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Key indicators

Single-crystal X-ray study
 T = 294 K
 Mean $\sigma(\text{C}-\text{C}) = 0.004 \text{ \AA}$
 R factor = 0.026
 wR factor = 0.078
 Data-to-parameter ratio = 12.5

For details of how these key indicators were
 automatically derived from the article, see
<http://journals.iucr.org/e>.

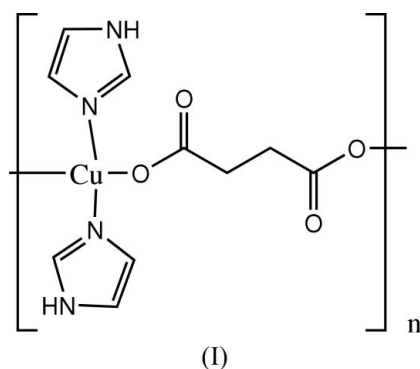
**catena-Poly[[bis(imidazole- κN)copper(II)]-
 μ -succinato- $\kappa^2\text{O}:\text{O}'$]**

In the title polymeric complex, $[\text{Cu}(\text{C}_4\text{H}_4\text{O}_4)(\text{C}_3\text{H}_4\text{N}_2)_2]_n$, the Cu^{II} ion assumes a distorted CuO_2N_2 square-planar coordination geometry formed by two succinate dianions and two imidazole molecules. The Cu^{II} complex units are bridged by the succinate dianions, forming polymeric chains.

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Comment

The succinate dianion has been widely used as a bridging ligand in the preparation of metal complexes. We present here the structure of the title polymeric Cu^{II} complex, (I).



The coordination environment around the Cu^{II} ion in the polymeric structure of (I) is shown in Fig. 1. The Cu^{II} ion is

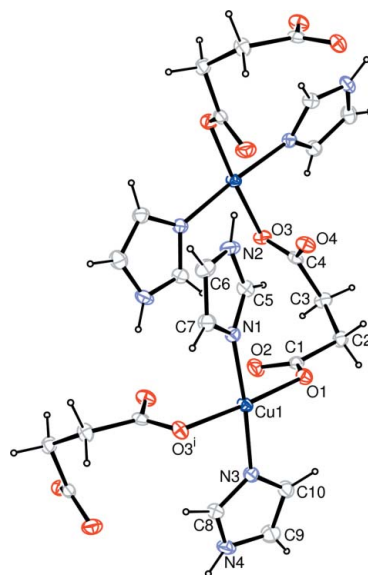


Figure 1
 A segment of the polymeric structure of (I) with 30% probability displacement ellipsoids (arbitrary spheres for H atoms) [symmetry code: (i) $-x + \frac{3}{2}, y + \frac{1}{2}, -z + \frac{1}{2}$].

located on a general position and assumes a distorted CuO_2N_2 square planar coordination geometry (Table 1), formed by two succinate dianions and two imidazole molecules. The Cu^{II} complex units are bridged by the succinate dianions, forming polymeric chains along the b axis. Adjacent chains are linked by $\text{N}-\text{H}\cdots\text{O}$ hydrogen bonding (Table 2).

Experimental

Succinic acid (10 mmol, 1.18 g) was added slowly to an aqueous solution (about 25 ml) of NaOH (0.80 g, 20 mmol) with stirring until the pH was ≤ 8.0 . $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ (2.42 g, 10 mmol) was dissolved in water (20 ml) and mixed with the former solution at room temperature; a light-blue precipitate appeared immediately. Solid imidazole (1.36 g, 20 mmol) was slowly added with stirring until most of the precipitate had dissolved and the color of the solution was dark blue. The mixture was filtered and the filtrate was allowed to stand at room temperature. Deep-blue single crystals of (I) were obtained by evaporation after one week.

Crystal data

$[\text{Cu}(\text{C}_4\text{H}_4\text{O}_4)(\text{C}_3\text{H}_4\text{N}_2)_2]$	$Z = 4$
$M_r = 315.78$	$D_x = 1.716 \text{ Mg m}^{-3}$
Monoclinic, $P2_1/n$	Mo $K\alpha$ radiation
$a = 9.6038 (15) \text{ \AA}$	$\mu = 1.80 \text{ mm}^{-1}$
$b = 10.4719 (17) \text{ \AA}$	$T = 294 (2) \text{ K}$
$c = 12.790 (2) \text{ \AA}$	Block, blue
$\beta = 108.154 (2)^\circ$	$0.26 \times 0.22 \times 0.20 \text{ mm}$
$V = 1222.3 (3) \text{ \AA}^3$	

Data collection

Siemens SMART CCD area-detector diffractometer	6063 measured reflections
φ and ω scans	2155 independent reflections
Absorption correction: multi-scan (SADABS; Sheldrick, 1996)	1859 reflections with $I > 2\sigma(I)$
$T_{\min} = 0.635$, $T_{\max} = 0.695$	$R_{\text{int}} = 0.051$
	$\theta_{\max} = 25.0^\circ$

Refinement

Refinement on F^2	$w = 1/[\sigma^2(F_o^2) + (0.0378P)^2 + 0.3267P]$
$R[F^2 > 2\sigma(F^2)] = 0.026$	where $P = (F_o^2 + 2F_c^2)/3$
$wR(F^2) = 0.078$	$(\Delta/\sigma)_{\max} = 0.001$
$S = 1.10$	$\Delta\rho_{\max} = 0.26 \text{ e \AA}^{-3}$
2155 reflections	$\Delta\rho_{\min} = -0.40 \text{ e \AA}^{-3}$
172 parameters	
H-atom parameters constrained	

Table 1

Selected geometric parameters (\AA , $^\circ$).

$\text{Cu1}-\text{N1}$	1.983 (2)	$\text{Cu1}-\text{O1}$	1.9933 (16)
$\text{Cu1}-\text{N3}$	1.991 (2)	$\text{Cu1}-\text{O3}^{\text{i}}$	2.0150 (16)
$\text{N1}-\text{Cu1}-\text{N3}$	175.72 (8)	$\text{N3}-\text{Cu1}-\text{O3}^{\text{i}}$	89.17 (7)
$\text{N1}-\text{Cu1}-\text{O1}$	90.47 (7)	$\text{O1}-\text{Cu1}-\text{O3}^{\text{i}}$	176.16 (7)
$\text{N3}-\text{Cu1}-\text{O1}$	93.07 (7)	$\text{C1}-\text{O1}-\text{Cu1}$	119.62 (15)
$\text{N1}-\text{Cu1}-\text{O3}^{\text{i}}$	87.16 (7)	$\text{C4}-\text{O3}-\text{Cu1}^{\text{ii}}$	107.31 (14)

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

Table 2

Hydrogen-bond geometry (\AA , $^\circ$).

$D-\text{H}\cdots A$	$D-\text{H}$	$\text{H}\cdots A$	$D\cdots A$	$D-\text{H}\cdots A$
$\text{N2}-\text{H2}\cdots\text{O2}^{\text{ii}}$	0.86	1.94	2.777 (3)	165
$\text{N4}-\text{H4}\cdots\text{O4}^{\text{iii}}$	0.86	2.00	2.781 (3)	151

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

All H atoms were placed in geometrically idealized positions and constrained to ride on their parent atoms, with $\text{C}-\text{H} = 0.93$ (aromatic) or 0.97 \AA (methylene) and $\text{N}-\text{H} = 0.86 \text{ \AA}$, and refined in riding mode, with $U_{\text{iso}}(\text{H}) = 1.2U_{\text{eq}}(\text{C}, \text{N})$.

Data collection: SMART (Siemens, 1996); cell refinement: SAINT (Siemens, 1996); data reduction: SAINT; program(s) used to solve structure: SHELXS97 (Sheldrick, 1997a); program(s) used to refine structure: SHELXL97 (Sheldrick, 1997a); molecular graphics: SHELXTL (Sheldrick, 1997b); software used to prepare material for publication: SHELXTL.

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