



## **ADSORPSI KOMPETITIF ION LOGAM Cd(II), Cu(II), Ni(II), Pb(II) PADA ASAM HUMAT**

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### **INTISARI**

Penelitian adsorpsi kompetitif logam Cd(II), Cu(II), Ni(II) dan Pb(II) pada asam humat telah dilakukan. Asam humat diisolasi dari tanah gambut yang diperoleh dari Rawa Pening, Jawa Tengah dengan cara melarutkan asam humat dengan larutan NaOH 0,1 M kemudian diendapkan dengan larutan HCl 0,1 M. Asam humat kemudian dimurnikan dengan larutan HF 0,3 M/HCl 0,1 M 1:1 (v/v). Selanjutnya asam humat sebelum dan sesudah dimurnikan dikarakterisasi dengan spektrofotometer FTIR dan diukur kadar abunya. Aplikasi termodinamika dan kinetika dipelajari dengan menginteraksikan asam humat dengan larutan yang mengandung ion logam Cd(II), Cu(II), Ni(II) dan Pb(II) pada variasi pH, konsentrasi dan waktu kontak. Filtrat dianalisis menggunakan *Atomic Adsorption Spectroscopy* (AAS), adsorben asam humat setelah interaksi dengan logam Cd(II), Cu(II), Ni(II), Pb(II) dikarakterisasi dengan spektrofotometer FTIR.

Hasil dari percobaan menunjukkan bahwa kadar abu asam humat berkurang dari 18,6% menjadi 0,57% setelah 4 kali pemurnian. Adsorpsi logam Cu(II), Ni(II), Pb(II) optimum pada pH 4 sementara adsorpsi logam Cd(II) optimum pada pH 5, dengan kapasitas adsorpsi maksimum mengikuti urutan Pb(II) > Cu(II) > Ni(II) > Cd(II). Logam Pb(II) dan Cu(II) mengikuti model isotherm Freundlich sedangkan logam Cd(II) dan Ni(II) mengikuti model isotherm Langmuir. Keempat logam tersebut diadsorpsi oleh asam humat mengikuti model kinetika adsorpsi pseudo orde dua, sementara laju adsorpsinya mengikuti urutan Pb(II) > Cu(II) > Cd(II) > Ni(II).

Kata Kunci : Adsorpsi, kompetitif, logam berat, asam humat



## COMPETITIVE ADSORPTION OF Cd(II), Cu(II), Ni(II), Pb(II) METAL IONS ON HUMIC ACID

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### ABSTRACT

Isolation of humic acid and their application for competitive adsorption of heavy metals have been done. Humic acid was isolated from peat soil of Rawa Pening, Jawa Tengah by dissolving humic acid with NaOH 0.1 M solution, and then precipitating with HCl 0.1 M. Isolated humic acid was purified with HF 0.3 M/HCl 0.1 M 1:1 (v/v). Humic acid before and after purification were characterized by FTIR spectrophotometer and then ash content was determined. Application for the determination of thermodynamic and kinetics parameters of adsorption was done by interacted humic acid with the mixture of metal ions Pb(II), Cu(II), Ni(II) and Cd(II) at various pH, concentration and contact time. Filtrate was analyzed using atomic adsorption spectroscopy (AAS) and adsorbent humic acid after interactions with Pb(II), Cu(II), Ni(II) and Cd(II) was characterized by FTIR spectrophotometer.

The result showed that the ash content became 0.57% from 18.6% after four time purification. Adsorption of Pb(II), Cu(II), Ni(II) was optimum at pH 4, while the optimum pH for Cd(II) adsorption was 5, the adsorption capacity for these heavy metal followed the order of Pb(II) > Cu(II) > Ni(II) > Cd(II). The Freundlich model adsorption fitted better to the adsorption of Cu(II) and Pb(II) while Cd(II) and Ni(II) adsorption was best described by Langmuir isotherm. Kinetics studies showed that the adsorption fitted well with pseudosecond-order model, and the rate kinetics followed the order Pb(II) > Cu(II) > Cd(II) > Ni(II).

Keywords : adsorption, competitive, heavy metal, humic acid