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Abstract

Anticorrosive Performance of New Epoxy-Amine Coatings Based onZinc Phosphate Tetrahydrate as a Nontoxic Pigment for Carbon Steel in NaCl Medium

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Abstract:
Epoxy resin isknown to reactwith a hardener such as polyamine to form a thermoset3D polymer net with an outstandingphysical and mechanicalproperties. They are widely used in coating and adhesives. In this study, wepresent a new epoxy resin materialuseful for makingan anticorrosive formulation for carbon-steel. The epoxy resin presented in this study isdiglycidyl ether 4,4-dihydroxy diphenyl sulfone (DGEDDS). It was prepared in a two-step process that involvesreactingepichlorohydrinwith 4, 4-dihydroxy diphenyl sulfone then with sodium hydroxide. The structural elucidation of DGEDDS was carried out with Fourier transforminfrared. The anticorrosive formulation DGEDDS–MDA–ZPH was prepared from DGEDDS and the hardener 4,4-methylene dianiline (MDA) in the presence of the anticorrosion pigment zinc phosphate tetrahydrate (ZPH). Another standard formulation (DGEDDS-MDA) was preparedwithout ZPH. The physicochemical and anticorrosive performance of the coatedcarbonsteel was evaluated using electrochemicalimpedancespectroscopy (EIS). The coated surface was subjected to morphologicalcharacterization by SEM before and after immersion in the corrosive medium and exposingit to the UV radiation. The value of the polarization resistance (Rp) obtained by the EIS method for the standard coating DGEDDS-MDA and epoxy composite coating DGEDDS-MDA-ZPH was 31898 and 72611 Ω.cm2during the 1 h of immersion in 3wt% NaCl, respectively. Afteraging by exposing the coatings for a 2000 h to UV radiation the values were dropped to 2596 and 5189 Ω.cm2,respectively. The values show the high stability and resistance of the epoxy resin coatingto electrolytes and UV radiation. The coatingevenshowedhigher stability in the presence of ZPH pigment. As shown in the results, the tricomponentcomposite showed an outstandingstability in protectingcarbonsteelform corrosion in an aggressivemarine environmentwhere UV isvery intense and the humidity and salts are very high.

Biography:

Omar Dagdag, Sidi Mohamed Ben Abdellah University, Morocco is Submitted his abstract on the Webinar on Biopolymers and Bioplastics; October 15, 2020; Paris, France.

Recent Publications:

1. Omar Dagdag, et al; Synthesis, characterization and rheological properties of epoxy monomers derived from bifunctional aromatic amines, 2018.
2. Omar Dagdag, et al; Development and Anti-corrosion Performance of Polymeric Epoxy Resin and their Zinc Phosphate Composite on 15CDV6 Steel in 3wt% NaCl: Experimental and Computational Studies, 2020.
3. Omar Dagdag, et al; Epoxy resins as anticorrosive polymeric materials: A review, 2020.
4. Omar Dagdag, et al; Trifunctional epoxy resin as anticorrosive material for carbon steel in 1 M HCl: Experimental and computational studies, 2020.
5. Omar Dagdag, et al; Epoxy resin and TiO2 composite as anticorrosive material for carbon steel in 3% NaCl medium: Experimental and computational studies, 2020.

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