Corrosion and Surface Electrochemical Behaviors of Aluminum Alloy 2A12-T3 During Long-Term Exposure at Dry-Hot Climate of Turpan (China)

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The long-term atmospheric corrosion behaviors of aluminum alloy 2A12-T3 specimens that are exposed in a dry-hot environment for 3 years were investigated via weight loss measurement, electrochemical impedance spectrum (EIS) analysis and several surface analytical techniques. The results demonstrated that the thicknesses of corrosion products that were exposed for 1, 2, and 3 years in Turpan were respectively 2.01 μm , 4.99 μm and 7.97 μm . The average corrosion rate of the 2A12-T3 alloy after exposure for 1, 2 and 3 years were 0.62 $\text{g}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$, 0.42 $\text{g}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$ and 0.34 $\text{g}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$. With the exposure time extending, the corrosion rate decreased owing to the corrosion products covered on the surfaces. According to the electrochemical measurements, the oxide layer primarily influenced the anodic dissolution process. The corrosion types of the 2A12-T3 alloy are pitting and intergranular corrosion in this environment. The dominate corrosion products were Al_2O_3 , bayerite ($\text{Al}(\text{OH})_3$), boehmite (AlOOH) and AlCl_3 .

Keywords: dry-hot environment; atmospheric corrosion; pitting; intergranular corrosion; 2A12-T3 alloy.

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