

# Pengaruh Penambahan Ozon pada Proses Koagulasi-Flokulasi Menggunakan Koagulan PAC untuk Limbah Cair Batik = Effect of Ozone Addition on Coagulation-Flocculation Process by Using PAC Coagulant for Batik Wastewater

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## Abstrak

Industri batik menghasilkan limbah cair dalam volume besar yang saat ini proses pengolahannya masih sangat buruk. Pada penelitian ini dilakukan upaya pengolahan limbah cair batik dengan metode koagulasi-flokulasi, ozonasi tunggal, dan kombinasi ozonasi sebelum koagulasi-flokulasi (pra-ozonasi) dan ozonasi setelah koagulasi-flokulasi (post-ozonasi). Pada keempat metode dioptimasi pada beberapa parameter yaitu pH awal, dosis koagulan, dan waktu bubbling ozon untuk memperoleh degradasi maksimum limbah cair batik. Koagulan yang digunakan adalah koagulan PAC yang memiliki rentang pH kerja yang lebih luas dibanding koagulan lain. Pada proses koagulasi-flokulasi tunggal dengan pH 4 dan dosis koagulan 300 ppm diperoleh penyisihan COD, TSS, dan warna (Pt-Co) masing-masing sebesar 84,55%, 99,24%, dan 98,50%. Pada proses ozonasi tunggal dengan pH 4 dan waktu bubbling 4 menit diperoleh penyisihan COD, TSS, dan warna (Pt-Co) masing-masing sebesar 9,52%, 6,78%, dan 0,15%. Pada kombinasi ozonasi sebelum koagulasi-flokulasi dengan pH 4, dosis koagulan 200 ppm dan waktu bubbling ozon 4 menit diperoleh penyisihan COD, TSS, dan warna (Pt-Co) masing-masing sebesar 83,41%, 98,77%, dan 98,01%. Pada kombinasi ozonasi setelah koagulasi-flokulasi dengan pH 4, dosis koagulan 300 ppm dan waktu bubbling ozon 4 menit diperoleh penyisihan COD, TSS, dan warna (Pt-Co) masing-masing sebesar 83,36%, 99,31%, dan 99,23%.

Batik industry produces large volumes of liquid waste, which is still has very poor treatment nowadays. In this research efforts were made to treat batik wastewater using the coagulation-flocculation, single ozonation, and combination of ozonation before coagulation-flocculation (pre-ozonation) and ozonation after coagulation-flocculation methods (post-ozonation). The methods were optimized for some parameters: initial pH, coagulant dose, and ozone bubbling time to obtain maximum degradation of batik waste water. The coagulant used in this research is PAC coagulant which has wider pH range than other coagulants. In a single coagulation-flocculation process with a pH 4 and 300 ppm PAC, the removal of COD, TSS, and color (Pt-Co) obtained were 84.55%, 99.24%, and 98.50%, respectively. In a single ozonation process with pH 4 and 4 minutes of bubbling time, the removal of COD, TSS, and color (Pt-Co) obtained were 9.52%, 6.78%, and 0.15%, respectively. In the combination of ozonation before coagulation-flocculation with pH 4, 200 ppm PAC and 4 minutes of ozone bubbling time, the removal of COD, TSS, and color (Pt-Co) obtained were 83.41%, 98.77%, and 98.01%. In the combination of ozonation after coagulation-flocculation with pH 4, 300 ppm PAC and 4 minutes of ozone bubbling time, the removal of COD, TSS, and color (Pt-Co) obtained were 83.36%, 99.31%, and 99.23%.