EFFECT OF ADDITION OF DOUBLE Mg-Al LAYERED HYDROXIDE ON THE PROPERTIES OF CEMENT STONE

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Layered double hydroxides (LDH) are natural or synthetic hydrotalcite-like materials consisting of positively charged brucite-like layers and anions in the interlayer space. Due to the structural characteristics, the diversity of the chemical composition, as well as simple methods of production and low cost, they cause an increased interest of researchers in various fields.

In this paper, we studied the effect of double hydroxide layered Mg-Al synthesized in the laboratory on the basic properties of a portland cement stone.

The synthesis of Mg-Al LDH with a ratio of Mg:Al=2 was carried out by thorough homogenization in a paddle mixer-grinder of $AlCl_3 \cdot 6H_2O$, $MgCl_2 \cdot 6H_2O$ and $(NH_4)_2CO_3$ salts of the grade "analytical grade". The Mg-Al LDH obtained thermally decomposed at 600° C for 1 hour is a fine powder with a specific surface area of 212,2 m^2/g, capable of full restoration of the layered structure upon rehydration.

Experimental studies have shown that with the introduction of the LDH Mg-Al additive to the cement composition, the setting time of the cement paste is reduced and the strength of the cement stone increases both in the early and late periods of hardening.

Ultrasonic dispersion of LDH Mg-Al in an aqueous medium in the presence of a surface-active substance, as well as co-administration with a superplasticizer promotes a uniform distribution of the additive in the volume of the cement composition and increase the strength of the cement stone. The greatest effect is achieved with the introduction of the LDH nano-additive in the cement composition together with the superplasticizer, the strength of the cement stone at a dosage of 0,1-1 wt.% LDH Mg-Al increases at the age of 1 day 2,2-2,4 times, and 28 days – 1,2-1,6 times. Layered double hydroxide Mg-Al does not lead to the formation of new phases, but increases the number of hydrated tumors. LDH Mg-Al is a promising material and can be used as a hardening accelerator to produce fast-hardening, high-strength cement compositions.