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Comparison of batch and novel continuous electrocoagulation processes in the treatment of paint industry wash water

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ABSTRACT

Water is crucial to all life forms on earth. Still, millions of people are suffering because of lack of fresh water. One of the most important reasons is industrial pollution. That is why more effective and economical water treatment systems must be developed and studied worldwide. In this study, a new design of continuous electrocoagulation systems is introduced and compared with widely studied batch process systems. This novel design improves the controllability of water flow and electricity. In the treatment of paint industry wash water, a batch system and a novel continuous electrocoagulation system with an aluminum (Al) anode and an iron (Fe) cathode were used. Two parallel analyses of both processes were conducted, and the average efficiency of chemical oxygen demand and Al removal were 68% and 79.8% in batch and 69.7% and 62.1% in the continuous system, respectively. The number of microbes decreased by 99.6% in the batch and by 99.8% in the continuous system. The calculated operational costs in this experiment were 1.63 €/m^3 for the batch and 1.19 €/m^3 for the continuous system. The novel continuous electrocoagulation process was as efficient as the batch process in this study.

Keywords: Electrocoagulation; Continuous; Wastewater; Operational costs; Microbial cells; Aluminum removal; COD removal

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