

MÖSSBAUER RESEARCH OF MAGNETIC PARTICLES IN MEDICINAL OINTMENTS

A.V. BYKOV ¹, V.I. NIKOLAEV ¹, E. REGUERA RUIZ ²,
Yu.Ya. KHARITONOV ³, O.G. CHERKASOVA ³ and V.I. SHULGIN ¹

¹ *The M.V. Lomonosov Moscow State University, Moscow, USSR*

² *Cuba National Center of Scientific Research, Havana, Cuba*

³ *The I.M. Sechenov First Moscow Medical Institute, Moscow, USSR*

Stability of the properties of magnetite particles in novel medicinal magnetic ointments of multipurpose application was studied using Mössbauer spectroscopy. Comparative analysis of the results obtained by model fitting of ⁵⁷Fe nuclei spectra with those known for the system Fe₃O₄-γ-Fe₂O₃ allowed to identify the phase composition of the particles. This composition, as well as that of the initial pure component in the form of a highly dispersed fraction (~ 100 Å), differs noticeably from the stoichiometric one. Despite their small sizes, the particles exhibit no superparamagnetism (in the temperature range from 95 to 300 K). Radiative sterilization of the ointments has no effect on the magnetic component composition.

It is well known that introduction of any novel drugs into wide medical practice required not only their adequate testing but development of the bases for their standardization and quality criteria as well. The composition of a drug and physicochemical properties of its constituents determine to a large extent the choice of a concrete complex of research methods.

Recently some new ointments for multipurpose application have been composed. Their medicinal effect is improved due to a magnetic component. One of the main problems to be solved in the course of ointments testing for subsequent application is to estimate the properties and composition stability of the magnetic component. This was the aim of our experiments.

We have investigated the vaseline-lanoline-based magnetic wound-healing ointments with highly dispersed magnetite particles synthesized by Elmar's method. Since the magnetic component contains iron (and ⁵⁷Fe-isotope), it appears to be advisable to use Mössbauer spectroscopy, in combination with magnetic measurements, as the main tool for undestructive control in these search investigations, like in [1]. The main conclusions about the properties of magnetic particles have been made while searching for the fitting model for the ⁵⁷Fe nuclei spectra (at temperatures ranging from 95 to 300 K). The series of the magnetic ointments samples has been analyzed at different stages of the probable time evolution of their properties. Identification of the phase composition for a ferri-ferrous component of the samples studied has been carried out by means of comparative