

Copper corrosion in soils contaminated with high concentrations of chlorides

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The influence of the soil composition on the corrosion resistance of buried metallic structures and the nature of the corrosion products formed are of great importance in many industrial applications, as well as in archaeological studies of metallic finds. Modifications in the soils characteristics can result from agricultural activity, such as fertilisation, chemicals accidentally spilled into the soil (acids or strong bases), acid rains, etc.

Gerwin and Baumhauer [1] concluded that corrosion of buried iron objects often decreases in loamy soils because of oxygen deficiency. On the other hand, a sandy soil results in comparatively good drainage and aeration.

The corrosion of copper in two Portuguese soils was studied. The original soils were characterized, and modifications were produced by adding chlorides in various amounts covering ranges of chlorides typical of the seawater. The aggressiveness degree of the various soil samples was determined.

Copper coupons exposed 3-month in the original and in the modified soil samples were analysed. The average corrosion rates determined from gravimetric data were in good correlation with the soil aggressiveness.

The morphology of the corroded copper surfaces, with and without corrosion products, was analysed by visual observation, optical microscopy and scanning electron microscopy (SEM). Energy dispersive spectroscopy (EDS) was used for the determination of the elemental composition of the corrosion products. X-ray diffraction spectroscopy (XRD) and FTIR spectroscopy were used for the identification of the crystalline and non-crystalline corrosion products.

Data from this study will be compared with previous studies performed in our group [2].

[1] Gerwin W and Baumhauer R *Geoderma* 96 (2000) 63.

[2] F.S. A. Afonso, M. M. M., M. H. Mendonça, G. Pimenta, L. Proença, I. T. E. Fonseca, *J Solid State Electrochem* 13 (11) (2009) 1757.