Instantaneous Impedance Analysis of Non-Stationary Corrosion Process: a Case Study of Carbon Steel in 1M HCl

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The paper concerns the problem of evaluation of stationarity of carbon steel corrosion in 1M HCl. Comparison of corrosion rate with addition of corrosion inhibitor to the reference measurement is the most often used way of evaluating inhibitor efficiency. Such an approach is valid only if corrosion rate is a stationary process. Two complementary techniques were used simultaneously: volumetric analysis of evolved hydrogen and instantaneous impedance spectroscopy monitoring. Changes of the electrode surface area and chemical composition have a major impact on the dynamics of both cathodic and anodic processes. On the base obtained results, authors claim that the stationarity of the process determined most often on the base of corrosion potential is ineffective and insufficient.

Keywords: corrosion, carbon steel, impedance monitoring, volumetric analysis

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