Epoxide hydrolase from the fungus *Trichoderma reesei*: biochemical properties and conformational characterization

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INTRODUCTION: Epoxide hydrolases (EH; EC 3.3.2.3), are enzymes that catalyze the conversion of epoxides into their corresponding diols through the addition of a water molecule. EHs have biotechnological potential in chiral chemistry, for the preparation of enantiopure epoxides, vicinal diols or fine chemicals. **OBJECTIVES:** In the present work, we report the cloning, purification, the enzymatic activity, and the conformational analysis by means of Circular Dichroism spectroscopy, of the TrEH gene from *Trichoderma reesei* strain QM9414. **MATERIALS AND METHODS:** The EH gene has an open reading frame encoding a protein of 343 amino acid residues resulting in a molecular mass of 38.2 kDa. The TrEH was purified and characterized using racemic styrene oxide (SO) as substrate. **DISCUSSION AND RESULTS**: The enzyme presents a pH optimum = 7.2, it is highly active at temperature range from 23 to 50 °C and thermal inactivation at 70 ºC ($t_{1/2}$= 7.4 min). The Michaelis constant (K_m) were 4.6 mM for racemic substrate, 21.7 mM for (R)-(+)-styrene oxide and 3.0 mM for (S)-(−)-styrene oxide. k_{cat}/K_m analysis indicated that TrEH is enantioselective hydrolyzing preferentially (S)-(−)-styrene oxide. The conformational stability studies suggested that, despite the extreme conditions (high temperatures and extremely acid and basic pHs). **CONCLUSION:** The recombinant protein showed an enantioselectivity distinct from that presented by other fungus EHs, making this protein a potential biotechnological tool.

Keywords: *Trichoderma reesei*, Epoxide hydrolase, Enantioselectivity
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