

昇溫海水中 鐵鋼材의 陰極防蝕에 관한 基礎研究

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A Fundamental Study of Cathodic Protection of Steel in Sea water at Elevated Temperature

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ABSTRACT

Cathodic protection of steel in sea water at elevated temperature was not obtained satisfactorily by using sacrificial anode such as zinc, because of high corrosion current density. Lead alloy anode containing more than 1% silver had increased current stability and that containing more than 2% silver had low anodic consumption rate i. e, below 0.4 lb/amp-yr. Application of cathodic protection using 2% silver-lead anode to steel structure that has surface area 5000 times larger than anode showed enough protection effects within 24 hours.

高溫 鹽水溶液내에서 軟鋼의 腐蝕舉動

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Corrosion Behavior of Mild Steel in High Temperature Salt Solution

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ABSTRACT

Corrosion behavior of 0.2% mild steel in 80°C stagnant acidic chloride solutions has been studied by potentiostatic polarization technique. pH of the solution was adjusted with hydrochloric acid, thus the concentration of chloride ion being fixed at constant value 0.5M. Anodic polarization curves showed a fairly well defined Tafel range, the slope of which approximated to $2/3$ ($2.3RT/F$) in the pH range 1 to 6. However, their relative positions in the potential axis were changed with pH. The shape of cathodic polarization curves was more complex than that of anodic ones. It was possible to analyze cathodic polarization curves by the mixed potential theory from which partial cathodic currents of $2H^+/H_2$, Fe^{2+}/Fe and H_2O/H_2 half cell reactions could be determined. Corrosion potentials were close to the reversible electrode potential for Fe^{2+}/Fe half cell reaction, but far below the corresponding value for the reversible $2H^+/H_2$ half cell reaction. Analyses of the polarization curves revealed that corrosion rate be controlled by the reduction rate of hydrogen ion. Corrosion potentials and rates could be expressed in a respective empirical equation as a function of pH with a certain theoretical evidence though. Several other electrochemical parameters are also presented.