

## Performance Evaluation of a Spouted Bed Bioreactor (SBBR) for the Biodegradation of 2, 4 Dichlorophenol

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**Abstract :** As an economical and environmentally friendly technology, biological treatment has been shown to be one of the most promising approaches for the removal of numerous types of organic water pollutants such as Chlorophenols, which are hazardous pollutants commonly encountered in wastewater generated by the petroleum and petrochemical industries. This study aimed at evaluating the performance of a spouted bed bioreactor (SBBR) for aerobic biodegradation of 2, 4 dichlorophenol (DCP) by a commercial strain of *Pseudomonas putida* immobilized in polyvinyl alcohol (PVA) gel particles. The SBBR is characterized by systematic intense mixing, resulting in improvement of the biodegradation rates through reducing the mass transfer limitations. The reactor was evaluated in both batch and continuous mode in order to evaluate its hydrodynamics in terms of stability and response to shock loads. The SBBR was able to maintain a stable operation and recovered quickly to its normal operating mode once the shock load had been removed. In comparison to a packed bed reactor bioreactor, the SBBR proved to be more efficient and more stable, achieving a removal percentage and throughput of 80% and 1414 g/m<sup>3</sup>day, respectively. In addition, the biodegradation of chlorophenols was mathematically modeled using a dynamic modeling approach in order to assess reaction and mass transfer limitations. The results confirmed the effectiveness of the use of the PVA immobilization technique for the biodegradation of phenols.

**Keywords :** biodegradation, 2, 4 dichlorophenol, immobilization, polyvinyl alcohol (PVA) gel

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