Abstract

The corrosion protection of aluminum and aluminum alloys is getting importance since it is used in a number of industries like aircraft industries, automotive and aerospace industries, for both technical and economic considerations. The uncoated aluminum sample has very thin oxide film naturally present and when it is broken down during the corrosion process, the corrosion of bare aluminum sample is severe. In the present work, different electrolyte compositions were used to obtain oxide coating on aluminum for its corrosion protection with no environmental pollution. The aluminum alloy samples were anodized in sulphuric/oxalic/ boric acid, sulphuric/citric/boric acid and sulphuric/tartaric acid electrolyte compositions at optimum conditions. It was observed from corrosion results that there was considerable increase in corrosion potential and decrease in corrosion current density. The increase in polarization resistance R_P revealed enhanced corrosion protection by the coated samples. The corrosion rate of aluminum samples was also quite less for the coated samples. The surface morphology of the coated samples before and after corrosion test exhibited no significant difference in SEM micrographs and no localized corrosion was observed. The microhardness value of the coated samples was greater, thus providing more corrosion resistance to the aluminum alloy.

The anodic oxide coating obtained using sulphuric/tartaric acid electrolyte composition was found better for corrosion protection of aluminum alloy although oxide coating was relatively thin as compared to the other coated samples while anodic oxide coating obtained using sulphuric/citric/boric acid electrolyte composition was found good for corrosion protection of aluminum alloy. The anodic oxide coating obtained using sulphuric/oxalic /boric acid electrolyte composition was found satisfactory for the corrosion protection of aluminum alloy sample. Different electrolyte compositions used for anodizing of aluminum are environmentally friendly as compared to the use of toxic Cr(VI) and as a result these processes are comparatively acceptable for the anodizing of aluminum.