

Assessment of unspecific peroxygenases (UPOs) for the degradation of cleaning waste contaminants

Master thesis at the Institute of Technical Biocatalysis

Introduction

The increasing use of synthetic polymers and hydrophobic hydrocarbons in industrial cleaning products has led to the accumulation of persistent contaminants in wastewater streams. Conventional treatment methods often fail to efficiently degrade these recalcitrant compounds, creating an urgent need for innovative and sustainable biocatalytic solutions. Unspecific peroxygenases (UPOs) have emerged as highly promising enzymes due to their ability to catalyze selective oxyfunctionalization reactions using hydrogen peroxide as a cosubstrate. Their broad substrate spectrum makes them attractive candidates for the degradation of complex and insoluble compounds.

This master thesis aims to assess the potential of unspecific peroxygenases for the degradation of contaminants commonly found in cleaning waste. The work will focus on improving substrate–enzyme interactions through the investigation of suitable solvent systems, as well as establishing a controlled hydrogen peroxide feeding strategy using an electrochemical setup. Furthermore, qualitative and quantitative analytical methods (e.g. GC-MS) will be applied to evaluate the oxyfunctionalization and degradation of selected recalcitrant compounds, such as polyethylene and mineral oil saturated and aromatic hydrocarbons.

Beginning: immediate



Content of the Thesis

During this master thesis:

- Investigate solvents for enhancing the substrate–enzyme contact
- Establish an H₂O₂ -feeding system with an electrochemical set-up.
- Qualitative and quantitative determination of oxyfunctionalization and degradation of a range of recalcitrant compounds (e.g. polyethylene, mineral oil hydrocarbons)



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