

PRELIMINARY STUDY ON THE EFFECT OF LOW ELECTRIC CURRENT ON PRODUCTION OF BIOSURFACTANT BY *Pseudomonas aeruginosa*

Djaber Tazdaït^{1,2*}, Rym Salah¹, Fadila Guiddir¹, Nawal Temouche¹, Nadia Abdi²,
Hocine Grib², Nabil Mameri²

1 Department of Biochemistry and Microbiology, Faculty of Biological and Agronomical Sciences, Mouloud Mammeri University of Tizi-Ouzou, P.O. Box 17 RP 15000 Hasnaoua, Tizi-Ouzou, Algeria.

2 Laboratory of Bioengineering and Process Engineering, National Polytechnic School, Avenue Hacén Badi, El-Harrach, Algiers, Algeria.

*Corresponding author. Emails:

djaber.tazdait@ummo.dz; djaber.tazdait@g.enp.edu.dz; djabertazdait@yahoo.fr

Abstract

Several studies have been attempted to investigate the effect of different parameters on the performance of biosurfactant production by microorganisms, these parameters include temperature, pH, agitation, and carbon and nitrogen sources. In literature, the studies devoted to the use of electric current are mostly focused on the treatment of wastewaters by electrocoagulation. However, to the best of our knowledge, no studies have been reported on the direct effect of electric current on microbial production of biosurfactants. The main purpose of this study was to investigate the effect of direct electric current on the performance of a biosurfactant-producing strain *Pseudomonas aeruginosa*, isolated from hydrocarbon-contaminated soil, to produce biosurfactant under aerobic conditions. The bacterial strain used in this study was previously isolated from a fuel-contaminated soil collected from a gas station located in Boumerdès, Algeria. The effect of direct electric current on the biosurfactant production was evaluated by varying the inter-electrode distance (d) (2, 4 and 6cm) with current density values (D) of $3\mu\text{A}/\text{cm}^2$ for 3 days at room temperature ($21.7^\circ\text{C} \pm 3.07^\circ\text{C}$), at 150 rpm and pH 7. Besides, control experiment was carried-out under the same conditions for which no electrical treatment was performed. On the other hand, the biosurfactant concentration was determined at the end of each experiment using a solvent extraction method. The results clearly showed that direct current application with distance between electrodes of 2 cm yielded the highest biosurfactant production, and emulsification index (E_{24}). Besides, the production cost decreases of about 20% with electric current application, which contributes very slightly in the total energy consumption cost. This method might, in the future, lead the way towards profitable application in enhancing biosurfactant production.

Keywords: biosurfactant; electric current; emulsification index; *Pseudomonas aeruginosa*;