

ABSTRAK

Limbah cair industri tahu yang langsung dibuang ke sungai tanpa pengolahan berisiko menurunkan kualitas air. Penelitian ini bertujuan untuk merancang dan mengevaluasi eksperimen pengolahan air limbah tahu metode filtrasi sistem *downflow* secara kontinu. Metode penelitian menggunakan desain faktorial dengan dua faktor yaitu jenis media (zeolit dan bioring) serta ketebalan media arang aktif (25 cm dan 30 cm). Data hasil uji laboratorium dianalisis menggunakan ANOVA dua arah dan uji lanjut BNT. Kondisi awal limbah memiliki kadar BOD 455,20 mg/L, COD 266,67 mg/L, dan TSS 1230,00 mg/L. Hasil uji ANOVA menunjukkan bahwa faktor jenis dan ketebalan media berpengaruh signifikan terhadap kadar BOD, COD, dan TSS ($p\text{-value} < 0,05$), sedangkan interaksi keduanya tidak berpengaruh signifikan ($p\text{-value} > 0,05$). Hasil uji *post hoc* menunjukkan adanya perbedaan signifikan antar level faktor. Berdasarkan rata-rata hasil, perlakuan paling potensial terdapat pada perlakuan media bioring dengan kadar BOD 158,50 mg/L, COD 220,67 mg/L, dan TSS 620,83 mg/L, serta ketebalan media 30 cm dengan kadar BOD 164,77 mg/L, COD 220,00 mg/L, dan TSS 576,67 mg/L. Kadar COD telah memenuhi baku mutu air limbah tahu, sedangkan BOD dan TSS meskipun menurun signifikan, namun nilainya masih melebihi baku mutu.

Kata kunci: limbah cair tahu, filtrasi *downflow*, ANOVA, baku mutu

ABSTRACT

Industrial tofu wastewater that is directly discharged into rivers without treatment risks reducing water quality. This study aims to design and evaluate an experiment on tofu wastewater treatment using a continuous downflow filtration system. The research method uses a factorial design with two factors, namely the type of media (zeolite and bioring) and the thickness of the activated carbon media (25 cm and 30 cm). The laboratory test data were analyzed using two-way ANOVA and BNT follow-up tests. The initial waste conditions had a BOD level of 455.20 mg/L, COD of 266.67 mg/L, and TSS of 1230.00 mg/L. The ANOVA test results showed that the media type and thickness factors had a significant effect on BOD, COD, and TSS levels ($p\text{-value} < 0.05$), while the interaction between the two factors had no significant effect ($p\text{-value} > 0.05$). The post hoc test showed significant differences between factor levels. Based on the average results, the most potential treatment was the bioring media treatment with BOD levels of 158.50 mg/L, COD levels of 220.67 mg/L, and TSS levels of 620.83 mg/L, as well as media thickness of 30 cm with BOD levels of 164.77 mg/L, COD 220.00 mg/L, and TSS 576.67 mg/L. The COD level met the quality standards for tofu wastewater, while BOD and TSS, although significantly reduced, still exceeded the quality standards.

Keywords: tofu liquid waste, downflow filtration, ANOVA, quality standards