

## INVESTIGATION OF THE INFLUENCE OF CONTROLLED TWO-JET PRECIPITATION CONDITIONS ON THE PROPERTIES OF ALUMINUM OXIDE

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The authors synthesized samples of aluminum hydroxide by the method of controlled two-jet precipitation under various conditions, followed by thermal decomposition to aluminum oxides. It was found that the pH value of synthesis significantly affects the physicochemical properties of samples.

The widest use of aluminum oxide is due to the availability and structural features of its modifications. The valuable properties of the material ensure a steady demand for it in various industries.

The ability to control such important characteristics as surface texture, phase and chemical composition is one of the main tasks in the development of methods for the synthesis of active aluminum oxide.

One of the suitable synthesis methods for the ability to control the characteristics of aluminum oxide is the method of controlled two-jet deposition. Features of the method of controlled two-stream deposition allow to influence the properties of the final product and obtain oxides with the required characteristics.

Precipitation was carried out at constant pH. In the course of the work, 5 samples were obtained, which differed in the conditions of synthesis, namely, in the pH values of the medium (5, 6, 7, 8, 9).

It was found that the pH of the precipitation significantly affects the physicochemical properties of aluminum hydroxides.

Hydroxides precipitated at constant pH values equal to 5 and 6 are not prone to gelation, they are well filtered, and they are not prone to aggregation during drying and firing. The oxides obtained from them have the minimum values of the specific surface area, pore volume, and pore diameter considered.

Hydroxides precipitated at constant pH values of 7, 8, and 9 are prone to gelation, poorly filtered, and strongly aggregate during drying and firing. The oxides obtained from them have high values of specific surface area, volume and pore diameter.

It is noted that particles of aluminum hydroxide precipitated at pH = 6 grow systematically in a multilayer process during the entire deposition. It was assumed that the aggregation during deposition occurs in the pH range close to the pH of isoelectric point of aluminum hydroxide.

The main difference between the samples in IR spectra is the intensity of the nitrate peaks. With an increase in pH, an increase in the intensity of the nitrate peak is observed, therefore, an increase in NO<sub>3</sub><sup>-</sup> ions. It was also found that with increasing pH, the intensity of carbonate peaks increases.

According to X-ray phase analysis, it was found that with an increase in the pH of precipitation, the size of crystallites increases, which is in agreement with theory.

It was found that the samples with washing had a specific surface area lower on average by 10-15 m<sup>2</sup>/g than samples without washing, and the average pore diameter was larger.

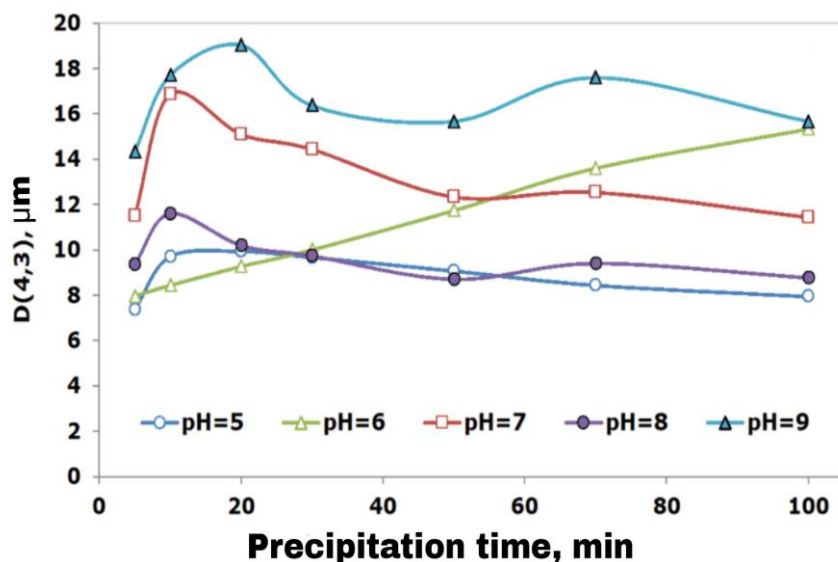


Fig. 1. Change in the average particle diameter of the suspension during the precipitation process in accordance with the selected pH of the synthesis

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