Short Communication

Effect of a High Concentration of Chloride Ions on the Corrosion Behaviour of X80 Pipeline Steel in 0.5 mol L⁻¹ NaHCO₃ Solutions

Wen Zhou, Wei Lan^{*}, Xianlong Cao^{*}, Hongda Deng, Yongbo Yan, Xianglong Hou

School of Metallurgy and Materials Engineering, Chongqing University of Science and Technology, Chongqing 401331, China

^{*}E-mail: ckffys@163.com, caoxianlong318@163.com

doi: 10.20964/2018.02.03

Received: 6 October 2017 / *Accepted:* 16 November 2017 / *Published:* 28 December 2017

A dynamic potential polarization technique and electrochemical impedance spectroscopy (EIS) measurements were used to explore the effects of a high concentration of chloride ions on the electrochemical corrosion properties of X80 pipeline steel in 0.5 mol L⁻¹ NaHCO₃ solutions. The surface corrosion morphology of X80 steel after polarization measurements was observed by scanning electron microscopy (SEM). The electrochemical results showed that the corrosion-product resistance and charge-transfer resistance decrease gradually with the increase of chloride ions, which resulted in the corrosion current density increasing monotonically. The surface corrosion morphology showed no pit formation in 0.5 mol L⁻¹ NaHCO₃ solutions without chloride ions. However, the addition of chloride ions decreases the stability of the passive film, and the density, size and depth of the corrosion pits increased with the increasing concentrations of chloride ions. Therefore, high concentrations of chloride ions greatly affected the electrochemical characteristics and caused further development of pitting in 0.5 mol L⁻¹ NaHCO₃ solutions.

Keywords: X80 pipeline steel; chloride ions; pitting corrosion; electrochemical impedance

[FULL TEXT](#)

© 2018 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/>).