

# *The role of oxygen in biomass fractionation*

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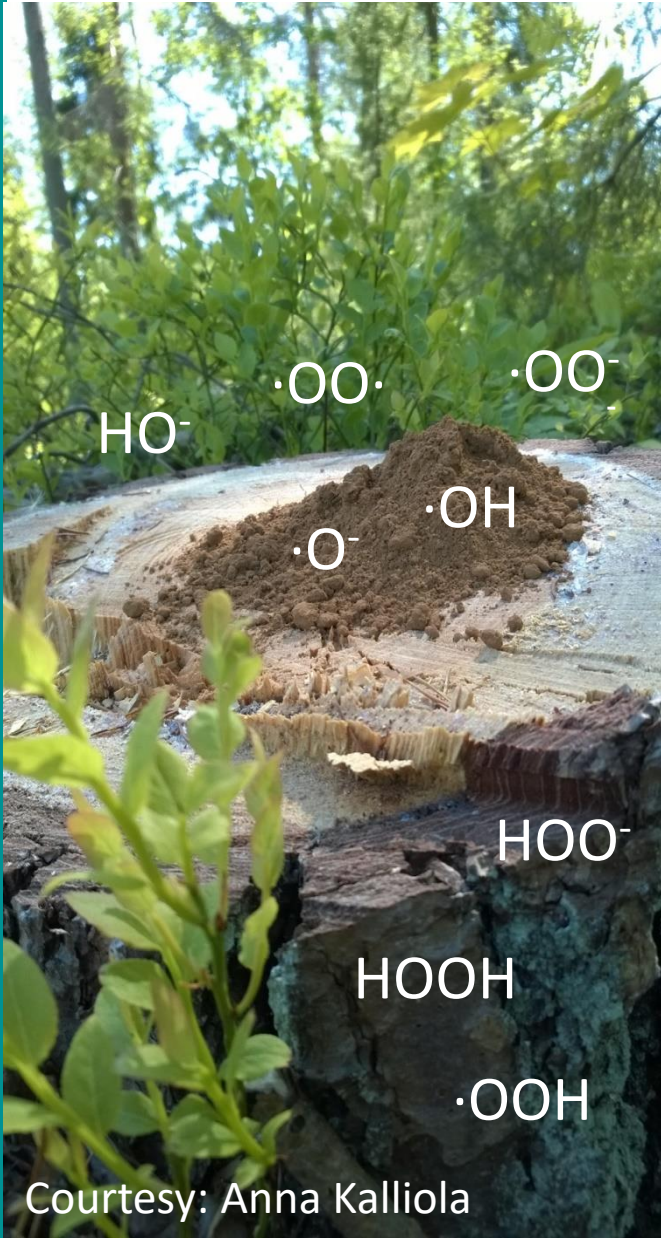
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# Why we are interested in oxygen



Courtesy: Anna Kalliola

- Molecular oxygen can be used as reagent in biomass treatment and lignin modification.
- On the other hand, it may induce detrimental effects, such as lowered selectivity.

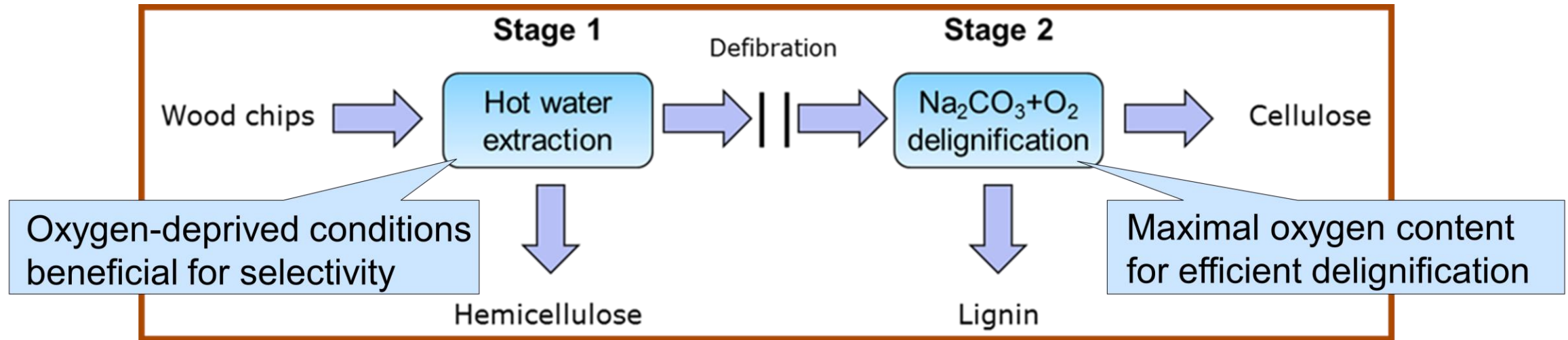


- Molecular oxygen is a diradical with complicated redox chemistry.



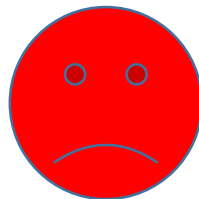
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# Practical example: 2-Stage AlkOx technology



## HYPOTHESES

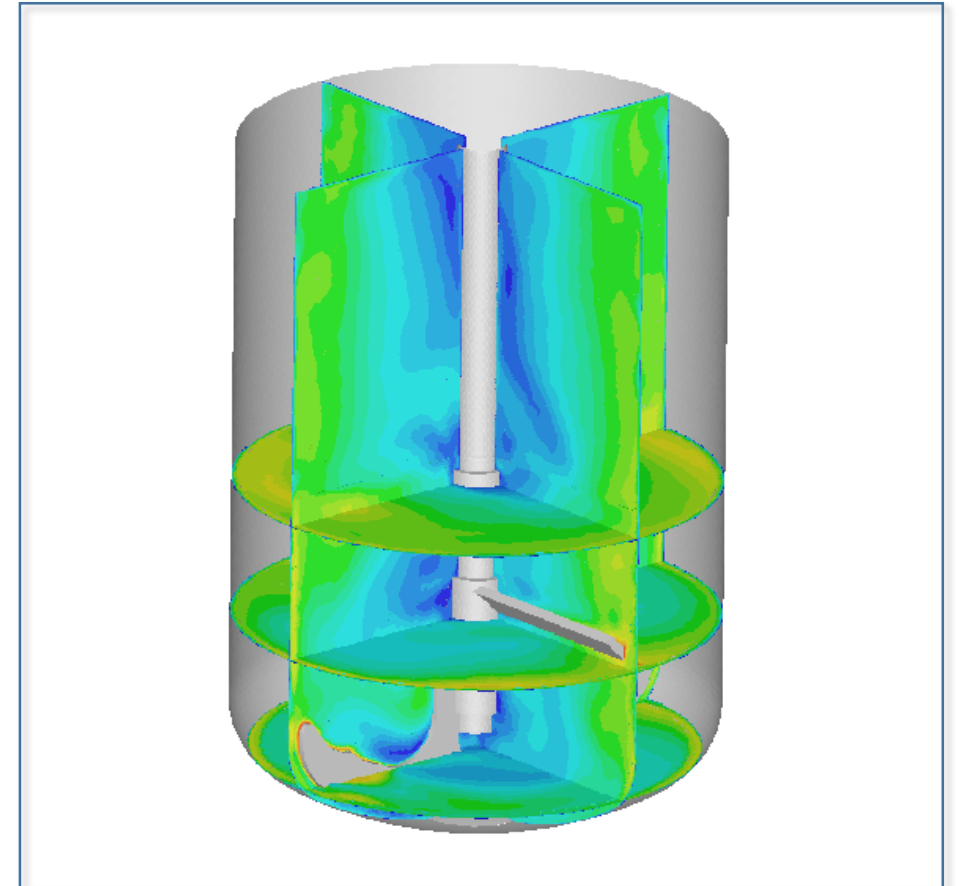
- Oxygen induces
  - Formation of Lignin-Carbohydrate Linkages (LCC)
  - Auto-oxidation of extractives: → polymeric compounds and chromophores hindering fractionation
- Oxygen induces
  - Improved water-solubility of lignin and thus delignification
  - Surface-active properties to lignin, necessary e.g. for dispersant applications



# Modelling as a tool to investigate oxygen content in oxidative applications

- Computational Fluid Dynamics (CFD) modelling was utilized to investigate the mixing element to ensure efficient operation of the unit.
- Combined micro and macro scale modelling provides an effective tool
  - to understand suspension phenomena
  - to scale up the process units.

CFD = Computational Fluid Dynamics



Instantaneous  
Velocity magnitude



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