THE EFFECTS OF RESIDUAL FUEL IN AN ASH CONTENT ON STRUCTURAL AND MECHANICAL PROPERTIES OF ASH CLAY COMPOSITIONS

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***Abstract:** the results of experimental research of study of structural and mechanical properties of ashes with different content of residual fuel in increments of 7-8% by weight of high and medium plastic local clays and there mixtures. The possibility of regulation of structural and rheological properties of the system "clay-ash-residual fuel ash" with residual fuel ash content to ensure defect-free plastic molding of air-dried brick. Basically, in the test system limits the quality and amount of components related to the third structural-mechanical type with the greatest development of elastic deformation or the fourth and fifth predominance of plastic.*
***Keywords:** properties of ash clay compositions, residual ash fuel, carbon, clay.*

ВЛИЯНИЕ СОДЕРЖАНИЯ ОСТАТОЧНОГО ТОПЛИВА В ЗОЛЕ НА СТРУКТУРНО-МЕХАНИЧЕСКИЕ СВОЙСТВА ЗОЛОГЛИНЯНЫХ КОМПОЗИЦИЙ

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***Аннотация:** приводятся результаты экспериментальных исследований по изучению структурно-механических свойств зол с различным содержанием остаточного топлива с шагом 7-8% по массе высоко- и среднепластичных местных глин и их смесей. Установлена возможность регулирования структурно-реологических свойств системы «глина-зола-остаточное топливо золы» с содержанием остаточного топлива золы для обеспечения бездефектного пластического формования кирпича-сырца. В основном, система в исследуемых пределах по качеству и количеству составляющих относится к третьему структурно-механическому типу с наибольшим развитием упругих деформаций или четвертому и пятому – преобладанием пластических.*
***Ключевые слова:** свойства зологлиняных композиций, остаточное зольное топливо, углерод, глина.*

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To investigate the nature of changes of structural and mechanical properties of dispersions based on ash, depending on the residual content of the fuel ash taken from a different content of unburnt coal particles with a pitch of 7-8% by weight: residual fuel containing 12.36% 19, 94% and 27.64% (table 1). These ashes are not randomly selected, and taking into account a very important factor - you might say the lack of the absence of discrete quantified carbon content (12, 19, 27), that in the course of the experiments will make it easier to establish patterns of changes in the properties of the ash clay dispersions of carbon content in them.The choice of this kind of composition of the charge is justified as follows: known that ashes with a low content of residual fuel (8%) which is a non-rigid plastic material structure resembling emery powder.Increasing the carbon content in the ash, (used as a lubricant in metal rubbing parts) naturally imparts plastic properties of the ash.Therefore, the study of the influence of this factor not previously studied on rheological properties of ash clay dispersions is relevant and has a considerable interest.

The additives used as binders superplastic Akmola's kaolinitic clay in the range (10-30%) and medium plastic standart beidallite clay (20-40%).

The study based on ceramic brick technology, along with the definition of the basic technological properties of the feedstock, is the study of the features of its behavior under load, which are essential in the processes of machining and molding mass, which in turn affects the final properties of the product [1].

In order to study coagulation structure formation studied ash clay dispersions and evaluate the impact of this process is the residual fuel curve $\delta = f(\tau)$ at constant loading and optimum moisture content were removed by determining the shear deformation in the area are not destroyed structures on rheometer with tangentially the shifting plate.

To study the composition of charges taken in Table 1.

The results of experimental studies on the structural and mechanical properties of the fly ash with different content of residual fuel, high and medium plastic clays (kaolinite and beidyllite), and their mixtures are given in Table 2.

Table 1.The composition of the ash clay masseswith different content of residual fuel ash

Number of charge	**Residual fuel**	**Charge content**		
		Ash	**Clay**	
			high-plastic	**medium - plastic**
1	27,64	100		
2	19,94	100		
3	12,36	100		
4			100	
5				100
6	27,64	90	10	
7		80	20	
8		70	30	
9		80		20
10		70		30
11		60		40
12	19,94	90	10	
13		80	20	
14		70	30	
15		80		20
16		70		30
17		60		40
18	12,36	90	10	
19		80	20	
20		70	30	
21		80		20
22		70		30
23		60		40

Table 2. Structural mechanical properties of ceramic materials

№ charge	**$W_{ф.отн.}$ %**	**The basic structural and mechanical properties**			**$N_{усл.}$, МПа,**	**Deformation**			**Structural Mechanical type**
		λ	**c^{-1}**	**θ**		**E_1**	**E_2**	**E_m**	
1	20,4	0,47	0,51	415	204,5	37,2	31,3	31,5	0
2	19,5	0,32	0,78	303	185,5	44,5	30,5	25,0	0
3	19,1	0,27	0,28	541	166,4	60,6	21,3	18,1	0
4	25,3	0,23	0,27	634	132,5	18,5	23,3	58,2	V
5	24,4	0,18	0,33	756	114,2	31,6	21,3	47,1	IV
6	21,8	0,46	0,42	380,5	148,4	35,4	30,4	34,2	III
7	22,3	0,41	0,36	716,4	197,5	35,5	26,8	37,7	IV
8	22,7	0,39	0,38	689,5	214,3	23,2	30,7	46,1	V
9	19,1	0,42	0,35	721,5	153,5	21,4	43,4	35,2	III
10	19,7	0,41	0,36	714,3	154,8	21,5	37,2	41,3	IV
11	20,1	0,37	0,39	674,8	166,4	26,7	26,8	46,5	IV
12	22,5	0,26	0,28	519,4	224,5	39,3	30,4	30,3	III
13	22,8	0,38	0,38	674,5	234,5	35,8	28,1	36,1	IV
14	23,1	0,36	0,37	668,4	298,3	37,5	15,0	47,5	IV
15	19,2	0,40	0,36	685,3	209,5	38,4	25,1	36,5	0,III
16	19,5	0,40	0,35	656,8	214,8	25,9	31,8	42,3	IV
17	19,8	0,41	0,36	705,4	219,5	21,2	36,3	42,5	IV

18	20,5	0,34	0,40	1010	133,8	49,3	23,2	22,5	0
19	21,2	0,37	0,41	674	226,2	45,7	16,1	38,2	III
20	21,5	0,35	0,37	672	230,5	39,3	15,2	45,5	IV
21	21,2	0,39	0,39	658	149,5	37,9	21,5	20,6	0
22	21,8	0,37	0,38	654	152,5	56,1	11,4	32,5	III
23	22,5	0,36	0,37	651,5	155,5	35,1	12,5	52,4	IV

Analysis of the experimental data of structural and mechanical properties in Table 2 of investigated ash, clay and ash-clay compositionsshowed that with the increase of the residual ash content of the fuel is slowly increased elastic (21 to 31.5) and plastic (18 to 31.5) strain, and the elastic deformation is significantly reduced (61 to 37). In investigated ash-clay compositions, regardless of the volume of the residual fuel in the ash, there is a natural increase of plastic deformation with the increase of the content of clay in the mixture and slowly elastic and elastic deformation changed selectively by significantly changing types of contacts between the disperse phase particles in the coagulation structures (Table 2) [2].

The addition of 10% kaolinite clay, high ductility in the ashes with the highest content of residual fuel (27.64%) translates variance from zero in the third structural-mechanical type, and there is an increase of plastic deformation from 31.5 to 34.2 and a decrease of elastic deformation - 37 2 to 35.4%.

Increased content of highly plastic clay from 20 to 30% transfers studied dispersion of III, IV and V of the structural-mechanical type, while increasing the amount of plastic deformation to 46.1. A similar effect of structural and mechanical properties of dispersions reached with input 20, 30 and 40% of medium plastic clay with beidellite composition (Table 2).

Transfer of ash containing 19.94% of residual fuel in the fourth structural-mechanical type occurs with input of 20% high plastic and 30% medium plastic clay, i.e. reduction of residual fuel ash from 27.64 to 19.94% gives approximately the same change of structural and mechanical properties of clay, increasing clay content to 10%. The same result is reached using ash which contains 12.36% of residual fuel with the additives to 30% of high plastic or 40% medium plastic clay [3].

Thus, the input of small amounts of clay 10 - 20% to ash with high content (19.94; 27.64%) of residual fuel, improved formability of ash-clay compositions. Thus, the elasticity and plasticity system with ashes containing more than 20% of residual fuel, during input clays increases slightly compared with the ash dispersions including 12.36%, and less of residual fuel, and period of relaxation of these masses reduced. Conventional strain capacity increases, which indicates the great mass connectivity. A plastic clay adding redistributes deformation characteristics slow upward to elastic and plastic diformations due to decrease fast elastic. It should also be noted that the improvement of molding properties of ash-clay massachieved using ash with a high content of residual fuel with adding clays with smaller quantity as compared with low content of unburned coal particles.

The experimental data in Table 2 show that reduction content of residual fuel ash to 7-8% produces the same effects of changes of basic structural and mechanical characteristics, such as increasing quantity of clay adding to 10%, i.e. the effect of residual fuel as plasticizer.

However, regulation of the system containing residual fuel in an ash and plasticity, amount of clay input didn't reach the transfer of ash-clay compositions on the first or second structural-mechanical type, providing defect-free plastic molding ceramic materials. Basically, in the test system limits the quality and amount of components related to the third structural-mechanical type with the greatest development of elastic deformation or the fourth and fifth predominance of plastic.

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