Chemical Interaction between High Basicity Sinter and Newman Blend Lump Analogues

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ABSTRACT (USE 'HEADING 1' STYLE)

The softening and melting (S&M) behaviour of ferrous raw materials is of great importance as it controls the formation of the cohesive zone and affects the stable operation of the blast furnace. It has been proven that both physical and chemical interactions exist between Newman Blend Lump (NBLL, a high grade hematite goethite Australian lump ore) and a high basicity sinter in the S&M process. The S&M behaviour of a 20% NBLL - high basicity sinter mixture was significantly improved by the interactions, resulting in a narrower S&M temperature zone with a much higher permeability than that for either of the individual burdens.

It was found previously that the high basicity sinter transferred Ca and Mg to neighbouring NBLL particles before 1450℃ leading to changes in the mineral and chemical compositions of the melts formed. In this study, a Coal Ash Fusion (CAF) furnace was used to investigate the mechanism and influencing factors for the chemical interaction between a high basicity sinter and NBLL using analogues made of crushed raw materials under controlled conditions. It was confirmed that the diffusion of Ca and Mg from sinter to NBLL particles occurred between 1200℃ and 1300℃, once initial melts had formed. The mineral compositions of the melts were studied using EPMA. FactSage calculations were used to assist in interpretation of the results. Move over, factors influencing the extent of the interaction, such as temperature, degree of reduction, holding time, and lump porosity were also examined experimentally. The mechanism of interaction is also discussed.

KEY WORDS

Chemical interaction, lump, sinter, temperature, Ca diffusion