

Abstract

Linum usitatissimum L. Seeds as a Natural Coagulant for the Removal of Colloidal Matter from Urban Wastewater: Process Optimization Using the Box–Behnken Response Surface Methodology [†]

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This study investigates the effectiveness of *Linum usitatissimum* L. seeds as an ecological and natural coagulant for the treatment of urban wastewater. By adopting the Box–Behnken method within the framework of the response surface methodology, the objective of this work is to evaluate the coagulant's effectiveness and optimize the conditions of the coagulation process, particularly for the removal of colloidal and suspended matter. Three key variables are studied: the concentration of the aqueous extract of *Linum usitatissimum* L. seeds (expressed in mL per liter of wastewater), the coagulation speed (expressed in rpm) and the coagulation duration (expressed in min). The effectiveness of this treatment is evaluated through the turbidity removal rate, serving as an indicator of the presence of colloidal matter in suspensions.

The obtained results suggest that the optimal conditions for the maximum removal of harmful colloidal matter, as indicated by turbidity reduction, involve the use of 1 mL of coagulant extract per liter of effluent, a coagulation speed of 300 rpm and a coagulation duration of 4 min. An average turbidity removal rate that exceeded 60% has been recorded, demonstrating the effectiveness of *Linum usitatissimum* L. seeds as an eco-friendly and natural coagulant, which can be a good alternative to chemical coagulants.

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