Corrosion Inhibition of Mild Steel by S-benzyl-O,O'-dialkyldithiophosphates in HCl Solution

Kun Wang¹, Chuan Lai^{1,2*}, Banglong Tan³, Bin Xie^{2**}, Shasha Zhu², Hui Zhu¹, Ke Liu¹, Jian Wei²

¹School of Chemistry and Chemical Engineering, Eastern Sichuan Sub-center of National Engineering Research Center for Municipal Wastewater Treatment and Reuse, Sichuan University of Arts and Science, Dazhou 635000, PR China

² College of Chemistry and Environmental Engineering, Institute of Functional Materials, Material Corrosion and Protection Key Laboratory of Sichuan Province, Sichuan University of Science and Engineering, Zigong 643000, PR China

³DaZhou Quality Technical Supervision and Inspection Testing Center, Dazhou 635000, PR China

*E-mail: laichuanemail@163.com

**E-mail: xiebinsuse@163.com

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In present work, the target compounds of S-benzyl-O,O'-dialkyldithiophosphates including S-benzyl-O,O'-diphenyldithiophosphate (Inhi-1), S-benzyl-O,O'-dibenzylthiophosphate (Inhi-2), S-benzyl-O,O'-di(2-phenylethyl)dithiophosphate(Inhi-3) and S-benzyl-O,O'-di(4-methylphenyl)dithiophosphate (Inhi-4) were prepared, which acting as corrosion inhibitor for mild steel (MS) in HCl solution were investigated by weight loss measurement, potentiodynamic polarization measurement and electrochemical impedance spectroscopy. The potentiodynamic polarization measurement indicates that the four synthesized compounds are all the mixed-type inhibitor for MS corrosion in HCl solution. Furthermore, all measurements in this study show that the inhibition efficiency increases with inhibitor concentration increasing. Weight loss measurement reveals that inhibition efficiency decreases with HCl concentration and temperature increasing. In addition, the adsorption of Inhi-1, Inhi-2, Inhi-3 and Inhi-4 on MS surface obeys Langmuir isotherm, which are mixed adsorption involving both physisorption and chemisorption.

Keywords: Acid; Corrosion; Inhibition; Synthesis; Mild steel; Polarization; Adsorption.

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