Investigation of hardwood char as a bed material in iron ore reduction

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Abstract

The bed material on which reduction occurs is an important variable in alternative iron making processes. Experiments were conducted comparing the quality of iron nuggets produced on anthracite coal and hardwood char bed materials at bed depths between 2.0—4.0 cm and residence times of 8, 10, and 12 minutes. While 8 minute residence times were insufficient for full reduction to occur, iron nuggets were successfully produced at 10 and 12 minute residence times on both coal and char beds. Average nugget density for coal beds was 6.3905±0.4554 g/cm^3 at 10 minutes and 6.2607±0.3869 g/cm^3 at 12 minutes, compared to 6.7331±0.6507 g/cm^3 at 10 minutes and 6.5114±0.5943 g/cm^3 at 12 minutes for char beds. Both types of beds adequately protected the crucible surface from damage by the iron and slag. These results suggest that hardwood char is a viable alternative to anthracite to produce high-density iron nuggets.