

ADSORPSI ION Pb(II) PADA MEMBRAN MAKROPORI KITOSAN–KARBOKSIMETIL SELULOSA (KMS) TERTAUT SILANG GLUTARALDEHIDA

Okti Restuning Ratri
11/317062/PA/14179

INTISARI

Telah dilakukan kajian adsorpsi ion Pb(II) pada membran makropori kitosan–karboksimetil selulosa (KMS) tertaut silang glutaraldehida dan SiO₂ sebagai porogen. Membran makropori disintesis dengan mencampurkan larutan kitosan 1% (b/v) dan larutan KMS 0,1 % (b/v), ditambahkan SiO₂ dan glutaraldehida. Larutan yang terbentuk dipanaskan pada suhu 70 °C. Pelepasan SiO₂ dilakukan dengan penambahan natrium hidroksida. Karakterisasi membran dilakukan dengan menggunakan spektrofotometer FTIR dan SEM. Pada kajian adsorpsi dipelajari pengaruh komposisi membran, waktu kontak, pH, konsentrasi awal ion Pb(II) dan jumlah porogen. Mekanisme adsorpsi ion Pb(II) pada membran makropori dipelajari dengan metode desorpsi sekuensial.

Hasil penelitian menunjukkan bahwa kondisi optimum membran untuk adsorpsi ion Pb(II) terjadi pada komposisi kitosan:KMS 3:7, waktu kontak 45 menit, pH larutan 5, konsentrasi awal ion Pb(II) 200 ppm dan jumlah porogen 25%. Adsorpsi membran makropori mengikuti kinetika pseudo–2 dengan nilai k 0,0244 g mg⁻¹ menit⁻¹ dan mengikuti isoterm Freundlich dengan kapasitas adsorpsi 40,61 mg g⁻¹. Kajian desorpsi menunjukkan bahwa mekanisme adsorpsi ion Pb(II) diduga melalui mekanisme pembentukan kompleks, mekanisme pemerangkapan dan pembentukan ikatan hidrogen.

Kata kunci : membran makropori, adsorpsi, Pb(II), isoterm

ADSORPTION OF Pb(II) ION ON GLUTARALDEHYDE–CROSSLINKED MACROPOROUS CHITOSAN–CARBOXYMETHYL CELLULOSE MEMBRANE

Okti Restuning Ratri
11/317062/PA/14179

ABSTRACT

Adsorption of Pb(II) ion on macroporous chitosan–carboxymethyl cellulose (CMC) membrane using glutaraldehyde as crosslinker agent and SiO₂ as porogen has been conducted. Macroporous membrane was synthesized by mixing 1% chitosan solution (w/v) and 0,1% CMC solution (w/v) then adding SiO₂ and glutaraldehyde. The solution was evaporated at 70 °C. Natrium hydroxide was added into membrane to release SiO₂. The membranes were characterized by using FTIR spectrophometer and SEM. The adsorption experiment was conducted in batch method by giving variations to chitosan–CMC composition, contact time, pH, initial concentration of Pb(II) ion and the amount of porogen. The adsorption mechanism of Pb(II) ion by macroporous membrane was determined by sequential desorption method.

The results showed that membrane has reached optimum conditions to adsorp Pb(II) metal ion on chitosan–CMC composition of 3:7, contact time of 45 min, solution pH of 5, Pb(II) initial concentration of 200 ppm and 25% porogen. Pb(II) ion adsorption by macroporous membrane adsorption followed pseudo second order kinetics with k value of 0.0244 g mg⁻¹ min⁻¹ and Freundlich isotherm model with adsorption capacity value of 40.61 mg g⁻¹. Sequential desorption method showed that Pb(II) adsorption mechanism was through formation of complex, physical entrapment and hydrogen bond mechanism.

Keywords : macroporous membrane, adsorption, lead, isotherm