

Bioremoval of toxic molybdenum using dialysis tubing

ABSTRACT

The toxicity of molybdenum to ruminants and its general toxicity to spermatogenesis in animals are increasingly being reported. Its contamination of aquatic bodies has been reported, and this necessitates its removal. In this work, we utilize the dialysis tubing method coupled with the molybdenum-reducing activity of *S. marcescens* strain Dr.Y6 to remove molybdenum from solution. The enzymatic reduction of molybdenum into the colloidal molybdenum blue traps the reduced product in the dialysis tubing. The initial rate of increase of Mo-blue product was determined using the modified Gompertz model while the resultant inhibition kinetics profile was carried out using the Haldane model. The calculated maximal rate of Mo-blue production was 153 $\mu\text{mole (Mo-blue.hr)}^{-1}$ and the concentration of molybdate resulting in the half-maximal rate of reduction (K_s), and the inhibition constant (K_i) were 0.22 and 506 mM, respectively. The results indicate that the system using dialysis tubing coupled with the Mo-reducing bacterium is a good candidate for a method for molybdenum bioremoval from solution.

Keyword: Dialysis tubing; Gompertz; Molybdenum; Molybdenum blue; *S. marcescens*