

عنوان مقاله:

Optimization of an ecofriendly coating containing chitosan and gelatin as corrosion inhibitor of carbon steel grade E by Response Surface Method

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نویسندگان:

Seyedeh Neda Mousavi - Malek Ashtar University of Technology, Tehran, Iran

Ali Bahrami - Malek Ashtar University of Technology, Tehran, Iran

Minoo Sadri - Malek Ashtar University of Technology, Tehran, Iran

Amin Alipour - Malek Ashtar University of Technology, Tehran, Iran

خلاصه مقاله:

Corrosion can lead to tremendous defects, and several approaches are applied to alleviate the destructive consequences. In this study, two chitosan and gelatin biopolymers with glutaraldehyde applied as a cross-linker were used to cover the surface of carbon steel grade E. Results showed that a cross-linker decreased water and ions from reaching the metal surface; thereby, increased the stability of the coating. The experiment design was performed with Design-Expert 7.0.0 software and Response Surface Method (RSM) was used to optimize the concentration of chitosan, gelatin and glutaraldehyde. The coatings quality was investigated with microscopic image. Results showed that the optimum coating consist of 10 g.L⁻¹ chitosan, 5 g.L⁻¹ gelatin and 1 mL.L⁻¹ glutaraldehyde. Electrochemical Impedance Spectroscopy (EIS) test were done to compare the anti-corrosion property. The results demonstrated that this optimized coating can enhance the corrosion resistance of coated carbon steel up to 6 times. This can be attributed to a homogenous uniform coating on the metal surface confirmed with EIS. The scanning Electron Microscope (SEM) showed coating covered pores and scratches of bare coupon and the Atomic Force Microscope (AFM) corroborated the coverage of this composition on the carbon steel surface.

کلمات کلیدی:

Gelatin, Chitosan, corrosion inhibitor, Optimization, carbon steel

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