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Influence Additives of Clayed on Characteristic Refractory Masses of Dinas

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Abstract: In given work are brought results of the study on study of the influences additives of clayed on physical-mechanical features of dinas refractory ramming masses on base clayed and high silica mineral raw materials resource of Republic of Uzbekistan. It Is Installed that contents added the clay of kaolin to quartzite must not exceed 25 %, but over this contents of the clay occurs the sharp reduction to porosity of the mass, in connection with formation glass fragment of pottery caking masses. Parallel porosity change and physical-mechanical characteristic of the pilot models.

Keywords: Refractory materials, dines, raw materials, mass of ramming, compositions, quartzite, clay, granulation, porosity, toughness, fire growing or shrinkage, physical-mechanical.

1. Introduction

Now one of pressing questions of the fire-resistant industry of many countries including in Uzbekistan working out of compositions of not moulded fire-resistant masses on the basis of an aboriginal source of raw materials is.

As, on the basis of the analysis of the available data [1,2] it is positioned that at designing of the optimum formula of ramming masses have great value such properties: linear changes of samples in a drying time and furnacing, tearing strengths and compression in the dried up and burnt states, porosity of the burnt crocks, fire resistance of masses and their softening point under a load.

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It is known that the major factors influencing technological properties of Dinas ramming masses the following: the maintenance of clay added to of silica to raw materials; quartzite changing by quartz sand; changing of clay by calcium oxide; a joint additive of quartzite, clay and calcium oxide; introduction of Dinas fight; dispersity - grain composition of quartzite; an additive to mass alkali containing components.

In a direction of studying of influence of these factors on technological the characteristic of fire-resistant masses also has been supplied the yielded part of work.

2. Materials and Methods

Thus it is necessary to notice that requirements which it is necessary show to the quartz stuffs applied to manufacturing of ramming masses, basically can to be shown to their high reactivity at interactions with the help solid phase reactions with other components of fusion mixture, in particular with clay. This requirement is a consequence of desirability of sintering of ramming masses at enough low temperatures. It is necessary to notice that concerning the maintenance of oxide of silicon in quartz raw materials in this case there is no necessity to show increased requirements as the general maintenance of oxide of silicon in ramming masses can be corrected quantity of added clay.

The clay maintenance in fusion mixture of ramming masses routinely low, therefore from the clay introduced into ramming mass, it is necessary to demand high binding capacity to sintering point. Fire resistance of clay should be high, especially in case of manufacturing of ramming masses.

As initial raw components for working out of Dinas fire-resistant ramming masses used quartzite's of Kaytash, clay of kaolin's of Angren deposits, results of which analysis of chemical composition are resulted in tab. 1.

Table 1. Chemical compositions of used raw materials

The raw materials name	Oxides content to air dry matter,%								LIC
	SiO_2	AI_2O_3	Fe_2O_3	CaO	MgO	K_2O	Na_2O	SO_3	
Quartzite of Kaytash	96,7	0,4	0,79	0,2	0,24	0,2	0,65	Сл.	1,34
Clay of kaolin's of Angren	59,23	26,16	1,44	0,67	0,24	1,0	0,4	-	10,8

Note: The loss on ignition (LIC) comprises: hygroscopic, constitutional, crystallized water, organic and volatile compounds and carbon (IV) oxide.

3. Results and Discussion

From technology of silicates it is known that [3,4] in ceramic and fire-resistant masses the granulometry plays extremely important role, appreciably defining properties of ramming masses after their heat treatment - furnacing at high temperatures. Therefore, for working out of composition of ramming masses from these raw components sealers of the various fractional compositions which granulometry are resulted in tab. 2 have been prepared.

The prepared compositions "quartzite of Kaytash quartzite - clay of kaolin's of Angren" was compounded with the maintenance of clay from 5 to 35 masses of %. The formula of these mixture compositions had the coverage purpose a wide concentration range of added clay. In tab. 3 are resulted mixture compositions of Dinas ramming masses.

Table 2. Fractional composition of the starting components of the batch mixture

Name of batch mixture components	The grain size in mm					Σ
	1-0,5	0,5-0,2	0,2-0,012	0,12-0,09	<0,09	
Quartzite of Kaytash	10,0	19,5	18,5	12,0	40,0	100
Clay of kaolin's of Angren	17,8	40,1	13,5	7,2	21,4	100

Furnacing of samples made gradual heating in laboratory silite furnaces at temperature 1350^{o}C, the endurance at outlet temperature compounded 5 hours.

Table 3. The compositions mixture of the Dinas ramming masses

The name raw materials	Composition of fusion mixture, masses of %						
	M1	M 2	M3	M4	M5	M6	M7
Quartzite of Kaytash	95	90	85	80	75	70	65
Clay of kaolin's of Angren	5	10	15	20	25	30	35

Results of researches of the burnt samples on the basis of a composition "quartzite of Kaytash quartzite - clay of kaolin's of Angren " are resulted on tab.4.

Apparently from tab.4, the made experimental researches give the chance to find out a series of the moments which are of interest from the point of view of revealing of operability of the formula mixture for manufacturing of fire-resistant ramming masses.

Table 4. Результаты испытаний обожженных образцов композиции «quartzite of Kaytash quartzite - clay of kaolin's of Angren»

№ sample	Change of linear dimensions		The volume porosity,%	Strength limit, MPa		
				bending		compression
	shrinkage after drying,%	fire shrinkage or growth,%		dried	roasted	roasted
M1	0,18	+1,50	22,8	1,3	2,36	53,6
M2	0,27	+1,71	25,3	3,4	2,86	30,8
M3	2,09	+1,52	26,5	4,1	2,39	23,7
M4	4,22	+0,91	25,9	5,6	2,97	27,4
M5	6,07	-0,41	25,5	7,6	3,05	22,6
M6	7,25	-1,22	14,7	7,4	4,76	33,7
M7	8,72	-0,70	8,72	8,5	5,01	98,3

Thus contraction after drying increases continuously at augmentation of an additive of clay. At the yielded intensity of furnacing in all cases reduction of the dimensions of the sample finally is received. However at the maintenance clay of kaolin's of Angren to 20 masses of % inclusive hot-fire contraction is positive, i.e. samples find growth in the course of furnacing. Further, since 25 masses of % of an additive of clay, growth of a mineral of quartz does not overlap contraction of clay and in furnacing samples yield reduction of the dimensions.

Thus it is necessary to notice that the additive of clay to 20 masses of % inclusive represents some limen, after which property of the burnt crocks sharply variate. Porosity of crocks of masses with an additive of clay to 20 masses of % is in limens of 23-26 masses of %.

On the basis of experimental researches it is positioned that the maintenance added clay of kaolin's of Angren to quartzite of Kaytash should not exceed 25 %, and at the maintenance of clay over this quantity there was a sharp reduction of porosity and increase of hardness of Dinas mass, in connection with vitrification of a crock of the fritting mass. Collaterally porosity physical-mechanical properties of pre-production models variate also. As clay of kaolin's in compositions is a knitting component so far as also compression strengths of the dried up masses continuously increased with augmentation in samples of quantity of clay.

Thus it is necessary to notice that transverse strength of samples for masses with the maintenance of clay from 5 to 20 masses of % does not show significant difference. Ultimate strength on compression variates rather naturally from high values for masses with the small maintenance of clay, through a minimum at the maintenance of clay of 15-25 masses of % to rather high values for mass with the maintenance of clay

of 35 masses of %. It is necessary to notice that on compression, obviously, it is necessary to explain similar change in resistibility of samples different quantity and composition of silicate minerals formed in burnt crocks.

As clay in compositions "quartzite of Kaytash quartzite - clay of kaolin's of Angren" is a knitting component so far as also transverse strength of the dried up samples continuously increases with augmentation in mass of quantity of clay.

Thus it is necessary to notice that in compositions "quartzite of Kaytash quartzite - clay of kaolin's of Angren" the great value has fire resistance of pre-production models in depends on the maintenance of added clay. Fire resistance definition has shown that the additive clay of kaolin's of Angren to quartzite of Kaytash to continuously reduces fire resistance of admixtures. Each 5 masses of % of an additive of clay, to its maintenance in an admixture of 15 masses of % inclusive, reduce fire resistance on 40-70oC. Further intensity of depressing of fire resistance falls.

As a whole, proceeding from the made experiments, it is necessary to draw a conclusion that the most perspective is joint sintering silica containing raw materials with plasticizing and binding agents, in particular quartzite and clay.

4. Conclusions

Thus, researches of influence of added clay on physical-mechanical properties of Dinas fire-resistant ramming masses, reveal the maximum quantity of additives, in particular clay of kaolin's of Angren to quartzite's mass for working out of optimum composition of Dinas fire-resistant ramming masses. It is positioned that the quantity of added clay in fire-resistant mass in a composition "quartzite-clay" should not hang 25 masses of %.

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