Polymeric bis(glycolato)nickel(II)

The title compound, poly[nickel(II)-bis(α-hydroxyacetato-κ²O₁,O²;O³)], \([\text{Ni(C}_2\text{H}_3\text{O}_3)_2]_n\), is isomorphous with the reported cobalt analogue. The Ni atom is located on a centre of inversion.

Comment

A cobalt complex of glycolate was reported by Medina et al. (2000). Recently, we synthesized a nickel complex of glycolate. Single-crystal X-ray diffraction analysis reveals that this complex is isomorphous with the cobalt analogue (Medina et al., 2000). The Ni atom is located on a centre of inversion.

In the title compound, (I) (Fig. 1), the Ni—O distance for the carboxy O atom (Ni—O2) is shorter than that for the α-hydroxy O atom (Ni1—O1), whereas the bond length between atom Ni1 and the axially coordinated atom O3(−x + 1/2, y + 1/2, −z + 3/2) is slightly longer than those observed for the Ni—O bonds in the chelate ring (Table 1).

Experimental

An aqueous solution of Ni(NO₃)₂ (1 ml, 1 mmol ml⁻¹) was added to a solution (15 ml) containing glycollic acid (0.07 g, 1 mmol) in a mixed solvent of water and ethanol in the volume ratio 1:1. The pH value of the solution was adjusted to ~5 with NaOH solution. The resulting green solution was sealed into a stainless steel autoclave. The autoclave was heated slowly to 453 K over a period of 8 h and then cooled to 393 K at a rate of 1.5 K h⁻¹. The temperature was kept at 393 K for 75 h and then allowed to drop to 303 K over a period of 8 h. Green crystals of the title compound, suitable for X-ray diffraction, were obtained.

Crystal data

\([\text{Ni(C}_2\text{H}_3\text{O}_3)_2]_n\)  \(D_\text{calc} = 2.133 \text{ Mg m}^{-3}\)  Mo Ka radiation  Cell parameters from 1462 reflections  \(\theta = 3.6–27.9^\circ\)  \(\mu = 2.96 \text{ mm}^{-1}\)  \(T = 298 \text{ (2) K}\)  Volume, Prism, green  \(V = 325.06(8) \text{ Å}^3\)  \(Z = 2\)  \(a = 5.1304(7) \text{ Å}\)  \(b = 7.6367(11) \text{ Å}\)  \(c = 8.6076(12) \text{ Å}\)  \(\beta = 105.443(2)^\circ\)  \(\alpha = 3.6–27.9^\circ\)  \(\mu = 2.96 \text{ mm}^{-1}\)  \(T = 298 \text{ (2) K}\)  Volume, Prism, green  \(V = 325.06(8) \text{ Å}^3\)  \(Z = 2\)  \(0.38 \times 0.20 \times 0.12 \text{ mm}\)
Figure 1
The coordination of the NiII ion in the title compound. Displacement ellipsoids are shown at the 50% probability level [symmetry codes: (i) \( \frac{1}{2} - x, \frac{1}{2} + y, \frac{1}{2} - z \); (ii) \( 1 - x, 2 - y, 2 - z \); (iii) \( \frac{1}{2} + x, \frac{1}{2} - y, \frac{1}{2} + z \)].

Table 1
Selected geometric parameters (Å, °).

<table>
<thead>
<tr>
<th>Bond/Angle</th>
<th>Distance/Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni1—O2</td>
<td>2.0095 (12)</td>
</tr>
<tr>
<td>Ni1—O1</td>
<td>2.0374 (12)</td>
</tr>
<tr>
<td>O2—Ni1—O1ii</td>
<td>99.99 (5)</td>
</tr>
<tr>
<td>O2—Ni1—O1</td>
<td>80.01 (5)</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Bond/Distance/Angle</th>
<th>Distance/Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>O1—H1···O3′′</td>
<td>0.82 1.84 2.6568 (17) 177</td>
</tr>
</tbody>
</table>

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

H atoms were treated as riding, with C—H = 0.97 Å, O—H = 0.82 Å, and \( U_{eq}(H) = 1.2U_{eq}(C) \) and \( 1.5U_{eq}(O) \).

Data collection: SMART (Bruker, 2001); cell refinement: SAINT (Bruker, 2001); data reduction: SAINT; program(s) used to solve structure: SHELXS97 (Sheldrick, 1997); program(s) used to refine structure: SHELXL97 (Sheldrick, 1997); molecular graphics: ORTEPII (Johnson, 1976); software used to prepare material for publication: SHELXL97.

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References