MODIFIKASI SELULOSA DAUN NANAS DENGAN ASAM TRIMELITAT UNTUK ADSORPSI ZAT WARNA KRISTAL VIOLET

Paulina Berliani
18/424234/PA/18339

INTISARI

Modifikasi selulosa daun nanas dengan asam trimelitat untuk adsorpsi zat warna kristal violet (KV) telah dilakukan. Tujuan dari penelitian ini yakni melakukan modifikasi adsorben selulosa daun nanas dengan asam trimelitat, menentukan kondisi optimum adsorpsi, menentukan kinetika dan isoterm adsorpsi, melakukan kajian desorpsi. Adsorben berbasis selulosa dari daun nanas diaktivasi dengan NaOH 0,1 M kemudian dimodifikasi menggunakan asam trimelitat. Serbuk daun nanas sebelum dan sesudah modifikasi dikarakterisasi dengan menggunakan FTIR, XRD, dan SEM. Kajian adsorpsi dilakukan berdasarkan pengaruh variasi pH larutan, massa adsorben, waktu kontak, dan konsentrasi awal adsorbat. Kajian desorpsi dilakukan dengan variasi pelarut dan waktu desorpsi. Konsentrasi KV sebelum dan sesudah adsorpsi ditentukan menggunakan spektrofotometri *UV-visible* pada panjang gelombang 590 nm.

Hasil karakterisasi menunjukkan bahwa modifikasi selulosa daun nanas dengan asam trimelitat berhasil dilakukan. Adsorpsi KV dengan SAT mencapai optimum pada pH 7, massa adsorben 75 mg, waktu kontak selama 90 menit, dan konsentrasi awal adsorbat sebesar 200 ppm. Proses adsorpsi KV dengan adsorben SAT mengikuti kinetika orde dua semu dengan konstanta laju reaksi $3{,}11\times10^{-3}$ g mg^{-1} $menit^{-1}$ dan model isoterm Langmuir dengan kapasitas adsorpsi sebesar 41,5 mg g^{-1}. Desorpsi KV berjalan lambat dengan pelarut optimum HCl pH 3 dan waktu optimum selama 90 menit.

Kata kunci: adsorpsi, asam trimelitat, desorpsi, kristal violet, dan selulosa.

MODIFICATION OF PINEAPPLE LEAF CELLULOSE WITH TRIMELLITIC ACID FOR ADSORPTION OF CRYSTAL VIOLET DYE

Paulina Berliani
18/424234/PA/18339

ABSTRACT

Modification of pineapple leaf cellulose with trimellitic acid for adsorption of crystal violet (CV) dye has been conducted. This research aimed to modify the adsorbent of pineapple leaf cellulose with trimellitic acid (CTA), determine the optimum conditions, and determine the kinetics and isotherm adsorption, conducted a desorption study. Cellulose-based adsorbent from pineapple leaf was activated with 0.1 M NaOH and then modified using trimellitic acid. Pineapple leaf powder before and after modification was characterized by FTIR, XRD, and SEM spectrophotometer. The adsorption process was carried out by varying the pH solution, adsorbent dose, contact time, and initial concentration of adsorbate. The desorption process was carried out by varying the desorption solvent and desorption time. The concentration of CV before and after adsorption was determined using a UV-visible spectrophotometer at wavelength 590 nm.

The characterization results showed that modifying pineapple leaf cellulose with trimellitic acid was successful. The adsorption of CV with CTA adsorbent was optimum at pH 7, 75 mg adsorbent mass, 90 min contact time, and 200 ppm initial concentration of adsorbate. The adsorption followed the pseudo-second-order kinetic model with the adsorption rate constant as 3.11×10^{-3} g mg^{-1} min^{-1} and the Langmuir isotherm model with a maximum adsorption capacity of 41.5 mg g^{-1}. In addition, the CV desorption process was optimum with HCl pH 3 solvent and the optimum desorption time was 90 min.

Keywords: adsorption, trimellitic acid, desorption, crystal violet, and cellulose.