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IMPROVEMENT OF TECHNOLOGY OF GYPSUM PRODUCTION RAW MATERIALS AND PRODUCTS IN PRODUCTION

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ABSTRACT: *Gypsum materials are one of the most effective and promising types of building materials, the production of which currently requires expansion and modernization, taking into account the latest achievements of science. This article focuses on the production of gypsum products and the improvement of production technology.*

Keywords: *binders, technical properties, gypsum products, phosphogypsum, borogips, sulfur, rocks.*

INTRODUCTION

In construction, mineral binders are called powder materials. Once they are mixed with water, they gradually harden and turn into a stone-like state. Building materials are divided into two groups: inorganic (mineral) and organic. The most important of the mineral materials are cement, cement grades, lime, gypsum, etc. [2]

Gypsum materials are one of the most effective and promising types of building materials, and their production now requires expansion and modernization, taking into account the latest advances in science. By expanding the use of gypsum building materials and products based on them, their performance properties can be improved. One way to improve the technical properties of gypsum materials and products is to use plasticizing additives that allow them to change their various properties. The properties of gypsum materials are determined by their structure, so the study of the effect of plasticizing additives on the hardening and performance properties of gypsum is currently an urgent task of the construction industry. [3]

LITERATURE ANALYSIS AND METHODOLOGY

Gypsum- mineral, alkali calcium sulfate. It occurs in cases such as gypsum stone, mirror stone, monmarite, sand rose, desert rose, gypsum feldspar. Gypsum is one of the oldest mineral binders. In Asia Minor, gypsum was used for decorative purposes for 9,000 years BC. During archeological excavations in Israel, gypsum-covered floors were found in the 16th millennium BC. Gypsum was also known in ancient Egypt, it was used in the construction of pyramids. The knowledge of the production of Paris gypsum from Egypt spread to the island of Crete, where many of the outer walls of the palace of King Knossos were built of gypsum. The joints in the wall are filled with gypsum solution. More information about gypsum came to Rome through Greece. Information about gypsum from Rome spread to central and northern parts of Europe. Gypsum has been skillfully used, especially in France. After the Romans migrated from Central Europe, knowledge of the production and use of gypsum in all areas north of the Alps was lost, and it was only from the 11th century that the use of gypsum began to increase again. Under the influence of the monasteries, technology spread, according to which the cavities inside the half-timbered buildings were filled with a mixture of gypsum, hay, or horsehair. In early medieval Germany, especially in Thuringia, the use of gypsum was known for flooring stones, bricks, ornaments, and monuments. Saxe-Anhalt has 11th-century remains of gypsum flooring. The walls and stones built in those ancient times are distinguished by their extraordinary durability. Their strength can be compared to ordinary concrete. A distinctive feature of these medieval gypsum solutions was that the binders and fillers were of the same material. Gypsum stone was used as filler, crushed to round grains, without tip and without layer. Once the solution has solidified, a bonded structure consisting only of calcium sulfate dihydrate is formed. Another feature of medieval lime is the high fineness of gypsum grinding and very low demand for water. Calcium oxide (CaO) 32.6%, sulfur trioxide (SO 3) 46.5%, water (H 2 O) 20.9%. Thin crystals and décolleté plates are flexible. [1]

The crystal structure is layered — two sheets of 2 anionic groups closely related to Ca2 + ions form bilayer layers oriented along the plane (010). The gaps between these two layers are occupied by H2O molecules. This easily explains the very perfect detachment typical of gypsum. Each calcium ion is surrounded by six oxygen ions and two water

molecules belonging to the SO4 group. Each water molecule binds the Ca ion to one oxygen ion in the same two-layer layer and to another oxygen ion in the adjacent layer.

RESULTS

At present, many different methods have been proposed to increase the water resistance of gypsum products. They are based on reducing the solubility of gypsum, compressing the gypsum mass, absorbing it with substances that prevent moisture from entering the product. [5] One of the most effective and economical ways to increase the water resistance of gypsum binder products is to introduce Portland cement with active hydraulic additives. This compound binder is called gypsum-cement-pozzolanic (GCPV). Samples were prepared from the following materials: gypsum (G-5), PC (M400), additives (crushed expanded perlite (I), powder obtained by grinding an expanded liquid liquid bottle at a temperature of 250-300 ° C (II).). The ratio of components by weight: 50% gypsum, 25% PC and 25% additives or 12.5 + 12.5% powder + perlite (III). The tests were performed on standard beams measuring 4x4x16 cm. Unloading of products was carried out after 24 hours. After that, the products are air-dried for 3 days and dried at a temperature of 70 °. In the manufacture of the products, we encountered difficulties in selecting the binding water ratio. The samples turn out to have a clearly visible structure. The addition of the powder allows us to replace perlite and improve GW performance. Further improvement of water resistance is carried out in the direction of increasing the water resistance of the powder and replacing the powder with expanded granules (IV) of the same composition. The resulting filler in the form of powder does not meet the requirements for water resistance, although it has good results in the gypsum product itself. Granules of a new material with a light weight, strong and dense shell and sufficient water resistance were obtained on the basis of the obtained powder and liquid glass. Granules are more resistant to water (than dust), which allows to reduce the density of products. [4]

DISCUSSION

The substances obtained by burning gypsum rocks are traditional mineral binders and have been known to mankind for thousands of years. Gypsum binders are widely used not only in plastering, but also in the manufacture of bulky building materials. The raw materials used in the production of binders are natural rocks (gypsum rocks, anhydrite), as well as industrial wastes containing calcium sulfate (wastes from the production of

phosphogypsum, borogyps, sulfur). There are a total of 35-40 million tons in the world. gypsum binders are produced, 90% of which are used in construction. The United States, France, the United Kingdom, and Spain are the largest producers of gypsum binders.

Production of gypsum binders in Uzbekistan is well developed in Bukhara and Fergana regions. In Tashkent, Fergana and Samarkand regions a lot of work is being done on the production of gypsum using industrial waste.

Gypsum has a special property - when heated, the chemically bound water separates from the crystal lattice, forming a semi-aqueous gypsum. Such gypsum can be easily crushed. Conversely, when water is added, the mineral binds it to the crystal lattice and restores the gypsum to its original strength. Gypsum is one of the oldest building materials. Its white color, its ability to harden when combined with water, its ability to give a hardening composition of any shape have long been used by builders and sculptors. For them, it is the main working material. Due to its rapid strength and ability to take the desired shape, the material itself plays an important role in medicine due to its high level of environmental friendliness. Formerly known as alabaster, it has been widely used in the manufacture of repair and construction work all over the world - for interior decoration, interior decoration in the form of hat molds on ceilings and walls. [1]

The ancient Egyptians discovered this unique property of gypsum in 3700 BC. The Greeks later gave the mineral the name Gipros, meaning "boiling stone." The Romans brought the knowledge of gypsum to Europe, and in the 15th century gypsum began to be widely used as gypsum. In order for the gypsum stone to become a binder, it is heat-treated, in which case dehydration occurs. Under normal conditions, water is released in the form of vapor, which can be obtained in the form of droplets at elevated pressure. Such crystalline water is the purest in nature, and gypsum binder, like all products based on it, is a very environmentally friendly, non-combustible building material.

According to the heat treatment conditions, gypsum binders are divided into two groups: 1) low flame and 2) high flame. Low-refractory gypsum includes construction, molding, high-strength gypsum and gypsum-cement-pozzolanic binders.

Depending on the time of hardening and hardening, gypsum binders are divided into: A - fast hardening (2-15 minutes); B - normal hardening (6-30 min); B - slow hardening (20 minutes or more).

Depending on the degree of grinding, the binders of coarse (I), medium (II) and fine (III) grinding differ. The marking of the gypsum binder contains information about its main properties. For example, G-7-A-II means: G - gypsum binder, 7 - final compressive strength (in MPa), A - fast hardening, II - moderate grinding. When gypsum binder powder is mixed with water (50-70% of gypsum mass) it forms a plastic paste that sets quickly and hardens. It turns out to be a gypsum stone, the strength of which increases as it dries. It should be borne in mind that the volume of gypsum increases by 0.3-1% during the hardening process, and this should be taken into account when preparing products by pouring into molds. [1]

CONCLUSION

In conclusion, the disadvantages of gypsum products were brittleness and hygroscopicity, but modern technology has allowed gypsum binder-based materials to provide sufficient strength and water resistance. In this production, the molecular compression technology of the substance is used, in which gypsum has special properties - it is very durable and stops contamination. No special additives, components or additives are required. Due to the molding method used, a significant compression of the internal structure of the tile is achieved 1.67 times.

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