

**ETHYLENEDIAMINETETRAACETIC DIANHYDRIDE  
MODIFIED COCONUT FROND FOR REMOVAL OF Pb (II):  
KINETICS, ISOTHERM AND THERMODYNAMICS**

**NUR 'AIN BINTI MOHD NIZAM PRUSHOTMAN**

**BACHELOR OF SCIENCE (Hons.) CHEMISTRY  
FACULTY OF APPLIED SCIENCES  
UNIVERSITI TEKNOLOGI MARA**

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## ABSTRACT

### ETHYLENEDIAMINETETRAACETIC DIANHYDRIDE MODIFIED COCONUT FROND FOR REMOVAL OF Pb (II): KINETICS, ISOTHERM AND THERMODYNAMICS

Ethylenediaminetetraacetic dianhydride (EDTAD) modified coconut frond was prepared, and characterized by using Attenuated transfer reflectance fourier transform infrared spectrophotometer (ATR-FTIR) and  $\text{pH}_{\text{zpc}}$ . The factors affecting the adsorption process which is pH (1-5), adsorbent dosage (0.02-0.10g), initial concentration (10, 20, 30 mg/L), contact time (1, 3, 6, 10, 20, 30, 60, 90, 120 min), temperature (303 K, 313 K, 323 K) were investigated. The adsorption process was relatively fast and equilibrium was established within 90 min. Due to the presence of large number of carboxyl groups, the adsorption capacity of EDTAD modified coconut frond (ECFP) for Pb(II) showed a high amount of maximum adsorption capacity 84.034 mg/g. Adsorption process fitted well with Langmuir isotherm model compared to Freundlich isotherm model. A comparison between two kinetic models were investigated and the result showed better correlation coefficient for pseudo-second-order kinetic model confirming that the sorption rate was controlled by chemisorption process. Different thermodynamic parameter Gibbs free energy  $\Delta G^\circ$ , enthalpy  $\Delta H^\circ$  and entropy  $\Delta S^\circ$  have also been evaluated and the result showed negative value of  $\Delta G^\circ$  which means that the process is spontaneous. Both positive value of  $\Delta H^\circ$  and  $\Delta S^\circ$  indicated that the process is endothermic and entropy driven in nature.