

**BIODEGRADATION OF POLYCYCLIC AROMATIC HYDROCARBONS BY *PSEUDOMONAS* SPECIES ISOLATED FROM PETROLEUM CONTAMINATED SOILS**Imaneh Amini<sup>1</sup>, Arezoo Tahmourespour<sup>2\*</sup>, Atousa Abdollahi<sup>3</sup><sup>1</sup>MSc student of microbiology, Falavarjan Branch, Islamic Azad University, Falavarjan, Isfahan, Iran<sup>2</sup>Department of Basic Medical Sciences, Islamic Azad University, Khorasgan (Isfahan) branch, Isfahan, Iran<sup>3</sup>Department of Basic Sciences, Islamic Azad University, Khorasgan (Isfahan) branch, Isfahan, Iran

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**INTRODUCTION:** Polycyclic aromatic hydrocarbons (PAHs) are toxic compounds widely distributed in the environment. Among microorganisms, bacteria play an important role in biodegradation of such pollutants. The aims of present study are isolation and characterization of dioxygenase producing bacteria with the ability to degrade phenanthrene and pyrene from refinery soils and the assessment of in vitro PAHs degradation.

**MATERIALS AND METHODS:** Two petroleum contaminated soil samples were collected from Isfahan-Iran refinery and chemically analysed. The population of PAH degrading bacteria was enumerated. Isolation of phenanthrene and pyrene degrading bacteria were done by enrichment culture technique in basal salt medium supplemented with 50 mg/l of each mentioned PAHs. Dioxygenase producing bacteria were selected using indole and catechol tests. Biosurfactant production ability of selected isolates was assayed by glass slide and drop collapsed tests. Identification of isolates were performed based on colony morphology, biochemical tests and 16S rDNA gene analyses. The biodegradation of PAHs was measured by gas chromatography during 9 days.

**RESULTS AND DISCUSSION:** According to results the concentration of phenanthrene and pyrene in two soil samples was more than standard level (1-3 mg/kg). The population of phenanthrene and pyrene degrading bacteria were  $2.17 \times 10^3$  and  $1.19 \times 10^3$  CFU/g in soil sample 1 and  $21.50 \times 10^3$  and  $19.40 \times 10^3$  CFU/g in sample 2. Among total of 18 bacterial isolates, 3 of them were selected based on their ability to show dioxygenase activity and produce biosurfactant. They were identified as *Pseudomonas plecoglossicida* ATAI18, *Pseudomonas aeruginosa* ATAI19 and *Pseudomonas stutzeri* ATAI21 and submitted to GenBank under the accession number of KF113842, KF113843 and KF113845, respectively. The degradation rate of pyrene by strains ATAI18 and ATAI19 were 45.32% and 31.23%, respectively. The strain ATAI21 degraded 39.38% of phenanthrene after 9 days. It can be concluded that these isolated bacteria can be used to improve the microbial population of other PAH polluted soils for faster bioremediation of such area.

**Keywords:** Biodegradation, Polycyclic aromatic hydrocarbons, Dioxygenase, Biosurfactant, *Pseudomonas* sp.



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