

**Title:** Statistical-Based Performance Evaluation Of Inhibitors On The Corrosion Of Steel Rebar In Concrete.

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**Abstract:** This paper explores the performance evaluation of some corrosion inhibitors on the corrosion of steel rebar in concrete immersed in dilute sulphuric acid and sodium chloride solutions as a means of achieving preventive maintenance for sustainable development of engineering facilities. The open circuit potential (OCP) corrosion monitoring technique was employed for both the acidic and the marine simulating environments. For these, potential readings were taken in accordance with ASTM C876. Voltage readings were recorded for each block of thirty specimens at two-day interval for thirty-two days. Inhibiting quality and uniformity of the inhibitors were then analyzed using an extreme value statistical modelling approach of the Weibull probability density distribution for determining the most efficient inhibitor. In the inhibitor concentrations considered, the statistically analyzed experimental results identified 4.5g of potassium chromate as exhibiting the best inhibiting quality in sulphuric acid whereas the synergetic admixture of 1.5g potassium dichromate + 3.0g potassium chromate is predicted as showing the lowest probability of corrosion risk in sodium chloride solutions. However, the overall probabilistic results rated potassium chromate as better inhibitor compared to potassium dichromate in most of the other concentrations investigated in the work, especially in concrete structures exposed to marine environments.