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CanlÃ„Â± Ã„Â°ki YeÃ„Âil Mikroalg Ã„Âœzerinde Nikel (II), Antimon (III), Mangan (II) ve BakÃ„Â±r (II)Ã„Â€™Ã„Â±n DÃ„Â¶rtlÃ„Â¼ Adsorpsiyon Etkisi

Quaternary Adsorption Effect of Nickel (II), Antimony (III), Manganese (II) and Copper (II) onto Living Two Green Microalgae

TuÃ„Âba Ã„ÂžENTÃ„ÂœRK [.11-](#) , Ã„ÂžÃ„Â¼kran YILDIZ [.12-](#)

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Özet

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Bu çalışmada, *Chlorella* ve *Scenedesmus* algleri kullanılarak sulu çözelti ortamından Ni, Sb, Mn ve Cu adsorpsiyonunun araştırılması amaçlanmıştır. 24 saat inkübasyon süresi boyunca sulu çözeltiden canlı iki mikro alg suyu üzerinde nikel (Ni^{2+}), antimony (Sb^{3+}), mangan (Mn^{2+}) ve bakır (Cu^{2+}) iyonlarının adsorpsiyon verimliliği incelenmiştir. Metal uygulaması sonrasında, klorofil a-b, toplam karbonhidrat ve atomik kuvvet mikroskopu (AFM) görüntüleme analizi yapılmıştır. Metal iyonlarının adsorpsiyon izoterm modelleri Langmuir ve Freundlich izotermine göre belirlenmiştir. Çoklu metal sisteminde *Scenedesmus* hücreleri tarafından sırasıyla antimon: 10.82 mg g^{-1} , mangan: 7.07 mg g^{-1} , bakır: 27.09 mg g^{-1} ve nikel: 9.71 mg g^{-1} ($Cu > Sb > Ni > Mn$) olarak belirlenirken *Chlorella* hücrelerinin adsorpsiyon kapasitesi antimon: 6.47 mg g^{-1} , mangan: 5.96 mg g^{-1} , bakır: 28.57 mg g^{-1} ve nikel: 10.71 mg g^{-1} ($Cu > Ni > Sb > Mn$) olarak belirlenmiştir. AFM görüntülemelerine göre, ağır metallerle maruz bırakılan hücre duvarlarında, maruz bırakılmamış hücrelere kıyasla deformasyon tespit edilmiştir. Bu çalışmada Freundlich adsorpsiyon modeli $1/n$ değerinin 1 ile ∞ arasında olmasıyla tüm metal iyonları için uygundur. Sonuç olarak, çalışmada elde edilen sonuçlar değerlendirildiğinde, *Chlorella* ve *Scenedesmus* hücrelerinin, dört ağır metal, özellikle Cu adsorpsiyonunun yüksek verimliliği nedeniyle, Cu^{2+} iyonlarının sulu çözelti ortamından uzaklaştırılmasında etkili bir adsorbent olduğu ortaya koymuştur.

This study aimed to investigate Ni, Sb, Mn and Cu adsorption from aqueous solution by *Chlorella* and *Scenedesmus* algae. The competitive adsorption efficiency of nickel (Ni^{2+}), antimony (Sb^{3+}), manganese (Mn^{2+}) and copper (Cu^{2+}) onto two living microalgae strains was studied from multi-metal aqueous solution for 24h incubation time. After exposure, chlorophyll a-b, total carbohydrate and Atomic force microscopy (AFM) imaging were performed. Then adsorption isotherms models of metal ions were determined based on Langmuir and Freundlich isotherms. The adsorption capacity in multi-metal system was determined 6.47 mg g^{-1} for antimony, 5.96 mg g^{-1} for manganese, 28.57 mg g^{-1} for copper and 10.71 mg g^{-1} for nickel ($Cu > Ni > Sb > Mn$) by *Chlorella* respectively, whereas, and 10.82 mg g^{-1} for antimony, 7.07 mg g^{-1} for manganese, 27.09 mg g^{-1} for copper and 9.71 mg g^{-1} for nickel ($Cu > Sb > Ni > Mn$) by *Scenedesmus* cells. According to AFM images, deformation was detected in two algae cell walls treated with heavy metals compared to untreated cells. For this study, Freundlich adsorption model best fitted the data for all metal ions with $1/n$ value < 1 . As a result, when the results obtained in the study are revealed that *Chlorella* and *Scenedesmus* cells were an effective adsorbent for removal of the four heavy metals, especially Cu^{2+} ions from aqueous solutions due to its high efficiency of Cu adsorption.

Anahtar Kelimeler

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[Adsorpsiyon](#), [AFM](#), [Chlorella](#), [ağır metal](#), [Scenedesmus](#)

[Adsorption](#), [AFM](#), [Chlorella](#), [heavy metal](#), [Scenedesmus](#)

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Yazar: TuÃ„,ÄŸba Ã ÄžENTÃfÄœRK(Sorumlu Yazar)

Yazar: Ä ÂžÄ¼kran YILDIZ

Kaynak Göster

Bibtex

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