Effect of Rare-earth Salts on Corrosion Resistance of Phytic Acid Based Conversion Coatings on Q235 Steel

Yong Lu^{1,2}, Huixia Feng^{1,*}

¹ School of Petrochemical Engineering, Lanzhou University of Technology, Gansu China

² Research Institute of Lanzhou Petrochemical Corporation of Petrochina, Gansu China

*E-mail: fenghx66@163.com

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Synergistic effect of rare earth salts conversion coating with phytic acid conversion coating was studied. Rare-earth salts were used as post-treatment to modify the phytic acid coated steel. The corrosion resistance properties of different coatings was investigated with electrochemical impedance spectroscopy in 3.5 wt.% NaCl solution. The corrosion resistance of phytic acid coated steel on steel was further enhanced with cerium nitrate post-treatment. The corrosion rate of phytic acid coated steel was seriously impaired by cerium nitrate post-treatment. But scanning electron microscopy (SEM) images indicated that there are also some micro-cracks on the coating surface when phytic acid coated steel was post-treated with cerium nitrate conversion bath. X-ray photoelectron spectroscopy (XPS) results demonstrated that the phytic acid could bind to the steel surface through the formation of -P-O-Fe and the cerium salts on the steel surface existed in the forms of both Ce³⁺ and Ce⁴⁺.

Keywords: conversion coating, phytic acid, rare-earth salts, corrosion

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