

Potensi Degradasi Paracetamol Menggunakan Dual Chamber Rectangular Membrane Bioreactor Pada Sistem Microbial Fuel Cell = Paracetamol Degradation Potential Using Dual Chamber Rectangular Membrane Bioreactor in Fuel Cell Microbial Systems

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Abstrak

Pandemi COVID-19 menyebabkan penggunaan obat-obatan seperti parasetamol (PCT) terus meningkat. Peningkatan konsumsi ini menyebabkan munculnya senyawa PCT di perairan Angke dan Ancol sebesar 0,42 µg/L dan 0,61 µg/L. Penelitian ini bertujuan untuk mempelajari potensi degradasi PCT pada lingkungan anoda sistem Microbial Fuel Cell (MFC) menggunakan konsorsium bakteri lumpur Danau Mahoni Universitas Indonesia. Percobaan dilakukan dengan memvariasikan konsentrasi awal PCT dan pH lingkungan anoda. Hasil menunjukkan bahwa terdapat degradasi PCT pada sistem ini dalam waktu 72 jam. Degradasi PCT sebesar 13,47±1,09%; 11,02±5,43%; dan 28,54±18,84% diperoleh untuk variasi konsentrasi awal 10,21; 20,24; dan 31,45 mg/L. Degradasi PCT juga diperoleh pada variasi pH lingkungan anoda 5,8; 7,0; dan 8,2 sebesar 31,31±3,54%; 11,02±5,43%; dan 48,69±0,86%. Analisis komunitas mikroba juga dilakukan menggunakan metode Next Generation Sequencing (NGS) 16s rRNA dan ditemukan bahwa bakteri yang berperan dalam mendegradasi PCT adalah Burkholderia sp. Hasil ini dapat digunakan untuk mengembangkan teknologi yang efisien dalam menghilangkan PCT pada air limbah farmasi.

.....The COVID-19 pandemic has caused the use of drugs such as paracetamol (PCT) to continue to increase. This increase in consumption led to the emergence of PCT compounds in the waters of Angke and Ancol of 0.42 µg/L and 0.61 µg/L. This study aims to study the potential for PCT degradation in the anode environment of the Microbial Fuel Cell (MFC) system using a consortium of University of Indonesia Lake Mahoni mud bacteria. Experiments were carried out by varying the initial concentration of PCT and the pH of the anode environment. The results show that there is PCT degradation in this system within 72 hours. PCT degradation of 13.47 ± 1.09%; 11.02±5.43%; and 28.54 ± 18.84% obtained for variations in the initial concentration of 10.21; 20.24; and 31.45 mg/L. PCT degradation was also obtained at various pH of the anode environment 5.8; 7.0; and 8.2 of 31.31 ± 3.54%; 11.02±5.43%; and 48.69 ± 0.86%. Microbial community analysis was also carried out using the Next Generation Sequencing (NGS) 16s rRNA method and it was found that the bacteria that played a role in degrading PCT was Burkholderia sp. These results used to develop efficient technologies for removing PCT in pharmaceutical wastewater.