Mössbauer Spectroscopic Studies of \((\text{Me}_2\text{NH}_2)_2\text{SnX}_6\) (X = Cl or Br) and Their Related Complexes

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The temperature dependence in the \(^{119}\text{Sn}\) Mössbauer spectral area for \((\text{CH}_3\text{NH}_2)_2\text{SnCl}_6\) was found to be almost linear, although a phase transition of the complex has been suggested by IR, \(^{35}\text{Cl}\) NQR and NMR studies, while an anomaly in the temperature dependence for \((\text{CH}_3\text{NH}_2)_2\text{SnBr}_6\) was found at \(\sim 235\) K, which is close to the phase transition temperature \(\sim 253\) K determined by \(^{89}\text{Br}\) NQR. These differences are attributable to molecular motion of the dimethylammonium ion in the complexes. The X-ray powder diffraction pattern of \((\text{CH}_3\text{NH}_2)_2\text{SnCl}_6\) did not change near the phase transition point, but that of \((\text{CH}_3\text{NH}_2)_2\text{SnBr}_6\) changed at 108 - 123 K and 233 - 253 K.

Key words: Mössbauer Spectroscopy; Phase Transition; SnX\(_6^{2-}\) Ion; Molecular Motion.