

Electro persulphate oxidation for polishing of biologically treated palm oil mill effluent (POME)

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Abstract

Malaysia alone produces more than 49 million m³ palm oil mill effluent per year. Biological treated palm oil mill effluent via ponding system often fails to fulfill the regulatory discharge standards. This is due to remaining of non-biodegradable organics in the treated effluent. Thus, the aim of this study was to resolve such issue by using electro persulphate oxidation process, for the first time, as a post treatment of palm oil mill effluent. Central composite design in response surface methodology was used to analyze and optimize the interaction of operational variables (i.e., current density, contact time, initial pH and persulphate dosage) targeted on maximum treatment efficiency. The significance of quadratic model of each response was determined by analysis of variance, where all models indicated sufficient significance with p-value < 0.0001. Optimum operational conditions with 45 mA/cm² of current density, 45 min of contact time, pH 4 and 0.892 g of S₂O₈²⁻ proved that 77.70% of Chemical Oxygen Demand, 97.96% of colour as well as 99.72% of Suspended Solids removal were achieved. The final pH of 5.88 of the effluent was obtained that fulfilled the limit and suitable for direct discharge to the natural environment. © 2017 Elsevier Ltd

Keywords: Central composite design; Electro persulphate oxidation; Optimization; Palm oil mill effluent; Post treatment

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