

## **ADSORPSI ZAT WARNA BIRU METILENA DENGAN ADSORBEN BERBASIS SELULOSA DARI BATANG JAGUNG TERMODIFIKASI ASAM MALEAT**

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### **INTISARI**

Penelitian tentang adsorpsi zat warna biru metilena dengan adsorben berbasis selulosa dari batang jagung termodifikasi asam maleat telah dilakukan. Tujuan penelitian ini adalah ekstraksi selulosa dari batang jagung dengan perlakuan alkali menggunakan NaOH dan modifikasi selulosa dengan asam maleat, melakukan karakterisasi adsorben selulosa dengan FTIR, XRD, dan SEM, dan melakukan uji adsorpsi dan desorpsi selulosa dengan biru metilena. Modifikasi selulosa dengan asam maleat melalui proses serbuk selulosa dilarutkan dalam DMF (N,N-dimetilformamida), kemudian larutan ditambahkan katalis piridin dan anhidrida maleat. Proses desorpsi biru metilena dilakukan dengan pelarut akuades, larutan HCl pH 3 dan 4, larutan NaCl 0,1 dan 1 M.

Hasil karakterisasi menunjukkan bahwa asam maleat berhasil dicangkokkan pada selulosa (SAM). Adsorben SAM digunakan untuk adsorpsi biru metilena (BM). Penelitian menunjukkan bahwa proses adsorpsi dapat berjalan dengan baik pada saat keadaan optimum yakni pada larutan biru metilena saat pH 6, massa adsorben sebesar 0,1 g, waktu kontak selama 60 menit, dan konsentrasi BM sebesar 400 mg/L. Adsorpsi biru metilena menggunakan adsorben SAM menunjukkan bahwa kinetika adsorpsi mengikuti model orde dua semu ( $k_2 = 1,34 \times 10^{-3} \text{ g mg}^{-1} \text{ menit}^{-1}$ ) dan isoterm adsorpsi mengikuti model Langmuir ( $Q_{\max} = 105,26 \text{ mg g}^{-1}$ ). Hasil desorpsi menunjukkan bahwa biru metilena terdesorpsi secara optimum (10,23% berat) pada larutan NaCl 1 M selama 120 menit dan interaksi antara situs aktif adsorben SAM dengan adsorbat ion biru metilena didominasi oleh interaksi elektrostatik.

Kata kunci: adsorpsi, asam maleat, biru metilena, dan selulosa

## **ADSORPTION OF METHYLENE BLUE DYE USING CORNSTALK-BASED CELLULOSE MODIFIED WITH MALEIC ACID**

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### **ABSTRACT**

Adsorption of methylene blue (MB) using cornstalk-based cellulose modified with maleic acid was carried out. This work aimed to extract cellulose from corn stalks by alkaline treatment using NaOH and to change the cellulose with maleic acid as an adsorbent. The characterization of the cellulose adsorbent was done using FTIR, XRD and SEM, and the adsorption and desorption process with methylene blue. The cellulose powder was modified with maleic acid by dissolving in DMF (N,N-dimethylformamide) with the addition of maleic anhydride and pyridine as a catalyst. The adsorbed MB could be desorbed with distilled water, HCl solution pH 3 and 4, 0.1 and 1.0 M NaCl solution.

The results showed that maleic anhydride was successfully grafted onto the cellulose (SMA). The research shows that the adsorption process can run well when the optimum conditions are in the MB solution pH 6, the adsorbent mass is 0.1 g, the contact time is 60 minutes, and the MB concentration is 400 mg/L. The absorbed MB could be desorbed with distilled water, HCl solution pH 3 and 4, 0.1 and 1.0 M NaCl solution. The adsorption of MB by the SMA adsorbent showed that the adsorption kinetics followed a pseudo-second order model ( $k_2 = 1.34 \times 10^{-3} \text{ g mg}^{-1} \text{ min}^{-1}$ ) and adsorption isotherm followed the Langmuir model ( $Q_{\max} = 105.26 \text{ mg g}^{-1}$ ). It also showed that MB was desorbed optimally (10.23 wt%) using 1.0 M NaCl solution for 120 min and the interaction between the active site of the SAM adsorbent and the methylene blue ion adsorbate was dominated by electrostatic interactions.

**Keywords:** adsorption, cellulose, maleic acid, and methylene blue