Optimization of culture medium for the degradation of phenanthrene by a strain of *Serratia marcescens*

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Key words: Biodegradation, HPAs, Experimental design.

Introduction. Polyaromatic hydrocarbons (PAHs) are a group of dangerous and recalcitrant pollutants that are widely distributed in the environment. The hydrophobicity of these compounds is correlated to an increase in their genotoxicity and a decrease in their degradability. Extensive search for microorganisms capable of degrading xenobiotic compounds resulted in an increase in the number substances which can be now biologically treated.
The overall objective of this project was to study the effect of culture medium components on the biodegradation of phenanthrene by different strains of *Serratia marcescens.*

Methods. This study was designed with three factors; glycerol, peptone and ammonium sulphate, at two concentration levels (Table 1), to assess the degradation and reduction of the surface tension of a pure culture of *Serratia marcescens* SM3, after five days of incubation, in a volume of 20 mL at 120 rpm with 25 ppm of phenanthrene.

Table 1. Factorial 2^3 experimental design used to evaluate the influence of the concentration of carbon and nitrogen source.

	Variables in coded levels		
Run	Glycerol	Peptone	Ammonium Sulfate
1	-1	-1	-1
2	+1	-1	-1
3	-1	+1	-1
4	+1	+1	-1
5	-1	-1	+1
6	+1	-1	+1
7	-1	+1	+1
8	+1	+1	+1

The surface tension was determined using a tensiometer Du Noüy and the concentration of PAHs by HPLC.

Results. The effect of medium composition (carbon and nitrogen) on maximal phenanthrene degradation and reduction of surface tension was evaluated using a 2^3 factorial design. Figure 1a shows the surface response for the degradation of phenanthrene by strain SM3 in function of the concentration of glycerol and peptone as the most significant factors. Figure 1b shows the surface response for decreasing the surface tension. Both responses revealed that the best conditions for the culture medium were those containing glycerol 8 g/L, peptone 1.4 g/L ammonium sulfate and 0.25 g/L. Increasing glycerol and peptone concentration had a significant effect on phenanthrene degradation and reduction of surface tension.

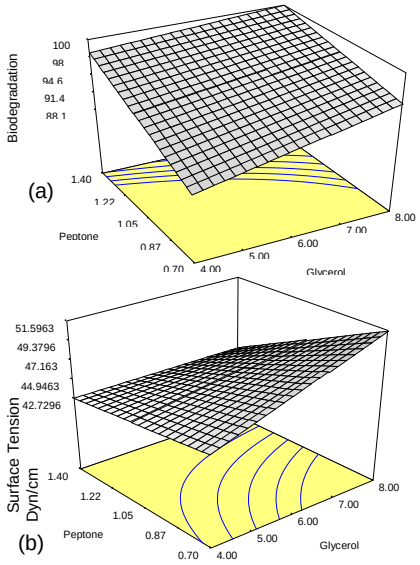

Fig.1 Surface response representing the maximal degradation and surface tension reduction.

Conclusions. The presence of glycerol and peptone at high concentrations increased biosurfactant production and phenanthrene biodegradation.

References.

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