Antimony-121 Mössbauer spectra for hypervalent pentacoordinate antimony compounds having Sb-transition metal bond \( \text{Rf}_2 \text{SbMCp(CO)}_n \) \( \text{RfH} = \sigma\text{-C}_6\text{H}_4\text{C(CF}_3)_2\text{OH}^- \), \( M = \text{Fe, Ru, Cr, Mo, W} \), \( \text{Rf}_2\text{SbFeCp(CO)}\text{PPh}_3, \text{Rf}_2\text{SbFeCp(dppe)} \) and closely related compounds \( \text{Rf}_2\text{SbTol} (\text{Tol} = \text{p-CH}_3\text{C}_6\text{H}_4) \), \( \text{Rf}_2\text{SbX} (X = \text{Cl, Br}) \) are described. The strong \( \sigma \)-donor power of the metal fragments is demonstrated by the Mössbauer parameters. The \( \sigma \)-donor power decreases in the order \( \text{FeCp(dppe)} > \text{FeCp(CO)}\text{PPh}_3 > \text{FeCp(CO)}_2 > \text{RuCp(CO)}_2 > \text{CrCp(CO)}_3 > \text{MoCp(CO)}_3 > \text{WCp(CO)}_3 \gg \text{Tol} \). The essential trends in the molecular structure and the Berry pseudorotation are interpreted by this order. In addition, the \( \epsilon^2 qQ \) values for 32 hypervalent antimony compounds are successfully calculated using the additivity model for the \( \epsilon^2 qQ \) value. A unique electronic feature for \( \text{Rf}_2\text{SbX} \) is clarified through the calculation.

**Key words:** \( ^{121}\text{Sb} \) Mössbauer Spectra; Hypervalent Compound; Organometallic Ligand; Berry Pseudorotation.