Corrosion Behaviors of Copper Exposed to an Urban Atmosphere

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Copper was exposed for a total period of six months in an urban atmosphere, Shenyang site of China. The corrosion data of the exposed copper were collected for monthly intervals. The products and the corrosion amounts accumulated on the exposed copper have been investigated by mass loss, scanning electron microscopy, X-ray diffraction and coulometric reduction. The corrosion loss calculated from the reduction charges were compared with mass loss from the weight technique. The primary corrosion products found on field-exposed samples were copper oxides. For shorter exposure, such as no more than one month, the corrosion products were composed of Cu_2O and CuO . For more than two month exposure, the chemical components were mainly Cu_2O and CuO , and $\text{Cu}_2(\text{OH})_3\text{Cl}$ and Cu_2S were also observed on the surface of the field exposed copper. The corrosion mechanisms of copper at Shenyang site are proposed as well.

Keywords: Copper; Atmospheric corrosion; Field exposure; Copper oxides; Coulometric reduction

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