



### PHYSICAL AND MECHANICAL PROPERTIES CEMENT STONE WITH CHEMICAL ADDITIVE KDj-3

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#### Annotation

The article presents the results of studies on the use of complex chemical additives KDj-3 to improve the properties of the building mixture. Development and research of concreting technology, reducing water consumption, increasing strength in the initial period (up to 3 days) and energy-saving concretes.

**Keywords:** cement stone, chemical additive, strength, technology, physical and mechanical properties, properties, Portland cement, efficiency, results, indicators.

The introduction of complex chemical additives into the composition of cement stone significantly changes its main properties, in particular, it increases the mobility of cement stone, accelerates its hardening in the initial stages, improves the strength, water resistance, frost resistance and other properties of cement stone [1,2]

"Uzkimyosanoat" DAK in the "Construction materials" laboratory of FarPi and the Tashkent scientific-research institute of chemical technologies. shows the efficiency of using the synthesized KDj-3 additive, studies were conducted on the optimization of the composition of cement stone with complex chemical additives [3,4]

KDj-3 complex chemical additives are used to regulate the following properties of cement stone: plasticizing the mixture in order to reduce water consumption, accelerating the hardening and setting period of cement stone (up to 3 days), very useful for the development of energy-saving technology in concrete works will come. [5,6,7]

For experimental studies, we used Portland cement of the Kuvasoysement plant, brand PC400 D20, and standard single-fraction Volsky sand GOST (6139-2003) fr 0-5 mm, whose fine aggregate is used to determine cement strength. Modulus  $M_k = 2.2$ ;

Experimental studies of various compositions of cement stone with 8, 10 and 12% KDj-3 added (Table 1) showed that the highest efficiency indicators were observed in the additive content of 1% [8,9 ]

Physical and mechanical properties of cement stone with KDj-3 were studied by preparing 2 twin samples with dimensions of 4x4x16 cm, the first control sample without additives, the second - 0.8;1;1.2%. The test period is 1, 3, 7, 14 and 28 days after hardening. The test results are presented in Figures 1 and 2, Tables 2 and 3 [10].



Table 1 - composition of cement stone

№	Naming		Composition of cement stone. mass. g			
			g	0,8%	1%	1,2%
1.	Cement		500	500	500	500
2.	Sand fr. 0-5 mm		1500	1500	1500	1500
4.	Water, ml		210	205	197	192
5.	KDj-3 chemical additives in relation to cement mass	0,8%	-	4	-	-
		1%	-	-	5	-
		1,2%	-	-	-	6

Studies have shown that with the introduction of complex chemical additive KDj-3, the density of cement stone increases by 6-9%, and also increases the strength of cement stone when it hardens. Durability is observed after 1 day. 33%; 3 days 26%; 7 days for 27%; 14 days 31% and 28 days 28%. 33% more than the design capacity of cement stone (Figure 1) [11].

Table 2 - Results of compressive strength of cement stone with complex chemical additive KDj-3 in days

№	Naming	relative to the additional cement mass %	Water, ml. %	compressive strength (MPa) in days (%),				
				1	3	7	14	28
1	Control sample	0	210	<u>6.7</u> 100	<u>13.1</u> 100	<u>28.3</u> 100	<u>36.1</u> 100	<u>41.8</u> 100
2	Additional example	0,8	-12%	<u>8.5</u> 118	<u>16.9</u> 124	<u>31.7</u> 112	<u>39.8</u> 112	<u>47.7</u> 116
3	Additional example	1	-16%	<u>9.9</u> 139	<u>20.2</u> 149	<u>35.6</u> 126	<u>44.5</u> 125	<u>52.7</u> 128
4	Additional example	1,2	-18%	<u>9.6</u> 133	<u>18.9</u> 139	<u>34.9</u> 122	<u>42.5</u> 120	<u>50.5</u> 121

Table 3 - Results of bending strength of cement stone with complex chemical additive KDj-3`

№	Nomlanishi	relative to the additional cement mass %	Water ml. %	bending strength (MPa) in days (%),				
				1	3	7	14	28
1	Control sample	0	210	<u>2.4</u> 100	<u>5.5</u> 100	<u>8.3</u> 100	<u>8.7</u> 100	<u>10.5</u> 100
2	Additional example	0,8	-12%	<u>3.3</u> 126	<u>6.8</u> 119	<u>8.8</u> 105	<u>9.9</u> 112	<u>12.7</u> 122
3	Additional example	1	-16%	<u>3.5</u> 135	<u>7.5</u> 129	<u>9.7</u> 115	<u>11.2</u> 126	<u>13.6</u> 128
4	Additional example	1,2	-18%	<u>3.4</u> 132	<u>6.9</u> 122	<u>9.3</u> 107	<u>10.2</u> 114	<u>13.1</u> 126

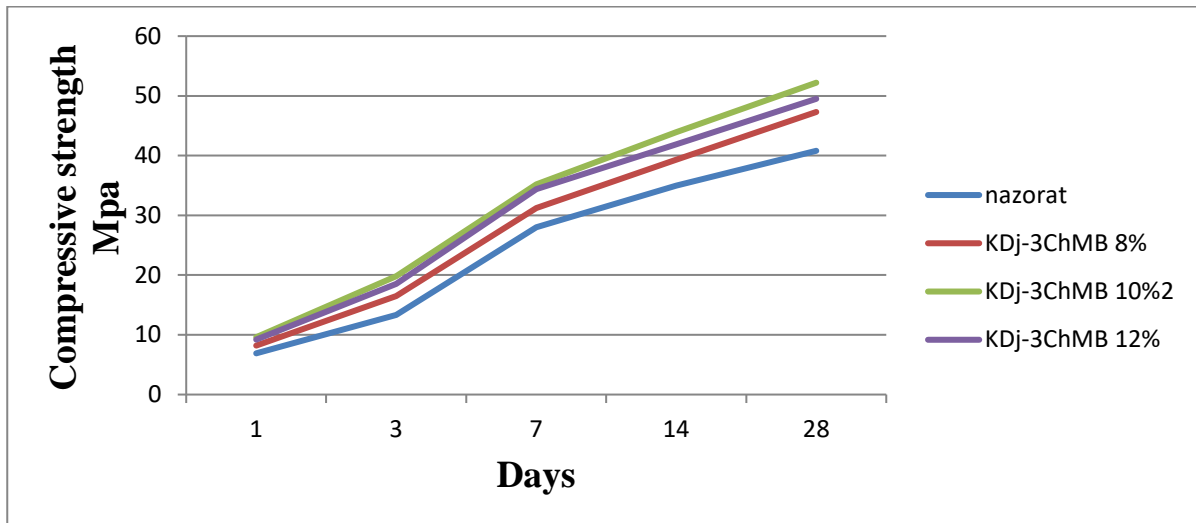


Figure 1. Compressive strength of cement stone with complex chemical additive KDj-3.

1 - Strength of cement stone without additives; 2. – 0.8; 1 and 1.2% KDj-3 in relation to the mass of cement. Strength of cement stone; respectively dried under normal temperature conditions.

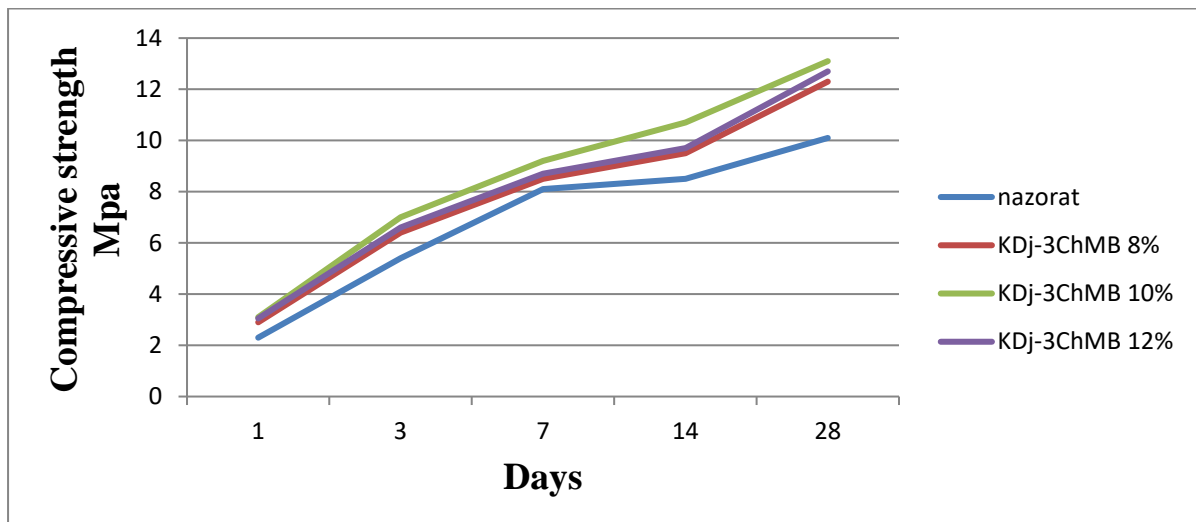


Figure 2. Bending strength of cement stone with complex chemical additive KDj-3

### Conclusions

1. The development and application of multi-functional complex additive KDj-3 in cement stone in the amount of 0.8, 1 and 1.2% of the cement mass helps to reduce the water requirement of cement stone by 11 and 16%, respectively, and helps to increase the strength of cement stone by 25 and 30 percent. compared to control samples. Studies have shown that the density of cement stone increases by 6-9% with the introduction of KDj-3 complex chemical additive..

2. Various compositions of cement stone with added KDz-3, containing 10% of the cement mass, were studied experimentally. After studying only 1 composition, the use of the additive



helps to reduce the water requirement of the cement stone by 10-15% and increase the strength by 25% compared to the control samples. Studies have shown that the density of cement stone increases by 6-9 percent with the introduction of KDj-3 complex chemical additive.

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