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Biodegradation kinetics of phenol by predominantly *Pseudomonas* sp. in a batch shake flask

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ABSTRACT

Biodegradation of phenol by predominantly *Pseudomonas* species isolated from a sewage wastewater treatment plant was investigated in batch shake flasks. Phenol with a lower concentration of 100 mg/L was degraded in 10 h and a highest of 800 mg/L in 69 h. The phenol degradation rate was observed to vary largely with the concentrations of phenol used and was found to be less than 10 mg/L/h at both the extremes of the initial concentrations. The degradation kinetics was found follow the three half-order kinetic model with the regression greater than 0.97. The specific substrate utilization rates of the culture at various initial phenol concentrations were fitted to modified substrate inhibition kinetic models of Edward, Haldane, Luong, Han–Levenspiel and Yano–Koga. Among these models the Edward was found to fit the data well with a minimum Root Mean Square error value of 0.0039.

Keywords: Biodegradation; Kinetics; Phenol; *Pseudomonas* species; Substrate inhibition models; Three half-order model

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