

TITLE: SELECTION OF BACTERIA, ISOLATED FROM A BRAZILIAN OIL RESERVOIR, FOR PRODUCTION OF BIOSURFACTANTS

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ABSTRACT:

Biosurfactants (BS) are compounds of microbial origin that can act by reducing surface and interfacial tensions in oil / water / air interfaces. In the petroleum industry BS have several applications, among them in microbial enhancement oil recovery (MEOR) processes. In this sense, 14 bacterial strains isolated of oil and rock from an offshore reservoir located in southeastern Brazil were screened for BS production. The strains were cultured in Luria-Bertani Broth (LB) for 7 days, under the original culture conditions of isolation (37°C or 55°C, 35 or 70 g/L NaCl), with measurements of optical density (OD) and emulsifying capacity of cell free extracts (by emulsification index E_{24}). The strain with the highest biosurfactant production (Ar35D5, belonging to the genus *Bacillus*) was selected to continue the tests by testing different culture conditions for agitation, temperature and salinity. For the static or shaking test (orbital at 150 rpm), the culture was done in LB broth for 6 days, in the same temperature and salinity of the isolation, 55°C and 35g/L of NaCl respectively. In the temperature test, temperatures of 45, 55, 65 and 75°C were tested, and in the salinity test the salinities of 5, 22.5, 35 and 70 g/L of NaCl were tested. Both assays were cultured for 7 days and all were performed in triplicate. Control flasks were incubated under the same conditions without the inoculum. An emulsification test on different hydrophobic substrates was also carried out: kerosene, toluene, hexane, iso-octane, ethyl acetate, n-butanol, chloroform, dichloroethane, dichloromethane, mineral oil, lubricant, canola oil, olive oil, frying oil and soybean oil. The results of the experiments showed that the growth and the emulsification index of the biosurfactant were better in the static condition (OD of 2.3 and E_{24} of 61.2%), at 55°C (OD of 1.9 and E_{24} of 64.9% in time 168h) and in the salinity of 35 g/L NaCl (OD of 2.2 and E_{24} of 67.8% in time 168h). BS promoted emulsification on all tested hydrophobic substrates (with E_{24} in the range of 9.0 to 92.6%), with the highest E_{24} being recorded for olive oil. The results indicate that strain Ar35D5 has potential for future MEOR tests, and further will be evaluated for growth and production of BS in different carbon and nitrogen sources.

Keywords: *Bacillus*, biosurfactant, petroleum, halophilic, thermophilic

Development Agency: National Council for Scientific and Technological Development (CNPq); Brazilian National Agency of Petroleum, Natural Gas and Biofuels (ANP); PETROBRAS (Petróleo Brasileiro S.A.); Graduation Program in Physics of São Carlos Institute of Physics (IFSC-USP).