

# A Comparative Study of Biosurfactant Synthesis by *Pseudomonas aeruginosa* Isolated from Clinical and Environmental Samples

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## Abstract

Evaluation of emulsifying activities indicates that biosurfactants were produced by an environmental (strain EPI) and a clinical (strain CPI) species of *Pseudomonas aeruginosa*. During growth on hydrocarbons, the organisms produced biosurfactants. Both strains grew luxuriantly on motor oil and readily synthesized abundant surfactants at the expense of easily metabolizable substrates. During a 12 day cultivation on motor oil, the organisms produced growth associated extracellular surfactants with emulsification activities of 71 and 38% for EPI and CPI, respectively. The general times obtained for EPI and CPI were 1.74 and 2.66 days. The biosurfactants that could not be secreted on glucose were partially purified and putatively identified as rhamnolipids. The surface-active compounds present high emulsification activity and stability in the pH range of 3.0-10.0, temperature range of 4°C-100°C, and salinity range of 16 -44‰ and are capable of stabilizing oil-in-water emulsions with several hydrocarbons. Typical emulsions produced were stable for several weeks. The results also showed that the biosurfactants were able to remove a significant amount of crude oil from contaminated soil; for instance, strain EPI surfactant removed 54%, CPI 41%, detergent 42%, and water 30%. The rhamnolipids from these strains represent a new class of biosurfactants that have potential for use in a variety of biotechnological and industrial applications where extremes of pH, thermal, and saline conditions would have little or no effect on activity.

**Keywords:** Biodegradation, Biosurfactant, Emulsification index, Hydrocarbons, Rhamnolipid

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