

**MICROWAVE SYNTHESIS OF AN ALUMINUM–SILICATE SUPPORT
REINFORCED WITH LOW-DISPERSED ALUMINUM POWDER***Hasanguliyeva N.M., Shakunova N.V., Litvishkov Yu.N.*

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Currently, in contrast to traditional methods, the known advantages of ultra-high frequency (UHF) electromagnetic radiation, such as instantaneous propagation of electromagnetic radiation with heat transfer throughout the entire volume of a substance, time and energy savings, etc., open up broad prospects for the modern development of technologies for producing catalysts for the chemical industry, especially the petrochemical industry. Taking all this into account, research was conducted in this area.

For this purpose, liquid glass—sodium silicate with a specific gravity of 46.5 g/cm³ and a modulus of 3.36—was used for synthesis, as well as an aqueous solution of aluminum sulfate Al(SO₄)·16H₂O in calculated quantities at various component ratios. At the same time, for reinforcement purposes, low-dispersion aluminum powder of various sizes was used: PA-1 (450–630 μm) and PA-2 (250–450 μm), taken in various percentage ratios. Aluminosilicate samples containing PA-1 and PA-2 separately were obtained by the co-precipitation method.

Each of the obtained hydrogel samples was subjected to heat treatment in an autoclave at different holding times and temperatures. At the next stage, the process was carried out in a microwave oven under the influence of microwave radiation, followed by drying and calcination, resulting in multiple reinforced aluminosilicate samples [Al_xSi_yO_z]_x/Al. Based on the studies conducted, an effective aluminosilicate carrier with a higher heating rate was obtained with the participation of aluminum powder with lower dispersibility. The samples obtained by this method were studied by X-ray phase analysis (XPA), and the dependence of their surface properties on the degree of dispersion of the aluminum powder used in reinforcement and the synthesis conditions was investigated. Samples [Al(x)Si(y)O(z)]_x·nH₂O/Al (PA-1) and [Al(x)Si(y)O(z)]_x·nH₂O/Al (PA-2) were heat treated in the temperature range of 200–2500 °C. The corresponding heat treatment conditions under the influence of microwave radiation (magnetron power, W/T, °C/τ, min) were as follows: drying - 300/105/5- 400/110/7 and 300/105/3- 400/110/7;

Calcination-600/300/10-800/400/20 and 600/350/10-800/450/20. The specific surface area (m²/g) / pore volume (cm³/g) were as follows: 225/1.25-190/0.98 and 243/1.38- 215/1.23, respectively.

As a result of the research, an effective reinforced aluminosilicate sample [Al_xSi_yO_z]_x/Al was obtained, containing 10% of low-dispersion aluminum powder of the PA-2 grade (250–450 μm), prepared by hydrothermal treatment for 8 hours at T = 350 °C and under the influence of microwave radiation.

According to the identified properties of the synthesized samples, they can be widely used in acid-base reactions, as potential catalyst carriers, and as catalysts in the oil refining and petrochemical industries.