Application of immobilized laccase in the removal of oil from wastewater

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ABSTRACT

The removal of oil from simulated oily wastewater by catalyzed oxidation with immobilized laccase was investigated. The effects of several main factors, such as pH, the amount of laccase, temperature, and reaction time, were discussed in detail. The results indicated that the optimum condition for immobilized laccase-catalyzed removal of oil was as follows: 25 mL simulated oily wastewater with the oil concentration of 120 mg/L in phosphate buffer (0.1 M, pH 4.5), reacted with 0.7696 g immobilized laccase and 100 mg/L chitosan at 25˚C for 6 h. The oil removal efficiency was as high as 86% under the optimum conditions. Mg²⁺ and Cu²⁺ ions had little effect on the oil removal efficiency of immobilized laccase, but Fe²⁺ reduced the oil removal efficiency. The effect of the support on oil removal efficiency could be neglected. The immobilized laccase demonstrated a reliable and stable reusability.

Keywords: Immobilized laccase; Catalyzed oxidation; Oily wastewater; Chitosan; Metal ions