Na₂PO₃F as Corrosion Inhibitor in Carbonated Cement Extract Contaminated with Chloride Ions

Feng Ouyang^{1,2}, Xiaotong Yu², Meng Yuan², Xingguo Feng^{1,2}, Junliang Gao³, Da Chen^{1,2,}*

¹ Jiangsu Key Laboratory of Coast Ocean Resources Development and Environment Security, Hohai University, Nanjing 210098, Jiangsu, China

² College of Harbour, Coastal and Offshore Engineering, Hohai University, Nanjing 210098, Jiangsu, China

³ School of Naval Architecture and Ocean Engineering, Jiangsu University of Science and Technology, Zhenjiang 212003, Jiangsu, China

Corresponding author: Da Chen

*E-mail: chenda@hhu.edu.cn

doi: 10.20964/2016.12.74

Received: 11 September 2016 / *Accepted:* 16 October 2016 / *Published:* 10 November 2016

In a chloride contaminated carbonated concrete pore solution, the corrosion inhibition behavior of Na₂PO₃F on carbon steel rebar was studied by open circuit potential, linear polarization resistance, electrochemical impedance spectroscopy, respectively. The corrosion state of the rebar was also examined after 30 days immersion in the carbonated pore solution. The results suggest that the open circuit potential, the polarization resistance, the impedance of rebar increased with the concentration of Na₂PO₃F. The viewed corrosion state is consistent with these electrochemical testing results, suggesting that the corrosion inhibition effect of Na₂PO₃F is increased with its concentration. The inhibition effect was especially significant as the concentration of Na₂PO₃F exceeds 0.50%, and no visible corrosion onset was observed on the carbon steel rebar as the concentration of inhibitor further increased to 1.0% after 30 days immersion in the chloride contaminated carbonated pore solution.

Keywords: Concrete, carbon steel, corrosion inhibitor, Na₂PO₃F

[FULL TEXT](#)

© 2016 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).