Powder Zeeman NQR Study on ^{123}Sb in $Sb(C_6H_5)_3$

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Powder Zeeman NQR spectra of ^{123}Sb in $Sb(C_6H_5)_3$ were studied by means of a computer simulation and an experiment. The ^{123}Sb nucleus has spin 7/2. There are two non-equivalent ^{123}Sb atoms in the crystal of $Sb(C_6H_5)_3$, so that there are two series of three transition lines (higher series: ν_{1h}, ν_{2h}, ν_{3h}; lower series: ν_{1l}, ν_{2l}, ν_{3l}). The powder Zeeman spectra for ν_{1h}, based on the transition between the levels $m_I = \pm 1/2$ and $\pm 3/2$, were observed at 77 K under the two conditions that i) the oscillation coil and the static magnetic coil were set coaxially and parallel, and ii) they were set perpendicular to each other. The powder line shapes for ν_{1h}, which is the lowest line of the higher series due to ^{123}Sb nuclei, were in good agreement with those from a computer simulation under the conditions i) and ii), showing that the asymmetry parameter of the field gradient is very small ($\eta = 0$). The line shape from i) exhibits two shoulders (saddle type), as it appeared for nuclear spin 5/2 and $\eta = 0$.

The quadrupole coupling constant for ν_{1h}, calculated from the resonance frequency 47.820 MHz and the observed η, is 669.480 MHz at 77 K.

Key words: NQR; Nuclear Quadrupole Resonance; Zeeman Effect; Powder Zeeman NQR; Spin 7/2.