

Electrochemical behavior of Mg and some Mg alloys in aqueous solutions of different pH

- Waheed A. Badawy^a
- Nadia H. Hilal^b,
- Mohammed El-Rabiee^b,
- H. Nady^b

^a Chemistry Department, Faculty of Science, University of Cairo, 12 613 Giza, Egypt

^b Chemistry Department, Faculty of Science, Fayoum University, Fayoum, Egypt

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Abstract

The electrochemical behavior of Mg, Mg–Al–Zn and Mg–Al–Zn–Mn alloys were investigated in aqueous acidic, neutral and basic solutions. Conventional electrochemical techniques such as open-circuit potential measurements, polarization methods and electrochemical impedance spectroscopy (EIS) were used. The results have shown that the rate of corrosion in acidic solution is relatively high compared to that in neutral or basic solutions. The presence of Al, Zn and Mn as alloying elements decreases the rate of corrosion of the alloy. The activation energy of the corrosion process occurring at the surface of Mg or Mg alloys in aqueous solutions is less than 40 kJ mol^{-1} . This value indicates a one electron transfer electrode as a rate controlling process. The impedance data were fitted to equivalent circuit models that explain the different electrochemical processes occurring at the electrode/electrolyte interface.