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Isolation of microorganisms from oil samples for application in microbial enhanced oil recovery

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Microbial Enhanced Oil Recovery (MEOR) is an important tertiary oil recovery process where microorganisms and their metabolites are used to retrieve unrecoverable oil from a reservoir after application of primary and secondary recovery techniques [1]. Stimulation of bacterial growth and biosurfactant production by indigenous microorganisms can reduce the capillary forces that retain the oil into the reservoir. MEOR offers major advantages over conventional EOR, namely low amounts of energy consumption and independence of the price of crude oil. In this work we have been addressing the isolation and identification of microorganisms capable of producing biosurfactants under conditions existent in oil reservoirs. Biosurfactant production by microorganisms isolated from crude oil samples was evaluated by measuring surface tension and emulsification activity. Among the isolated microorganisms, seven *Bacillus* strains were able to grow and produce extracellular biosurfactants at 40°C under anaerobic conditions in medium supplemented with hydrocarbons. Three isolates (PX309, PX311 and PX573) were selected as the higher biosurfactant producers; biosurfactants produced by those isolates reduce the surface tension of water from 72 to 30 mN/m, exhibit emulsifying activity and are not affected by exposure to high temperatures (121°C), which make them good candidates for use at the extreme conditions usually existent in oil reservoirs. The results obtained show that those isolates exhibit potential for the development of enhanced oil recovery processes.

[1] Banat IM. 1995. Biosurfactants production and possible uses in microbial enhanced oil recovery and oil pollution remediation: A review. *Bioresource Technology* 51: 1-12.