

Introduction

The outcome of a fermentation is directly related to the level of nutrients.

There is a need for continuous and accurate measurements of nutrients using at-line sensor technology, instead of traditional sampling and subsequent QC analysis, typically with long response time.

This study seeks to investigate the potential of implementing at-line sensor technology to potentially control, adjust, and optimize the fermentation in real-time, eventually resulting in improved fermentation processes, higher yields and quality.

Experiments were performed at Helix Lab and in the fermentation plant at Novozymes.

Methods

Ion selective electrodes (ISEs):

- Calibration in mixed standard solutions.
- Measurements in diluted and raw samples.

Reference measurements:

- ICP-OES
- Spectrophotometry



Outcome

Baseline of the level of nutrients throughout the fermentation of 40+ different products. 741 data points.

- Depletion of important nutrients.
- Possible precipitation of important nutrients.
- High levels of some nutrients.

The trend of some ions could be followed with ISEs, others could not.

Perspectives

..on the project:

- Possible process improvements by adjustment of concentration of salt.
- Potentially higher yields at the same or lower cost.

Future research:

- Monitor biomass concentration and product formation (oCelloScope).
- Room for improvement of ion selective electrodes.

..on being a Helix Lab Fellow:

- Opportunity to work with the industry.
- Network and discussion.
- Site visits and socials.
- Introduction to the opportunities in Kalundborg.

