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Evaluation of anaerobic stabilization pond for removal of pentachlorophenol from wastewater: response surface methodology

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ABSTRACT

Pentachlorophenol is one of the most important environmental pollutants that despite its dangerous nature are widely used in the industry. Therefore, its removal in aqueous solution is necessary because of toxicity, carcinogenicity, and undesirable health effects. To evaluate the efficiency of process of anaerobic stabilization pond with a volume of one cubic meter and the efficiency of removal of pentachlorophenol and organic matter from wastewater was studied. The effect of pentachlorophenol concentration (0.5, 2.5, and 5 mg/L) and the hydraulic retention time (24, 48, and 60 h) was evaluated on the process efficiency by the response surface methodology and the central composition design test at three levels and 13 runs. Also, to determine the relationship between high-performance liquid chromatography and spectrophotometric methods for measuring pentachlorophenol, SPSS software and *t*-test were used. The chemical oxygen demand (COD) and biochemical oxygen demand (BOD_5) levels in raw wastewater were 380 and 220 mg/L, respectively. The removal efficacy of pentachlorophenol, COD, and BOD_5 was in the range of 17.92%–77.84%, 12.35%–55.44%, and 21.82%–53.15%, respectively. The results showed a good correlation between laboratory values and predicted values of models ($P < 0.05$). Results proved that anaerobic stabilization pond may be a proper low-cost alternative for pentachlorophenol, COD, and BOD_5 removal from wastewaters.

Keywords: Anaerobic stabilization pond; Pentachlorophenol; RSM

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