

Influence of Metal Oxide Nanoparticles on Oxalate Oxidase

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ABSTRACT

Oxalate oxidase (OxO) is a largely employed for determination of oxalate in various biological materials. The present report describes in vitro effects of nanoparticles (NPs) of three metal oxides, i.e., zinc oxide (ZnO), copper oxide (CuO), and manganese oxide (MnO₂), on the activity and stability of OxO purified from barley roots. The transmission electron microscopy and X-ray diffraction studies of these NPs revealed their very fine crystalline structure with the diameter in the range 30–70, 50–60, and 20–60 nm for ZnONPs, CuONPs, and MnO₂NPs, respectively. The addition of suspension of these three NPs into assay mixture of enzyme individually, led to the adsorption of OxO over their surface, as confirmed by Fourier transform infrared spectra and UV–Vis spectroscopic studies. Compared to free enzyme, MnO₂ NPs-bound enzyme showed improved activity (35 % stimulation at 2.5 mg/ml concentration), while ZnONPs- and CuONPs-bound enzyme had no substantial improvement. The MnO₂NPs-bound enzyme also showed marked improvement in its storage and thermal stability compared to free enzyme.

Keywords: Nanoparticles; enzyme; oxalate oxidase