

Degradasi zat warna blue KN-R pada limbah industri batik melalui proses oksidasi lanjut menggunakan kombinasi teknik ozonasi dan kavitasasi hidrodinamika = Degradation of blue KN-R dye in batik effluent by advanced oxidation process using a combination of ozonation and hydrodynamic cavitation technique

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Abstrak

Pada penelitian ini, degradasi 100 ppm Blue KN-R dilakukan menggunakan ozonasi, kavitasasi hidrodinamika, dan kombinasi keduanya dalam waktu 60 menit. Ketiga konfigurasi metode dioptimasi pada beberapa parameter seperti laju alir, pH awal, dan dosis ozon untuk mendapatkan degradasi maksimum Blue KN-R. Proses ozonasi menghasilkan laju dekolonisasi sebesar 70,16 pada pH 11 dan 156,48 mg/jam dosis ozon, sementara proses kavitasasi hidrodinamika menghasilkan laju dekolonisasi sebesar 1,79 pada pH 4. Dekolorisasi tertinggi dihasilkan oleh kombinasi ozonasi dan kavitasasi hidrodinamika sebesar 79,39 pada pH 11 dan 156,48mg/jam dosis ozon. Penurunan TOC yang dihasilkan oleh metode ozonasi, kavitasasi hidrodinamika, dan kombinasi keduanya adalah sebesar 14,81 ; 1,85 ; dan 19,9. Dengan menggunakan kondisi optimum, degradasi Blue KN-R dilakukan selama 120 menit dan menghasilkan dekolonisasi sebesar 92,63 dan penurunan TOC sebesar 24,54. Hasil dekolonisasi dan mineralisasi yang sinergis disebabkan oleh efek mekanis dan kimiawi dari kavitasasi hirodinamika dalam meningkatkan kelarutan ozon dan produksi radikal hidroksil. Degradasi limbah batik dilakukan pada kondisi operasi optimum selama 120 menit. Hasil degradasi warna, COD, BOD, dan TSS adalah sebesar 69,82 ; 68,72 ; 66,54 ; dan 79,84.

.....In the present work, degradation of 100 ppm Blue KN R has been investigated using ozonation, hydrodynamic cavitation, and their combination for 60 min. Three configuration methods were optimized in terms of different operating parameters such as flowrate, initial pH, and ozone dosage to get the maximum degradation of Blue KN R. It has been found that the decolorization rate at pH 11 and 156.48 mg h of ozone by ozonation was 70.16, while the decolorization rate at pH 4 by hydrodynamic cavitation was 1.79. The highest decolorization by their combination was observed at pH 11 and 156.48 mg h of ozone with 79.39 decolorization rate. The percentage of TOC removal by ozonation, hydrodynamic cavitation, and their combination has been investigated resulting 14.81, 1.85, and 19.9, respectively. Following the optimization of hybrid method, degradation of Blue KN R was conducted for 120 min resulted 92.63 decolorization rate and 24.52 of TOC removal. The synergetic decolorization and mineralization rate is due to the mechanical and chemical effect of hydrodynamic cavitation to enhance ozone solubility and hydroxyl radicals production. Degradation of batik effluent has been investigated by optimum operational condition for 120 min. The color, COD, BOD, and TSS removal were 69.82, 68.72, 66.54, and 79.84, respectively.