

Electrochemical impedance spectroscopy (SIE) evaluation of the effect of immersion time of the protective matrix based on a polymer Tetra Glycidyl of Ethylene Dianiline (TGEDA) on carbon steel in 3% NaCl

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Abstract: In this work, we studied the impact on carbon steel coatings by Tetrafunctional epoxy resin TetraGlycidyl of Ethylene Dianiline (TGEDA) whose thickness of the deposited film on the substrate is estimated by 170 ± 10 microns. To better understand the coating degradation mechanisms, we evaluated the impact of immersion time on the protective matrix by electrochemical impedance spectroscopy (EIS), and we have studied the impact of coated carbon steel with a formulation of Tetra Glycidyl of Ethylene Dianiline (TGEDA) in the presence of 5% of Zinc and 5% of Trisodium Phosphate (Na_3PO_4) in 3% NaCl. The experimental results obtained by the EIS method of carbon steel gave the polarization resistance (R_p) from the formulation TGEDA / MDA / (Methylene Dianiline) / Na_3PO_4 (5%) / Zinc (5%) equal to $68149 \Omega \text{ cm}^2$ and $5385 \Omega \cdot \text{cm}^2$ in a 3% NaCl for an immersion time equal to 1 hour and 12 hours. the effectiveness is equal to 99.7% and 97.86%.

Keywords: Carbon steel, coating, 3% NaCl medium, formulation, epoxy resin, immersion time and electrochemical impedance spectroscopy.

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