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Mössbauer Study of $MgCr_{0.1}Fe_{1.9}O_4$

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$MgCr_{0.1}Fe_{1.9}O_4$ has been studied with X-ray diffraction and Mössbauer spectroscopy. The crystal structure is found to have a cubic spinel structure with a lattice constant of a_0=8.388±0.005 Å. The iron ions at both A (tetrahedral) and B (octahedral) sites are found to be in ferric high-spin states. Its Néel temperature T_N is found to be 687±3 K. The Debye temperatures for the A and the B sites are found to be 515±5 K and 265±5 K, respectively. Atomic migration from the A to the B sites starts near 350 K and increases rapidly with increasing temperature to such a degree that 50 % of the ferric ions at the A sites have moved over to the B sites by 600 K.