

## **Crystallographic and Mössbauer Study of the Spinel $\text{Ni}_{0.1}\text{Fe}_{0.9}\text{Cr}_2\text{S}_4$**

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(Received 26 May 1989)

$\text{Ni}_{0.1}\text{Fe}_{0.9}\text{Cr}_2\text{S}_4$  has been studied by Mössbauer Spectroscopy and x-ray diffraction. The crystal structure is the cubic spinel and the lattice parameter  $a_0$  is found to be 9.972 Å. Mössbauer spectra of  $\text{Ni}_{0.1}\text{Fe}_{0.9}\text{Cr}_2\text{S}_4$  have been taken at various temperatures ranging from 40 K to room temperature. The absence of quadrupole splitting above the magnetic ordering temperature indicates that iron ions occupy only the tetrahedral sites. The isomer shift indicates that the charge state of a Fe ion is ferrous in character. Magnetic ordering of a ferrimagnetic nature exists below the Néel temperature,  $T_N = 198$  K. It is notable that quadrupole splitting appears below  $T_N$  and increases with decreasing temperature. The magnetic hyperfine field and quadrupole splitting at 40 K are found to be 205 kOe and 0.81 mm/s, respectively.