Distortions of $\text{[Sb}_2\text{Cl}_{10}]^{4-}$ Biocahedra and Phase Transitions in the Chloroantimonate(III) $(\text{C}_3\text{H}_5\text{NH}_3)_2[\text{SbCl}_5] \cdot (\text{C}_3\text{H}_5\text{NH}_3)\text{Cl}$

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Bis(allylammonium)pentachloroantimonate(III) – allylammonium chloride, $(\text{C}_3\text{H}_5\text{NH}_3)_2[\text{SbCl}_5] \cdot (\text{C}_3\text{H}_5\text{NH}_3)\text{Cl}$, belongs to the chloroantimonate(III) organic-inorganic salts family. The DSC studies of this compound showed two anomalies at 181 K and at 223 K. Both are associated with phase transitions, which mainly occur due to ordering-disordering processes of the organic cations. Between 181 and 223 K the structure is incommensurate. The crystal structure was determined at 298 and 86 K. At both temperatures the crystal structure consists of $(\text{C}_3\text{H}_5\text{NH}_3)^+$ cations, anionic distorted $\text{[Sb}_2\text{Cl}_{10}]^{4-}$ units and isolated $\text{Cl}^-$ ions. In the room-temperature phase two out of three, and in the low-temperature phase two out of six allylammonium cations were found to be disordered. The deformations of the $\text{[Sb}_2\text{Cl}_{10}]^{4-}$ moieties in both phases are discussed and explained by the deviation of the SbIII 5s electron lone pair from its spherical symmetry and the influence of N–H···Cl hydrogen bonds, which join together the organic and inorganic sublattices.

Key words: Chloroantimonates(III), Phase Transitions, Crystal Structure, Octahedral Distortions, Hydrogen Bonding