Full Paper _____ *Thematic Section:* Physicochemical Research.
Reference Object Identifier – ROI: jbc-02/16-47-7-62 *Subsection:* Physical Chemistry.
Publication is available for discussion in the framework of the on-line Internet conference "*Butlerov readings*".
http://butlerov.com/readings/
Submitted on September 26, 2016.

Composite system amizon-silica and its properties

© **Alina P. Golovan**,[1] **Tatiana V. Krupska**,[1] **Katerina O. Filatova**,[1,2] **Vladimir Sedlaric**,[2] **Peter Humpolicek**,[2] **Mykola V. Borisenko**,[1] **Eugeny M. Pakhlov**,[1] and **Vladimir V. Turov**[2]*
[1] *Chuiko Institute of Surface Chemistry of NAS of Ukraine. General Naumov St., 17. Kyiv, 03164. Ukraine. Phone: +38 (044) 424-35-67. E-mail: krupska@ukr.net*
[2] *Centre of Polymer System. University Institute, Tomas Bata University in Zlin. T. Bati, St., 5678. Zlin, 76001. Czech Republic. E-mail: katyafilatova87@mail.ru*

*Supervising author; +Corresponding author
Keywords: nanosilica, amizon, low-temperature ^{1}H NMR spectroscopy, weakly bound water, strongly bound water, hydration properties.

Abstract

The state of amizon immobilized by mechano-chemical activation on the surface of Silica A-300 was studied by low-temperature ^{1}H NMR spectroscopy and X-ray analysis. Research revealed that amizon entered an amorphous state during the process of mechano-chemical activation. However, it was established that water on the surface of the amizon composite system could generate clusters with different solubility in relation to trifluoroacetic acid (TFAA). It was discerned that the solubility of strong acids in nanoscale clusters of water was significantly lower than in bulk water and varied in accordance with the size and structure of clusters. This effect evidences its potential to act as a mechanism to differentiate between surface water clusters through their ability to dissolve acid. Applying TFAA, due to the fact that it was a strong acid, as a consequence of which it was used in deuterated form, did not lead to a change in signal intensity of the protons. This gave rise to formula that could be applied when calculating the thermodynamic parameters of any bound water. Almost half of all associated water pertaining to the clusters could dissolve TFAA in very small quantities, which proved insufficient enough to shift the signal of proton fusion of H_2O-TFAA over into weak magnetic fields. Thus, it was suggested that the clustering of layers, which essentially create a coating over the composite, may be importantto the process of desorption of the bioactive substance from the surface of the composite, as well as its transport to the cells of the mucous membrane of the stomach and intestines.