OPTIMASI PENURUNAN KADAR *COD* PADA AIR LIMBAH RUMAH SAKIT DENGAN METODE ELEKTRO - FENTON: VARIASI KONSENTRASI H_2O_2, TEGANGAN, DAN PENAMBAHAN H_2O_2.

Fami Amalia Putri
18/437570/PTK/12603

INTISARI

Limbah Rumah Sakit memiliki senyawa polutan yang tinggi dan beracun sehingga dapat mencemari lingkungan. Limbah Rumah Sakit Kota Yogyakarta mempunyai kadar *COD* yang tinggi yaitu sebesar 421,03 mg/L. Penanganan uji *COD* dilakukan untuk mengetahui pengurangan kadar oksigen pada air limbah agar sesuai dengan standar baku mutu air limbah Rumah Sakit yang dapat dibuang ke lingkungan yaitu sebesar 80 ppm. *Advanced Oxidation Process (AOPs)* telah banyak terbukti dapat menurunkan kadar *COD* limbah industri maupun domestik. *AOPs* merupakan metode ramah lingkungan yang dapat membantu proses penghilangan senyawa organik pada air limbah. Pada penelitian ini, *AOPs* yang dipilih adalah Elektro – Fenton. Elektro – Fenton dilakukan proses elektrolisis dengan menggunakan dua buah elektroda besi dan hidrogen peroksida (H_2O_2). Tujuan penelitian ini adalah untuk mengetahui pengaruh konsentrasi H_2O_2, nilai tegangan listrik, dan jumlah tahap penambahan H_2O_2 terhadap penurunan kadar *COD* air limbah rumah sakit serta memperoleh kondisi operasi yang optimum. Desain Eksperimen penelitian proses Elektro – Fenton menggunakan *RSM Box – Behnken* dengan memvariasikan faktor konsentrasi H_2O_2 (30, 35, dan 50% *(w/v)*), tegangan (3, 4, dan 5 volt), dan penambahan H_2O_2 (1, 2, dan 3 kali). Variasi parameter dilakukan untuk dapat menentukan kondisi operasi optimum penurunan *COD* air limbah rumah sakit. Hasil penelitian membuktikan faktor konsentrasi H_2O_2, tegangan, dan penambahan H_2O_2 pada proses Elektro – Fenton berpengaruh nyata terhadap penurunan kadar *COD*. Penelitian ini menunjukkan bahwa kondisi optimum pengolahan air limbah rumah sakit dengan Elektro – Fenton diperoleh pada konsentrasi H_2O_2 50% (*w/v*), tegangan 4 volt, dan penambahan H_2O_2 3 kali. Pada kondisi optimum tersebut diperoleh efisiensi penurunan *COD* air limbah rumah sakit sebesar 96,48% dengan kadar *COD* akhir yaitu 14,81 mg/L. Nilai tersebut menunjukkan bahwa proses Elektro – Fenton efektif menurunkan kadar *COD* air limbah rumah sakit hingga memenuhi syarat baku mutu.

Kata Kunci : air limbah rumah sakit; elektro – fenton; kebutuhan oksigen kimiawi.

OPTIMIZATION OF COD REDUCTION IN HOSPITAL WASTEWATER WITH ELECTRO - FENTON METHOD: VARIATION OF H_2O_2 CONCENTRATION, VOLTAGE, AND ADDITIONAL H_2O_2.

Fami Amalia Putri
18/437570/PTK/12603

ABSTRACT

Hospital discharges wastewater with high pollutants and toxic compounds that can pollute the environment. Yogyakarta City Hospital wastewater has a high COD level of 421.03 mg / L. Handling the COD test is carried out to determine the reduction in oxygen levels in the wastewater in order to fit the quality standards of hospital wastewater that can be discharged into the environment, which is 80 ppm. Advanced oxidation processes (AOPs) have been shown to reduce COD levels in both industrial and domestic waste. AOPs are an environmentally friendly method that can assist in the removal of organic compounds in wastewater. In this study, the AOPs chosen were Electro - Fenton. Electro-Fenton electrolysis was carried out using two electrodes of iron and hydrogen peroxide (H_2O_2). The purpose of this study was to determine the effect of H_2O_2 concentration, the value of electric voltage, and the number of stages of adding H_2O_2 to the reduction of COD levels in hospital wastewater and to obtain optimum operating conditions. Experimental design of Electro-Fenton process research using RSM Box - Behnken by varying the concentration factors of H_2O_2 (30, 35, and 50% (w / v)), voltage (3, 4, and 5 volts), and the addition of H_2O_2 (1, 2, and 3 times). Variation of parameters was carried out to determine the optimum operating conditions for the efficiency of COD reduction in hospital wastewater. The results showed that the concentration factor of H_2O_2, voltage, and the addition of H_2O_2 in the Electro-Fenton process had a significant (significant) effect on reducing COD levels. This study shows that the optimum conditions for hospital wastewater treatment with Electro-Fenton are obtained at a concentration of H_2O_2 50% (w/v), a voltage of 4 volts, and the addition of H_2O_2 3 times. In this optimum condition, it was obtained that the efficiency of COD reduction in hospital wastewater was 96.48% with a final COD level of 14.81 mg / L. This value indicates that the Electro - Fenton process is effective in reducing COD levels in hospital wastewater until it meets the quality standard requirements.

***Keywords**: hospital wastewater; electro-fenton; chemical oxygen demand.*