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DURABILITY CHARACTERISTICS OF CONCRETE ADMIXED WITH WOLLASTONITE MINERAL

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ANNOTATION. *Several materials as naturally occurring minerals and either industrial wastes have been investigated for making durable concrete material. The present investigation has been aimed to determine the influence of wollastonite on properties of concrete such as strength, permeability and durability over a range of water-binder (w/b) ratios and cement replacement.*

KEY WORDS *Durability, concrete, Wollastonite,calcium hydroxide, silane and orgsilane to processing, activity, izometric grain, cube durability, prizm durability.*

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I. INTRODUCTION

As well known, huge amount of the concrete is used for construction of the infrastructure, including dams, bridges, undersea building, channels, roads and other building. At portlandcement [1] is a key component for concrete product and motivated one of the most important and enough irreplaceable building material all over the world. The construction industry spends the big amount of the expenses for maintenance quality and provision to longevity of buildings and constructions raised from concrete and reinforced concrete (repair-reconstruction work, reconstructions existing constructions and others.). This is conditioned by additional expenses of the cement and other astringent. However, for satisfaction of need to production of the portland cement brings about closing natural fossilized, connected with production it. On the other hand usual (heavy) concrete not time-proof. There is number factors, which influencing on durability and concrete often decays. The main factors influencing on toughness and the other characteristics of the concrete is a penetration moisture, occurring micro-cracks in body of concrete in consequence of corrosion that is not prevented in sufficient measure.

The characteristic of the concrete is able be changed by use additional cementing material. In most cases different additives is used to cement or concrete mixture for increasing of toughness of the concrete. However question increasing fracture strength, toughness on sprain and deformative characteristics of concrete under load under equal condition, it is very actual.

For control of structure-forming and receptions concrete with different characteristics use different modifiers of structure of concrete. For improvement of toughness connection between structured element of the concrete and accordingly increasing to toughness of cement stone in contact zone between filling aggregate at sprain use disperse fiber reinforcement. In modern construction use metallic, glass, basalt, asbestos, polymeric and the other fibre.

One of such mineral is wollastonite, as raw material of the multi-objective purpose, possessing macrocrystalline needle-shaped-fiber structure anduse extensively in different branch of industry. Wollastonite presents natural silicate calcium with chemical formula $CaSiO_3$, much functional minerals with constantly rising demand on it [2]. The colour of wollastonite white with grey or oilrig tone (fig. 1), differs the chemical purity, contains the scant few of the bad admixtures in the manner of oxides manganese, ferric and titanium.

II. MATERIALS AND METHODS:

In nature wollastonite solely seldom clear from admixtures. In most cases wollastomite meets with the other mineral of trace amount of the admixtures. Field of wollastonite meets enough seldom. Deposit of wollastonite in Central and and East Asia is the florid (tabl.). The Average contents of wollastonite in sorts varies from 40 till 70%.

Follows to note that metamorphized quarz-consist limestones, in particular wollastonite the most peculiar for that sorts, which were subjected to the most deep change to granulated faction. As well as interesting paragenesis of wollastonite is connected with alkaline magmatic sorts and carbonatite.

Fig.1. Type of wollastonite

Chemical composition of wollastonite in countries of Asia

Oxids	Uzbekistan			Russia			Kazakhstan		China	India
	Koytash field	Change field	Langar field	Pribaykal field	East soyan field	Aldan field	Bosagin field	Hayruzov field		
SiO_2	38,6	47,28	51,50	51,41	51,70	49,36	52,0	42,9	46-53	49,0
CaO	42,5	46,10	46,90	46,27	47,38	45,81	39,9	40,80	43-50	48,0
Al_2O_3	2,37	1,00	0,05	0,56	0,10	0,58	2,97	3,05	0,3-0,4	0,7
Fe_2O_3+FeO	3,60	0,74	0,16	0,30	0,06	1,22	0,52	2,61	0,1-0,2	0,40
TiO_2	0,20	-	-	-	-	-	-	-	-	-
MgO	1,60	-	-	0,17	-	0,50	0,60	1,29	0,2	0,06

MnO	0,18	0,14	0,1	0,01	-	0,44	0,14	0,05	-	0,10
K_2O	0,40	1,09	0,03	0,14	-	-	0,40	-	-	0,1
Na_2O	0,25	1,36	-	0,22	-	0,35	0,40	-	-	0,02
п.п.п	10,30	2,29	1,26	0,92	0,76	1,74	3,07	9,3	2,3	1,62
total	100	100	100	100	100	100	100	100	100	100

Practicability and need reinforcing material on base of portland cement and other mineral matrix is these material defined by frailty and their low toughness on sprain. The main requirements of presented to reinforcing fibre, are their toughness on sprain, bend, compression, striking stability, acerbity resilience. All this requirements satisfies wollastonite. So wollastonite as micro-reinforcing filler is used in production of ceramic products, fire-proof and acid-fast material, asbestos-cement products, paint-and-lacquer materials, composite polymers and others.

Using of wollastonite cheese as filler for concrete, other things being equal possible get the more strong concretes and perfected other features [3, 4, 5].

Considering that in Uzbekistan, there is row mineral of wollastonite, reserves which consist of ten mln.tonny, was studied possibility its using as fine aggregate for concrete. For the experimental researches were used wollastonite cheese of Koytash field (Uzbekistan).TheAbram's fineness modulus of crushed wollastonite sand has formed M_f =1.8 (fine aggregate, fineness).

For sampling selected the concrete mix C:FA:CA=1:2:3,29 on Navoi portlandcement marks 400 under W/C=0,57 and elementary discharge of cement - 350 kg/m^3, quartz sand - 700 kg/m^3 and coarse aggregate - 1150 kg/m^3 (the flowability of concrete 3-4 sm). This composition was accepted for source. In the second composition of 30% sand have changed the wollastonie sand (mass) FA:P:W:CA=1:1,4:0,6:3,29. Water-cement ratio were supported both compositions constant.

From concrete mixtures molded the examples of concrete cube size of the sides 10x10x10 sm and prisms size 10x10x40 sm, after three-days hardening of concrete were molted. Cube and prizm toughness of the concrete defined after molted of examples and 28, 60, 90, 180, 270 and 360 days of the hardening in laboratory.

III. RESULTS AND DISCUSSION:

Received experienced results of cube and prizm durability of the concrete were provided in graphs (the pic. 2 and 3).

On base experimental results (look at fig.2 and 3) possible note that availability of use in composition of the concrete fiber fractions of wollastonite. On graphs possible to draw a conclusion in that, that cube and prizm durability of concrete in all their age greatly differs. For instance, cube durability of the usual concrete at age 28 and 360 day has accordingly formed 18,5 and 27,4 MPA. At that time wollastonite-concrete has formed 24,5 and 37,1 MPA that increase durability at average forms 1,32 and 1,35 times (accordingly 32 and 35%). Increase prizm durability at age 28 and 360 day has too formed at average 32...38%.

Should note that wollastonite-contain concretes as in early and at late period gains durability, exceeding durability of concrete without concrete admixture. Also concretes to 7 and 28 days age take the main part its durability.

Above mentioned results are indicative of that, that using instead of a part fine aggregates (sand) before 30% allows to get the concretes, durability which much above durability of concrete on cement without concrete admixture.

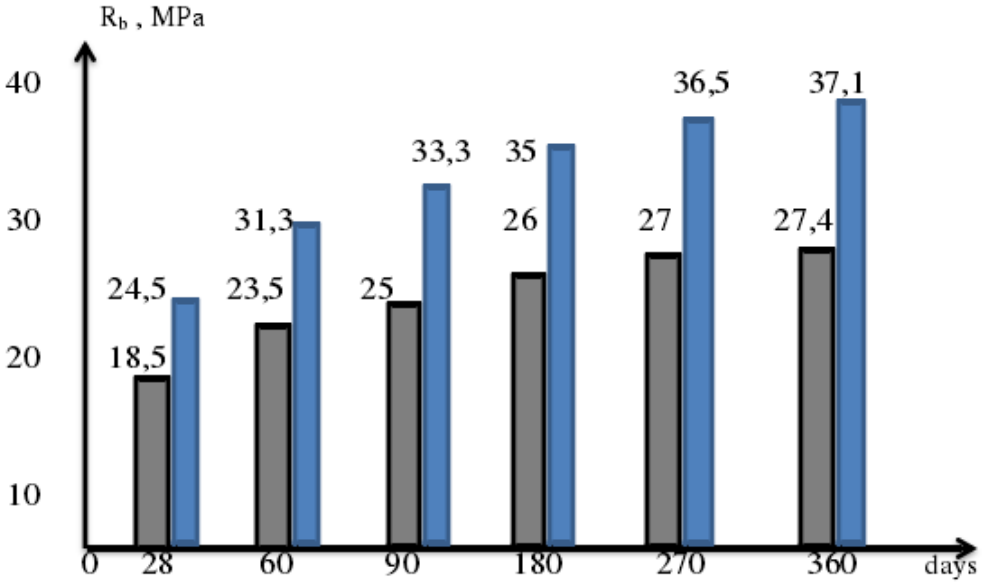

Fig-2. Cube durability of usual and wollastonite-contain concrete

– for usual concrete;

-for wollastonite-contain concrete

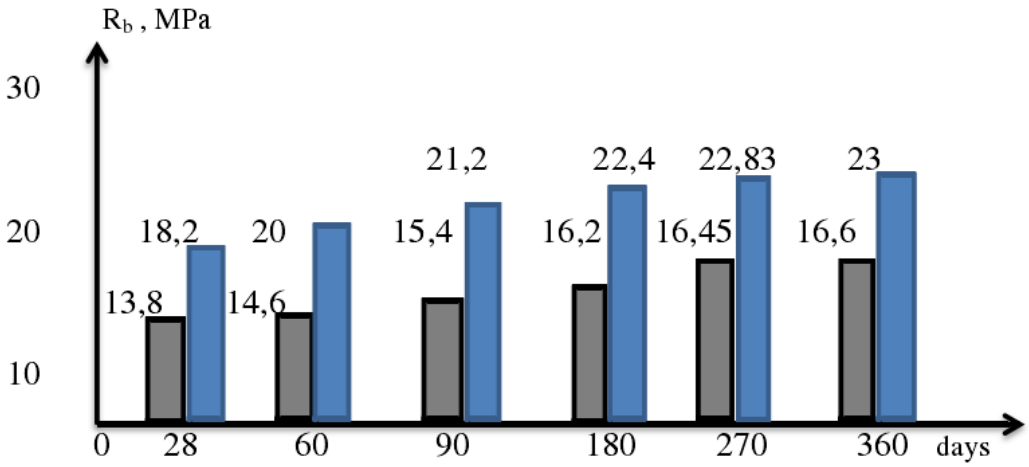

Fig-3. Prizm durability of usual and wollastonite-contain concrete

– for usual concrete;

-for wollastonite-contain concrete

CONCLUSION:

Thereby possible to note that availability use in concrete mix of wollastonite fraction of wollastonite. So, for instance, wholly real reception special concrete of durability 60...70 MPA on base portland cement 40-50 MPA under simultaneously improvement such more important characterizes of concrete, as limit durability under bending, fracture strength, abradability and the other characteristics (freeze-thaw durability, corrosive ability.

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