Title: EVALUATION OF BIOSURFACTANT APPLICATION ON BACTERIAL BIOFILMS IN APIX60 STEEL SPECIMENS

Authors: Naspolini, B.F.[1,3], Machado, A.C.[2], Rodrigues, T.A.[1], Barboza, H.N.[1], Freire, D.M.G. [2], Cammarota, M.C.[3], Cravo, W.B.[1].

Institutions: [1]Labio (INT-MCTI) - Biocorrosion and Biodegradation Laboratory - National Institute of Technology / Ministry of Science and Technology and Innovation (Venezuela Avenue 82, room No. 206), [2]Labim (IQ-UFRJ) - Biotechnology Microbial Laboratory – Chemistry Institute/UFRJ (Av Athos da Silveira Ramos 149, CT, Block A, Room 549-2), [3]LTA - Environmental Technology Laboratory -. School of Chemistry / UFRJ (Av Athos da Silveira Ramos 149, CT, Block E, room 115).

Abstract

In Brazilian´s sugarcane and alcohol production plants, it is estimated that to produce one liter of ethanol, approximately 13 liters of vinasse are generated. This industrial wastewater is generated from ethanol distillation step and has a high pollution potential, as it has high organic content, low pH and a large amount of minerals like potassium and magnesium. In order to manage this residue of the agro-industry and make an efficient usage of it, vinasse was used as raw material for producing a biosurfactant (BS) of Rhamnolipids class through submerged fermentation with *Pseudomonas aeruginosa* PA1 bacteria. The BS was characterized regarding its physicochemical properties: Surface Tension Concentration and Critical Micelle Concentration and Rhamnolipids Concentration. Corrosion is a major problem in the oil industry, caused by the presence of microorganisms which forms biofilms in various systems of exploration and production. To evaluate the BS inhibitory action on the formation and growth of these bacterial biofilms,experiments were conducted on steel API X60 specimens with mixed bacteria cultures from a sample of production water, from oil industry. To evaluate the BS efficiency tests were performed under the same conditions, with and without addition of the compound. The microbial groups were evaluated as Total aerobes, iron oxidizing bacteria, total anaerobes and sulfate reducing bacteria (SRB). The BS concentration applied on these tests was 21.8 µL/mL. The vials were incubated at 30 ° C ± 14 days. After this period, the quantification of planktonic and sessile cells was performed through the technique of the Most Probable Number (MPN). Based on these results, it was observed a reduction of two magnitude orders in the quantification of planktonic cells and sessile group of SRB, a prominent group of microbiologically induced corrosion, caused by the previous formation of biofilms.

Keywords: Biosurfactants, Vinasse, sulfate-reducing bacteria

Development Agency: Petrobrás, Cnpq