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Magnetic properties of the series $\text{YFe}_x\text{Cr}_{1-x}\text{O}_3$

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Due to their interest in both experimental and theoretical study of the structural and electronic properties as multiferroic materials, the compounds $\text{YFe}_x\text{Cr}_{1-x}\text{O}_3$ ($x = 0.25, 0.50, 0.75$ and 1) were prepared by autocombustion. They were analyzed using techniques that provide information both at the atomic and macroscopic level, including low temperature neutron diffraction, ^{57}Fe Mössbauer spectrometry under external magnetic field and magnetic hysteresis loops. It is concluded that, although these compounds can be structurally described as solid solutions resulting from distorted octahedra of FeO_6 and CrO_6 supported by an orthorhombic structure, the magnetic properties are not colinear. Indeed, for example, the central compound ($x = 0.50$) is a canted weak antiferromagnetic (WAF) with a ferromagnetic saturation moment even higher than that of YFeO_3 . This behavior seems to be linked to the fact that it is a very thermally stable material (the lattice parameters a , b and c do not change when the temperature drops). Moreover, the description of the Mössbauer spectra under applied field gives rise to canted antiferromagnetic structures. These results are very interesting and encourage more work in this system.

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