Investigation of Anodic Behavior of Nickel in H₂SO₄ Solutions Using Galvanostatic Polarization Technique. II. Initiation and Inhibition of Pitting Corrosion by Some Inorganic Passivators

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The anodic polarization of nickel in dilute sulfuric acid media was investigated in the absence and presence of ClO₄⁻ ions, at a constant current density. The anodic polarized curve is characterized by a sudden jump in potential owing to the decay of H-over voltage, followed by two oxidation arrests, passive and O₂ evolution regions. The presence of ClO₄⁻ ions distorts the polarized curve owing to the damage in the passive film with the initiation of localized pitting corrosion, at pitting potential, E_{pit} . E_{pit} displaces into active direction with rising amounts of the ClO₄⁻ ions. The presence of various concentrations of Na₂HPO₄, Na₂MoO₄ and Na₂CrO₄ shift the E_{pit} into more positive values, confirming the suppression of pitting corrosion. The anions of these salts displace the E_{pit} into the more noble direction due to a competition with the ClO₄⁻ ions. The inhibition effect towards the pitting corrosion of Ni follows the sequence Na₂HPO₄ > Na₂MoO₄ > Na₂CrO₄. Thermodynamics activation energies required for the destruction of the passive film, E_a , are estimated and explained in the absence and presence of the different anions.

Keywords: Nickel; Galvanostatic; Pitting Corrosion; Inhibition; Oxide film; Passivity.

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