

## **PENGARUH WAKTU AKTIVASI DAN KONSENTRASI NaOH TERHADAP KUALITAS ARANG AKTIF DARI TULANG DAUN JATI**

Oleh :

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### **INTISARI**

Limbah tulang daun jati (*Tectona grandis* Linn. f.) merupakan salah satu limbah biomassa dengan potensi sangat besar dan belum dimanfaatkan secara maksimal. Limbah tulang daun jati (*T. grandis*) dapat dimanfaatkan sebagai bahan baku pembuatan arang aktif sehingga dapat memberi nilai tambah. Penelitian ini bertujuan untuk memanfaatkan limbah tulang daun jati (*T. grandis*) untuk diolah menjadi arang aktif, mengetahui kualitas dan sifat arang aktif yang dibuat dari tulang daun jati (*T. grandis*), dan mengetahui interaksi antara waktu aktivasi dan konsentrasi NaOH yang dipakai terhadap kualitas arang aktif yang dihasilkan. Arang aktif kualitas terbaik diaplikasikan untuk meningkatkan kualitas air sumur.

Penelitian ini menggunakan rancangan acak lengkap yang disusun secara faktorial dengan dua faktor, yaitu waktu aktivasi (30 menit, 60 menit, dan 90 menit) dan konsentrasi NaOH (1%, 1,25%, dan 1,5%) dengan masing-masing perlakuan lima ulangan. Tulang daun jati (*T. grandis*) diarangkan dengan menggunakan *retort* listrik pada suhu 400 °C selama tiga jam. Proses aktivasi dilakukan secara kimia dan fisik (*thermal*). Pengujian kualitas arang aktif berdasarkan Standar Mutu Arang Aktif Teknis Serbuk SNI 06-3730-1995. Data hasil penelitian dianalisis dengan analisis varians dan apabila berbeda nyata akan di uji lanjut HSD.

Karakteristik arang aktif tulang daun jati (*T. grandis*) meliputi ; rendemen 47,199% – 59,503%, kadar air 0,438% – 2,006%, kadar volatil 41,038% – 50,945%, kadar abu 30,821% – 46,315%, kadar karbon terikat 8,694% – 23,199%, daya serap iodium 671,748 mg/g – 1.317,229 mg/g, daya serap benzena 4,260% – 12,352% , dan daya serap metilen biru 131,347 mL/g – 137,126 mL/g. Kualitas arang aktif terbaik diperoleh dari perlakuan waktu aktivasi 90 menit dengan konsentrasi NaOH 1% dan diaplikasikan sebagai penjernih air sumur di Dusun Kuwaru, Poncosari, Srandakan, Bantul, Yogyakarta. Karakteristik air sumur setelah dijernihkan dengan arang aktif meliputi ; warna (9,5 Pt-Co) terjadi penurunan 88,485%, kekeruhan (8,33 NTU) terjadi penurunan 79,175%, pH (8) terjadi kenaikan 14,285%, kesadahan (278,29 mg/L) terjadi penurunan 3,271%, kadar besi (0,2 mg/L) terjadi penurunan 95%, dan kadar mangan (0,137 mg/L) terjadi penurunan 72,6%. Hasil analisis tersebut menunjukkan peningkatan kualitas dan telah memenuhi Standar Mutu Air Bersih KEP. MENKES RI No. 416/Menkes/Per/IX/1990.

Kata kunci : arang aktif, tulang daun jati, waktu aktivasi, konsentrasi NaOH, penjernih air sumur

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## THE EFFECTS OF TIME ACTIVATION AND NaOH CONCENTRATION TOWARD ACTIVATED CARBON QUALITY FROM VEIN OF TEAK

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### Abstract

The vein of teak (*Tectona grandis* Linn. f) waste is one of the waste biomass with enormous potential and not fully utilized. Vein of teak (*T. grandis*) can be used as raw material for the manufacture of activated carbon into a value-added. The research aims to utilize the vein of teak to be processing into activated carbon, determine the quality and characteristics of activated carbon from vein of teak (*T. grandis*), and interaction between time activation and NaOH concentration used for quality activated carbon. The best quality of activated carbon used to improve the quality of well water.

The research using completely randomized design in two major factors, includes time activation (30 minutes, 60 minutes, and 90 minutes) and NaOH concentration (1%, 1.25%, and 1.5%) with five replications for each interaction. Vein of teak (*T. grandis*) were carbonized on electrical retort at 400°C for three hours. Chemical and thermal activation is doing in this research. Evaluation of the quality of activated carbon conducted according to Indonesian National Standard of Technical Standard Quality Activated Carbon Powder SNI 06-3730-1995. The result was analyzed with analysis of variance and HSD will tested further.

Characteristics of activated carbon from vein of teak (*T. grandis*) of this research includes the yield 47.199% - 59.503%, moisture content 0.438% - 2.006%, volatile matter 41.038% - 50.945%, ash content 30.821% - 46.315%, fixed carbon 8.694% - 23.199%, iodine adsorption 671.748 mg/g - 1317.229 mg/g, benzene adsorption 4.260% - 12.352%, and blue methylene adsorption 131.347 mL/g - 137.126 mL/g. The best quality of activated carbon was obtained from 90 minutes time activation with 1% NaOH concentration and applied as well water purifier in Kuwaru, Poncosari, Srandakan, Bantul, Yogyakarta. Following with the characteristic of well water after purified with activated carbon able to reduce the color (9.5 Pt-Co) 88.485%, turbidity (8.33 NTU) 79.175%, CaCO<sub>3</sub> hardness (278.29 mg/L) 3.271%, grade of Ferro (Fe) (0.2 mg/L) 95%, and grade of manganese (Mn) (0.137 mg/L) 72.6%, and increasing the level of pH (8) 14.285%. The well water results, increasing the quality and compliance with Water Quality Standards according to recommendation of the Ministry of Health number 416/Menkes/Per/IX/1990.

Keyword : activated carbon, vein of teak, time activation, NaOH concentration, well water purifier

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