Groups	:	Enzymes and Surfaces & Biobased Chemistry and Technology (BCT)
Project	:	**Enzyme catalysed oxidation of biobased compounds**
Supervisors	:	Maurice Franssen (ORC), Elinor Scott (BCT) and Harry Bitter (BCT)

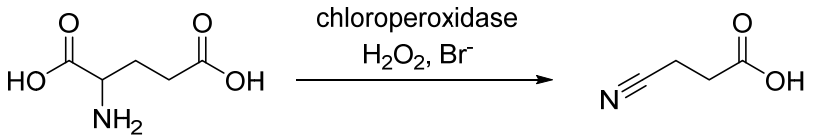
Keywords: Enzymatic reactions, green chemistry, biobased compounds

Introduction

Nature produces a huge array of beautiful molecules that would potentially be excellent feedstocks for the production of chemicals. Up to now almost all chemicals that are produced worldwide are based on fossil hydrocarbons that lack oxygen or nitrogen functionality. Conversely, biobased compounds often contain *too many* functional groups, so a selective removal or transformation would be beneficial. Enzymes are perfect catalysts for selective conversions under since they work at **environmentally benign** reaction conditions in water at ambient temperature and pH.

Goal

In this project we will focus on one particular enzyme, namely the chloroperoxidase from *Curvularia inaequalis*. In the group of dr. Elinor Scott and prof. Harry Bitter (BCT) it has been shown that this enzyme is able to perform selective oxidative decarboxylation of glutamic acid:



glutamic acid 3-cyanopropanoic acid

In this project, we wish to investigate the scope and limitations of this reaction. Specifically:

- We know that some other amino acids can also be converted, but a full overview of the scope is lacking: what substituents are tolerated, what is their effect on the reaction rate and how can this be explained?
- Could α-hydroxy acids be converted by this enzyme, and would the products be?
- Could other biobased molecules like fatty acids and terpenes be converted under these reaction conditions, and what would their products be?

This is a joint project of the Biobased Chemistry and Technology group (BCT) and Organic Chemistry (ORC); the student will in principle work at the BCT lab, using the analytical equipment of ORC when needed. There will be weekly joint research meetings with the supervisors from both groups.

Topics to be studied

Reaction kinetics, elucidation of product structure and reaction mechanism, optimisation of reaction conditions to favour a particularly interesting product.

Techniques to be used

Enzymatic reactions, analytical techniques like TLC, NMR, HPLC, LC-MS, isolation techniques like column chromatography, possibly enzyme immobilisation.

Information

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