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# MAKING ANHYDROUS CEMENT AND LIME PHOSPHORUS BINDER FROM PHOSPHORGYPSUM

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**Anotatsiya**

*Anhydrous cement mainly consists of anhydrous calcium sulfate. Including natural or synthetic gypsum, after burning it up to 700⁰ C, various other additives together with catalysts are saturated to powder. Dalamet, crushed blaststone with a lot of alkaline calcium oxide, etc. are used as additives. Soviet scientists P.E.Somonovskaya, P.F.Gordashevsky, V.I.Berezovsky conducted a lot of scientific research on obtaining anhydride cement in phosphorgypsum. As a result, anhydride cement production technology, which does not harden as fast as ordinary gypsum, but gives properties typical of cement, has been applied. As a result, it is possible to prepare a powdery binder that does not expand with the size of cement, but has the hardening properties typical of cements.*

*We know that binding materials can be obtained by impregnating gypsum and lime without burning. The relative amount of similar gypsum-lime binders consists of 50-70 percent phosphogypsum and 30-50 percent lime. Binders can be obtained at the expense of mixtures.*

**Key words**

*phosphor gypsum, anhydride cement, anhydride, catalyst, blast stone, burnt dalamite, sodium sulfate, lime-phosphorus gypsum, phosphate anhydride, gypsum-lime binder.*

Production of anhydride cement from phosphogypsum. Fifty-five years ago, the chemist scientist P.P. Budnikov showed that small amounts of alkalis, acids, medium and sour salts allow the insoluble anhydride to hydrate, that is, solidify. Anhydride cement is a product consisting mainly of anhydrous calcium sulfate, natural or synthetic gypsum is burned at a temperature of 600⁰ - 700⁰ C, and then ground into powder together with various other additives - catalysts. As additives, lime has various sulfates, tune. crushed dolomite, basic (alkaline, i.e. high SaO) crushed blaststone and several other materials are used.

P. E. Simonovskaya, P. F. Gordashevsky and V. I. Berezovsky conducted a special study in Moscow on obtaining anhydride cement from phosphogypsum. They used substances such as sodium sulfate and sodium bisulfate or potassium sulfate and potassium bisulfate as catalysts for binder hardening.

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Unlike low-burning gypsum binders, anhydride cement does not expand in volume when it hardens. This water-borne cement does not have hydraulic properties. It hardens very quickly in a humid environment. After initial hardening in a humid environment, anhydride cement becomes progressively less stiff in a dry environment. If the hardened binder stays in water for a long time, its strength decreases, then the strength of anhydride cement increases again in dry conditions. However, if blast stone is added to anhydride cement as an activator, its water resistance increases. If the building mixes are made of anhydride cement, they will not deteriorate significantly even after freezing and thawing up to 15 times. Anhydride cement is used in the production of seamless house flooring, linoleum flooring, various plasters and intermediate compounds, light concrete with organic and inorganic fillers, heavy concrete, as well as in the production of artificial marble.

In 1940, researchers used a method described by McEnally to extract binders from gypsum and lime without burning. In general, plastering uses a building mixture consisting of lime and plaster of paris. Lime is usually used in the form of lime paste, for which it is pressed. Lime slaking is an exothermic process in which a certain amount of heat is released. Plaster burning is an endothermic process, in which water is released and heat is absorbed. McEnally made good use of the moisture from the gypsum to hydrate the lime, and the heat of lime hydration to burn the gypsum. Researcher R. E. Simanovskaya was able to obtain a plaster mixture of phosphogypsum and quicklime using this method. Two types of phosphogypsum were used: washed and unwashed phosphogypsum containing 0.4% and 2% water-soluble $R_2O_5$ and total moisture content of 45%. During the experiment, it was found that by mixing and pulverizing phosphogypsum and quicklime together, it is possible to create a plaster mixture of acceptable quality. After seven days of outdoor storage, the ultimate tensile strength of this mixture was 6-7 kg/cm$^2$.

The technological process of preparing the mixture used for plastering consists of simultaneously mixing and pulverizing lime with phosphogypsum in aggregates with grinding and mixing devices. Depending on the nature of the base materials, the relative amount of gypsum-lime binders consists of 50-70 percent phosphogypsum and 30-50 percent lime. The resulting product should be left for a certain period of time so that all the processes are completed. However, despite the wide range of opportunities for obtaining air-hardening binding materials from phosphor gypsum, their scope of application is limited. Air-hardening binders and products made from them are used in construction only for interior finishing

works. Therefore, the above-mentioned methods of processing phosphogypsum cannot ensure the full use of a very large amount of phosphogypsum.

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