Epoxy Resin with Amphiphilic Ionic Liquid as Hydrophobic Organic Coating for Steel

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The ionic liquids (ILs) have been proposed as curing modifiers to obtain superior epoxy coatings. In the present work, the imidazolium and pyridinium cations combined in amphiphilic hardener based on polyamines to apply as curing for epoxy resin and to obtain organic coatings on the steel surface. In this respect, the primary amine groups of triethylenetetramine, pentaethylenehexamine or aminopyridinium tetradecylbromide was condensed with p-hydroxybenzaldehyde and glyoxal to obtain new ILs. The phenol group of the produced ILs were etherified with tetraethylene glycol to obtain amphiphilic ILs. The chemical structure, thermal stability, and thermal characteristics as new ILs were characterized. The curing exotherms of the epoxy resins with the liquid ILs were evaluated from differential scanning calorimetric (DSC) and thermostated curing system to determine the maximum curing exothermic temperatures and times. The cured epoxy coatings were applied on the steel surfaces to investigate their adhesion strengths, morphologies and seawater salt spray resistance. The data confirm that the cured epoxy resin in the presence of ILs hardeners show higher adhesion strengths and salt spray exposure time more than 15 MPa and 2000h, respectively.

Keywords: Epoxy; Ionic liquids; Imidazolium and pyridinium cations; Coatings; Adhesion.

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