USAGE OF HYDROGEN IN THE STEEL INDUSTRY

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Abstract : Usage of hydrogen from natural gas as a clean and storable energy source as a substitute of coking coal for the reduction of iron oxides by the process of direct reduction was investigated [1]. The resulting product called "pre-reduce" or "synthetic scrap" is the biggest load of arc furnaces in steel production. To meet the needs in steel production and in order to prevent the import of coal, which is an expensive and polluting matter, we focused our studies and research work on the enhancement of our natural resources, including the use of iron ore Gara Djebilet and Algerian natural gas. The main objective of this work is to produce a rich reducing gas hydrogen from natural gas at a lower cost by the principle of steam reforming [4] [5]:\[ \text{CH}_4 (\text{GN}) + \text{H}_2\text{O (steam)} = \text{CO} + 3 \text{H}_2 (1) \]

Reducing gas [2], consisting primarily of hydrogen (H2) and carbon monoxide (CO), is produced from natural gas and water vapor in a re-driver. It is used as a reducing agent for iron ore (pellets or calibrated) in a direct reduction pilot module [3] with a capacity of one ton: \[ \text{Fe}_2\text{O}_3 + 3 \text{H}_2 = 2 \text{Fe} + 3 \text{H}_2\text{O} (2) \]

Keywords : Energy and applications; Energy conversion; Hydrogen; gas reducing; sponge iron; steel; pollution