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The Effect of Soda Enterprises on the Strength of Low-Grade Concrete in the Presence of Various Waste

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ABSTRACT. Research work is underway at the Tashkent Institute of Chemical Technologies on the effect of soda ash on the strength of concrete as a filler with the participation of limestone waste, which has not decomposed during the process of lime quenching. These studies were carried out with the participation of various concrete mixtures and fillers up to 20 mm in size of limestone waste, which did not decompose during the lime quenching process of soda deposits. Experiments were carried out on non-high concrete stamps.

KEYWORDS: strength limit, concrete, carbonate filler, limestone, quartz sand, cement, fraction, activity, waterability.

I. INTRODUCTION

The high technical characteristics of carbonate filler concretes have been studied in a large number of experimental studies [1-3]. The selection of the compositions of a group of concretes with carbonate filler shows the experiments carried out that the same can be done as for conventional heavy concrete, for example through a known computational experimental method. However, this should take into account the possibility of a 10 – 20% increase in the strength of carbonate concretes, filler concretes based on erupted rocks, as well as the high-water capacity characteristics of carbonate fillers [4-6].

According to the studies we conducted, in experiments on concrete used as a filler from carbonate rocks with a strength of 200 kg/cm2, even higher branded concrete was obtained than concrete with a gravel filler, the expert of which is even higher than 1200 kg/cm2. Also, a limestone filler showed that the mustachability of the introduced concrete would be higher than that of the concrete in which the Granite filler was introduced.

II SIGNIFICANCE OF THE SYSTEM

In all experiments, concrete is made in a laboratory concrete mixer, laying in molds was carried out on a standard vibro field, samples were stored in wet conditions. The strength of the concrete is determined by squeezing 100 mm ribbed holsters. The results of the test, the value of which was checked in special experiments, with an increase in the transition coefficient of 0.85, are brought to an indicator of the consistency of ribcage cubes of 200 mm. Limestone waste, which did not decompose during the lime quenching process of Soda deposits, is characterized by good concrete quality (strength indicator P=0-41). However, even in such fillers, concrete of the most mass brands can be obtained.

III. MAIN PART

The results of the physical and chemical analyzes carried out showed that the limestone formed in the process of quenching lime contains CaO-54.06%, MgO-0.43%, SiO_2-0.18% and R_2O-021% (Table 1 and Figure 1).

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Table 1
Results of elementary analysis of X-ray-fluorescence spectrometer

Chemical composition. %						
CaO	MgO	SiO_2	Al_2O_3	Fe_2O3	SO_3	loss in burning.
54,06	0,43	0,22	0,18	0,03	0,10	44,98

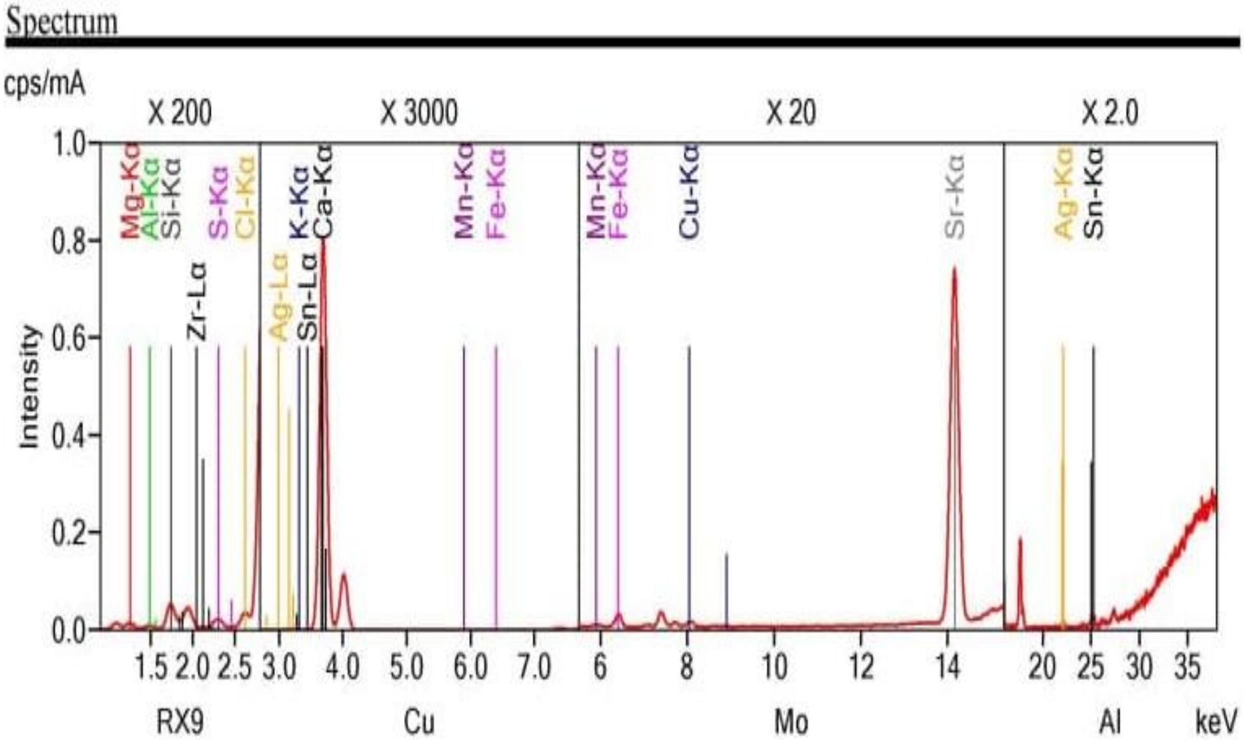

Figure 1. Graphic drawing of elementary analysis of X-ray-fluorescence spectrometer.

From the result of the physical and chemical analyzes carried out, we can see that these wastes did not contain substances (salts, alkalis and acids in different compound states) that affect the different properties of concrete. The determination of the strength limit of the limestone formed in the process of lime quenching of the Soda plant was carried out according to GOST 8267-93, and it was determined that the M500 i.e. belongs to the class of low-brand fillers. Based on GOST 8762-93 ""crushed stone and gravel from dense rocks for construction work", the expediency of applying fillers of this brand on M200 and lower brands of concrete is given.
In the process of quenching lime, the results of IR - spectroscopic analysis were carried out with the participation of the first samples of limestone that did not decompose.

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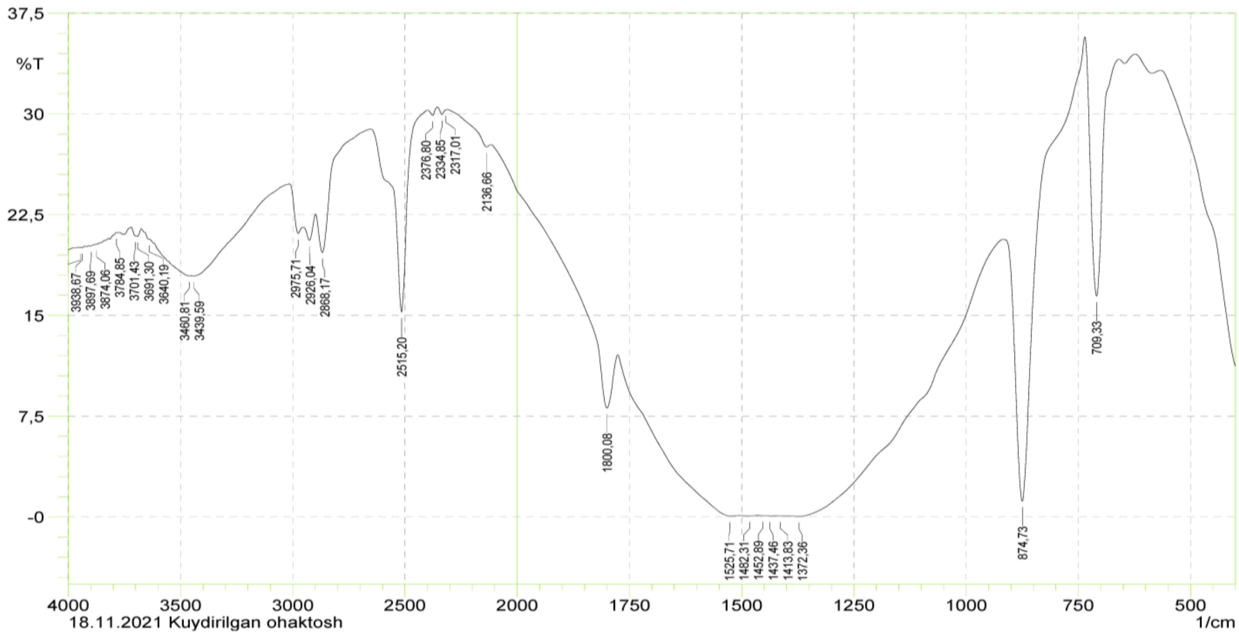

Figure 2. Lime quenching is a non-decomposing limestone infrared spectrokopia

According to the results of infrared spectroscopy of limestone waste, which did not decompose in the process of lime quenching of Soda corhones, deformation fluctuations of CaO atoms corresponding to the upper are of IR−radiation are observed in 709.33 and 875.21 cm-1s. And in the area from 1395.51 to 1800.08 cm−1, fluctuations in secondary bonds are observed. From 2135,22 to 2373,91−cm-1 in the field, triple bonds were observed with the participation of $MgO*H_2O$. And in Sokha from 2515 to 4000 cm-1, fluctuations in the presence of hydrogen atoms are observed.
Physical and mechanical properties. The dimensions of 10-20 and 5-10 mm of lime were carried out according to GOST 8267-93 of the limestone waste pusyclic module, which did not decompose in the process of quenching the Lime of soda deposits, and the following results were obtained.

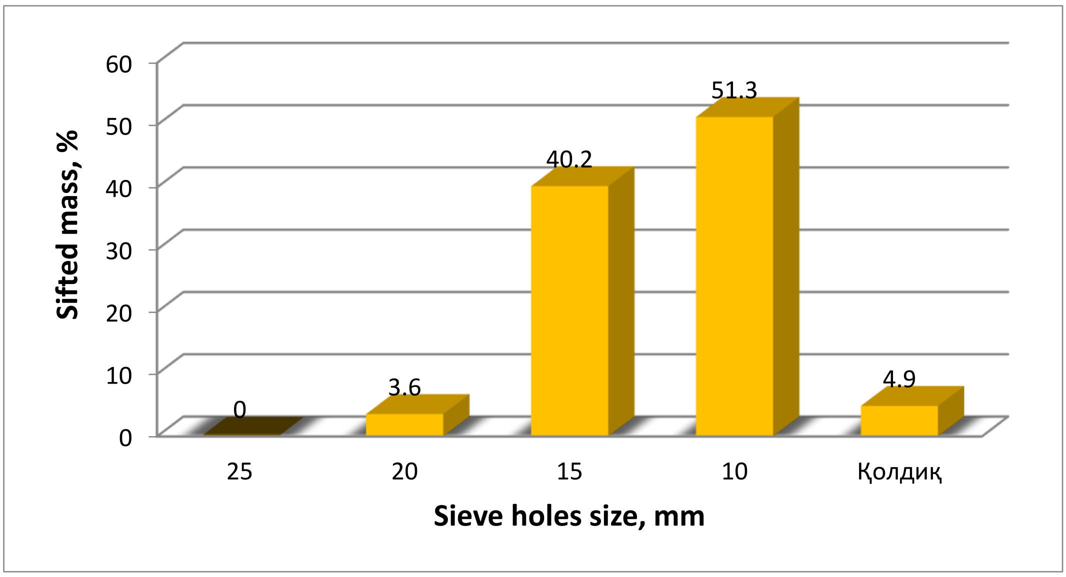

Figure 3. The density module of stones of 10-20 mm, which did not decompose in the process of quenching lime

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Limestone waste, which did not decompose in the process of quenching the soda enterprise, remained on top of the sieve with a maximum mass of i.e. 15 and 10% in holes size 40,2 and 51,3 mm according to the results of sieving. The 4.9% mass, on the other hand, was marked as a remnant by falling below the 10 mm holes.
Limestone waste, which did not decompose in the process of quenching the Soda enterprise, 5-10 mm limestone was also carried out according to the yiriklik module GOST 8269-97.

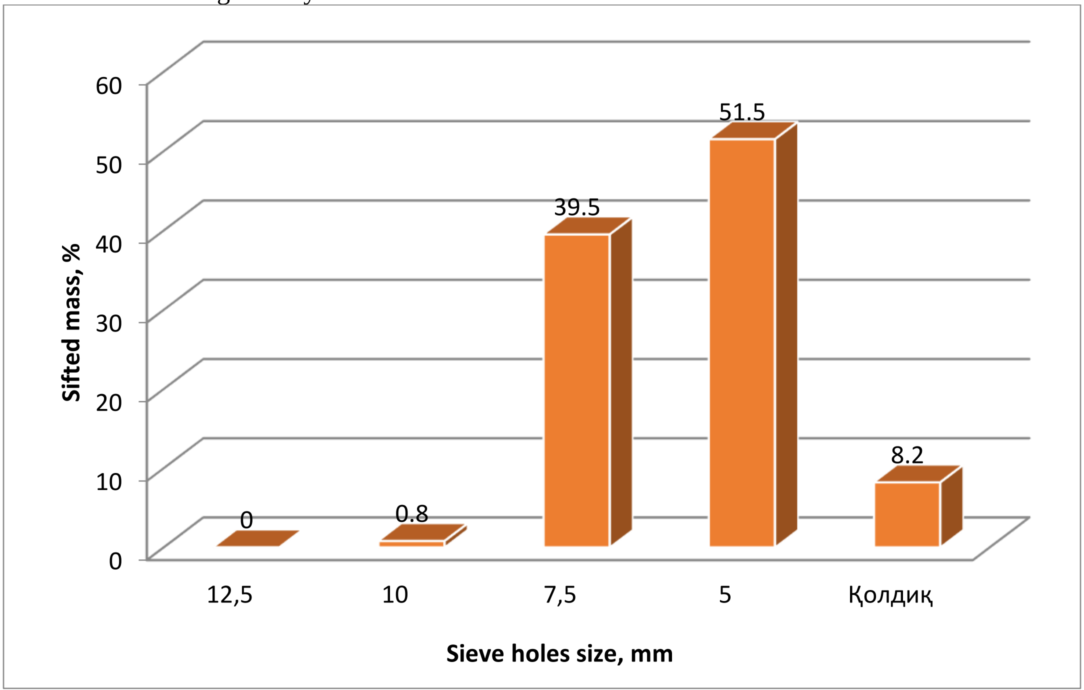

Figure 4. 5-10 mm of stone tear module formed in the process of lime quenching

In the process of quenching the Soda enterprise lime, tests carried out on the waste yyricity module of limestone that did not decompose were found to meet the requirements of GOST 8269-97.
The waste of limestone, which did not decompose in the process of silting the Soda enterprise, was checked according to the strength limit GOST 8762-93 ""crushed stone and gravel from dense rocks for construction work"" and was determined to enter the class of M500, i.e. low-grade fillers. Based on the requirements of this state template, the feasibility of applying low-grade fillers on M200 and lower brands of concrete is given.
The application of these emissions to the composition of M200 brand concrete as large fillers and their effect on concrete strength were studied, and the results were presented in Table 2.

2-table

Concrete strength with limestone filler, which does not decompose during the lime quenching process

Raw materials, %		Concrete strength by time, MPa					
Filler (Flint)	waste of the Soda enterprise 5-20 mm	3 day	7 day	28 day	90 day	180 day	360 day
100	-	5,12	11,79	16,85	18,34	19,99	21,64
90	10	5,17	11,84	16,89	18,39	20,06	21,73
85	15	5,22	11,87	16,92	18,42	20,10	21,75
80	20	5,26	11,91	16,94	18,44	20,12	21,77

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75	25	5,30	11,95	16,98	18,47	20,15	21,79
70	30	5,34	12,00	17,00	18,55	20,18	21,80
65	35	5,37	12,04	17,03	18,60	20,21	21,82
60	40	5,38	12,06	17,06	18,65	20,23	21,84
55	45	5,41	12,11	17,10	18,68	20,26	21,88
50	50	5,44	11,14	17,12	18,74	20,29	21,91
45	55	5,45	12,16	17,13	18,76	20,33	21,93
40	60	5,50	12,23	17,15	18,77	20,35	22,94
35	65	5,46	12,25	17,15	18,79	20,34	22,93
30	70	5,44	12,14	17,13	18,76	20,32	22,87
25	75	5,38	11,62	17,11	18,71	20,22	22,80
20	80	5,33	11,16	17,05	18,66	20,10	22,74
15	85	5,23	11,73	17,04	18,61	20,01	22,64
10	90	5,14	11,51	17,01	18,51	19,93	22,52
5	95	5,02	11,60	16,44	18,12	19,11	21,61

It can be seen from this table that the waste of limestone, which did not decompose in the process of quenching soda enterprise, significantly increased the strength of concrete in the introduction into the composition of concrete. In particular, the highest indicators showed that the waste of limestone, which did not decompose in the process of quenching the Flint and soda enterprise, was reduced in the proportions of 40/60 and 35/65, that is, the strength of concrete in these proportions showed 101.8% strength at the age of 28 days. At the age after it (90, 180,360), the hardening periodicity of concrete continued to manifest strength indicators of 18.79, 20.34 and 22.93 MPa. In the ratio of 30/70 and higher, the concrete strength was reduced to a certain extent, and in the introduction of the soda enterprise in the amount of 95% of the waste of limestone that did not decompose during the process of lime quenching, and more, it was found that the concrete strength does not correspond to the requirements of "methods for determining the strength The main reason for this is that we explain the soda enterprise by the fact that in the process of quenching lime, the waste of limestone that has not decomposed enters the class of fillers of a lower brand than rauttan.

Samples of concrete with the addition of this waste were studied the conditions of hardening under different conditions, and the following results were obtained.

Table 3

The strength of concrete based on solid limestone filler and soda plant carbonate waste under different conditions

Types of filler	Concrete composition kg/m^3				$\frac{W}{C}$	Hardening condition	Compressive strength limit kg/cm^2		$\frac{Rnp}{R}$	Strength limit in elongation Rp kg/cm^2	$\frac{Rp}{R}$
	C	S	G	W			Cubic R	Prismatic R_{np}			
1	2	3	4	5	6	7	8	9	10	11	12
From carbonate limestone of gravel and soda enterprise						P	169	103	0.61	28.0	0.17
	308	601	1159	216	0.70	PE	180	171	0.95	16.5	0.09
						E	205	177	0.86	20.3	0.10
						P	210	185	0.88	36.8	0.16
	426	552	1066	213	0.50	PE	245	200	0.82	25.2	0.10

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						E	256	242	0.95	29.6	0.11
From limestone mixed with 40% quartz sand to carbonate waste of gravel and soda enterprise	320	320	945	256	0.80	P	96	77	0.80	16.6	0.25
						PE	130	114	0.88	16.9	0.13
						E	138	162	1.17	18.9	0.14
	445	451	872	267	0.60	P	140	187	1.33	20.8	0.15
						PE	156	174	1.1	23.2	0.15
						E	181	222	1.22	23.4	0.13

Note: 1. P-steaming; PE – steaming + 27 day, hardening in natural conditions; E – 28 day. hardening in natural conditions.
2. the highest magnitude of the gravel in all compositions is 20 mm.

The contents of concrete with porous carbonate filler are obtained by an experimental way. In this case, the data of the instruction, as well as those presented in this article, The Fillers of concrete strength, can use water resistance indicators, cement activity and connections between its specific consumption.
The experiment conducted at TCTI feared that the limestone waste of soda corhones, which did not decompose during the lime quenching process, included groups II and III of concrete, providing the highest strength in the least consumption of cement, the optimal ratio of the weight of sand to gravel (20 mm. depending on the quality of sand/gravel, fillers and cement consumption varies from 0.5 to 1).
In this case, the higher values of about 1 belong to the limestone waste of the soda corhones, which did not decompose during the lime quenching process. Gravel should be of low strength, its amount in concrete should be reduced, since in this the amount of further granules increases, and the comfortable laying of the concrete mixture improves. $\frac{S}{G} = \alpha \cdot \nu \cdot \frac{\gamma s}{\gamma g}$ in the Formula (ν - the relative volume of gravel spaces, Ɣs , Ɣg – the coefficient of grain displacement $\boldsymbol{\alpha}$, as a rule, should not be less than 1.2.
In fillers with limestone waste, which did not decompose in the process of lime quenching of Soda deposits, at values the water – cement ratio up to 0.46 – 0.75, the concrete contents of the mixture according to the technical viscometer were selected. The granulometric composition of fillers in accordance with the considerations was as follows: 0-5 mm - 5% of gravel, 10-20 mm - 40%, 5 - 10mm - 55%, 20 - 40 mm of sand - 1.25-5.0 mm 42%, 1.25 mm. up to-58% (the amount of fractions up to 0.14 mm is 9.2%).
Descriptions of limestone waste fillers that did not decompose in the process of lime quenching of Soda deposits are partially presented in the article.

IV. CONCULION

The growth curves of the strength of the bitons, which are in different carbonate fillers, are presented in natural conditions. With an increase in the age of concrete, the redistribution of voltages to the skeleton from the cement stone in the filler occurs. In this regard, the effect of filler consistency on the strength of concretes is somewhat reduced.
Fearing the experiments carried out, the 10% replacement of Tabby sand on concrete based on carbonate fillers of the soda plant either does not lead to a decrease in the strength of the concrete, or only slightly reduces it. However, in the latter case, it is also economically worthwhile from all sides to apply cheap sand, which is formed from weak limestone instead of quartz sand, which falls into a remote bearing.

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