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Ph.D. thesis (2017-2020)  
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# Hemicelluloses oligomers from wood

Molecular diversity of oligosaccharides

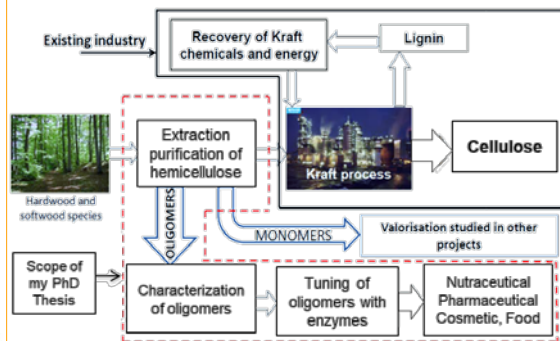
## Context

### Glyco@Alps Project

*Alpine glycoresources exploration*

- Hemicelluloses represent up to 30% of wood, a large untapped potential
- Autohydrolysis of wood prior to the kraft process has been optimized for oligosaccharides (OS) production
- New high value added products trigger a need to fully characterize and purify hemicelluloses soluble oligomers from wood

### Advantages of an integrated biorefinery model



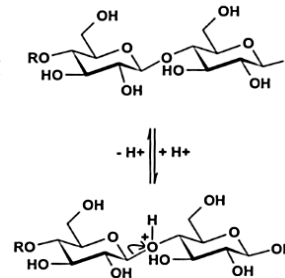
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## Methods

### Extraction and Purification

#### Autohydrolysis

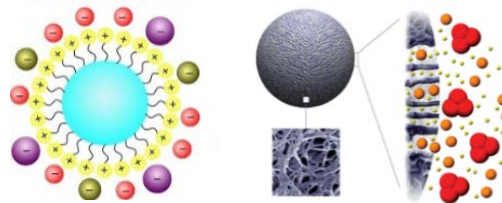
prior to kraft process in order to extract soluble oligosaccharides without degrading cellulose



Purification of complex mixture by:

- **Ultra/Nanofiltration**
- **Activated charcoal treatment**

### Analytical Techniques



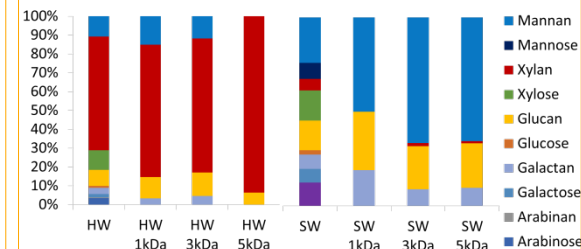
- Osidic composition and quantification thanks to HPAEC PAD
- SEC RID and GPC MALLS used for fractionation and the molecular weight distribution
- MALDI-TOF and NMR for precise structure determination

## Results

Dry wood %	Raw AH	1 kDa	3 kDa	5 kDa
SW	6	2,5	1,6	0,7
HW	10	0,5	0,3	0,05

*Table of autohydrolysis extraction yields*

Extraction yield up to 1/3<sup>rd</sup> of hemicelluloses available in wood  
Mainly xylans in hardwood (HW) and Galactoglucomannans in softwood (SW)



*Osidic composition of ultrafiltrated hydrolysates*

OS extracted from HW are much smaller (in terms of DP) than OS from SW  
UF also permits to eliminate lignins and small organic acids

#### Conferences:

Francillon, J & al. (2018). *European Workshop on Lignocellulosics and Pulp, Aveiro, Portugal*