LAPORAN KEGIATAN

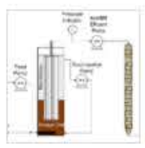
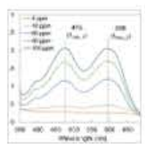
PENELITIAN DOSEN

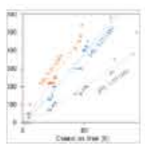
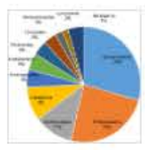
Evaluation of combined anaerobic membrane bioreactor and downflow hanging sponge reactor for treatment of synthetic textile wastewater

Peneliti:
Choerudin Choerudin, Fauziyah Istiqomah Arrahmah, Jonatan Kevin Daniel, Takahiro Watari, Takashi Yamaguchi, Tjandra Setiadi

Teknik Kimia
Fakultas Teknologi Industri
Institut Teknologi Nasional
2021

Outline

Journal of Environmental Chemical Engineering
Volume 9, Issue 4, August 2021, 105276

Evaluation of combined anaerobic membrane bioreactor and downflow hanging sponge reactor for treatment of synthetic textile wastewater

Choerudin Choerudin [a, b], Fauziyah Istiqomah Arrahmah [a], Jonatan Kevin Daniel [a], Takahiro Watari [c], Takashi Yamaguchi [c], Tjandra Setiadi [a, d]

Show more

https://doi.org/10.1016/j.jece.2021.105276

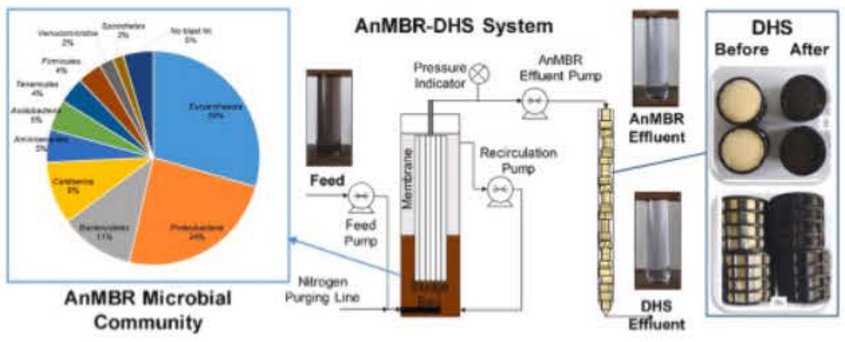
Highlights

- The combination of AnMBR-DHS significantly reduced the COD, BOD, and color with the most reduction occurred in the AnMBR.
- The HRT and membrane flux did not significantly affect the AnMBR-DHS performances.
- Analysis of microbial in the AnMBR and DHS help to determine the potential microorganism groups for the degradation dye.

Abstract

Various toxic chemicals in textile wastewater can cause serious problems for the ecosystem and human health if it is discharged without proper treatment. In this study, the performance of textile wastewater treatment using an anaerobic membrane bioreactor (AnMBR) combined with a downflow hanging sponge (DHS) reactor is evaluated. An AnMBR with a working volume of 5 L and a third-generation DHS with a working volume of 0.5 L is used to treat synthetic textile wastewater containing Reactive Black 5 azo dye. The experiment is performed under ambient conditions using AnMBR hydraulic retention times (HRTs) of 12 and 24 h, DHS HRTs of 1.4 and 2.8 h, and membrane fluxes of 2.65 and 5.21 LMH. The AnMBR-DHS combination significantly reduces the biochemical oxygen demand, chemical oxygen demand, and color of the synthetic textile wastewater by approximately 97.3 ± 1.8%, 94.4 ± 4.8%, and 95.0 ± 1.6%, respectively. Most of the reduction occurs in the AnMBR. The HRT and membrane flux do not significantly affect the performance of the AnMBR-DHS system. The microbial community in the AnMBR is dominated by the phyla *Euryarchaeota*, *Caldiserica*, and *Proteobacteria*, whereas that in the DHS is dominated by *Proteobacteria*. Some of the genera found in the AnMBR can reportedly reduce azo dyes, whereas some of those found in the DHS can reportedly degrade sulfonated aromatic amines.

Graphical Abstract



Keywords

Anaerobic aerobic process; Biofilm; Microbial community; Reactive Black 5; Textile wastewater