

Mössbauer Study of the Ferrimagnetic Spinel $\text{Co}_{0.1}\text{Fe}_{0.9}\text{Cr}_2\text{S}_4$

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The ferrimagnetic normal spinel $\text{Co}_{0.1}\text{Fe}_{0.9}\text{Cr}_2\text{S}_4$ has been studied using the Mössbauer effect. Spectra have been collected over the temperature range 12-300 K. The absence of quadrupole splitting above the Néel temperature T_N indicates that iron ions occupy only the tetrahedral (A) sites. The isomer shift indicates that the charge state of a Fe ion is ferrous in character. It is notable that, as the temperature decreases below $T_N = 178$ K, both quadruple splitting and asymmetrical line broadening appear and increase with decreasing temperature, suggesting the appearance of a dynamic Jahn-Teller distortion. The magnetic hyperfine field and quadrupole splitting at 12 K are found to be 181 kOe and 1.10 mm/s, respectively. The Debye temperature is found to be 231 K.