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Performance Evaluation of Potassium Dichromate and Potassium Chromate Inhibitors on Concrete Steel Rebar Corrosion

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Abstract

This study investigated the performance of potassium dichromate and potassium chromate inhibitors on the corrosion of steel rebar in concrete partially immersed in sulfuric acid and sodium chloride medium. The open circuit potential corrosion monitoring technique was employed for the acidic and marine simulating environments, and potential readings were taken in accordance with ASTM C 876. Inhibiting quality and uniformity of the inhibitors were then analyzed using an extreme value statistical modeling approach of the Weibull probability density distribution for determining the most efficient inhibitor. In the inhibitor concentrations used, the statistically analyzed experimental results identified 0.145 M potassium chromate as exhibiting the best inhibiting quality in sulfuric acid whereas the synergetic admixture of 0.032 M potassium dichromate and 0.097 M potassium chromate was predicted as showing the lowest probability of corrosion risk in sodium chloride solution. However, the overall probabilistic results rated potassium chromate as the best inhibitor compared to potassium dichromate in most of the other concentrations investigated in the study, especially in concrete structures exposed to saline environments.

Keywords

Corrosion inhibitors Performance Passive/active corrosion Extreme value Weibull density distribution

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