SYNTHESIS OF SPECIFIC BINDING ON THE BASE OF THE ALUMINATE AND CHROMATE ALKALINE EARTH ELEMENTS

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Special binders and unshaped materials based on their compositions have complex set of performance. They can be widely used in various branches of industry today: energy, metallurgy, oil refining, organic and inorganic synthesis. Thanks to its high melting point, strength, resistance to several different aggressive factors (corrosive environment, molten metal and slag, hydrocarbon vapors, etc.), they can successfully replace structural materials and primarily refractory materials.

The most widely used are aluminous and high-alumina cements and concretes. This study suggested partially or fully replace the aluminous and high-alumina components with aluminate and chromite alkaline earth elements (magnesium, calcium, strontium and barium) .

Three-and four-component oxide aluminate and chromite alkaline earth elements systems were previously studied. And it was established that in the ternary calcium, strontium and barium systems that are the basis of synthesis of binders, coexisting phases with high hydraulic activity (mono-aluminate), refractoriness (two-aluminate and poly-aluminate and mono-chromite), corrosion resistance (chromite and hexa-aluminate) of the alkaline earth elements. The combination of such phases in the binder material will give a higher cement hydraulic activity at the synthesis stage. This will be due to the greater deformability of the crystal lattice of the aluminate phase. In virtue of the isovalent substitution of aluminum ions of trivalent chromium ions and the presence of a number of limited solid solutions, what is evidenced by X-ray peaks shift of the aluminate phases. Aluminate crystal lattice is preserved.

Quaternary oxide aluminate and chromite systems combined with magnesium oxide as the alleged aggregate composites were studied. And it was found that the interaction between the main phases aluminate and chromite developed cements and periclase does not occur in the entire investigated temperature range (up to 2000 °C), which confirms the correctness of the choice of the material as aggregate.

Synthesis aluminate and chromite cements was produced in the kriptol oven at the temperature 1350 - 1550 °C depending on the phase composition with a layer of active carbon to prevent transition $Cr^{+3} \rightarrow Cr^{+6}$.

According to the research of physical and mechanical properties it was found that this cement production is a high-strength (up to 70 MPa), fast-setting (the start cementation is from 8 min. to 2 hr. 5 min.; the end cementation is from 25 min. to 3 h. 20 min.), it is rapid hardening cement (compressive strength after 1 day of hardening is up to 45 MPa), it is astringent both air and hydraulic hardening with water cement ratio from 0.18 to 0.22).

According to the research of the basic properties of the corrosion stability of refractory concretes it was found that the compressive strength of concrete samples aged at the age of 1 day is 21 MPa and in 28 days is 53 MPa, temperature resistance (conditions were temperature 1300 °C and air) is 7 thermal cycles ; fire resistance is over 1700 °C, the change in volume at a temperature of 1600 °C does not exceed 1 %; deformation temperature range is 260 °C; resistance to slags for a basic slag is 2 mm, for acidic slag is 2.8 mm; resistance to metals is 1.8 mm.

Thus, as a result of studies, it was found that the developed aluminate and chromite binders and concretes based on them are highly effective for their application in various branches of modern industry.