Organic pollutants removal from olive mill wastewater by coagulation and electrocoagulation: application of Box-Behnken design (BBD)

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**A B S T R A C T**

In this study, chemical coagulation and electrocoagulation (CC/EC) were evaluated as alternatives for olive mill wastewater (OMW) treatment. Jar test was used to determine the most favorable dosage of coagulant, pH of the process and proper flocculation time. CC experiments were carried out using coagulants (alum, lime, ferric chloride and cement dust). Coagulation efficiency was evaluated by measuring chemical oxygen demand (COD), color and turbidity removal ratio. From Tukey test, it was established that alum was more efficient than other coagulants. The maximum removal efficiency of COD and turbidity were 42\%, 66\%, respectively. The optimum condition was achieved at 0.5 g/100 ml of alum, pH = 6 and flocculation time ranging between 15 min to 25 min. This study used aluminum plates as anode and cathode in electrocoagulation to study COD removal from OMW. Its performance was optimized using Box-Behnken experimental Design and Response Surface Methodology. The following EC optimal conditions were found: current density = 60 mA/cm\textsuperscript{2}, pH = 4 and electrolysis time 20 min. At these conditions, the maximum COD removal ratio was 47\% with an estimated operating cost of 1 USD/m\textsuperscript{3}.

**Keywords:** Chemical coagulation; Electrocoagulation; BBD; OMW; Optimization

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