ABSTRACT

Conventional techniques for removing dissolved heavy metals are only practical and cost-effective when applied to high strength wastes with heavy metal ion concentrations greater than 100 ppm. The possibility of using a non-living algal biomass to solve this problem was studied. Lead(II) was used in this study because it has been reported to cause several disorders in human.

The non-living algal biomass was obtained from the filamentous green alga *Spirogyra neglecta*. The effects of initial concentration and contact time, pH, and temperature on the adsorption of lead(II) by the non-living algal biomass were studied. The equilibrium isotherms and kinetics were found from batch adsorption experiments. The surface characteristics of the non-living algal biomass were examined using scanning electron microscope and Fourier Transformed Infrared Spectrometer. Langmuir, Freundlich models were applied to describe the adsorption isotherms of the metal ions by *S. neglecta* biomass.

Langmuir model is more closer to the equilibrium data than the Freundlich isotherm. The kinetics of adsorption was found to follow the pseudo-second-order kinetic model. The adsorption of lead(II) by native non-living biomass was rapid reaching equilibrium within one hour of contact time. The effects of solution pH and temperature on adsorption equilibrium were investigated and the results indicated that adsorption of lead(II) by *S. neglecta* biomass increased with increasing pH and temperature.

The calculated thermodynamic parameters, ΔG°, ΔH° and ΔS° showed that the adsorption of lead(II) ions onto *S. neglecta* was feasible, spontaneous and endothermic under examined conditions.

The maximum adsorption capacity (q_{max}) of *S. neglecta* biomass was found to be 132 mg/g form experimental data.

ABSTRAK

Bagi pengasingan logam berat yang terlarut teknik konvensional hanya praktikal dan kos-efektif apabila diaplikasi untuk sisa buangan kekuatan tinggi dengan kepekatan ion logam berat lebih dari 100 ppm. Kemungkinan menggunakan biojisim alga bukan-hidup untuk menyelesaikan masalah yang dikaji. Plumbum(II) digunakan dalam kajian ini kerana telah dilaporkan menyebabkan beberapa gangguan terhadap kesihatan manusia.

Alga biojism bukan-hidup diperolehi dari alga berbentuk filament hijau *Spirogyra neglecta*. Pengaruh kepekatan awal masa tindakbalas pH dan suhu semasa penyerapan Plumbum(II) oleh alga biojism bukan hidup dikaji keseimbangan isotermal dan kinetik didapati dari ujikaji penyerapan berkumpulan. Permukaan kriteria dari biojism alga bukan-hidup telah diteliti dengan menggunakan mikroskop elektron imbasan dan Fourier Transformed Infrared Spectrometer. Model Langmuir, Freundlich yang digunakan penyerapan isotermal ion logam oleh biojism *S. neglecta*.

Model Langmuir lebih hampir dengan data keseimbangan dari isotermal Freundlich kinetik penyerapan dapati mengikut pseudo tertib kedua model kinetik. Pengaruh pH larutan dan suhu pada keseimbangan penyerapan diselidiki dan haslinya menunjukkan bahawa penyerapan Plumbum(II) oleh biojism *S. neglecta* meningkatnya pH dan suhu.

Parameter termodinamik ΔG°, ΔH° and ΔS° menunjukkan bahawa penyerapanion Plumbum(II) atas *S. neglecta* mudah spontan dan endotermik dalam keadaan ujian .

Kapasiti penyerapan maksimum(q_{max}) dari biojism *S. neglecta* dijumpai 132 mg/g bentuk data eksperimen.

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TABLE OF CONTENTS

LIST OF FIGURS

LIST OF TABLES

LIST OF ABBREVIATION (NOMENCLATURE)

Pb	Lead
C_0	Initial lead(II) concentration (mg /L)
C_e	Equilibrium lead(II) concentration (mg/L)
q_{max}	Maximum adsorption capacity of the adsorbent (mg/g)
q_e	Equilibrium capacity of adsorption (mg/L)
K_F	Constant in the Freundlich equation
L	Liter
1/n	Constant in the Freundlich equation
V	Sample volume (ml)
W	Amount of dry biomass (g)
R^2	Correlation coefficient
min.	Minute
hr.	Hour
t	Time (minute)
µ	Micro
K	Kelvin
AAS	Atomic Absorption Spectrometer
rpm	revolutions per minute
DOE	Department of Environment
Emf	Electromagnetic force
EPA	Environmental Protection Agency
FTIR	Fourier transform infrared spectroscopy
SEM	Scanning electron microscope
WHO	World Health Organization