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ELECTROCHEMICAL STUDY OF THE SCALING INHIBITION IN THE HAMMA WATER WITH SODIUM ALGINATE

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Abstract

The Hamma water, that supplies drinking water to the city of Constantine (Algeria), is considered as a very hard water because it comes from calcareous soils. Thus, scaling phenomenon could occur in these conditions. In this context, it is important to find an efficient solution to prevent scale formation. In this work, the inhibition efficiency of a scale inhibitor, sodium alginate, was studied. The effective concentration of this inhibitor was determined by using two electrochemical techniques: chronoamperometry and impedancemetry. The results obtained by chronoamperometric tests showed that the raw Hamma water was characterized by a scaling time of 15 min at 30°C and the residual current reached 9.70 μA , which corresponds to a compact and adherent precipitate of calcium carbonate. Moreover, the value of the scaling time decreased with the temperature increase. In addition, impedance measurements showed that the high frequency capacity increased with the increase of the inhibitor concentration, which leads to the formation of more porous deposits. In the presence of increasing concentrations of sodium alginate, the scaling time and the residual current increased and the total inhibition of scale formation occurred at a concentration of 70 mg/L. Sodium alginate remains a very effective inhibitor because it acts at a very low concentration (10 mg/L) by blocking the nucleation and the growth of calcium carbonate.

Key words: calcium carbonate, chronoamperometry, green inhibitor, impedancemetry, scale inhibition, scaling, sodium alginate

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