

Electronic and microscopic research of a structure of particles of synthetic γ -Al(OH)₃

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Abstract

The method of the electronic scanning microscopy has conducted a research of a structure of particles of synthetic hydroxide of aluminum γ -modifications (gibbsite) with various degree of dispersion, for the purpose of specification of the reasons influencing the structural changes fixed radiographic. Object of a research was synthetic hydroxide of aluminum – a semi-product of the Ural aluminum plant from which the classification method on sets with various diameter of cells has received two samples: large fraction with a size of particles more than 160 microns and small with a size of particles less than 63 microns.

It is shown that particles of hydroxide of the aluminum received on Bayer's way have the block structure which isn't observed by methods of optical microscopy i.e. they consist from smaller, uniform in contrast of chips which sizes and a form differs depending on the size of primary particles. Large particles of a gibbsite (fraction with a size of particles more than 160 microns) consist of the defective lamellar crystals which are characterized by the relation of the sizes in the diameter to their thickness (form-factor) about 30-50. Small particles (fraction with a size of particles less than 63 microns) consist of several units or tens of prismatic chips possessing a facet and uniform contrast.

Earlier the X-ray analysis method has investigated parameters of an elementary crystal cell of samples γ -Al(OH)₃ with various degree of dispersion, received by classification on sets with various diameter of cells. It has been established that parameter from an elementary crystal cell decreases, and half-width of diffraction maxima on roentgenograms increases with growth of the average size of crystals γ -Al(OH)₃. In the real work, on the basis of data of electronic microscopy, the conclusion is drawn that deficiency of crystals, in total with their lamellar form, can be the cause of microtension in these the chips that is shown in reduction of parameter from an elementary cell of crystal structure and broadening of diffraction maxima on roentgenograms of coarsely dispersed hydroxide of aluminum γ -modifications.

References

- [1] M.P. Nikolsky, E.V. Kuznetsova. Technology of obtaining alumina from bauxite. *Kamensk – Uralsky*. 2007. 184p. (russian)
- [2] A.A. Godovikov. Mineralogy. The second edition, revised and enlarged. *Moscow: Nedra*. 1983. 647p. (russian)
- [3] A.V. Tolchev, E.L. Kazantseva, D.D. Laryn. The study of the structure of gibbsite with different degrees of dispersion. *Non-Ferrous Metals*. 2010. No.1. P.57-59. (russian)
- [4] A.V. Tolchev. Phase and structural transformation of aluminium oxide compounds with different degrees of dispersion. *Chelyabinsk: Physics and Mathematics Journal*. 2011. No.39. P.24-29. (russian)