



**STUDY OF THE EFFECT OF NEW SYNTHESIZED COMPLEX  
CHEMICAL ADDITIVES ON RHEOLOGICAL PROPERTIES OF  
PORTLAND CEMENT**

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**Abstract**

This article examines the effect of newly synthesized complex chemical additives KDj-3 and KDj-3MB on the kinetics and water requirements of Portland cement on the basis of local raw materials. The use of complex additives in the production of concrete mixes significantly reduces the negative impact of each additive. In this way, the universality of additives can be achieved in the production of concrete mixes and compositions made of cements of different brands. Because complex admixtures are so convenient, it is not necessary to use several components to obtain concrete with the desired properties.

**Keywords:** Water, Portland cement, complex chemical additives, KDj-3, KDj-3 MB.

**Introduction**

Research is being carried out around the world to improve the properties of concrete and concrete mixes. In this regard, including the selection of aggregates for the production of high quality concrete, control the formation of structure in the hardening cement stone using chemical and mineral additives, optimize the composition of concrete, improve the contact zone between aggregate and mineral binder, durable A lot of research work is being done to shape the structure. In this regard, it is important to study the physical and technical properties of concrete, to reduce the consumption of mineral binders in their production using local raw materials and secondary resources, to develop energy-saving technologies.

The main part: Most of the one-component chemical additives designed to improve the properties of concrete have little change in the properties of concrete and sometimes have a negative effect on them. Therefore, it is advisable to use complex



supplements consisting of two or more separate components. The advantage of complex chemical additives is that they have multifunctional properties, that is, they affect the concrete mixture to the independent properties of the concrete. Thus, complex additives are multifunctional modifiers, which increase the effect of individual additives.

The use of complex additives in the production of concrete mixes 'significantly reduces the secretion. In this way, the universality of additives can be achieved in the production of concrete mixes and compositions made of cements of different brands [1,2,3].

Because complex admixtures are so convenient, it is not necessary to use multiple components to obtain concrete with the desired properties.

It is known that superplasticizers reduce the water demand of cement systems and increase the strength of the concrete mix. Theoretical and practical research was conducted to study the effects of complex chemical additives KDj-3 and KDj-3MB on the kinetics and water requirements of Portland cement produced by JSC "Quvasoytsement". .

Rheological properties of cement paste in accordance with the requirements of GOST 310.3-76, Vik was determined in device a [4].

The effect of complex chemical additives on the reduction of water demand (St) of cement was calculated by the following formula:

$$C_T = \left[ \left( \frac{H_\kappa - H_{\kappa n}}{H_\kappa} \right) \right] \cdot 100\%$$

Here  $N_q$  and  $N_{qp}$  are the normal densities of cement paste without additives and with the addition of plasticizers. The results of the study are given in Table 1.

The normal density of the cement paste did not change when KDj-3MB was added to 5%. Therefore, its 10% water demand was studied [6-10].

The results given in Table 1 show that both chemical additives reduce the water demand of cement paste. . In this case, the effect of KDj-3 is slightly higher than that of KDj-3MB. At the same time, an increase in the amount of chemical additives of KDj-3 by more than 1% is considered economically inefficient and may lead to an increase in the cost of construction.

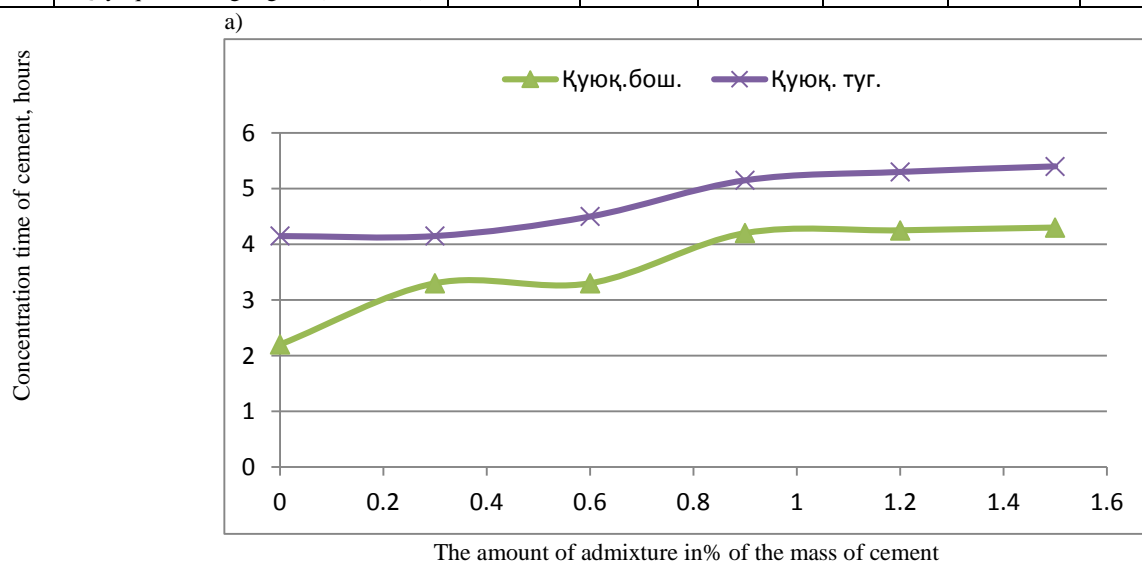
**Table 1. The effect of complex chemical additives on the water demand of cement**

Additional brand	Decrease in water demand of cement paste,%					
	The amount of admixture in% of the mass of cement					
	0,2	0,3	0,6	0,9	1,2	1,5
KDj-3	10,0	18,5	25,0	28,5	30,0	31,0
	Qo'shimchani miqdori, tsement massasiga nisbatan %da					
	1	3	6	9	12	15
KDj-3MB	5,0	12,5	21,3	25,1	26,9	28,7

The effect of these additives on the thickening time of cement was studied in accordance with GOST 3103-76. The results obtained are presented in Table 2 and Figure 2 [5].

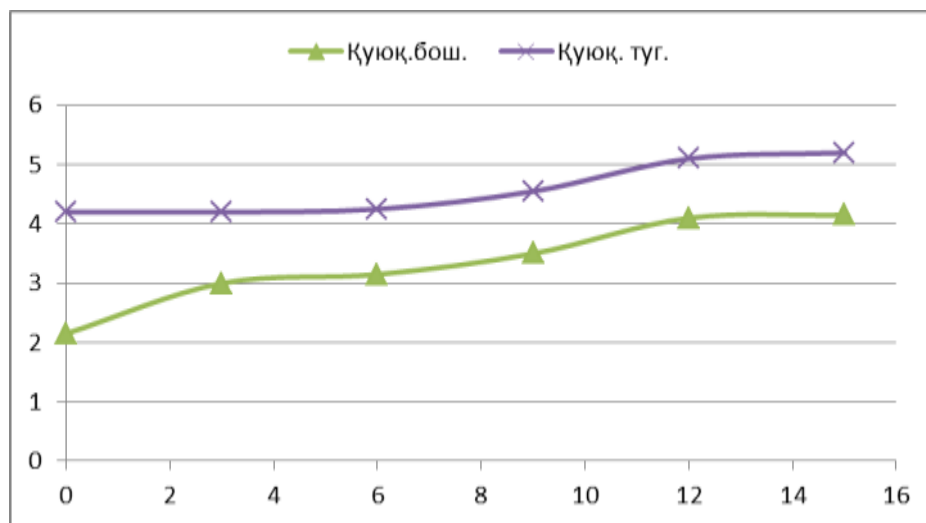
**Table 2. The effect of complex chemical additives on the thickening time of cement paste**

Additional brand	Condensation time of cement	The amount of admixture in% of the mass of cement					
		0,0	0,3	0,6	0,9	1,2	1,5
KDj-3	Beginning of condensation (hours, min.)	2,20	3,30	3,30	4,20	4,25	4,30
	Beginning of condensation (hours, min.)	4,15	4,15	4,25	5,15	5,30	5,40
		The amount of admixture in% of the mass of cement					
		0,0	3	6	9	12	15
KDj-3 MB	Beginning of condensation (hours, min.)	2,20	3,00	3,15	3,50	4,10	4,15
	Quyulanishning tugashi(soat, min.)	4,15	4,20	4,25	4,55	5,10	5,20



b)

Concentration time of cement,



The amount of admixture in% of the mass of cement

Figure 2. Effect of chemical additives KDj-3 (a) and KDj-3 MB (b) on the thickening time of cement paste

The results of the experimental study showed that complex chemical additives slightly shortened the duration of the cement paste at the beginning of the thickening process designed. The dilution effect serves to increase the density and strength of the concrete by reducing the water demand or cement consumption while maintaining the initial mobility of the concrete mix.

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