

## Evaluation of La-Doped CaO Derived from Cockle Shells for Photodegradation of POME

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### ABSTRACT

Photocatalysis has merged to be one of the most promising technology in wastewater remediation. However, the application of photocatalysis in treating palm oil mill effluent (POME) is still limited. Many researches were conducted to explore simple and cost-effective alternatives to replace TiO<sub>2</sub> for various industrial purposes. Therefore, the aim of this study is to synthesize and characterize lanthanum doped calcium oxide (La/CaO) as photocatalyst as well as to evaluate the performance of these photocatalysts in the degradation of POME. The photocatalyst used in this study was converted from cockle shells to transform into calcium oxide (CaO) through calcination process. The CaO produced was doped with 1 wt%, 3 wt%, and 5 wt% of lanthanum (La) using wet impregnation method to enhance its photocatalytic activity. The photocatalysts were characterised using X-ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), Brunauer-Emmett-Teller (BET), Scanning Electron Microscopy (SEM), Energy-Dispersion X-ray (EDX) and Inductively Coupled Plasma Mass Spectrometry (ICPMS). Then, this photocatalyst was performed on POME under UVC in a batch system by using different La/CaO at optimum catalyst dosage of 3.0 g/L. Through this research, it was found that the POME degradation through photocatalytic reaction was increased with the incorporation of La where 3 wt% La/CaO shows the highest POME degradation compared to others. This is due to the larger BET surface area that provides more active sites resulted from the incorporation of La. The findings of this study imply that the contaminants in POME can be reduced by utilizing CaO derived from cockle shells.

### KEYWORDS:

Calcium Oxide; Cockle Shell; Palm Oil Mill Effluent; Photodegradation