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INVESTIGATION OF THE PROPERTIES OF FOAM GENERATORS

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A B S T R A C T	K E Y W O R D S
Is to research the development and properties of foam concrete using local raw materials.	Foam concrete, technology, parameter, foaming agent, stability.

Introduction

The most important component in the production of foam concrete is the foaming agent. One of the important factors is that the foams obtained on the basis of foaming agents have the same size of pores and high aggregative stability of the pore structure after mixing with the binder. Such mixtures are said to be aggregatively stable if, after mixing the components with foam, the gas phase introduced into the mixture is preserved until the process of solidification. After pouring the foam concrete mixture into the molds, due to gravitational forces, the process of water separation is observed in the lower part of the molds. The faster the process of water separation, the faster the foam concrete mass poured into the molds will sink. Currently, every enterprise producing foam concrete is experimentally determining the foam with optimal performance.

Technical, technological and operational characteristics of the product are taken into account when choosing this or that foaming agent. The properties of the foam have different effects on the porosity, structure and solidification of the mass. In the production industry, foaming agents and foams obtained based on them are evaluated based on various criteria. To date, there is no universal method for evaluating the effectiveness of this or that foaming agent. In each case, foaming agents are considered based on certain criteria.

Mainly the following features are considered important:

- volume increase during whipping - the ratio of the primary foam volume to the initial volume of the foam-forming substance mixture;
-equilibrium - breaking of a certain volume of foam in a unit time interval;
-dispersity - a quantity representing the average size of pores in the foam and their distribution throughout the volume;
- density - mutual ratio of liquid and gas phases;
- mechanical-structural properties - the ability to maintain the initial shape for a certain time;
- lifting capacity - the ability to keep a certain amount of foreign substances on its surface without breaking the foam pores.

The foaming agent has two effects on the quality of the porous material. The surface activity of the foaming substance affects the formation of the structure of the porous concrete and ensures the necessary density of the concrete. At the same time, the addition of a foaming agent slows down the setting and hardening times of the binder. This, in turn, leads to the destruction of cement and a decrease in the durability of the product. Therefore, choosing the right foaming agent is important.

In order to determine which of the foaming agents has a less destructive effect, the effect of the alkaline binder obtained without burning the foaming agents on the strength was studied.

At the initial stage, the pH environment, stability and volume increase of foaming agents at different temperatures were studied.

The pH environment of the foaming agent should be as close as possible to the pH environment of the material used as a binder. As the difference in pH media increases, foam breakdown accelerates and this, in turn, leads to product quality deterioration.

As can be seen from Table 1 below, among the foaming agents studied in the study, pH medium has the greatest.

Table 1. pH environment of the foaming agent

	The name of the foaming agent			
	Zimpor	PB-lyuks	PB-2000	Arekom-4
pH environment	8,0	7,0	9,0	8,7

The stability of the foaming agent and the increase in volume during foaming are considered to be sufficiently influencing factors in obtaining a porous material. The foam stability method is based on recording the time taken until 50% of the initial foam volume is broken or 50% of the primary total liquid is separated.

The volume increase during foaming represents the ratio of the volume of the foam to the volume of the mixture in it. According to the increase in volume when foaming agents are whipped, the foam is divided into 3 groups:

- foam with a small increase in volume when whipped (not higher than 20);
- foam with an average increase in volume when whipped (from 20 to 200);
- foam with a high volume increase when whipped (over 200).

According to the classic technology of foam concrete, foams with medium expansion (from 4 to 9) are used. According to the information in the literature, foam concrete with the maximum porosity (about 83%) will have a volume increase of 6-9 when the foam is whipped.

The results of foam stability at different temperatures and volume growth during whipping are given in Table 2 below.

Table 2. Stability of foam depending on water temperature (Minute)

Name	Occupied size	Water temperature, ^{0}C			
		12	20	35	50
PB 2000	600	8	6	5	3
PB luks	720	26	20	17	4
Zimpor	320	29	23	15	8

The obtained results show that the stability of foams decreases with increasing temperature. In our opinion, this is due to the decrease in the molecular attraction forces of water at increased temperature, which in turn led to the acceleration of water separation from the foam.

Figure 1 shows the size and appearance of foaming agents used in the experiment when mixed with water to form foam.

Figure 1. Sizes of foaming agents

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