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Microbial degradation of hydrocarbons and its applications to enhanced oil recovery at lab scale**Jorge F. B. Pereira¹, Eduardo J. Gudiña², Lúgia R. Rodrigues², José A. Teixeira², João A. P. Coutinho¹**¹CICECO – Chemistry Department, University of Aveiro, Portugal; ²IBB – Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, University of Minho, Braga, Portugal

The renewed interest in Enhanced Oil Recovery (EOR) techniques as a consequence of the current oil prices is boosting the development of the Microbial Enhanced Oil Recovery (MEOR). This technique is useful to recover incremental oil from a reservoir beyond primary and secondary recovery operations and can be carried by the injection of exogenous or stimulation of indigenous microorganisms. This last approach is here investigated. In this work we address the isolation and identification of microorganisms from Brazilian heavy oil samples capable of producing biosurfactants and to promote the degradation of heavy oil fractions, in particular long-chain hydrocarbons. Different crude oil samples obtained from an oil reservoir were used to isolate microorganisms for application in MEOR. Most of isolates were *Pseudomonas* and *Bacillus* strains. The growth of different microbial isolates was studied under both aerobic and anaerobic conditions at 40°C. These isolates were found to produce extracellular biosurfactants, reduce surface tension and showed a high emulsifying activity. In addition to these capabilities, we studied the ability of these microorganisms to degrade the heavy oil fraction, in particular long-chain hydrocarbons. Several parameters were studied, such as nutritional conditions, incubation time and paraffinic composition of the mixture. Our results show that some of the isolates displayed a capacity to degrade, under aerobic and anaerobic conditions, the large alkyl chains (18+ carbons in alkyl chains) and to reduce the viscosity of hydrocarbon mixtures. Our results, show the ability of the *Bacillus subtilis* strains to enhance the recovery of paraffinic oil on sand pack columns. These results suggest that the microorganisms' here isolated have interesting characteristics to be applied for MEOR.