

TITLE: EVALUATION OF THE GROWTH AND BIOSURFACTANT PRODUCTION BY AN OIL RESERVOIR BACTERIUM USING LOW COST CARBON SOURCES.

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ABSTRACT: Biosurfactants (BS) are amphipathic molecules potentially applicable in various industrial and environmental sectors because they can be produced from renewable substrates of low cost, are biodegradable, have low toxicity and chemical specificity. In the oil industry, this type of molecule can be used in tertiary oil recovery processes. BS production is influenced by several factors, including the carbon source. The aim of this study was to evaluate the growth and the production of BS by a bacterial strain (Ar70C2) isolated from an offshore reservoir rock sample, testing different carbon sources. Ar70C2 is a spore-forming, halophilic and thermophilic rod which grows best at 55 °C and 35 g NaCl/L. Cultures were performed in defined culture medium (Mineral Medium) of composition (g/L): NaNO₃ (1.00), Na₂HPO₄ (2.20), MgSO₄.7H₂O (0.60), NaCl (35.0), KH₂PO₄ (1.40), CaCl₂ (0.02) and FeSO₄.7H₂O (0.001). The carbon sources tested were glucose, molasses, buffalo milk whey, and used soybean oil. Growth conditions were: 100 rpm or static, with or without yeast extract, at 55 °C. Bacterial growth was measured by optical density (OD) and BS production by E24 emulsification index. The carbon sources that resulted in better performance were glucose and molasses, in static condition and without yeast extract: with glucose, maximum OD of 1.96 reached in 170 h of cultivation and average E24 of 61% in 146 h; with molasses, maximum OD of 2.0 in 170 h of cultivation and average E24 of 60% in 98 h. With buffalo milk whey, in the same conditions, the highest OD of 1.05 and average E24 of 38% were noted in 146 h. With the used soybean oil, in the same conditions, maximum OD of 0.25 was observed in 50 h of culture and average E24 of 58% in 74 h. The experiments showed that strain Ar70C2 produces BS under halophilic and thermophilic conditions, which is relevant in assessing the use of microorganisms in tertiary oil recovery processes, and using a low cost carbon source, which can cheapen the BS production process.

KEYWORDS: biosurfactant, petroleum, molasses, MEOR.

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