

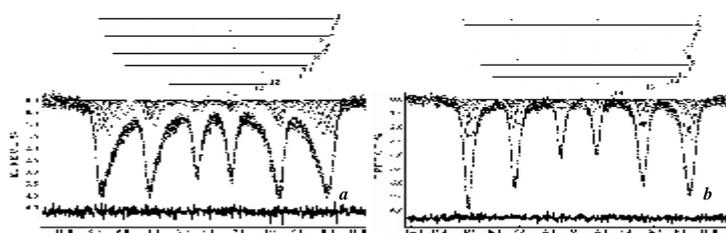
# MÖSSBAUER SPECTROSCOPY OF MAGNETITE NANOPARTICLES FOR MAGNETIC FLUIDS: A PROBLEM OF SPECTRA FITTING AND INTERPRETATION

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Magnetic fluids based on iron oxide nanoparticles are used and developed for various biomedical applications. Therefore, Mössbauer spectroscopy is a useful tool for study of nanoparticles features. In this work we consider the results of the study of two samples: magnetite as prepared and dried magnetite nanoparticles dispersed in Copaiba oil using Mössbauer spectroscopy with a high velocity resolution (using 4096 channels) at 295 and 90 K. Mössbauer spectra of dried magnetite nanoparticles dispersed in Copaiba oil measured at 295 and 90 K are shown in Fig. 1. All spectra were fitted using discrete approach with various numbers of magnetic sextets and paramagnetic doublet (at 295 K only). It was observed that parameters of magnetite nanoparticles as prepared and dispersed in Copaiba oil were different. This fact may be explained as a result of surface interactions of polar molecules of Copaiba oil (for instance, kaurenoic acid) with iron. A large number of magnetic components is not clear yet and may be a result of complicated nanoparticle structure (surface and



**Fig. 1.** Mössbauer spectra of dried magnetite nanoparticles dispersed in Copaiba oil measured in 4096 channels at 295 K (*a*) and at 90 K (*b*).

internal layers and/or domains). Some problems of complicated spectra fitting and interpretation are considered on the basis of the results of various spectra fittings with a large number of varied parameters.

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