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Screening of electrocoagulation process parameters for treated palm oil mill effluent using minimum-runs resolution IV design (Article)

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Abstract

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The present study aimed at the screening of parameters for electrocoagulation treatment of treated palm oil mill effluent using minimum-runs resolution IV design. The responses examined include: chemical oxygen demand removal (%), total suspended solids removal (%) and turbidity reduction (%), and the varied dependent factors comprise: electrical current density (mA/cm^2), time (min), pH, electrolyte concentration (g/L), stirring speed (rpm), electrode spacing (mm) and electrode configuration (monopolar or dipolar). The statistical results revealed that the current density has a significant influence on the treatment performance at two-level interactions with pH, electrode spacing and electrode concentration and at three-level correlations with time and pH. Thus, the most important factors affecting the removal efficiency of the organic compounds were found to be pH, time, electrode spacing, electrolyte concentration and electrode configuration at a P value less than 0.05, respectively, in the descending order of significance. Therefore, the optimized electrocoagulation process could be reached with current density equal to 5 mA/cm^2, electrolysis time of 5 min, electrode spacing of 5 mm and using monopolar electrode configuration. This combination provided the maximum ability of the process for chemical oxygen demand (68.84%), total suspended solids (93.27%) and turbidity reduction (92.88%) predictions, with the corresponding experimental values of 69.27, 97.59 and 96.91%, respectively. © 2018, Islamic Azad University (IAU).

SciVal Topic Prominence

Topic: Coagulation | Removal | electrocoagulation EC

Prominence percentile: 98.984

Author keywords

Electrocoagulation | Minimum-runs resolution IV design | Reclamation | Treated palm oil mill effluent

Indexed keywords

Engineering controlled terms: Coagulation | Current density | Effluent treatment | Effluents | Electrodes | Electrolytes | Land reclamation | Oil shale | Oxygen | Palm oil | pH | Turbidity

Engineering uncontrolled terms: Chemical oxygen demand removals | Electro coagulations | Electrode configurations | Electrolyte concentration | Monopolar electrode configurations | Palm oil mill effluents | Total suspended solids | Treatment performance

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