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Letter to Editor Open Access

Biodegradable Flocculants Exploitation in Industrial Mining to Maintain Tailings in a Sustainable Manner

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Letter to Editor

Industrial mining and mineral processing processes discharge massive amounts of fluid tailings, which offer significant economic and environmental issues. We created a unique bioflocculant using defined risk materials, a form of waste biomass from the animal rendering industry, to extract water and compress tailings into sediment [1]. The bioflocculant satisfied industry criteria for fluid tailings treatment, including better short-term tailings settling and increased final water removal extent, by carefully managing essential synthesis parameters. Settling studies using genuine industrial fluid tailings revealed that the synthesised bioflocculant obtained a 4-fold greater initial settling rate than the control case and 93.2 percent of the dewatering effectiveness of a commercial flocculants (hydrolysed polyacrylamide; HPAM) [2]. Unlike HPAM, our bioflocculant can settle tailings without the need of gypsum, a popular processing aid that can stymie downstream industrial processes. More significantly, growth studies with two common microorganisms (Saccharomyces cerevisiae and Escherichia coli) revealed that the bioflocculant is quickly degradable, implying that it has less negative environmental consequences after usage. Taken together, this research shows that using a biodegradable bioflocculant derived from proteinaceous wastes for the clean and long-term management of mining and mineral processing fluid tailings has a lot of promise.

Three knowledge gaps will be filled in this study in order to advance technology development for scale-up. To enable the creation of bioflocculants that satisfy various tailings settling goals, the influence of synthesis parameters on product performance will be examined first [3]. For example, a bioflocculant that improves ultimate dewatering efficiency is important for mining operations that rely heavily on the amount of water that can be recycled, such as the mining of oil sands; alternatively, a bioflocculant that allows for rapid tailings settling in a short amount of time is important for facilities with limited tailings processing capabilit [4]. Second, after the successful use of peptides-PAE for the flocculation of synthetic tailings, this bioflocculant will be used to test its efficacy in the treatment of industrial tailings finally, whereas SRM-derived peptides from cattle are biodegradable, it is crucial to investigate if the peptides-PAE bioflocculant may preserve this property. As a result, if used for dewatering industrial fluid tailings, this peptide-PAE bioflocculant has a high potential for biodegradation by environmental strains. Future research will look at the influence of the bioflocculant on microorganism activity in the real tailings, as well as the effects on tailings pond landscape reclamation. This is the first research to show that a peptide-PAE bioflocculant may be used to remediate genuine industrial fluid tailings [5]. Bioflocculants with varying performance may be synthesised by correctly regulating key synthesis elements to fulfil specific industrial needs, such as better short-term tailings settling or improved ultimate water removal. In comparison to the commercial HPAM flocculant, the created SRM-derived bioflocculant not only accomplished a comparable quick and full densification (93.2 percent dewatering efficiency in the HPAM example) of genuine industrial fluid tailings, but also allowed tailings to settle without gypsum. Two common microbes can also breakdown the bioflocculant and use it as a nitrogen source. Overall, bioflocculants obtained from negative-value SRM feedstock's have a lot of promise for clean and long-term industrial fluid tailings management.

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