Development of an inhibitive enzyme assay for copper

ABSTRACT

In this work the development of an inhibitive assay for copper using the molybdenum-reducing enzyme assay is presented. The enzyme is assayed using 12-molybdophosphoric acid at pH 5.0 as an electron acceptor substrate and NADH as the electron donor substrate. The enzyme converts the yellowish solution into a deep blue solution. The assay is based on the ability of copper to inhibit the molybdenum-reducing enzyme from the molybdate-reducing Serratia sp. Strain DRY5. Other heavy metals tested did not inhibit the enzyme at 10 mg l(-1). The best model with high regression coefficient to measure copper inhibition is one-phase binding. The calculated IC50 (concentration causing 50% inhibition) is 0.099 mg l(-1) and the regression coefficient is 0.98. The comparative LC50, EC50 and IC50 data for copper in different toxicity tests show that the IC50 value for copper in this study is lower than those for immobilized urease, bromelain, Rainbow trout, R. meliloti, Baker's Yeast dehydrogenase activity Spirillum volutans, P. fluorescens, Aeromonas hydrophilia and synthetic activated sludge assays. However the IC50 value is higher than those for Ulva pertusa and papain assays, but within the reported range for Daphnia magna and Microtox assays.

Keyword: Inhibitive enzyme assay; Copper; Mo-reducing enzyme