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Hydrodynamic Dispersion of Calcium Aluminosilicate from Technogenic and Nonmetallic Materials

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Physicochemical properties of two calcium aluminosilicate materials after reducing in the hydrodynamic rotary generator in supercavitation mode were studied. The samples are the crystal ceramic foam based on Kansk-Achinsk lignite-ash and the porous glass material obtained from low-manganese nonmetallic feed. X-ray phase analysis, EPR-method, NPR-method (the Mossbauer Effect) and optical microscopy were used. It was found that the material is changing its structure in a hydrodynamic dispersion process caused by high-cavitation. The nature of the changes depends on its initial state.

Keywords: hydrodynamic dispersion, cavitation, crystal ceramic foam, porous glass material.

Introduction

Currently, treatment processes of technogenic materials allowing not only to extract the most valuable components of the waste, but also to obtain new materials with desired properties are developed and implemented. However, these technologies are energy intensive, since more than 50 % of the energy consumed for cominution of the basic substance. Recent studies have shown that energetically low-cost technology of hydrodynamic dispersion (crushing in a liquid medium) can be successfully used for fine powdering [1-8]. In [8] it was shown that used rotary hydrodynamic generator of low productivity under specified modes for 1 minute of dispersion at the initial average ash size of 175 microns produces a particle with average size of 25 microns, i.e. ash particles are “grind down” by almost 7 times (the concentrations less than 3 wt %). If dispersed ash with an average initial size of 25 microns under the same conditions, then the output can be obtained particles having an average particle size of 3,5 – 4 mkm. Thus, in two phases (2 min. dispersion) particle size can be reduced from 175 microns to 4 microns, i.e. by more than 40 times. At higher

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