

## KARAKTERISTIK ARANG AKTIF DARI LIMBAH BATANG JAGUNG (*Zea mays*) DAN PEMANFAATANNYA SEBAGAI MEDIA PENJERNIH AIR LIMBAH BATIK

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### INTISARI

Indonesia mengalami peningkatan produksi jagung tiap tahunnya. Produksi jagung menunjukkan peningkatan yang signifikan dari 19,01 juta ton pada tahun 2014 menjadi 23,16 juta pada tahun 2016. Peningkatan produksi jagung berbanding lurus dengan jumlah limbah pasca panen tanaman jagung. Limbah batang jagung merupakan salah satu limbah yang tidak tertangani dengan baik. Tujuan penelitian ini yaitu memanfaatkan limbah batang jagung sebagai arang aktif.

Penelitian ini dilakukan menggunakan rancangan acak lengkap (*Completely Randomized Design*) dengan 2 faktor perlakuan yaitu suhu aktivasi (750°C, 800°C, 850°C) dan waktu aktivasi (60 menit, 80 menit, 100 menit) dengan masing-masing perlakuan lima kali ulangan. Penelitian dilakukan dengan mengarangkan batang jagung dalam *retort* listrik pada suhu 400°C selama 3 jam. Arang aktif yang dihasilkan diuji kualitasnya yaitu rendemen, kadar air, kadar zat mudah menguap, kadar abu, kadar karbon terikat, daya serap terhadap benzena, daya serap terhadap biru metilen, daya serap terhadap iodium. Arang aktif terbaik dimanfaatkan untuk menjernihkan air limbah batik. Analisis yang dilakukan meliputi warna, pH, zat padat tersuspensi, fenol, COD, BOD, dan NO<sub>2</sub>.

Hasil penelitian menunjukkan bahwa rendemen arang aktif batang jagung berkisar antara 78,29-84,5%; kadar air 3,32-8,68%; kadar zat mudah menguap 12,48-29,26%; kadar abu 16,25-17,34%; kadar karbon terikat 49,64-66,28%; daya serap terhadap benzena 4,66-7,21%; daya serap terhadap biru metilen 1312,35-1393,08 mg/g; daya serap terhadap iodium 845,35-1001,44 mg/g. Kondisi optimal arang aktif dari batang jagung sebagai absorben yakni perlakuan suhu aktivasi 800°C dan lama aktivasi 100 menit.

Hasil penelitian pemanfaatan arang aktif batang jagung untuk memperbaiki kualitas limbah cair industri batik menunjukkan peningkatan kualitas air limbah batik yaitu terjadi penurunan nilai derajat keasaman (pH) sebesar 2,92%, penurunan tingkat nilai BOD sebesar 50,41%, COD 52,43 %, nitrit 39,07 %, phenol 30,44%, TSS 29,73%, warna 15,56%.

*Kata Kunci: Arang aktif, batang jagung, waktu aktivasi, suhu aktivasi*

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## CHARACTERISTICS OF ACTIVATED CHARCOAL FROM CORN (*Zea Mays*) STEM WASTE AND THE UTILIZATION AS MEDIUM OF BATIK WASTEWATER PURIFIER

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### ABSTRACT

Indonesia experiences an increase of corn production every year. The corn production increased significantly from 19.01 million tons in 2014 to 23.16 million in 2016. The increase in corn production is directly proportional with total of post-harvest corn crop waste. The corn stem waste is one of the waste that has not been handled properly. The purpose of this research is to utilize corn stem waste as activated charcoal.

This research used a completely randomized design with 2 treatment factors, which were activation temperature (750°C, 800°C, 850°C) and activation duration (60 minutes, 80 minutes, 100 minutes) with five replications of each treatment. The research was conducted with corn stem carbonization in an electric retort at 400°C for 3 hours. The result of activated charcoal were tested in term of their quality is yield, moisture content, volatile matter content, ash content, fixed carbon content, absorption of benzene, absorption of iodine, and absorption of methylene blue. The best activated charcoal was utilized for purifying batik wastewater. The analysis carried out includes color, pH, total suspended solid, phenol, COD, BOD, and NO<sub>2</sub>.

The result showed that the best quality of activated charcoal from corn stem was produced from a combination of 800°C activation temperature with activation time of 100 minutes which produced activated carbon with following specifications: yield 79.11%; moisture content of 6.97%, volatile matter content of 24%; ash content of 16.26%; fixed carbon content of 52.77%; absorption of benzene 6.22%; absorption of iodine 1001.44 mg/g; and absorption of methylene blue 1393.08 mg/g.

The results of this study to improve the quality of wastewater batik industry showed an increase in the quality of batik wastewater. The activated carbon from corn stem successfully decreased the value of acidity (pH) by 2.92%, BOD 50.41%, COD 52.43%, nitrite 39.07%, phenol 30.44%, TSS 29.73%, and color 15.56%.

*Keyword: Activated charcoal, corn stem, activation time, activation temperature*

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