

# REMOVAL OF HEXAVALENT CHROMIUM FROM AQUEOUS SOLUTION BY USING A LOW-COST BIOSORBENT – *Codiaeum variegatum*

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## ABSTRACT

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In this study, the *Codiaeum variegatum* technical feasibility for the removal of Cr(VI) from aqueous solutions prepared in the laboratory was investigated through batch mode experiments. A best fit standard curve was successfully constructed, with correlation coefficient ( $R^2$ ) of 0.999 and an equation for the determination of Cr(VI) concentration was generated;  $y = 0.6103x$ . Effects of initial pH (1 to 7) at various contact time and different initial concentrations on the biosorption of Cr(VI) by these biosorbents were successfully studied. The investigations revealed that at pH 1 and pH 2, more than 99% of Cr(VI) was completely removed from the solutions with equilibrium time of 15 minutes and 45 minutes with metal uptake of 2.41 mg/g and 2.18 mg/g respectively. The data obtained was further analyzed by t-test ( $p > 0.05$ ) where there was no significant difference between pH 1 and pH 2. As the concentration increased from 10 mg/L to 100 mg/L, the percentage of removal decreased from 91.38% to 41.57%. The Langmuir model provides an estimation of maximum metal uptake capacity at higher metal equilibrium concentration. Equilibrium data for the biosorption of Cr(VI) onto *C. variegatum* at various initial concentrations obeyed the isotherm with correlation coefficient ( $R^2$ ) of 0.9281 and the maximum metal uptake,  $Q_{max}$  and metal-biomass affinity,  $b$  were found to be 9.79 mg/g and 9.18 mg/L respectively. By using the biosorption technique, it could be concluded the efficiency of the biosorbents towards the removal of Cr(VI) was greatly affected by pH and initial concentration of the Cr(VI) solutions.

**Key words:** *Codiaeum variegatum*; costless biosorbents; biosorption of hexavalent chromium; Langmuir isotherm