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The crystalline compounds $CaAl_2O_4$ and $Ca_{12}Al_{14}O_{33}$ are reliably identified by electron microscopic and X-ray studies of the structural and phase features of clinker, and the iron- and chromium-containing phases are presented in the form of solid solutions: $Ca_2Al_{0.48}Fe_{1.52}O_5$ and $Ca_5(CrO_4)(CrO_4)_2$. This allows creating of a heat-resistant, strong, weighted oil-well cement for cementing “hot” oil and gas wells. It has been found that obtained materials have enhanced strength – compressive strength after 28 days of setting reaches 55 MPa, quick-setting – initial set – 2 hours 55 minutes, final set – 4 hours 20 minutes, quick-setting – compressive strength after 3 days of setting reaches 48.6 MPa, bending strength reaches 6.7 MPa; and are hydraulic binders with water-cement ratio of 0.17 – 0.38; with high sulfate resistance ratio of 1.31 which is 1.5 times higher than that of Portland cement.

Key words: calcium aluminates, calcium ferrites, calcium aluminoferrites, calcium chromite, X-ray microprobe analysis, solid solutions, oil-well cement, high strength, sulfate resistance