

Isolation and characterization of copper and cadmium resistant bacteria from industrial wastewaters and evaluating the biosorption of selected bacteria

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Received 25 April 2017; Accepted 21 September 2017

ABSTRACT

Heavy metals are considered as the most serious environmental contaminations because of their high stability in the environmental matrices. Biological activities are imperative themes because of their relationship with mitigation of heavy metals toxicity as well as removing them from the environment. The purpose of this study was to isolate and purify bacteria resistant towards copper and cadmium available in industrial wastewater, and also to evaluate the biosorption of these metals by selective bacteria. In this research the resistant bacteria were isolated at different concentrations of copper and cadmium sulfate salts. Thereafter, the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of isolated bacteria were assessed via three repetitions. Analysis of variance (ANOVA) was performed for isolated bacteria according to MBC values and significant differences were observed between data. Then, comparison between the means values of samples by using Duncan method was achieved and the resistant bacteria was selected. Out of 31 resistant bacteria were isolated, purified and gram stained, the most percentage of resistance to copper and cadmium belonged to gram-negative bacteria. Four bacterial species were resistant to high concentration of each copper sulfate and cadmium sulfate. Bacteria were obtained from *Pseudomonas* spp., *Alcaligenes* spp., *Acinetobacter* spp. and *Achromobacter* spp. *Pseudomonas* sp. had the highest ability to absorb copper (78.31%) from 2 mM copper sulfate while *Achromobacter* sp. got the maximum potency to absorb cadmium (53.38%) from 5 mM cadmium sulfate. This work demonstrated that biosorption of copper was higher than cadmium by resistant bacteria and bioaccumulation played a vital role in the removal of cadmium. Consequently, using these bacteria could really consider as a systematic and effective approach in order to heavy metals removal from industrial wastewaters by biosorption and bioaccumulation.

Keywords: Minimum inhibitory concentration (MIC); Minimum bactericidal concentration (MBC); Heavy metals; Biosorption; Wastewater

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