

**MODIFIKASI SELULOSA KULIT JAGUNG (*Zea mays*) DENGAN ASAM MALEAT SEBAGAI ADSORBEN ZAT WARNA KATIONIK KRISTAL VIOLET**

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**INTISARI**

Telah dilakukan modifikasi selulosa kulit jagung dengan asam maleat (MA) sebagai adsorben untuk penghilangan zat warna kationik kristal violet (KV). Penelitian ini terdiri dari aktivasi selulosa dengan NaOH 5% (*wt/v*) dan modifikasi selulosa teraktivasi dengan asam maleat diikuti dengan karakterisasi adsorben menggunakan FTIR, XRD, dan SEM, kemudian dilakukan kajian adsorpsi dan desorpsi zat warna kationik kristal violet. Beberapa parameter yang mempengaruhi kinerja adsorpsi seperti pH larutan, massa adsorben, waktu kontak, dan konsentrasi awal zat warna telah dioptimalkan. Konsentrasi zat warna dalam larutan sebelum dan sesudah adsorpsi dianalisis dengan metode spektrofotometer UV-Vis. Kajian desorpsi dilakukan pada beberapa reagen pendesorpsi seperti aquades; HCl pH 3; HCl pH 4; NaCl 1 M; dan NaCl 0,1 M.

Hasil karakterisasi menunjukkan selulosa kulit jagung termodifikasi asam maleat telah berhasil dibuat. Adsorpsi terhadap zat warna kationik kristal violet mencapai optimum pada pH 7, massa adsorben 100 mg, waktu kontak 120 menit dan konsentrasi awal 400 ppm. Proses adsorpsi zat warna kationik kristal violet mengikuti mengikuti orde kedua semu dengan konstanta laju  $10,4 \times 10^{-4} \text{ g mg}^{-1} \text{ menit}^{-1}$  dan mengikuti isoterm Langmuir dengan kapasitas adsorpsi  $153,8 \text{ mg g}^{-1}$  dan energi adsorpsi sebesar  $25,19 \text{ kJ mol}^{-1}$ . Kajian desorpsi menunjukkan HCl pH 3 yang paling efektif sebagai larutan pendesorpsi untuk zat warna kationik kristal violet.

Kata kunci: adsorpsi, asam maleat, desorpsi, kristal violet, dan selulosa

## **MODIFICATION OF CORN HUSK CELLULOSE (*Zea mays*) WITH MALEIC ACID AS AN ADSORBENT OF CRYSTAL VIOLET CATIONIC DYE**

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### **ABSTRACT**

Modification of corn husk cellulose with maleic acid (MA) as an adsorbent of crystal violet (CV) cationic dye has been conducted. The study includes the activation of cellulose with 5% NaOH (wt/v), modification of cellulose with maleic acid, followed by the characterization of the adsorbents using FTIR, XRD, and SEM. Some parameters influencing the adsorption performance, such as solution pH, the mass of the adsorbent, interaction time, and initial concentration of the dye, have been optimized. The concentration of dye in the solution before and after adsorption was analyzed by the UV-Vis spectrophotometric method. Desorption studies were carried out on several solutions such as distilled water; HCl pH 3; HCl pH 4; 1.0 M NaCl; and 0.1 M NaCl.

The characterization results show that corn husk cellulose modified maleic acid was successfully prepared. The adsorption of crystal violet cationic dye reaches its optimum value at pH 7, adsorbent mass of 100 mg, interaction time of 120 minutes, and initial concentration of 400 ppm. Adsorption kinetics studies showed that crystal violet cationic dye adsorption follows the pseudo-second-order kinetic models with the adsorption rate constant as  $10.4 \times 10^{-4} \text{ g mg}^{-1} \text{ min}^{-1}$  and Langmuir isotherms with adsorption maximum capacity  $153.8 \text{ mg g}^{-1}$  and adsorption energy  $25.19 \text{ kJ mol}^{-1}$ . Desorption studies show that HCl pH 3 is the most effective desorption solution for crystal violet cationic dye.

**Keywords:** adsorption, cellulose, crystal violet, desorption, and maleic acid