Aalto University
School of Chemical Engineering

https://www.aalto.fi/school-of-chemical-engineering
https://into.aalto.fi/display/endoctoralchem
puh. 050 577 3736 Sirje Liukko

**Defence announcement** **Public Defence on 23 August 2024**

# How does wood cook during kraft pulping?

| | |
|---|---|
| **Title of the doctoral thesis** | Modelling and simulation of biorefinery processes<br>Case study: Kraft pulping process |
| **Content of the doctoral thesis** | With the ongoing shift in today's society towards a green and sustainable future, biorefineries play a crucial role in achieving such goals. One predominant member of this process family is the so-called kraft pulping process, which aims to produce cellulose fibres from wood, also called pulp, which are subsequently transformed into tissues, paper, and cardboard. However, research is picking up the challenge of valorising the wood to its maximal potential, where all the chemical components of the wood can be transferred to valuable products without any waste. Therefore, the process needs to be optimised regarding the feedstock usage to accomplish this ambitious aim.<br>The thesis presents a mathematical framework to describe the cooking of the wood chip during the kraft pulping process from a theoretical point of view, which was tested with experimental data. The idea is to cook the wood chip in a virtual environment and have educated predictions on what cooking in the real world would look like. Moreover, the presented models are used to hypothesise chemical/physical phenomena in actual cooking processes, guiding possible experimental research directions.<br>The research shows that wood is a diverse raw material with variations regarding its chemical composition. Moreover, the "glue" lignin, which holds the fibres together, comes with different variations, and using the lignin in further processing should consider this fact.<br>Overall, the thesis provides another tool for optimising our processes to the maximum potential without wasting our resources. |
| **Field of the doctoral thesis** | Chemical Engineering |
| **Doctoral candidate and contact information** | M.Sc. Nicolaus Bijok<br>e mail: bijok.nicolaus@googlemail.com |
| **Public defence date and time** | 23 August 2024 at 12 o'clock (in Finnish time) |
| **Remote defence** | https://aalto.zoom.us/j/66363697117 |
| **Place of public defence** | Aalto University School of Chemical Engineering, Lecture hall Ke2 (Komppa-Sali), Kemistintie 1, (main door at Biologinkuja) Espoo |
| **Opponent(s)** | Professor Tapio Salmi, Åbo Akademi University, Finland |
| **Custos** | Professor Ville Alopaeus, Aalto University School of Chemical Engineering |
| **Link to electronic thesis** | https://aaltodoc.aalto.fi/handle/123456789/51 |
| **Keywords** | Kraft pulping, Multiscale modelling, Kinetics, Distribution, Lignocellulose |

Dissertation will be on public display at https://aaltodoc.aalto.fi/doc_public/eonly/riiputus/