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Triammonium hexahydroxidooctadecaoxidohexamolybdogallate(III) heptahydrate

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Key indicators: single-crystal X-ray study; T = 173 K; mean σ(Mo–O) = 0.004 Å; H-atom completeness 19%; R factor = 0.040; wR factor = 0.110; data-to-parameter ratio = 15.7.

The title compound, $(NH_4)_3[GaMo_6(OH)_6O_{18}]\cdot 7H_2O$, contains two centrosymmetric $GaMo_6$ B-type Anderson cluster units consisting of central GaO_6 octahedra surrounded by a hexagonal assembly of MoO_6 edge-sharing octahedra. Like other B-type Anderson clusters, where the central Mo atom is substituted with a di- or trivalent metal ion, the central six μ_3-oxido bridges are protonated. The average Ga—O bond length is 1.97 (1) Å, whereas the average Mo—O distances are 2.29 (2), 1.94 (1) and 1.709 (5) Å, respectively, for Mo—(μ_3-OH), Mo—(μ_2-O) and Mo=O bonds. In the crystal structure, the $Ga(\mu_3\text{-}OH)_6Mo_6O_{18}^{3-}$ polyanionic clusters are surrounded by NH_4^+ cations and solvent water molecules, forming an extended network of hydrogen bonds.

Related literature

The gallium-substituted B-type Anderson cluster has been observed previously in solution and the solid state (Rollins & Earley, 1959; Kitazumi *et al.*, 2003), but crystal structures have not been reported. Anderson–Evans clusters are well known and many papers dealing with their preparation have been published (Anderson, 1937; Lorenzo-Luis & Gili, 2000; Lee *et al.*, 2001, and references therein). A similar planar core of seven metals is observed in the recently reported structure of $[Ga_{13}(\mu_3\text{-}OH)_6(\mu_2\text{-}OH)_{18}(H_2O)_{24}](NO_3)_{15}$ (Rather *et al.*, 2005). Research into this structure led to isolation of the title compound.

Experimental

Crystal data

$(NH_4)_3[GaMo_6(OH)_6O_{18}]\cdot 7H_2O$
M_r = 1215.65
Monoclinic, $P2_1/c$
a = 22.7642 (15) Å
b = 10.9651 (7) Å
c = 11.7599 (8) Å
β = 100.2120 (10)°
V = 2888.9 (3) Å^3
Z = 4
Mo $K\alpha$ radiation
μ = 3.56 mm^{-1}
T = 173 (2) K
0.38 × 0.20 × 0.03 mm

Data collection

Bruker SMART APEX CCD diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1995)
T_{min} = 0.345, T_{max} = 0.901
15163 measured reflections
6225 independent reflections
4471 reflections with $I > 2\sigma(I)$
R_{int} = 0.020

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.040
$wR(F^2)$ = 0.110
S = 1.17
6225 reflections
397 parameters
6 restraints
H atoms treated by a mixture of independent and constrained refinement
$\Delta\rho_{max}$ = 1.02 e Å^{-3}
$\Delta\rho_{min}$ = −1.10 e Å^{-3}

Table 1
Selected bond lengths (Å).

Ga1—O3	1.953 (3)	Mo3—O6	1.949 (4)
Ga1—O1	1.954 (4)	Mo3—O3	2.252 (4)
Ga1—O2	1.972 (3)	Mo3—O1^{i}	2.286 (4)
Ga2—O15	1.968 (3)	Mo4—O19	1.705 (4)
Ga2—O13	1.969 (3)	Mo4—O20	1.713 (4)
Ga2—O14	1.978 (3)	Mo4—O17	1.939 (3)
Mo1—O7	1.703 (4)	Mo4—O16	1.948 (3)
Mo1—O8	1.711 (4)	Mo4—O13	2.286 (3)
Mo1—O5	1.918 (4)	Mo4—O14	2.324 (3)
Mo1—O4	1.939 (4)	Mo5—O21	1.702 (4)
Mo1—O1	2.293 (4)	Mo5—O22	1.708 (3)
Mo1—O2	2.307 (4)	Mo5—O17	1.932 (4)
Mo2—O9	1.704 (4)	Mo5—O18	1.956 (3)
Mo2—O10	1.714 (4)	Mo5—O15	2.285 (3)
Mo2—O6	1.943 (4)	Mo5—O14	2.284 (3)
Mo2—O5	1.948 (4)	Mo6—O23	1.712 (3)
Mo2—O3	2.287 (4)	Mo6—O24	1.719 (4)
Mo2—O2	2.300 (3)	Mo6—O16^{ii}	1.917 (4)
Mo3—O12	1.711 (4)	Mo6—O18	1.944 (4)
Mo3—O11	1.715 (4)	Mo6—O15	2.273 (3)
Mo3—O4^{i}	1.918 (4)	Mo6—O13^{ii}	2.290 (3)

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

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

D—H···A	D—H	H···A	D···A	D—H···A
O2—H2···O10^{iii}	0.84 (2)	2.00 (3)	2.822 (5)	166 (6)
O13—H13···O23^{iv}	0.84 (2)	1.86 (2)	2.691 (5)	173 (7)
O14—H14···O22^{v}	0.84 (2)	1.98 (2)	2.808 (5)	168 (6)
O3—H3···O4S^{vi}	0.85 (2)	1.76 (3)	2.602 (5)	169 (8)
O1—H1···O11^{vii}	0.85 (2)	1.87 (4)	2.682 (5)	159 (9)
O15—H15···O1S	0.83 (2)	1.87 (3)	2.645 (5)	155 (7)

Symmetry codes: (iii) $x, -y+\frac{1}{2}, z-\frac{1}{2}$; (iv) $-x, y-\frac{1}{2}, -z+\frac{1}{2}$; (v) $x, -y+\frac{3}{2}, z+\frac{1}{2}$; (vi) $x, -y+\frac{1}{2}, z+\frac{1}{2}$; (vii) $-x+1, y+\frac{1}{2}, -z+\frac{3}{2}$.

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Table 3
Short contact geometry (Å).

N1*S*···O24^{ii}	2.911 (7)	O2*S*···O12	2.797 (6)
N1*S*···O6*S*^{vi}	2.784 (8)	O2*S*···O3*S*^{xii}	2.830 (7)
N2*S*···O16	2.779 (6)	O2*S*···O6*S*^{ix}	2.704 (7)
N2*S*···O21^{iii}	2.979 (6)	O3*S*···O9	3.016 (6)
N2*S*···O24^{vii}	2.901 (6)	O3*S*···O19	3.034 (7)
N2*S*···O3*S*^{viii}	2.899 (7)	O3*S*···O5*S*^{iv}	2.917 (8)
N2*S*···O7*S*	2.898 (7)	O4*S*···O3^{xiii}	2.602 (5)
N3*S*···O5^{i}	2.775 (6)	O4*S*···O6	2.773 (6)
N3*S*···O12^{xii}	2.907 (7)	O4*S*···O6^{xii}	2.934 (6)
N3*S*···O5*S*	2.801 (8)	O5*S*···O8	2.782 (6)
N3*S*···O7*S*^{i}	3.030 (8)	O5*S*···O16^{i}	3.083 (6)
O1*S*···O18^{x}	2.794 (5)	O6*S*···O20	2.776 (6)
O1*S*···O18^{ii}	2.905 (6)	O6*S*···O7*S*	2.769 (7)
O2*S*···O4^{xi}	2.718 (5)	O7*S*···O7^{xiv}	2.973 (6)

Symmetry codes (i): $x, -y+\frac{1}{2}, z-\frac{1}{2}$; (ii): $-x, y-\frac{1}{2}, -z+\frac{1}{2}$; (iii): $x, -y+\frac{3}{2}, z+\frac{1}{2}$; (iv): $x, -y+\frac{1}{2}, z+\frac{1}{2}$; (v): $-x+1, y+\frac{1}{2}, -z+\frac{3}{2}$; (vi): $x, -y+\frac{3}{2}, z-\frac{1}{2}$; (vii): $-x, y-\frac{1}{2}, -z+\frac{3}{2}$; (viii): $x, -y+\frac{1}{2}, z+\frac{1}{2}$; (ix): $1-x, 1-y, 1-z$; (x): $x, -y+\frac{3}{2}, z-\frac{1}{2}$; (xi): $-x+1, y-\frac{1}{2}, -z+\frac{1}{2}$; (xii): $-x+1, -y, -z+1$; (xiii): $x, -y+\frac{1}{2}, z-\frac{1}{2}$; (xiv): $x, -y+\frac{3}{2}, z+\frac{1}{2}$

Data collection: *SMART* (Bruker, 2000); cell refinement: *SAINT* (Bruker, 2000); data reduction: *SAINT*; program(s) used to solve structure: *SHELXTL* (Bruker, 2000); program(s) used to refine structure: *SHELXTL*; molecular graphics: *SHELXTL*; 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: WM2161).

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supporting information

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Triammonium hexahydroxidooctadecaoxidohexamolybdogallate(III) heptahydrate

Zachary L. Mensinger, Lev N. Zakharov and Darren W. Johnson

S1. Comment

Compounds containing Anderson-type clusters have been explored for applications as structural aesthetics, biologically active compounds, and catalysts (Rollins & Earley, 1959; Lorenzo-Luis & Gili, 2000). They have also been shown to act as building blocks for larger molecular assemblies, where they can be linked to form extended networks with pores and cavities (Lorenzo-Luis & Gili, 2000). The majority of Anderson clusters are based on $Mo_7O_{24}^{6-}$ or $W_7O_{24}^{6-}$ frameworks, and many structures have been synthesized with substitution of the central octahedron or variable bridging ligands (Lorenzo-Luis & Gili, 2000). Due to the similarity of the structure of the $Mo_7O_{24}^{6-}$ complex to the inner planar core of our recently reported flat-Ga_{13} metal-hydroxo cluster $[Ga_{13}(\mu_3\text{-}OH)_6(\mu_2\text{-}OH)_{18}(H_2O)_{24}](NO_3)_{15}$ (Rather *et al.*, 2005), it was hypothesized that a mixed-metal Mo_7Ga_6 compound could be obtained by reaction of $(NH_4)_6Mo_7O_{24}$ with six or more equivalents of $Ga(NO_3)_3$. Setting up the reaction in a similar manner to the synthesis of flat-Ga_{13} (dissolving starting materials in a MeOH:H_2O mixture and adding *N*-nitroso-di-n-butylamine), single crystals of the gallium-substituted B-type Anderson cluster, $(NH_4)_3[Ga(\mu_3\text{-}OH)_6Mo_6O_{18}]\cdot 7H_2O$, (I), were isolated and structurally characterized by X-ray crystallography.

Anderson-type polyanions were first described by Anderson (1937). The planar structure consisting of seven metals observed in that compound is also observed in the structure of (I), with average Ga—O bond lengths of 1.97 (1) Å. The average Mo—O distances are 2.29 (2), 1.94 (1) and 1.710 (5) Å, respectively, for Mo-(μ_3-OH), Mo-(μ_2-O) and Mo=O. There are six μ_3-OH bridges, six μ_2-oxo bridges, and twelve terminal oxo ligands for each of the two independent cluster anions (Figure 1).

Extensive literature reports have covered the different structural variants and chemistry of hexamolybdoaluminate(III) polyanions (Lorenzo-Luis & Gili, 2000). The synthesis reported herein also represents an alternative preparation of the Al-substituted structure, with no acid addition required (as is usually the case). Synthesis by this method also represents a far more benign method than that previously reported. The Ga-substituted B-type Anderson compound had been synthesized previously by adding a solution of Ga metal in concentrated HNO_3 to a solution of MoO_3 in aqueous NaOH. The mixture was heated overnight and rinsed several times with acetone, and vacuum dried overnight, affording product as the sodium salt. However, a crystal structure determination of the title compound has not been reported previously (Rollins & Earley, 1959; Kitazumi *et al.*, 2003).

S2. Experimental

Commercial products $(NH_4)_6Mo_7O_{24}$ (Baker and Adamson) and $Ga(NO_3)_3$ (Strem) were used to obtain the title compound, (I). $(NH_4)_6Mo_7O_{24}$ (0.25 g, 0.2 mmol) and $Ga(NO_3)_3$ (0.7 g, 1.92 mmol) were dissolved in a 1:1 H_2O/MeOH mixture (10 ml) in a 20 ml scintillation vial. The mixture was heated slightly, with some cloudiness remaining in the mixture. *N*-nitroso-di-n-butylamine (0.45 g, 0.5 ml, 2.8 mmol) was added, and was not initially miscible. Additional MeOH (~2 ml)

brought most into solution, and the mixture was then filtered. The remaining solution was evaporated, and after 9 d clear, colorless crystals with block-like habit had formed around the outside edge of the vial. The crystals were isolated in 90% crude yield. Fewer equivalents of $Ga(NO_3)_3$ (relative to $(NH_4)_6Mo_7O_{24}$) and no organic additive (H_2O as solvent only) have also been used successfully to produce crystals of (I).

S3. Refinement

The H atoms of the μ_3-oxo groups were found from difference Fourier maps and were refined with restraints; the value of 0.85 Å was used as a target for corresponding O—H distances in the refinement. The H atoms in the NH_4^+ cations and solvent water molecules were not found and thus were not taken into consideration. Positions of N atoms of the NH_4^+ cations *versus* positions of the solvent water molecules were found based on analysis of the network of H-bonds in the structure. The positions of two NH_4^+ cations found in the structure of (I) are close to positions of the K cations found in the structure of $K_3[Co(\mu_3\text{-}OH)_6Mo_6O_{18}]\cdot 7H_2O$ (Lee *et al.*, 2001), but the position of the third one is different against the positions of the third K cation in the potassium compound. Both structures crystallize in the same space groups and exhibit similar lattice parameters of the unit cells. However, the β-angles in these structures are different (100.212 (1)° in (I) *versus* 94.577 (9)° in $K_3[Co(\mu_3\text{-}OH)_6Mo_6O_{18}]\cdot 7H_2O$) that indicates the packing in these structures seems to be different. The highest peak and the deepest hole observed in the final Fourier map are 0.96 and 0.87 Å away from atoms O1S and Mo6, respectively.

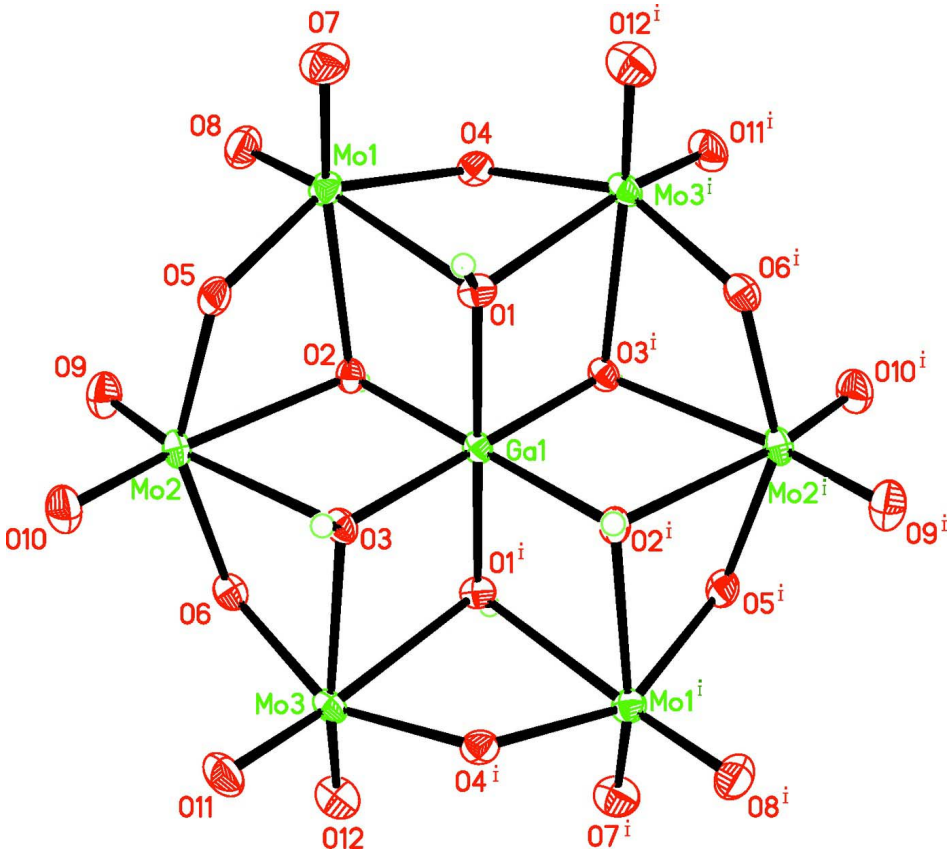

Figure 1

One of the two symmetrically independent $Ga(\mu_3\text{-}OH)_6Mo_6O_{18}^{-3}$ anions in the crystal structure of (I). Displacement ellipsoids are drawn at the 50% probability level. [Symmetry code (i): 1 - *x*, 1 - *y*, 1 - *z*].

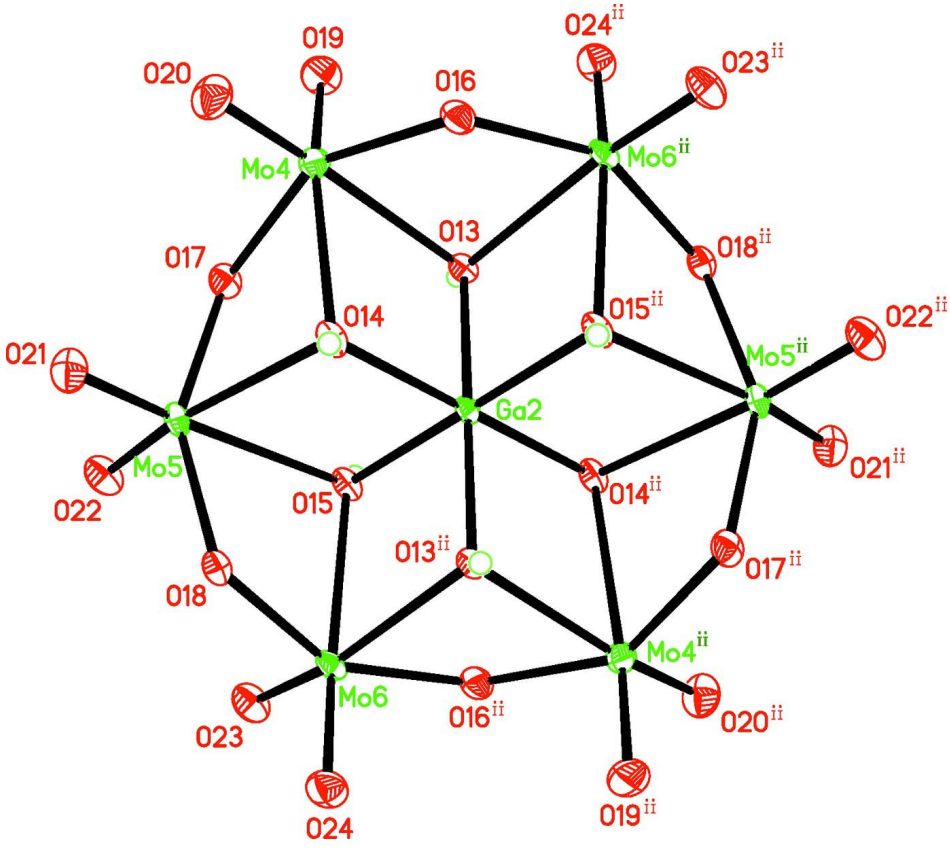

Figure 2

The second polyanionic cluster, displayed at the same probability level than in Fig. 1. [Symmetry code: (ii) -*x*, 1 - *y*, 1 - *z*.]

Triammonium hexahydroxidooctadecaoxidohexamolybdogallate(III) heptahydrate

Crystal data

$(NH_4)_3[GaMo_6(OH)_6O_{18}]\cdot 7H_2O$
$M_r = 1215.65$
Monoclinic, $P2_1/c$
Hall symbol: -P 2ybc
$a = 22.7642\ (15)$ Å
$b = 10.9651\ (7)$ Å
$c = 11.7599\ (8)$ Å
$\beta = 100.212\ (1)°$
$V = 2888.9\ (3)$ Å^3
$Z = 4$
$F(000) = 2336$
$D_x = 2.795$ Mg m^{-3}
Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å
Cell parameters from 4958 reflections
$\theta = 2.6–27.0°$
$\mu = 3.56$ mm^{-1}
$T = 173$ K
Plate, colorless
0.38 × 0.20 × 0.03 mm

Data collection

Bruker SMART APEX CCD diffractometer
Radiation source: fine-focus sealed tube
Graphite monochromator
φ and ω scans
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1995)
$T_{min} = 0.345$, $T_{max} = 0.901$
15163 measured reflections
6225 independent reflections
4471 reflections with $I > 2\sigma(I)$
$R_{int} = 0.020$
$\theta_{max} = 27.0°$, $\theta_{min} = 0.9°$
$h = -29\rightarrow28$
$k = -13\rightarrow12$
$l = -15\rightarrow8$

Refinement

Refinement on F^2
Least-squares matrix: full
$R[F^2 > 2\sigma(F^2)] = 0.040$
$wR(F^2) = 0.110$
$S = 1.17$
6225 reflections
397 parameters
6 restraints
Primary atom site location: structure-invariant direct methods
Secondary atom site location: difference Fourier map
Hydrogen site location: inferred from neighbouring sites
H atoms treated by a mixture of independent and constrained refinement
$w = 1/[\sigma^2(F_o^2) + (0.0387P)^2 + 12.6663P]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max} = 0.001$
$\Delta\rho_{max} = 1.02$ e Å^{-3}
$\Delta\rho_{min} = -1.10$ 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.

Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å²)

	x	*y*	*z*	U_{iso}*/U_{eq}
Ga1	0.5000	0.5000	0.5000	0.01123 (17)
Ga2	0.0000	0.5000	0.5000	0.00902 (16)
Mo1	0.35141 (2)	0.51841 (4)	0.45196 (4)	0.01479 (12)
Mo2	0.41872 (2)	0.26668 (4)	0.56993 (4)	0.01458 (12)
Mo3	0.56707 (2)	0.25263 (4)	0.62097 (4)	0.01402 (12)
Mo4	0.149068 (19)	0.48479 (4)	0.54667 (4)	0.01355 (12)
Mo5	0.079304 (19)	0.73509 (4)	0.42939 (4)	0.01232 (11)
Mo6	−0.069381 (19)	0.74690 (4)	0.37855 (4)	0.01178 (11)
O1	0.43873 (16)	0.6143 (3)	0.5303 (3)	0.0141 (7)
O2	0.43179 (15)	0.4003 (3)	0.4257 (3)	0.0129 (7)
O3	0.49702 (16)	0.3947 (3)	0.6328 (3)	0.0134 (7)
O4	0.37835 (15)	0.6157 (3)	0.3335 (3)	0.0158 (8)
O5	0.37155 (16)	0.4126 (3)	0.5830 (3)	0.0170 (8)
O6	0.49123 (16)	0.1923 (3)	0.5366 (3)	0.0156 (7)
O7	0.31028 (18)	0.6221 (4)	0.5119 (3)	0.0246 (9)
O8	0.30144 (17)	0.4316 (4)	0.3604 (3)	0.0237 (9)
O9	0.36921 (17)	0.1825 (4)	0.4758 (3)	0.0231 (9)
O10	0.41851 (18)	0.2072 (4)	0.7046 (3)	0.0236 (9)
O11	0.56491 (18)	0.1958 (4)	0.7561 (3)	0.0226 (9)
O12	0.61044 (18)	0.1536 (4)	0.5596 (3)	0.0238 (9)
O13	0.06252 (15)	0.3866 (3)	0.4699 (3)	0.0102 (7)
O14	0.06773 (16)	0.6024 (3)	0.5736 (3)	0.0116 (7)
O15	0.00201 (15)	0.6053 (3)	0.3652 (3)	0.0110 (7)
O16	0.12375 (16)	0.3851 (3)	0.6664 (3)	0.0162 (8)
O17	0.12752 (16)	0.5927 (3)	0.4152 (3)	0.0151 (7)
O18	0.00595 (15)	0.8078 (3)	0.4637 (3)	0.0136 (7)
O19	0.19123 (17)	0.3843 (4)	0.4850 (3)	0.0226 (9)
O20	0.19832 (17)	0.5724 (4)	0.6393 (3)	0.0234 (9)

O21	0.12650 (17)	0.8245 (4)	0.5225 (3)	0.0211 (8)
O22	0.07868 (17)	0.7965 (3)	0.2957 (3)	0.0189 (8)
O23	−0.06660 (17)	0.8033 (3)	0.2438 (3)	0.0193 (8)
O24	−0.11382 (17)	0.8471 (3)	0.4373 (3)	0.0202 (8)
N1S	0.1801 (2)	0.5087 (5)	0.2359 (5)	0.0322 (12)
N2S	0.1667 (2)	0.4712 (5)	0.8877 (4)	0.0248 (11)
N3S	0.3235 (3)	0.0134 (5)	0.2727 (5)	0.0359 (14)
O1S	−0.0158 (3)	0.5433 (4)	0.1444 (4)	0.0396 (13)
O2S	0.6662 (2)	0.0517 (4)	0.3883 (4)	0.0323 (10)
O3S	0.2536 (2)	0.1465 (5)	0.5634 (4)	0.0427 (12)
O4S	0.4997 (3)	0.0459 (5)	0.3479 (4)	0.063 (2)
O5S	0.2479 (2)	0.2149 (5)	0.2729 (5)	0.0456 (13)
O6S	0.2500 (2)	0.8016 (5)	0.6761 (4)	0.0430 (12)
O7S	0.2491 (2)	0.6706 (5)	0.8771 (4)	0.0446 (13)
H1	0.428 (4)	0.643 (8)	0.591 (5)	0.07 (3)*
H2	0.434 (3)	0.373 (6)	0.360 (3)	0.032 (19)*
H3	0.493 (4)	0.416 (8)	0.701 (3)	0.06 (3)*
H13	0.062 (3)	0.365 (6)	0.401 (2)	0.027 (18)*
H14	0.065 (3)	0.634 (6)	0.638 (3)	0.027 (18)*
H15	0.003 (3)	0.568 (5)	0.304 (3)	0.031 (19)*

Atomic displacement parameters (Å²)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Ga1	0.0137 (4)	0.0111 (4)	0.0095 (4)	0.0004 (3)	0.0037 (3)	0.0004 (3)
Ga2	0.0122 (4)	0.0076 (4)	0.0078 (4)	0.0004 (3)	0.0033 (3)	0.0009 (3)
Mo1	0.0136 (2)	0.0175 (3)	0.0137 (2)	0.00039 (17)	0.00386 (17)	0.00109 (18)
Mo2	0.0179 (2)	0.0135 (2)	0.0132 (2)	−0.00216 (17)	0.00494 (17)	0.00214 (17)
Mo3	0.0182 (2)	0.0129 (2)	0.0114 (2)	0.00243 (17)	0.00382 (17)	0.00248 (17)
Mo4	0.0130 (2)	0.0149 (2)	0.0130 (2)	0.00026 (16)	0.00294 (17)	0.00230 (17)
Mo5	0.0163 (2)	0.0106 (2)	0.0105 (2)	−0.00180 (16)	0.00373 (17)	0.00182 (16)
Mo6	0.0164 (2)	0.0102 (2)	0.0094 (2)	0.00274 (16)	0.00408 (16)	0.00240 (16)
O1	0.0144 (19)	0.018 (2)	0.0103 (18)	0.0022 (14)	0.0039 (14)	0.0003 (15)
O2	0.0146 (18)	0.0135 (18)	0.0107 (18)	−0.0024 (14)	0.0026 (14)	0.0000 (15)
O3	0.0168 (19)	0.0130 (18)	0.0111 (18)	0.0005 (14)	0.0045 (14)	0.0018 (15)
O4	0.0149 (18)	0.020 (2)	0.0115 (17)	0.0002 (15)	−0.0002 (14)	0.0015 (15)
O5	0.0157 (19)	0.019 (2)	0.0188 (19)	−0.0008 (15)	0.0090 (15)	0.0015 (15)
O6	0.020 (2)	0.0124 (18)	0.0147 (18)	0.0008 (14)	0.0045 (14)	−0.0014 (15)
O7	0.024 (2)	0.028 (2)	0.023 (2)	0.0061 (17)	0.0100 (17)	0.0019 (18)
O8	0.018 (2)	0.026 (2)	0.027 (2)	−0.0047 (16)	0.0038 (16)	0.0017 (18)
O9	0.024 (2)	0.022 (2)	0.023 (2)	−0.0078 (16)	0.0037 (16)	−0.0005 (17)
O10	0.026 (2)	0.023 (2)	0.024 (2)	−0.0022 (17)	0.0092 (17)	0.0061 (17)
O11	0.028 (2)	0.022 (2)	0.0181 (19)	0.0011 (17)	0.0039 (16)	0.0082 (17)
O12	0.029 (2)	0.023 (2)	0.020 (2)	0.0043 (17)	0.0072 (17)	−0.0003 (17)
O13	0.0146 (18)	0.0108 (17)	0.0059 (16)	0.0017 (13)	0.0037 (13)	−0.0002 (14)
O14	0.0200 (19)	0.0109 (18)	0.0046 (16)	−0.0005 (14)	0.0037 (14)	−0.0001 (14)
O15	0.0197 (19)	0.0091 (17)	0.0050 (16)	0.0009 (14)	0.0042 (13)	−0.0008 (14)
O16	0.0175 (19)	0.0160 (19)	0.0148 (18)	0.0015 (15)	0.0025 (14)	0.0037 (15)

O17	0.0184 (19)	0.0167 (19)	0.0113 (17)	0.0001 (14)	0.0058 (14)	0.0023 (14)
O18	0.0173 (19)	0.0097 (17)	0.0140 (17)	−0.0011 (14)	0.0037 (14)	−0.0001 (14)
O19	0.021 (2)	0.025 (2)	0.025 (2)	0.0058 (16)	0.0134 (16)	0.0031 (17)
O20	0.022 (2)	0.027 (2)	0.019 (2)	−0.0062 (17)	−0.0009 (16)	0.0002 (17)
O21	0.022 (2)	0.020 (2)	0.021 (2)	−0.0041 (16)	0.0043 (16)	0.0008 (16)
O22	0.029 (2)	0.018 (2)	0.0110 (18)	0.0026 (16)	0.0067 (15)	0.0024 (15)
O23	0.028 (2)	0.019 (2)	0.0114 (18)	0.0017 (16)	0.0044 (15)	0.0040 (15)
O24	0.023 (2)	0.018 (2)	0.022 (2)	0.0041 (16)	0.0089 (16)	−0.0009 (16)
N1S	0.031 (3)	0.041 (3)	0.025 (3)	0.000 (2)	0.005 (2)	−0.007 (2)
N2S	0.027 (3)	0.029 (3)	0.021 (2)	0.001 (2)	0.011 (2)	−0.005 (2)
N3S	0.036 (3)	0.042 (3)	0.032 (3)	0.006 (3)	0.014 (3)	0.016 (3)
O1S	0.086 (4)	0.019 (2)	0.018 (2)	0.004 (2)	0.022 (2)	−0.0010 (18)
O2S	0.034 (3)	0.041 (3)	0.021 (2)	0.005 (2)	0.0056 (18)	−0.001 (2)
O3S	0.032 (3)	0.051 (3)	0.042 (3)	−0.005 (2)	−0.001 (2)	−0.002 (2)
O4S	0.159 (7)	0.021 (3)	0.013 (2)	0.008 (3)	0.021 (3)	0.0012 (19)
O5S	0.038 (3)	0.041 (3)	0.057 (3)	−0.010 (2)	0.008 (2)	−0.014 (3)
O6S	0.044 (3)	0.040 (3)	0.044 (3)	−0.012 (2)	0.007 (2)	−0.005 (2)
O7S	0.053 (3)	0.038 (3)	0.038 (3)	−0.011 (2)	−0.004 (2)	−0.003 (2)

Geometric parameters (Å, º)

Ga1—O3^{i}	1.953 (3)	Mo3—O6	1.949 (4)
Ga1—O3	1.953 (3)	Mo3—O3	2.252 (4)
Ga1—O1^{i}	1.954 (4)	Mo3—O1^{i}	2.286 (4)
Ga1—O1	1.954 (4)	Mo4—O19	1.705 (4)
Ga1—O2^{i}	1.972 (3)	Mo4—O20	1.713 (4)
Ga1—O2	1.972 (3)	Mo4—O17	1.939 (3)
Ga2—O15^{ii}	1.968 (3)	Mo4—O16	1.948 (3)
Ga2—O15	1.968 (3)	Mo4—O13	2.286 (3)
Ga2—O13^{ii}	1.969 (3)	Mo4—O14	2.324 (3)
Ga2—O13	1.969 (3)	Mo5—O21	1.702 (4)
Ga2—O14	1.978 (3)	Mo5—O22	1.708 (3)
Ga2—O14^{ii}	1.978 (3)	Mo5—O17	1.932 (4)
Mo1—O7	1.703 (4)	Mo5—O18	1.956 (3)
Mo1—O8	1.711 (4)	Mo5—O15	2.285 (3)
Mo1—O5	1.918 (4)	Mo5—O14	2.284 (3)
Mo1—O4	1.939 (4)	Mo6—O23	1.712 (3)
Mo1—O1	2.293 (4)	Mo6—O24	1.719 (4)
Mo1—O2	2.307 (4)	Mo6—O16^{ii}	1.917 (4)
Mo2—O9	1.704 (4)	Mo6—O18	1.944 (4)
Mo2—O10	1.714 (4)	Mo6—O15	2.273 (3)
Mo2—O6	1.943 (4)	Mo6—O13^{ii}	2.290 (3)
Mo2—O5	1.948 (4)	O1—H1	0.85 (2)
Mo2—O3	2.287 (4)	O2—H2	0.84 (2)
Mo2—O2	2.300 (3)	O3—H3	0.85 (2)
Mo3—O12	1.711 (4)	O13—H13	0.84 (2)
Mo3—O11	1.715 (4)	O14—H14	0.84 (2)
Mo3—O4^{i}	1.918 (4)	O15—H15	0.83 (2)

O3^{i}—Ga1—O3	180.0	O19—Mo4—O13	92.19 (16)
O3^{i}—Ga1—O1^{i}	96.11 (15)	O20—Mo4—O13	159.49 (16)
O3—Ga1—O1^{i}	83.89 (15)	O17—Mo4—O13	83.94 (14)
O3^{i}—Ga1—O1	83.89 (15)	O16—Mo4—O13	71.12 (13)
O3—Ga1—O1	96.11 (15)	O19—Mo4—O14	159.82 (16)
O1^{i}—Ga1—O1	180.00 (14)	O20—Mo4—O14	92.85 (16)
O3^{i}—Ga1—O2^{i}	83.70 (15)	O17—Mo4—O14	71.01 (13)
O3—Ga1—O2^{i}	96.30 (15)	O16—Mo4—O14	82.43 (13)
O1^{i}—Ga1—O2^{i}	84.55 (15)	O13—Mo4—O14	70.34 (12)
O1—Ga1—O2^{i}	95.45 (15)	O21—Mo5—O22	105.42 (18)
O3^{i}—Ga1—O2	96.30 (15)	O21—Mo5—O17	102.56 (17)
O3—Ga1—O2	83.70 (15)	O22—Mo5—O17	98.72 (16)
O1^{i}—Ga1—O2	95.45 (15)	O21—Mo5—O18	95.58 (17)
O1—Ga1—O2	84.55 (15)	O22—Mo5—O18	99.26 (16)
O2^{i}—Ga1—O2	179.999 (1)	O17—Mo5—O18	149.97 (15)
O15^{ii}—Ga2—O15	180.0	O21—Mo5—O15	158.85 (15)
O15^{ii}—Ga2—O13^{ii}	96.04 (14)	O22—Mo5—O15	93.52 (16)
O15—Ga2—O13^{ii}	83.96 (14)	O17—Mo5—O15	83.36 (14)
O15^{ii}—Ga2—O13	83.96 (14)	O18—Mo5—O15	71.71 (13)
O15—Ga2—O13	96.04 (14)	O21—Mo5—O14	91.86 (15)
O13^{ii}—Ga2—O13	180.0	O22—Mo5—O14	161.99 (16)
O15^{ii}—Ga2—O14	96.23 (14)	O17—Mo5—O14	72.03 (13)
O15—Ga2—O14	83.77 (14)	O18—Mo5—O14	83.77 (13)
O13^{ii}—Ga2—O14	95.44 (14)	O15—Mo5—O14	70.43 (12)
O13—Ga2—O14	84.56 (14)	O23—Mo6—O24	105.18 (18)
O15^{ii}—Ga2—O14^{ii}	83.77 (14)	O23—Mo6—O16^{ii}	98.37 (17)
O15—Ga2—O14^{ii}	96.23 (14)	O24—Mo6—O16^{ii}	101.31 (17)
O13^{ii}—Ga2—O14^{ii}	84.56 (14)	O23—Mo6—O18	100.29 (17)
O13—Ga2—O14^{ii}	95.45 (14)	O24—Mo6—O18	95.85 (17)
O14—Ga2—O14^{ii}	180.0	O16^{ii}—Mo6—O18	150.31 (15)
O7—Mo1—O8	106.2 (2)	O23—Mo6—O15	92.21 (15)
O7—Mo1—O5	98.15 (17)	O24—Mo6—O15	160.59 (15)
O8—Mo1—O5	101.91 (18)	O16^{ii}—Mo6—O15	84.25 (14)
O7—Mo1—O4	101.41 (17)	O18—Mo6—O15	72.17 (13)
O8—Mo1—O4	96.51 (17)	O23—Mo6—O13^{ii}	160.43 (15)
O5—Mo1—O4	148.11 (15)	O24—Mo6—O13^{ii}	93.42 (15)
O7—Mo1—O1	91.64 (17)	O16^{ii}—Mo6—O13^{ii}	71.55 (13)
O8—Mo1—O1	160.15 (16)	O18—Mo6—O13^{ii}	83.48 (13)
O5—Mo1—O1	83.59 (14)	O15—Mo6—O13^{ii}	70.50 (12)
O4—Mo1—O1	70.98 (13)	Ga1—O1—Mo3^{i}	102.26 (14)
O7—Mo1—O2	159.64 (17)	Ga1—O1—Mo1	103.21 (16)
O8—Mo1—O2	93.31 (16)	Mo3^{i}—O1—Mo1	93.09 (13)
O5—Mo1—O2	71.66 (13)	Ga1—O1—H1	135 (6)
O4—Mo1—O2	81.56 (14)	Mo3^{i}—O1—H1	115 (6)
O1—Mo1—O2	70.09 (13)	Mo1—O1—H1	99 (6)
O9—Mo2—O10	106.50 (19)	Ga1—O2—Mo2	102.79 (14)
O9—Mo2—O6	97.41 (17)	Ga1—O2—Mo1	102.15 (15)

O10—Mo2—O6	99.69 (17)	Mo2—O2—Mo1	92.85 (12)
O9—Mo2—O5	100.70 (18)	Ga1—O2—H2	116 (5)
O10—Mo2—O5	98.51 (17)	Mo2—O2—H2	119 (5)
O6—Mo2—O5	149.42 (15)	Mo1—O2—H2	120 (5)
O9—Mo2—O3	158.51 (16)	Ga1—O3—Mo3	103.53 (15)
O10—Mo2—O3	93.70 (16)	Ga1—O3—Mo2	103.88 (15)
O6—Mo2—O3	71.45 (14)	Mo3—O3—Mo2	94.30 (13)
O5—Mo2—O3	83.06 (14)	Ga1—O3—H3	128 (6)
O9—Mo2—O2	91.34 (16)	Mo3—O3—H3	116 (6)
O10—Mo2—O2	161.06 (17)	Mo2—O3—H3	106 (6)
O6—Mo2—O2	83.87 (14)	Mo3^{i}—O4—Mo1	119.01 (17)
O5—Mo2—O2	71.34 (14)	Mo1—O5—Mo2	119.36 (18)
O3—Mo2—O2	69.63 (12)	Mo2—O6—Mo3	117.54 (18)
O12—Mo3—O11	105.88 (19)	Ga2—O13—Mo4	103.36 (14)
O12—Mo3—O4^{i}	101.65 (17)	Ga2—O13—Mo6^{ii}	102.45 (13)
O11—Mo3—O4^{i}	97.94 (17)	Mo4—O13—Mo6^{ii}	93.37 (12)
O12—Mo3—O6	95.45 (17)	Ga2—O13—H13	117 (4)
O11—Mo3—O6	100.37 (17)	Mo4—O13—H13	113 (4)
O4^{i}—Mo3—O6	150.41 (15)	Mo6^{ii}—O13—H13	124 (5)
O12—Mo3—O3	158.97 (16)	Ga2—O14—Mo5	102.74 (14)
O11—Mo3—O3	93.27 (16)	Ga2—O14—Mo4	101.74 (14)
O4^{i}—Mo3—O3	83.83 (14)	Mo5—O14—Mo4	93.04 (12)
O6—Mo3—O3	72.14 (14)	Ga2—O14—H14	117 (4)
O12—Mo3—O1^{i}	92.00 (16)	Mo5—O14—H14	116 (5)
O11—Mo3—O1^{i}	160.95 (16)	Mo4—O14—H14	122 (4)
O4^{i}—Mo3—O1^{i}	71.47 (14)	Ga2—O15—Mo6	103.08 (14)
O6—Mo3—O1^{i}	84.08 (14)	Ga2—O15—Mo5	103.06 (14)
O3—Mo3—O1^{i}	70.29 (13)	Mo6—O15—Mo5	94.02 (13)
O19—Mo4—O20	106.2 (2)	Ga2—O15—H15	115 (5)
O19—Mo4—O17	97.87 (17)	Mo6—O15—H15	121 (5)
O20—Mo4—O17	102.08 (17)	Mo5—O15—H15	117 (5)
O19—Mo4—O16	101.89 (17)	Mo6^{ii}—O16—Mo4	118.93 (18)
O20—Mo4—O16	95.69 (17)	Mo5—O17—Mo4	119.45 (17)
O17—Mo4—O16	148.51 (15)	Mo6—O18—Mo5	117.47 (17)

O3^{i}—Ga1—O1—Mo3^{i}	1.23 (15)	O15—Ga2—O13—Mo4	82.62 (15)
O3—Ga1—O1—Mo3^{i}	−178.77 (15)	O13^{ii}—Ga2—O13—Mo4	64 (8)
O2^{i}—Ga1—O1—Mo3^{i}	84.27 (15)	O14—Ga2—O13—Mo4	−0.50 (13)
O2—Ga1—O1—Mo3^{i}	−95.73 (15)	O14^{ii}—Ga2—O13—Mo4	179.50 (13)
O3^{i}—Ga1—O1—Mo1	97.41 (16)	O15^{ii}—Ga2—O13—Mo6^{ii}	−0.82 (14)
O3—Ga1—O1—Mo1	−82.59 (16)	O15—Ga2—O13—Mo6^{ii}	179.18 (14)
O2^{i}—Ga1—O1—Mo1	−179.54 (14)	O14—Ga2—O13—Mo6^{ii}	96.06 (15)
O2—Ga1—O1—Mo1	0.46 (14)	O14^{ii}—Ga2—O13—Mo6^{ii}	−83.94 (15)
O7—Mo1—O1—Ga1	170.39 (18)	O19—Mo4—O13—Ga2	−169.21 (17)
O8—Mo1—O1—Ga1	−35.1 (5)	O20—Mo4—O13—Ga2	36.9 (5)
O5—Mo1—O1—Ga1	72.37 (16)	O17—Mo4—O13—Ga2	−71.52 (15)
O4—Mo1—O1—Ga1	−88.10 (17)	O16—Mo4—O13—Ga2	88.98 (16)
O2—Mo1—O1—Ga1	−0.41 (13)	O14—Mo4—O13—Ga2	0.45 (12)

O7—Mo1—O1—Mo3^{i}	−86.25 (16)	O19—Mo4—O13—Mo6^{ii}	87.14 (16)
O8—Mo1—O1—Mo3^{i}	68.3 (5)	O20—Mo4—O13—Mo6^{ii}	−66.7 (5)
O5—Mo1—O1—Mo3^{i}	175.73 (15)	O17—Mo4—O13—Mo6^{ii}	−175.17 (14)
O4—Mo1—O1—Mo3^{i}	15.26 (13)	O16—Mo4—O13—Mo6^{ii}	−14.67 (13)
O2—Mo1—O1—Mo3^{i}	102.96 (14)	O14—Mo4—O13—Mo6^{ii}	−103.20 (13)
O3^{i}—Ga1—O2—Mo2	−179.47 (14)	O15^{ii}—Ga2—O14—Mo5	179.66 (14)
O3—Ga1—O2—Mo2	0.53 (14)	O15—Ga2—O14—Mo5	−0.34 (14)
O1^{i}—Ga1—O2—Mo2	83.75 (15)	O13^{ii}—Ga2—O14—Mo5	−83.63 (15)
O1—Ga1—O2—Mo2	−96.25 (15)	O13—Ga2—O14—Mo5	96.37 (15)
O3^{i}—Ga1—O2—Mo1	−83.67 (15)	O15^{ii}—Ga2—O14—Mo4	83.78 (14)
O3—Ga1—O2—Mo1	96.33 (15)	O15—Ga2—O14—Mo4	−96.22 (14)
O1^{i}—Ga1—O2—Mo1	179.55 (14)	O13^{ii}—Ga2—O14—Mo4	−179.51 (13)
O1—Ga1—O2—Mo1	−0.45 (14)	O13—Ga2—O14—Mo4	0.49 (13)
O9—Mo2—O2—Ga1	−170.25 (18)	O14^{ii}—Ga2—O14—Mo4	130 (9)
O10—Mo2—O2—Ga1	29.1 (6)	O21—Mo5—O14—Ga2	168.49 (18)
O6—Mo2—O2—Ga1	−72.94 (16)	O22—Mo5—O14—Ga2	−27.7 (6)
O5—Mo2—O2—Ga1	88.91 (17)	O17—Mo5—O14—Ga2	−88.91 (17)
O3—Mo2—O2—Ga1	−0.48 (13)	O18—Mo5—O14—Ga2	73.08 (16)
O9—Mo2—O2—Mo1	86.60 (17)	O15—Mo5—O14—Ga2	0.31 (12)
O10—Mo2—O2—Mo1	−74.1 (5)	O21—Mo5—O14—Mo4	−88.75 (16)
O6—Mo2—O2—Mo1	−176.08 (14)	O22—Mo5—O14—Mo4	75.0 (5)
O5—Mo2—O2—Mo1	−14.24 (13)	O17—Mo5—O14—Mo4	13.85 (13)
O3—Mo2—O2—Mo1	−103.63 (14)	O18—Mo5—O14—Mo4	175.84 (14)
O7—Mo1—O2—Ga1	−26.9 (5)	O15—Mo5—O14—Mo4	103.06 (14)
O8—Mo1—O2—Ga1	169.24 (17)	O19—Mo4—O14—Ga2	30.9 (5)
O5—Mo1—O2—Ga1	−89.30 (17)	O20—Mo4—O14—Ga2	−168.40 (17)
O4—Mo1—O2—Ga1	73.15 (16)	O17—Mo4—O14—Ga2	89.81 (16)
O1—Mo1—O2—Ga1	0.41 (12)	O16—Mo4—O14—Ga2	−73.04 (15)
O7—Mo1—O2—Mo2	76.8 (5)	O13—Mo4—O14—Ga2	−0.44 (12)
O8—Mo1—O2—Mo2	−87.02 (16)	O19—Mo4—O14—Mo5	−72.8 (5)
O5—Mo1—O2—Mo2	14.43 (13)	O20—Mo4—O14—Mo5	87.92 (16)
O4—Mo1—O2—Mo2	176.88 (14)	O17—Mo4—O14—Mo5	−13.88 (13)
O1—Mo1—O2—Mo2	104.14 (14)	O16—Mo4—O14—Mo5	−176.72 (14)
O1^{i}—Ga1—O3—Mo3	1.25 (15)	O13—Mo4—O14—Mo5	−104.13 (13)
O1—Ga1—O3—Mo3	−178.75 (15)	O13^{ii}—Ga2—O15—Mo6	−0.83 (14)
O2^{i}—Ga1—O3—Mo3	−82.55 (16)	O13—Ga2—O15—Mo6	179.18 (14)
O2—Ga1—O3—Mo3	97.45 (16)	O14—Ga2—O15—Mo6	−97.00 (15)
O1^{i}—Ga1—O3—Mo2	−96.74 (16)	O14^{ii}—Ga2—O15—Mo6	83.00 (15)
O1—Ga1—O3—Mo2	83.26 (16)	O13^{ii}—Ga2—O15—Mo5	96.51 (15)
O2^{i}—Ga1—O3—Mo2	179.46 (14)	O13—Ga2—O15—Mo5	−83.49 (15)
O2—Ga1—O3—Mo2	−0.54 (14)	O14—Ga2—O15—Mo5	0.34 (14)
O12—Mo3—O3—Ga1	−35.2 (5)	O14^{ii}—Ga2—O15—Mo5	−179.66 (14)
O11—Mo3—O3—Ga1	169.01 (18)	O23—Mo6—O15—Ga2	−169.88 (18)
O4^{i}—Mo3—O3—Ga1	71.36 (16)	O24—Mo6—O15—Ga2	36.2 (5)
O6—Mo3—O3—Ga1	−91.15 (17)	O16^{ii}—Mo6—O15—Ga2	−71.69 (16)
O1^{i}—Mo3—O3—Ga1	−1.13 (13)	O18—Mo6—O15—Ga2	90.02 (16)
O12—Mo3—O3—Mo2	70.2 (5)	O13^{ii}—Mo6—O15—Ga2	0.75 (13)
O11—Mo3—O3—Mo2	−85.60 (17)	O23—Mo6—O15—Mo5	85.71 (16)

O4^{i}—Mo3—O3—Mo2	176.76 (14)	O24—Mo6—O15—Mo5	−68.2 (5)
O6—Mo3—O3—Mo2	14.25 (13)	O16^{ii}—Mo6—O15—Mo5	−176.10 (14)
O1^{i}—Mo3—O3—Mo2	104.27 (15)	O18—Mo6—O15—Mo5	−14.39 (12)
O9—Mo2—O3—Ga1	29.5 (5)	O13^{ii}—Mo6—O15—Mo5	−103.66 (14)
O10—Mo2—O3—Ga1	−170.27 (18)	O21—Mo5—O15—Ga2	−34.9 (5)
O6—Mo2—O3—Ga1	90.74 (17)	O22—Mo5—O15—Ga2	171.32 (17)
O5—Mo2—O3—Ga1	−72.14 (16)	O17—Mo5—O15—Ga2	72.94 (16)
O2—Mo2—O3—Ga1	0.49 (13)	O18—Mo5—O15—Ga2	−90.09 (16)
O9—Mo2—O3—Mo3	−75.6 (5)	O14—Mo5—O15—Ga2	−0.31 (12)
O10—Mo2—O3—Mo3	84.64 (17)	O21—Mo5—O15—Mo6	69.6 (5)
O6—Mo2—O3—Mo3	−14.35 (13)	O22—Mo5—O15—Mo6	−84.26 (15)
O5—Mo2—O3—Mo3	−177.23 (14)	O17—Mo5—O15—Mo6	177.37 (13)
O2—Mo2—O3—Mo3	−104.60 (14)	O18—Mo5—O15—Mo6	14.34 (12)
O7—Mo1—O4—Mo3^{i}	66.8 (2)	O14—Mo5—O15—Mo6	104.12 (14)
O8—Mo1—O4—Mo3^{i}	174.9 (2)	O19—Mo4—O16—Mo6^{ii}	−68.1 (2)
O5—Mo1—O4—Mo3^{i}	−59.9 (4)	O20—Mo4—O16—Mo6^{ii}	−175.9 (2)
O1—Mo1—O4—Mo3^{i}	−20.98 (17)	O17—Mo4—O16—Mo6^{ii}	59.7 (4)
O2—Mo1—O4—Mo3^{i}	−92.7 (2)	O13—Mo4—O16—Mo6^{ii}	20.19 (17)
O7—Mo1—O5—Mo2	178.4 (2)	O14—Mo4—O16—Mo6^{ii}	91.9 (2)
O8—Mo1—O5—Mo2	69.8 (2)	O21—Mo5—O17—Mo4	68.7 (2)
O4—Mo1—O5—Mo2	−54.1 (4)	O22—Mo5—O17—Mo4	176.7 (2)
O1—Mo1—O5—Mo2	−90.8 (2)	O18—Mo5—O17—Mo4	−57.1 (4)
O2—Mo1—O5—Mo2	−19.71 (18)	O15—Mo5—O17—Mo4	−90.7 (2)
O9—Mo2—O5—Mo1	−68.0 (2)	O14—Mo5—O17—Mo4	−19.20 (18)
O10—Mo2—O5—Mo1	−176.7 (2)	O19—Mo4—O17—Mo5	−178.4 (2)
O6—Mo2—O5—Mo1	57.3 (4)	O20—Mo4—O17—Mo5	−69.9 (2)
O3—Mo2—O5—Mo1	90.6 (2)	O16—Mo4—O17—Mo5	53.0 (4)
O2—Mo2—O5—Mo1	19.81 (18)	O13—Mo4—O17—Mo5	90.2 (2)
O9—Mo2—O6—Mo3	179.9 (2)	O14—Mo4—O17—Mo5	18.98 (17)
O10—Mo2—O6—Mo3	−71.9 (2)	O23—Mo6—O18—Mo5	−70.0 (2)
O5—Mo2—O6—Mo3	53.9 (4)	O24—Mo6—O18—Mo5	−176.6 (2)
O3—Mo2—O6—Mo3	18.79 (17)	O16^{ii}—Mo6—O18—Mo5	58.1 (4)
O2—Mo2—O6—Mo3	89.33 (19)	O15—Mo6—O18—Mo5	19.05 (16)
O12—Mo3—O6—Mo2	178.4 (2)	O13^{ii}—Mo6—O18—Mo5	90.61 (18)
O11—Mo3—O6—Mo2	71.1 (2)	O21—Mo5—O18—Mo6	178.3 (2)
O4^{i}—Mo3—O6—Mo2	−56.3 (4)	O22—Mo5—O18—Mo6	71.7 (2)
O3—Mo3—O6—Mo2	−19.01 (17)	O17—Mo5—O18—Mo6	−54.4 (4)
O1^{i}—Mo3—O6—Mo2	−90.18 (19)	O15—Mo5—O18—Mo6	−19.00 (16)
O15^{ii}—Ga2—O13—Mo4	−97.38 (15)	O14—Mo5—O18—Mo6	−90.41 (19)

Symmetry codes: (i) −*x*+1, −*y*+1, −*z*+1; (ii) −*x*, −*y*+1, −*z*+1.

Hydrogen-bond geometry (Å, º)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
O2—H2···O10^{iii}	0.84 (2)	2.00 (3)	2.822 (5)	166 (6)
O13—H13···O23^{iv}	0.84 (2)	1.86 (2)	2.691 (5)	173 (7)
O14—H14···O22^{v}	0.84 (2)	1.98 (2)	2.808 (5)	168 (6)

O3—H3···O4*S*^{vi}	0.85 (2)	1.76 (3)	2.602 (5)	169 (8)
O1—H1···O11^{vii}	0.85 (2)	1.87 (4)	2.682 (5)	159 (9)
O15—H15···O1*S*	0.83 (2)	1.87 (3)	2.645 (5)	155 (7)

Symmetry codes: (iii) $x, -y+1/2, z-1/2$; (iv) $-x, y-1/2, -z+1/2$; (v) $x, -y+3/2, z+1/2$; (vi) $x, -y+1/2, z+1/2$; (vii) $-x+1, y+1/2, -z+3/2$.