Corrosion Behaviour of AZ63 Magnesium Alloy in Natural Seawater and 3.5 wt.% NaCl Aqueous Solution

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doi: 10.20964/2018.08.32

Received: 23 January 2018 / Accepted: 15 May 2018 / Published: 5 July 2018

In this study, the corrosion behaviour of AZ63 magnesium alloy was investigated in natural seawater and neutral 3.5 wt.% NaCl aqueous solution. The electrochemical processes were studied using potentiodynamic polarization. The composition and morphology of the alloys and corrosion products formed were studied using X-ray diffraction (XRD) and scanning electron microscopy (SEM). The experimental results highlighted the differences between the corrosion mechanisms of AZ63 magnesium alloy in natural seawater and that in 3.5 wt.% NaCl solution. The corrosion products formed in the seawater primarily consisted of CaCO_3 and $\text{Mg}(\text{OH})_2$, while the corrosion products formed in the 3.5 wt.% NaCl solution primarily consisted of $\text{Mg}(\text{OH})_2$ and $\text{Mg}_2(\text{OH})_3\text{Cl}\cdot 4\text{H}_2\text{O}$. The results of hydrogen evolution, weight loss and potentiodynamic polarization tests showed that the AZ63 magnesium alloy samples had better corrosion resistance in natural seawater than in 3.5 wt.% NaCl aqueous solution.

Keywords: AZ63 magnesium alloy; corrosion behaviour; polarization curve; seawater

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