

Enhanced coagulant extraction from *Jatropha curcas* in aqueous solutions and its application in turbidity removal

ABSTRACT

In this study, the effect of the extraction medium on the properties and efficiency of bio-coagulant, extracted of *Jatropha curcas* (Jc), in turbidity removal from aqueous solutions has been investigated. The optimized values of NaCl concentration (i.e., NaCl), solution pH and solution temperature were identified to improve the extraction of the coagulant. The optimized conditions were associated with an optimum coagulant dosage and a maximum turbidity removal from the synthetic aqueous solutions. The highest turbidity reduction was achieved with the coagulant extracted at a solution pH of 10 and an extraction temperature of 60°C (pH10/60°C-Jc press cake). Under these conditions, the coagulant dosage required was reduced by 80%–90%, depending on the coagulation pH. At the coagulation pH = 6, the pH10/60°C-Jc press cake well reduced the turbidity by 85%. However, the distilled water-based extract failed to lower the turbidity. Several analytical techniques were employed to characterize the nature of the active components derived from Jc. SDS-PAGE electrophoresis showed that Jc extract was mainly made up of proteins with molecular weights between 20 and 35 kDa. The optimized extraction conditions significantly improved the efficiency of this promising bio-derived coagulant in turbidity reduction. This study demonstrates the potential employability of these enhanced bio-coagulants. This can be a step ahead in helping with the development of sustainable processes in (waste)water treatment, particularly in tropical regions, for example, Malaysia with an abundant access to Jc.

Keyword: *Jatropha curcas*; Natural coagulant; Water treatment; Biomass; Protein; Turbidity removal