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Abstract	:	Modern advances in semiconductor photocatalysis, particularly increased turnover on degradation of phenolic compounds from industrial wastewater. Phenolic compound is a major environmental threat considering their hazardous effects and recalcitrance. This study focused on the development of high efficiency magnetic bead catalyst with photocatalysis technology as a solution to phenolic compound obstacles in industrial wastewater. The magnetic bead catalyst underwent bead casting process by encapsulating a polymer matrix of sodium alginate and crosslinking it with epichlorohydrin, which enhancing its hydrophilicity, durability, rigidity, selectivity, permeability, and longevity, thereby achieving superior photocatalytic performance. Characterisation techniques including Fourier-transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD) were employed to analyse the structural and chemical properties of these catalyst. The photocatalytic efficiency of the magnetic bead catalyst for the degradation of phenol was assessed when subjected to visible light. A comprehensive study was conducted exploring the effects of pH, catalyst dosage, and initial phenol concentration on effectiveness of degradation. The optimal conditions for the Fe-beads catalyst were achieved at pH 5, with a dosage of 6.0 g L⁻¹ and an initial phenol concentration of 20 mg L⁻¹, resulting in a phenol photodegradation efficiency of 87.29%. These magnetic bead catalyst implementations for wastewater recovery were cost-effective, quick to implement, eco-friendly, and regenerable. In short, synthesising magnetic bead catalyst might pose an innovative approach towards challenges with wastewater treatment.