ABSTRACT

The textile industry is one of the largest contributors of liquid waste, which contains hazardous dyes such as remazol black B (RBB), an azo compound that is difficult to degrade and has the potential to pollute aquatic environments. One method developed to address this waste is the fenton-like method, a modification of the traditional fenton process that replaces Fe^{2+} catalysts with alternative catalysts such as lead (Pb), which can react with H_2O_2 to generate hydroxyl radicals. Lead derived from used batteries is chosen for its cost-effectiveness, corrosion resistance, and environmental friendliness. This study aims to obtain the best decolorization performance and determine the effectiveness of Pb from used and new batteries as catalysts in the decolorization of RBB solution using the fenton-like method. The research steps included Pb characterization from used batteries using XRF, preparation of 100 ppm RBB solution, determination of maximum wavelength, and variations in H_2O_2 concentration and volume as well as Pb powder dosage. Analysis was conducted using UV-Vis spectrophotometry, COD testing, and AAS. The results showed optimum conditions at 15% H_2O_2 with a volume of 25 mL and 8 mmol of Pb, yielding decolorization efficiencies of 99,39% (used battery) and 93,25% (new battery). COD reduction reached 25,25% (used battery) and 18,18% (new battery), with an increase in dissolved Pb concentration to 0,05 mg/L (used battery) and 0,09 mg/L (new battery). These results indicate that Pb from used batteries is more effective and efficient as a catalyst in the decolorization of RBB solution using the fenton-like method.

Keywords: Fenton-like method, decolorization, remazol black B, lead, hydrogen peroxide, UV-Vis spectrophotometry