

## **SINTESIS FILM KARBOKSIMETIL SELULOSA-POLIVINIL ALKOHOL TERTAUT SILANG GLUTARALDEHIDA SEBAGAI ADSORBEN BIRU METILEN**

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### **INTISARI**

Sintesis film karboksimetil selulosa (CMC)-polivinil alkohol (PVA) tertaut silang glutaraldehida (GA) sebagai adsorben biru metilen telah berhasil dilakukan. Tujuan penelitian ini adalah untuk mengetahui karakteristik film yang terbentuk dan melakukan studi adsorpsi desorpsi film terhadap biru metilen. Pembuatan film dilakukan dengan teknik *solution casting*. Film yang terbentuk dikarakterisasi dengan spektrofotometer *Fourier Transform Infrared* (FTIR), *Scanning Electron Microscope* (SEM), uji daya serap air dan uji kekuatan tarik. Studi adsorpsi film dikaji melalui beberapa parameter, meliputi variasi komposisi CMC-PVA dan CMC-PVA tertaut silang GA, pH, waktu kontak, konsentrasi awal biru metilen, kinetika dan isoterm adsorpsi. Selanjutnya, studi desorpsi film dilakukan menggunakan larutan NaCl, HCl dan akuabides.

Hasil karakterisasi FTIR menunjukkan kemiripan antara spektra film CMC-PVA tertaut silang GA dengan material penyusunnya dan beberapa daerah serapan dari gugus fungsional yang mengalami sedikit pergeseran atau perubahan intensitas. Citra SEM menunjukkan morfologi permukaan film CMC-PVA tertaut silang GA yang rata dan tidak berpori. Kemampuan serap air film meningkat seiring meningkatnya jumlah CMC dan turun dengan bertambahnya jumlah GA. Sifat mekanik film meningkat seiring bertambahnya jumlah GA. Pada studi adsorpsi, film CMC-PVA (C1P2) dengan penambahan massa GA 0,09 g menunjukkan kemampuan adsorpsi terbesar terhadap biru metilen. Kondisi optimum adsorpsi biru metilen terjadi pada pH 7 dengan waktu kontak selama 300 menit. Konsentrasi optimum biru metilen adalah 200 mg L<sup>-1</sup> dengan kapasitas adsorpsi sebesar 193,89 mg g<sup>-1</sup>. Kinetika adsorpsi biru metilen sesuai dengan model kinetika orde kedua semu dan isoterm adsorpsi sesuai dengan model isoterm Langmuir. Berdasarkan studi desorpsi menunjukkan adsorpsi berlangsung melalui interaksi kimia.

Kata kunci: adsorpsi, film, CMC, PVA, GA

## **SYNTHESIS OF GLUTARALDEHYDE-CROSSLINKED CARBOXYMETHYL CELLULOSE-POLYVINYL ALCOHOL FILM AS ADSORBENT FOR METHYLENE BLUE**

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### **ABSTRACT**

The research about the synthesis of glutaraldehyde (GA)-crosslinked carboxymethyl cellulose (CMC)-polyvinyl alcohol (PVA) film as adsorbent of methylene blue has been done. The purposes of this research were to determine the characteristics and performance of film and investigate adsorption-desorption toward methylene blue. Film has been obtained by solution casting technique and characterized by Fourier Transform Infrared (FTIR) spectrophotometer, Scanning Electron Microscope (SEM), swelling test, and tensile strength test. The adsorption study of GA crosslinked-CMC-PVA was learned by variations of CMC-PVA mass and GA ratio, pH, contact time, variation initial concentration of methylene blue, adsorption kinetics and adsorption isotherm. Meanwhile, desorption study was conducted by NaCl, HCl, and double distilled water.

FTIR characterization result showed a similarity between GA crosslinked-CMC-PVA spectra with its precursor, but some of their absorption peak's intensity changed or shifted that possibly caused by interaction of film components. SEM image showed smooth and non porous appearance. The swelling ability increased as the amount of CMC increased and decreased as the amount of GA increased. Besides, the mechanical properties of film increased as GA increased. In the adsorption study, CMC-PVA film (C1P2) with addition 0.09 g of GA showed the highest adsorption capacity against methylene blue. The optimum pH for adsorption of methylene blue reached at pH 7 and contact time for 300 minutes. The optimum initial concentration of methylene blue was 200 mg L<sup>-1</sup> with highest adsorption capacity of 193.89 mg g<sup>-1</sup>. The adsorption kinetics has been found to follow pseudo-second order, which isotherms fit well Langmuir model. Desorption study showed that adsorption occurred through chemical interaction.

Key words: adsorption, film, CMC, PVA, GA