

The effect of silica concentration on the biosorption of Cu^{2+} and Co^{2+} from aqueous solutions mediated by strains of *Bacillus*

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Abstract

Bacillus strains were isolated from a mine tailings dump in Nigel town, south-east of Johannesburg. These were then grown at $37(\pm 0.5)^\circ\text{C}$ in a trace element-agitated liquid media. The effects of pH, contact time, initial ion concentration and the presence of co-cations were studied to ascertain the optimal conditions for biosorption to take place. Test solutions contained 0.002 M, 0.07 M and 0.2 M of either copper or cobalt ions. The *Bacillus* strains removed the copper and cobalt more efficiently from solutions of low concentration (0.002 M and 0.07 M) than from solutions of high concentration (0.2 M) over a 48 h period. Maximum biosorption was obtained at pH 6.5 and 5.5 for copper and cobalt solutions, respectively. The presence of silica led to an initial increase in both copper and cobalt biosorption, though higher concentrations of silica resulted in a decrease in metal uptake by *Bacillus* strains.

Keywords: biosorption, *Bacillus*, silica, copper, cobalt