Influence of Cl⁻ on the Initial Corrosion of Weathering Steel in Simulated Marine-Industrial Atmosphere

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Influence of Cl⁻ on the initial corrosion of weathering steel in simulated marine-industrial atmosphere was investigated in this paper. The marine-industrial atmospheric corrosion of Q355GNH weathering steel was simulated by the wet/dry cyclic corrosion test in different NaCl + NaHSO₃ solution. The morphology and composition of rust layer on the surface of weathering steel after 30 h test were characterized by SEM and XRD. At the same time electrochemical measurements were conducted to evaluate the corrosion resistance of bare and rusted steel. The result shows that the corrosion rate of weathering steel gradually increases with the increase of Cl⁻ concentration, but the corrosion rate of weathering steel decreases with the formation of rust layer. The compositions of rust layer include lepidocrocite, goethite and magnetite/maghemite. As the concentration of Cl⁻ increases, the content of lepidocrocite and magnetite/maghemite gradually increases while the content of goethite gradually decreases. Meanwhile, the rust layer on the surface of weathering steel becomes less compact.

Keywords: Atmospheric corrosion, weathering steel, rust layer, costal-industrial, electrochemical impedance.

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