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EIS Study of the Corrosion Behavior of an Organic Coating Applied on Algerian Oil Tanker in Sea Water

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Abstract : Organic coatings are widely employed in the corrosion protection of most metal surfaces, particularly steel. They provide a barrier against corrosive species present in the environment, due to their high resistance to oxygen, water and ions transport. This study focuses on the evaluation of corrosion protection performance of epoxy paint on the carbon steel surface in sea water by Electrochemical Impedance Spectroscopy (EIS). The electrochemical behavior of painted surface was estimated by EIS parameters that contained paint film resistance, paint film capacitance and double layer capacitance. On the basis of calculation using EIS spectrums it was observed that pore resistance (Rpore) decreased with the appearance of doubled layer capacitance (Cdl) due to the electrolyte penetration through the film. This was further confirmed by the decrease of diffusion resistance (Rd) which was also the indicator of the deterioration of paint film protectiveness.

Keywords : epoxy paints, carbon steel, electrochemical impedance spectroscopy, corrosion mechanisms, sea water
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