

## **MODIFIKASI KARBON AKTIF DAUN ANTING-ANTING (*Acalypha Indica* L) DENGAN KITOSAN UNTUK ADSORPSI ZAT WARNA METIL JINGGA**

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### **INTISARI**

Modifikasi karbon aktif daun anting-anting (*Acalypha indica*) dengan kitosan untuk adsorpsi zat warna metil jingga telah berhasil dilakukan. Penelitian ini dilakukan dalam tiga tahap. Tahap pertama adalah sintesis karbon aktif dari daun anting-anting (*Acalypha indica*) melalui karbonasi. Tahap kedua adalah modifikasi karbon aktif dengan kitosan. Tahap ketiga adalah kajian adsorpsi zat warna metil jingga menggunakan karbon aktif termodifikasi kitosan. Material dikarakterisasi dengan *Fourier Transform Infra-Red Spectroscopy* (FTIR), *X-Ray Diffraction* (XRD), dan *Scanning Electron Microscopy* (SEM). Parameter adsorpsi yang diteliti dalam penelitian ini meliputi pH larutan, massa adsorben, waktu kontak, konsentrasi awal adsorbat, dan suhu adsorpsi.

Hasil karakterisasi menunjukkan bahwa adsorben berhasil disintesis. Data FTIR menunjukkan bahwa gugus amina dan hidroksil dari kitosan telah terikat pada karbon aktif-kitosan (AC-Chit). Data XRD menunjukkan bahwa karbon aktif-kitosan (AC-Chit) memiliki struktur amorf dan muncul puncak khas kitosan. Data SEM menunjukkan bahwa karbon aktif-kitosan (AC-Chit) memiliki permukaan yang lebih kasar yang mengindikasikan adanya peningkatan jumlah pori. Adsorpsi zat warna metil jingga menggunakan adsorben mencapai kondisi optimum pada pH larutan 3, massa adsorben 0,200 g waktu kontak 120 menit konsentrasi zat warna metil jingga 20 mg L<sup>-1</sup>, suhu adsorpsi 30 °C dan kapasitas adsorpsi 4,046 mg g<sup>-1</sup> dengan efisiensi adsorpsi sebesar 86,53% . Adsorpsi zat warna metil jingga mengikuti model kinetika orde kedua semu dan isoterm Freundlich. Termodinamika adsorpsi bersifat eksotermik, spontan, dan kemisorpsi.

Kata kunci: *Acalypha indica*, adsorpsi, karbon aktif, kitosan, metil jingga

***MODIFICATION OF ACTIVATED CARBON FROM ANTING-ANTING  
(Acalypha Indica L) WITH CHITOSAN FOR METHYL ORANGE DYE  
ADSORPTION***

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**ABSTRACT**

Modification of activated carbon from anting-anting leaves (*Acalypha indica*) with chitosan for adsorption of methyl orange dye has been successfully carried out. This study was conducted in three stages. The first stage is synthesis of activated carbon synthesis from anting-anting leaves (*Acalypha indica*) through carbonation. The second stage is modification activated carbon with chitosan. The third stage is methyl orange dye adsorption study using chitosan-modified activated carbon. The material was characterized by Fourier Transform Infra-Red Spectroscopy (FTIR), X-Ray Diffraction (XRD), and Scanning Electron Microscopy (SEM). The adsorption parameters studied in this study included environmental pH, adsorbent mass, contact time, initial adsorbate concentration, and adsorption temperature.

The characterization results showed that the adsorbent was successfully synthesized. FTIR data showed that the amine and hydroxyl groups of chitosan had been bound to activated carbon-chitosan (AC-Chit). XRD data showed that activated carbon-chitosan (AC-Chit) had an amorphous structure and a typical chitosan peak appeared. SEM data showed that activated carbon-chitosan (AC-Chit) had a rougher surface indicating an increase in the number of pores. The adsorption of methyl orange dye using adsorbent reached optimum conditions at a solution pH of 3, an adsorbent mass of 0.200 g, a contact time of 120 minutes, a concentration of methyl orange dye of 20 mg L<sup>-1</sup>, an adsorption temperature of 30 oC and an adsorption capacity of 4.046 mg g<sup>-1</sup> with an adsorption efficiency of 86.53%. The adsorption of methyl orange dye followed the pseudo-second-order kinetic model and the Freundlich isotherm. The thermodynamics of adsorption were exothermic, spontaneous, and chemisorption.

Keywords: *Acalypha indica*, adsorption, activated carbon, chitosan, methyl orange