$[Mn(H_2O)_2]_4[HNC_5H_4(COO)]_2[C_6H_2(COO)_4]_2 \cdot 4H_2O$ — A Three-dimensional Coordination Polymer with Guest Water Molecules in Channel-like Voids

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Abstract

Single crystals of $[Mn(H_2O)_2]_4[HNC_5H_4(COO)]_2[C_6H_2(COO)_4]_2 \cdot 4H_2O$ have been prepared in aqueous solution at 55 °C. Space group $P1^-$ (no. 2), a = 999.7(2), b = 1314.4(2), c = 1645.8(2) pm, α = 101.096(8)°, β = 92.796(14)°, γ = 96.03(2)°, V = 2.1053(5) nm^3, Z = 2. There are four unique Mn^{2+} which are coordinated in a distorted, octahedral manner by two water molecules, three oxygen atoms of the pyromellitate anions and one oxygen atom of isonicotinic acid (Mn—O 208.6(2) — 227.3(3) pm). The connection of Mn^{2+} and $[C_6H_2(COO)_4]^{4-}$ yields a three-dimensional coordination polymer with two different, channel-like voids extending parallel to [110]. The first channel accomodates water molecules, the second channel is filled by isonicotinic acid molecules. Thermogravimetric analysis in air revealed that the loss of water of crystallisation occurs in two steps between 97 and 200 °C. The dehydrated sample was stable between 200 and 340 °C. Further decomposition yielded Mn_3O_4.