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INVESTIGATION OF BIOFLOCCULANT AS DEWATERING AID IN SLUDGE TREATMENT

By: Jami, MS (Jami, Mohammed Saedi)^[1]; Mel, M (Mel, Maizirwan)^[1]; Ariff, ARM (Ariff, Aysha Ralliya Mohd)^[1]; Abdulazeez, QM (Abdulazeez, Qabas Marwan)^[1]

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Abstract

Sludge treatment is one of the most important and expensive steps in water and wastewater treatment plants. Chemical conditioners such as polyaluminum chloride, aluminum sulfate, Fenton's reagent, gypsum, and polyacrylamide can produce byproducts that cause health and environmental problems. *Moringa oleifera* (MO) seeds can be used as a natural alternative to chemical conditioners. The bioactive materials have to be extracted from MO seeds for better performance. In this study, the treatment methods of MO seeds were the bioactive extraction by NaCl (1 M) and oil extraction by hexane solvent, as well as the untreated (crude) seeds powder. Synthetic sludge samples were prepared using kaolin suspension (5% w/v). The most effective coagulant-form was determined based on the values of settling velocity (V-s) and sludge volume index (SVI). Results showed that extraction by NaCl gave the best results of 0.41 cm/min of settling velocity and 63.39 ml/g of SVI. A SVI value greater than 150 ml/g indicates poor settling qualities whereas the control sludge of the current study was 100 ml/g. The most effective coagulant-form was optimized with respect to three process conditions: MO seeds dosage, mixing speed, and contact time. The experiments were designed using 2 Level Factorial-Design by Design-Expert software. The optimum process conditions were seeds dosage of 3246 mg/l, mixing speed of 102 rpm, and mixing time of 29 min. MO seeds can be considered as a natural coagulant that can be used as main sludge conditioner.

Keywords

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Author Information

Reprint Address: Jami, MS (reprint author)

+ Int Islamic Univ Malaysia, Fac Engr, Dept Biotechnol Engr, Jalan Gombak, Kuala Lumpur 53100, Malaysia.

Addresses:

+ [1] Int Islamic Univ Malaysia, Fac Engr, Dept Biotechnol Engr, Jalan Gombak, Kuala Lumpur 53100, Malaysia

E-mail Addresses: saedi@iium.edu.my

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