

Analisis efisiensi dan kinetika penyisihan COD dan fenol limbah cair industri perminyakan pada pengolahan adsorpsi biofilter bermedia limbah kelapa kajian pengolahan limbah cair PT Pertamina RU- III Plaju Sumatera Selatan = Efficiency and kinetic studies of cod and phenol degradation on refinery wastewater by using coconut waste utilization on adsorption biofilter treatmnet study of wastewater treatment in PT Pertamina RU-III Plaju Sumatera Selatan

Nur Aisyah Al Anbiya, author

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Abstrak

[ABSTRAK

40-60% air bersih yang digunakan pada proses pengolahan minyak bumi menjadi limbah cair yang berbahaya bagi lingkungan. Penelitian ini bertujuan menganalisis efisiensi dan kinetika penyisihan COD, fenol, sulfida, amonia limbah cair industri perminyakan pada pengolahan adsorpsi karbon aktif tempurung kelapa dan biofilter serabut kelapa. Air limbah berasal dari PT.Pertamina RU-III. Pada percobaan batch adsorpsi, didapatkan waktu kontak optimum 95 menit dengan dosis adsorben 40 g/l serta kinetika penyisihan COD dan fenol yakni $k_{COD}=0,00696$ g/mg.min dan $k_{fenol}=1,243$ g/mg.min. Adsorpsi dapat menyisihkan COD 97-48%, fenol 100-56%, amonia 100-71%, sulfida 100-5,15% dalam waktu operasi 235 jam. Sementara itu, pengolahan biofilter dapat menyisihkan COD 52-87% %, fenol 45-99%, amonia 100%, sulfida 100% dengan HLR 3,65 m³/m².day. Hasil permodelan kinetika menunjukkan bahwa HLR berpengaruh pada pengolahan biofilter. Sedangkan pada penggabungan npengolahan adsorpsi-biofilter, biofilter tidak menunjukkan hasil optimum karena rentang optimal OLR biofilter yaitu 0,4-2,6 kg COD/m³.day.

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ABSTRACT

Approximately 40%-60% of raw water is wasted into wastewater in oil refinery that can be hazardous to the environment. The purpose of this research was to analyze the efficiency and kinetic study of COD, phenol, sulfide, ammonia degradation in refinery wastewater by using coconuts shell activated carbon in adsorption unit and coconut fiber in biofilter unit. Wastewater sample was conducted from PT.Pertamina RU-III. By the end of research, the optimum condition of batch adsorption obtained which hit 95 minutes in contact time and 40 g/l in adsorption dose. Moreover, the kinetic of COD and phenol degradation consecutively sat on $k_{COD}=0,00696$ g/mg.min and $k_{fenol}=1,243$ g/mg.min. Furthermore, column adsorption that operated for 235 hours removed 97%-48% of COD, 100%-56% of phenol, 100%-71% of ammonia, 100%-5,15% of sulfide. In addition, biofilter unit could eliminate 52-87% of COD, 45-99% of phenol, 100%

of ammonia and sulfide by using 3,65 m³/m².day as the HLR. Based on the kinetic model, HLR have influence in biofilter COD and phenol removal. However, in the combination of adsorption and biofilter process, the biofilter unit could not achieve the optimum outcome because the OLR not in the range of 4-2,6 kg COD/ m³.day., Approximately 40%-60% of raw water is wasted into wastewater in oil refinery that can be hazardous to the environment. The purpose of this research was to analyze the efficiency and kinetic study of COD, phenol, sulfide, ammonia degradation in refinery wastewater by using coconuts shell activated carbon in adsorption unit and coconut fiber in biofilter unit. Wastewater sample was conducted from PT.Pertamina RU-III. By the end of research, the optimum condition of batch adsorption obtained which hit 95 minutes in contact time and 40 g/l in adsorption dose. Moreover, the kinetic of COD and phenol degradation consecutively sat on $k_{COD}=0,00696$ g/mg.min and $k_{phenol}=1,243$ g/mg.min. Furthermore, column adsorption that operated for 235 hours removed 97%-48% of COD, 100%-56% of phenol, 100%-71% of ammonia, 100%-5,15% of sulfide. In addition, biofilter unit could eliminate 52-87% of COD, 45-99% of phenol, 100% of ammonia and sulfide by using 3,65 m³/m².day as the HLR. Based on the kinetic model, HLR have influence in biofilter COD and phenol removal. However, in the combination of adsorption and biofilter process, the biofilter unit could not achieve the optimum outcome because the OLR not in the range of 4-2,6 kg COD/ m³.day.]