

EFEKTIVITAS PEMANFAATAN LIMBAH *SAWDUST* TERAKTIVASI SEBAGAI ADSORBEN AIR TERCEMAR OLI DI PT. X, KALIMANTAN SELATAN

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INTISARI

PT. X merupakan industri pembangkit listrik di Provinsi Kalimantan Selatan yang menggunakan batu bara sebagai bahan bakar utama dan *sawdust* sebagai biomassa tambahan. Pada proses operasionalnya, ditemukan aliran air drainase yang mengandung oli dan belum mendapatkan penanganan khusus. Limbah *sawdust* yang tersedia di lingkungan perusahaan berpotensi dimanfaatkan sebagai bahan baku adsorben. Penelitian ini bertujuan menganalisis kualitas air berdasarkan parameter COD, TOC, Minyak dan Lemak pada air buangan di drainase PT. X; menganalisis kemampuan adsorben karbon aktif *sawdust* dalam menurunkan kadar parameter COD, TOC, Minyak dan Lemak; menganalisis dosis optimum adsorben arang aktif *sawdust* dalam menurunkan parameter COD, TOC, Minyak dan Lemak; serta memberikan Rekomendasi arahan teknis pengelolaan air buangan dengan menggunakan adsorben arang aktif *sawdust* pada drainase PT. X.

Penelitian dilakukan menggunakan pendekatan kuantitatif dan kualitatif. Data diperoleh dari studi lapangan dan data sekunder. Sampel air dipilih dengan metode *grab sampling*, sedangkan *sawdust* dipilih secara *purposive*. Pengolahan air dilakukan dengan metode *mixing* menggunakan variasi dosis adsorben 1 gram; 1,5 gram; 2 gram; 2,5 gram; dan 3 gram. Evaluasi hasil dilakukan secara deskriptif dan matematis melalui perhitungan efektivitas, regresi linear, dan kapasitas adsorpsi.

Hasil pengujian menunjukkan bahwa air drainase memiliki kadar COD 19 mg/L; TOC 6,20 mg/L; dan minyak lemak <0,40 mg/L, ketiga parameter masih memenuhi aturan baku mutu. Perhitungan efektifitas dan regresi linear variasi dosis menunjukkan karbon aktif *sawdust* dapat menurunkan kadar COD meskipun fluktuatif dan signifikan terhadap kadar TOC, sedangkan pada minyak lemak hasil pengukuran berada di batas deteksi alat sehingga tidak dapat dianalisis lebih lanjut. Dosis optimum ditetapkan sebesar 3 gram berdasarkan nilai kapasitas adsorpsi terhadap TOC. Arahan pengelolaan yang direkomendasikan berupa desain unit pengadukan skala lapangan dengan media adsorpsi karbon aktif *sawdust* aktivasi H₂SO₄. Rekomendasi pengelolaan teknologi berupa produksi karbon aktif skala lapangan sebesar 10 ton/hari, pembuatan unit pengadukan silinder-kerucut (tinggi 3,5 m; diameter 7,3 m), bak pengumpul (16 × 15,3 × 5 m), *hopper* dan *screw feeder* untuk pembubuh, serta bak penampung karbon aktif bekas.

Kata kunci: adsorben, *sawdust*, COD, TOC, minyak lemak

**THE EFFECTIVENESS OF USING ACTIVATED SAWDUST WASTE
AS AN ADSORBENT FOR OIL-CONTAMINATED WATER
AT PT. X, SOUTH KALIMANTAN**

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ABSTRACT

PT. X is a power generation industry in South Kalimantan Province that uses coal as the main fuel and sawdust as an additional biomass. In its operational process, a drainage water flow containing oil was found and has not yet received special treatment. Sawdust waste available in the company's environment has the potential to be utilized as a raw material for adsorbents. This research aims to analyze water quality based on COD, TOC, Oil, and Grease parameters in wastewater from PT. X's drainage; analyze the ability of activated carbon sawdust adsorbent to reduce the levels of COD, TOC, Oil, and Grease parameters; analyze the optimum dose of activated carbon sawdust adsorbent in reducing COD, TOC, Oil, and Grease parameters; and provide technical recommendations for wastewater management using activated carbon sawdust adsorbent in PT. X's drainage.

The research was conducted using quantitative and qualitative approaches. Data were obtained from field studies and secondary data. Water samples were taken using the grab sampling method, while sawdust was purposively selected. Water treatment was carried out using the mixing method with variations of adsorbent doses of 1 gram; 1.5 grams; 2 grams; 2.5 grams; and 3 grams. The evaluation of the results was conducted descriptively and mathematically through the calculation of effectiveness, linear regression, and adsorption capacity.

The test results show that the drainage water has a COD level of 19 mg/L; TOC 6.20 mg/L; and oil and grease <0.40 mg/L, all three parameters still meet the quality standard regulations. The calculation of effectiveness and linear regression of dose variation shows that activated carbon sawdust can reduce COD levels, although fluctuating, and significantly affect TOC levels, while the measurement results for grease are at the detection limit of the instrument and cannot be analyzed further. The optimum dose is set at 3 grams based on the adsorption capacity value for TOC. The recommended management direction is the design of a field-scale stirring unit with activated carbon sawdust adsorption media activated by H₂SO₄. Technology management recommendations include the production of activated carbon on a field scale of 10 tons/day, the construction of a conical-cylinder mixer unit (height 3.5 m; diameter 7.3 m), a collection tank (16 × 15.3 × 5 m), a hopper and screw feeder for the addition, and a tank for storing used activated carbon.

Keywords: adsorbent, sawdust, COD, TOC, oil and grease