Polycyclic Aromatic Hydrocarbon Degradation by Biosurfactant-Producing *Pseudomonas* sp. IR1

Manoj Kumar^{a,b,*}, Vladimir Leon^a, Angela De Sisto Materano^a, Olaf A. Ilzins^a, Ivan Galindo-Castro^a, and Sergio L. Fuenmayor^a

- ^a Unidad de Biotecnología del Petróleo, Centro de Biotecnología, Fundación Instituto de Estudios Avanzados (IDEA), Apartado 17606 Caracas 1015 A, Venezuela
- ^b Present address: Synthesis and Biotics Division, Indian Oil Corporation, Research and Development Center, Faridabad-121007, Haryana, India. Fax: +91-129-2286221.
 E-mail: manojupreti@rediffmail.com and mkumar@idea.gov.ve
- * Author for correspondence and reprint requests
- Z. Naturforsch. 61c, 203-212 (2006); received September 22/November 14, 2005

We characterized a newly isolated bacterium, designated as IR1, with respect to its ability to degrade polycyclic aromatic hydrocarbons (PAHs) and to produce biosurfactants. Isolated IR1 was identified as *Pseudomonas putida* by analysis of 16S rRNA sequences (99.6% homology). It was capable of utilizing two-, three- and four-ring PAHs but not hexadecane and octadecane as a sole carbon and energy source. PCR and DNA hybridization studies showed that enzymes involved in PAH metabolism were related to the naphthalene dioxygenase pathway. Observation of both tensio-active and emulsifying activities indicated that biosurfactants were produced by IR1 during growth on both water miscible and immiscible substrates. The biosurfactants lowered the surface tension of medium from 54.9 dN cm⁻¹ to 35.4 dN cm⁻¹ and formed a stable and compact emulsion with an emulsifying activity of 74% with diesel oil, when grown on dextrose. These findings indicate that this isolate may be useful for bioremediation of sites contaminated with aromatic hydrocarbons.

Key words: Biosurfactant, Polycyclic Aromatic Hydrocarbons, Pseudomonas sp.