*Thematic Section:* Physicochemical Research. **Full Paper**
*Subsection:* Physical Chemistry. *Reference Object Identifier* – ROI: jbc-01/17-51-8-129
*The Digital Object Identifier* – DOI: 10.37952/ROI-jbc-01/17-51-8-129
Submitted on August 18, 2017.

# Dynamics of transformations in the system "Crystalline aluminum hydroxide – water"

© **Alexander V. Tolchev**,[1+] **Artem P. Tronov**,[1]* and **Dmitry A. Zherebtsov**[2]
[1] *Department of Chemical Technology and Computational Chemistry. Chelyabinsk State University. Br. Kashirinuh St., 129. Chelyabinsk, 454001. Chelyabinsk Region. Russia. Phone: +7 (351) 799-70-64. E-mail: arteq_tron@mail.ru*
[2] *Scientific and Educational Center "Nanotechnologies". South Ural State University. Lenin Ave., 76. Chelyabinsk, 454080. Chelyabinsk Region. Russia. Phone: +7 (351) 267-95-46. E-mail: zherebtsov_da@yahoo.com*

*Supervising author; +Corresponding author

***Keywords:*** synthetic hydroxide of aluminum, change of a hydrogen indicator of suspensions, electronic scanning microscopy, the X-ray phase analysis, dispergating of particles, the possible mechanism of reactions.

## Abstract

Synthetic hydroxide of aluminum γ-modifications (gibbsite) of various dispersion has investigated interaction with the distilled water in the course of its processing in the range of temperatures of 20-90 °C the control method of a hydrogen indicator of suspension, with further electronic and microscopic and radiographic studying of particles of a firm phase.

Technical synthetic hydroxide of aluminum was subjected by classifications on sets with a size of cell 50 and 200 of micron. Further sample of the gibbsites of fractions of >200 microns and <50 microns weight on 15 g everyone, subjected to processing in 150 ml of the distilled water, by mixing on the magnetic mixer at temperatures of 20, 60 and 90 °C. Constancy of volume of the reactionary environment was maintained by means of the return refrigerator. In all experiments through certain periods took measurement of a hydrogen indicator (pH) of suspension by means of pH meter and ionomer *Expert-001* whose accuracy of measurements was ±0.02 units. On the basis of experimental data was built diagrams of dependence pH gibbsites suspensions from time of processing and analyzed them. Content of impurity of sodium, morphology, a form and the average sizes of particles of hydroxide of aluminum, after its processing in the distilled water, studied on the scanning electronic microscope *JEOL*.

It is established that processing of synthetic hydroxide of aluminum (gibbsites) in the distilled water in the range of temperatures of 20-90 °C is followed by dispergating of a firm phase that is most brightly shown in case of the coarsely dispersed gibbsites. It is shown that large (>200 microns) fraction of the γ-$Al(OH)_3$ is characterized by raised (in ~2 times), in comparison with small (<50 microns) fraction, content of sodium. The assumption is made that in aluminum hydroxide processing in the distilled water in a temperature interval of 20-90 °C are implemented two competing processes: dissolution of $Al(OH)_3$, owing to formation of new, reactionary and active interfaces at dispergating; transition to a liquid phase of sodium aluminate which is contained in aluminum hydroxide.

## References

[1] A.V. Tolchev, A.P. Tronov, M.A. Kulikov. Electronic and microscopic research of a structure of particles of synthetic γ-$Al(OH)_3$. *Butlerov Communications*. **2017**. Vol.50. No.4. P.112-116. DOI: 10.37952/ROI-jbc-01/17-50-4-112
[2] A.V. Tolchev, E.L. Kazantseva, D.D. Larin. Study of the structure of gibbsite with different degree of dispersion. *Non-ferrous Metals.* **2010**. No.1. P.57-59. (russian)
[3] G. Remy. The course of inorganic chemistry. Vol. 1. *Moscow.* **1963**. 920p. (russian)
[4] The Chemical Encyclopedia. In 5 vol.: Vol.1. Editorial team: Knunyants I. L. (Chief Editor) and others. *Moscow: Soviet Encyclopedia.* **1983**. 623p. (russian)
[5] I.A. Kuznetsov, V.S. Anashkin, V.A. Lebedev. Decomposition of aluminate solutions. *Industrial Siberia.* **2005**. P.1-3. (russian)