

# The role of Oxygen and Hydrogen in Steel Processing

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## ABSTRACT

Iron and steel are extremely important for a large variety of applications, including sheet materials for the automotive industry, structural steels for the building sector as well as for pipelines to utilise new energy sources.

Nowadays steel plants are quite effective in terms of energy consumption and carbon dioxide emissions since both parameters come close to the thermochemical minimum for converting iron oxides into pure iron.

During steel production, the material undergoes a variety of treatments, most of them characterised by either a significant exposure to oxygen or hydrogen at elevated temperatures.

This presentation gives an overview of the most common corrosion issues such as high temperature oxidation, hydrogen embrittlement and electrochemical corrosion that are related to steel production. The use of computer aided methods will be discussed and strategies to use the combination of thermodynamics and element transport will be outlined.

The aim of this presentation is to draw the listener's attention to the capabilities of mathematical methods to understand corrosion phenomena as well as to distinguish between the effects of element transport, thermochemistry and reaction kinetics in corrosion.