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Effective photocatalytic and solid acid catalytic behaviour of novel bismuth oxychloride nanomaterial

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In this article, superior photoactive BiOCl nanomaterial has been successfully synthesized and characterized by FT-IR, XRD, SEM, EDS, ECM and UV-DRS analysis respectively. The XRD results show that BiOCl is in tetragonal primitive crystal structure with size of 67 nm. The synthesized BiOCl nanomaterial has been employed as a catalyst to remove methyl orange from aqueous solutions by varying the operational parameters such as pH, catalyst concentration, and reusability using photocatalytic method. The maximum degradation of dye that has been attained is 97% under the optimum conditions of pH 6 and 1.4 g L⁻¹ catalyst concentration. Besides, their removal efficiencies are not much lowered even after five repeated cycles. Moreover, BiOCl nanocatalyst has been used as a solid acid catalyst for the effective synthesis of some chalcones. Hence, the synthesized nanocatalyst could be applied for tertiary process in pilot scale in continuous mode for the treatment of wastewater.

Keywords: Photocatalyst, BiOCl nanocatalyst, Solid acid catalyst, Methyl orange, Wastewater