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**Effect of surfactants on the kinetics of anthracene biodegradation by *P. putida* ATCC****Ana Cristina Rodrigues<sup>1,2</sup>, Regina Nogueira<sup>1</sup>, Luís Ferreira de Melo<sup>3</sup>, António Guerreiro de Brito<sup>1</sup>**

<sup>1</sup>Centre of Biological Engineering - Institute for Biotechnology and Bioengineering - University of Minho, Portugal; <sup>2</sup>Escola Superior Agrária - Instituto Politécnico de Viana do Castelo; <sup>3</sup>LEPAE - Faculdade de Engenharia da Universidade do Porto, Departamento de Engenharia Química, Porto, Portugal

Polycyclic aromatic hydrocarbons (PAH) are organic contaminants that resemble a certain threat to human health and natural ecosystems due to their known carcinogenic and mutagenic properties. The low water solubility of PAHs limits their availability to microorganisms, which is a potential problem for bioremediation of contaminated sites. Nonionic surfactants at concentrations above the critical micelle concentration (CMC) may contribute to increase the rate of biodegradation of PAH by solubilization or emulsification (Edwards *et al.*, 1991). On the other hand, surfactants may reduce the adhesion of cells to the hydrocarbon-water interface (Rosenberg and Rosenberg, 1995). The ability of surfactants to enhance the bioavailability of PAH will depend on the mechanisms used by bacteria to get access to such hydrophobic substrates. Therefore, the present study aimed to investigate the effect of surfactants on the kinetics of PAH biodegradation by *P. putida* ATCC 17514 and addressed the specific issue of the effect of the surfactant on bacterial adhesion to PAH, which is believed to be an important mechanism for the uptake of hydrophobic compounds (Rodrigues *et al.*, 2005). For that purpose, anthracene biodegradation assays were carried out with three surfactants, namely, the nonionic Tween 20, at a concentration of 0.08 mM, slightly higher than its CMC, the anionic SDS (Sodium dodecyl sulfate) and the cationic surfactant CTAB (Cetyltrimethyl ammonium bromide), both at a concentration lower than the CMC, 0.35 mM and 0.27 mM, respectively. Measurements of zeta potential and bacterial surface hydrophobicity were also performed. The results obtained showed that the surfactants caused different effects on the biodegradation of anthracene, as sole carbon and energy source for growth, which is considered one of the most hydrophobic PAH. In fact, the presence of the non-ionic surfactant Tween 20, at a concentration of 0.08 mM doubled the maximum specific biodegradation rate of anthracene. Moreover, the presence of SDS (0.35 mM) also doubled the removal rate of anthracene, reaching  $0.35 \text{ mg L}^{-1} \text{ h}^{-1}$ . On the other hand, the cationic surfactant CTAB (0.27 mM) had a negative effect on the biodegradation of such PAH, leading to an abrupt decrease on the biomass growth curve. The results also demonstrated that in the presence of Tween 20 or SDS (100 to  $1000 \text{ mg L}^{-1}$ ) an increase in the oxygen uptake rate was observed during the utilization of anthracene by *P. putida*.