Degradasi Limbah Lindi Menggunakan Reaktor DBD Nanobubble dengan Udara Sebagai Reaktan = Leachate Degradation Using DBD Nanobubble Reactor by Utilizing Air as Reactant

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Abstrak

Pengolahan lindi yang efektif sangat penting untuk mencegah dampak negatifnya terhadap lingkungan dan manusia. Dalam penelitian ini, digunakan Teknik Advanced Oxidation Process (AOPs) berbasis ozonasi dengan Reaktor Plasma Dielectric Barrier Discharge (DBD) Ozone Nanobubble untuk mendegradasi lindi. Udara diinjeksikan ke dalam reaktor, dan melalui reaksi dengan plasma, radikal hidroksil (•OH) dan ozon (O3) dihasilkan sebagai oksidator limbah. Penelitian ini bertujuan untuk menguji efektivitas metode dan menganalis pengaruh laju alir gas dan tegangan reaktor terhadap proses pengolahan lindi. Hasil setelah pengolahan selama 60 menit, terjadi pengurangan Total Suspended Solids (TSS) sebesar 100%, Chemical Oxygen Demand (COD) sebesar 95,5%, Biological Oxygen Demand (BOD) sebesar 71,95%, dan penurunan pH hingga 57,02%. Namun, terjadi peningkatan pada nilai Total Dissolved Solids (TDS) sebesar 436,13% dan Nitrat sebesar 75,27%. Laju alir ditemukan berpengaruh terhadap pH, TSS, COD, dan Nitrat. Sedangkan, tegangan berpengaruh terhadap pH, COD, dan Nitrat. Pada uji TDS ditemukan tidak dipengaruhi oleh laju alir dan tegangan.

.....Effective leachate treatment is essential to prevent its negative impact on the environment and humans. In this research, ozonation-based Advanced Oxidation Process (AOPs) Techniques were used with an Ozone Nanobubble Dielectric Barrier Discharge (DBD) Plasma Reactor to degrade leachate. Injected air will react with the plasma thus generating hydroxyl radicals (OH) and ozone (O3) as waste oxidizing agents. This study aims to test the effectiveness of the method and to analyse the influence of gas flow rate and reactor voltage on the leachate treatment process. The results after processing for 60 minutes, there was a reduction in Total Suspended Solids (TSS) by 100%, Chemical Oxygen Demand (COD) by 95.5%, Biological Oxygen Demand (BOD) by 71.95%, and a decrease in pH up to 57.02%. However, there was an increase in the Total Dissolved Solids (TDS) value of 436.13% and Nitrate of 75.27%. Flow rate was found to have an effect on pH, TSS, COD, and Nitrate. Meanwhile, the voltage affects the pH, COD, and Nitrate. In the TDS test it was found that it was not affected by flow rate and voltage.