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COMPOSITION OF HEMATITE IRON ORE RAW MATERIAL AND CHARACTERISTICS OF ITS METALLURGICAL PROCESSING

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Abstract: One of the promising ways to develop the metallurgical industry is to introduce new types of ores, in particular hematite ores. In order to choose the most rational methods for using this type of raw material, it is necessary to analyze the existing theoretical and practical achievements in the field of iron ore agglomeration and determine the tasks of further work.
Keywords: Hematite, porosity, recovery capacity agglomerate. In modern conditions, the possibilities of increasing the efficiency of metallurgical processing of iron ores are associated with improving the quality of the fractionated raw materials, which leads to a reduction in the consumption of material and energy resources in blast furnace production technologies. The use of any reserves in this direction is complicated by the unsatisfactory state of the ore base of a number of enterprises, the depletion of existing deposits and the increase in the transport costs of transporting raw materials from the places of extraction and, as a result, the increase in the transport component of the cost of metal products. The modern stage of metallurgy development is characterized by the large-scale development of poor ore deposits, the enrichment of which results in the formation of finely dispersed concentrates. Currently, the preparation of such concentrates for smelting in a blast furnace is carried out by fractionation with the formation of agglomerates or rounded masses. The initial components for obtaining agglomerates are ores and concentrates, the properties of which largely depend on the quality of the fractionated raw materials. By the type of main iron constituent, ores are divided into hematite, magnetite-hematite, siderite, as well as ores whose minerals consist mainly of iron hydroxides. The majority of world reserves (up to 78%) and production (66...69%) of iron ores are hematite and magnetite materials obtained as a result of processing rich ores formed in iron-bearing quartzites and their weathering crusts. The main iron-containing compound of hematite ores is anhydrous iron oxide $Fe2O3$. Hematite raw materials used by metallurgical enterprises are characterized by a high iron content - 60...68% (85...97% $Fe2O3$), as well as a low mass fraction of sulfur and phosphorus. This indicates their high metallurgical value. Properties such as porosity, recovery ability, grain size composition have practically lost their significance for metallurgists, since the vast majority of ores are crushed and subjected to the process of enlargement. The strength of granules and the rate of formation of their structure depend on the surface properties of ore particles and the granulometric composition of the initial raw materials. In this case, the nature of the ore material (hematite or magnetite) affects the specific properties of the granulation process precisely through the relative surface area of the charge components. The higher the value of this indicator, the faster the formation of charge particles and the better their load resistance. The main difference between natural hematite ores and magnetite concentrates is that they contain colloidal particles that form a gel when interacting with water, which contribute to an increase in the strength of interparticle bonds in the sinter charge grains. The specific features of hematite ores and their metallurgical processing are as follows: 1. High iron content (up to 60...68%) mainly in the form of $Fe2O3$, while the loose rock consists of silicon and alumina components with insignificant amounts of phosphorus and sulfur. 2. Depending on the surface structure of the ore grains and the origin of the hematite materials, their sanding ability varies significantly, which is determined by the size of their specific surface area and the presence of

colloidal particles. 3. Cooking agglomerate from hematite raw materials is carried out with magnetite ores andis characterized by an increase in heat consumption compared to the processing of concentrates. This is due to the absence of an internal heat source from the oxidation of magnetite to FeO in hematite materials, as well as a higher melting temperature (80...100°C) compared to magnetite ores. The above-described properties of hematite ores reveal the uniqueness of this type of raw material only qualitatively, but do not take into account the specific characteristics of individual deposits. The transition to a quantitative description of the physicochemical processes of aglospeck formation from hematite ores can be carried out by analyzing the properties of specific mine raw materials and studying their sanding ability.

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