Pengolahan limbah cair industri tahu menggunakan kombinasi proses koagulasi-flokulasi dan ultrafiltrasi membran polysulfone = Treatment of industrial tofu wastewater by combination of coagulation flocculation and ultrafiltration process with polysulfone membrane

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Abstrak

Limbah cair tahu merupakan salah satu sumber pencemaran air yang masih membutuhkan metode pengolahan yang lebih efektif. Dalam penelitian ini, digunakan teknologi ultrafiltrasi membran polisulfon dan pretreatment berupa proses koagulasi-flokulasi dengan koagulan PAC. Pada proses koagulasi - flokulasi dilakukan variasi dosis sebesar 100 ppm, 200 ppm, 300 ppm, 400 ppm dan 500 ppm. Sedangkan pada proses ultrafiltrasi, dilakukan variasi tekanan umpan sebesar 0,5 bar, 1 bar, 1,5 bar dan 2 bar. Umpan limbah cair tahu memiliki pH antara 3,8-4, total padatan terlarut TDS antara 850-880 mg/L, total padatan tersuspensi TSS 380-420 mg/L, turbiditas antara 450-530 FAU, dan kandungan zat organik COD antara 5600-6600 mg/L dan BOD 2900 mg/L.
Hasil penelitian menunjukkan bahwa kondisi koagulasi optimum dicapai ketika dosis PAC 300 ppm dengan penyisihan TSS sebesar 45,7, penyisihan turbiditas 44,8 dan penyisihan COD 26,5, sedangkan tekanan optimum pada ultrafiltrasi dicapai ketika 1,5 bar dengan penyisihan COD 75,5, penyisihan TSS 99,7, penyisihan TDS 41,7 dan penyisihan turbidity 97,7, sedangkan parameter BOD pada kondisi operasi optimum menunjukkan penyisihan hingga 99,6.
<hr>Wastewater from tofu industry is one of water pollution sources that still require more effective treatment. This study aim to treat wastewater from tofu industry through a combination of coagulation flocculation and ultrafiltration processes. Coagulation flocculation is conducted prior to ultrafiltration process to minimize the effect of fouling on membrane and to improve the performance of ultrafiltration process. Poly aluminum chloride PAC was used as coagulant with doses of 100, 200, 300, 400 and 500 ppm. The wastewater feed has pH, total dissolved solid TDS, total suspended solids TSS, turbidity and chemical oxygen demand in the ranges of 3.8-4, 850-880 mg L, 380-420 mg L, 450-530 FAU and 5600-6600 mg L, respectively. Experimental results showed that the effectiveness of coagulation increased with the addition of coagulant dose until the optimum dose is reached. After coagulation flocculation process, COD, TSS, and turbidity decreased, whereas TDS increased. The optimum dose of the coagulation flocculation process was then used for a combination of coagulation flocculation and ultrafiltration processes.
The results shows that optimum coagulation condition was achieved at 300 ppm of PAC dosage and yields 45.7 of TSS penyisihan, 44.8 of turbidity penyisihan and 26.5 of COD penyisihan, while the optimum pressure of ultrafiltration was achieved at 1.5 bar and yields penyisihan of COD by 75.5, penyisihan of TSS by 99.7, penyisihan of TDS by 41.7 and penyisihan of turbidity by 97.7, as for the BOD parameter yields 99.6 penyisihan by doing the ultrafiltration process twice.