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# *catena*-Poly[[tetrakis(hexamethylphosphoramide-$\kappa O$)bis(nitrato-$\kappa^2 O,O'$)dysprosium(III)] [silver(I)-di-$\mu$-sulfidotungstate(VI)-di-$\mu$-sulfido]]

**Hongyang Wei,[a] Jinfang Zhang[b] and Chi Zhang[a]***

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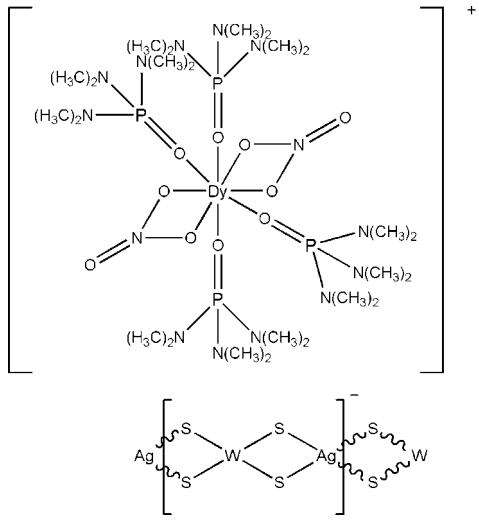
Key indicators: single-crystal X-ray study; $T$ = 153 K; mean $\sigma$(N–C) = 0.011 Å; $R$ factor = 0.035; $wR$ factor = 0.081; data-to-parameter ratio = 18.2.

Hexamethylphosphoramide (hmp), tetrathiotungstate, silver sulfide and dysprosium nitrate were self-assembled, forming an anionic $[AgWS_4]_n^{n-}$ chain in the title compound, $\{[Dy(NO_3)_2(C_6H_{18}N_3OP)_4][AgWS_4]\}_n$. The central Dy atom in the cation is coordinated by eight O atoms from two didentate nitrate and four hmp ligands, giving rise to a distorted square antiprismatic structure. Together with the two nitrate ligands, the cation is univalent, which leads to the anionic chain having a $[WS_4Ag]$ repeat unit. The polymeric anionic chain, with W—Ag—W and Ag—W—Ag angles 161.16 (2) and 153.606 (11)°, respectively, presents a distorted linear configuration. The title compound is isotypic with other rare earth complexes.

## Related literature

For one-dimensional Mo(W)/S/Ag anionic polymers, see: Niu *et al.* (2004). For their unique properties, see: Zhang *et al.* (2007*a*). For the structures of isotypic compounds, see: Cao *et al.* 2007) for Yb; Zhang *et al.* (2007*b*,*c*) for Y and Eu; Tang *et al.* (2008*a*,*b*) for Nd and La.



## Experimental

### Crystal data

$[Dy(NO_3)_2(C_6H_{18}N_3OP)_4][AgWS_4]$
$M_r$ = 1423.33
Monoclinic, $P2_1/c$
$a$ = 15.790 (3) Å
$b$ = 29.659 (6) Å
$c$ = 11.376 (2) Å
$\beta$ = 90.94 (3)°
$V$ = 5326.8 (18) Å$^3$
$Z$ = 4
Mo $K\alpha$ radiation
$\mu$ = 4.24 mm$^{-1}$
$T$ = 153 K
0.25 × 0.2 × 0.15 mm

### Data collection

Rigaku Saturn724+ diffractometer
Absorption correction: multi-scan (*CrystalClear*; Rigaku, 2007)
$T_{min}$ = 0.376, $T_{max}$ = 0.529
24513 measured reflections
9675 independent reflections
8851 reflections with $I > 2.0\sigma(I)$
$R_{int}$ = 0.029

### Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.035
$wR(F^2)$ = 0.081
$S$ = 1.08
9675 reflections
532 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 1.12 e Å$^{-3}$
$\Delta\rho_{min}$ = −0.87 e Å$^{-3}$

Data collection: *CrystalClear* (Rigaku, 2007); 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: *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: PV2306).

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Zhang, C., Song, Y. L. & Wang, X. (2007*a*). *Coord. Chem. Rev.* **251**, 111–141.

# supporting information

*Acta Cryst.* (2010). E**66**, m1193–m1194 [doi:10.1107/S1600536810029235]

## *catena*-Poly[[tetrakis(hexamethylphosphoramide-$\kappa O$)bis(nitrato-$\kappa^2 O,O'$)dysprosium(III)] [silver(I)-di-$\mu$-sulfido-tungstate(VI)-di-$\mu$-sulfido]]

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### S1. Comment

One-dimensional Mo(W)/S/Ag anionic polymers have attracted much attention for their configurational isomerism (Niu *et al.*, 2004) and unique properties as functional materials, such as third-order nonlinear optical (NLO) materials (Zhang *et al.*, 2007*a*). Different solvent-coordinated rare-earth cations proved effective to obtain various configurations of anionic chains (Niu *et al.*, 2004). The title compound, $\{n[Dy(hmp)_4(NO_3)_2][WS_4Ag]_n\}$ (hmp = hexamethylphosphoramide) with a wave-like anionic chain was prepared by following such route using Dy(III)-hmp complex as counterion.

The title complex is isostructural with Yb (Cao *et al.* 2007), Y (Zhang *et al.* 2007*b*), Eu (Zhang *et al.* 2007*c*), Nd (Tang *et al.* 2008*a*), and La (Tang *et al.* 2008*b*) isomorphs. $Dy^{3-}$ in the cation of the title complex is coordinated by eight O atoms from two nitrate and four hmp ligands. Parts of dimethylamine groups from hmp ligands have large librations reflecting a small degree of thermal disorder. In possession of two nitrate ligands, the cation in the title compound is univalent (Fig. 1), which leads to an anionic chain with a univalent repeat unit. The anionic chain in the title compound (Fig. 2) has a distorted linear configuration with W—Ag—W and Ag—W—Ag angles of 161.16 (2) and 153.606 (11) °, respectively, as reported in the other isostructural complexes quoted above.

### S2. Experimental

$Ag_2S$ (1 mmol) was added to a solution of $[NH_4]_2WS_4$ (2 mmol in 30 mL hmp) with thorough stirring for 6 h. The solution underwent an additional stirring for two minute after $Dy(NO_3)_3.6H_2O$ (1 mmol) was added. After filtration the orange-red filtrate was carefully laid on the surface with 30 ml *i*-PrOH. Orange-red block crystals were obtained after ten days.

### S3. Refinement

H atoms were positioned geometrically and refined with riding model, with C—H = 0.96 Å and $U_{iso} = 1.5U_{eq}$(C). The final difference map had a residual electron density in the close proximity of W1 (1.0 Å).

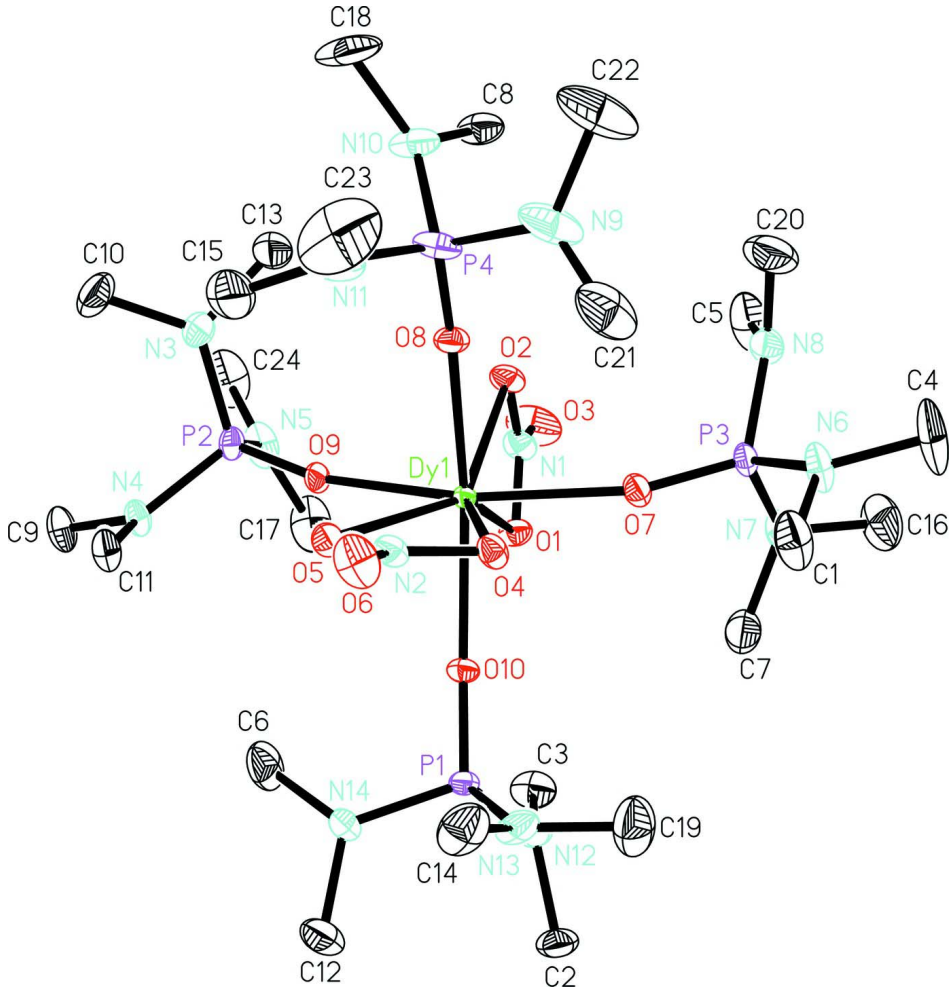


**Figure 1**

The molecular structure of the cation in the title compound, with atomic labels and 30% probability displacement ellipsoids; H atoms have been omitted for clarity.

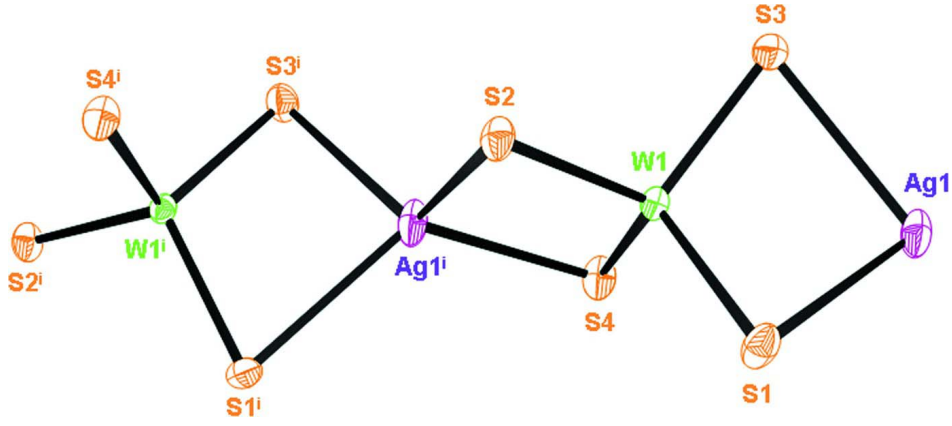


**Figure 2**

The molecular structure of a portion of the anionic chain in the title compound, with atomic labels and 30% probability displacement ellipsoids, Symmetry code: (i) *x*, 1/2 - *y*, -1/2 + *z*.

**catena-Poly[[tetrakis(hexamethylphosphoramide-κO)bis(nitrato-κ²O,O′)dysprosium(III)] [silver(I)-di-μ-sulfido-tungstate(VI)-di-μ-sulfido]]**

*Crystal data*

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$b$ = 29.659 (6) Å
$c$ = 11.376 (2) Å
$\beta$ = 90.94 (3)°
$V$ = 5326.8 (18) Å$^3$
$Z$ = 4
$F(000)$ = 2820.0
$D_x$ = 1.775 Mg m$^{-3}$
Mo $K\alpha$ radiation, $\lambda$ = 0.71073 Å
Cell parameters from 22684 reflections
$\theta$ = 3.1–29.1°
$\mu$ = 4.24 mm$^{-1}$
$T$ = 153 K
Block, orange-red
0.25 × 0.2 × 0.15 mm

*Data collection*

Rigaku Saturn724+ diffractometer
Radiation source: fine-focus sealed tube
Graphite monochromator
dtprofit.ref scans
Absorption correction: multi-scan (*CrystalClear*; Rigaku, 2008)
$T_{min}$ = 0.376, $T_{max}$ = 0.529
24513 measured reflections
9675 independent reflections
8851 reflections with $I > 2.0\sigma(I)$
$R_{int}$ = 0.029
$\theta_{max}$ = 25.4°, $\theta_{min}$ = 3.2°
$h$ = −19→13
$k$ = −35→33
$l$ = −13→11

*Refinement*

Refinement on $F^2$
Least-squares matrix: full
$R[F^2 > 2\sigma(F^2)]$ = 0.035
$wR(F^2)$ = 0.081
$S$ = 1.08
9675 reflections
532 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
$w = 1/[\sigma^2(F_o^2) + (0.0212P)^2 + 31.1497P]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max}$ = 0.002
$\Delta\rho_{max}$ = 1.12 e Å$^{-3}$
$\Delta\rho_{min}$ = −0.87 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)*

| | $x$ | $y$ | $z$ | $U_{iso}$*/$U_{eq}$ |
|---|---|---|---|---|
| Dy1 | 0.737898 (16) | 0.082563 (8) | 0.82753 (2) | 0.01918 (7) |
| P1 | 0.69823 (11) | −0.03058 (5) | 0.69847 (15) | 0.0279 (4) |
| P2 | 0.52175 (10) | 0.13308 (5) | 0.82312 (14) | 0.0264 (3) |

| | | | | |
|---|---|---|---|---|
| P3 | 0.95850 (10) | 0.09625 (5) | 0.73112 (15) | 0.0270 (3) |
| P4 | 0.79491 (13) | 0.14651 (6) | 1.09706 (16) | 0.0374 (4) |
| O1 | 0.7239 (3) | 0.10325 (13) | 0.6185 (4) | 0.0314 (10) |
| O2 | 0.7515 (3) | 0.15839 (13) | 0.7372 (4) | 0.0330 (10) |
| O3 | 0.7248 (4) | 0.17207 (18) | 0.5529 (5) | 0.0659 (17) |
| O4 | 0.8012 (3) | 0.02649 (14) | 0.9650 (4) | 0.0296 (10) |
| O5 | 0.6686 (3) | 0.04061 (14) | 0.9886 (4) | 0.0290 (9) |
| O6 | 0.7373 (3) | 0.00133 (18) | 1.1211 (5) | 0.0513 (14) |
| O7 | 0.8757 (3) | 0.08065 (13) | 0.7803 (4) | 0.0299 (10) |
| O8 | 0.7725 (3) | 0.12697 (14) | 0.9816 (4) | 0.0302 (10) |
| O9 | 0.6029 (2) | 0.10699 (13) | 0.8235 (4) | 0.0266 (9) |
| O10 | 0.7065 (3) | 0.01790 (12) | 0.7279 (4) | 0.0265 (9) |
| N1 | 0.7335 (3) | 0.14548 (17) | 0.6337 (5) | 0.0332 (12) |
| N2 | 0.7359 (3) | 0.02203 (17) | 1.0282 (5) | 0.0301 (12) |
| N3 | 0.5230 (4) | 0.17275 (19) | 0.9225 (6) | 0.0427 (15) |
| N4 | 0.4445 (3) | 0.09787 (18) | 0.8495 (5) | 0.0305 (12) |
| N5 | 0.5054 (4) | 0.1574 (2) | 0.6976 (5) | 0.0460 (16) |
| N6 | 1.0341 (3) | 0.0709 (2) | 0.8051 (5) | 0.0404 (15) |
| N7 | 0.9563 (4) | 0.0862 (2) | 0.5892 (5) | 0.0447 (15) |
| N8 | 0.9832 (4) | 0.14921 (18) | 0.7390 (6) | 0.0416 (15) |
| N9 | 0.8966 (5) | 0.1385 (2) | 1.1236 (7) | 0.070 (2) |
| N10 | 0.7754 (5) | 0.20026 (19) | 1.0959 (5) | 0.0480 (17) |
| N11 | 0.7407 (6) | 0.1235 (2) | 1.2007 (6) | 0.067 (2) |
| N12 | 0.7204 (4) | −0.03686 (17) | 0.5586 (5) | 0.0350 (13) |
| N13 | 0.7634 (4) | −0.06550 (18) | 0.7666 (5) | 0.0437 (15) |
| N14 | 0.6045 (4) | −0.0481 (2) | 0.7376 (6) | 0.0475 (16) |
| C1 | 1.0210 (5) | 0.0280 (3) | 0.8613 (8) | 0.060 (2) |
| H1A | 1.0724 | 0.0186 | 0.9003 | 0.090* |
| H1B | 1.0050 | 0.0059 | 0.8032 | 0.090* |
| H1C | 0.9768 | 0.0307 | 0.9179 | 0.090* |
| C2 | 0.7254 (5) | −0.0827 (2) | 0.5060 (7) | 0.050 (2) |
| H2A | 0.7390 | −0.0802 | 0.4243 | 0.074* |
| H2B | 0.6717 | −0.0976 | 0.5134 | 0.074* |
| H2C | 0.7685 | −0.0998 | 0.5462 | 0.074* |
| C3 | 0.6974 (6) | −0.0024 (3) | 0.4746 (6) | 0.052 (2) |
| H3A | 0.7153 | −0.0114 | 0.3978 | 0.078* |
| H3B | 0.7245 | 0.0254 | 0.4962 | 0.078* |
| H3C | 0.6371 | 0.0016 | 0.4738 | 0.078* |
| C4 | 1.1232 (5) | 0.0803 (4) | 0.7827 (9) | 0.080 (3) |
| H4A | 1.1582 | 0.0624 | 0.8344 | 0.120* |
| H4B | 1.1345 | 0.1117 | 0.7963 | 0.120* |
| H4C | 1.1356 | 0.0730 | 0.7026 | 0.120* |
| C5 | 0.9516 (5) | 0.1825 (3) | 0.6534 (11) | 0.082 (4) |
| H5A | 0.9734 | 0.2118 | 0.6736 | 0.124* |
| H5B | 0.8908 | 0.1832 | 0.6545 | 0.124* |
| H5C | 0.9699 | 0.1744 | 0.5762 | 0.124* |
| C6 | 0.5348 (5) | −0.0163 (3) | 0.7479 (8) | 0.059 (2) |
| H6A | 0.4848 | −0.0321 | 0.7714 | 0.089* |

| | | | | |
|---|---|---|---|---|
| H6B | 0.5245 | −0.0019 | 0.6734 | 0.089* |
| H6C | 0.5492 | 0.0061 | 0.8058 | 0.089* |
| C7 | 0.9085 (5) | 0.0481 (3) | 0.5430 (7) | 0.057 (2) |
| H7A | 0.9140 | 0.0469 | 0.4591 | 0.085* |
| H7B | 0.8498 | 0.0516 | 0.5621 | 0.085* |
| H7C | 0.9299 | 0.0207 | 0.5771 | 0.085* |
| C8 | 0.8031 (5) | 0.2273 (2) | 0.9966 (6) | 0.0473 (19) |
| H8A | 0.7871 | 0.2582 | 1.0084 | 0.071* |
| H8B | 0.7768 | 0.2162 | 0.9256 | 0.071* |
| H8C | 0.8635 | 0.2252 | 0.9904 | 0.071* |
| C9 | 0.3560 (4) | 0.1074 (3) | 0.8127 (7) | 0.0473 (19) |
| H9A | 0.3203 | 0.0829 | 0.8363 | 0.071* |
| H9B | 0.3529 | 0.1107 | 0.7288 | 0.071* |
| H9C | 0.3374 | 0.1347 | 0.8492 | 0.071* |
| C10 | 0.4541 (5) | 0.1828 (3) | 1.0010 (8) | 0.059 (2) |
| H10A | 0.4700 | 0.2075 | 1.0513 | 0.088* |
| H10B | 0.4421 | 0.1568 | 1.0480 | 0.088* |
| H10C | 0.4045 | 0.1909 | 0.9557 | 0.088* |
| C11 | 0.4536 (4) | 0.0646 (2) | 0.9424 (6) | 0.0401 (17) |
| H11A | 0.4029 | 0.0468 | 0.9462 | 0.060* |
| H11B | 0.4631 | 0.0796 | 1.0162 | 0.060* |
| H11C | 0.5008 | 0.0453 | 0.9262 | 0.060* |
| C12 | 0.5800 (7) | −0.0956 (3) | 0.7198 (9) | 0.080 (3) |
| H12A | 0.5232 | −0.1001 | 0.7465 | 0.120* |
| H12B | 0.6180 | −0.1148 | 0.7635 | 0.120* |
| H12C | 0.5827 | −0.1029 | 0.6377 | 0.120* |
| C13 | 0.5903 (5) | 0.2069 (3) | 0.9216 (9) | 0.062 (2) |
| H13A | 0.5823 | 0.2277 | 0.9852 | 0.093* |
| H13B | 0.5884 | 0.2229 | 0.8483 | 0.093* |
| H13C | 0.6444 | 0.1924 | 0.9309 | 0.093* |
| C14 | 0.7521 (6) | −0.0815 (3) | 0.8850 (8) | 0.068 (3) |
| H14A | 0.7979 | −0.1013 | 0.9063 | 0.102* |
| H14B | 0.6994 | −0.0974 | 0.8896 | 0.102* |
| H14C | 0.7515 | −0.0563 | 0.9380 | 0.102* |
| C15 | 0.6502 (7) | 0.1205 (3) | 1.1889 (9) | 0.082 (3) |
| H15A | 0.6276 | 0.1063 | 1.2574 | 0.123* |
| H15B | 0.6357 | 0.1031 | 1.1205 | 0.123* |
| H15C | 0.6268 | 0.1503 | 1.1810 | 0.123* |
| C16 | 1.0306 (6) | 0.0958 (4) | 0.5173 (8) | 0.076 (3) |
| H16A | 1.0186 | 0.0877 | 0.4371 | 0.115* |
| H16B | 1.0782 | 0.0787 | 0.5463 | 0.115* |
| H16C | 1.0436 | 0.1274 | 0.5217 | 0.115* |
| C17 | 0.5188 (6) | 0.1331 (4) | 0.5901 (7) | 0.074 (3) |
| H17A | 0.5059 | 0.1523 | 0.5243 | 0.111* |
| H17B | 0.4825 | 0.1071 | 0.5874 | 0.111* |
| H17C | 0.5768 | 0.1236 | 0.5868 | 0.111* |
| C18 | 0.7504 (8) | 0.2257 (3) | 1.1997 (8) | 0.091 (4) |
| H18A | 0.7422 | 0.2568 | 1.1788 | 0.137* |

| | | | | |
|---|---|---|---|---|
| H18B | 0.7940 | 0.2234 | 1.2591 | 0.137* |
| H18C | 0.6985 | 0.2136 | 1.2292 | 0.137* |
| C19 | 0.8530 (6) | −0.0677 (3) | 0.7356 (9) | 0.075 (3) |
| H19A | 0.8812 | −0.0897 | 0.7842 | 0.113* |
| H19B | 0.8787 | −0.0387 | 0.7476 | 0.113* |
| H19C | 0.8577 | −0.0762 | 0.6545 | 0.113* |
| C20 | 1.0133 (7) | 0.1691 (3) | 0.8496 (9) | 0.088 (4) |
| H20A | 1.0247 | 0.2006 | 0.8380 | 0.133* |
| H20B | 1.0642 | 0.1541 | 0.8752 | 0.133* |
| H20C | 0.9707 | 0.1657 | 0.9082 | 0.133* |
| C21 | 0.9359 (6) | 0.0957 (3) | 1.1106 (10) | 0.082 (3) |
| H21A | 0.9949 | 0.0980 | 1.1317 | 0.123* |
| H21B | 0.9302 | 0.0860 | 1.0304 | 0.123* |
| H21C | 0.9091 | 0.0742 | 1.1610 | 0.123* |
| C22 | 0.9519 (8) | 0.1714 (4) | 1.1835 (11) | 0.105 (5) |
| H22A | 1.0082 | 0.1594 | 1.1904 | 0.158* |
| H22B | 0.9305 | 0.1776 | 1.2604 | 0.158* |
| H22C | 0.9530 | 0.1989 | 1.1387 | 0.158* |
| C23 | 0.7820 (10) | 0.1057 (4) | 1.3109 (9) | 0.119 (5) |
| H23A | 0.7396 | 0.0936 | 1.3615 | 0.179* |
| H23B | 0.8115 | 0.1298 | 1.3507 | 0.179* |
| H23C | 0.8216 | 0.0825 | 1.2912 | 0.179* |
| C24 | 0.4636 (6) | 0.2014 (3) | 0.6817 (9) | 0.077 (3) |
| H24A | 0.4609 | 0.2087 | 0.5995 | 0.116* |
| H24B | 0.4954 | 0.2241 | 0.7231 | 0.116* |
| H24C | 0.4073 | 0.2000 | 0.7120 | 0.116* |
| W1 | 0.216043 (15) | 0.227581 (7) | 0.47517 (2) | 0.02023 (7) |
| Ag1 | 0.21731 (4) | 0.234185 (17) | 0.21464 (4) | 0.03708 (13) |
| S1 | 0.10252 (11) | 0.21233 (6) | 0.36887 (14) | 0.0353 (4) |
| S2 | 0.21400 (11) | 0.18483 (5) | 0.63413 (13) | 0.0298 (3) |
| S3 | 0.33048 (10) | 0.21154 (6) | 0.37526 (14) | 0.0340 (4) |
| S4 | 0.21630 (11) | 0.30059 (5) | 0.51519 (14) | 0.0326 (4) |

*Atomic displacement parameters (Å²)*

| | $U^{11}$ | $U^{22}$ | $U^{33}$ | $U^{12}$ | $U^{13}$ | $U^{23}$ |
|---|---|---|---|---|---|---|
| Dy1 | 0.01654 (13) | 0.01366 (12) | 0.02736 (15) | −0.00042 (10) | 0.00137 (10) | −0.00093 (11) |
| P1 | 0.0336 (9) | 0.0183 (7) | 0.0322 (9) | −0.0052 (6) | 0.0095 (7) | −0.0047 (7) |
| P2 | 0.0185 (8) | 0.0312 (8) | 0.0296 (8) | 0.0052 (6) | 0.0002 (6) | 0.0048 (7) |
| P3 | 0.0173 (8) | 0.0245 (8) | 0.0394 (9) | 0.0004 (6) | 0.0043 (7) | 0.0078 (7) |
| P4 | 0.0558 (12) | 0.0242 (8) | 0.0316 (9) | −0.0101 (8) | −0.0166 (8) | 0.0004 (7) |
| O1 | 0.041 (3) | 0.022 (2) | 0.031 (2) | 0.0000 (19) | 0.004 (2) | −0.0011 (19) |
| O2 | 0.038 (3) | 0.020 (2) | 0.041 (3) | −0.0046 (18) | −0.002 (2) | 0.003 (2) |
| O3 | 0.106 (5) | 0.043 (3) | 0.049 (3) | −0.017 (3) | −0.012 (3) | 0.025 (3) |
| O4 | 0.021 (2) | 0.026 (2) | 0.042 (3) | 0.0001 (17) | −0.0023 (19) | 0.007 (2) |
| O5 | 0.026 (2) | 0.027 (2) | 0.034 (2) | 0.0015 (18) | −0.0001 (19) | 0.0042 (19) |
| O6 | 0.051 (3) | 0.056 (3) | 0.047 (3) | −0.004 (3) | −0.003 (2) | 0.026 (3) |
| O7 | 0.022 (2) | 0.025 (2) | 0.043 (3) | −0.0013 (17) | 0.0023 (19) | 0.0056 (19) |

| | | | | | | |
|---|---|---|---|---|---|---|
| O8 | 0.030 (2) | 0.026 (2) | 0.035 (2) | −0.0003 (18) | −0.0073 (19) | −0.0091 (19) |
| O9 | 0.016 (2) | 0.025 (2) | 0.039 (2) | 0.0034 (16) | 0.0001 (17) | 0.0007 (19) |
| O10 | 0.032 (2) | 0.0165 (19) | 0.031 (2) | −0.0024 (17) | 0.0003 (18) | −0.0009 (18) |
| N1 | 0.037 (3) | 0.025 (3) | 0.038 (3) | −0.003 (2) | 0.000 (2) | 0.008 (3) |
| N2 | 0.031 (3) | 0.024 (3) | 0.036 (3) | −0.004 (2) | −0.001 (2) | 0.002 (2) |
| N3 | 0.032 (3) | 0.036 (3) | 0.061 (4) | 0.007 (3) | 0.007 (3) | −0.006 (3) |
| N4 | 0.017 (3) | 0.038 (3) | 0.036 (3) | 0.000 (2) | −0.002 (2) | 0.008 (3) |
| N5 | 0.035 (3) | 0.068 (4) | 0.035 (3) | −0.004 (3) | −0.007 (3) | 0.022 (3) |
| N6 | 0.020 (3) | 0.050 (4) | 0.051 (4) | −0.001 (2) | 0.002 (3) | 0.027 (3) |
| N7 | 0.033 (3) | 0.057 (4) | 0.044 (4) | −0.008 (3) | 0.006 (3) | 0.005 (3) |
| N8 | 0.037 (3) | 0.025 (3) | 0.063 (4) | −0.002 (2) | 0.010 (3) | 0.007 (3) |
| N9 | 0.072 (5) | 0.050 (4) | 0.087 (6) | −0.013 (4) | −0.049 (4) | 0.001 (4) |
| N10 | 0.086 (5) | 0.025 (3) | 0.032 (3) | −0.008 (3) | 0.004 (3) | −0.006 (3) |
| N11 | 0.110 (7) | 0.049 (4) | 0.043 (4) | −0.028 (4) | −0.005 (4) | 0.006 (3) |
| N12 | 0.047 (4) | 0.026 (3) | 0.032 (3) | −0.003 (2) | 0.007 (3) | −0.004 (2) |
| N13 | 0.067 (4) | 0.020 (3) | 0.044 (3) | 0.007 (3) | 0.018 (3) | 0.008 (3) |
| N14 | 0.041 (4) | 0.042 (3) | 0.060 (4) | −0.019 (3) | 0.018 (3) | −0.018 (3) |
| C1 | 0.035 (4) | 0.060 (5) | 0.085 (6) | 0.005 (4) | 0.002 (4) | 0.039 (5) |
| C2 | 0.070 (6) | 0.032 (4) | 0.047 (4) | −0.008 (4) | 0.019 (4) | −0.014 (3) |
| C3 | 0.071 (6) | 0.048 (5) | 0.036 (4) | −0.005 (4) | −0.003 (4) | 0.001 (4) |
| C4 | 0.021 (4) | 0.111 (8) | 0.108 (8) | 0.004 (4) | 0.006 (4) | 0.065 (7) |
| C5 | 0.046 (5) | 0.040 (5) | 0.161 (11) | 0.008 (4) | 0.016 (6) | 0.056 (6) |
| C6 | 0.028 (4) | 0.064 (5) | 0.086 (7) | 0.001 (4) | −0.003 (4) | 0.012 (5) |
| C7 | 0.040 (5) | 0.075 (6) | 0.054 (5) | 0.001 (4) | 0.003 (4) | −0.016 (5) |
| C8 | 0.073 (6) | 0.028 (4) | 0.041 (4) | −0.005 (3) | 0.004 (4) | −0.004 (3) |
| C9 | 0.021 (4) | 0.066 (5) | 0.055 (5) | −0.003 (3) | −0.002 (3) | 0.010 (4) |
| C10 | 0.056 (5) | 0.054 (5) | 0.067 (6) | 0.020 (4) | 0.021 (4) | −0.006 (4) |
| C11 | 0.026 (4) | 0.048 (4) | 0.046 (4) | −0.001 (3) | 0.007 (3) | 0.008 (4) |
| C12 | 0.090 (7) | 0.054 (5) | 0.098 (8) | −0.039 (5) | 0.045 (6) | −0.026 (5) |
| C13 | 0.053 (5) | 0.038 (4) | 0.096 (7) | −0.005 (4) | 0.016 (5) | −0.013 (5) |
| C14 | 0.081 (7) | 0.054 (5) | 0.069 (6) | 0.020 (5) | 0.013 (5) | 0.015 (5) |
| C15 | 0.105 (9) | 0.072 (6) | 0.071 (7) | −0.039 (6) | 0.044 (6) | −0.005 (5) |
| C16 | 0.064 (6) | 0.113 (8) | 0.053 (5) | −0.020 (6) | 0.023 (5) | 0.006 (6) |
| C17 | 0.055 (6) | 0.131 (9) | 0.036 (5) | −0.007 (6) | −0.008 (4) | 0.007 (5) |
| C18 | 0.177 (12) | 0.049 (5) | 0.050 (5) | −0.039 (6) | 0.045 (7) | −0.030 (5) |
| C19 | 0.050 (6) | 0.081 (7) | 0.095 (8) | 0.017 (5) | 0.011 (5) | 0.022 (6) |
| C20 | 0.104 (9) | 0.073 (7) | 0.089 (8) | −0.053 (6) | 0.035 (6) | −0.030 (6) |
| C21 | 0.057 (6) | 0.068 (6) | 0.119 (9) | −0.006 (5) | −0.042 (6) | 0.017 (6) |
| C22 | 0.117 (10) | 0.085 (8) | 0.113 (10) | −0.040 (7) | −0.070 (8) | 0.008 (7) |
| C23 | 0.206 (16) | 0.110 (10) | 0.043 (6) | 0.025 (10) | 0.019 (8) | 0.032 (6) |
| C24 | 0.058 (6) | 0.074 (6) | 0.100 (8) | 0.014 (5) | −0.005 (5) | 0.051 (6) |
| W1 | 0.02434 (13) | 0.01905 (12) | 0.01724 (12) | −0.00250 (9) | −0.00159 (9) | 0.00094 (9) |
| Ag1 | 0.0573 (3) | 0.0347 (3) | 0.0192 (2) | 0.0006 (2) | −0.0009 (2) | 0.0018 (2) |
| S1 | 0.0298 (9) | 0.0480 (10) | 0.0279 (8) | −0.0136 (7) | −0.0060 (7) | 0.0045 (8) |
| S2 | 0.0448 (10) | 0.0215 (7) | 0.0231 (8) | 0.0000 (6) | 0.0021 (7) | 0.0063 (6) |
| S3 | 0.0306 (9) | 0.0442 (9) | 0.0272 (8) | 0.0058 (7) | 0.0018 (7) | 0.0042 (7) |
| S4 | 0.0520 (11) | 0.0186 (7) | 0.0271 (8) | −0.0041 (7) | 0.0002 (7) | 0.0019 (6) |

*Geometric parameters (Å, º)*

| | | | |
|---|---|---|---|
| Dy1—O7 | 2.250 (4) | C6—H6A | 0.9600 |
| Dy1—O9 | 2.252 (4) | C6—H6B | 0.9600 |
| Dy1—O8 | 2.253 (4) | C6—H6C | 0.9600 |
| Dy1—O10 | 2.278 (4) | C7—H7A | 0.9600 |
| Dy1—O1 | 2.463 (4) | C7—H7B | 0.9600 |
| Dy1—O2 | 2.483 (4) | C7—H7C | 0.9600 |
| Dy1—O5 | 2.484 (4) | C8—H8A | 0.9600 |
| Dy1—O4 | 2.482 (4) | C8—H8B | 0.9600 |
| Dy1—N1 | 2.888 (5) | C8—H8C | 0.9600 |
| Dy1—N2 | 2.905 (5) | C9—H9A | 0.9600 |
| P1—O10 | 1.482 (4) | C9—H9B | 0.9600 |
| P1—N14 | 1.637 (6) | C9—H9C | 0.9600 |
| P1—N13 | 1.644 (6) | C10—H10A | 0.9600 |
| P1—N12 | 1.645 (5) | C10—H10B | 0.9600 |
| P2—O9 | 1.496 (4) | C10—H10C | 0.9600 |
| P2—N5 | 1.617 (6) | C11—H11A | 0.9600 |
| P2—N3 | 1.631 (6) | C11—H11B | 0.9600 |
| P2—N4 | 1.637 (5) | C11—H11C | 0.9600 |
| P3—O7 | 1.504 (4) | C12—H12A | 0.9600 |
| P3—N8 | 1.620 (6) | C12—H12B | 0.9600 |
| P3—N6 | 1.633 (6) | C12—H12C | 0.9600 |
| P3—N7 | 1.642 (6) | C13—H13A | 0.9600 |
| P4—O8 | 1.473 (4) | C13—H13B | 0.9600 |
| P4—N11 | 1.619 (7) | C13—H13C | 0.9600 |
| P4—N10 | 1.623 (6) | C14—H14A | 0.9600 |
| P4—N9 | 1.647 (8) | C14—H14B | 0.9600 |
| O1—N1 | 1.273 (6) | C14—H14C | 0.9600 |
| O2—N1 | 1.265 (7) | C15—H15A | 0.9600 |
| O3—N1 | 1.218 (7) | C15—H15B | 0.9600 |
| O4—N2 | 1.274 (6) | C15—H15C | 0.9600 |
| O5—N2 | 1.272 (6) | C16—H16A | 0.9600 |
| O6—N2 | 1.222 (7) | C16—H16B | 0.9600 |
| N3—C10 | 1.450 (9) | C16—H16C | 0.9600 |
| N3—C13 | 1.469 (9) | C17—H17A | 0.9600 |
| N4—C11 | 1.452 (8) | C17—H17B | 0.9600 |
| N4—C9 | 1.480 (8) | C17—H17C | 0.9600 |
| N5—C17 | 1.438 (11) | C18—H18A | 0.9600 |
| N5—C24 | 1.471 (10) | C18—H18B | 0.9600 |
| N6—C1 | 1.441 (9) | C18—H18C | 0.9600 |
| N6—C4 | 1.462 (9) | C19—H19A | 0.9600 |
| N7—C7 | 1.452 (10) | C19—H19B | 0.9600 |
| N7—C16 | 1.469 (9) | C19—H19C | 0.9600 |
| N8—C20 | 1.462 (11) | C20—H20A | 0.9600 |
| N8—C5 | 1.469 (10) | C20—H20B | 0.9600 |
| N9—C21 | 1.422 (12) | C20—H20C | 0.9600 |
| N9—C22 | 1.469 (11) | C21—H21A | 0.9600 |

| | | | |
|---|---|---|---|
| N10—C8 | 1.457 (9) | C21—H21B | 0.9600 |
| N10—C18 | 1.461 (10) | C21—H21C | 0.9600 |
| N11—C15 | 1.436 (13) | C22—H22A | 0.9600 |
| N11—C23 | 1.500 (12) | C22—H22B | 0.9600 |
| N12—C3 | 1.442 (9) | C22—H22C | 0.9600 |
| N12—C2 | 1.487 (8) | C23—H23A | 0.9600 |
| N13—C14 | 1.442 (10) | C23—H23B | 0.9600 |
| N13—C19 | 1.465 (10) | C23—H23C | 0.9600 |
| N14—C6 | 1.455 (10) | C24—H24A | 0.9600 |
| N14—C12 | 1.476 (9) | C24—H24B | 0.9600 |
| C1—H1A | 0.9600 | C24—H24C | 0.9600 |
| C1—H1B | 0.9600 | W1—S1 | 2.1929 (17) |
| C1—H1C | 0.9600 | W1—S3 | 2.2025 (17) |
| C2—H2A | 0.9600 | W1—S2 | 2.2092 (15) |
| C2—H2B | 0.9600 | W1—S4 | 2.2125 (16) |
| C2—H2C | 0.9600 | W1—Ag1$^{i}$ | 2.9506 (7) |
| C3—H3A | 0.9600 | W1—Ag1 | 2.9706 (7) |
| C3—H3B | 0.9600 | Ag1—S4$^{ii}$ | 2.4922 (17) |
| C3—H3C | 0.9600 | Ag1—S2$^{ii}$ | 2.5708 (17) |
| C4—H4A | 0.9600 | Ag1—S3 | 2.6222 (19) |
| C4—H4B | 0.9600 | Ag1—S1 | 2.6244 (19) |
| C4—H4C | 0.9600 | Ag1—W1$^{ii}$ | 2.9506 (7) |
| C5—H5A | 0.9600 | S2—Ag1$^{i}$ | 2.5708 (17) |
| C5—H5B | 0.9600 | S4—Ag1$^{i}$ | 2.4922 (17) |
| C5—H5C | 0.9600 | | |

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| O7—Dy1—O9 | 157.26 (15) | N8—C5—H5C | 109.5 |
| O7—Dy1—O8 | 88.71 (16) | H5A—C5—H5C | 109.5 |
| O9—Dy1—O8 | 92.58 (15) | H5B—C5—H5C | 109.5 |
| O7—Dy1—O10 | 93.63 (15) | N14—C6—H6A | 109.5 |
| O9—Dy1—O10 | 93.58 (15) | N14—C6—H6B | 109.5 |
| O8—Dy1—O10 | 158.03 (15) | H6A—C6—H6B | 109.5 |
| O7—Dy1—O1 | 81.23 (15) | N14—C6—H6C | 109.5 |
| O9—Dy1—O1 | 80.24 (15) | H6A—C6—H6C | 109.5 |
| O8—Dy1—O1 | 128.50 (15) | H6B—C6—H6C | 109.5 |
| O10—Dy1—O1 | 73.38 (14) | N7—C7—H7A | 109.5 |
| O7—Dy1—O2 | 80.41 (15) | N7—C7—H7B | 109.5 |
| O9—Dy1—O2 | 77.81 (15) | H7A—C7—H7B | 109.5 |
| O8—Dy1—O2 | 76.76 (15) | N7—C7—H7C | 109.5 |
| O10—Dy1—O2 | 125.17 (15) | H7A—C7—H7C | 109.5 |
| O1—Dy1—O2 | 51.80 (14) | H7B—C7—H7C | 109.5 |
| O7—Dy1—O5 | 127.06 (14) | N10—C8—H8A | 109.5 |
| O9—Dy1—O5 | 75.40 (14) | N10—C8—H8B | 109.5 |
| O8—Dy1—O5 | 79.80 (15) | H8A—C8—H8B | 109.5 |
| O10—Dy1—O5 | 81.40 (14) | N10—C8—H8C | 109.5 |
| O1—Dy1—O5 | 143.50 (14) | H8A—C8—H8C | 109.5 |
| O2—Dy1—O5 | 143.26 (14) | H8B—C8—H8C | 109.5 |
| O7—Dy1—O4 | 75.68 (14) | N4—C9—H9A | 109.5 |

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|---|---|---|---|
| O9—Dy1—O4 | 126.85 (14) | N4—C9—H9B | 109.5 |
| O8—Dy1—O4 | 79.13 (15) | H9A—C9—H9B | 109.5 |
| O10—Dy1—O4 | 80.31 (14) | N4—C9—H9C | 109.5 |
| O1—Dy1—O4 | 143.56 (14) | H9A—C9—H9C | 109.5 |
| O2—Dy1—O4 | 146.19 (14) | H9B—C9—H9C | 109.5 |
| O5—Dy1—O4 | 51.45 (13) | N3—C10—H10A | 109.5 |
| O7—Dy1—N1 | 81.10 (15) | N3—C10—H10B | 109.5 |
| O9—Dy1—N1 | 76.46 (15) | H10A—C10—H10B | 109.5 |
| O8—Dy1—N1 | 102.63 (16) | N3—C10—H10C | 109.5 |
| O10—Dy1—N1 | 99.31 (15) | H10A—C10—H10C | 109.5 |
| O1—Dy1—N1 | 26.00 (14) | H10B—C10—H10C | 109.5 |
| O2—Dy1—N1 | 25.87 (14) | N4—C11—H11A | 109.5 |
| O5—Dy1—N1 | 151.84 (15) | N4—C11—H11B | 109.5 |
| O4—Dy1—N1 | 156.68 (15) | H11A—C11—H11B | 109.5 |
| O7—Dy1—N2 | 101.25 (15) | N4—C11—H11C | 109.5 |
| O9—Dy1—N2 | 101.07 (15) | H11A—C11—H11C | 109.5 |
| O8—Dy1—N2 | 75.85 (15) | H11B—C11—H11C | 109.5 |
| O10—Dy1—N2 | 82.28 (14) | N14—C12—H12A | 109.5 |
| O1—Dy1—N2 | 155.65 (14) | N14—C12—H12B | 109.5 |
| O2—Dy1—N2 | 152.51 (15) | H12A—C12—H12B | 109.5 |
| O5—Dy1—N2 | 25.82 (13) | N14—C12—H12C | 109.5 |
| O4—Dy1—N2 | 25.85 (14) | H12A—C12—H12C | 109.5 |
| N1—Dy1—N2 | 177.11 (15) | H12B—C12—H12C | 109.5 |
| O10—P1—N14 | 108.9 (3) | N3—C13—H13A | 109.5 |
| O10—P1—N13 | 116.9 (3) | N3—C13—H13B | 109.5 |
| N14—P1—N13 | 103.5 (3) | H13A—C13—H13B | 109.5 |
| O10—P1—N12 | 108.0 (3) | N3—C13—H13C | 109.5 |
| N14—P1—N12 | 115.8 (3) | H13A—C13—H13C | 109.5 |
| N13—P1—N12 | 104.0 (3) | H13B—C13—H13C | 109.5 |
| O9—P2—N5 | 110.9 (3) | N13—C14—H14A | 109.5 |
| O9—P2—N3 | 111.8 (3) | N13—C14—H14B | 109.5 |
| N5—P2—N3 | 106.8 (3) | H14A—C14—H14B | 109.5 |
| O9—P2—N4 | 108.0 (3) | N13—C14—H14C | 109.5 |
| N5—P2—N4 | 109.8 (3) | H14A—C14—H14C | 109.5 |
| N3—P2—N4 | 109.5 (3) | H14B—C14—H14C | 109.5 |
| O7—P3—N8 | 119.2 (3) | N11—C15—H15A | 109.5 |
| O7—P3—N6 | 107.4 (3) | N11—C15—H15B | 109.5 |
| N8—P3—N6 | 104.2 (3) | H15A—C15—H15B | 109.5 |
| O7—P3—N7 | 107.8 (3) | N11—C15—H15C | 109.5 |
| N8—P3—N7 | 103.4 (3) | H15A—C15—H15C | 109.5 |
| N6—P3—N7 | 115.2 (3) | H15B—C15—H15C | 109.5 |
| O8—P4—N11 | 111.2 (3) | N7—C16—H16A | 109.5 |
| O8—P4—N10 | 109.6 (3) | N7—C16—H16B | 109.5 |
| N11—P4—N10 | 108.5 (4) | H16A—C16—H16B | 109.5 |
| O8—P4—N9 | 109.1 (4) | N7—C16—H16C | 109.5 |
| N11—P4—N9 | 109.4 (4) | H16A—C16—H16C | 109.5 |
| N10—P4—N9 | 109.1 (4) | H16B—C16—H16C | 109.5 |
| N1—O1—Dy1 | 96.0 (3) | N5—C17—H17A | 109.5 |

| | | | |
|---|---|---|---|
| N1—O2—Dy1 | 95.2 (3) | N5—C17—H17B | 109.5 |
| N2—O4—Dy1 | 96.0 (3) | H17A—C17—H17B | 109.5 |
| N2—O5—Dy1 | 95.9 (3) | N5—C17—H17C | 109.5 |
| P3—O7—Dy1 | 158.6 (3) | H17A—C17—H17C | 109.5 |
| P4—O8—Dy1 | 167.2 (3) | H17B—C17—H17C | 109.5 |
| P2—O9—Dy1 | 167.6 (3) | N10—C18—H18A | 109.5 |
| P1—O10—Dy1 | 161.3 (3) | N10—C18—H18B | 109.5 |
| O3—N1—O2 | 121.8 (5) | H18A—C18—H18B | 109.5 |
| O3—N1—O1 | 121.5 (6) | N10—C18—H18C | 109.5 |
| O2—N1—O1 | 116.7 (5) | H18A—C18—H18C | 109.5 |
| O3—N1—Dy1 | 174.8 (5) | H18B—C18—H18C | 109.5 |
| O2—N1—Dy1 | 58.9 (3) | N13—C19—H19A | 109.5 |
| O1—N1—Dy1 | 58.0 (3) | N13—C19—H19B | 109.5 |
| O6—N2—O4 | 122.4 (5) | H19A—C19—H19B | 109.5 |
| O6—N2—O5 | 121.8 (5) | N13—C19—H19C | 109.5 |
| O4—N2—O5 | 115.7 (5) | H19A—C19—H19C | 109.5 |
| O6—N2—Dy1 | 171.8 (4) | H19B—C19—H19C | 109.5 |
| O4—N2—Dy1 | 58.2 (3) | N8—C20—H20A | 109.5 |
| O5—N2—Dy1 | 58.2 (3) | N8—C20—H20B | 109.5 |
| C10—N3—C13 | 114.4 (6) | H20A—C20—H20B | 109.5 |
| C10—N3—P2 | 125.1 (5) | N8—C20—H20C | 109.5 |
| C13—N3—P2 | 119.5 (5) | H20A—C20—H20C | 109.5 |
| C11—N4—C9 | 114.6 (5) | H20B—C20—H20C | 109.5 |
| C11—N4—P2 | 120.2 (4) | N9—C21—H21A | 109.5 |
| C9—N4—P2 | 122.0 (5) | N9—C21—H21B | 109.5 |
| C17—N5—C24 | 114.3 (7) | H21A—C21—H21B | 109.5 |
| C17—N5—P2 | 120.3 (6) | N9—C21—H21C | 109.5 |
| C24—N5—P2 | 124.7 (6) | H21A—C21—H21C | 109.5 |
| C1—N6—C4 | 113.1 (6) | H21B—C21—H21C | 109.5 |
| C1—N6—P3 | 121.8 (5) | N9—C22—H22A | 109.5 |
| C4—N6—P3 | 121.3 (5) | N9—C22—H22B | 109.5 |
| C7—N7—C16 | 111.5 (7) | H22A—C22—H22B | 109.5 |
| C7—N7—P3 | 120.0 (5) | N9—C22—H22C | 109.5 |
| C16—N7—P3 | 120.5 (6) | H22A—C22—H22C | 109.5 |
| C20—N8—C5 | 113.6 (7) | H22B—C22—H22C | 109.5 |
| C20—N8—P3 | 120.9 (6) | N11—C23—H23A | 109.5 |
| C5—N8—P3 | 122.5 (6) | N11—C23—H23B | 109.5 |
| C21—N9—C22 | 112.7 (8) | H23A—C23—H23B | 109.5 |
| C21—N9—P4 | 122.4 (6) | N11—C23—H23C | 109.5 |
| C22—N9—P4 | 124.0 (8) | H23A—C23—H23C | 109.5 |
| C8—N10—C18 | 115.5 (6) | H23B—C23—H23C | 109.5 |
| C8—N10—P4 | 119.1 (5) | N5—C24—H24A | 109.5 |
| C18—N10—P4 | 123.6 (6) | N5—C24—H24B | 109.5 |
| C15—N11—C23 | 118.4 (9) | H24A—C24—H24B | 109.5 |
| C15—N11—P4 | 119.7 (6) | N5—C24—H24C | 109.5 |
| C23—N11—P4 | 121.9 (8) | H24A—C24—H24C | 109.5 |
| C3—N12—C2 | 113.2 (6) | H24B—C24—H24C | 109.5 |
| C3—N12—P1 | 120.4 (5) | S1—W1—S3 | 109.94 (7) |

| | | | |
|---|---|---|---|
| C2—N12—P1 | 120.4 (5) | S1—W1—S2 | 108.07 (6) |
| C14—N13—C19 | 110.2 (7) | S3—W1—S2 | 108.76 (6) |
| C14—N13—P1 | 124.2 (5) | S1—W1—S4 | 108.31 (7) |
| C19—N13—P1 | 120.9 (5) | S3—W1—S4 | 108.59 (7) |
| C6—N14—C12 | 115.7 (7) | S2—W1—S4 | 113.16 (6) |
| C6—N14—P1 | 120.3 (5) | S1—W1—Ag1$^{i}$ | 125.56 (5) |
| C12—N14—P1 | 120.2 (5) | S3—W1—Ag1$^{i}$ | 124.49 (5) |
| N6—C1—H1A | 109.5 | S2—W1—Ag1$^{i}$ | 57.64 (4) |
| N6—C1—H1B | 109.5 | S4—W1—Ag1$^{i}$ | 55.53 (4) |
| H1A—C1—H1B | 109.5 | S1—W1—Ag1 | 58.82 (5) |
| N6—C1—H1C | 109.5 | S3—W1—Ag1 | 58.69 (5) |
| H1A—C1—H1C | 109.5 | S2—W1—Ag1 | 148.75 (4) |
| H1B—C1—H1C | 109.5 | S4—W1—Ag1 | 98.09 (4) |
| N12—C2—H2A | 109.5 | Ag1$^{i}$—W1—Ag1 | 153.606 (11) |
| N12—C2—H2B | 109.5 | S4$^{ii}$—Ag1—S2$^{ii}$ | 93.58 (5) |
| H2A—C2—H2B | 109.5 | S4$^{ii}$—Ag1—S3 | 121.50 (6) |
| N12—C2—H2C | 109.5 | S2$^{ii}$—Ag1—S3 | 119.81 (6) |
| H2A—C2—H2C | 109.5 | S4$^{ii}$—Ag1—S1 | 120.82 (6) |
| H2B—C2—H2C | 109.5 | S2$^{ii}$—Ag1—S1 | 117.31 (6) |
| N12—C3—H3A | 109.5 | S3—Ag1—S1 | 86.63 (5) |
| N12—C3—H3B | 109.5 | S4$^{ii}$—Ag1—W1$^{ii}$ | 47.05 (4) |
| H3A—C3—H3B | 109.5 | S2$^{ii}$—Ag1—W1$^{ii}$ | 46.54 (3) |
| N12—C3—H3C | 109.5 | S3—Ag1—W1$^{ii}$ | 137.39 (4) |
| H3A—C3—H3C | 109.5 | S1—Ag1—W1$^{ii}$ | 135.88 (5) |
| H3B—C3—H3C | 109.5 | S4$^{ii}$—Ag1—W1 | 151.77 (4) |
| N6—C4—H4A | 109.5 | S2$^{ii}$—Ag1—W1 | 114.62 (4) |
| N6—C4—H4B | 109.5 | S3—Ag1—W1 | 45.86 (4) |
| H4A—C4—H4B | 109.5 | S1—Ag1—W1 | 45.63 (4) |
| N6—C4—H4C | 109.5 | W1$^{ii}$—Ag1—W1 | 161.16 (2) |
| H4A—C4—H4C | 109.5 | W1—S1—Ag1 | 75.55 (5) |
| H4B—C4—H4C | 109.5 | W1—S2—Ag1$^{i}$ | 75.81 (5) |
| N8—C5—H5A | 109.5 | W1—S3—Ag1 | 75.45 (5) |
| N8—C5—H5B | 109.5 | W1—S4—Ag1$^{i}$ | 77.43 (5) |
| H5A—C5—H5B | 109.5 | | |

Symmetry codes: (i) $x$, $-y+1/2$, $z+1/2$; (ii) $x$, $-y+1/2$, $z-1/2$.