

Silicate Brick Based Calcareous-Clay Binder

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Abstract—It was found that, as a raw material for the production of energy-saving autoclave silicate materials can be used clay rocks unfinished stage process of clay formation.

Keywords—clay rocks, lime-clay binder, autoclave silicate materials

INTRODUCTION

Currently, it is so crucial that the existing problems need of capital construction, primarily residential, efficient, high quality and environmentally friendly single-piece construction materials and products in Uzbekistan. One of the most efficient and common in Uzbekistan wall materials are ceramic and sand-lime brick.

As the silica component in the production of silica brick by traditional technology using high-quality silica sand, which are limited resources. Therefore, it becomes urgent task of expanding the resource base of production of silicate materials by the use of local raw materials and, above all, accessible, such as barkhan sands and other industrial wastes. These wastes include overburden.

As you know, the development of ore deposits in the area of mining operations get hundreds of millions of cubic meters of non-traditional building materials industry of clay rocks, the specifics of which is incomplete process of clay formation.

The initial source rocks collapsed, due to their mineral formed thermodynamically unstable compounds such as mixed eloynye education, imperfect structure hydromica, Ca²⁺ + montmorillonite, unordered kaolin, finely divided silica, amorphous minerals and others. A large proportion of recoverable "empty" rocks in mining accounts on clay deposits. Such deposits in the form of overburden accumulated in large quantities in areas Uchkuduk. Clay deposits - are products of one of the final phases of weathering of aluminosilicate rocks. The final stage of weathering are pure kaolinite and montmorillonite clay.

Studies have shown the fundamental possibility of getting through these rocks autoclave silicate materials [1-3]. These raw materials with the properties of natural nanoparticles, allows you to change the morphology of neoplasms and optimize the structure of the cementitious compound.

Clay rocks are very diverse mineralogical composition and properties. Therefore, to develop a methodology for calculating the composition of the raw mix on the basis of lime-clay binder, the kinetics of the interaction of the major rock-forming clay minerals (kaolinite and montmorillonite) with calcium hydroxide under hydrothermal conditions.

In our studies, as the clay component of overburden have been tried as loess and opoka-like clay that has accumulated in large quantities in the area Uchkuduk. It is found that the optimum kinetic parameters for the reaction of kaolinite and montmorillonite are provided in the case, if the content of CaO exceeds 30 meq / g of clay.

In the experiment, we have launched, that limit the absorption of calcium oxide kaolinite and montmorillonite under autoclaving factory LLC "Kushkupir silicate brick Factory", which made the production of the traditional sand-lime brick, is respectively 28 and 30 mEq / g of clay. Based on the data and the calculation of the optimal composition of lime-clay binder, according to the method proposed by AN Volodchenko [3], which is based on the condition of full cooperation with the clay minerals with CaO.

$$C = \frac{2800 \cdot P \cdot H}{28 \cdot P \cdot H + 1000A}$$

where C - CaO in lime-clay binder, by weight. %; P-content of clay minerals in the clay rock mass. %; N - limiting the absorption of lime clay, 28-30 mEq / g; A lime, by weight. %.

The study of joint effects of fine quartz and clay minerals on the properties of lime-sand materials

showed that the most efficient synthesis of tumors can be controlled by the introduction of rocks containing clay minerals along with the 50-70 May. % Finely divided silica.

Testing this hypothesis conducted by using as raw clay overburden rocks Navoi MMC (Figure 1)

As our experience of using semi-stripping clay rocks in the form of lime-clay binder increases the strength of crude 2-3 times, finished silica brick in 1.0-1.5 times. Increasing raw strength will reduce the marriage in the molding process and facilitate the release of high hollow products. The optimum content of shale, depending on the mineralogical composition and activity of the raw mass is 25-30 wt. %. Due to the

high reactivity of the clay rocks studied the possibility of reducing the duration of the isothermal hold products in the autoclave by 1.5-2 times and, consequently, reduce the consumption of primary energy.

As a result, physical and chemical analysis of test samples found that lime-clay-sand mixture of cementitious compounds are mainly formed by the interaction of calcium hydroxide with clay minerals and partially in ground quartz. The products of the interaction of clay minerals with lime silicate and are low base hydro garnet, and kaolinite are formed mainly hydrogarnet and montmorillonite – low base hydrous calcium.

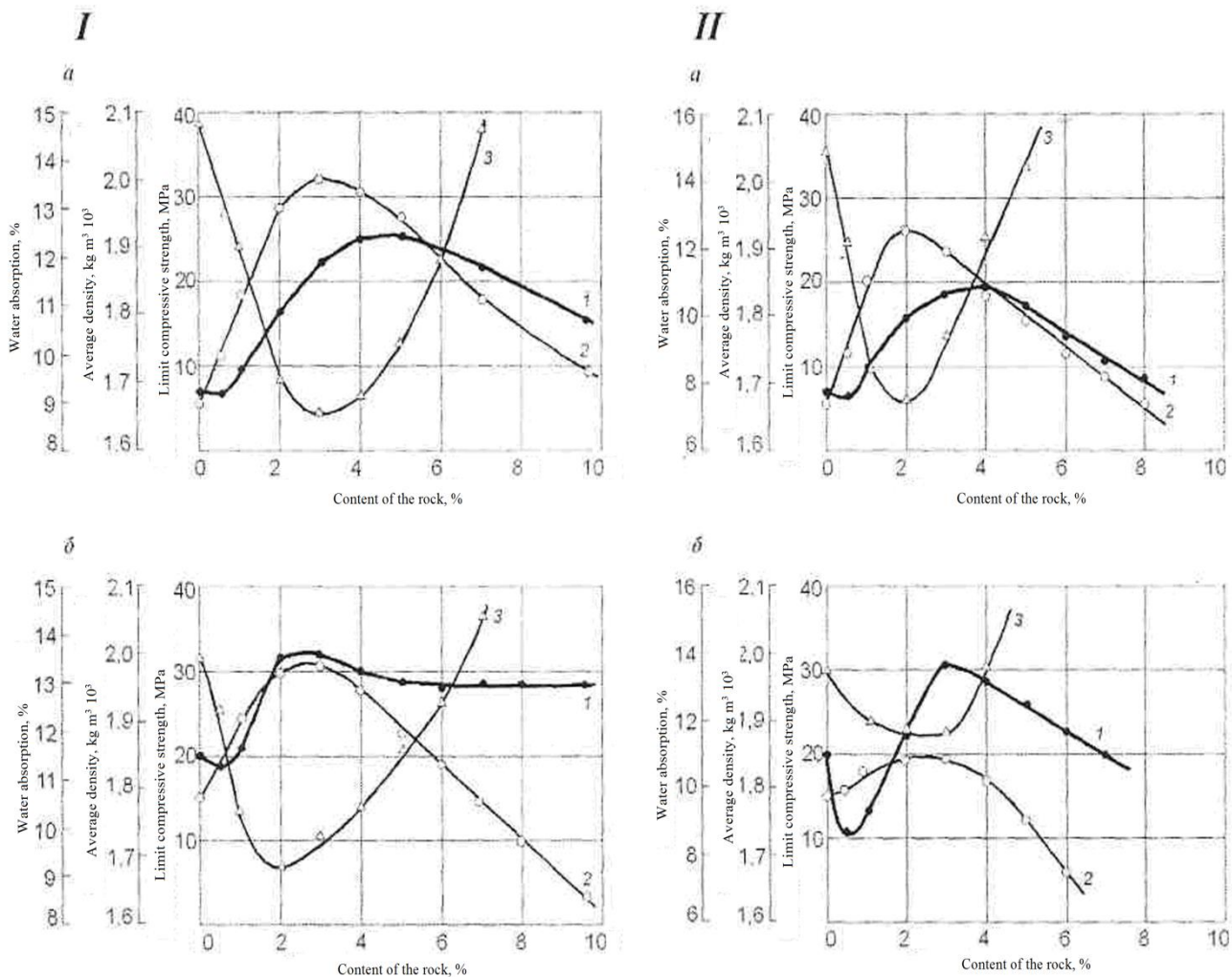


Fig. 1. Properties of samples based on the content of clay overburden rocks Navoi Mining and Metallurgical Combine: I - loess; II - opoka-like clay; active CaO content by weight. % A - 4, 6-8; 1 - compression strength, is the average density of 2, 3 - water absorption

Thus, as technological and energy-saving raw materials for the production of autoclave silicate materials may be used as overburden deposition, the initial stage of clay formation which consist of a metastable structure nanosized mineral deficient level of finely divided amorphous silica and mineral, which will improve the mechanical properties autoclave silicate materials. Reduction of energy consumption

for the production of silica brick will be in the range of 20-25%.

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