

**ADSORPSI DAN DESORPSI BIRU METILEN PADA MEMBRAN MAKROPORI PEC
KITOSAN/KARAGINAN TERTAUT SILANG GLUTARALDEHIDA DENGAN SiO₂
SEBAGAI POROGEN**

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INTISARI

Telah dilakukan penelitian tentang adsorpsi dan desorpsi biru metilen pada membran makropori PEC kitosan/karaginan tertaut silang glutaraldehida dengan SiO₂ sebagai porogen. Membran makropori diperoleh dengan melarutkan karaginan dalam air pada temperatur 60 °C kemudian ditambahkan kitosan, asam asetat, bubuk SiO₂, dan glutaraldehida dalam larutan secara bertahap. Setelah dikeringkan pada temperatur 75 °C, membran direndam dengan NaOH pada temperatur yang sama selama 2 jam. Membran makropori yang diperoleh dikarakterisasi dengan FTIR dan SEM. Uji kemampuan adsorpsi dilakukan pada berbagai variasi komposisi, waktu kontak, pH, jumlah porogen, konsentrasi biru metilen serta dilakukan juga kajian terhadap kinetika adsorpsi-desorpsi dan isoterm adsorpsi secara sistematis.

Hasil karakterisasi FTIR menunjukkan pelepasan SiO₂ berhasil dilakukan dan karakterisasi menggunakan SEM menunjukkan adanya perubahan pada permukaan membran non porogen dan membran makropori. Pada proses adsorpsi, komposisi 30:70 antara kitosan dan karaginan menunjukkan kapasitas adsorpsi biru metilen paling tinggi. Adsorpsi mengalami kesetimbangan pada menit ke-30 dan kinetika mengikuti orde dua semu. Proses adsorpsi biru metilen sesuai dengan persamaan isoterm Langmuir dengan kapasitas adsorpsi maksimum 169,5 mg/g. Desorpsi biru metilen maksimum menggunakan NaCl 1,0 M dengan mengikuti kinetika orde dua semu.

Kata kunci: biru metilen, adsorpsi, desorpsi, SiO₂, membran makropori PEC kitosan/karaginan

**ADSORPTION AND DESORPTION OF METHYLENE BLUE USING
CHITOSAN/CARRAGEENAN PEC MACROPOROUS MEMBRANE CROSSLINKED BY
GLUTARALDEHYDE USING SiO₂ AS POROGEN**

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ABSTRACT

A study about adsorption and desorption of methylene blue using PEC chitosan/carrageenan crosslinked glutaraldehyde using SiO₂ as porogen has been done. Macroporous membrane has been obtained by dissolving carrageenan in water at 60 °C followed by addition of chitosan, acetic acid, SiO₂ powder, and glutaraldehyde, respectively. After the evaporating of solution at 75 °C, the membrane was immersed by NaOH and evaporated for 2 hours at the same temperature. The obtained macroporous membrane was characterized by FTIR and SEM. The effect of compositions of chitosan and carrageenan, time contacts, pH, concentrations of methylene blue, kinetics of adsorption-desorption, and adsorption isotherm has also been studied systematically.

The results of FTIR analyses showed that the release of SiO₂ has been successfully done and the characterization using SEM showed that there is a change in the surface on non-porogen membrane and macroporous membranes. The highest methylene blue adsorption capacity was found in membrane with 30:70 composition of chitosan to carrageenan. The adsorption kinetics followed the pseudo-second-order kinetics with the adsorption equilibrium achieved within 30 min. The maximum adsorption capacity of methylene blue is 169.5 mg/g and the adsorption followed Langmuir isotherm model. The maximum desorption of methylene blue is obtained by using NaCl 1.0 M and it follows pseudo-second-order kinetics.

Keyword: methylene blue, adsorption, desorption, SiO₂, chitosan/
carrageenan PEC, macroporous membrane