

Effects of various relative humidity conditions on copper corrosion behavior in bentonite

Syafiqah Mohd Azmi, Nurul^a; Mohamed, Danial^b; Yuhyi Mohd Tadza, Mohd^a

^a College of Engineering, Universiti Malaysia Pahang, Lebuhraya Tun Razak, Gambang, Kuantan, Pahang, 26300, Malaysia

^b AEC, Faculty of Mechanical Engineering, Universiti Malaysia Pahang, Pekan, Pahang, 26600, Malaysia

ABSTRACT

Bentonite is low resistance water retaining conductive clayey material often used as grounding enhancement material, particularly in a troubled environment. Due to its unique property, bentonite retains water and dissipate unwanted electrical current to ground. However, bentonite's water retention capacity would inevitably induce corrosion to the grounding electrode and may jeopardize the grounding system's performance in the long run. This study presents bentonite properties on copper electrodes' corrosion behavior. In this study, copper corrosion behavior buried in Andrassy bentonite specimens was investigated under varying relative humidity conditions using the vapor equilibrium technique. The corrosion rate was calculated at equilibrium, and FESEM later characterized the corroded surfaces. The copper corrosion rate in Andrassy bentonite was found to be between 2.2 and 2.8×10^{-3} mm/year. Test results showed that more water might not necessarily induce and expedite copper corrosion. However, it was noted that copper corrosion was somewhat limited under extremely dry conditions and very wet conditions. On the other hand, RH = 75% was the optimum copper corrosion condition to occur. It is believed that the corrosion of copper specimen may be influenced by other complex mechanism presence of such as chemicals species and microbes contained within the bentonite and surrounding environment.

KEYWORDS

Bentonite; Copper; Corrosion; Electrode; Grounding material; Microbes

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