ABSTRAK

EFEKTIVITAS VARIASI EKSTRAK BIJI PEPAYA DAN BIJI KELOR SEBAGAI BIOKOAGULAN DALAM PENGOLAHAN LIMBAH CAIR INDUSTRI KARTON BOX

(Nurhidayah, 2026, 42 halaman, 10 Tabel, 10 Gambar, 4 Lampiran)

Limbah cair industri karton box mengandung padatan tersuspensi dan bahan organik yang tinggi sehingga memerlukan pengolahan sebelum dibuang ke lingkungan. Penelitian ini bertujuan untuk mengetahui karakteristik awal limbah cair industri karton box, menganalisis pengaruh variasi rasio dan dosis kombinasi ekstrak biji pepaya (*Carica papaya L*.) dan biji kelor (*Moringa oleifera*) sebagai biokoagulan terhadap penurunan TSS, COD, dan BOD, serta menentukan kondisi optimum pengolahan. Penelitian dilakukan menggunakan *Jet Bubble Column* dengan variasi rasio ekstrak biji kelor dan biji pepaya yaitu 20:80, 30:70, 50:50, 70:30, dan 80:20 serta dosis 100, 150, 200, dan 250 ppm. Hasil penelitian menunjukkan bahwa kondisi optimum diperoleh pada rasio 80:20 dengan dosis 200 ppm, yang menghasilkan efisiensi penurunan TSS sebesar 94,40%, COD sebesar 88,65%, dan BOD sebesar 87,45%. Hasil penelitian menunjukkan bahwa kombinasi ekstrak biji kelor dan biji pepaya efektif digunakan sebagai biokoagulan alami dalam pengolahan limbah cair industri karton box menggunakan *Jet Bubble Column*.

Kata kunci: biokoagulan, biji pepaya, biji kelor, limbah cair karton box, koagulasi-flokulasi, TSS, COD, dan BOD.

ABSTRACT

THE EFFECTIVENESS OF VARIATIONS OF PAPAYA SEED AND MORINGA SEED EXTRACTS AS BIOCOAGULANTS IN PROCESSING LIQUID WASTE FROM THE CARTON BOX INDUSTRY

(Nurhidayah, 2026, 42 *Page, 10 Table, 10 Figure, 4 Appendixes)*

Corrugated cardboard industry wastewater contains high concentrations of suspended solids and organic matter, requiring appropriate treatment before being discharged into the environment. This study aimed to determine the initial characteristics of corrugated cardboard industry wastewater, evaluate the effect of different ratios and dosages of combined papaya seed (Carica papaya L.) and moringa seed (Moringa oleifera) extracts as natural biocoagulants on the removal of Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), and Biological Oxygen Demand (BOD), and determine the optimum treatment conditions. The treatment process was carried out using a Jet Bubble Column with moringa seed to papaya seed extract ratios of 20:80, 30:70, 50:50, 70:30, and 80:20, and biocoagulant dosages of 100, 150, 200, and 250 ppm. The optimum condition was obtained at a ratio of 80:20 and a dosage of 200 ppm, achieving removal efficiencies of 94.40% for TSS, 88.65% for COD, and 87.45% for BOD. These results indicate that the combination of moringa seed and papaya seed extracts is effective as a natural biocoagulant for the treatment of corrugated cardboard industry wastewater using a Jet Bubble Column.

Keywords: *Natural coagulant, papaya seed, moringa seed, Jet Bubble Column, TSS, COD, BOD.*