

Heavy Metal Removal by Green Microalgae Biofilms from Industrial Wastewater

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Abstract : Heavy metals are hazardous pollutants present in both industrial and domestic wastewater. They are usually disposed directly into natural streams, and when left untreated, they are a major cause of natural degradation and diseases. This study aimed to determine the ability of microalgae to remove heavy metals from coal mine wastewater. The green algae were grown and used for heavy metal removal in a laboratory bench. The physicochemical parameters and heavy metal removal were determined at 24 hours intervals for 5 days. The highest removal efficiencies were found to be 85%, 95%, and 99%, for Fe, Zn, and Cd, respectively. Copper and aluminium both had 100%. The results also indicated that the correlation between physicochemical parameters and all heavy metals were ranging from ($0.50 \leq r \leq 0.85$) for temperature, which indicated moderate positive to a strong positive correlation, pH had a very weak negative to a very weak positive correlation ($-0.27 \leq r \leq 0.11$), and chemical oxygen demand had a fair positive to a very strong positive correlation ($0.69 \leq r \leq 0.98$). The paired t-test indicated the removal of heavy metals to be statistically significant ($0.007 \geq p \geq 0.000$). Therefore, results showed that the microalgae used in the study were capable of removing heavy metals from industrial wastewater using possible mechanisms such as binding and absorption. Compared to the currently used technology for wastewater treatment, the microalgae may be the alternative to industrial wastewater treatment.

Keywords : heavy metals, industrial wastewater, microalgae, physicochemical parameters

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