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Deciphering Suitability of Rhamnolipids as Emulsifying Agent for Hydrophobic Pollutants

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Abstract : Biosurfactants are amphiphilic surface active compounds obtained from natural resources such as plants and microorganisms. Because of their diverse physicochemical characteristics biosurfactant are replacing synthetic compounds in various commercial applications. In present study, a strain of P. aeruginosa was isolated from crude oil contaminated soil as efficient biosurfactant producers. The biosurfactant production was analyzed as a function of surface tension reduction, oil spreading capacity, emulsification index and hemolysis assay. This bacterial strain showed excellent emulsion activity of EI24 85%, surface tension reduction up to 28.6 mNm-1 and 7.0 mm oil displacement zone. Physicochemical and biological properties of extracted rhamnolipid were also investigated in current study. The chemical composition of product from strain PSS was analyzed by FTIR spectroscopy. The results revealed that extracted biosurfactant was rhamnolipid type in nature having RL-1 and RL-2 homologues. The surface behavior of rhamnolipid in aqueous phase was investigated varying extreme pH, temperature, salt conditions and with various hydrocarbons. The results indicated that biosurfactant produced by strain PSS Which showed stability during high temperature up to 121 C, salt concentrations up to 20% and pH range between (4—14). The emulsification activity with different hydrocarbons was also remarkable. It was concluded that rhamnolipid biosurfactant produced by strain PSS has excellent potential as emulsifying/remediation agent for broad range of hydrophobic pollutants.

Keywords : P. aeruginosa, bioremediation, rhamnolipid, surfactants
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