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Study of the structural heterogeneity of concentrated emulsions of organoelemental oligomers

© **Alina V. Ishchenko**,[+] **Pavel S. Baskakov**, **Ekaterina N. Gubareva**, **Valeria V. Strokova**,* and **Larisa N. Botsman**
Department of Materials Science and Technology of Materials. V.G. Shukhov Belgorod State Technological University. Kostyukov St., 46. Belgorod, 308012. Belgorod Region. Russia. Phone: +7 (4722) 54-90-41. E-mail: alina.ishchenko.92@mail.ru

*Supervising author; [+]Corresponding author

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Abstract

The paper deals with the effect of changes in temperature and concentration of the components of the emulsion separately and the final dispersion of organoelemental oligomers on the heterogeneity of the system. In the research the following components were used to prepare the emulsion: an organic-silicon hydrophobisator based on ethyl hydride siloxane polymer was used as the dispersed phase, an aqueous solution of polyvinyl alcohol was chosen as the dispersion medium. The study of such parameters of the dispersion medium as surface tension with a change of concentration and temperature increase allowed to determine their effect on the degree of heterogeneity of dispersion, which consists in changing the structure of micelles, as evidenced by a decrease in the number of peaks (minimum) of the values of surface tension from two to one.

When studying the rheo-technological characteristics of the finished emulsion of organoelemental oligomers during heating, it was noted that when the temperature rises above 60 °C, the changes of values of the apparent activation energy of the viscous flow change to negative values. The decrease in the above-mentioned parameter indicates structural changes in the particles of the hydrophobisator emulsion, expressed in the transition from vesicular structures to a small-sized and monomodal straight system.

Thus, on the basis of carried out in this research studies of the surface tension of the dispersion medium and the viscosity of the organoelemental oligomer emulsion during heating, rational conditions were established (temperature of the entire system, concentration and temperature of the dispersion medium) to obtain a dispersion with monodimensional particles, that eliminates the presence of vesicular structures in a system indicating a lack of water-soluble polymer and system heterogeneity.

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