Evaluation of Interaction Effect of Sulfate and Chloride Ions on Reinforcements in Simulated Marine Environment Using Electrochemical Methods

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doi: 10.20964/2016.08.51

Received: 10 May 2016 / Accepted: 12 June 2016 / Published: 7 July 2016

The general corrosion processes of mild steel caused by the introduction of chloride ions and sulfate ions in simulated marine environment were studied by the measurements of open circuit potential (OCP), linear polarization resistance (LPR) and electrochemical impedance spectroscopy (EIS) methods. Moreover, wire beam electrode (WBE) was employed to evaluate the action effects of both sulfate and chloride ions for the propagation of localized corrosion in the simulated pore solution. OCP, LPR and EIS measurement results indicated that in simulated marine environment sulfate ions only had slight influence for the passive film compared to chloride ions which could rapidly destroy the passive film on the steel surface. Meanwhile, sulfate ions could also decrease the corrosion rate of the steel in chloride-induced corrosion process. Furthermore, WBE test results revealed that localized corrosion behavior was mitigated by the introduction of sulfate ions in simulated marine environment.

Keywords: sulfate ion; passive; wire beam electrode; localized corrosion

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