



Biodegradasi Pewarna Indigosol pada Limbah Batik oleh Bakteri

Intisari

Residu bahan kimia terutama pewarna terdapat di dalam limbah tekstil. Salah satu jenis pewarna yang paling banyak digunakan untuk industri batik adalah indigosol. Pewarna tersebut bersifat sukar mengalami biodegradasi (*recalcitrant*) sehingga mempunyai potensi sebagai pencemar lingkungan. Penelitian bertujuan untuk mendapatkan bakteri pendekomposisi pewarna indigosol dan menguji aktivitasnya. Penelitian diawali dengan seleksi isolat bakteri perombak pewarna batik dari limbah cair berdasarkan kemampuan tumbuh pada medium cair yang mengandung berbagai konsentrasi pewarna indigosol ($C_{16}H_{10}N_2O_2$). Isolat yang mampu tumbuh dan memiliki zona pertumbuhan terbesar dipilih untuk penelitian selanjutnya. Kemampuan degradatif isolat terpilih terhadap pewarna indigosol diuji melalui percobaan kultivasi dengan menggunakan medium mineral basal (MSM) yang berisi pewarna indigosol (100mg/L). Aktivitas bakteri yang meliputi pertumbuhan diukur dengan spektrofotometer ($\lambda 600$ nm) dan hasil degradasi dianalisis berdasarkan kandungan gula reduksi dengan metoda DNS, serta hasil struktur degradasi dideteksi menggunakan *Gas Chromatography-Mass Spectrometry* (GC-MS). Isolat bakteri diidentifikasi menggunakan metode standar. Hasil penelitian menunjukkan bahwa 40 isolat bakteri dari limbah batik, hanya tiga isolat (SP 20, SP 28 dan SP 38) yang menunjukkan aktivitas degradatif tinggi terhadap pewarna indigosol. Aktivitas tertinggi ditunjukkan oleh isolat bakteri SP 38, mampu mendekolorisasi indigosol sebesar 88,39%, isolat bakteri SP 28 mendekolorisasi indigosol sebesar 78,48% dan isolat bakteri SP 20 mendekolorisasi indigosol sebesar 42,24%. Hasil identifikasi dan karakterisasi menunjukkan bahwa isolat SP 20 mirip dengan *Serratia* sp., SP 28 mirip dengan *Klebsiella* sp. Sedangkan isolat SP 38 yang mempunyai aktivitas degradasi tertinggi mirip dengan *Aeromonas* sp.

Kata kunci: Limbah, Indigosol, Bakteri, Degradasi, GC-MS



BIODEGRADATION OF INDIGOSOL TEXTILE DYE BY BACTERIA

Abstract

Waste textile dyes contain most of the residues. One of the dyes used is indigosol. These dyes are difficult for degradation (*recalcitrant*) and therefore have potential as an environment pollutant. The research aims were to obtain bacterial capable of doing degradation of indigosol dye and to test their activities on degradation and decolorization. The study begins with the selection of bacterial isolates degradation dye batik from wastewater based on the ability to grow in a liquid medium containing various concentrations of dye indigosol ($C_{16}H_{10}N_2O_2$). Isolates were able to grow and have the greatest growth zone was selected for subsequent experiments. Degradative ability of Isolates was elected to the dye indigosol tested by experiment cultivation using basal mineral medium (MSM), which contain dyes indigosol (100mg/L). Activities include the growth of bacteria was measured by a spectrophotometer ($\lambda 600$ nm) and the degradation products were analyzed by reducing sugar content (DNS Method), and the amount of the chemical compound detected using Gas Chromatography-Mass Spectrometry (GC-MS). Isolates were identified using the guidelines for bacterial identification Bergey's Manual of Determinative Bacteriology. The results showed that 40 isolates of batik waste, only three isolates (SP 20, SP 28 and SP 38) which showed a high degradative activity to the indigosol dye. The highest activity was shown by the SP 38 isolates of bacteria, capable of decolorization indigosol to 88.39%, isolates decolorization of 78.48% and isolates SP 20 decolorization of 42.24%. The identification and characterization showed that isolates SP 20 similar to *Serratia* sp., SP 28 similar to *Klebsiella* sp. Whereas SP 38 which had the highest degradation activity similar to *Aeromonas* sp.

Keywords: Waste, Indigosol, Bacteria, Degradation, GC-MS