

18<sup>th</sup> National and 3<sup>rd</sup> International Conference of Iranian Biophysical chemistry هجدهمین همایش ملی و سومین همایش  
بین المللی بیوشیمی فیزیک ایران

25-26 Des, 2024, University of Hormozgan

۵-۶ دی ماه ۱۴۰۳، دانشگاه هرمزگان

## A novel NADPH-dependent nitrate reductase with tellurite reductase activity from heavy metal resistance bacteria, *Bacillus licheniformis* strain ZT1

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### Abstract

The tellurium and tellurium-containing compounds have been used extensively in several fields such as electronics, optics and biosensor creation. Some reductase enzymes could reduce tellurite or tellurate to generate tellurium nanoparticles.

In this work, the NADPH-dependent nitrate reductase enzyme with tellurite reductase activity was purified from *Bacillus licheniformis* strain ZT1 that resistant to some heavy metals. The  $K_m$  and  $V_{max}$  values of purified enzyme were 1.5 mM and 0.3  $\mu\text{mol}/\text{min}$ , respectively. The enzyme exhibited its optimum activity at pH 9 and 45°C. Divalent cations, such as  $\text{Mn}^{2+}$ ,  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$ , had no effect on the activity, while similar concentrations of  $\text{Cu}^{2+}$  abolished the activity. N-ethylmaleimide furthermore could completely inhibit the enzyme activity due to changes in enzyme conformation.

In order to investigate correctly the effects of water-miscible organic solvents on the behavior of the enzyme, some organic solvents were selected for the investigation. The enzyme revealed 65% of its initial activity in the presence of Tween 80.

**Keywords:** NADPH-dependent nitrate reductase, Tellurite reductase activity, Heavy metal resistance strain

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