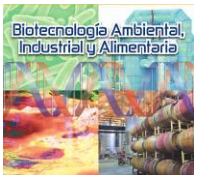
Poster



Role of natural surfactants in bioremediation and bioavailability of PAH

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ABSTRACT

Motivation:

Polycyclic aromatic hydrocarbons (PAHs) are organic compounds found in most polluted areas mainly due to anthropogenic activity. Such compounds entail several damages to human health and the environment in general because of their toxicity and carcinogenecity. Moreover, due to their recalcitrance and ubiquity, they supose a problem where research groups focus their attention(1). In our case, efforts to find solutions to PAH pollution are aimed at bioremediation, looking for chemical strategies for improving the bioavailability in the biorremediation of contaminated areas, always without increasing the risk to the environment where they are adsorbed.

The main objectives of this project are the tuning of the fluorimetry method to detect hydrocarbons in aqueous samples and to test the effectiveness of a novel commercial rhamnolipid versus another one previously used, obtained from a cell culture at the laboratory.

Methods:

We used a strain of *Mycobacterium gilvum* as biodegrader organism, and we have tested its ability to use these compounds as carbon source (1, 2) in biodegradation experiments against different concentrations of pyrene (4-rings PAH as a representative compound of this group) supplied dissolved and crystalline in aqueous solutions. The variation in the concentration of pyrene is measured using fluorimetry techniques in an equipment able to submit a sample to ultraviolet radiation and collect the radiation emitted by the sample in a graph, where we will be able to detect a peak representing the pyrene in a specific and known length wave. We also studied the effect of a commercial rhamnolipid recently bought by the laboratory, which is expected to increase the bioavailability of such compounds due to its surfactant effect, thus overcoming one of the main barriers to remediation and being a friendly alternative with the environment because of its naturally origin (2).

Results:

The bacteria is able to assimilate the supplied pyrene. When rhamnolipids are added, the final concentration of pyrene remaining in the saturated samples is less than in the cases we are not providing the rhamnolipid. When the pyrene is supplied as crystals, passive dosing occurs so that it dissolves until equilibrium is reached. When *M. gilvum* is added in that point, pyrene is removed from the aqueous phase by breaking the balance and allowing a greater amount of crystals to be dissolved and removed from the medium.

Conclusions:

It has been found that using this commercial rhamnolipid is more effective, because it allows a greater solubility and the advantage of having it available simply and quickly.

REFERENCES

(1) Congiu, E., Ortega-Calvo, J.J. (2014) Role of desorption kinetics in the rhamnolipid-enhanced biodegradation of polycyclic aromatic hydrocarbons. Environmental Science and Technology 48:10869–10877

(2) Congiu, E., R. Parsons, J, Ortega-Calvo, J.J. (2015) Dual partitioning and attachment effects of rhamnolipid on pyrene biodegradation under bioavailability restrictions. Environmental pollution 205: 378-384