

ABSTRACT

This study developed the synthesis of lead oxide nanoparticles (PbO-NPs) through a green chemistry approach using *Artocarpus heterophyllus* (jackfruit) peel extract as a bioreductant, capping agent, and stabilizer. The high antioxidant content in the peel facilitates the eco-friendly formation of nanoparticles while promoting the sustainable utilization of agricultural waste. The primary objective was to decolorize Remazol Black B (RBB) dye solution using a Fenton-like reaction catalyzed by the synthesized PbO-NPs, as well as to evaluate the effect of the catalyst and determine optimal operational conditions. Variations in hydrogen peroxide (H₂O₂) concentration and volume were investigated through a series of steps, including sample preparation, PbO characterization, and UV-Vis spectrophotometric analysis. The results demonstrated a decolorization efficiency of 99.06% for a 20 ppm RBB solution (50 mL) with a contact time of 1 hour. However, the presence of dissolved Pb ions at 1.2 mg/L highlights the need for further consideration in practical applications. These findings contribute to the development of nanomaterials based on green chemistry principles and their application in dye wastewater treatment, offering an innovative, efficient, and environmentally sustainable nanotechnology solution.

Keywords: Fenton-like reaction, jackfruit peel extract, lead oxide nanoparticles, decolorization, Remazol Black B, green chemistry