



## **Utilization of Marine Green Algae for Removal of Cd(II), Cu(II) and Ni(II) Ions from Aqueous Solutions by Batch and Fixed Bed Column**

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*Received May 17, 2013; Accepted July 28, 2013*

**Abstract** The marine algae have high metal binding capacities due to the presence of polysaccharides, proteins and lipids in the cell wall structure which containing functional groups such as; amino, carboxyl, hydroxyl and sulphate, that act as binding sites for heavy metals. Marine green algae *Enteromorpha torta* (Wulfen) (Chlorophyta: Ulvales) collected from western Alexandria coast was investigated for the removal of Cd(II), Cu(II) and Ni(II) from their aqueous solutions. Different dry weights of *E. torta* 0.025, 0.05, 0.1, 0.15 and 0.2g were immobilized using 10 ml of 4% calcium alginate (CA) to choose the optimum immobilized weight. The optimum immobilized weight was 0.1g dry weight/10 ml CA. The equilibrium sorption studies for Cd(II), Cu(II) and Ni(II) removal were done using 2g (50 beads) of immobilized algal biomass (IAB) beads in a batch experiments. It was observed that the equilibrium reached in three hours. The maximum biosorption of Cd(II), Cu(II) and Ni(II) was occurred at pH 5.0-5.5. The maximum removal capacity in batch experiment was obtained using 800ppm metal ion solution where; 208.0, 192.0 and 150mg of Cu(II), Cd(II) and Ni(II) were removed by gram dry weight, respectively. Also, column experiments were carried out to investigate the capacity of IAB beads for Cd(II), Cu(II) and Ni(II). The factors affecting the breakthrough curve; effluent flow rate (0.5, 1, 2, 5 ml/min) and column depth (2, 4, 6cm) were studied using constant initial effluent ions concentration (100ppm).

**Key words:** *Biosorption, marine green algae, immobilization, heavy metals, fixed bed column*

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