The Effect of Environmental Conditions on Electrochemical Corrosion Behavior of AISI 1018 Low-carbon Steel in Concrete Pore Solution

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The effect of environmental conditions such as dissolved oxygen (DO) and temperature on electrochemical corrosion behavior of AISI 1018 low-carbon steel in concrete pore solution (CPS) were investigated. The corrosion behavior of low-carbon steel was determined using electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization methods at temperatures ranging from 20 to 40 °C and DOES concentration from 0.5 ppm to 4.5 ppm. The corrosion rate of steels increased with increasing ambient temperatures. The electrochemical corrosion resistance was observed to be higher in CPS with lower DO concentrations. The SEM analysis shows that the metal dissolution rate was more intense in CPS with higher DO levels.

Keywords: Dissolved oxygen; Electrochemical corrosion behavior; AISI 1018 low-carbon steel; Cement pore solution

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