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ASH MICROSPHERE APPLICATION AS A FRAMEWORK FORMING FILLER

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Hollow aluminum and silica microsphere is a component of ash wastes from heat and power industry that today is widely used as a microaddition almost in all sectors of economy. It is used to improve properties of different materials and constructions or to produce advanced properties of these materials. Hollow aluminum and silica microsphere is non-reactive microaddition that determine its advantages in producing ecologically friendly materials and in providing materials with additional properties without changing the basic. In this paper research has been conducted on identifying the modulus of viscosity focused on the effect on the capacity to form structure links that are influence the properties of producing leak less framework. Modulus of viscosity is one of the main dynamic characteristics of fill finely divided materials that determine materials and constructions strength properties including the capability to form a rigid frame. The research was carried out to determine the correlation between the modulus of viscosity and the humidity of raw component in order to identify optimal conditions of material formation and producing an item with the highest level of durability and rigidity. Moreover, the paper revealed the connection between the modulus of viscosity and the size of non-reactive microaddition based on set humidity and the influence of the microaddition size on the trend in modulus of viscosity.

Modern theory and practices in developing new technologies of materials shows the necessity of using microadditives able to improve the quality of resulting material as much as possible. Meanwhile the primary importance has a material water content in the moment of forming its structure properties. Creating of materials and objects that have a high operational reliability and durability always attract an interest in every sector of economy, especially while using technological wastes of heat power industry. It is based on the fact, that mineral component of coal is ash that passed thermal treatment under the high temperature (2192⁰F – 3272⁰F) receive a range of specific properties, that provide products and materials with extra unique characteristics. One of the most perspective areas in both economic and ecological point of view is an application of valuable parts of ash wastes called hollow aluminum silicate microspheres (cenospheres). Nowadays cenospheres are widely used as a filler in composite materials on the basis of organic and inorganic binders [1-3].

Studies to define chemical composition of ashes after burning Ekibastuz coal show the opportunity of hollow microspheres safe application because of their low reactional and chemical properties [4-5].

Table 1 - Approximate composition of ashes after burning Ekibastuz coal

Chemical composition	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	R ₂ O	SO ₃	loss on ignition
Concentration, %	62,4	26,1	5,3	1,7	0,9	0,75	1,1	1,75

Ash content determined by the losses on ignition constituted 49,5%. Sampled for studies ash aluminum silicate microspheres more than 90 % consist of silica, aluminum oxide and of iron. More than 25% concentration of Al₂O₃ resulted from involvement of kaolinite in mineral part of coal. Humidity of ash aluminum silica microspheres constituted from 1 to 50%.

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