MODERN BUILDING MATERIALS AND THEIR PHYSICAL-MECHANICAL PROPERTIES BASED ON INDUSTRIAL WASTE

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Abstract. *In this article, it is planned and conducted the following research to obtain gas blocks using microcrystalline instead of quartz sand in the production of lightweight concrete and to study their physical and mechanical properties: Introduction to research and technology in the production of lightweight concrete selection and creation of innovations; sampling of gas blocks on the basis of the developed composition and study of physical and mechanical properties of samples and talks about saving fuel and energy resources, improving the efficiency of heat protection of buildings and structures, introducing energy-saving materials and technologies, and developing the world construction industry.*
Keywords: *construction, concrete, portland cement, experiment, filler, building, sand.*

The construction of mass industrial buildings in Uzbekistan is based on the construction of buildings by industrial methods from prefabricated elements prepared in reinforced concrete plants and factories. Almost all the buildings under construction are being built from prefabricated large panel constructions. Along with prefabricated housing construction, the construction of monolithic buildings from lightweight concrete is also developing. Today, the national economic sectors of our independent Uzbekistan are growing day by day. It is known that the development of the national economy depends on the growth of the manufacturing industry in our country. The growth of industry leads to the construction of construction facilities with a lot of space.

By using different types of binders, polymers, sulfur, liquid glass, flexible cement types, specially selected different types of fillers and chemical additives, high strength, waterproofing, cold resistance and heat resistance, different types of concrete resistant to aggressive environments can be obtained. During the design process, the architect draws up the plan of the future building, its volume-spatial composition, creates the architectural, artistic, and, if necessary, socio-political image of the structure. A modern builder realizes the volume-planning solution of a building or structure created by an architect with the help of building materials and constructions, calculates constructions for strength, priority and other operational requirements.

After choosing the path of independence and gaining independence, our republic demands stable science-based development in industry, construction, production and many other sectors of the national economy. In the decision of the President of the Republic of Uzbekistan dated May 2, 2017 "On measures to further improve the activities of project-research organizations" No. PQ-2946, dated April 2, 2018 No. PF-5392 In the decree "to radically improve the management system", the minutes of the meeting held on November 30, 2017 and other documents under the leadership of the President of the Republic of Uzbekistan set a number of tasks for the implementation of the above tasks.

Today, saving fuel and energy resources, increasing the efficiency of heat protection of buildings and structures, introducing energy-saving materials and technologies are the priority directions of development of the world construction industry.

One of such effective building materials is **lightweight concrete**. In practice, the production of products made of aerated concrete, established in large automated enterprises, has found wide application. At the current stage of the development of small and medium-sized businesses from non-autoclaved lightweight concrete, non-autoclaved foam concrete technology is in demand, and its advantages are the low cost of production. Solving the problems of efficient production and use of lightweight concrete with the help of composite binders, highly porous materials with specified properties can be obtained, and their use ensures the construction of energy-saving structures with optimal technical and economic indicators.

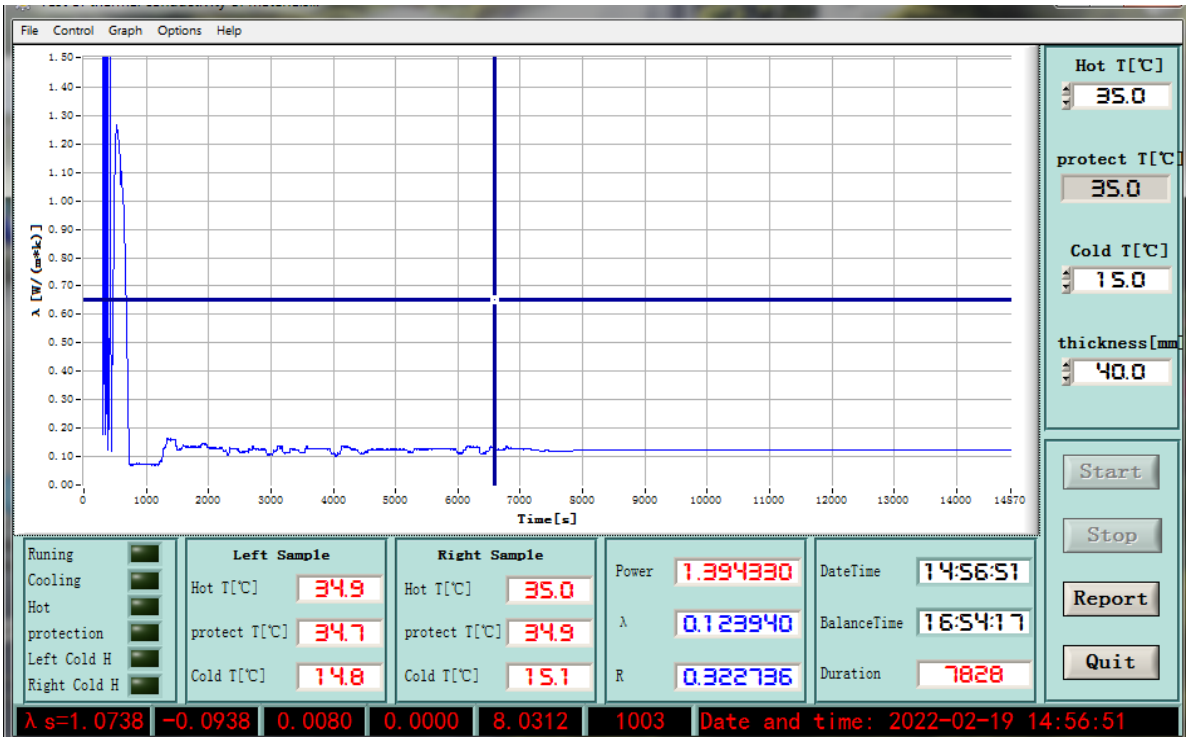
In this regard, the decision of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev dated May 23, 2019 "On measures for the further development of the construction materials production industry" refers to the sustainable development of the production and export of competitive products in our Republic. Systematic work is being carried out to deepen structural changes in the building materials industry aimed at ensuring growth rates, as well as modernization of enterprises, technical and technological updating.

Aerated concrete is a type of porous concrete, a building material consisting of 75-85% of its volume of pores with a size of 0.5-2.0 mm, the porosity is uniformly distributed in size. will be To date, porous blocks are widely used in the construction industry due to their lightness, sufficient strength, and, moreover, relatively cheapness. The use of porous structural materials in the construction industry in the restoration of external and internal barrier walls not only accelerates the construction work, but also performs the function of heat preservation. Today, saving fuel and energy resources, increasing the efficiency of heat protection of buildings and structures, and introducing energy-efficient materials and technologies have a great economic effect on the development of the construction industry. Research in the field of production of lightweight concrete shows that in the formation of hot storage properties, it is possible to provide additives that help to create closed porosity in the composition of the cementitious composition. First of all, cement and fiber materials are included in the additives.

As a binding material in the preparation of aerated concrete, it is mainly made of portland cement, silica component, often lime, gypsum binder, caustic soda and gas-forming aluminum powder. The strength of porous structural materials depends on the water-cement ratio in the preparation of the cement mixture, that is, the amount of water used for the preparation of normal cement paste. When making blocks with a porous structure, we determined how much water should be poured into the cement paste in order for it to be normal in laboratory conditions, and the amount of water is calculated as a percentage of the cement mass. The normal density of the cement paste was determined using a Vika tool and a steel rod with a diameter of 10 mm and a length of 50 mm . We used PS 400 D 20 portland cement in our experiment. It was determined on the basis of experiments that 27% of the mass of normal pouring of cement. Based on the experiments, it was determined that the beginning of the hardening period of cement of normal density is 127 minutes and the end is 360 minutes. PAP-1 aluminum powder was used as a gas generating material for making blocks with a porous structure in cement. The formation of a porous structure in the process of solidification of cement mixtures occurs in the process of the following chemical reactio

$$2Al + 3Ca(OH)_2 + H_2O = 3CaO\,Al_2O_3\,6H_2O + 3H_2$$

The hydrogen gas released as a result of the reaction between alkali and aluminum powder expands the mixture based on cement and binder, forming small pores in the composition of the mixture, forming aerated concrete. In the production of porous structural blocks, small-sized quartz sands and fly ash dust from thermal power stations are used as fillers. In our research, man-made waste microsilica MK-85 was used instead of quartz sand in the production of lightweight concrete. The composition of microsilica MK-85 consists of 94.0-96.0% SiO_2, it is a man-made product produced in the production of ferrosilicon alloys, its density is 150-250 kg/m ^{3}.



1-picture. *Thermal and physical parameters of lightweight concrete with a volume mass of 600 kg/m^3.*

In the production of lightweight concrete, instead of quartz sand, man-made waste microsilica from AO UZMETKOMBINAT in Bekobad was used, and the composition, solidification processes and properties of the obtained porous structural materials were studied;

- as a result of the research, microsilica was added as a filler in certain percentages, and a localized, economically efficient optimal composition was developed;

- on the basis of the obtained composition, aerated concrete blocks with microsilica addition were prepared, and it was determined that their physical and mechanical properties meet the customer's requirements.

The main issues and hypotheses of the research: During the research, determining the optimal composition of aerated concrete with low thermal conductivity using local raw materials is the main issue of the research.

Based on the main question of the research, as a working hypothesis, in order to save sand, it is assumed that it is possible to obtain the local composition of aerated concrete and achieve economic efficiency by adding certain amounts of microsilica to the man-made waste produced at AO UZMETKOMBINAT in Bekobad.

2-picture. *Strength parameters of lightweight concrete with a volume of 600 kg/m3.*

In laboratory conditions, when obtaining blocks with a porous structure, 10x10x10 sm cubic samples were obtained by mixing cement and filler in different proportions and using gas-generating additives. According to the results of the research, with the increase in the amount of microsilica in the mixture, the volumetric weight of the samples was observed to decrease. The main properties of lightweight concrete are its strength, grades, ability to transfer heat and cold, classes and deformation properties. The physical and mechanical parameters of the obtained porous block samples are given below.

3-picture. *Samples of 300*300*50 mm for determining thermal-physical parameters of lightweight concrete.*

Physical and mechanical properties of porous structural blocks . Brand of concrete D 300 D400 D500 D600 D700 . Weight after one day, gr. 400 505 610 760 850 Dry weight, gr. 360 , 420 , 500 , 610 , 705 . Musta h deficiency, 28 sut., kgs/cm ^{2} 11, 12.3, 15.5, 17.6 MPa. Thermal conductivity, W/(m•°C) 0.7, 0.10 0.12, 0.14, 0.17.

According to the results of the research, samples with a porous structure taken in laboratory conditions according to the requirements of GOST 31359-2007 "Aerated concretes" have a compressive strength of M15 - M25, and a dry density of D 500 - D 600. The coefficient of thermal conductivity was found to be 0.10-0.14.

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