13) |
| C3—C4—C5—C6 | −0.5 (12) | C8—C9—C14—C13 | −176.6 (8) |

Symmetry code: (i) −*x*+2, −*y*+1, −*z*+3.

*Hydrogen-bond geometry (Å, º)*

| *D*—H···*A* | *D*—H | H···*A* | *D*···*A* | *D*—H···*A* |
|---|---|---|---|---|
| O4—H4···O2 | 0.87 | 1.87 | 2.653 (7) | 150 |
| O5—H5···N1 | 0.82 | 1.90 | 2.632 (9) | 148 |
| O3—H3···O2$^{ii}$ | 0.85 | 1.83 | 2.640 (7) | 160 |

Symmetry code: (ii) −*x*+2, *y*+1/2, −*z*+5/2.