



Application of fuzzy inference system (FIS) coupled with Mamdani's method in modelling and optimization of process parameters for biotreatment of real textile wastewater

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ABSTRACT

A fuzzy logic-based diagnosis system was developed to optimize the process parameters for the decolourization of a real textile wastewater. A batch-scale colour removal experiment was conducted with a set of variable parameters of the process. The measured data of variables were implemented into the fuzzy inference system with Mamdani's method. The fuzzy model incorporates the weights provided by an expert, avoids the crisp values and offers overlapping range between the different fuzzy sets. A fuzzy rule-based model was shaped to define essential quality parameters monitored as pH, temperature, inoculum concentrations and glucose concentration as inputs. The fuzzy-modelled values of decolourization were validated against the experimental values. Results suggested that modelled results could be validated with experimental data-sets, as supported by a significant correlation coefficient ($r = 0.87$). This study confirms the applicability of fuzzy logic for optimization of conditions in the decolourization process in textile wastewater treatment process.

Keywords: Textile wastewater; Mixed culture; Fuzzy inference system; Optimization

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