

## SINTESIS SELULOSA-POLIETILENIMINA TERTAUT SILANG GLUTARALDEHID SEBAGAI ADSORBEN ZAT WARNA *ERIOCHROME BLACK-T*

Azhaarramadhani Fawzia Irwanto  
20/455461/PA/19676

### INTISARI

Pada penelitian ini telah dilakukan sintesis dengan menaut silangkan selulosa-polietilenimina menggunakan glutaraldehyd untuk meningkatkan kapasitas adsorpsi zat warna *Eriochrome Black-T*. Tujuan dari penelitian ini adalah melakukan sintesis adsorben S-GA-PEI serta penentuan pH optimum, menentukan model isoterm dan kinetika adsorpsi terhadap *Eriochrome Black-T* menggunakan adsorben S-GA-PEI. Sintesis adsorben diawali dengan isolasi selulosa melalui tahapan delignifikasi dan *bleaching*. Isolasi kemudian dilanjutkan tahapan sintesis adsorben melalui selulosa yang dicampurkan dengan polietilenimina dan glutaraldehyd. Adsorben S-GA-PEI dikarakterisasi dengan FTIR, XRD, dan SEM-EDX. Penelitian mengenai adsorben S-GA-PEI pada proses adsorpsi *Eriochrome Black-T* mencakup penentuan pH optimum, isoterm adsorpsi, dan kinetika adsorpsi yang dianalisis menggunakan spektrofotometer UV-Vis. Studi desorpsi *Eriochrome Black-T* dilakukan dengan menggunakan berbagai pelarut yaitu akuades, NaCl 0,1 M, HCl 0,1 M, etanol 0,1 M, dan NaOH 0,1 M.

Hasil penelitian yang didapatkan adalah adsorben S-GA-PEI yang stabil pada pH 1-8. Kondisi optimum yang terjadi saat proses adsorpsi EBT oleh adsorben S-GA-PEI didapatkan kapasitas sebesar 344,07 mg/g yang diperoleh pada pH 3 dengan konsentrasi 250 mg/L dan waktu kontak selama 300 menit. Model isoterm dan kinetika adsorpsi *Eriochrome Black-T* oleh adsorben S-GA-PEI mengikuti model isoterm Langmuir dengan nilai  $K_L$  0,126 L/mg dan model kinetika orde kedua semu dengan nilai konstanta laju adsorpsi sebesar  $4,54 \times 10^{-4}$  g/mg·menit. Pada kajian desorpsi, larutan NaOH 0,1 M memiliki kemampuan paling kuat yaitu 36,30%.

Kata kunci: adsorpsi, *Eriochrome Black-T*, glutaraldehyd, polietilenimina, selulosa

## **CELLULOSE-POLYETHYLENEIMINE SYNTHESIS CROSSLINKED GLUTARALDEHYDE AS AN ADSORBENT OF ERIOCHROME BLACK-T DYE**

Azhaarramadhani Fawzia Irwanto  
20/455461/PA/19676

### **ABSTRACT**

In this research, synthesis has been carried out by cross-linking cellulose-polyethyleneimine using glutaraldehyde to increase the adsorption capacity of Eriochrome Black-T dye. This research aims to synthesize the S-GA-PEI adsorbent and determine the optimum pH, the isotherm model, and the adsorption kinetics of Eriochrome Black-T using the S-GA-PEI adsorbent. Adsorbent synthesis begins with cellulose isolation through delignification and bleaching stages. The isolation was then continued with the adsorbent synthesis stage through cellulose mixed with polyethyleneimine and glutaraldehyde. FTIR, XRD, and SEM-EDX characterized the S-GA-PEI adsorbent. The S-GA-PEI adsorbent study was carried out on Eriochrome Black-T adsorption including determining the optimum pH, adsorption isotherm, and adsorption kinetics which will be analyzed using a UV-Vis spectrophotometer. Desorption studies of Eriochrome Black-T were carried out in distilled water, 0.1 M NaCl, 0.1 M HCl, 0.1 M ethanol, and 0.1 M NaOH.

The research results showed that the S-GA-PEI adsorbent was stable at pH 1-8. The optimum conditions that occurred during the EBT adsorption process by the S-GA-PEI adsorbent were obtained with a capacity of 344.07 mg/g obtained at pH 3 with a concentration of 250 mg/L and a contact time of 300 minutes. The isotherm dan kinetic model of adsorption of Eriochrome Black-T by the S-GA-PEI adsorbent follows the Langmuir isotherm model with a KL value of 0.126 L/mg dan a pseudo-second-order kinetic model with an adsorption rate constant value of  $4.54 \times 10^{-4}$  g/mg · minute. In the desorption study, 0.1 M NaOH solution had the strongest capacity, 36.30%.

**Keywords:** adsorption, cellulose Eriochrome Black-T, glutaraldehyde, polyethyleneimine