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THE IMPORTANCE OF CALCIUM OXIDE IN THE PRODUCTION OF PORTLAND CEMENT CLINKER AND THE STEPS OF THE PRODUCTION PROCESSES

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ANNOTATION: In this article, the stages of obtaining CaO, which is the main element in the production of portland cement clinker, are considered in laboratory conditions.

Key words: clinker, cement, chemical analysis, calcium oxide.

Introduction: Cement is a synthetic inorganic powdered binding mineral. When water is added, a doughy mass is formed, which hardens over time and turns into a rocky body. Cement has the property of hardening both in air and in water. Cement is the main component of concrete, which is widely used in construction. There are types of cement such as Roman cement, portland cement, glass cement, expandable cement, hydraulic additive [1].

Methods: Clinker is a solid material produced in Portland cement production as a cement-making intermediate. Clinker occurs as lumps or nodules, typically 3 millimeters (0.12 in) to 25 millimeters (0.98 in) in diameter. It is produced by sintering (melting without melting to the point of liquefaction) aluminosilicate materials such as limestone and clay in a kiln stage[2].

Limestone mineral consists of calcium carbonate $CaCO_3$ mineral and a small amount of magnesium carbonate $MgCO_3$ salt. Calcium carbonates located in geological regions are suitable for making Portland cement clinker. Limestone is hexagonal and aragonite is a rhombic crystal, the density of limestone is 2.7 t/m^3, and the density of aragonite is 2.95 t/m^3

The chemical composition of limestone consists of iron oxide (Fe_2O_3), silica (SiO_2), dolomite and clay soil (Al_2O_3). Depending on the amount of additives in the limestone, its color is white, gray, and black [3].

Discussions and results: When we studied the chemical composition of the selected limestone, it showed these indicators only in the purified state.

1-table. Analyzed result(FP method, Scatter)

№	Component	Result Unit .
1	Cl	0.0109 mass%
2	MgO	1.6 mass%
3	Al_2O_3	0.404 mass%
4	SiO_2	0.820 mass%
5	SO_3	0.0476 mass%
6	K_2O	0.0814 mass%
7	CaO	61.2 mass%
8	Fe_2O_3	0.100 mass%

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9	MnO	0.0105 mass%
10	NiO	0.0042 mass%
11	CuO	0.0027 mass%
12	ZnO	0.0020 mass%
13	Rb_2O	0.0006 mass%
14	SrO	0.0161 mass%
15	ZrO_2	0.183 mass%
16	SnO_2	0.0018 mass%
17	Dy_2O_3	0.0103 mass%

Clinker mainly consists of four minerals; they consist of three-calcium silicate (alite) $3CaO*SiO_2$, two-calcium silicate (belite) $2CaO*SiO_2$, three-calcium aluminate $3CaO*Al_2O_3$, four-calcium aluminum ferrate $4CaO* Al_2O_3*Fe_2O_3$. It can be seen that the basis of these minerals is CaO, and we can only produce CaO using limestone in the production of cement products [4].

Table 2. The mineral composition of clinker is as follows

Short formula	**Zur Strassen**	**gygi**
C3S	191g	673g
C2S	544g	112g
C3A	265g	103g
C4AF	-	113g

The process of determining the CaO content of the limestone powder that we have selected is as follows. Take 25 ml of the solution into a conical flask, add 5 ml of a 2% solution of KF to it, keep it for 2 minutes, pour distilled water (H_2O) until the volume reaches 200 ml, add TEA (tretanolamine $C_5H_{15}N$) in a ratio of 1:2. After adding a spoonful of SMP (yellow) indicator, add 20% KOH until the color changes and then titrate in EPTA until the color turns red. And by this formula the result was obtained.

$CaO=T_{CaO}*V/mG$

Here: G- grams, T- titer, V- spent amount.

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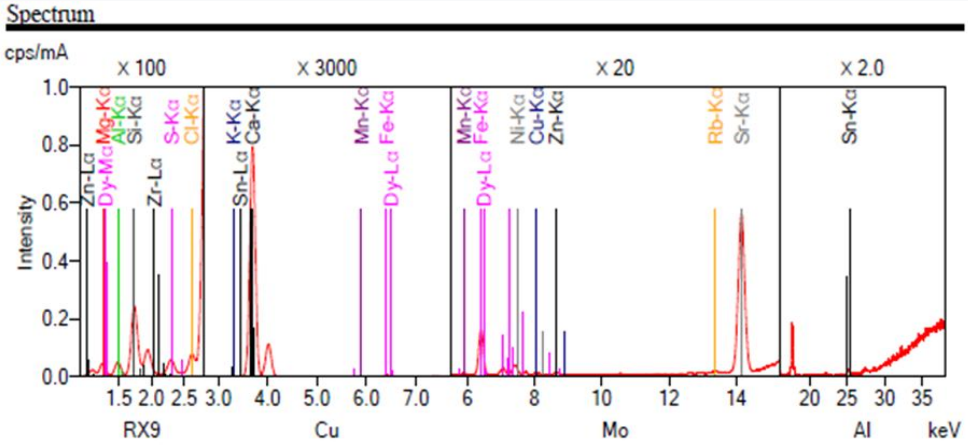
The approximate composition of Portland cement clinker is as follows. We studied the composition of CaO as the main raw material, considering that CaO=62-68%, SiO_2 =21-25%, Al_2O_3 =4-8%, Fe_2O_3=3-5%, MgO ≤ 5%.

Figure 1. Infrared spectrum analysis



Conclusion: When determining the amount of CaO in limestone (zvistnyak) using limestone in laboratory conditions, it was determined that CaO=57% was determined using a special laboratory, and it was determined that it was an acceptable option for the preparation of cement products, and it was found to meet the requirements of GOST 5382-91, and it is located in Andijan region. limestone region was selected.

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