

Optimization of a method to extract the active coagulant agent from *Jatropha curcas* seeds for use in turbidity removal.

Abstract

An improved and alternative method for the extraction of the active coagulant agent from *Jatropha curcas* seeds was developed and compared with the conventional water extraction method (JCSC-DW). In the new method, the seeds were extracted using different solvents in different concentrations, using NaCl (JCSC-NaCl) and NaOH (JCSC-NaOH) to extract the active coagulant agent from the *Jatropha*. In addition, ultrasound was investigated as a potential method to assist the extraction process. Batch coagulation experiments were conducted to evaluate the performance of the extracted coagulant achieved through various schemes. The effects of the dosage, pH and concentration of solvents were investigated for optimum turbidity removal at different values of initial synthetic wastewater turbidity from 50 to 500 NTU. JCSC-NaCl at 0.5 M was found to provide a high turbidity removal of >99% compared to JCSC-DW and JCSC-NaOH at pH 3 using 120 mg/l of the coagulant agent. Among these three solvents, NaOH demonstrated the lowest performance in turbidity removal. The conventional extraction method of the active coagulant agent by blending the seeds in solvents for 2 min alone sufficiently extracts most of the coagulant component from the *Jatropha* seed and provides up to 99.4% turbidity removal. Blending assisted by ultrasound demonstrated comparable turbidity removal in a shorter period of time and thus showed a potential to be used on a larger scale. Analysis was undertaken to determine the protein content as this is believed to be the coagulating agent. It was found that extraction of the coagulant agent using NaCl yielded more protein compared to when using water and NaOH.

Keyword: Coagulation; Coagulant; *Jatropha curcas*; Turbidity; Extraction; Wastewater