

Reduction Behavior of Some Low-Grade Iron Ores for Application in Blast Furnace

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Abstract : Day after day, high-grade iron ores are consumed. Because of the strong global demand for iron and steel, it has necessitated the utilization of various low-grade iron ores, which are not suitable for direct exploitation in the iron industry. The low-grade ores cannot be dressed using traditional mineral processing methods because of complicated mineral compositions. The present work is aimed to investigate the reducibility of some Egyptian iron ores and concentrates by conditions emulate different blast furnace areas. Representative specimens are collected from El-Gedida-Baharia oasis, Eastern South Aswan, and Eastern desert-wadi Kareem (EDC). Some mineralogical and morphological characterizations are executed. The reactivity arrangement of green samples is Baharia>Aswan>EDC. The presence of magnetite decreased reactivity of EDC. The reducibility of the Aswan sample is lower than Baharia due to the presence of agglomerated metallic grain surrounded by semi-melted phases. Specimens are annealed at 1000°C for 3 hours. After firing, the reducibility of Aswan becomes the lowest due to the formation of fayalite and calcium phosphate phases. The relative attitude for green and fired samples reduced at different conditions are studied. For thermal and top areas, the reactivity of fired samples is greater than green ones, which were confirmed by morphological examinations.

Keywords : reducibility, low grade, iron industry, blast furnace

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