

Zinc from the Algerian metallurgy industry (zinc A) was compared with specimens of the same zinc following fusion treatment at 500°C for 60 minutes and cooling according to three different kinetics. The treated materials are designated by B, C, and D. The fusion/cooling treatment modified the microstructural state of the metal. The different microstructural states were revealed by X-ray diffraction. Electrochemical studies of the treated zinc specimens were performed using voltammetry, potentiometry and electrochemical impedance spectroscopy (EIS). Only a significant variation in EIS results was found. The EIS diagrams of the materials varied with immersion times. The variations in low frequency resistance were directly correlated with the microstructural states of the specimens. The results of the study indicate that fusion treatment at 500°C for 60 minutes and cooling by nitrogen to 10 l min⁻¹ is the most suitable for use as a sacrificial anode. © EuroJournals Publishing, Inc. 2006.