

عنوان مقاله:

Optimization of direct reduction in tunnel furnace using different resources of ferrous oxides

محل انتشار:

فصلنامه سنتز و تفجوشی، دوره 3، شماره 1 (سال: 1402)

تعداد صفحات اصل مقاله: 7

نویسندگان:

Sara Ahmadi ۱

Hossein Nuranian ۲

خلاصه مقاله:

Nowadays it is highly desired to maximize using of existing resources and recycle waste materials. The by-product of steel being hot rolled is mill scale that disposing of it as waste material has environmental effects. Therefore, the use of mill scale in iron production is economically and environmentally beneficial. In the current work, an attempt has been made to use mill scale and iron concentrate which are not applicable to pelletized, in the reduction process with tunnel kiln for iron manufacturing. Non-coking coal and limestone were utilized as reducing agents. The reluctant to ferrous oxide ratio was kept constant during the reduction tests. The reduction process was carried out in a crucible at 1150°C . The analyses of the metal Fe content in the reduced samples show that the mill scale can be used successfully in the direct reduction process to produce sponge iron. In the rolling mill scale-iron pellet, iron concentrate-iron pellet, and iron concentrate-mill scale mixtures, the compositions $7\cdot\text{MS}-3\cdot\text{IP}$, $7\cdot\text{IC}-3\cdot\text{IP}$, and $7\cdot\text{IC}-3\cdot\text{MS}$ were optimum. The result of XRD and STA results revealed that the optimal heat treatment setting for reducing utilized ferrous oxide mixtures is 1150°C for 1 h. Nowadays it is highly desired to maximize using of existing resources and recycle waste materials. The by-product of steel being hot rolled is mill scale that disposing of it as waste material has environmental effects. Therefore, the use of mill scale in iron production is economically and environmentally beneficial. In the current work, an attempt has been made to use mill scale and iron concentrate which are not applicable to pelletized, in the reduction process with tunnel kiln for iron manufacturing. Non-coking coal and limestone were utilized as reducing agents. The reluctant to ferrous oxide ratio was kept constant during the reduction tests. The reduction process was carried out in a crucible at 1150°C . The analyses of the metal Fe content in the reduced samples show that the mill scale can be used successfully in the direct reduction process to produce sponge iron. In the rolling mill scale-iron pellet, iron concentrate-iron pellet, and iron concentrate-mill scale mixtures, the compositions $7\cdot\text{MS}-3\cdot\text{IP}$, $7\cdot\text{IC}-3\cdot\text{IP}$, and $7\cdot\text{IC}-3\cdot\text{MS}$ were optimum. The result of XRD and STA results revealed that the optimal heat treatment setting for reducing utilized ferrous oxide mixtures is 1150°C for 1 h.

کلمات کلیدی:

Direct reduction, Iron pellet, Iron mill scale, Iron concentrate, Tunnel furnace

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1950194>

