Dirubidium Digallium Oxide Bis(orthoborate)

Robert W. Smith  
*University of Nebraska at Omaha*, robertsmith@unomaha.edu

Chunhua Hu  
*University of Nebraska-Lincoln*

Christopher D. DeSpain  
*University of Nebraska at Omaha*

---

Follow this and additional works at: [https://digitalcommons.unomaha.edu/chemfacpub](https://digitalcommons.unomaha.edu/chemfacpub)

Part of the Materials Chemistry Commons, and the Physical Chemistry Commons

Please take our feedback survey at: [https://unomaha.az1.qualtrics.com/jfe/form/SV_8cchtFmpDyGfBLE](https://unomaha.az1.qualtrics.com/jfe/form/SV_8cchtFmpDyGfBLE)

---

**Recommended Citation**  
Smith, Robert W.; Hu, Chunhua; and DeSpain, Christopher D., "Dirubidium Digallium Oxide Bis(orthoborate)" (2008). *Chemistry Faculty Publications*. 9.  
[https://digitalcommons.unomaha.edu/chemfacpub/9](https://digitalcommons.unomaha.edu/chemfacpub/9)
Dirubidium digallium oxide bis(orthoborate)

Robert W. Smith, Chunhua Hu and Christopher D. DeSpain

Acta Cryst. (2008). E64, i23

This article is distributed under the terms of the Creative Commons Attribution Licence http://creativecommons.org/licenses/by/2.0/uk/legalcode, which permits unrestricted use, distribution, and reproduction in any medium, provided the original authors and source are cited.

Acta Crystallographica Section E: Structure Reports Online is the IUCr’s highly popular open-access structural journal. It provides a simple and easily accessible publication mechanism for the growing number of inorganic, metal-organic and organic crystal structure determinations. The electronic submission, validation, refereeing and publication facilities of the journal ensure very rapid and high-quality publication, whilst key indicators and validation reports provide measures of structural reliability. In 2007, the journal published over 5000 structures. The average publication time is less than one month.
Dirubidium digallium oxide bis(orthoborate)

Robert W. Smith,* Chunhua Hu, and Christopher D. DeSpain

*Department of Chemistry, University of Nebraska at Omaha, Omaha, NE 68182-0109, USA, and 5Nebraska Center for Materials and Nanoscience, University of Nebraska, Lincoln, NE 68588-0104, USA

Correspondence e-mail: robertsmith@mail.unomaha.edu

Received 8 February 2008; accepted 29 February 2008

Key indicators: single-crystal X-ray study; Z = 4; T = 297 K; mean σ(σ) = 0.118, wR2 = 0.091; data-to-parameter ratio = 13.3.

The title compound, Rb2Ga2O(BO3)2, is part of the homologous series A3Ga2O(BO3)3 (A = Na, K, Rb and Cs). The structure contains pairs of gallium-centered tetrahedra connected through a shared oxygen vertex. Orthoborate triangles connect the basal vertices of the tetrahedra, forming a three-dimensional network with voids occupied by rubidium ions.

Related literature

For related literature, see: Chen et al. (2004); Corbel & Leblanc (2000); Smith (1995, 1997).

Experimental

Crystal data

Rb2Ga2O(BO3)2

M_r = 444.00
Monoclinic, P2_1/c

a = 8.8115 (18) Å
b = 7.7224 (16) Å
c = 11.997 (3) Å
β = 104.246 (4)°

V = 791.3 (3) Å³
Z = 4
Monochromatic, Mo Kα radiation
μ = 19.05 mm⁻¹
T = 297 (2) K

Cell parameters from 5192 reflections

θ = 2.9–35.7°
θ = 2.9–35.7°
θ = 2.9–35.7°
θ = 2.9–35.7°
θ = 2.9–35.7°

Volume

V = 791.3 (3) Å³
Z = 4

Data collection

Bruker SMART APEX CCD diffractometer
Absorption correction: multi-scan (SADABS; Sheldrick, 2003)
T_max = 0.846, T_min = 0.632

8611 measured reflections
1568 independent reflections
1151 reflections with I > 2σ(I)
R(int) = 0.093

Refinement

R[F² > 2σ(F²)] = 0.037
wR(F²) = 0.091
S = 1.05
1568 reflections

Table 1

Selected geometric parameters (Å, °).

| Ga1—O3i | 1.834 (5) | Ga2—O7 | 1.810 (5) |
| Ga1—O4i | 1.835 (5) | B1—O1 | 1.376 (10) |
| Ga1—O6 | 1.831 (5) | B2—O2i | 1.370 (10) |
| Ga1—O7ii | 1.790 (5) | B3—O3i | 1.358 (10) |
| Ga2—O1 | 1.840 (5) | B2—O4 | 1.366 (9) |
| Ga2—O2ii | 1.858 (5) | B2—O5 | 1.395 (9) |
| Ga2—O5ii | 1.832 (5) | B2—O6w | 1.341 (10) |

O7iii—Ga1—O6 110.8 (2)
O7iii—Ga1—O3i 110.4 (2)
O6—Ga1—O3i 114.5 (2)
O5iv—Ga2—O1 109.3 (2)
O4—Ga2—O3i 105.7 (2)
O7—Ga2—O2iii 112.7 (7)
O7—Ga2—O5w 112.7 (7)
O5w—Ga2—O2iii 119.0 (7)

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

Data collection: SMART (Bruker, 2005); cell refinement: SAINT-Plus (Bruker, 2003); data reduction: SAINT-Plus; program(s) used to solve structure: SHELXTL (Sheldrick, 2008); program(s) used to refine structure: SHELXTL; molecular graphics: DIAMOND (Brandenburg & Putz, 2007); software used to prepare material for publication: SHELXTL.

This work was supported by the Nebraska Research Initiative.

References


supplementary materials
supplementary materials


Dirubidium digallium oxide bis(orthoborate)

R. W. Smith, C. Hu and C. D. DeSpain

Comment

Complex metal borates adopt various structure types that result from the many possible geometric arrangements formed by metal-centered polyhedra and borate anions, which can be either three- or four-coordinate. They are also of interest as nonlinear optical materials, such as β-BaB₂O₄, LiB₃O₅, and YAl₃(BO₃)₄ (Chen et al., 2004). For these reasons, we have examined the phase diagrams of alkali metal gallium borates and have determined the crystal structures of some of the materials discovered. The homologous series A₂Ga₂O(BO₃)₂ (A = Na, K, Rb, Cs) is a portion of the new compounds discovered to date. In each, pairs of gallium-centered tetrahedra are connected through a shared oxygen vertex, and the tetrahedral basal planes are connected through shared oxygen vertices with triangular orthoborate anions. Depending on the size of the alkali metal ions, which occupy channels or spaces within the three-dimensional network, the compounds crystallize in different space groups: P31c for the Na member (Corbel & Leblanc, 2000), P321 for the K member (Smith et al., 1997), and P2₁/c for the Cs member (Smith, 1995), which is isotypic with the Rb compound reported herein (Fig. 1).

Experimental

Powders of Rb₂Ga₂O(BO₃)₂ were prepared from stoichiometric mixtures of RbNO₃, Ga(NO₃)₃, and H₃BO₃, which were decomposed in alumina crucibles at 300 °C and then heated to 500 °C at 50 °C increments, with a soak of several hours at each temperature and intermediate grinding between each soak period. Crystals were grown in a platinum dish from a 1:1 molar mixture of the prepared powder in the presence of Rb₂BO₃ flux. The mixture was heated to 700 °C and cooled at 10 °C/hour to room temperature, and a single-crystal was cut from the crystal mass for subsequent X-ray diffraction analysis.

Refinement

The highest peak and the deepest hole are located 0.74 Å and 1.13 Å, respectively, from Rb2.

Figures

Fig. 1. View of the unit cell along the b axis. Displacement ellipsoids are drawn at the 50% probability level.
supplementary materials

dirubidium digallium oxide bis(orthoborate)

Crystal data

\[ \text{Rb}_2\text{Ga}_2\text{O}(\text{BO}_3)_2 \]
\[ M_r = 444.00 \]

Monoclinic, \( P2_1/c \)

Hall symbol: -P 2ybc

\( a = 8.8115 \) (18) Å
\( b = 7.7224 \) (16) Å
\( c = 11.997 \) (3) Å
\( \beta = 104.246 \) (4)°

\( V = 791.3 \) (3) Å\(^3\)

\( Z = 4 \)

\[ F_{000} = 808 \]
\[ D_x = 3.727 \text{ Mg m}^{-3} \]

Mo K\( \alpha \) radiation

\( \lambda = 0.71073 \) Å

Cell parameters from 1660 reflections

\( \theta = 3.7\text{–}25.7° \)

\( \mu = 19.03 \text{ mm}^{-1} \)

\( T = 297 \) (2) K

Block, colorless

\[ 0.23 \times 0.21 \times 0.19 \text{ mm} \]

Data collection

Bu ker SMART APEX CCD
diffractometer

Radiation source: fine-focus sealed tube

Monochromator: graphite

\( T = 297\) (2) K

\( \omega \) scans

Absorption correction: numerical
(SADABS; Sheldrick, 2003)

\[ h = -10\rightarrow10 \]

\( T_{\text{min}} = 0.118, T_{\text{max}} = 0.429 \)

8611 measured reflections

1568 independent reflections

1151 reflections with \( I > 2\sigma(I) \)

\( R_{\text{int}} = 0.093 \)

\( \theta_{\text{max}} = 26.1° \)

\( \theta_{\text{min}} = 2.4° \)

Refinement

Refinement on \( F^2 \)

Least-squares matrix: full

\[ R[F^2 > 2\sigma(F^2)] = 0.037 \]

\[ wR(F^2) = 0.091 \]

\( S = 1.05 \)

1568 reflections

118 parameters

Primary atom site location: structure-invariant direct methods

Secondary atom site location: difference Fourier map

\[ \Delta \sigma_{\text{max}} < 0.001 \]

\( \Delta \rho_{\text{max}} = 1.28 \text{ e Å}^{-3} \)

\( \Delta \rho_{\text{min}} = -0.90 \text{ e Å}^{-3} \)

Extinction correction: none

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

sup-2
between c.s.d.’s in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell c.s.d.’s is used for estimating c.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 $F^2 > 2\sigma(F^2)$ 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 ($\AA^2$)

<table>
<thead>
<tr>
<th></th>
<th>$x$</th>
<th>$y$</th>
<th>$z$</th>
<th>$U_{iso}$/(U_{eq})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rb1</td>
<td>0.05407 (9)</td>
<td>0.12523 (11)</td>
<td>0.15061 (7)</td>
<td>0.0276 (2)</td>
</tr>
<tr>
<td>Rb2</td>
<td>0.53288 (9)</td>
<td>0.12728 (10)</td>
<td>0.62677 (7)</td>
<td>0.0265 (2)</td>
</tr>
<tr>
<td>Ga1</td>
<td>0.84630 (9)</td>
<td>0.12201 (10)</td>
<td>0.38547 (7)</td>
<td>0.0183 (2)</td>
</tr>
<tr>
<td>Ga2</td>
<td>0.31419 (9)</td>
<td>0.06933 (11)</td>
<td>0.86673 (8)</td>
<td>0.0191 (2)</td>
</tr>
<tr>
<td>B1</td>
<td>0.6554 (10)</td>
<td>0.0915 (10)</td>
<td>0.9123 (8)</td>
<td>0.0166 (19)</td>
</tr>
<tr>
<td>B2</td>
<td>0.1834 (10)</td>
<td>0.1269 (11)</td>
<td>0.4388 (8)</td>
<td>0.0181 (18)</td>
</tr>
<tr>
<td>O1</td>
<td>0.5159 (5)</td>
<td>0.0083 (6)</td>
<td>0.8667 (5)</td>
<td>0.0221 (13)</td>
</tr>
<tr>
<td>O2</td>
<td>0.7394 (6)</td>
<td>0.0677 (7)</td>
<td>0.0235 (4)</td>
<td>0.0249 (13)</td>
</tr>
<tr>
<td>O3</td>
<td>0.7155 (6)</td>
<td>0.1924 (7)</td>
<td>0.8410 (5)</td>
<td>0.0261 (13)</td>
</tr>
<tr>
<td>O4</td>
<td>0.0442 (5)</td>
<td>0.2139 (6)</td>
<td>0.4178 (5)</td>
<td>0.0247 (13)</td>
</tr>
<tr>
<td>O5</td>
<td>0.3091 (5)</td>
<td>0.2014 (6)</td>
<td>0.4049 (5)</td>
<td>0.0215 (12)</td>
</tr>
<tr>
<td>O6</td>
<td>0.7902 (6)</td>
<td>0.0280 (7)</td>
<td>0.5097 (5)</td>
<td>0.0286 (14)</td>
</tr>
<tr>
<td>O7</td>
<td>0.1781 (6)</td>
<td>0.0322 (7)</td>
<td>0.7290 (5)</td>
<td>0.0248 (12)</td>
</tr>
</tbody>
</table>

### Atomic displacement parameters ($\AA^2$)

<table>
<thead>
<tr>
<th></th>
<th>$U_{11}$</th>
<th>$U_{22}$</th>
<th>$U_{33}$</th>
<th>$U_{12}$</th>
<th>$U_{13}$</th>
<th>$U_{23}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rb1</td>
<td>0.0180 (4)</td>
<td>0.0338 (5)</td>
<td>0.0310 (5)</td>
<td>−0.0050 (3)</td>
<td>0.0063 (4)</td>
<td>−0.0004 (4)</td>
</tr>
<tr>
<td>Rb2</td>
<td>0.0225 (4)</td>
<td>0.0282 (4)</td>
<td>0.0260 (5)</td>
<td>0.0032 (3)</td>
<td>0.0008 (3)</td>
<td>−0.0024 (4)</td>
</tr>
<tr>
<td>Ga1</td>
<td>0.0125 (4)</td>
<td>0.0193 (4)</td>
<td>0.0237 (5)</td>
<td>0.0007 (3)</td>
<td>0.0055 (4)</td>
<td>0.0004 (4)</td>
</tr>
<tr>
<td>Ga2</td>
<td>0.0122 (4)</td>
<td>0.0203 (4)</td>
<td>0.0252 (5)</td>
<td>−0.0007 (3)</td>
<td>0.0052 (4)</td>
<td>0.0005 (4)</td>
</tr>
<tr>
<td>B1</td>
<td>0.017 (4)</td>
<td>0.011 (4)</td>
<td>0.026 (5)</td>
<td>0.003 (3)</td>
<td>0.014 (4)</td>
<td>0.000 (4)</td>
</tr>
<tr>
<td>B2</td>
<td>0.015 (4)</td>
<td>0.017 (4)</td>
<td>0.022 (5)</td>
<td>0.000 (3)</td>
<td>0.005 (4)</td>
<td>0.002 (4)</td>
</tr>
<tr>
<td>O1</td>
<td>0.008 (3)</td>
<td>0.022 (3)</td>
<td>0.037 (4)</td>
<td>−0.001 (2)</td>
<td>0.007 (2)</td>
<td>−0.005 (2)</td>
</tr>
<tr>
<td>O2</td>
<td>0.016 (3)</td>
<td>0.031 (3)</td>
<td>0.025 (3)</td>
<td>−0.008 (2)</td>
<td>0.002 (2)</td>
<td>0.010 (3)</td>
</tr>
<tr>
<td>O3</td>
<td>0.024 (3)</td>
<td>0.024 (3)</td>
<td>0.029 (3)</td>
<td>−0.012 (2)</td>
<td>0.004 (3)</td>
<td>0.000 (3)</td>
</tr>
<tr>
<td>O4</td>
<td>0.008 (3)</td>
<td>0.023 (3)</td>
<td>0.043 (4)</td>
<td>−0.006 (2)</td>
<td>0.008 (2)</td>
<td>0.001 (3)</td>
</tr>
<tr>
<td>O5</td>
<td>0.011 (3)</td>
<td>0.021 (3)</td>
<td>0.035 (3)</td>
<td>0.001 (2)</td>
<td>0.011 (2)</td>
<td>0.004 (2)</td>
</tr>
<tr>
<td>O6</td>
<td>0.029 (3)</td>
<td>0.024 (3)</td>
<td>0.040 (4)</td>
<td>0.004 (2)</td>
<td>0.023 (3)</td>
<td>0.010 (3)</td>
</tr>
<tr>
<td>O7</td>
<td>0.019 (3)</td>
<td>0.026 (3)</td>
<td>0.026 (3)</td>
<td>0.003 (2)</td>
<td>−0.001 (2)</td>
<td>−0.006 (3)</td>
</tr>
</tbody>
</table>

### Geometric parameters ($\AA, ^\circ$)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>Ga2—O2$^{iv}$</th>
<th>1.838 (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rb1—O2$^{i}$</td>
<td>2.851 (5)</td>
<td>Ga2—O2$^{iv}$</td>
<td>1.838 (5)</td>
<td></td>
</tr>
<tr>
<td>Rb1—O7$^{ii}$</td>
<td>2.928 (5)</td>
<td>Ga2—O5$^{viii}$</td>
<td>1.832 (5)</td>
<td></td>
</tr>
<tr>
<td>Rb1—O7$^{iii}$</td>
<td>3.034 (5)</td>
<td>Ga2—O7</td>
<td>1.810 (5)</td>
<td></td>
</tr>
<tr>
<td>Rb1—O4$^{ii}$</td>
<td>3.039 (5)</td>
<td>Ga2—Rb1$^{iii}$</td>
<td>3.5346 (12)</td>
<td></td>
</tr>
</tbody>
</table>
supplementary materials

<table>
<thead>
<tr>
<th>Bond</th>
<th>Distance (Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rb1—O3</td>
<td>3.170 (5)</td>
</tr>
<tr>
<td>Rb1—B1</td>
<td>3.298 (8)</td>
</tr>
<tr>
<td>Rb1—O4</td>
<td>3.300 (6)</td>
</tr>
<tr>
<td>Rb1—O4</td>
<td>3.341 (5)</td>
</tr>
<tr>
<td>Rb1—O2</td>
<td>3.363 (9)</td>
</tr>
<tr>
<td>Rb1—O5</td>
<td>3.365 (5)</td>
</tr>
<tr>
<td>Rb1—O2</td>
<td>3.430 (6)</td>
</tr>
<tr>
<td>Rb1—Ga2</td>
<td>3.534 (12)</td>
</tr>
<tr>
<td>Rb2—O3</td>
<td>2.722 (5)</td>
</tr>
<tr>
<td>Rb2—O5</td>
<td>2.953 (5)</td>
</tr>
<tr>
<td>Rb2—O5</td>
<td>2.964 (5)</td>
</tr>
<tr>
<td>Rb2—O1</td>
<td>2.977 (5)</td>
</tr>
<tr>
<td>Rb2—O6</td>
<td>3.045 (5)</td>
</tr>
<tr>
<td>Rb2—O1</td>
<td>3.060 (5)</td>
</tr>
<tr>
<td>Rb2—O6</td>
<td>3.151 (6)</td>
</tr>
<tr>
<td>Rb2—B2</td>
<td>3.340 (9)</td>
</tr>
<tr>
<td>Rb2—B1</td>
<td>3.340 (9)</td>
</tr>
<tr>
<td>Rb2—O2</td>
<td>3.392 (6)</td>
</tr>
<tr>
<td>Rb2—B2</td>
<td>3.419 (8)</td>
</tr>
<tr>
<td>Rb2—B2</td>
<td>3.5477 (17)</td>
</tr>
<tr>
<td>Ga1—O3</td>
<td>1.834 (5)</td>
</tr>
<tr>
<td>Ga1—O4</td>
<td>1.834 (5)</td>
</tr>
<tr>
<td>Ga1—O6</td>
<td>1.831 (5)</td>
</tr>
<tr>
<td>Ga1—O7</td>
<td>1.790 (5)</td>
</tr>
<tr>
<td>Ga1—Rb1</td>
<td>3.7189 (13)</td>
</tr>
<tr>
<td>Ga1—Rb1</td>
<td>3.7966 (13)</td>
</tr>
<tr>
<td>Ga1—Ga2</td>
<td>3.8275 (13)</td>
</tr>
<tr>
<td>Ga1—Rb1</td>
<td>3.9828 (14)</td>
</tr>
<tr>
<td>Ga1—Rb1</td>
<td>4.0307 (14)</td>
</tr>
<tr>
<td>Ga1—Rb2</td>
<td>4.0975 (12)</td>
</tr>
<tr>
<td>Ga2—O1</td>
<td>1.840 (5)</td>
</tr>
<tr>
<td>O2—Rb1</td>
<td>123.34 (15)</td>
</tr>
<tr>
<td>O2—Rb1</td>
<td>60.74 (14)</td>
</tr>
<tr>
<td>O7—Rb1</td>
<td>116.83 (11)</td>
</tr>
<tr>
<td>O2—Rb1</td>
<td>76.60 (14)</td>
</tr>
<tr>
<td>O7—Rb1</td>
<td>81.35 (14)</td>
</tr>
<tr>
<td>O2—Rb1</td>
<td>137.01 (13)</td>
</tr>
<tr>
<td>O7—Rb1</td>
<td>115.30 (15)</td>
</tr>
<tr>
<td>O2—Rb1</td>
<td>120.23 (13)</td>
</tr>
<tr>
<td>O7—Rb1</td>
<td>100.16 (13)</td>
</tr>
<tr>
<td>O2—Rb1</td>
<td>102.65 (13)</td>
</tr>
<tr>
<td>Ga2—Rb2</td>
<td>3.6641 (13)</td>
</tr>
<tr>
<td>Ga2—Rb1</td>
<td>3.8226 (12)</td>
</tr>
<tr>
<td>Ga2—Rb2</td>
<td>3.9973 (13)</td>
</tr>
<tr>
<td>B1—O1</td>
<td>1.376 (10)</td>
</tr>
<tr>
<td>B1—O2</td>
<td>1.370 (10)</td>
</tr>
<tr>
<td>B1—O3</td>
<td>1.358 (10)</td>
</tr>
<tr>
<td>B1—Rb1</td>
<td>3.298 (8)</td>
</tr>
<tr>
<td>B1—Rb2</td>
<td>3.724 (8)</td>
</tr>
<tr>
<td>B2—O4</td>
<td>1.366 (9)</td>
</tr>
<tr>
<td>B2—O5</td>
<td>1.395 (9)</td>
</tr>
<tr>
<td>B2—O6</td>
<td>1.341 (10)</td>
</tr>
<tr>
<td>B2—Rb2</td>
<td>3.419 (8)</td>
</tr>
<tr>
<td>B2—Rb1</td>
<td>3.584 (9)</td>
</tr>
<tr>
<td>O1—Rb2</td>
<td>2.977 (5)</td>
</tr>
<tr>
<td>O2—B1</td>
<td>1.370 (10)</td>
</tr>
<tr>
<td>O2—Ga2</td>
<td>1.838 (5)</td>
</tr>
<tr>
<td>O2—Rb1</td>
<td>2.851 (5)</td>
</tr>
<tr>
<td>O2—Rb2</td>
<td>3.392 (6)</td>
</tr>
<tr>
<td>O2—Rb1</td>
<td>3.430 (6)</td>
</tr>
<tr>
<td>O3—Ga1</td>
<td>1.834 (5)</td>
</tr>
<tr>
<td>O3—Rb1</td>
<td>3.170 (5)</td>
</tr>
<tr>
<td>O4—Ga1</td>
<td>1.834 (5)</td>
</tr>
<tr>
<td>O4—Rb1</td>
<td>3.039 (5)</td>
</tr>
<tr>
<td>O5—Ga2</td>
<td>1.832 (5)</td>
</tr>
<tr>
<td>O5—Rb2</td>
<td>2.964 (5)</td>
</tr>
<tr>
<td>O6—B2</td>
<td>1.341 (10)</td>
</tr>
<tr>
<td>O6—Rb2</td>
<td>3.151 (6)</td>
</tr>
<tr>
<td>O7—Ga1</td>
<td>1.790 (5)</td>
</tr>
<tr>
<td>O7—Rb1</td>
<td>2.928 (5)</td>
</tr>
<tr>
<td>O7—Rb1</td>
<td>3.034 (5)</td>
</tr>
<tr>
<td>Rb1—Ga1</td>
<td>121.81 (3)</td>
</tr>
<tr>
<td>O7—Ga1</td>
<td>42.60 (17)</td>
</tr>
<tr>
<td>O6—Ga1</td>
<td>79.48 (16)</td>
</tr>
<tr>
<td>O4—Ga1</td>
<td>99.91 (16)</td>
</tr>
<tr>
<td>O3—Ga1</td>
<td>149.37 (17)</td>
</tr>
<tr>
<td>Rb1—Ga1</td>
<td>76.19 (2)</td>
</tr>
<tr>
<td>Rb1—Ga1</td>
<td>120.83 (2)</td>
</tr>
<tr>
<td>Rb2—Ga1</td>
<td>74.04 (2)</td>
</tr>
<tr>
<td>O7—Ga1</td>
<td>123.18 (18)</td>
</tr>
<tr>
<td>O6—Ga1</td>
<td>125.38 (17)</td>
</tr>
<tr>
<td>Bond</td>
<td>Distance (Å)</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>O2−-Rb1−B1\textsuperscript{iv}</td>
<td>120.40 (19)</td>
</tr>
<tr>
<td>O7\textsuperscript{iv}-Rb1−B1\textsuperscript{iv}</td>
<td>106.42 (17)</td>
</tr>
<tr>
<td>O7\textsuperscript{iii}-Rb1−B1\textsuperscript{iv}</td>
<td>123.92 (17)</td>
</tr>
<tr>
<td>O4\textsuperscript{iv}-Rb1−B1\textsuperscript{iv}</td>
<td>81.11 (18)</td>
</tr>
<tr>
<td>O3\textsuperscript{iv}-Rb1−B1\textsuperscript{iv}</td>
<td>24.13 (17)</td>
</tr>
<tr>
<td>O2\textsuperscript{i}-Rb1−O4</td>
<td>107.29 (14)</td>
</tr>
<tr>
<td>O7\textsuperscript{ii}-Rb1−O4</td>
<td>66.27 (13)</td>
</tr>
<tr>
<td>O7\textsuperscript{iii}-Rb1−O4</td>
<td>55.84 (13)</td>
</tr>
<tr>
<td>O4\textsuperscript{iv}-Rb1−O4</td>
<td>143.75 (4)</td>
</tr>
<tr>
<td>O3\textsuperscript{iv}-Rb1−O4</td>
<td>107.42 (13)</td>
</tr>
<tr>
<td>B1\textsuperscript{iv}-Rb1−O4</td>
<td>122.35 (19)</td>
</tr>
<tr>
<td>O2\textsuperscript{v}-Rb1−O4\textsuperscript{v}</td>
<td>63.98 (14)</td>
</tr>
<tr>
<td>O7\textsuperscript{iv}-Rb1−O4\textsuperscript{v}</td>
<td>172.59 (13)</td>
</tr>
<tr>
<td>O7\textsuperscript{iii}-Rb1−O4\textsuperscript{v}</td>
<td>64.64 (13)</td>
</tr>
<tr>
<td>O4\textsuperscript{iv}-Rb1−O4\textsuperscript{v}</td>
<td>102.47 (12)</td>
</tr>
<tr>
<td>O3\textsuperscript{iv}-Rb1−O4\textsuperscript{v}</td>
<td>52.94 (12)</td>
</tr>
<tr>
<td>B1\textsuperscript{iv}-Rb1−O4\textsuperscript{v}</td>
<td>68.29 (16)</td>
</tr>
<tr>
<td>O4−Rb1−O4\textsuperscript{v}</td>
<td>111.63 (12)</td>
</tr>
<tr>
<td>O2\textsuperscript{i}-Rb1−B2</td>
<td>126.09 (18)</td>
</tr>
<tr>
<td>O7\textsuperscript{ii}-Rb1−B2</td>
<td>70.20 (18)</td>
</tr>
<tr>
<td>O7\textsuperscript{iii}-Rb1−B2</td>
<td>67.02 (17)</td>
</tr>
<tr>
<td>O4\textsuperscript{iv}-Rb1−B2</td>
<td>150.35 (17)</td>
</tr>
<tr>
<td>O3\textsuperscript{iv}-Rb1−B2</td>
<td>85.29 (17)</td>
</tr>
<tr>
<td>B1\textsuperscript{iv}-Rb1−B2</td>
<td>98.7 (2)</td>
</tr>
<tr>
<td>O4−Rb1−B2</td>
<td>23.63 (16)</td>
</tr>
<tr>
<td>O4−Rb1−B2</td>
<td>104.94 (17)</td>
</tr>
<tr>
<td>O2\textsuperscript{i}-Rb1−O5</td>
<td>148.92 (14)</td>
</tr>
<tr>
<td>O7\textsuperscript{ii}-Rb1−O5</td>
<td>55.79 (13)</td>
</tr>
<tr>
<td>O7\textsuperscript{iii}-Rb1−O5</td>
<td>90.94 (13)</td>
</tr>
<tr>
<td>O4\textsuperscript{iv}-Rb1−O5</td>
<td>128.56 (13)</td>
</tr>
<tr>
<td>O3\textsuperscript{iv}-Rb1−O5</td>
<td>80.03 (13)</td>
</tr>
<tr>
<td>B1\textsuperscript{iv}-Rb1−O5</td>
<td>85.03 (18)</td>
</tr>
<tr>
<td>O4−Rb1−O5</td>
<td>41.80 (11)</td>
</tr>
<tr>
<td>O4−Rb1−O5</td>
<td>117.62 (12)</td>
</tr>
<tr>
<td>O2\textsuperscript{i}-Rb1−O2\textsuperscript{vi}</td>
<td>23.93 (16)</td>
</tr>
<tr>
<td>O7\textsuperscript{ii}-Rb1−O2\textsuperscript{vi}</td>
<td>101.45 (12)</td>
</tr>
<tr>
<td>O7\textsuperscript{iii}-Rb1−O2\textsuperscript{vi}</td>
<td>112.08 (14)</td>
</tr>
<tr>
<td>O4\textsuperscript{iv}-Rb1−O2\textsuperscript{vi}</td>
<td>129.57 (13)</td>
</tr>
<tr>
<td>O3\textsuperscript{iv}-Rb1−O2\textsuperscript{vi}</td>
<td>61.13 (12)</td>
</tr>
<tr>
<td>B1\textsuperscript{iv}-Rb1−O2\textsuperscript{vi}</td>
<td>41.56 (13)</td>
</tr>
</tbody>
</table>

*supplementary materials*
<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>O4—Rb1—O2</td>
<td>145.74 (12)</td>
<td>Rb2—Ga2—Rb2</td>
<td>82.84 (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O4—Rb1—O2</td>
<td>65.28 (12)</td>
<td>Rb1—Ga2—Rb2</td>
<td>75.46 (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2—Rb1—O2</td>
<td>122.11 (17)</td>
<td>O7—Ga2—Rb2</td>
<td>152.81 (16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb1—O2</td>
<td>106.98 (12)</td>
<td>O5—Ga2—Rb2</td>
<td>43.56 (16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2—Rb1—Ga2</td>
<td>31.19 (10)</td>
<td>O2—Ga2—Rb2</td>
<td>86.43 (17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O7—Rb1—Ga2</td>
<td>131.89 (11)</td>
<td>O1—Ga2—Rb2</td>
<td>82.56 (12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O7—Rb1—Ga2</td>
<td>30.80 (10)</td>
<td>Rb1—Ga2—Rb2</td>
<td>123.67 (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O4—Rb1—Ga2</td>
<td>107.55 (9)</td>
<td>Rb2—Ga2—Rb2</td>
<td>115.16 (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb1—Ga2</td>
<td>104.14 (9)</td>
<td>Rb1—Ga2—Rb2</td>
<td>105.14 (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1—Rb1—Ga2</td>
<td>121.58 (14)</td>
<td>Rb2—Ga2—Rb2</td>
<td>106.28 (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O4—Rb1—Ga2</td>
<td>84.39 (8)</td>
<td>O3—B1—O2</td>
<td>119.4 (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O4—Rb1—Ga2</td>
<td>53.33 (8)</td>
<td>O3—B1—O1</td>
<td>117.8 (8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2—Rb1—Ga2</td>
<td>97.81 (14)</td>
<td>O2—B1—O1</td>
<td>122.7 (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb1—Ga2</td>
<td>121.74 (8)</td>
<td>O3—B1—Rb1</td>
<td>72.7 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2—Rb1—Ga2</td>
<td>113.35 (9)</td>
<td>O2—B1—Rb1</td>
<td>83.7 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb2—O5</td>
<td>157.47 (16)</td>
<td>O3—B1—Rb1</td>
<td>109.9 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O5</td>
<td>95.27 (15)</td>
<td>O2—B1—Rb2</td>
<td>52.0 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb2—O5</td>
<td>106.33 (12)</td>
<td>O2—B1—Rb2</td>
<td>166.2 (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb2—O1</td>
<td>81.27 (15)</td>
<td>O1—B1—Rb2</td>
<td>66.4 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O1</td>
<td>76.31 (14)</td>
<td>Rb1—B1—Rb2</td>
<td>83.14 (19)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O1</td>
<td>157.67 (13)</td>
<td>O3—B1—Rb2</td>
<td>109.0 (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb2—O6</td>
<td>98.49 (16)</td>
<td>O2—B1—Rb2</td>
<td>65.4 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O6</td>
<td>92.34 (14)</td>
<td>O1—B1—Rb2</td>
<td>99.4 (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O6</td>
<td>45.46 (13)</td>
<td>Rb1—B1—Rb2</td>
<td>145.8 (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O1—Rb2—O6</td>
<td>112.93 (14)</td>
<td>Rb2—B1—Rb2</td>
<td>125.8 (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb2—O1</td>
<td>47.31 (13)</td>
<td>O6—B2—O4</td>
<td>124.7 (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O1</td>
<td>136.88 (12)</td>
<td>O6—B2—O5</td>
<td>116.3 (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O1</td>
<td>89.80 (13)</td>
<td>O4—B2—O5</td>
<td>119.0 (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O1—Rb2—O1</td>
<td>103.37 (11)</td>
<td>O6—B2—Rb2</td>
<td>70.3 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O6—Rb2—O1</td>
<td>124.94 (13)</td>
<td>O4—B2—Rb2</td>
<td>139.5 (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb2—O6</td>
<td>144.03 (14)</td>
<td>O5—B2—Rb2</td>
<td>62.0 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O6</td>
<td>44.59 (13)</td>
<td>O6—B2—Rb1</td>
<td>116.6 (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—O6</td>
<td>90.03 (13)</td>
<td>O4—B2—Rb1</td>
<td>75.6 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O1—Rb2—O6</td>
<td>105.77 (13)</td>
<td>O5—B2—Rb1</td>
<td>78.1 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O6—Rb2—O6</td>
<td>110.17 (11)</td>
<td>Rb2—B2—Rb1</td>
<td>135.8 (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O1—Rb2—O6</td>
<td>97.31 (13)</td>
<td>O6—B2—Rb2</td>
<td>62.6 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb2—B2</td>
<td>150.50 (19)</td>
<td>O4—B2—Rb2</td>
<td>156.1 (6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O5—Rb2—B2</td>
<td>24.64 (17)</td>
<td>O5—B2—Rb2</td>
<td>59.4 (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3—Rb2—B2</td>
<td>107.28 (18)</td>
<td>Rb2—B2—Rb2</td>
<td>63.31 (15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O1—Rb2—B2</td>
<td>84.46 (17)</td>
<td>Rb1—B2—Rb2</td>
<td>80.99 (19)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### supplementary materials

<table>
<thead>
<tr>
<th>Bond</th>
<th>Distance (Å)</th>
<th>Error (Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O1—Rb2—B2</td>
<td>112.62 (17)</td>
<td>23.61 (16)</td>
</tr>
<tr>
<td>O6&lt;sup&gt;x&lt;/sup&gt;—Rb2—B2</td>
<td>23.13 (17)</td>
<td>156.39 (16)</td>
</tr>
<tr>
<td>O3—Rb2—B1</td>
<td>111.28 (17)</td>
<td>24.32 (16)</td>
</tr>
<tr>
<td>O5—Rb2—B1</td>
<td>121.60 (17)</td>
<td>134.8 (2)</td>
</tr>
<tr>
<td>O5&lt;sup&gt;iv&lt;/sup&gt;—Rb2—B1</td>
<td>134.98 (13)</td>
<td>124.89 (13)</td>
</tr>
<tr>
<td>O1&lt;sup&gt;vii&lt;/sup&gt;—Rb2—B1</td>
<td>104.03 (17)</td>
<td>114.4 (16)</td>
</tr>
<tr>
<td>O6—Rb2—O2&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>91.56 (19)</td>
<td>105.54 (18)</td>
</tr>
<tr>
<td>O5&lt;sup&gt;iv&lt;/sup&gt;—Rb2—B&lt;sup&gt;ii&lt;/sup&gt;</td>
<td>23.90 (16)</td>
<td>133.78 (17)</td>
</tr>
<tr>
<td>O6&lt;sup&gt;iv&lt;/sup&gt;—Rb2—O2&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>23.01 (17)</td>
<td>104.57 (17)</td>
</tr>
<tr>
<td>O1—Rb2—O2&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>106.29 (17)</td>
<td>116.69 (15)</td>
</tr>
<tr>
<td>O2&lt;sup&gt;viii&lt;/sup&gt;—Rb2—B&lt;sup&gt;ii&lt;/sup&gt;</td>
<td>96.8 (2)</td>
<td>80.00 (16)</td>
</tr>
<tr>
<td>O3—Rb2—Rb2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>147.74 (12)</td>
<td>53.31 (10)</td>
</tr>
<tr>
<td>O5—Rb2—Rb2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>53.02 (10)</td>
<td>53.02 (10)</td>
</tr>
<tr>
<td>O5&lt;sup&gt;iv&lt;/sup&gt;—Rb2—Rb2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>125.17 (11)</td>
<td>56.49 (11)</td>
</tr>
<tr>
<td>O1&lt;sup&gt;vii&lt;/sup&gt;—Rb2—Rb2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>127.20 (10)</td>
<td>53.68 (10)</td>
</tr>
<tr>
<td>O6&lt;sup&gt;iv&lt;/sup&gt;—Rb2—Rb2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>59.44 (15)</td>
<td>140.98 (13)</td>
</tr>
<tr>
<td>B2—Rb2—Rb2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>93.49 (9)</td>
<td>57.25 (15)</td>
</tr>
<tr>
<td>B1—Rb2—Rb2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>110.8 (2)</td>
<td>56.0 (4)</td>
</tr>
<tr>
<td>B2—O2—B2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>113.6 (5)</td>
<td>85.5 (2)</td>
</tr>
<tr>
<td>O5—B2—Rb1&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>130.1 (2)</td>
<td>148.0 (3)</td>
</tr>
<tr>
<td>Rb2—B2—Rb1&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>130.5 (5)</td>
<td>124.9 (4)</td>
</tr>
<tr>
<td>Rb1&lt;sup&gt;iv&lt;/sup&gt;—B2—Rb1&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>96.17 (18)</td>
<td>89.3 (4)</td>
</tr>
<tr>
<td>B1—O1—Ga2</td>
<td>101.2 (2)</td>
<td>111.24 (16)</td>
</tr>
<tr>
<td>B1—O1—Rb2&lt;sup&gt;xii&lt;/sup&gt;</td>
<td>127.1 (5)</td>
<td>136.1 (4)</td>
</tr>
<tr>
<td>Ga2—O1—Rb2&lt;sup&gt;xii&lt;/sup&gt;</td>
<td>95.4 (2)</td>
<td>93.0 (4)</td>
</tr>
<tr>
<td>B1—O1—Rb2</td>
<td>83.28 (19)</td>
<td>103.59 (16)</td>
</tr>
<tr>
<td>Rb2&lt;sup&gt;vii&lt;/sup&gt;—O1—Rb2</td>
<td>72.9 (4)</td>
<td>117.0 (2)</td>
</tr>
<tr>
<td>B1&lt;sup&gt;x&lt;/sup&gt;—O2—Ga2&lt;sup&gt;xvi&lt;/sup&gt;</td>
<td>78.55 (12)</td>
<td>159.51 (17)</td>
</tr>
<tr>
<td>B1&lt;sup&gt;x&lt;/sup&gt;—O2—Rb1&lt;sup&gt;vi&lt;/sup&gt;</td>
<td>125.4 (5)</td>
<td>104.9 (5)</td>
</tr>
<tr>
<td>Ga2&lt;sup&gt;vii&lt;/sup&gt;—O2—Rb1&lt;sup&gt;vi&lt;/sup&gt;</td>
<td>127.0 (2)</td>
<td>83.2 (4)</td>
</tr>
<tr>
<td>Rh1&lt;sup&gt;x&lt;/sup&gt;—O2—Rb1&lt;sup&gt;vi&lt;/sup&gt;</td>
<td>104.1 (2)</td>
<td>96.45 (16)</td>
</tr>
<tr>
<td>Rb2&lt;sup&gt;vii&lt;/sup&gt;—O3—Rb1&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>127.8 (5)</td>
<td>102.1 (5)</td>
</tr>
<tr>
<td>B2—O4—Ga1&lt;sup&gt;i&lt;/sup&gt;</td>
<td>99.4 (2)</td>
<td>80.8 (4)</td>
</tr>
<tr>
<td>B2—O4—Rb1&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>88.01 (19)</td>
<td>167.46 (17)</td>
</tr>
<tr>
<td>Ga1&lt;sup&gt;i&lt;/sup&gt;—O4—Rb1&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>132.8 (4)</td>
<td>167.46 (17)</td>
</tr>
<tr>
<td>B2—O4—Rb1&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>98.07 (19)</td>
<td>77.53 (12)</td>
</tr>
<tr>
<td>B1—O4—Ga2&lt;sup&gt;ii&lt;/sup&gt;</td>
<td>91.48 (13)</td>
<td>122.8 (5)</td>
</tr>
<tr>
<td>B2—O5—Rb2</td>
<td>93.4 (4)</td>
<td>111.1 (2)</td>
</tr>
<tr>
<td>B2—O5—Rb2&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>96.7 (4)</td>
<td>88.01 (19)</td>
</tr>
</tbody>
</table>
supplementary materials

| O$_7^{iv}$—Gal—O$_4^{ix}$ | 110.4 (2) | Ga$_2^{ii}$—O$_5$—Rb$_2^{iv}$ | 139.0 (2) |
| O$_6$—Gal—O$_4^{ix}$ | 114.5 (2) | Rb$_2$—O$_5$—Rb$_2^{iv}$ | 73.67 (11) |
| O$_7^{iv}$—Gal—O$_3^{ii}$ | 110.4 (2) | B$_2$—O$_5$—Rb$_1$ | 77.9 (4) |
| O$_6$—Gal—O$_3^{ii}$ | 105.7 (2) | Ga$_2^{ii}$—O$_5$—Rb$_1$ | 89.68 (19) |
| O$_4^{x}$—Gal—O$_3^{ii}$ | 104.8 (2) | Rb$_2$—O$_5$—Rb$_1$ | 158.76 (17) |
| O$_7^{iv}$—Gal—Rb$_1^{ix}$ | 53.98 (17) | Rb$_2^{iv}$—O$_5$—Rb$_1$ | 87.95 (13) |
| O$_6$—Gal—Rb$_1^{ix}$ | 154.26 (16) | B$_2^{iv}$—O$_6$—Ga$_1$ | 132.7 (5) |
| O$_4^{x}$—Gal—Rb$_1^{ix}$ | 62.46 (17) | B$_2^{iv}$—O$_6$—Rb$_2$ | 94.4 (4) |
| O$_3^{ii}$—Gal—Rb$_1^{ix}$ | 99.52 (17) | Ga$_1$—O$_6$—Rb$_2$ | 131.0 (2) |
| O$_7^{iv}$—Gal—Rb$_1^{x}$ | 157.95 (16) | B$_2^{iv}$—O$_6$—Rb$_2^{iv}$ | 86.1 (4) |
| O$_6$—Gal—Rb$_1^{x}$ | 72.13 (18) | Ga$_1$—O$_6$—Rb$_2^{iv}$ | 96.8 (2) |
| O$_4^{x}$—Gal—Rb$_1^{x}$ | 52.16 (17) | Rb$_2$—O$_6$—Rb$_2^{iv}$ | 69.83 (11) |
| O$_3^{ii}$—Gal—Rb$_1^{x}$ | 88.92 (17) | Ga$_1^{iv}$—O$_7$—Ga$_2$ | 137.2 (3) |
| Rb$_1^{ix}$—Gal—Rb$_1^{x}$ | 113.93 (3) | Ga$_1^{iv}$—O$_7$—Rb$_1^{ix}$ | 113.0 (2) |
| O$_7^{iv}$—Gal—Rb$_2^{iv}$ | 72.36 (17) | Ga$_2$—O$_7$—Rb$_1^{ix}$ | 105.1 (2) |
| O$_6$—Gal—Rb$_2^{iv}$ | 54.84 (18) | Ga$_1^{iv}$—O$_7$—Rb$_1^{ix}$ | 97.5 (2) |
| O$_4^{x}$—Gal—Rb$_2^{iv}$ | 168.11 (17) | Ga$_2$—O$_7$—Rb$_1^{ix}$ | 90.1 (2) |
| O$_3^{ii}$—Gal—Rb$_2^{iv}$ | 84.37 (17) | Rb$_1^{ix}$—O$_7$—Rb$_1^{ix}$ | 105.83 (16) |
| Rb$_1^{ix}$—Gal—Rb$_2^{iv}$ | 124.20 (3) |

Symmetry codes: (i) x, y, z; (ii) x, −y+1/2, z−1/2; (iii) −x, −y, −z+1; (iv) −x+1, −y, −z+1; (v) −x, y−1/2, −z+1/2; (vi) −x+1, −y, −z; (vii) −x+1, y+1/2, −z+3/2; (viii) x, −y+1/2, z+1/2; (ix) x+1, y, z; (x) x+1, −y+1/2, z+1/2; (xi) −x+1, y−1/2, −z+1/2; (xii) −x+1, y+1/2, −z+1/2; (xiii) −x+1, y−1/2, −z+3/2; (xiv) x, y, z+1; (xv) x, y, z−1; (xvi) −x, y+1/2, −z+1/2.
Fig. 1