

Modeling and Optimization of a Green Process for Olive Mill Wastewater Treatment	
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<p><b>Abstract:</b> The olive mill wastewater (OMW) treatment process is modeled and optimized through new design of experiments (DOE). The first step of the process is coagulation–flocculation using three coagulants (modeled with the mixture design) followed by photo-degradation (modelled with the full factorial design). Based on this methodology, we successfully established a direct correlation between the system’s composition during the coagulation–flocculation step and the conditions of the photo-catalytic degradation step. Three coagulants are used in this study, Fe<sup>3+</sup> solution, lime, and cactus juice, and two parameters are considered for the photo-degradation conditions: dilution and catalyst mass. Utilizing a sophisticated quadratic model, the analysis of the two observed responses reveals the ideal parameters for achieving maximum efficiency in coagulation–flocculation and photo-degradation processes. This is attained using a quasi-equal mixture of limewater and cactus juice, exclusively. To achieve an optimal photo-catalytic degradation, it is essential to maintain a minimal dilution rate while employing an elevated concentration of TiO<sub>2</sub>. It was found that the experimental tests validations were in good concordance with the mathematical predictions (a decolorization of 92.57 ± 0.90% and an organic degradation of 96.19 ± 0.97%)</p>	