

**DEGRADATION OF ANTHRACENE BY PHYLLOSHERE BACTERIUM *BACILLUS VELEZENSIS* AND ITS KINETIC ASPECTS**

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Polycyclic aromatic hydrocarbons (PAHs) are hazardous pollutants, and among them, researchers have been focusing on anthracene due to its high persistence. PAHs released into the environment could be removed by several approaches. Microbial activity is one of the critical remediators of PAH degradation. Few studies have reported the growth kinetics of bacteria on PAHs. Understanding of growth kinetics of bacteria at different concentrations can help determine their applicability in bioremediation. This study aimed to understand the anthracene biodegradation kinetics of *Bacillus velezensis* in the presence of different concentrations of anthracene. *Bacillus velezensis* (Accession number MN190156) was isolated from the phyllosphere of urban areas in Colombo, Sri Lanka. The isolate was acclimatized in an anthracene-rich medium using anthracene-enriched Bacto Bushnell-Hass. Degradation percentages were analyzed using High-Performance Liquid Chromatography. The best degradation percentage was obtained in the 100 mg/l concentration. Cell growth rates and dry weight of cells under different anthracene concentrations were measured for the kinetic assay. The isolate produced by-product 9, 10-Anthracenedione during the degradation and was detected using Gas Chromatography-Mass Spectrometry. This intermediate was tested for phytotoxicity and was revealed to be not harmful to the phyllosphere. The batch tests were conducted to examine the interaction of anthracene for single components by a pure culture of *B. velezensis* under aerobic conditions. Anthracene degradation was fast with the bacterium, resulting in high biomass growth. The optimum anthracene concentration was 100 mg/l, while higher concentrations inhibit bacterial growth as well as being toxic to the phyllosphere. Michaelis-Menten mathematical equation gives a better fit with experimental kinetic data of anthracene. The results confirmed that the high correlation determination values in anthracene degradation convinced their degradation kinetics to fit the first-order kinetic model well. This model provided a suitable prediction of the *B. velezensis* growth kinetic constants and interactions between PAHs substrates.

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