



## **Microbial Degradation of Phenol by Polyurethane Foam-Immobilized Cells of *Pseudomonas aeruginosa* NCIB 950 and *Pseudomonas fluorescens* NCIB 3756**

S.E. Agarry, M.O. Aremu<sup>\*</sup>, L.A. Jimoda

*Department of Chemical Engineering, Biochemical Engineering and Biotechnology Laboratory, Ladoko Akintola University of Technology, P. M. B. 4000, Ogbomoso, Nigeria.*

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**Abstract:** The pollution of soil, river sediments, and ground water by hazardous organic compounds has been gaining increasing attention in the field of environmental remediation. Monoaromatics such as phenol are environmental contaminants suspected of posing human health risks. The potential of various microorganisms to metabolize organic compounds has been observed to be a potentially effective means in disposing of hazardous and toxic wastes. The biodegradation potential of pure cultures of *Pseudomonas aeruginosa* and *Pseudomonas fluorescens* immobilized on polyurethane foam was studied in batch culture using synthetic phenol in water with the initial concentration of 200 – 400 mg/L as a model limiting substrate. The effects of varying cell loadings and foam sizes on the rate of degradation were investigated. The results showed that the immobilized cells presented higher phenol biodegradation activity than free cells in all the experiments. Higher phenol concentrations reduced the biodegradation rate while higher cell loading and larger foam size increased the rate of phenol biodegradation. Modeling of the phenol biodegradation indicated that the first-order kinetic model gave better fit of the experimental biodegradation data than the zero-order kinetic model. These results support development of efficient biocatalysts using immobilized cells and thus can be used to design a practical and economical biodegradation process for the removal of phenol from wastewater.

**Keywords:** *Phenol, Degradation, Immobilization, Pseudomonas aeruginosa, Pseudomonas fluorescens.*

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<sup>\*</sup> Corresponding: E-Mail: moaremu@lautech.edu.ng; Tel: +2348038515011; Fax: +234 815 111 2756