COMPOSITION POLYMERIC MATERIALS FOR MODIFICATION OF CONCRETE MIXES

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ABSTRACT
In this article influence of cationic - active polymeric polyquarternary salts on quality and on structure of a cement stone formed at its hydration is based.
It is shown influence polyquarternary salts on durability of the concrete subjected to warmly moist processing. Maximum effect of gain is established right after steaming can be gained at joint influence of temperature and additives.
When using additive it is created highly plastic concrete and at the same time water requirement decreases, and it in turn leads to reduction of porosity of concrete and increase in closed pores. In addition, to increase in durability, frost resistance, increase to action sulfate of the containing salts and other indicators.

KEY WORDS: cement, concrete, composition materials, technology, adsorption, processing, modification, polyquarternary salts.

INTRODUCTION
Now application as effective additives was received by surfactants, electrolytes and surfactant. They are an effective remedy of regulation of processes of hydrolysis and hydration of cement and macrostructures of concrete allow influencing actively forming micro. However, because of more in-depth studies it is established that the known number of additives is ineffective at the soft modes of warmly moist processing of concrete and at the raised dosages can cause concrete corrosion in the presence in it reactive filler. Therefore, the scope of the existing additives is also limited search of the new additives accelerating solidification of concrete, promoting forming of its optimum structure, improving operational properties of concrete is relevant [1].
The analysis of the provided scientific literary and patent data showed that in this direction, polymeric polyquarternary salts cationic polyelectrolytes with regularly located ion genic groups having the high molecular weight and effective surface-active properties can be perspective. Weed feature of receiving polyquarternary salts allows to vary over a wide range their chemical structure and by that purposefully to change properties.
One of the most perspective and effective directions of chemicalixation in the modern construction industry is the use of organic and inorganic additives influencing chemical processes of forming of concrete and significantly increasing its operational properties.
In this aspect development of effective composition materials on the basis of cement systems with optimization of their structure, increase in durability, durability and decrease in a metarialoyemkost of products by introduction of the effective additives increasing quality of concrete is relevant. According to it, the purpose of the real researches was studying of a possibility of application polyquarternary N, N salts – dimethylaminoethyl methacrylate with chloride Benzylium(PDMAEMA·HB), iodide Benzylium(PDMAEMA·IB), bromic Benzylium(PDMAEMA·EE). Moreover, polidimetildialilamoniy chloride(PDMAAH) for improvement of structure and properties of concrete, increase in efficiency of thermal treatment, reduction of its duration, decrease in a consumption of cement by production of reinforced concrete structures of hydrotechnical, road and bridge construction.

OBJECTS AND METHODS OF A RESEARCH

For an experiment the following materials were accepted. Polyquarternary salts N,N– dimethylaminoethyl methacrylate with chloride Benzylium (PDMAEMA·HB), iodide Benzylium (PDMAEMA·IB), bromic Benzylium (PDMAEMA·EE) and also polidimetildialilamony-chloride (PDMAAH).

Composition materials of construction assignment on the basis of cement systems, in particular concrete and steel concrete, thanks to high operational properties, existence of a local source of raw materials, developed network of the enterprises, a possibility of creation of the mini-enterprises for production of products and constructions housing, road, bridge, hydrotechnical and other assignments are one of large-scale bases of development of economy.

We developed effective composition materials of construction assignment based on cement systems by modification of structure of binding.

For preparation of concrete mixes four types of cement of a different alyuminatnost, sand of the Chinaz pit (module of fineness of $M_{кр}$= 2.8-3.2), granite crushed stone of the Chirchik pit with a volume bulk weight of 1360 kg/m3, density-2.6 gr/cm3, by water absorption of 0.21%, porosity of 1.17% and chemical additives were used. As chemical additives water solutions of polymeric polyquarternary salts – N,N – dimethylaminoethyl methacrylate with chloride Benzylium (PDMAEMA·HB), bromic Benzylium (PDMAEMA·EE), iodide Benzylium (PDMAEMA·IB) and also polydimethyl diallylammonium of chloride (PDMDAAH) were used.

RECEIVED RESULTS AND THEIR DISCUSSION

For definition of influence of the studied polyquarternary salts of plasticizers on processes of hydration of a cement stone, is of the interest of a research of sorption interaction them with the main minerals of cement.

For a research were taken as models, the main mineral components of cement – three-calcic $(CS)_3$and two-calcic silicates $(CS)_2$, three-calcic aluminate $(SA)_3$and four-calcic alyumoferrit $(CAF)_4$with a specific surface of S=4350-5690 $_{уд}$cm2/gr. Modification of samples was carried out by method of mechanochemical treatment. The adsorbing ability of mineral components of cement was defined as follows; for extraction of not adsorbed plasticizer of a hinge plate of minerals with water (1:2) within 1 hour mixed at the room temperature then defined a liquid phase on the centrifuge (V=6000 $_{BP}$RPM).

The number of not adsorbed plasticizers of polyquarternary salts, determined by a transmission coefficient of the received extracts on the nephelometer of Federal Energy Regulatory Commission 56 m (heliofilter No.7, a ditch of thickness 3 mm). For comparison it is used water extracts of their initial (unmodified) brick minerals the specific surface of which was brought to S=4350-5690 $_{уд}$cm2/gr.

These researches given in table 1 show that the adsorbing ability of brick components on the relation in this case, to PDMAEMA·HB depends on their structure. Analyzing results of an experiment according to the table it is possible to draw the following conclusions: the smallest transmission coefficient has modified weed polyquarternary salts CS mineral$_2$, the smallest - SA_3, on increase of value of a transmission coefficient minerals it is possible to row $CS_2 < CS_3 < SA_3 < CAF_4$.

Table 1

The adsorbing ability of brick components

Brick mineral	initial				modified			
Specific surface, cm2	4900 CS_3	4450 CS_2	5000 CA_3	5600 CAF_4	5050 CA_3	5050 CS_2	5000 CAF_4	5600 CS_3
Transmission coefficient, %					93.3	64.8	97.1	99.3

Thus it is possible to draw a conclusion that polyquarternary salt for silicate monomineral has waterproofing effect, and hydrophilization effect for mono alyuminatny.

The efficiency of the studied additives was set by comparison of durability of concrete without additives, natural solidification and steamed with corresponding to the modes.

In view of the fact that the studied additives are plasticizing-airinvolving, researches are conducted on concrete mixes of identical consistence.

Results of researches of influence of chemical additives on durability of concrete at the compression and stretching made on low are given in figure 1 - and high alyuminaty cements with use of granite crushed stone, at a temperature of isothermal keeping equal 333 K and 385 K [1.2].

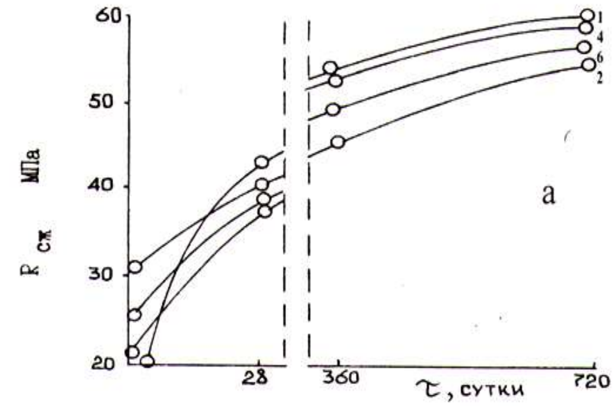

Fig. 1. Influence of temperature isothermal processings (and-333 K, -358 K) and additives on concrete durability (В/Ц=0,5; C_3A=4%))
– Concrete of natural solidification; 2.3 - the concrete steamed without additives; 4.5 - the concrete modified ПДМАЭМА·ХБ; 6.7 - concrete the modified PDMAAH

The analysis of these data shows that steaming at $T_{из}$ 333 to the concrete made on cement No. 1 with PDMAAH additive and ПДМАЭМА·ХБ promotes increase in its durability respectively by 21% and 34%, in comparison with concrete without additives. At the subsequent storage of concrete in normal conditions, their durability increases. At the same time increase in durability of concrete with these additives at the age of 360 and 720 days is 12% and 15% in comparison with steam-seasoned concrete of control structure.

As one would expect, increase in temperature of steaming to 358 K and reduction of preliminary exposure till 3 o'clock, worsened physic mechanical indicators of concrete in comparison with the concrete steamed at $T_{из}$ =333 K. At later age (365 days) durability is aligned that it is possible to explain with minor changes in structure of concrete. It should be noted that use of more plastic mixes with В/Ц 0.5 against В/Ц 0.4 leads to decrease in durability of the concrete subjected to warmly moist processing (fig. 2).

Especially this decrease is noticeable with temperature increase of isothermal keeping. So, for example, if at 333 To decrease in durability of concrete without additives makes 15% in comparison with concrete of natural solidification, then at В/Ц 0.5 and solidification of concrete at 358 To decrease in durability of concrete makes 40%. With introduction polyquarternary salts the mobility of concrete mixes increases that allows to reduce the water cement relation without decrease in a consumption of cement therefore concrete durability increases in time and differs from durability of concrete of normal solidification a little.

Results of researches of influence of chemical additives on durability of the concrete made on low - and high alyuminaty portlandtsement are given in figure 2. The analysis of these data demonstrates that weed steaming of concrete on low alyuminatny portlandtsement of M500 with additive polyquarternary salts, promotes increase in its durability right after steaming for 35-37% in comparison with concrete without additives. At the subsequent storage in normal conditions, durability of concrete with additives at the age of 28 days and more exceeds durability of concrete without additives for 15-20%. Results of a research of endurance of the concrete prepared on granite crushed stone and hardening in different conditions, presented in table 2, also demonstrates that the samples prepared on a portlandtsement and hardening in normal conditions have the maximum endurance. Steaming of concrete at a temperature of 358 To reduces a relative limit of his endurance from 0.6 to 0.56.

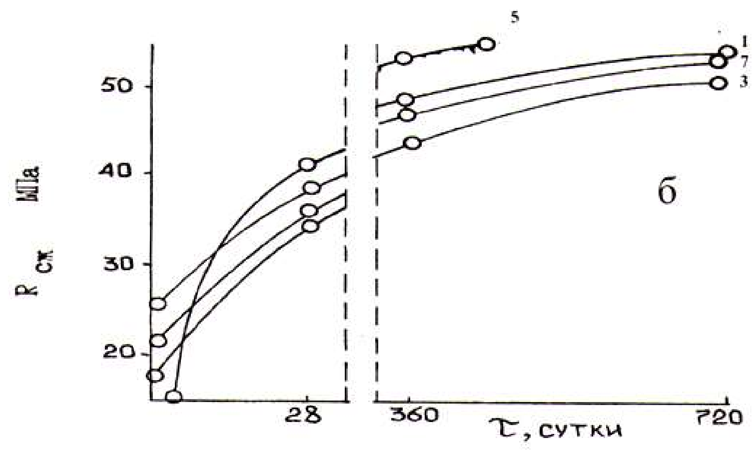

Fig. 2. Influence of temperature isothermal processings (and-333 K, -358 K) and additives on concrete durability (В/Ц=0,4; C_3A=11%)

concrete of natural solidification; 2.3 - the concrete steamed without additives; 4.5 - the concrete modified ПДМАЭМА·ХБ; 6.7 - the concrete modified by PDMAAH

It is established that weed endurance of the concrete modified polyquarternary salts, the frost resistance depends on the same factors, as and also weed an opportunity by introduction polyquarternary salts to increase endurance of concrete.

Thus, researches on influence polyquarternary salts on durability of the concrete subjected to warmly moist processing it is established that the maximum effect of gain right after steaming can be gained at joint influence of temperature and additives.

Table 2

Weed a fatigue crack of the concrete modified polyquarternary salts

Structures	Strength of a concrete sample	Logarithms number of cycles until a fatigue crack					
		Granite crushed stone			Calcareous crushed stone		
		Natures. it is firm.	T $_{from}$= 333K	T $_{from}$= 333K	Natures. it is firm.	T $_{from}$= 333K	T $_{from}$= 333K
The standard - ny mix	0.80	5.32	4.96	4.37	5.38	5.01	4.50
	0.70	5.72	5.40	4.82	5.79	6.58	4.90
	0.65	5.02	5.66	5.16	6.08	5.74	5.26
	0.60	6.30	5.89	5.55	6.30	5.97	5.63
	0.55	-	6.30	6.30	-	6.30	6.30
Modifitsi-rovanny mix	0.80	5.61	5.56	5.50	5.72	5.63	5.60
	0.70	6.00	5.85	5.80	6.08	5.96	5.89
	0.65	6.30	6.06	6.02	6.18	6.16	6.13
	0.60	-	6.30	6.30	6.30	6.30	6.30
	0.55	-	-	-	-	-	-

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