

'Effect of Coke Breeze and CaO on Oxidation of Magnetite Concentrate'

*T. Murakami*¹, *D. Maruoka*² and *E. Kasai*³

1.

Associate Professor, Graduate School of Environmental Studies, Tohoku University, Sendai, Miyagi 980-8579. Email:taichi@material.tohoku.ac.jp

2.

Assistant Professor, Graduate School of Environmental Studies, Tohoku University, Sendai, Miyagi 980-8579. Email:daisuke@material.tohoku.ac.jp

3.

Professor, Graduate School of Environmental Studies, Tohoku University, Sendai, Miyagi 980-8579. Email:kasai@material.tohoku.ac.jp

ABSTRACT

Gangue content in iron ore using for sintering process is increasing year after year. It results in increasing the energy consumption of ironmaking, if these are used directly. The utilization of magnetite concentrate as iron source of sinter process is one of the method to resolve this problem because its gangue content is very low. Furthermore, oxidation reaction of magnetite with oxygen is exothermic. It leads to decreasing the amount of coke agglomerating agent in sinter and decreasing the amount of carbon dioxide emission. However, the production rate decreases by the utilization of magnetite concentrate because the utilization of fine raw materials leads to decreasing the permeability in sinter bed. And, increasing the utilization amount of magnetite leads to lowering the sinter property such as reducibility since bivalent iron ion in sinter increases. In this study, effect of coke and CaO in the sinter bed on the oxidation behavior of magnetite is examined to discuss the optimum quasi-particles state in the sinter bed.

Using TG, oxidation rate of magnetite concentrate with and without the addition of coke breeze and CaCO₃ was measured in air at 1473 K. Oxidation rate of magnetite decreased with increasing coke ratio, and final oxidation ratio also decreased. The reason is that iron oxide reacts with ash compounds in coke and the melted slag with low melting point forms. The CaO addition also leads to the same results. It is suggested that magnetite should be kept away from coke and CaO source in the sinter bed.