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Researching High Quality Dry Materials Building Mixtures

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ABSTRACT: This article presents the composition of raw materials in the production of dry mixes, its properties, plants and zones for raw materials.

KEYWORDS: hiding power, marshallism, dispersion.

I.INTRODUCTION

The growing need for dry mixes has become a reality. The desire of Uzbek manufacturers to produce products that are not inferior in quality to foreign analogues, but more affordable, dictates an increase in the quality requirements of all components of building mixtures: binders, aggregates, fillers and additives.

Tashkent factory of dry building mixtures (Karasaray building materials) specializes in the production of environmentally friendly high-quality mineral aggregates and fillers for dry building mixtures for various purposes and other building materials. The plant has established technologies for crushing and enrichment, dry and wet grinding, dry and wet classification of crushed materials.

As a result of processing natural marble and dolomite, the following are produced:

- fractionated aggregates for decorative fine-grained concrete and mineral plasters - marble chips of fractions 5 - 7; 2 to 5; 1 - 2 and 1 - 0.2 mm;
- unfractionated and fractionated mineral fillers - marble and dolomite flour.

A distinctive feature of the produced mineral flour is a high degree of purity (Table 1). The chemical composition of dolomite flour satisfies the requirements for raw materials for the glass industry. Marble flour has a whiteness of 97% (according to the FB-2 gloss meter), which makes it suitable for the production of paints and varnishes, decorative white and colored stucco and joint mixtures.

Table 1

Product type	CaO, %	MgO, %	Fe_2O_3, %	Al_2O_3, %	SiO_2, %	P_2O_5, %
Marble flour	34,7 – 52	3,82 – 19,12	0,16	0,15	4,17 – 7,36	0,02 – 0,07
Dolomite flour	No more	No less	no more	no more	no more	-
DK 18-0.25	34	18	0,25	2	2,5	-
DK 19-0.1	32	19	0,1	1,5	2	-
DK 18-0.4	34	18	0,4	2,5	5	-

Such a filler allows you to increase the whiteness of mixtures based on domestic white cement, the whiteness of which does not exceed 80%, brighten mixtures based on ordinary (gray) Portland cement, reduce pigment consumption and obtain cleaner and brighter tones of finishing materials, oil and polymer paints and enamels.

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Another advantage of the produced mineral fillers is their high dispersion. A study of the particle size distribution of unfractionated marble flour showed that the particle size varies between 1-192 μm (Fig. 1), with a high content of grains 24 - 48 (28.6%) in size and very fine particles 1 - 6 μm in size (27, 2%). The specific surface area of flour is very high - more than 15000 cm2 / cm3. Therefore, by fractionation it is possible to obtain a material with a grain size of less than 100 microns (for highly filled building adhesives) and less than 50 microns (for the manufacture of paints).

High dispersion of mineral fillers provides good hiding power of paints and varnishes, increased ductility and water-holding ability of stucco mixtures and mineral adhesives, reduces their consumption per unit surface due to the application of a thinner layer. Such mineral fillers can be used in the production of asphalt concrete.

The plant's product range also includes a group of materials obtained from the integrated processing and enrichment of marshallite:

- groundmarshallite (with a particle size of less than 200 microns),
- sand for glass production;
-sands for dry building mixtures;
- dust quartz (less than 48 microns).

Initially, when developing the field, it was supposed to receive only raw materials for glass production. The chemical composition of marshallite satisfies the requirements for glass sands (Table 2), but only 20 - 25% of the mined material satisfies the grain size requirements for glass raw materials (0.1 - 0.8 mm). For disposal of the rest, you can grind large fractions or use them for construction purposes.

TABLE 2

Product type	SiO_2, %	Al_2O_3, %	Fe_2O_3, %	CaO, %	MgO, %	SO_3, %	K_2O, %	N_2O, %
Marshallite	92,56	4,29	Traces	0,69	0,32	0,16	0,69	0,17
Dusty fraction	92,93	6,8	0,27	-	-	-	-	-

The plant has established hydroclassification of crushed marshallite with the release of glass raw materials and building sands with grain sizes of 0.14 - 0.4 mm (Fig. 2). They are a fine-grained aggregate for dry construction mixtures that does not require additional grinding. Thus, another 20 - 25% of the extracted material is used.

The remaining finely dispersed part of the raw material, which accumulates up to 60% of the initial marshallite, is dusty quartz with small impurities of kaolinite (Table 2, Fig. 2).

After drying, this part of the raw material can be used as a filler in rubber products, since the grain size does not exceed 48 microns, the specific surface is more than 17,000 cm2 / cm3.

But this is not the only possibility of using the dusty fraction of marshallite. In the future, it is planned to enrich and separate this product into pulverized silica and clay component, then the possibilities for their utilization will be much wider. Such an integrated approach to the processing of natural raw materials with the minimization of unused waste is a fundamental direction of the enterprise. Next in line is the integrated processing of zeolites and limestones of Angren deposits.

The immediate plans of the Tashkent factory of dry building mixtures include expanding the range of products by arranging the production of small tonnage dry multicomponent mixtures for various purposes based on our own mineral fillers, aggregates and special binders from local raw materials.

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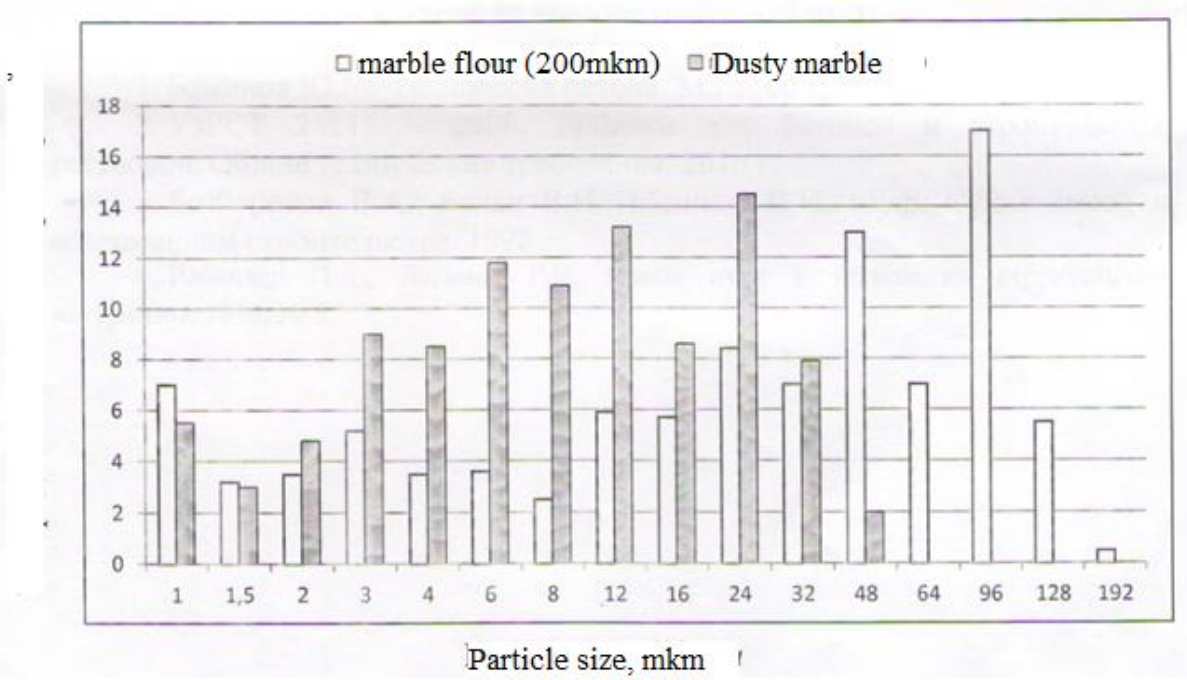

Fig. 1.Granulometric composition of unfractionated marble flour

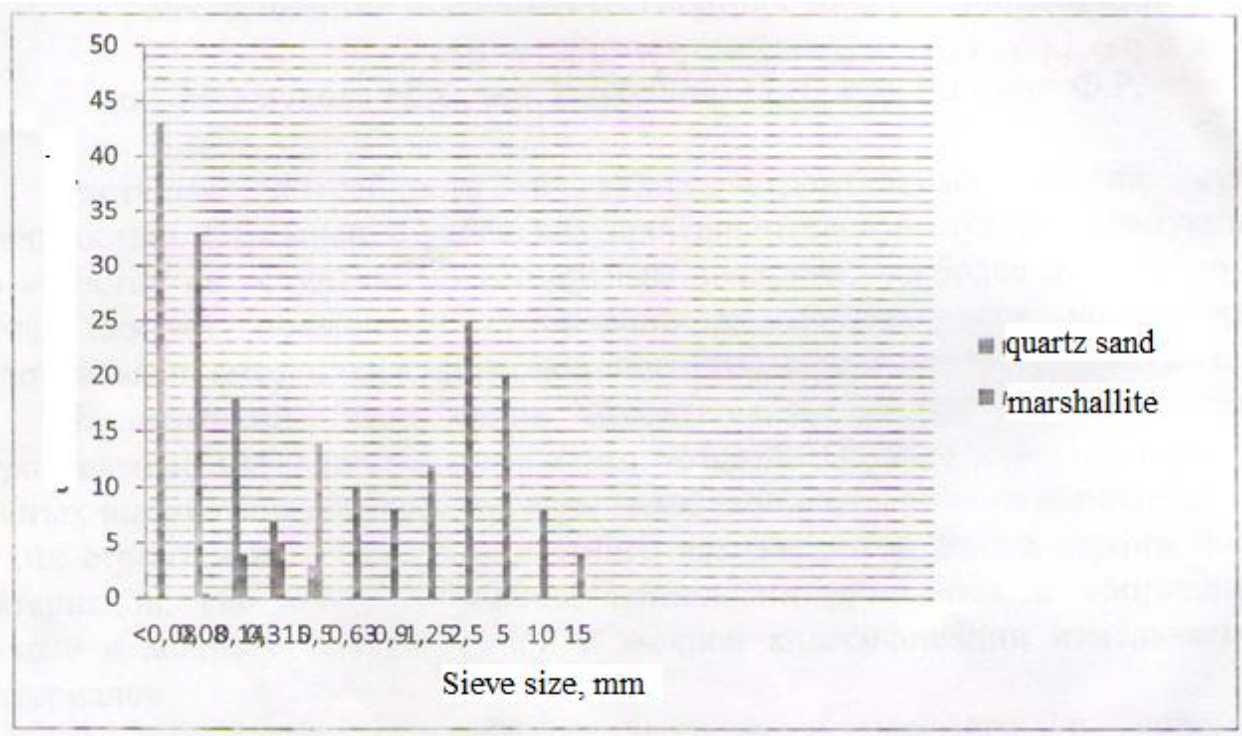

Fig. 2.Granulometric composition of unfractionated marble flour

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