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NEW TANNIN-BASED COAGULANT FROM GRAPE STEMS: SYNTHESIS, CHARACTERIZATION AND COAGULATION TESTS

Cristiane Lisboa Giroletti^{1*}, Jean Carlo Salomé dos Santos Menezes², Beatriz Lima Santos
Klienchen Dalari¹, Maria Angeles Lobo-Recio¹, Maria Eliza Nagel Hassemer¹

¹Federal University of Santa Catarina - Sanitary and Environmental Engineering Department, Brasil

²University of Passo Fundo- Graduate Program in Civil and Environmental Engineering, Brasil

Abstract

The present study propounds the synthesis of a new tannin-based organic coagulant (TBC) for the treatment of water and wastewater. Using the Mannich reaction, the TBC was produced based on tannins extracted from grape stems, combined with ammonium chloride, formaldehyde, and diethanolamine. The concentration of total tannins analyzed by the Fólin-Ciocalteu, was 263.9 mg per g of grape stem of stems, and the concentration of condensed tannins analyzed by Vanilina methods 14.95 per g of grape stem. The extract also had a pH of 6.4, density of 0.909 g.L⁻¹, kinematic viscosity of 24.88 Cp and an initial solids concentration of 3%. The physical-chemical characterization of the TBC revealed characteristics similar to commercial organic coagulants, with a brownish liquid aspect, concentration of 238 g.L⁻¹, pH of 1.7, viscosity of 28 c and a solids concentration of 42%. The FTIR spectrum of TBC showed different peaks when compared to the tannin extract spectrum, especially in the regions of 1990 cm⁻¹ and 1737 cm⁻¹. The TBC's effectiveness in the coagulation process was confirmed by the coagulation diagram, which evaluated the best conditions for removing turbidity due to the coagulant dosage and pH variation in water with 50 NTU turbidity induced with kaolin. The TBC was shown to be able to act effectively in the destabilization of colloidal particles and potential applicability in water and wastewater treatment.

Key words: coagulation diagram, grape stems, Mannich reaction, organic coagulant, Tannins

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^{*}Author to whom all correspondence should be addressed: e-mail: cristiane.lisboa01@gmail.com; cristiane.lisboa@posgrad.ufsc.br.