

Optimization study on sewage sludge conditioning using *Moringa oleifera* seeds

Abstract

Disposal of sewage sludge is a main problem faced by local municipalities in Malaysia. Sludge conditioned with chemical polymer often termed as undesirable use for land application. However, using natural polymer will help to reduce the impact of this problem. In this study, optimization using *Moringa oleifera* seeds as a natural polymer in sewage sludge conditioning is highlighted. An earlier sludge conditioning using jar test apparatus was conducted using *Moringa oleifera* seeds in three different forms; dry powder, distilled water extracted and salt extracted (1 N NaCl). Results from the study indicate that *Moringa oleifera* in distilled water extracted form shows the most optimum reduction in Capillary Suction Time (CST) value. Optimization of three important factors namely mixing speed, mixing duration and *Moringa oleifera* dosage for distilled water extracted form was done using Design of Experiments (DOE). Optimum values for the selected factors were obtained using Box-Behnken design, Response Surface Design Method (RSM). There was a total of seven set of optimized solutions produced. The best solution generated showed lowest CST and Specific Resistance to Filtration (SRF) was obtained at 4.5 s and 1.22×10^{11} m/kg respectively. These values were obtained under the optimum conditions of mixing speed at 100 rpm, mixing duration of 1 min and *Moringa oleifera* dosage of 4695 mg/L. The desirability index for the optimized solution was 1.000.