

## Effects of pH on the Electrochemical Behavior and Stress Corrosion Cracking of X80 Pipeline Steel in Simulated Alkaline Soil Solution

Ping Liang\*, Yier Guo, Hua Qin, Yanhua Shi, Fei Li, Lan Jin, Zheng Fang

School of Mechanical Engineering, Liaoning Shihua University, Fushun 113001, China

\*E-mail: [liangping770101@163.com](mailto:liangping770101@163.com)

doi: 10.20964/2019.07.09

Received: 12 February 2019 / Accepted: 18 April 2019 / Published: 10 June 2019

---

The electrochemical behavior of X80 pipeline steel in alkaline soil solution with different pH value was studied by mean of potentiodynamic polarization and electrochemical impedance spectroscopy (EIS). The results of electrochemical measurements showed that the general corrosion and pitting corrosion resistance of X80 pipeline steel increased with increasing pH, which could be attributed to formation of a protective  $\text{FeCO}_3$  film in the solution ( $\text{pH} \geq 11.0$ ). Stress corrosion cracking susceptibility decreased with increasing pH during the slow strain rate tensile tests. The pits were found to be an important factor in the initiation of transgranular cracks below  $\text{pH}=10.0$ . However, when  $\text{pH}>10$ , intergranular cracking occurred because of selective dissolution at grain boundaries

---

**Keywords:** X80 Pipeline Steel, pH, General Corrosion, Pitting Corrosion, Stress Corrosion Cracking

[FULL TEXT](#)

© 2019 The Authors. Published by ESG ([www.electrochemsci.org](http://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/>).