

ABSTRAK

Telah dilakukan penelitian dekolorisasi larutan zat warna *remazol black B* menggunakan metode *Fe-modified Fenton* sebagai salah satu pengolahan limbah tekstik dan batik. Penelitian ini melibatkan penentuan kondisi optimum terhadap konsentrasi H_2O_2 , volume H_2O_2 dan jumlah serbuk Fe yang dibutuhkan. Penelitian ini melibatkan beberapa tahapan, termasuk preparasi larutan sampel *remazol black B* 100 ppm sebanyak 500 mL, penentuan panjang gelombang maksimum, pembuatan kurva kalibrasi, karakterisasi serbuk Fe sebelum dan setelah proses dekolorisasi menggunakan SEM-EDX, penentuan kondisi optimum dekolorisasi dengan metode *Fe-modified Fenton* dengan variasi konsentrasi H_2O_2 (3%, 6%, 9%, 12%, 15%, dan 18%), variasi volume H_2O_2 (5 mL, 10 mL, 15 mL, 20 mL, 25 mL, 30 mL, 35 mL, dan 40 mL), dan variasi jumlah serbuk Fe (4 mmol, 12 mmol, 20 mmol, 28 mmol, 36 mmol, 44 mmol, dan 52 mmol), kemudian divalidasi dengan hasil analisis spektra UV-Vis, analisis nilai COD (*Chemical Oxygen Demand*), dan analisis kandungan logam Fe menggunakan AAS (*Atomic Absorption Spectrophotometry*). Berdasarkan penelitian yang telah dilakukan, kondisi optimum yang digunakan dalam metode *Fe-modified Fenton* adalah konsentrasi H_2O_2 9% sebanyak 30 mL dan serbuk Fe sebanyak 12 mmol. Persentase dekolorisasi metode *Fe-modified Fenton* adalah 54,64%. Hasil tersebut diperkuat dengan spektra UV-Vis larutan pasca dekolorisasi yang lebih landai daripada sebelum dekolorisasi. Nilai COD setelah perlakuan *Fe-modified Fenton* mengalami kenaikan hingga 15,6 kali dan hasil analisis AAS menunjukkan konsentrasi ion logam Fe terlarut sebesar 0,3 mg/L pada larutan zat warna *remazol black B* setelah perlakuan dekolorisasi.

Kata kunci: Dekolorisasi, Fenton modifikasi, *remazol black B*, serbuk Fe, hidrogen peroksida

ABSTRACT

A study was conducted on the decolorization of remazol black B dye solution using the Fe-modified Fenton method as a treatment for textile and batik waste. This research involved determining the optimal conditions for H₂O₂ concentration, H₂O₂ volume, and the amount of Fe powder required. The study included several stages, such as the preparation of a 100 ppm remazol black B dye solution of 500 mL, determination of the maximum wavelength, creation of a calibration curve, characterization of Fe powder before and after the decolorization process using SEM-EDX, optimization of decolorization conditions using the Fe-modified Fenton method with variations in H₂O₂ concentration (3%, 6%, 9%, 12%, 15%, and 18%), H₂O₂ volume (5 mL, 10 mL, 15 mL, 20 mL, 25 mL, 30 mL, 35 mL, and 40 mL), and the amount of Fe powder (4 mmol, 12 mmol, 20 mmol, 28 mmol, 36 mmol, 44 mmol, and 52 mmol). The results were validated through UV-Vis spectrum analysis, COD (Chemical Oxygen Demand) analysis, and Fe content analysis using AAS (Atomic Absorption Spectrophotometry). Based on the research conducted, the optimal conditions for the Fe-modified Fenton method were 9% H₂O₂ with a volume of 30 mL and 12 mmol of Fe powder. The decolorization percentage using the Fe-modified Fenton method was 54.64%. This result was supported by the UV-Vis spectra of the solution after decolorization, which showed a more gradual slope compared to before decolorization. The COD value after the Fe-modified Fenton treatment increased by up to 15.6 times, and the AAS analysis showed a dissolved Fe ion concentration of 0.3 mg/L in the remazol black B dye solution after decolorization.

Keywords: Decolorization, modified fenton, remazol black B, Fe powder, hydrogen peroxide