

Carbothermic reduction of iron oxide in kahnouj ilmenite concentrate by pelletizing and investigating of its properties

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Abstract

In this study, pelletizing of Kahnouj ilmenite concentrate with bentonite binder and reduction of iron oxide from the pellets were investigated. A disk pelletizer was used to make pellets from ilmenite concentrate. The rotation speed and angle of pelletizing device were optimized for pelletizing. Bentonite binder in amounts of between one and four wt.% was added to the concentrate, and the pellets were made with a moisture content of 9 to 11 wt.%. Drop number measurement, crushing strength test, and thermal resistance test were performed for different percentages of bentonite. For the reduction stage, the pellets were buried in coke and charcoal, and then reduction was carried out at different times and temperatures. The results showed that by increasing the amount of bentonite binder and moisture content, the pellet strength increased and decreased, respectively. The calculated reduction degree for metallic iron at different times and temperatures indicated that higher degrees of reduction could be possible using coke as the reducing agent as compared with charcoal. Furthermore, with increasing time and temperature, the reduction degree increased.

Keywords: Ilmenite, Pelletizing, Carbothermic, Bentonite.

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