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Study of Physical And Mechanical Properties of Gypsum Building G10

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ABSTRACT: This article discusses the physico-mechanical properties, heat dissipation and solidification period of G10 grade gypsum.

KEY WORDS: gypsum, gypsum, heat dissipation, construction, hardening of gypsum, physical and mechanical properties.

I.INTRODUCTION

In the Resolution of the President of the Republic of Uzbekistan dated May 23, 2019 No PP-4335 "On additional measures for the accelerated development of the construction materials industry." At a meeting with industry experts, the President instructed to reduce costs through the introduction of energy-saving technologies in the construction materials industry. In 2019, 4 cement plants with a capacity of 2 million tons each were launched in the Republic of Karakalpakstan, Surkhandarya, Andijan and Navoi regions. By the end of the year, new plants with a capacity of 3.5 million tons will be commissioned, bringing the annual capacity to 15 million tons. This was returned to meet domestic demand for cement and allow for lower prices. In 2019-2020, it is planned to implement more than a thousand projects worth 17 trillion soums. [1]

The basis of modern construction are binders. They are widely used in the preparation of plaster mixtures and various concretes.

Mineral (inorganic) binders are powdery, when mixed with water they form a plastic mixture and become an artificial stone material as a result of physicochemical processes.

Gypsum reserves are widespread in Uzbekistan and other Central Asian countries and differ in composition. [2]

The launch of the production of composite building materials on the basis of gypsum binder, in particular gypsum board, requires the mass production of such binders.

Gypsum binders are a powdery mineral that is mainly a product of the dehydration of calcium by aqueous sulfate. Natural gypsum stone $SaSO_4 \cdot 2N_2O$ and natural anhydride $SaSO_4$, gilgips, as well as various wastes of the chemical industry, consisting mainly of calcium sulfate, as well as phosphorus gypsum, borogyps, serve as raw materials for the production of gypsum substances.

The density of gypsum binders is 2.6-2.75 g / cm3, the average bulk density is 800-1100 kg / m^3 and 1250-1450 kg / m^3 in the compacted state. Its normal density is represented by 50-70% water consumption, the degree of fineness depends on the amount of impurities. Due to the fact that gypsum is an air binder, its strength is reduced in wet conditions. To increase its resistance to moisture, cement, putstsolan minerals and blast furnace slag powder, water-resistant polymers are added or the surface of the gypsum product is covered with varnish - paints and films. [2]

According to the hardening properties, gypsum binders are divided into two types: fast-setting gypsum binders construction, ultra-strong, mold and medical gypsum, slow-setting anhydrite cement and high-strength gypsum gypsum binders.

The biting and hardening times of gypsum depend on the nature of the raw material, its preparation conditions, shelf life and conditions, the amount of water added, the ratio of gypsum to water - S / G, binder and water temperature, mixing conditions and the presence of any additives.

Special diluents are added to the plaster to prolong its bite time. Colloidal solution-forming, semi-aqueous gypsum (density 2500… 2800 kg / m^3, bulk density 800 ... 1100 kg / m^3, compacted volume mass 1250 ... 1450 kg / m^3) attenuates the melting rate and, as a result, two Examples of materials that delay the crystallization of molecular

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aqueous gypsum are bone glue, casein, gelatin, glycerin, magnesium, calcium salts. Water heated to 60 ° C can also be used to prolong the biting time of gypsum.

Enterprises are required to accelerate the biting of construction gypsum in order to make gypsum building materials and harden them in the cold. To do this, two aqueous gypsum, table salt, potassium sulfate, sulfuric acid, alkalis, potassium silicon fluoride and many other substances are added to the construction gypsum.

When construction gypsum looks more, a very soft and quick-biting molded gypsum is formed. Construction gypsum is divided into two grades according to its quality. The tensile strength of gypsum is determined in samples prepared by casting in a mold measuring 40x40x160 mm. To prepare a gypsum mixture that meets the requirements of GOST 23789-2018, great attention should be paid to the amount of water.

In the laboratory, construction plaster of G10 brand was selected. As physical and mechanical properties, the normal thickness of construction gypsum, tensile life, bending and compressive strength were considered. Samples of 40x40x160 cm were prepared in the laboratory. The test results are given in Table 1.

Sampling times were set at 2 hours, during which the samples were tested for bending and compression in accordance with GOST 23789-2018 using a hydraulic press, and the test results were determined.

The use of gypsum binder is highly dependent on its crystallization rate. Water accumulation of gypsum binder is an exothermic heat release process.

Figure 1. Determination of heat release of gypsum of construction grade G10.

Here is a heat dissipation diagram of our samples taken in the laboratory, namely G10 construction gypsum.

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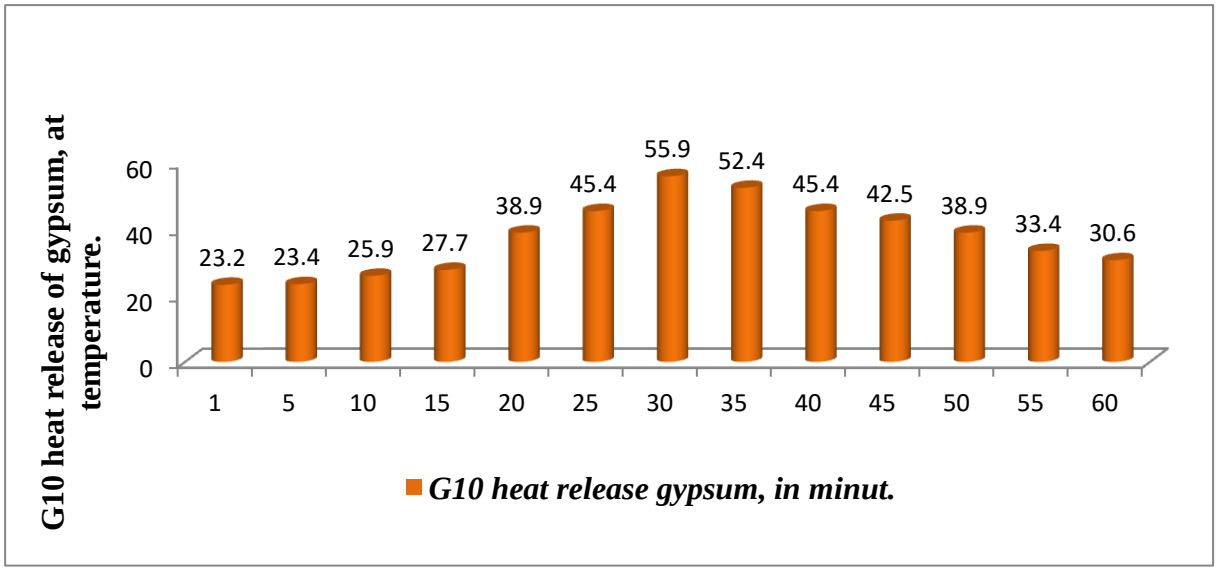

Figure 2. Diagram of the process of thermal separation of construction gypsum grade G10.

The G10 construction gypsum test was performed at room temperature at 22 0C. From the 1st minute heat dissipation, the temperature began to rise from 23.2 0S, and by 30 minutes, the building gypsum had a maximum heat release of 55.9 0S and started back.

During the hardening process of gypsum, its volume expands by about 1%. This makes it easy to use gypsum in the manufacture of architectural items, to close cracks and for other purposes. According to GOST, the beginning of construction gypsum biting should be after 4 minutes, and the end - up to 30 minutes. Hence, construction gypsum is a fast bite and quick-setting binder.

a) *b)*

Figure 3. Determination of bending and compressive strength of gypsum. a) bending, b) compression.

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Biting times of construction gypsum, (minute-second) observation.
Table 1

№	Gypsum type	Normal density, see	Bite times, minute-second		Strength in bending MPa	In the jam durability MPa
			Start time	End time	2 hour	2 hour
1	Г10	17,5	2-40	19-55	4,62	10,95

The results showed that the curing period of G10 construction gypsum lasted up to 19.55 minutes.

In summary, the physical and mechanical properties of G10 construction gypsum and its heat release were observed. The normal thickness of G10 construction gypsum is 17.5 cm, the curing period starts at 2.40 minutes and ends at 19.55 minutes. The heat dissipation rose to a maximum of 55.9 0S in 30 minutes and slowly began to recede.

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