Isolation and characterization of *Pseudomonas* resistant to heavy metals contaminants

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ABSTRACT

In this work, chromium, copper, nickel, cadmium were selected as a model for metal contamination. This selection is based on the fact that these metals are discharged in many of the industries such as electroplating, detergents, oil refining and others. The isolation of bacteria resistant to different metal ions was done by using mixed industrial and domestic wastewater from the western station of sewage treatment plant in Alexandria. Iron limiting Casamino acid media is used in this study, since it can induce the production of fluorescent siderofores of the Pseudomonas species. Eighteen colonies were selected and purified as single colonies. The preliminary observation and the biochemical identification of these isolates indicated that the selected isolates are belonging to Pseudomonas species. Screening of the bacterial isolates for metal resistance against Cr(VI), Cu(II), Cd(II) and Ni(II) was done by the use of MIC and MTC (Maximum tolerable concentrations). Different metal concentrations were used throughout the screening to select bacterial isolates capable to grow and resist the metal toxicity. The optimum pH of metal precipitation was around 6. Whereas the optimum growth pH for Cr and Ni resistant strains was 5.5, while was 6 for Cu and Cd resistant strains.

Keywords: *Heavy metals, wastewater, screening, metal resistance, bioaccumulation.*

INTRODUCTION

The pollution of the environment with toxic heavy metals is spreading throughout the world along with industrial progress. Copper, chromium, cadmium and nickel are known to be the most commonly heavy metals used and the more widespread contaminants of the environment (Patterson, 1977; Aksu, 1998; Doenmez and Aksu, 1999). Traces of these heavy metals are necessary as Co-factors of enzymatic reactions, but high levels of them may cause extreme toxicity to living organisms due to inhibition of metabolic reactions. The microorganisms respond to these heavy metals by several processes; including transport across the cell membrane, biosorption to the cell walls and entrapment in extracellular capsules, precipitation, complexation and oxidation-reduction reactions (Rai *et al*., 1981; Macaskie and Dean, 1989; Huang *et al*., 1990; Avery and Tobin, 1993; Brady *et al*., 1994; Veglio *et al*., 1997).

The bioremediation of heavy metals using microorganisms has recieved a great deal of attention in recent years, not only as a scientific novelty but also for its potential