



## Removal of cadmium(II) from aqueous solutions by biosorption onto the brown macroalga (*Dictyota dichotoma*)

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### ABSTRACT

This paper presents the characteristics of Cd(II) biosorption from aqueous solution using the brown alga (*Dictyota dichotoma*) as a function of pH, biomass dosage, contact time and temperature. Langmuir, Freundlich and Dubinin–Radushkevich (D–R) models were applied to describe the biosorption isotherms of Cd(II) by *D. dichotoma* biomass. The monolayer biosorption capacity of *D. dichotoma* biomass for Cd(II) ions was found to be 75 mg/g. The mean free energy calculated from D–R isotherm indicated that the biosorption of Cd(II) onto *D. dichotoma* macroalga took place by chemisorption. Kinetic evaluation of the experimental data showed that the biosorption process followed pseudo-second-order model. The calculated thermodynamic parameters  $\Delta G^\circ$ ,  $\Delta H^\circ$  and  $\Delta S^\circ$ , showed that the biosorption of Cd(II) onto *D. dichotoma* biomass was feasible, spontaneous and exothermic under examined conditions. X-ray photoelectron spectroscopy (XPS) and FT-IR analysis of *D. dichotoma* revealed the chelating character of the ion coordination to carboxyl groups. It was confirmed that carboxyl, ether, alcoholic and amino groups are responsible for the binding of the metal ions.

*Keywords:* *Dictyota dichotoma*; Biosorption; Langmuir and Freundlich models; Kinetic; XPS; FT-IR

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