

Pemanfaatan *Fine Coal* Sebagai Adsorben Untuk Pengolahan Air Asam Tambang Di PT Tanjung Alam Jaya, Kabupaten Banjar, Provinsi Kalimantan Selatan

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ABSTRAK

Fine coal yang hanya ditimbun dan tidak dimanfaatkan dapat mengurangi kapasitas *stockpile* bahkan menyebabkan pencemaran di sekitar area *stockpile*. Diperlukan upaya pengelolaan *fine coal* untuk mengurangi timbunan *fine coal*. Tujuan penelitian ini adalah menganalisis karakteristik *fine coal* dan karbon aktif setelah tahap aktivasi, menganalisis pengaruh dosis karbon aktif terhadap parameter pH, TSS, Fe, dan Mn, serta mengetahui arahan pengelolaan *fine coal*.

Penelitian ini menggunakan metode pengumpulan data, metode analisis laboratorium, metode analisis data, dan metode geometris sederhana (*Volume based estimation*). Pengumpulan data dilakukan melalui survei lapangan, *sampling*, dan uji laboratorium. Analisis laboratorium melalui rancangan percobaan variasi dosis karbon aktif *fine coal* 0 gram, 1 gram, 2 gram, 3 gram, 4 gram, dan 5 gram dengan parameter yang digunakan antara lain pH, TSS, Fe, dan Mn. Setelah itu akan dianalisis menggunakan analisis efektivitas, analisis regresi linear, dan analisis isotherm. Arahan pengelolaan menggunakan metode geometris sederhana (*Volume based estimation*) untuk merencanakan tempat penimbunan sementara *fine coal*.

Hasil penelitian menunjukkan bahwa *fine coal* memiliki karakteristik *fix carbon* sebesar 39,02% yang berpotensi dijadikan sebagai bahan baku karbon aktif. Karbon aktif *fine coal* yang dihasilkan setelah melalui tahap aktivasi sudah memenuhi SNI 06-3730-1995 tentang kualitas arang teknis dengan parameter kadar air sebesar 1,13%; kadar abu sebesar 4,9%; zat terbang 20,93%; dan daya serap iodium sebesar 1143,3 mg/g. Hasil percobaan didapatkan bahwa dosis 5 gram per 250 ml, karbon aktif *fine coal* mampu menaikkan pH sampai 8,1; efektivitas penurunan TSS mencapai 96,7%; efektivitas penurunan Fe dan Mn yaitu 98,9% dan 99,8%. Selain itu, pola adsorpsi yang terjadi pada parameter Fe dan Mn mengikuti pola isotherm Langmuir dengan kapasitas adsorpsi Fe dan Mn sebesar 1,48 mg/g dan 1,433 mg/g. Arahan pengelolaan dalam pemanfaatan *fine coal* dapat dilakukan dengan beberapa tahap yaitu tahap pengumpulan *fine coal*, tahap aktivasi dan tahap aplikasi skala lapangan. Aplikasi karbon aktif *fine coal* sebagai adsorben ke skala lapangan membutuhkan karbon aktif *fine coal* sebesar 474,857 kg untuk pengolahan air sebanyak 72.000 liter.

Kata kunci : *fine coal*, karbon aktif, adsorpsi, air asam tambang

***Utilisation of Fine Coal as Adsorbent for Acid Mine Drainage Treatment at PT
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ABSTRACT

Fine coal that is only stockpiled and not utilised can reduce stockpile capacity and even cause pollution around the stockpile area. Efforts are needed to manage fine coal in order to reduce fine coal stockpiles. The objective of this study is to analyse the characteristics of fine coal and activated carbon after the activation stage, analyse the effect of activated carbon dosage on pH, TSS, Fe, and Mn parameters, and determine the direction of fine coal management.

This study employs data collection methods, laboratory analysis methods, data analysis methods, and simple geometric methods (volume-based estimation). Data collection is conducted through field surveys, sampling, and laboratory tests. Laboratory analysis was conducted through an experimental design varying the activated carbon dosage of fine coal at 0 grams, 1 gram, 2 grams, 3 grams, 4 grams, and 5 grams, with parameters including pH, TSS, Fe, and Mn. The results were then analysed using effectiveness analysis, linear regression analysis, and isotherm analysis. Management guidelines using a simple geometric method (volume-based estimation) for planning temporary storage sites for fine coal.

The research results indicate that fine coal has a fixed carbon content of 39.02%, which has the potential to be used as raw material for activated carbon. The activated carbon produced from fine coal after the activation process meets the SNI 06-3730-1995 standard for technical charcoal quality, with parameters including moisture content of 1.13%, ash content of 4.9%, volatile matter of 20.93%, and iodine adsorption capacity of 1143.3 mg/g. Experimental results showed that a dose of 5 gram per 250 ml, of fine coal activated carbon could increase the pH to 8.1; the effectiveness of TSS reduction reached 96.7%; and the effectiveness of Fe and Mn reduction was 98.9% and 99.8%, respectively. Additionally, the adsorption patterns observed for Fe and Mn parameters followed the Langmuir isotherm pattern, with adsorption capacities of 1.48 mg/g for Fe and 1.433 mg/g for Mn. Management guidelines for the utilisation of fine coal can be implemented through several stages: collection of fine coal, activation, and field-scale application. The application of fine coal activated carbon as an adsorbent on a field scale requires 474.857 kg of fine coal activated carbon for the treatment of 72,000 litres of water.

Keywords: fine coal, activated carbon, adsorption, acid mine drainage