# Poly[[$\mu_2$-acetato-aquadi-$\mu_3$-isonicotinato-dysprosium(III)silver(I)] perchlorate]

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In the title three-dimensional heterometallic complex, $\{[AgDy(C_6H_4NO_2)_2(C_2H_3O_2)(H_2O)]ClO_4\}_n$, the Dy(III) ion is eight-coordinated by four O atoms from four different isonicotinate ligands, three O atoms from two different acetate ligands and one O atom of water molecule. The two-coordinate $Ag^I$ ion is bonded to two N atoms from two different isonicotinate anions. These metal coordination units are connected by bridging isonicotinate and acetate ligands, generating a three-dimensional network. The coordinated water molecules link the carboxylate group and the acetate ligand by O—H···O hydrogen bonding. The perchlorate anion is disordered over two sites with site occupancy factors 0.508 (12) and 0.492 (12) and the methyl group of the acetate ligand is disordered over two positions of equal occupancy.

## Related literature

For the applications of lanthanide–transition metal heterometallic complexes with bridging multifunctional organic ligands in ion exchange, magnetism, bimetallic catalysis and as luminescent probes, see: Cheng *et al.* (2006); Kuang *et al.* (2007); Peng *et al.* (2008); Zhu *et al.* (2009).
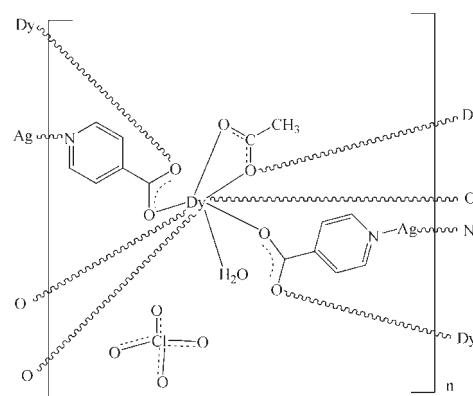


## Experimental

### Crystal data

| | |
|---|---|
| $[AgDy(C_6H_4NO_2)_2(C_2H_3O_2)$- $(H_2O)]ClO_4$ | $\beta$ = 92.845 (1)° |
| $M_r$ = 691.08 | $V$ = 1947.2 (3) Å³ |
| Monoclinic, $P2_1/c$ | $Z$ = 4 |
| $a$ = 16.1682 (15) Å | Mo $K\alpha$ radiation |
| $b$ = 15.1020 (14) Å | $\mu$ = 5.01 mm⁻¹ |
| $c$ = 7.9846 (7) Å | $T$ = 296 K |
| | $0.23 \times 0.20 \times 0.19$ mm |

### Data collection

| | |
|---|---|
| Bruker APEXII area-detector diffractometer | 9904 measured reflections |
| Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996) | 3486 independent reflections |
| | 3112 reflections with $I > 2\sigma(I)$ |
| $T_{min}$ = 0.328, $T_{max}$ = 0.386 | $R_{int}$ = 0.025 |

### Refinement

| | |
|---|---|
| $R[F^2 > 2\sigma(F^2)]$ = 0.023 | H atoms treated by a mixture of independent and constrained refinement |
| $wR(F^2)$ = 0.056 | |
| $S$ = 1.04 | |
| 3486 reflections | $\Delta\rho_{max}$ = 0.66 e Å⁻³ |
| 322 parameters | $\Delta\rho_{min}$ = −0.76 e Å⁻³ |
| 158 restraints | |

**Table 1**
Hydrogen-bond geometry (Å, °).

| $D$—H···$A$ | $D$—H | H···$A$ | $D$···$A$ | $D$—H···$A$ |
|---|---|---|---|---|
| O1W—H2W···O2ⁱ | 0.79 (3) | 2.21 (4) | 2.925 (4) | 150 (5) |
| O1W—H1W···O5ⁱⁱ | 0.79 (3) | 2.05 (4) | 2.813 (4) | 161 (5) |

Symmetry codes: (i) $x, -y+\frac{3}{2}, z+\frac{1}{2}$; (ii) $x, -y+\frac{3}{2}, z-\frac{1}{2}$.

Data collection: *APEX2* (Bruker, 2004); cell refinement: *SAINT* (Bruker, 2004); data reduction: *SAINT*; 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: *SHELXL97*.

# metal-organic compounds

## References

Bruker (2004). *APEX2* and *SAINT*. Bruker AXS Inc., Madison, Wisconsin, USA.

Cheng, J.-W., Zhang, J., Zheng, S.-T., Zhang, M.-B. & Yang, G.-Y. (2006). *Angew. Chem. Int. Ed.* **45**, 73–77.

Kuang, D.-Z., Feng, Y.-L., Peng, Y.-L. & Deng, Y.-F. (2007). *Acta Cryst.* E**63**, m2526–m2527.

Peng, G., Qiu, Y.-C., Hu, Z.-H., Li, Y.-H., Liu, B. & Deng, H. (2008). *Inorg. Chem. Commun.* **11**, 1409–1411.

Sheldrick, G. M. (1996). *SADABS*. University of Göttingen, Germany.

Sheldrick, G. M. (2008). *Acta Cryst.* A**64**, 112–122.

Zhu, L.-C., Zhao, Z.-G. & Yu, S.-J. (2009). *Acta Cryst.* E**65**, m1105.

# supporting information

## Poly[[*µ*₂-acetato-aquadi-*µ*₃-isonicotinato-dysprosium(III)silver(I)] perchlorate]

**Li-Cai Zhu**

### S1. Comment

In the past few years, lanthanide-transition metal heterometallic complexes with bridging multifunctionnal organic ligands are of increasing interest, not only because of their impressive topological structures, but also due to their versatile applications in ion exchange, magnetism, bimetallic catalysis and luminescent probe(Cheng *et al.*, 2006; Kuang *et al.*, 2007; Peng *et al.*, 2008; Zhu *et al.*, 2009). As an extension of this research, the structure of the title compound, a new heterometallic coordination polymer, (I), has been determined which is presented in this article.

In the title compound (Fig. 1), there are one Dy(III) ion, one Ag(I) ion, two halves of acetate ligand, two isonicotinate ligands, one coordinated water molecule, and one perchlorate anion in the asymmetric unit. Each Dy(III) ion is eight-coordinated by four O atoms from four different isonicotinate ligands [Dy—O distances ranging from 2.297 (3) to 2.348 (3) Å], and three O atoms from two different acetate ligands [Dy—O distances ranging from 2.394 (3) to 2.484 (3) Å], and one O atom of water molecule [Dy—O distances 2.414 (3) Å]. The O—Dy—O bond angles are in the range from 52.70 (10) to 155.05 (10) °. The Dy center can be described as having a bicapped trigonal prism coordination geometry. The two-coordinate Ag(I) ion is bonded to two N atoms from two different isonicotinate anions [Ag—N distances 2.163 (4) Å]. Thus the Ag(I) ion is in a somewhat linear configuration with N1—Ag1—N2 angle 165.40 (17) °. These metal coordination units are connected by bridging isonicotinate and acetate ligands, generating a three-dimensional network (Fig. 2).The coordinated water molecules link the carboxylate group and acetate ligand by O—H⋯O hydrogen bonding (Table 1). The perchlorate anion is disordered over two sites with site occupancy factors 0.508 (12) and 0.492 (12). The methyl group of the acetate ligand is disordered over two positions of equal occupancy (0.5:0.5).

### S2. Experimental

A mixture of AgNO₃(0.057 g, 0.33 mmol), Dy₂O₃(0.116 g, 0.33 mmol), isonicotinic acid (0.164 g, 1.33 mmol), CH₃COONa(0.057 g, 0.7 mmol), H₂O(7 ml), and HClO₄(0.257 mmol)(pH 2) was sealed in a 20 ml Teflon-lined reaction vessel at 443 K for 6 days then slowly cooled to room temperature. The product was collected by filtration, washed with water and air-dried. Colorless block crystals suitable for X-ray analysis were obtained.

### S3. Refinement

H atoms bonded to C atoms were positioned geometrically and refined as riding, with C—H = 0.93 or 0.96 Å and $U_{iso}$(H) = 1.2 or 1.5 $U_{eq}$(C). H atoms of water molecules were found from difference Fourier maps and refined isotropically with a restraint of O—H = 0.82 Å. The perchlorate anion is disordered over two sites with site occupancy factors 0.508 (12) and 0.492 (12). The methyl group of the acetate ligand is disordered over two positions of equal occupancy (0.5:0.5).
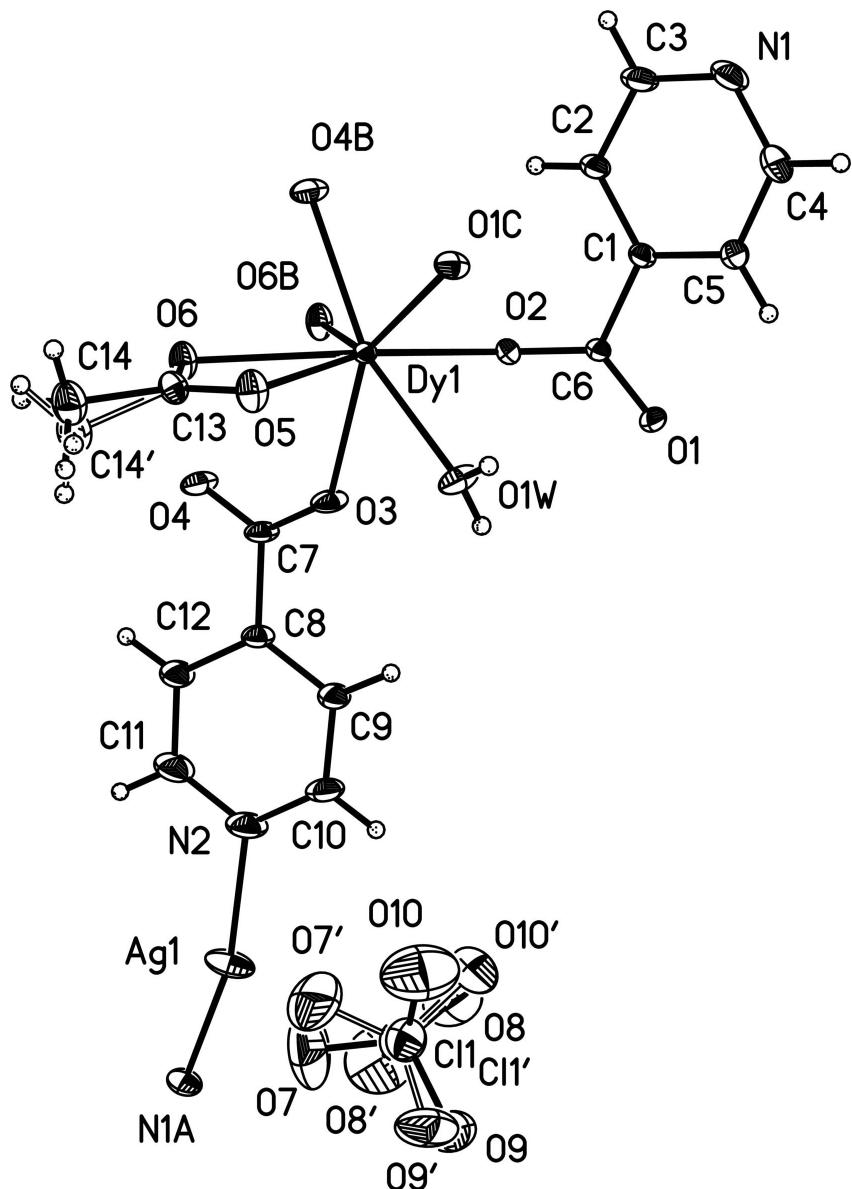
**Figure 1**

The molecular structure showing the atomic-numbering scheme and displacement ellipsoids drawn at the 30% probability level. Symmetry codes: (A) $1 + x$, $1.5 - y$, $-1/2 + z$; (B) $1 - x$, $1 - y$, $2 - z$; (C) $x$, $1.5 - y$, $1/2 + z$.
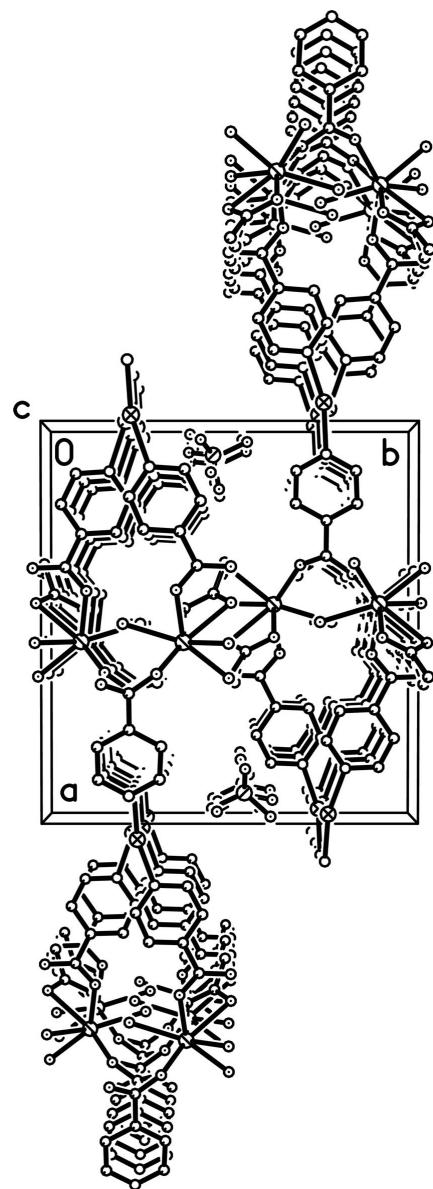
**Figure 2**

A view of the three-dimensional structure of the title compound. Hydrogen atoms are omitted for clarity.

**Poly[[*μ*₂-acetato-aquadi-*μ*₃-isonicotinato-dysprosium(III)silver(I)] perchlorate]**

*Crystal data*
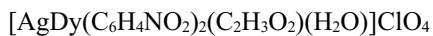
[AgDy(C₆H₄NO₂)₂(C₂H₃O₂)(H₂O)]ClO₄  
$M_r = 691.08$  
Monoclinic, $P2_1/c$  
Hall symbol: -P 2ybc  
$a = 16.1682\ (15)$ Å  
$b = 15.1020\ (14)$ Å  
$c = 7.9846\ (7)$ Å  
$\beta = 92.845\ (1)°$  
$V = 1947.2\ (3)$ Å³  
$Z = 4$

$F(000) = 1316$  
$D_x = 2.357$ Mg m⁻³  
Mo *Kα* radiation, $\lambda = 0.71073$ Å  
Cell parameters from 5589 reflections  
$\theta = 2.7–27.8°$  
$\mu = 5.01$ mm⁻¹  
$T = 296$ K  
Block, colorless  
$0.23 \times 0.20 \times 0.19$ mm

*Data collection*

| | |
|---|---|
| Bruker APEXII area-detector diffractometer | 9904 measured reflections |
| Radiation source: fine-focus sealed tube | 3486 independent reflections |
| Graphite monochromator | 3112 reflections with $I > 2\sigma(I)$ |
| $\varphi$ and $\omega$ scan | $R_{int} = 0.025$ |
| Absorption correction: multi-scan ($SADABS$; Sheldrick, 1996) | $\theta_{max} = 25.2°$, $\theta_{min} = 1.9°$ |
| $T_{min} = 0.328$, $T_{max} = 0.386$ | $h = -15 \rightarrow 19$ |
| | $k = -18 \rightarrow 17$ |
| | $l = -8 \rightarrow 9$ |

*Refinement*

| | |
|---|---|
| Refinement on $F^2$ | Secondary atom site location: difference Fourier map |
| Least-squares matrix: full | Hydrogen site location: inferred from neighbouring sites |
| $R[F^2 > 2\sigma(F^2)] = 0.023$ | |
| $wR(F^2) = 0.056$ | |
| $S = 1.04$ | H atoms treated by a mixture of independent and constrained refinement |
| 3486 reflections | |
| 322 parameters | $w = 1/[\sigma^2(F_o^2) + (0.0236P)^2 + 3.5237P]$ where $P = (F_o^2 + 2F_c^2)/3$ |
| 158 restraints | |
| Primary atom site location: structure-invariant direct methods | $(\Delta/\sigma)_{max} = 0.002$ |
| | $\Delta\rho_{max} = 0.66$ e Å$^{-3}$ |
| | $\Delta\rho_{min} = -0.76$ 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$^2$)*

| | $x$ | $y$ | $z$ | $U_{iso}*/U_{eq}$ | Occ. (<1) |
|---|---|---|---|---|---|
| Dy1 | 0.454540 (11) | 0.616178 (12) | 1.04948 (2) | 0.01852 (7) | |
| Ag1 | 0.97316 (3) | 0.73989 (4) | 0.60071 (7) | 0.06665 (17) | |
| O1 | 0.35829 (18) | 0.81592 (19) | 0.7190 (4) | 0.0300 (7) | |
| O2 | 0.38143 (17) | 0.68117 (19) | 0.8281 (4) | 0.0263 (7) | |
| O3 | 0.5762 (2) | 0.6330 (2) | 0.9080 (5) | 0.0401 (9) | |
| O4 | 0.63060 (19) | 0.49745 (19) | 0.8632 (5) | 0.0403 (9) | |
| O5 | 0.5347 (2) | 0.6149 (2) | 1.3147 (4) | 0.0360 (8) | |
| O6 | 0.54781 (19) | 0.4970 (2) | 1.1607 (4) | 0.0320 (7) | |
| O1W | 0.4979 (2) | 0.7687 (2) | 1.0758 (4) | 0.0358 (8) | |
| H1W | 0.518 (3) | 0.795 (3) | 1.002 (6) | 0.054* | |
| H2W | 0.475 (3) | 0.800 (3) | 1.139 (6) | 0.054* | |
| N1 | 0.0943 (2) | 0.7527 (3) | 0.9981 (6) | 0.0404 (10) | |
| N2 | 0.8576 (3) | 0.6967 (3) | 0.6991 (6) | 0.0500 (12) | |
| C1 | 0.2516 (3) | 0.7494 (3) | 0.8695 (5) | 0.0231 (9) | |
| C2 | 0.2116 (3) | 0.6710 (3) | 0.9112 (6) | 0.0312 (11) | |

| | | | | |
|---|---|---|---|---|
| H1 | 0.2372 | 0.6165 | 0.8967 | 0.037* |
| C3 | 0.1336 (3) | 0.6753 (3) | 0.9741 (7) | 0.0388 (12) |
| H2 | 0.1072 | 0.6229 | 1.0008 | 0.047* |
| C4 | 0.1333 (3) | 0.8284 (4) | 0.9589 (7) | 0.0446 (13) |
| H3 | 0.1068 | 0.8821 | 0.9760 | 0.054* |
| C5 | 0.2109 (3) | 0.8294 (3) | 0.8945 (6) | 0.0335 (11) |
| H4 | 0.2358 | 0.8828 | 0.8680 | 0.040* |
| C6 | 0.3367 (2) | 0.7495 (3) | 0.8008 (5) | 0.0202 (9) |
| C7 | 0.6332 (3) | 0.5809 (3) | 0.8637 (6) | 0.0303 (10) |
| C8 | 0.7113 (3) | 0.6231 (3) | 0.8058 (6) | 0.0293 (10) |
| C9 | 0.7156 (3) | 0.7123 (3) | 0.7613 (7) | 0.0410 (13) |
| H7 | 0.6693 | 0.7486 | 0.7668 | 0.049* |
| C10 | 0.7894 (3) | 0.7458 (4) | 0.7088 (8) | 0.0489 (15) |
| H8 | 0.7917 | 0.8053 | 0.6791 | 0.059* |
| C11 | 0.8533 (3) | 0.6108 (4) | 0.7457 (9) | 0.0568 (17) |
| H5 | 0.9009 | 0.5763 | 0.7427 | 0.068* |
| C12 | 0.7818 (3) | 0.5719 (3) | 0.7975 (7) | 0.0428 (13) |
| H6 | 0.7810 | 0.5123 | 0.8264 | 0.051* |
| C13 | 0.5697 (3) | 0.5411 (3) | 1.2898 (5) | 0.0276 (10) |
| C14 | 0.6271 (11) | 0.5015 (17) | 1.421 (3) | 0.045 (4) | 0.50 |
| H14A | 0.6719 | 0.5418 | 1.4467 | 0.068* | 0.50 |
| H14B | 0.6487 | 0.4468 | 1.3804 | 0.068* | 0.50 |
| H14C | 0.5976 | 0.4905 | 1.5203 | 0.068* | 0.50 |
| C14′ | 0.6444 (10) | 0.5127 (17) | 1.393 (3) | 0.045 (4) | 0.50 |
| H14D | 0.6503 | 0.5488 | 1.4915 | 0.068* | 0.50 |
| H14E | 0.6926 | 0.5191 | 1.3282 | 0.068* | 0.50 |
| H14F | 0.6385 | 0.4518 | 1.4246 | 0.068* | 0.50 |
| Cl1 | 0.9165 (8) | 0.9620 (9) | 0.7618 (15) | 0.0633 (8) | 0.492 (12) |
| O7 | 0.9742 (9) | 0.8934 (9) | 0.785 (2) | 0.138 (7) | 0.492 (12) |
| O8 | 0.8752 (9) | 0.9496 (8) | 0.6037 (14) | 0.105 (5) | 0.492 (12) |
| O9 | 0.9544 (10) | 1.0465 (9) | 0.761 (2) | 0.074 (5) | 0.492 (12) |
| O10 | 0.8556 (9) | 0.9600 (10) | 0.8849 (19) | 0.139 (7) | 0.492 (12) |
| Cl1′ | 0.9216 (7) | 0.9553 (8) | 0.7502 (15) | 0.0633 (8) | 0.508 (12) |
| O7′ | 0.9307 (9) | 0.8895 (9) | 0.8748 (17) | 0.125 (6) | 0.508 (12) |
| O8′ | 0.9565 (10) | 0.9226 (10) | 0.6054 (17) | 0.139 (6) | 0.508 (12) |
| O9′ | 0.9612 (10) | 1.0334 (9) | 0.809 (2) | 0.090 (6) | 0.508 (12) |
| O10′ | 0.8355 (6) | 0.9715 (7) | 0.720 (2) | 0.101 (5) | 0.508 (12) |

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

| | $U^{11}$ | $U^{22}$ | $U^{33}$ | $U^{12}$ | $U^{13}$ | $U^{23}$ |
|---|---|---|---|---|---|---|
| Dy1 | 0.01576 (11) | 0.01481 (11) | 0.02554 (12) | 0.00081 (7) | 0.00650 (8) | 0.00006 (8) |
| Ag1 | 0.0261 (2) | 0.0917 (4) | 0.0846 (4) | −0.0148 (2) | 0.0267 (2) | 0.0028 (3) |
| O1 | 0.0256 (16) | 0.0230 (16) | 0.0424 (19) | 0.0016 (13) | 0.0128 (14) | 0.0096 (14) |
| O2 | 0.0190 (15) | 0.0247 (15) | 0.0357 (18) | 0.0039 (12) | 0.0055 (13) | 0.0049 (13) |
| O3 | 0.0302 (19) | 0.0227 (17) | 0.071 (3) | −0.0018 (13) | 0.0332 (18) | −0.0015 (16) |
| O4 | 0.0337 (18) | 0.0193 (16) | 0.070 (2) | −0.0035 (14) | 0.0288 (17) | −0.0028 (16) |
| O5 | 0.044 (2) | 0.0315 (18) | 0.0319 (18) | 0.0101 (15) | −0.0040 (15) | −0.0092 (14) |

| | | | | | |
|---|---|---|---|---|---|
| O6 | 0.0376 (18) | 0.0270 (16) | 0.0304 (17) | 0.0082 (14) | −0.0078 (14) | −0.0062 (14) |
| O1W | 0.049 (2) | 0.0228 (17) | 0.038 (2) | −0.0094 (15) | 0.0213 (17) | −0.0029 (14) |
| N1 | 0.023 (2) | 0.049 (3) | 0.051 (3) | 0.0021 (18) | 0.0138 (19) | −0.003 (2) |
| N2 | 0.028 (2) | 0.050 (3) | 0.074 (3) | −0.009 (2) | 0.022 (2) | −0.002 (2) |
| C1 | 0.017 (2) | 0.028 (2) | 0.024 (2) | 0.0005 (17) | 0.0038 (17) | 0.0033 (17) |
| C2 | 0.020 (2) | 0.026 (2) | 0.049 (3) | −0.0004 (18) | 0.011 (2) | 0.000 (2) |
| C3 | 0.025 (2) | 0.037 (3) | 0.056 (3) | −0.006 (2) | 0.017 (2) | −0.001 (2) |
| C4 | 0.033 (3) | 0.040 (3) | 0.062 (4) | 0.013 (2) | 0.014 (3) | −0.002 (3) |
| C5 | 0.027 (2) | 0.025 (2) | 0.050 (3) | 0.0046 (19) | 0.012 (2) | 0.004 (2) |
| C6 | 0.016 (2) | 0.020 (2) | 0.024 (2) | −0.0002 (16) | 0.0040 (17) | 0.0002 (17) |
| C7 | 0.023 (2) | 0.028 (2) | 0.041 (3) | −0.0069 (19) | 0.016 (2) | −0.001 (2) |
| C8 | 0.023 (2) | 0.026 (2) | 0.041 (3) | −0.0048 (18) | 0.014 (2) | −0.003 (2) |
| C9 | 0.025 (3) | 0.029 (3) | 0.070 (4) | 0.000 (2) | 0.017 (2) | 0.004 (2) |
| C10 | 0.032 (3) | 0.036 (3) | 0.081 (4) | −0.010 (2) | 0.021 (3) | 0.007 (3) |
| C11 | 0.026 (3) | 0.047 (3) | 0.100 (5) | 0.000 (2) | 0.019 (3) | −0.004 (3) |
| C12 | 0.027 (3) | 0.031 (3) | 0.073 (4) | 0.001 (2) | 0.017 (3) | −0.001 (3) |
| C13 | 0.026 (2) | 0.032 (2) | 0.025 (2) | 0.0036 (19) | −0.0008 (19) | −0.0022 (19) |
| C14 | 0.046 (6) | 0.045 (5) | 0.044 (6) | 0.006 (5) | −0.012 (5) | −0.003 (4) |
| C14′ | 0.046 (6) | 0.045 (5) | 0.044 (6) | 0.006 (5) | −0.012 (5) | −0.003 (4) |
| Cl1 | 0.0616 (15) | 0.0502 (16) | 0.0776 (16) | 0.0036 (11) | −0.0019 (11) | −0.0024 (12) |
| O7 | 0.145 (10) | 0.105 (8) | 0.162 (11) | 0.076 (7) | −0.030 (8) | −0.017 (7) |
| O8 | 0.132 (10) | 0.108 (8) | 0.072 (7) | −0.039 (7) | −0.042 (7) | 0.005 (6) |
| O9 | 0.068 (8) | 0.060 (7) | 0.094 (8) | −0.011 (6) | 0.012 (6) | −0.003 (6) |
| O10 | 0.135 (10) | 0.151 (10) | 0.136 (10) | −0.038 (8) | 0.054 (8) | −0.009 (8) |
| Cl1′ | 0.0616 (15) | 0.0502 (16) | 0.0776 (16) | 0.0036 (11) | −0.0019 (11) | −0.0024 (12) |
| O7′ | 0.140 (10) | 0.120 (9) | 0.112 (8) | −0.019 (7) | −0.017 (7) | 0.066 (7) |
| O8′ | 0.163 (10) | 0.142 (9) | 0.119 (9) | 0.012 (8) | 0.063 (8) | −0.035 (7) |
| O9′ | 0.074 (8) | 0.082 (9) | 0.115 (10) | −0.034 (7) | 0.006 (7) | −0.038 (7) |
| O10′ | 0.055 (6) | 0.088 (7) | 0.160 (10) | 0.004 (5) | −0.008 (6) | 0.008 (7) |

*Geometric parameters (Å, º)*

| | | | |
|---|---|---|---|
| Dy1—O2 | 2.297 (3) | C2—C3 | 1.382 (6) |
| Dy1—O4[i] | 2.328 (3) | C2—H1 | 0.9300 |
| Dy1—O3 | 2.330 (3) | C3—H2 | 0.9300 |
| Dy1—O1[ii] | 2.348 (3) | C4—C5 | 1.380 (6) |
| Dy1—O6[i] | 2.394 (3) | C4—H3 | 0.9300 |
| Dy1—O1W | 2.414 (3) | C5—H4 | 0.9300 |
| Dy1—O5 | 2.428 (3) | C7—C8 | 1.509 (6) |
| Dy1—O6 | 2.484 (3) | C8—C12 | 1.381 (6) |
| Dy1—C13 | 2.842 (4) | C8—C9 | 1.395 (6) |
| Dy1—Dy1[i] | 3.9005 (5) | C9—C10 | 1.381 (6) |
| Ag1—N2 | 2.163 (4) | C9—H7 | 0.9300 |
| Ag1—N1[iii] | 2.163 (4) | C10—H8 | 0.9300 |
| O1—C6 | 1.256 (5) | C11—C12 | 1.379 (7) |
| O1—Dy1[iv] | 2.348 (3) | C11—H5 | 0.9300 |
| O2—C6 | 1.272 (5) | C12—H6 | 0.9300 |
| O3—C7 | 1.275 (5) | C13—C14 | 1.490 (9) |

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| O4—C7 | 1.261 (5) | C13—C14′ | 1.490 (9) |
| O4—Dy1[i] | 2.328 (3) | C14—H14A | 0.9600 |
| O5—C13 | 1.269 (5) | C14—H14B | 0.9600 |
| O6—C13 | 1.263 (5) | C14—H14C | 0.9600 |
| O6—Dy1[i] | 2.394 (3) | C14′—H14D | 0.9600 |
| O1W—H1W | 0.79 (3) | C14′—H14E | 0.9600 |
| O1W—H2W | 0.79 (3) | C14′—H14F | 0.9600 |
| N1—C3 | 1.348 (6) | Cl1—O7 | 1.399 (12) |
| N1—C4 | 1.350 (7) | Cl1—O8 | 1.411 (12) |
| N1—Ag1[v] | 2.163 (4) | Cl1—O9 | 1.416 (11) |
| N2—C10 | 1.335 (7) | Cl1—O10 | 1.426 (12) |
| N2—C11 | 1.351 (7) | Cl1′—O8′ | 1.401 (12) |
| C1—C5 | 1.394 (6) | Cl1′—O7′ | 1.408 (12) |
| C1—C2 | 1.398 (6) | Cl1′—O9′ | 1.411 (11) |
| C1—C6 | 1.506 (5) | Cl1′—O10′ | 1.420 (11) |
| | | | |
| O2—Dy1—O4[i] | 104.83 (12) | C2—C1—C6 | 121.9 (4) |
| O2—Dy1—O3 | 89.71 (12) | C3—C2—C1 | 119.1 (4) |
| O4[i]—Dy1—O3 | 138.72 (10) | C3—C2—H1 | 120.4 |
| O2—Dy1—O1[ii] | 85.79 (11) | C1—C2—H1 | 120.4 |
| O4[i]—Dy1—O1[ii] | 74.38 (10) | N1—C3—C2 | 122.6 (4) |
| O3—Dy1—O1[ii] | 146.22 (10) | N1—C3—H2 | 118.7 |
| O2—Dy1—O6[i] | 77.05 (10) | C2—C3—H2 | 118.7 |
| O4[i]—Dy1—O6[i] | 72.23 (11) | N1—C4—C5 | 122.6 (4) |
| O3—Dy1—O6[i] | 73.89 (11) | N1—C4—H3 | 118.7 |
| O1[ii]—Dy1—O6[i] | 136.70 (11) | C5—C4—H3 | 118.7 |
| O2—Dy1—O1W | 78.20 (12) | C4—C5—C1 | 119.2 (4) |
| O4[i]—Dy1—O1W | 148.29 (11) | C4—C5—H4 | 120.4 |
| O3—Dy1—O1W | 71.91 (11) | C1—C5—H4 | 120.4 |
| O1[ii]—Dy1—O1W | 74.40 (11) | O1—C6—O2 | 124.5 (4) |
| O6[i]—Dy1—O1W | 137.44 (11) | O1—C6—C1 | 118.2 (3) |
| O2—Dy1—O5 | 155.05 (10) | O2—C6—C1 | 117.3 (3) |
| O4[i]—Dy1—O5 | 91.77 (13) | O4—C7—O3 | 126.4 (4) |
| O3—Dy1—O5 | 89.81 (13) | O4—C7—C8 | 116.7 (4) |
| O1[ii]—Dy1—O5 | 80.85 (11) | O3—C7—C8 | 116.9 (4) |
| O6[i]—Dy1—O5 | 126.52 (10) | C12—C8—C9 | 118.5 (4) |
| O1W—Dy1—O5 | 77.96 (12) | C12—C8—C7 | 119.0 (4) |
| O2—Dy1—O6 | 149.85 (10) | C9—C8—C7 | 122.5 (4) |
| O4[i]—Dy1—O6 | 73.52 (11) | C10—C9—C8 | 119.0 (5) |
| O3—Dy1—O6 | 74.95 (11) | C10—C9—H7 | 120.5 |
| O1[ii]—Dy1—O6 | 121.22 (11) | C8—C9—H7 | 120.5 |
| O6[i]—Dy1—O6 | 73.84 (12) | N2—C10—C9 | 122.8 (5) |
| O1W—Dy1—O6 | 119.46 (12) | N2—C10—H8 | 118.6 |
| O5—Dy1—O6 | 52.70 (10) | C9—C10—H8 | 118.6 |
| O2—Dy1—C13 | 169.94 (11) | N2—C11—C12 | 123.1 (5) |
| O4[i]—Dy1—C13 | 83.17 (13) | N2—C11—H5 | 118.4 |
| O3—Dy1—C13 | 80.23 (13) | C12—C11—H5 | 118.4 |
| O1[ii]—Dy1—C13 | 102.45 (12) | C11—C12—C8 | 118.8 (5) |

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| O6$^i$—Dy1—C13 | 100.12 (12) | C11—C12—H6 | 120.6 |
| O1W—Dy1—C13 | 98.28 (13) | C8—C12—H6 | 120.6 |
| O5—Dy1—C13 | 26.41 (11) | O6—C13—O5 | 118.8 (4) |
| O6—Dy1—C13 | 26.36 (11) | O6—C13—C14 | 120.1 (11) |
| O2—Dy1—Dy1$^i$ | 114.40 (7) | O5—C13—C14 | 120.6 (11) |
| O4$^i$—Dy1—Dy1$^i$ | 68.41 (7) | O6—C13—C14′ | 119.0 (11) |
| O3—Dy1—Dy1$^i$ | 70.39 (7) | O5—C13—C14′ | 121.4 (12) |
| O1$^{ii}$—Dy1—Dy1$^i$ | 140.97 (7) | C14—C13—C14′ | 15.6 (17) |
| O6$^i$—Dy1—Dy1$^i$ | 37.71 (7) | O6—C13—Dy1 | 60.8 (2) |
| O1W—Dy1—Dy1$^i$ | 139.94 (8) | O5—C13—Dy1 | 58.3 (2) |
| O5—Dy1—Dy1$^i$ | 88.82 (7) | C14—C13—Dy1 | 177.5 (10) |
| O6—Dy1—Dy1$^i$ | 36.13 (7) | C14′—C13—Dy1 | 166.7 (9) |
| C13—Dy1—Dy1$^i$ | 62.43 (9) | C13—C14—H14A | 109.5 |
| N2—Ag1—N1$^{iii}$ | 165.40 (17) | C13—C14—H14B | 109.5 |
| C6—O1—Dy1$^{iv}$ | 149.1 (3) | C13—C14—H14C | 109.5 |
| C6—O2—Dy1 | 138.1 (3) | C13—C14′—H14D | 109.5 |
| C7—O3—Dy1 | 134.9 (3) | C13—C14′—H14E | 109.5 |
| C7—O4—Dy1$^i$ | 139.1 (3) | H14D—C14′—H14E | 109.5 |
| C13—O5—Dy1 | 95.3 (3) | C13—C14′—H14F | 109.5 |
| C13—O6—Dy1$^i$ | 160.5 (3) | H14D—C14′—H14F | 109.5 |
| C13—O6—Dy1 | 92.8 (3) | H14E—C14′—H14F | 109.5 |
| Dy1$^i$—O6—Dy1 | 106.16 (12) | O7—Cl1—O8 | 107.5 (10) |
| Dy1—O1W—H1W | 123 (4) | O7—Cl1—O9 | 112.5 (10) |
| Dy1—O1W—H2W | 119 (4) | O8—Cl1—O9 | 107.4 (10) |
| H1W—O1W—H2W | 113 (5) | O7—Cl1—O10 | 111.9 (11) |
| C3—N1—C4 | 118.2 (4) | O8—Cl1—O10 | 107.5 (10) |
| C3—N1—Ag1$^v$ | 122.7 (3) | O9—Cl1—O10 | 109.7 (10) |
| C4—N1—Ag1$^v$ | 119.1 (3) | O8′—Cl1′—O7′ | 107.6 (10) |
| C10—N2—C11 | 117.6 (4) | O8′—Cl1′—O9′ | 111.8 (10) |
| C10—N2—Ag1 | 125.7 (4) | O7′—Cl1′—O9′ | 109.0 (10) |
| C11—N2—Ag1 | 116.5 (3) | O8′—Cl1′—O10′ | 110.8 (10) |
| C5—C1—C2 | 118.3 (4) | O7′—Cl1′—O10′ | 107.9 (10) |
| C5—C1—C6 | 119.8 (4) | O9′—Cl1′—O10′ | 109.6 (10) |

Symmetry codes: (i) −x+1, −y+1, −z+2; (ii) x, −y+3/2, z+1/2; (iii) x+1, −y+3/2, z−1/2; (iv) x, −y+3/2, z−1/2; (v) x−1, −y+3/2, z+1/2.

*Hydrogen-bond geometry (Å, º)*

| D—H···A | D—H | H···A | D···A | D—H···A |
|---|---|---|---|---|
| O1W—H2W···O2$^{ii}$ | 0.79 (3) | 2.21 (4) | 2.925 (4) | 150 (5) |
| O1W—H1W···O5$^{iv}$ | 0.79 (3) | 2.05 (4) | 2.813 (4) | 161 (5) |

Symmetry codes: (ii) x, −y+3/2, z+1/2; (iv) x, −y+3/2, z−1/2.