

STUDY OF COMPOSITION AREAS OF IRON-CONTAINING SPECIAL BINDERS IN THE CaO-BaO-Al₂O₃-Fe₂O₃ SYSTEM

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Agglomeration, i.e. the transformation of finely dispersed dust-like materials into lumpy ones (granules, briquettes, pellets), is an important technical task solved in many sectors of the national economy.

The process of agglomeration of ores and ore concentrates is of greatest importance for ferrous metallurgy, since so-called deep enrichment ores produce concentrates, the bulk of which (over 50%) contain particles smaller than 70 microns.

The most common method of agglomeration is granulation in specialized granulation units, typically with the use of binders. Pelletizing produces strong iron ore pellets. A modern trend is the transition from roasting to non-roasting methods of pellet hardening. The use of non-roasted pelletizing methods for ores and concentrates allows for a significant reduction in fuel and energy costs for pellet production, a reduction in capital expenditures, improvement of sanitary and hygienic working conditions, and a significant reduction in the cost of the process.

A metallurgical binder must be fast-hardening, provide high mechanical strength to pellets, allow ore reduction, and not introduce harmful or undesirable impurities into the blast furnace charge. Since the composition and properties of most existing binders do not meet metallurgical requirements, the development of special binders for the non-roasting agglomeration of finely dispersed ore concentrates and ores is a pressing issue.

The aim of our work was to identify promising areas of the four-component CaO-BaO-Al₂O₃-Fe₂O₃ system, which can be the basis for the development of new special cements, the composition of which is as close as possible to the compositions of the corresponding metallurgical charges.

Based on our research, we performed a geometric assessment (calculating the lengths of tie bars and the areas of triangles) and estimated the temperatures and compositions of eutectics in selected sections of the system. The data obtained allowed us to develop new compositions of high-strength iron-containing binders based on compounds of the CaO-BaO-Al₂O₃-Fe₂O₃ system.