

Thermal, dielectric and vibrational properties of allylammonium chloroantimonates(III) and chlorobismuthates(III): $[C_3H_5NH_3]_3[BiCl_6]$ and $[C_3H_5NH_3]_3[SbCl_5] \cdot Cl$.

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Streszczenie

The allylammonium hexachlorobismuthate(III), $[C_3H_5NH_3]_3[BiCl_6]$, and the allylammonium pentachloroantimonate(III), $[C_3H_5NH_3]_3[SbCl_5]Cl$, compounds have been synthesized and studied by means of differential scanning calorimetry, thermal expansion, dielectric and infrared (IR) techniques. $[C_3H_5NH_3]_3[BiCl_6]$ exhibits three solid–solid structural phase transitions (PTs) at: 304/304 K (I $\leftrightarrow$ II) (upon cooling/heating), 195/197 K (II $\leftrightarrow$ III) and 155/156 K (III $\leftrightarrow$ IV). In turn $[C_3H_5NH_3]_3[SbCl_5]Cl$ exhibits two PTs at: 221/221 K (I $\leftrightarrow$ II) and 181/185 K (II $\leftrightarrow$ III). The dielectric studies have been made in the frequency range of 2 kHz–1 MHz between 100 and 350 K. The dielectric relaxation processes are observed in both crystals. The activation energy (E_A) value of the dielectric relaxation process for $[C_3H_5NH_3]_3[BiCl_6]$ amounts to about 43 and 72 kJ mol⁻¹ for the low- and high-temperature relaxation, respectively, whereas for $[C_3H_5NH_3]_3[SbCl_5]Cl$ $E_A = 15$ kJ mol⁻¹. The infrared spectra of $[C_3H_5NH_3]_3[BiCl_6]$ and $[C_3H_5NH_3]_3[SbCl_5]Cl$ have been recorded over the wavenumber range between 3800 and 40 cm⁻¹ at selected temperatures (10–310 K). The mechanisms of PTs in the title compounds are discussed.

Słowa kluczowe

Thermal properties, Chloroantimonates(III) and chlorobismuthates(III), dielectric properties, phase transition, Infrared and Raman spectroscopy

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