

## PRODUCING OF THE OPTIMAL INGREDIENTS OF MULTI-COMPONENT CEMENTS AND RESEARCH OF THE PHYSICAL-MECHANICAL PROPERTIES

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### ANNOTATION

This article discusses its cost-effectiveness in the production of multi-component cement, the composition of multi-component cements obtained on the basis of industrial waste and active minerals, the reduction of its economic performance and the chemical composition of industrial waste and mineral additives and laboratory conditions. physical and mechanical properties of cement samples are considered.

**Keywords:** clinker, industrial waste, active mineral additive, microsilica, crushed limestone, gypsum, chemical composition, specific gravity, strength.

### АННОТАЦИЯ

В данной статье рассмотрены его экономическая эффективность при производстве многокомпонентного цемента, состав многокомпонентных цементов, получаемых на основе промышленных отходов и активных минералов, снижение его экономических показателей и химический состав промышленных отходов и минеральных добавок, лабораторных условиях, учитываются физико-механические свойства образцов цемента.

**Ключевые слова:** клинкер, промышленные отходы, активная минеральная добавка, микрокремнезём, дробленый известняк, гипс, химический состав, удельный вес, прочность.

### INTRODUCTION

There are 31 enterprises specializing in the production of cement in our country, and by the end of 2021, the cement production capacity has reached 21.3 million tons. a total of 14,195 million tons of cement was produced. It is worth noting that the largest amount of cement is produced by one of the largest industrial enterprises in our country, "Kyzilkumsement" OAJ. A total of 3,666,000 tons of products were delivered here last year. [2, 5,7].

In 2021, "Ohangaronsement" OAJ, located in Tashkent region, which started its operations with new capacities, produced 2,015 million tons of cement. Sherabad cement plant belonging to "Almalik Mining and Metallurgical Combine" OAJ 1.4 mln. tons and at the Jizzakh cement plant, 850,000 tons of products were delivered to construction sites. Annual production capacity is 1.6 mln. "Bekobodsement" OAJ produced 968.2 thousand tons of products during the year. "Huaksin cement Jizzakh' LLC, which started

its activity in Jizzakh region, will not stay either. 1,666 million in the reporting period, produced tons of cement . In January-December 2021, 2,715 million tons of cement were imported, and 333,600 tons were exported [1, 3].

According to the address list of investment projects for cement production in 2021-2023, it is planned to build 3 new cement plants in Fergana region, 3 in Surkhandarya and 4 in Namangan region.

If we pay attention to the analysis, by the end of 2016, 8.6 million tons of cement were produced in our Republic. In 2021, this figure was increased to 21.3 million tons. In addition, special attention is being paid to the production of high-quality cement in our country. [8, 11].

### USED MATERIALS AND METHODS

Raw materials for the experimental work are as follows: Portland cement clinker produced at the Jizzakh cement plant belonging to “Almalik mining-metallurgy kombinati” OAJ Own DSt 2801:2013, belonging to “Bukhorogips” OAJ gypsum Uz DSt 760-96, crushed limestone powder belonging to the “Baliklitog” mine Ts 00193950-011:2019, microsilica Ts 00186200-12:2019, a waste product of silicon alloys belonging to “Ozmetkombinat” OAJ, were selected. Physico-mechanical properties of multi-component cements and GOST 31108-2020 are studied by students [4, 8].

### THE RESULTS OF SCIENTIFIC RESEARCH

In the laboratory of Jizzakh cement plant belonging to “Almaliq KMK” OAJ, selected raw materials were weighed on an electronic scale, and 3 kg of raw materials were crushed for 45 minutes in a ball mill used in the laboratory. After taking the cement samples, the following indicators of cement powder were determined:

- Residue on the sieve, N<sup>o</sup>008;
- Specific gravity;
- Comparison surface, (BLEIN);
- True density;
- Beginning and end of hardening of cement paste;
- SO<sub>3</sub> sulfur (VI) oxide;
- normal density;
- expansion of cement paste;
- durability.

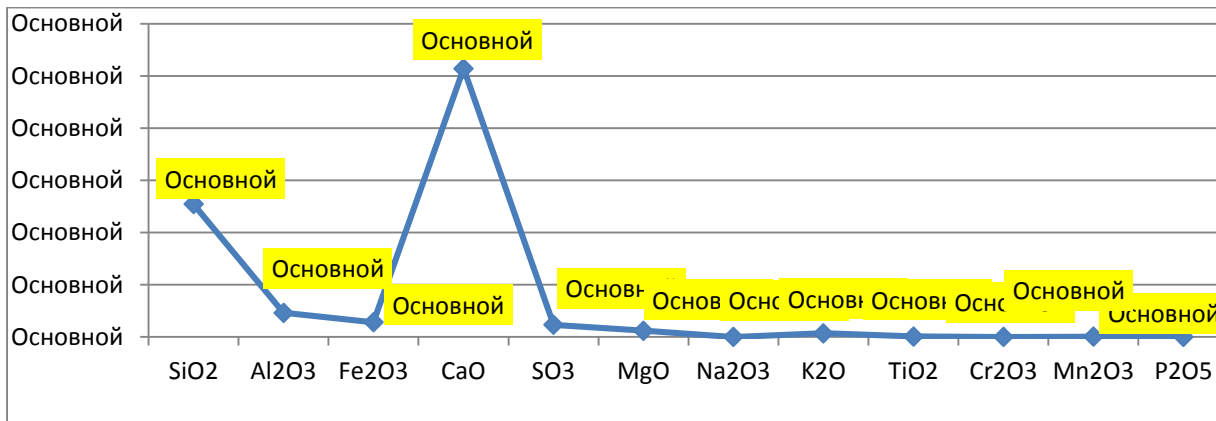
The results of these cement samples are presented in Tables 1-2-3.

Table 1 Cement screeds prepared in laboratory conditions

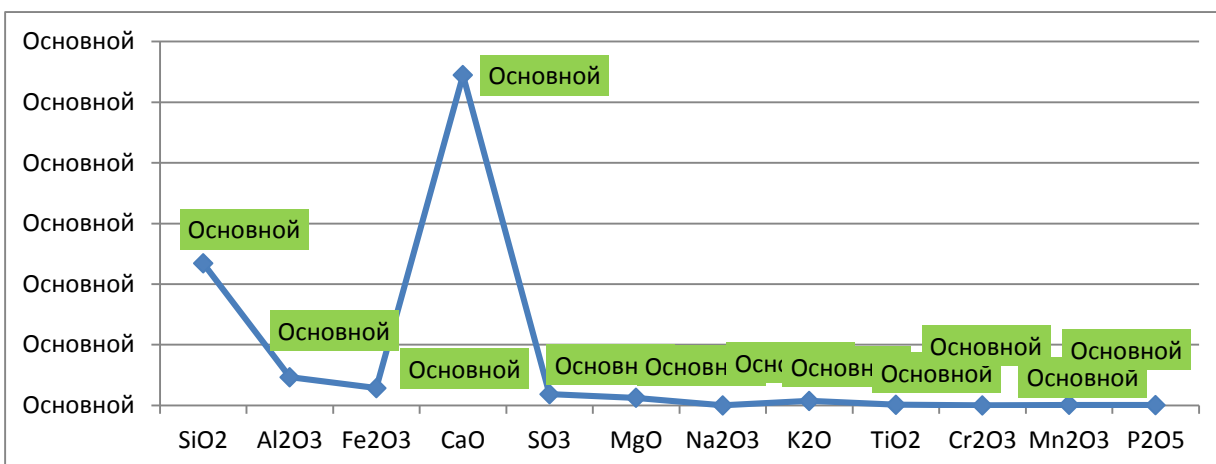
№	Sample number	Selected content, mass %				Specific weight, gr/dm <sup>3</sup>
		Clinker	Gypsum	Crushed limestone	Microcrem-nezyom	
1	Test 949	78	4	10	8	1169
2	Test 950	78	4	8	10	1049
3	Test 951	78	4	6	12	1052

Table 2 Chemical composition of cement samples prepared in laboratory conditions

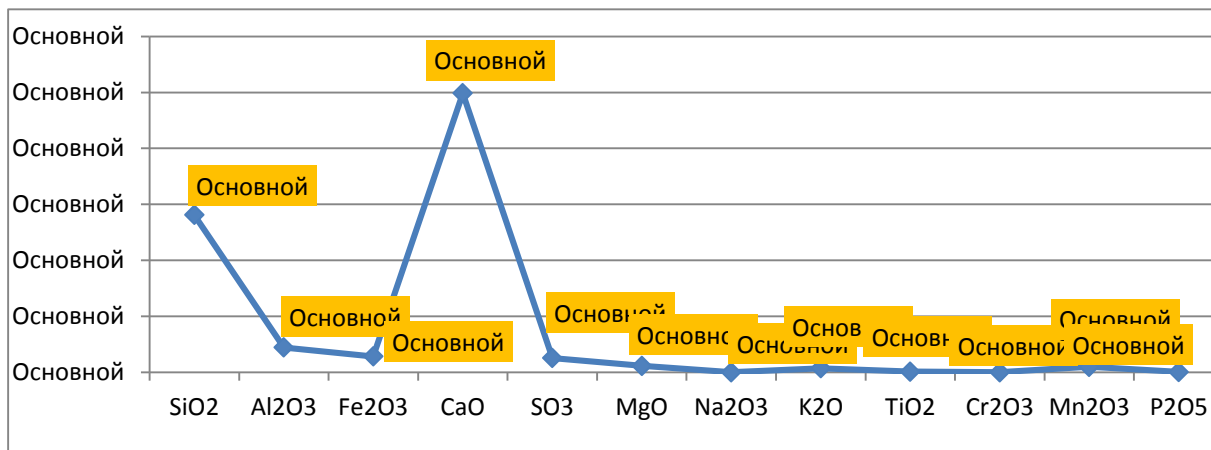
№	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	SO <sub>3</sub>	MgO	Na <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	TiO <sub>2</sub>	Cr <sub>2</sub> O <sub>3</sub>	Mn <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	PPP
1	23.00	4.63	2.84	54.47	1.84	1.23	0.00	0.73	0.11	0.0045	0.0706	0.0445	5,25
2	25.45	4.65	2.82	51.44	2.33	1.21	0.00	0.71	0.11	0.0091	0.0839	0.0421	5,06
3	28.12	4.43	2.83	49.85	2.53	1.15	0.00	0.70	0.11	0.0061	0.978	0.0409	4,68



1-Picture. Chemical composition of cement samples prepared in laboratory conditions.



2-Picture. Chemical composition of cement samples prepared under laboratory conditions.



3-Picture. Chemical composition of cement samples prepared in laboratory conditions.

Molds with dimensions of 40x40x160 mm were used to study the physical and mechanical properties of cement samples prepared for testing and experimental work on the selected composition. To determine the compressive and flexural strength of cement samples (450 grams and 1350 grams), cement and standard sand (sand of volga) were taken and mixed for 1 minute, water/cement ratio of 0.5 was added to it (255 grams) and 5 stirring for a minute. Oiled molds with dimensions of 40x40x160 mm were used for the finished mixture. The mixture was placed in molds and transferred to a shaking table. The molds were shaken on a shaking table for 2 minutes. After the end of shaking, the sample was removed from the table and smoothed with a wet knife. The samples were then tested after 2, 7 and 28 days. [2, 4].

The samples were prepared according to the following GOST 31108-2020, GOST 30744-2001 and Own DSt 2950:2015. The test periods of the prepared cement samples were determined as 2, 7 and 28 days, and during these periods the samples were kept in a climatic chamber of the ND-960 model. The results are presented in Table 3.

Table 3 Study of physical and mechanical properties of cement samples prepared in laboratory conditions

№	The duration of the hardening, min.		Consistency in compression, MPa		
	beginning	final	2 day	7 day	28 day
1	300	390	16,5	30,5	42,5
2	240	360	17,1	30,7	44,7
3	290	400	15,3	29,5	44,65

On the requirements of GOST 31108-2020, 5p-200 kN was tested using a hydraulic press and the results of testing samples were determined in the picture 4.



4-picture. To examine the strength of cement samples to compression.

## CONCLUSION

The scientific research conducted showed that the results of the experimental-test work on the determination of the physico-mechanical properties of cement samples prepared using mineral additives microcremnezyom production of silicon alloys belonging to "Uzmetkombinat" OAJ, crushed limestone belonging to the "Baliqlitog" mine showed their compliance with the requirements of the current standards. It is suitable for SEM II/A-K portlandsement class on physico-mechanical properties and GOST 31108-2020 42.5 N orders.

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