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CHEMICAL ADDITIVES FOR OBTAINING PLASTICIZED GYPSUM

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ABSTRACT

The article describes the possibilities of obtaining building materials based on plasticized gypsum using compositions based on tetraethoxysilane and industrial secondary products. As a result of test experiments, an increase in flexural and compressive strength and a decrease in water absorption of gypsum samples treated with polymer compositions were shown.

Keywords: Gypsum, tetraethoxysilane, urea-formaldehyde, liquid glass, polyvinyl acetate, bending strength, compressive strength, water absorption.

Currently one of the best features of the products, made on the basis of gypsum, is their ecological cleanliness and harmlessness to the human body. Also important properties for building materials are their low average density, sufficient strength, heat and sound insulation properties. [1,2].

The main disadvantages of gypsum-based products are water permeability, excessive plastic deformation under the influence of moisture. Therefore, they are widely used in parts of buildings and structures that are not in contact with moisture. [3]

Based on innovative technologies, allowing to reliably solve the problem of gypsum deformation under the influence of moisture, created a new generation of chemicals with complex properties - compositions based on organosilicon substances.[4,5].

Taking into account the above, a new type of polymeric hydrophobic compositions based on tetraethoxysilane (TEOS) was created, hydrolyzed polyacrylonitrile (GIPAN) and urea-formaldehyde (MF) [6, 7].

Based on the synthesized polymers, a composition was created (table 1) for the production of plasticized gypsum.

Accordingly, the optimal proportion of the synthesized polymer in the composition was determined in test experiments and is 3%.[8].

Table 1 **The proportions of the created composition in production**

№	The optimal ratio is 3% of the total mass	Polyvinyl acetate (PVA)		Liquid glass
1	Gipan+TEOS	90		7
2		80		17
3		70		27
1	MF + TEOS	90		7
2		80		17
3		70		27

In order to obtain plasticized gypsum, experiments were carried out.

Of the total mass of gypsum, 0.3% of the mass of the components was used according to the calculation indicated in the table. On the basis of the created composition, prototypes were made with a size of 40x40x160 mm in accordance with the requirements of GOST 23789-79 to obtain a gypsum sample. Technical requirements for gypsum according to GOST 125-79 are given in table 2. [9,10,11].

Таблица 2 **Technical requirements for gypsum according to GOST 125-79**

Grades of gypsum binders	Tensile strength after 2 hours of a gypsum rod measuring 40x40x160 mm			
	Compression		bend	
	MPa	kgc/cm²	MPa	kgc/cm²
G-2	2	20	1,2	12
G-3	3	30	1,8	18
G-4	4	40	2	20
G-5	5	50	2,5	25
G-6	6	60	3	30
G-7	7	70	3,5	35
G-10	10	100	4,5	45
G-13	13	130	5,5	55
G-16	16	160	6	60
G-19	19	190	6,5	65
G-22	22	220	7	70
G-25	25	250	8	80

Determination of the mechanical strength of the prepared samples, MII-100 was used to determine the bending strength, and 250 kgf/cm2 was used to determine the compressive strength (Fig. 1). [12,13,14]

To MF + TEOS and Gipan + TEOS, it was noted that the physical and mechanical properties of gypsum change significantly when preparing a gypsum mixture with compositions, based on [12,13,14]. In particular, it was found that in the 1st composition based on MF + TEOS, the bending strength increased by 8%, the compressive strength increased by 4%, and the water absorption decreased by 9.7%, in the 1st composition based on Gipan + TEOS test results reflect TEOS, bending strength increased by 12.25%, compressive strength increased by 34, increased by 1%, and water absorption decreased by 7%. At the same time, the reduction of plastic deformation under the action of moisture was achieved by reducing the elasticity of the foam. This, in turn, allows you to expand the scope of gypsum.

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