“ELECTROCHEMICAL ASSESSMENT OF A X-70 TYPE STEEL IMMERSED IN A HYDROGEN SULFIDE SOLUTION: INFLUENCE OF CONCENTRATION”

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Introduction

Electrochemical assessment of a X-70 steel immersed in H_2S containig solutions was carried out for two different laboratory conditions by using Electrochemical Spectroscopy Impedance EIS, and Linear Polarization Resistance LPR, techniqhes. The Charge Transfer Resistance, R_{CT} and Corrosion Rate, CR, parameters are presented as a function of the total H_2S (ppm) concentration. The corrosion of steel in presence in these media is well known and involved several industrial processes. Therefore, the aim of the present work is directed to gain understanding of corrosion process in this kind of systems.

The electrochemical behavior of steel in this system (Fe-H_2S), using EIS is presented for two different concentrations of H_2S 100 ppm and satutation condition (2550 ppm aproximately) in terms of Nyquist plot. As it can be seen from Figure 1. There is an important shift in the R_{CT} value when the concentration changes from 100 ppm to saturation condition. In the other hand, a similar behavior is shown in Figure 2, for the corrosion rate parameter.

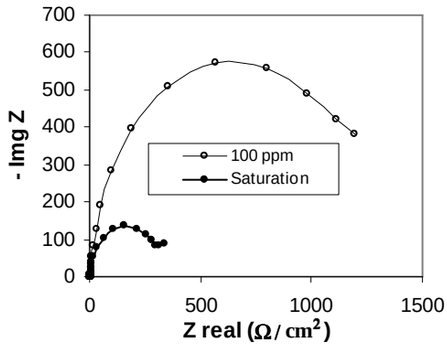

Figure 1. Nyquist plot for the two studied conditions of H_2S.

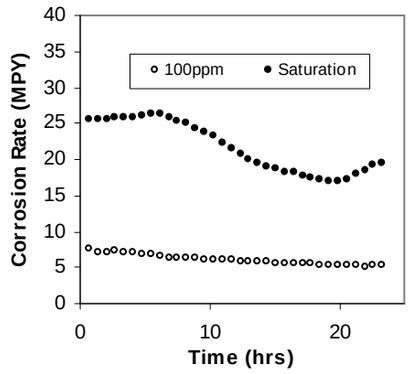

Figure 2. Corrosion rate variation for the two studied conditions of H_2S.

Conclusions

- Corrosion of X-70 immersed in a hydrogen sulfide solution is clearly influenced by the total H_2S concentration as it can be seen on the corresponding Nyquist plots.

- The non-protective nature of the well known film (mackinawite), formed on the steel surface is demonstrated by the corrosion rate values for both test conditions studied.

References

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