

An Analysis of Quadrupole Splitting of the Mössbauer Spectra of Ferritin and Iron-Dextran Complexes in Relation to the Iron Core Microstructural Variations

M. I. Oshtrakh^a, O. B. Milder^b, V. A. Semionkin^b, P. G. Prokopenko^c, A. B. Livshits^d,
A. A. Kozlov^d, and A. I. Pikulev^b

^a Division of Applied Biophysics, Faculty of Physical Techniques and Devices for Quality Control,
Ural State Technical University, Ekaterinburg, 620002, Russian Federation

^b Faculty of Experimental Physics, Ural State Technical University, Ekaterinburg, 620002,
Russian Federation

^c Faculty of Biochemistry, Russian State Medical University, Moscow, Russian Federation

^d Hematological Scientific Center of the Russian Academy of Medical Sciences, Moscow, 125167,
Russian Federation

Reprint requests to Dr. M. I. O.; Fax: +7(3432) 74-38-84,

E-mail: oshtrakh@mail.utnet.ru or oshtrakh@soek.sco.ru

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Mössbauer spectra of human liver ferritin and some pharmaceutically important iron-dextran complexes as ferritin models were measured at 87 K (frozen solutions) and at both 87 and 295 K (lyophilized forms). The Mössbauer spectra consisted of paramagnetic doublets only. However, the spectral line shapes were not Lorentzian and these Mössbauer spectra were better fitted using a superposition of two or more quadrupole doublets or using a distribution of quadrupole splittings. The differences of the maximal quantity of quadrupole doublets for better fitting of various Mössbauer spectra of ferritin and iron-dextran complexes were compared with the fitting using the distribution of quadrupole splitting for additional analysis. It is possible that variations of the quantity of quadrupole doublets for better fitting of Mössbauer spectra of ferritin and iron-dextran complexes may be related to heterogeneous iron cores in the samples. This heterogeneity is supposed to be different for various samples and changed for lyophilized samples and for frozen solutions as well as for various temperatures.

Key words: Ferritin; Iron-Dextran Complexes; Mössbauer Spectroscopy; Paramagnetic Iron Core; Quadrupole Splitting.