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Magnetization of a Pyrrhotite of Composition $\text{Fe}_{0.847}\text{S}$ in Area of a Curie Point

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The x-ray, Mossbauer and termomagnetic researches of pyrrhotites possessing high-temperature λ – peak ($T_\lambda = 310^\circ\text{C}$) on curve dependence of magnetization on temperature – I (T) are lead. The chemical compound and conditions of formation of such pyrrhotites is determined. It is established, that samples with λ – peak possessed the raised maintenance of sulfur in comparison with pyrrhotites Fe_7S_8 and corresponded to structure Fe_{1-n}S ($n=0.153$). As has shown experiment, these pyrrhotites are in a metastable phase condition and in due course (samples were observed during 29 years) pass in a pyrite and a pyrrhotite of structure Fe_7S_8 (at the presence of an atmosphere the Goethite and a szomolnokit was formed also). Because of quantum-mechanical calculations of dependence of specific magnetization from temperature for various underlattices with various integral of exchange interaction good conformity of a settlement curve with experimental is received. Calculations were made within the framework of model of a molecular field for a two-sublattice ferrimagnetic.

Keywords: the pyrrhotite, a metastable phase, a szomolnokit, quantum-mechanical calculations, spin, ferrimagnetic, a molecular field, magnetization.

Introduction

One of carriers of magnetism of rocks is the pyrrhotite (sulfides of iron Fe_{1-n}S ($0 < n < 0.125$), possessing structure such as NiAs) [1].

Magnetic properties of this mineral are in direct dependence on its history of formation, therefore their studying is interesting to understanding of some problems of geomagnetism. These properties of pyrrhotites are in direct dependence on temperature, pressure, crystal structure, a chemical compound, and also on type of distribution of cationic vacancies on magnetic sublattice (i.e. from superstructure) [3,7-9].

The pyrrhotite possesses structure with weak distortions in which the part of cationic positions is vacant [1]. Hence, the mineral is similar to a form solution of cationic vacancies in pseudo-hexagonal crystal structure. It is obvious, what even at a constant chemical compound the type of distribution of vacancies can influence physical properties of a mineral essentially. In turn, distribution of vacancies in structure depends on any sort of external influences and time [3,7-9].

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