STUDY OF IRON SULFIDE FILMS STABILITY FOR CORROSION MONITORING IN FLUID CATALYTIC CRACKING UNITS

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An increasing tendency on processing high nitrogen content crude oils has been resulting in a great increase of the corrosion and hydrogen damages at Fluid Catalytic Cracking Units (FCCU's). Thus, it is extremely important to develop more effective methods to monitor this kind of corrosion, which occurs mainly due to the presence of H_2S and CN^-.

Recently it was proposed a new monitoring method based on application of voltammetry technique for evaluating the integrity of the protective iron sulphide film. Laboratory tests and preliminary pilot scale assays showed the application feasibility of the new methodology for detecting film destruction caused by cyanide ion. Figure 1, related to a laboratory test, shows a cyclic voltammogram of carbon steel in an aqueous sulphide solution (0,05 M Na_2S) before and after CN^- addition.
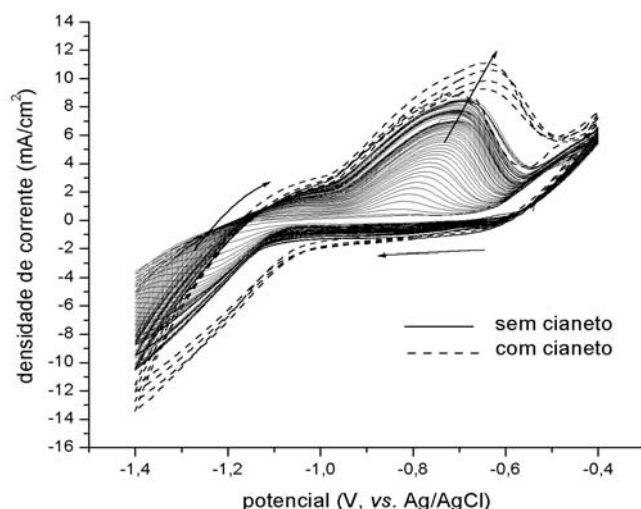

Fig. 1 – Cyclic voltammetry of carbon steel in an aqueous sulphide solution (0,05 M Na_2S), from -1400 mV to -400 mV (versus Ag/AgCl), with later addition of 1000 ppm CN^-, scan rate = 10 mV.s^{-1}, room temperature and pressure, pH = 9. Cyanide was just injected after stabilization of the curve.

It can be seen that CN^- addition caused significant changes in both cathodic and anodic branches of the voltammetric curve. This result indicates the possibility of applying the technique as an on-line and at real-time monitoring method for corrosive process in FCCU's.

In the present study it is discussed the electrochemical behaviour of carbon steel in containing-sulphide solutions with and without cyanide ion additions. Voltammetry was the main technique used and the electrolyte was Na_2S solution with pH adjusted to 8 – 9. Experiments were accomplished at room temperature and pressure.

This work will supply important knowledge for latter development of the new corrosion monitoring method.