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# A simple method for the inhibition of the corrosion of carbon steel by molten nitrate salt for thermal storage in concentrating solar power applications

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## Abstract

Corrosion is an important issue in high-temperature applications such as Concentrated Solar Power (CSP) technology, playing a crucial role in the long-term use of storage tanks, heat exchanger and piping materials which account for a considerable component of the investment costs. While there are many studies regarding the corrosion rates of container materials under the conditions of CSP, there is little progress in the field of their degradation prevention by anticorrosion methods. This work presents an analysis of the corrosion mechanisms between the most economical construction material—carbon steel—and molten nitrate salt. A method to protect the carbon steel against corrosion by molten salt at high temperature was proposed, involving the formation of a calcium carbonate layer on the carbon steel surface. The stability of the layer was tested under isothermal and temperature cycling conditions up to 500 °C, in both inert and air atmospheres in the presence or absence of humidity. The protection method proposed has potential to reduce investment costs for CSP technology.

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