Influence of environmental parameters on the corrosion behavior of 90/10 cupronickel tubes in 3.5% NaCl

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ABSTRACT

The paper describes an experimental study concerning the influence of major environmental parameters (temperature, chloride, carbon dioxide, and oxygen) on the corrosion behavior of 90/10 Cu–Ni alloys widely used for heat-transfer tubes. Electrochemical techniques have been used to investigate the corrosion behavior of 90/10 Cu–Ni alloys in aerated 3.5% NaCl solutions, at temperatures of 25, 50, and 80°C with and without the injection of carbon dioxide. The results have revealed increases in chloride corrosion rates of the 90/10 Cu–Ni alloy with temperature and decreases with CO2 presence. Tests performed in aerated chloride–CO2 solutions have shown higher corrosion rates relative to those conducted in deaerated chloride solutions saturated with CO2 species. The surface morphology of polarized specimens in chloride solutions with and without CO2 presence has shown a susceptibility to pitting attack. Pit characteristics have been found to be highly influenced by CO2 presence.

Keywords: 90/10 copper nickel alloys; Chloride ions; CO2; Corrosion

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