Photocatalytic Degradation of Methylene Blue (MB) using Tilabia (*Oreochromis niloticus*) fishbone derived hydroxyapatite (Hap)

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ABSTRACT

The impact of excessive accumulation of dye like methylene blue (MB) in the environment has posed a challenge to both researchers and scientists. Due to the recalcitrant nature of the dye, the implementation of advanced oxidation process in wastewater paves the way for the development of a sustainable photocatalyst. Here, the photocatalytic degradation of MB using hydroxyapatite (HAp) from Tilapia *(Oreochromis niloticus)* fish bone as a photocatalyst was investigated. The Hap was synthesized via calcination under simple heat treatment at 900^{o}C with 5/min heating rate. The physicochemical properties of the synthesized HAp were characterized using Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscope (SEM), and X-ray Diffractometer (XRD). The photocatalytic degradation of MB was conducted at varying initial pollutant concentrations (8 and 12 ppm), catalyst loading (500 and 1000 mg), and time exposure (1 and 2 hr). Results showed that the HAP exhibited an agglomerated formation of non-uniform nano-spherical crystal powder. FTIR confirmed the presence of functional groups associated with Hap while the XRD spectra demonstrated peaks at 31.70°, 32.84° and 32.12° confirming the formation of Hap. Finally, the highest photocatalytic degradation of 84.75% was obtained with 12 ppm initial concentration, 1000 mg catalyst loading subjected to 2 hr UV irradiation time showing the potential of mitigating the impact of MB dye in the environment.

Keywords: Photocatalytic Degradation, Calcination, Hydroxyapatite, Methylene Blue, Tilapia Fish Bone