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Hydrogen direct reduction of iron ores: effect of agglomeration

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Hydrogen ironmaking is becoming increasingly important in the field of scientific and industrial research. In particular, direct reduction proves to be an extraordinarily effective system for reducing harmful emissions in the steel sector. Naturally, the efficiency of the entire process is strongly linked to the type of agglomeration of the ferrous minerals. This work is dedicated to the analysis of the direct reduction of pellets or briquettes in a reducing atmosphere containing hydrogen. Naturally, we demonstrate that depending on the porous structure of the agglomerated minerals, the reducibility and level of metallization change considerably. In addition, carburization levels also tend to change, for the same process condition, depending on the agglomeration state. Here we propose a numerical-experimental model developed through finite element calculations supported by a detailed kinetic analysis for the prediction of the best direct reducibility conditions.

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