Atmospheric Corrosion of Aluminum Exposed in Tropical Environment

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Upon exposure to the tropical environment of Cartagena de Indias (Colombia) aluminum (Al) degrades with the formation of a variety of corrosion products. Cartagena de Indias, is a port located on the northern coast of Colombia in the Caribbean Coast Region; presents a climate regime under the influence of the North-South displacements of the Intertropical convergence zone, shows an average annual relative humidity of 82% and annual precipitation between 500 mm and 1000 mm. Specimens were exposed for one years at three atmospheric testing sites in Cartagena: Institution tecnologica Colegio Mayor de Bolívar (ITCMB), Universidad Tecnológica de Bolívar (UTB), and Cotecmar. Cross sections of the exposed Al were characterized by optical microscopy, SEM and XRD; and the corrosion rate of the Al during atmospheric exposure was determined gravimetrically. For studies on the passivity of Al in the tropical environment were used Electrochemical Impedance Spectroscopy (EIS). The results show high humidity above 80%, it proves that corrosive species such as Cl^- is high (UTB 53.5, ITCBM: 117.5 and COTECMAR: 91.1 mg/m^2*day Cl^-) generate high levels of corrosion rate, whereby the atmospheric corrosiveness of the city is between the categories high and very high; and mass gain UTB: 0.004 g, ITCBM : 0.079 g and COTECMAR: 0.027g show variations in different testing sites in Cartagena that will provide models of behavior that will make it possible to select the most suitable material, minimizing the effects of corrosion through effective corrective and preventive maintenance.