



Treatment performance of palm oil mill effluent by utilizing Chitosan and ferric chloride coupled with activated carbon and ultrasound bath

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ABSTRACT

Although the palm oil industry contributes significantly to the Malaysian economy, it is creating environmental problems also, due to the palm oil mill effluent (POME). More than 85% of Malaysia's palm oil mills have adopted the ponding system to reduce the chemical oxygen demand (COD) and the biochemical oxygen demand (BOD) of POME to an acceptable limit because of its low equipment cost and ease of operation. However, given that the system requires a long hydraulic retention time, vast land, and that it releases methane gases, many mills are unable to achieve the discharge limit. This study addresses the issue by applying Chitosan and ferric chloride to decrease the COD and the BOD pollutants in POME before their discharge into the watercourse. A series of experiments were carried out to determine the characteristics performances and the optimum working conditions of each natural and synthetic coagulants paired with an ultrasound bath and activated carbon (AC). Results show that the best combination for POME treatment was with ultrasound cavitation, ferric chloride, and AC. The hybrid treatment was able to remove the BOD, the COD, the color and the total suspended solid up to 89.74%, 88.05%, 99.9%, and 99.5%, respectively. Therefore, the outcome of the study complies with the requirement of the Department of Environment Malaysia, which could assist palm oil mills to achieve environmental sustainability.

Keywords: Palm oil mill effluent; Ultrasound cavitation; Chitosan; Ferric chloride; Activated carbon

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