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About The Perspective of the Use of Silicon-Containing Mineral Fillers in the Production of Composite Presenting

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ABSTRACT

One of the ways to improve RTI is the use of chemicals- additives and mineral dispersed fillers, which in a wide assortment are presented in the markets of the Republic of Uzbekistan, their use will allow facilitate the processing of mixtures with the creation of rubbers with improved properties.

Despite the advantages and high technical and economic efficiency, the use of additives in production is currently constrained due to the little knowledge of the properties of silica-containing additives and the nature of their interaction with other components of the composite material, which, in turn, are sufficiently studied and available.In this regard, the analysis of raw materials that could be use as silica additives in production. Mainly studied were large-tonnage silica-containing wastes of technogenic origin, which has previously undergone a natural technological activation of rocks due to deep geological or technogenic processes.

The complex use of such raw materials in the production of composite materials is difficult, since its various species differ significantly in the mineral composition, structure, texture, and genesis of natural matter; thermodynamic conditions of its formation in various layers of the earth's crust, conditions of melting and crystallization of magmas, subsequent conditions and degree of metamorphism and sedimentation; either from technogenesis - conditions and degree technogenic transformations. In this regard, the waste of undissolved rock salt used in technologies for the regeneration of cation exchange resin at Farg’ona IEM JSC (Fergana, Uzbekistan).

In the course of the study, a big drawback of waste was revealed - the variability of the composition and high chloride content. It was determined that the waste mainly consists of two components: SiO_2 and NaCl. The appearance of the waste is shown in Fig.1.

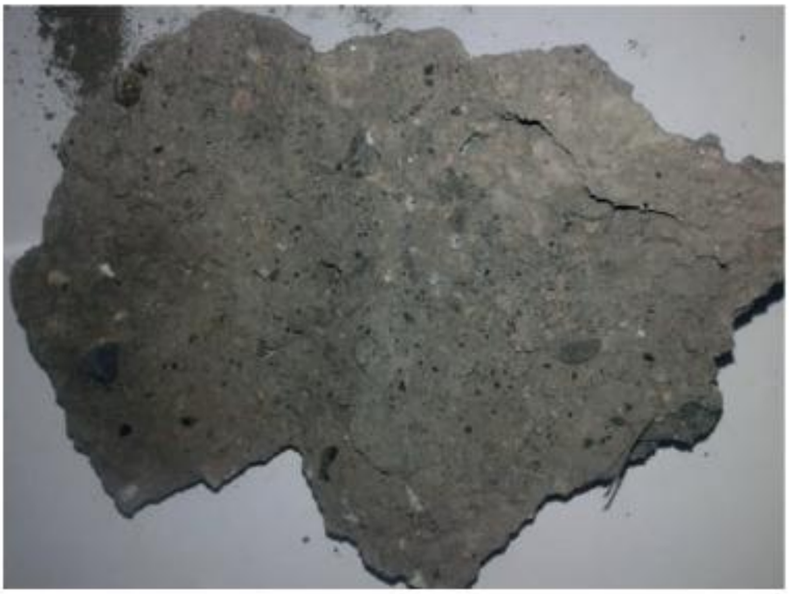

Figure 1 - Waste of undissolved rock salt

Characteristics of microsilica obtained by isolation from the sludge according to the scheme: concentration, drying and grinding, is presented in table 1.

№	Indicators	Values
1	pH	8,0…9,2
2	Total content of SiO..., kg/m3	3,0…62,5
3	Sol density, kg/m3	1001….1325
4	Impurity concentration, mg/dm3	873…1070
5	Average diameter of nanoparticles, SiO, nm	50….100
6	The content of SiO, in the material deposited from the sol, mass. %	Up to 99.72

Further, new for building materials science types of mineral additives - magnetic separation waste (hereinafter referred to as MS waste), which are significantly different from the traditionally used quartz raw materials - waste was used JSC "Quartz", where glass products are produced.

Due to deep geological processes, this raw material has gone from sedimentogenesis to catagenesis and metagenesis, underwent dynamo metamorphism and partially high-temperature

Contact metamorphism, i.e. is genetically activated. Waste MS consists mainly of acute-angled isometric aggregates and individual quartz particles, magnetite, hematite, silicates and carbonates.

In this regard, the mineral additive from MS waste with its inherent free internal energy accumulated because of geological and manufactured impacts will have polyfunctional significance for the processes of structure formation of composite materials, which will lead to a significant increase in its quality.

The study of the composition of this waste showed a fairly high content X-ray amorphous substances that determine their hydraulic activity during interaction with Ca $(OH)_2$ to form calcium hydrosilicates (Table 3). Stocks magnetic separation wastes in AO dumps amount to hundreds of thousands of tons, which allows consider them as a powerful raw material base for industrial production construction products from KGV.

Table 3 - Chemical composition of magnetic separation waste

Substance	SiO_2	Al_2O_3	Fe_3O_4	CaO	MgO	SO_3	CO_3
Content, %	68-77	0,7-2.2,27	10,2-17,7	1,67	1,83-2,26	0,12-0,15	3,63

This waste is a man-made fine powder of dark gray color, consisting of unrounded quartz particles (about 60%), metal oxides, carbonates, hematite and its aggregates. Fineness modulus - significantly below 1, particle content less than 0.074 mm - about 80-85%.

Table 4 - Activity of finely ground magnetic separation waste

The amount of CaO in mg absorbed by 1 g of mineral supplement in terms of		Sediment volume, cm3
		5,61
2nd day	4,9	
30 days	126,7	

For use of magnetic separation waste as microsilica additive Waste grinding was carried out in a laboratory ball mill. Analysis of the microstructure and morphology of finely ground microsilica showed: finely ground up to S = 500 m2/kg MS waste has a developed rough surface,

which contributes to the compaction of the microstructure of the hardening matrix. Their particle shape differs depending on the size. Silica particles are mainly composed of dense vitreous particles of various sizes of cubic and rounded shapes, having layered structure. Defects in the crystal structure of MS waste and the value of the total specific surface confirms their high dispersion and reactivity (Figure 2.1, 2.2).

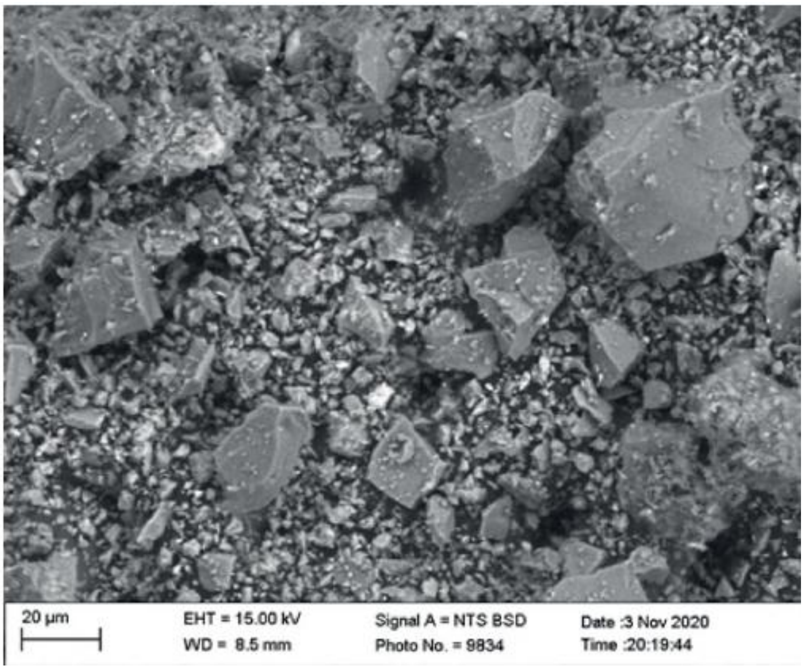

Figure 2.1 - Morphology of the surface of finely ground magnetic waste separation

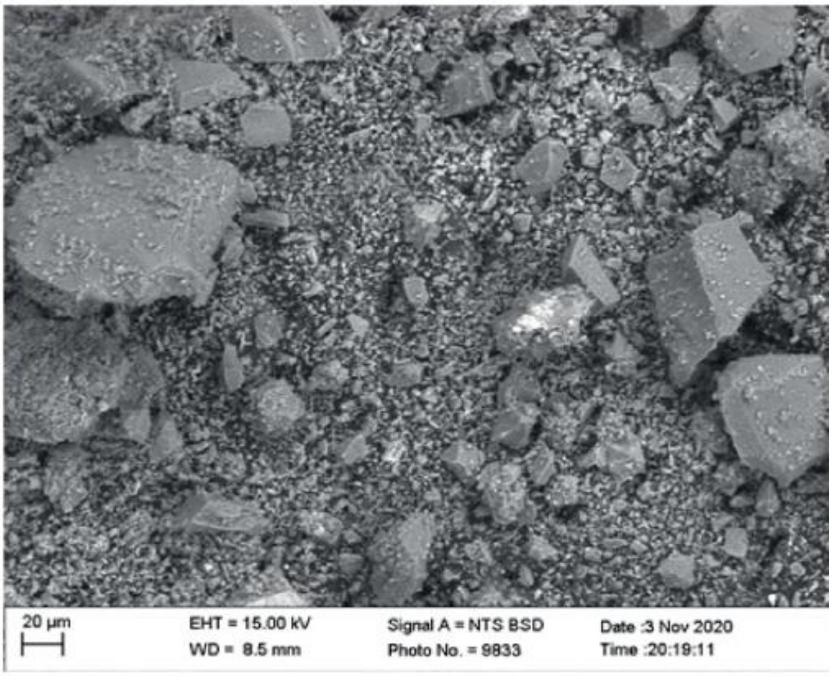

Figure 2.2 - Morphology of the surface of finely ground magnetic waste Separation

Bibliography

1. Бекин Н.Г. Оборудование заводов резиновой промышленности. / Н.Г. Бекин, Н.Г.
2. Шанин. - Л.: Химия, 1996. 376 с.
3. Машины и аппараты резинового производства. / Под. Ред Д.М. Барскова. - М.: Химия, 1975. 600 с.
4. Лепетов В.А. Резиновые технические изделия. / В.А. Лепетов. // 3-е изд. испр. - Л.: Химия, 1976. 440 с.
5. Минуленко Л.И. Ускорители вулканизации. /Л.И. Минуленко, О.И. Денисова, Е.М.
6. Струбельская. // Сырье и материалы для производства РТИ. - 2002. № 1. 8-11 с.
7. Цой В.М. О новом методологическом подходе к исследованию поверхностно активных свойств минеральных наполнителей в цементных системах [Текст]. / В.М. Цой, А.И. Адылходжаев, И.М. Махаматалиев. // Архитектура и строительство Узбекистана. - 2016. № 4-5. 79-82 с
8. Mohankumar S. Indian Rubber Products Manufacturing Industry- Evolutionary Dynamics and Structural Dimensions. / S. Mohankumar, G.K. Tharian. RubberResearch Institute of India,1999.
9. Automotive Tyre Manufacturers Association. [Электронный ресурс]. - URL: http://www. atmaindia.com. (дата обращения: 05.03.2021).