Optimization Of Photocatalytic Degradation Of Palm Oil Mill Effluent In UV/Zno System Based On Response Surface Methodology

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ABSTRACT

This paper reports on the optimization of palm oil mill effluent (POME) degradation in a UV-activated-ZnO system based on central composite design (CCD) in response surface methodology (RSM). Three potential factors, \textit{viz.} \textit{O}_2 flowrate (A), ZnO loading (B) and initial concentration of POME (C) were evaluated for the significance analysis using a 2\textsuperscript{3} full factorial design before the optimization process. It is found that all the three main factors were significant, with contributions of 58.27\% (A), 15.96\% (B) and 13.85\% (C), respectively, to the POME degradation. In addition, the interactions between the factors AB, AC and BC also have contributed 4.02\%, 3.12\% and 1.01\% to the POME degradation. Subsequently, all the three factors were subjected to statistical central composite design (CCD) analysis. Quadratic models were developed and rigorously checked. A 3D-response surface was subsequently generated. Two successive validation experiments were carried out and the degradation achieved were 55.25 and 55.33\%, contrasted with 52.45\% for predicted degradation value.

KEYWORDS

Center composite design; Optimization; Palm oil mill effluent; Photocatalysis; Zinc oxide

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