



Influence of aqueous alkali concentration on extraction of lignin from spruce wood

Ekaterina Korotkova

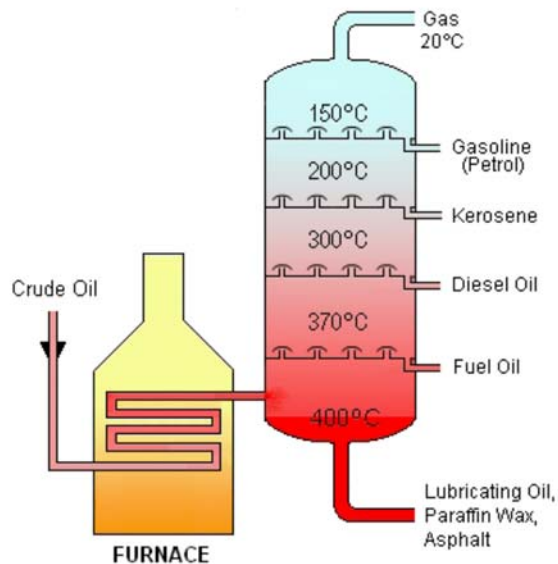
Åbo Akademi University

Laboratory of Wood and Paper Chemistry

What are Refinery and Biorefinery?

Refinery

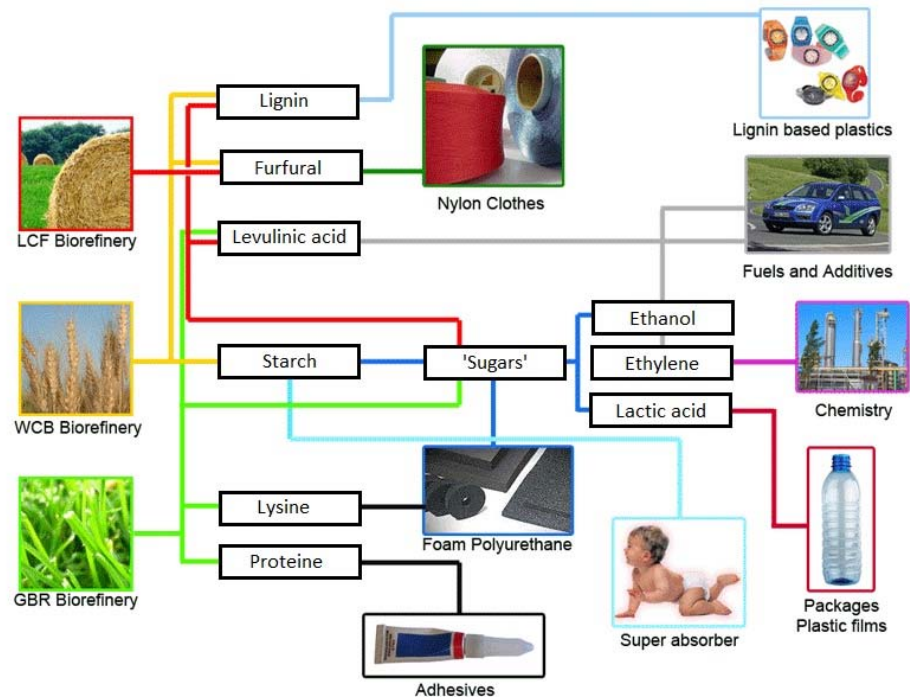
Conversion of raw material into products of value (e.g. oil refinery produces multiple fuels and products from crude oil)



http://en.wikipedia.org/wiki/Oil_refinery

Biorefinery

Conversion of **biomass** to produce fuels, power, and chemicals



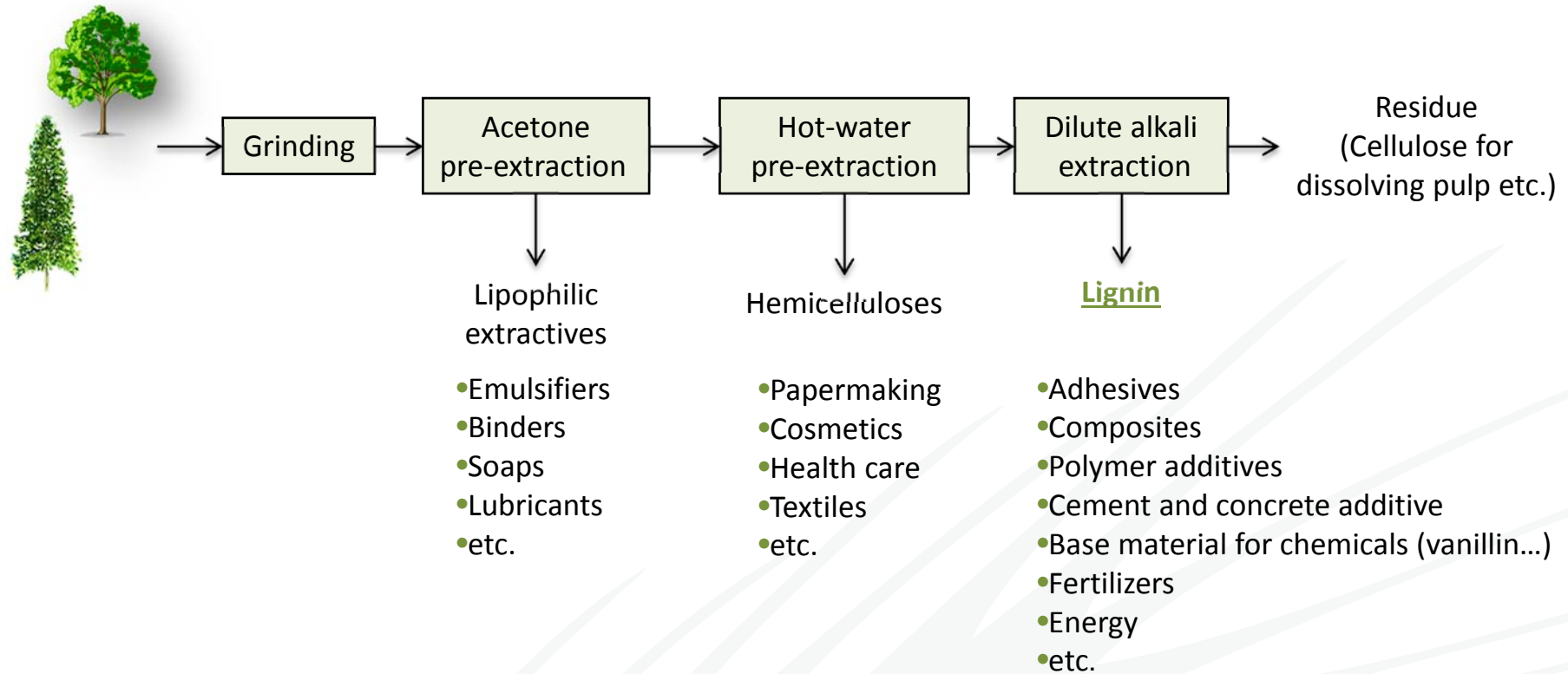
Biorefinery Ireland Ltd <http://www.biorefinery.ie>

Why wood?

- No direct competition with food and feed production
- Relatively cheap
- Highly available
- Sustainable, natural, and renewable
- Carbon neutral



Our biorefinery concept



Due to its phenolic structure, lignin has great potential in different areas. Extraction from wood using pressurised hot water with addition of alkali is a promising way to obtain new, more reactive types of lignin for future applications.

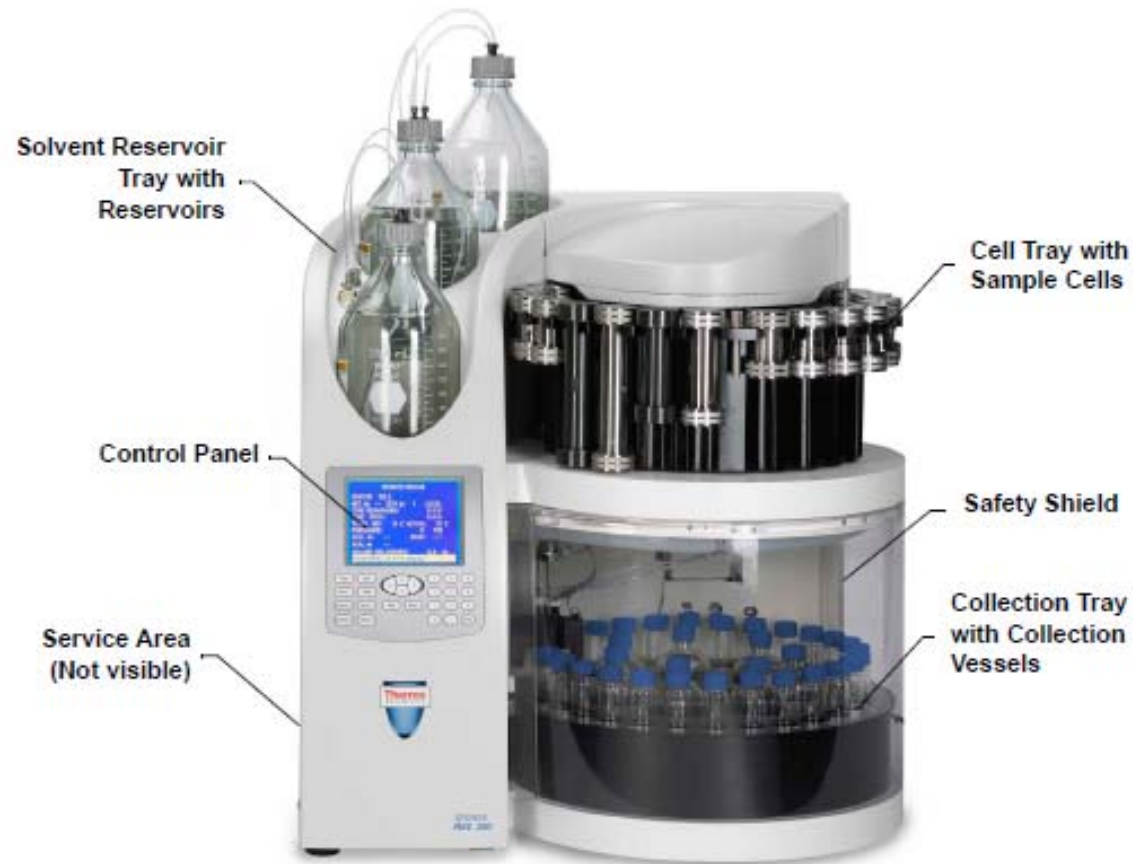


<http://www.innventia.com/en/Our-Expertise/Chemical-Pulping-and-bleaching/Carbon-fibres>
<http://www.tecnaro.de/english/willkommen.htm?section=we>

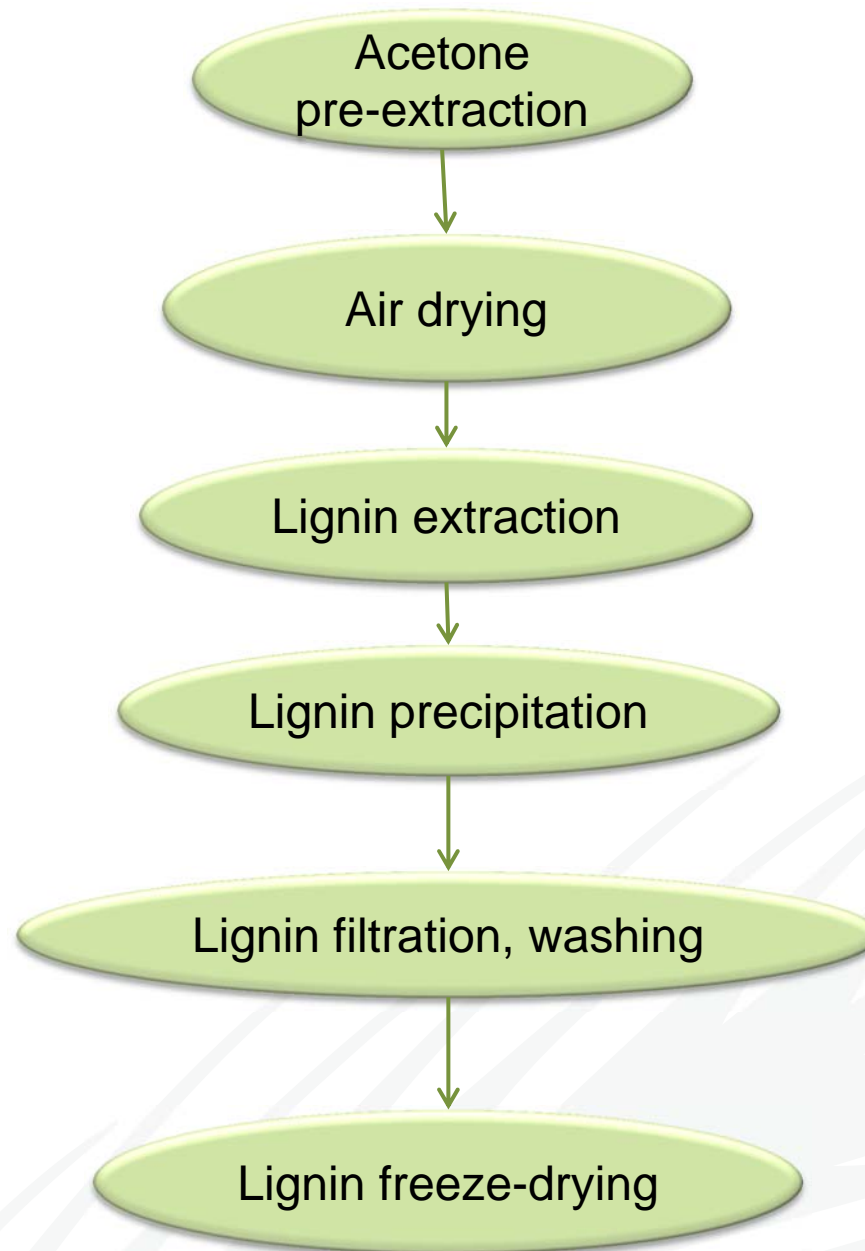
Sample preparation



Accelerated Solvent Extraction (ASE)

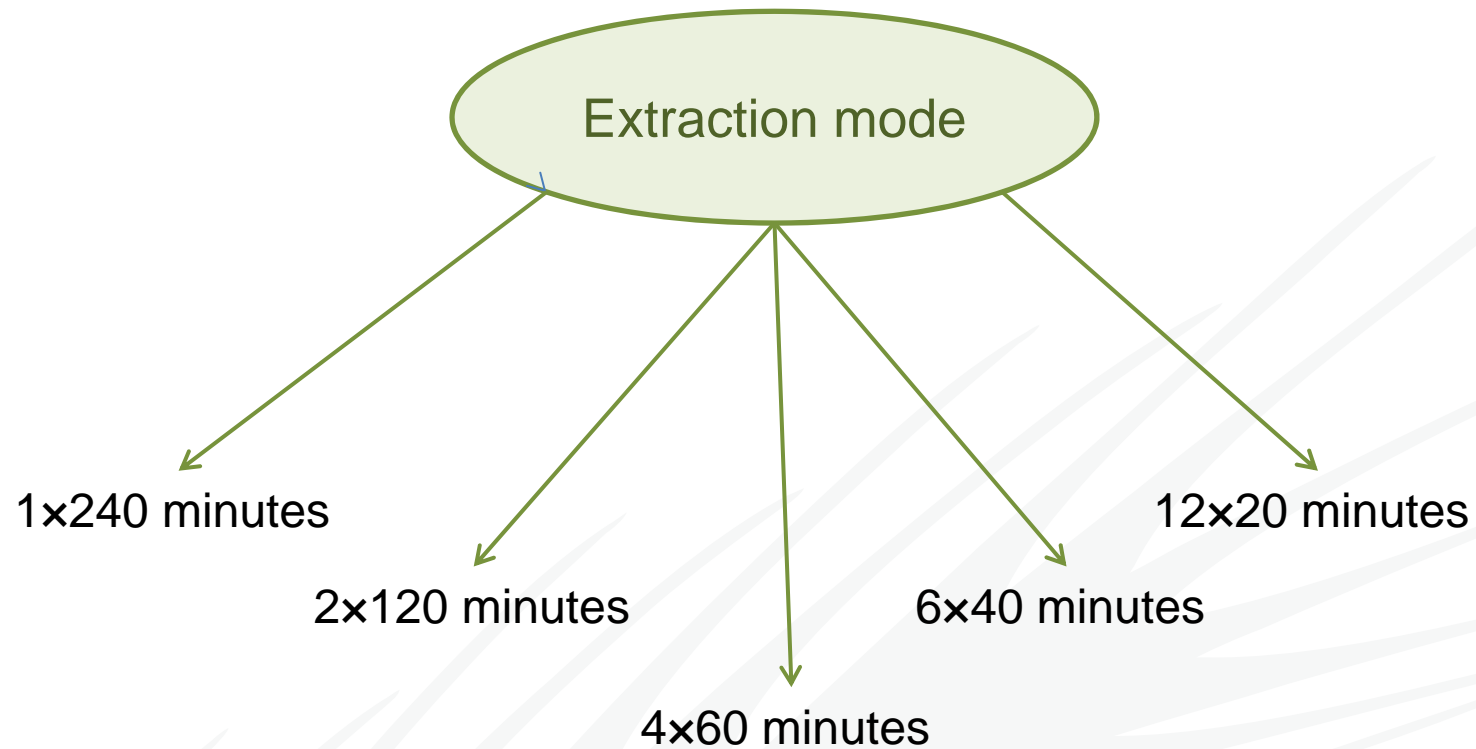


*Dionex ASE 350 Accelerated Solvent Extractor Operator's Manual

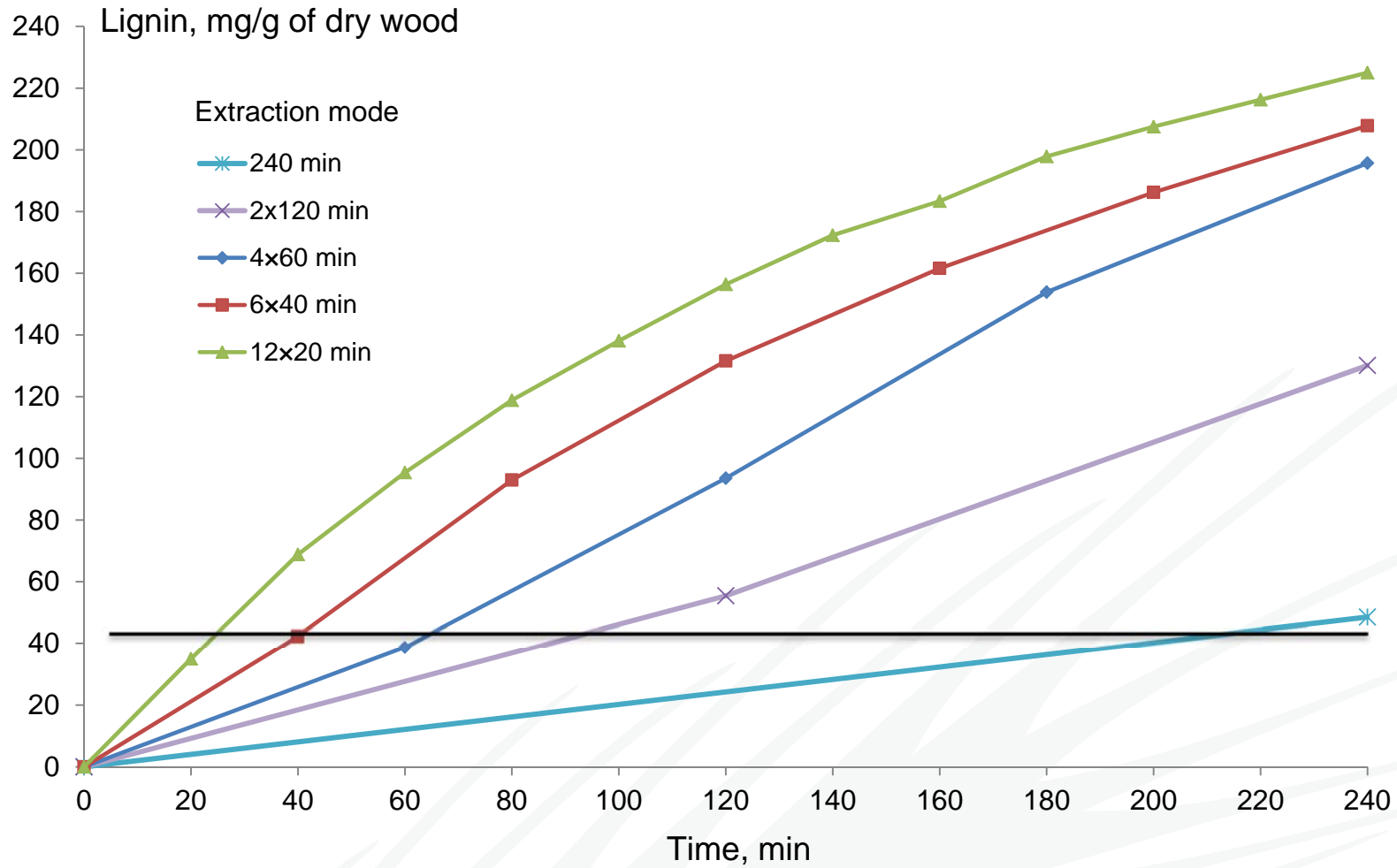


Choosing of lignin extraction mode

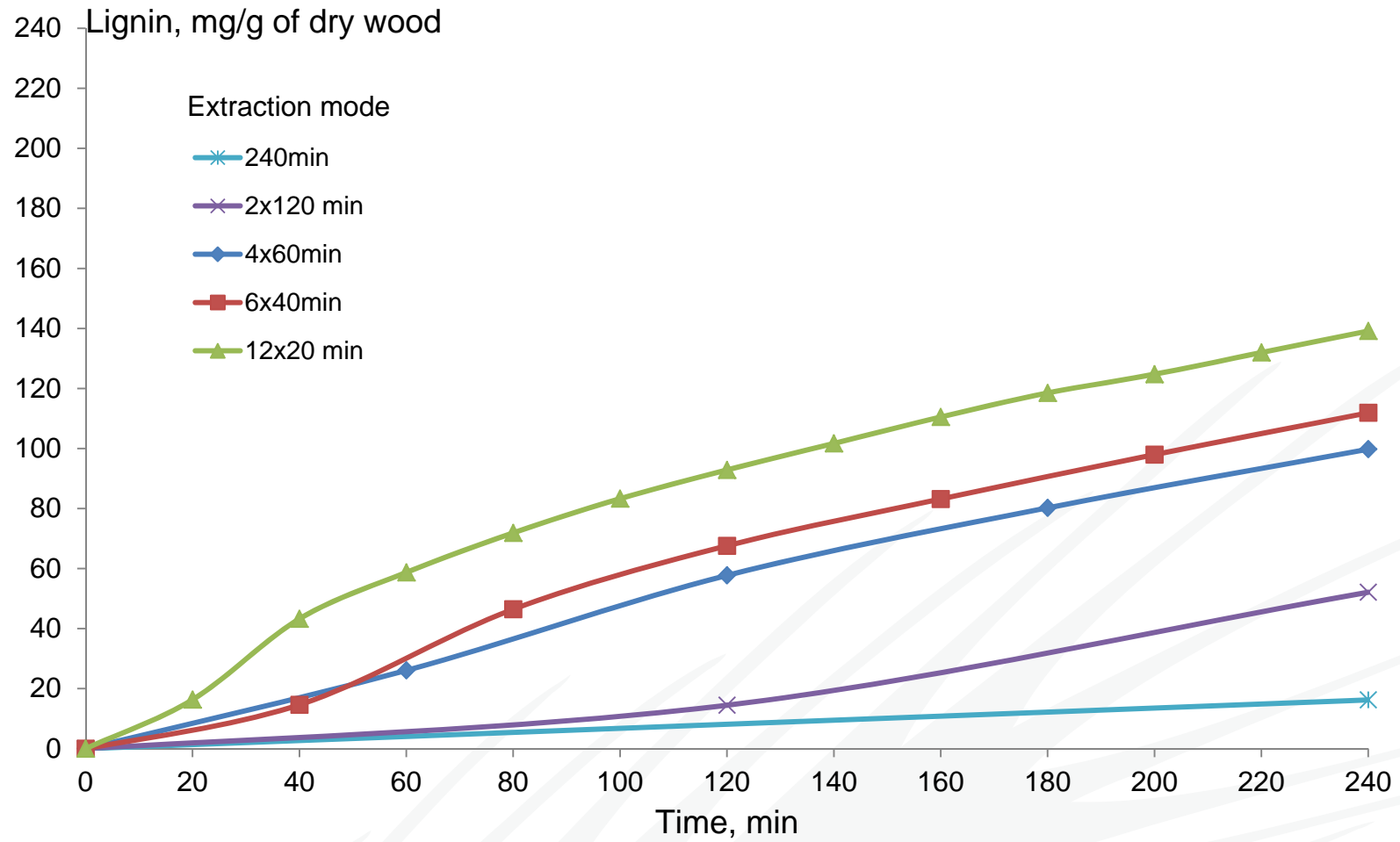
- 170°C
- 4 hours extraction
- 1% and 2% NaOH



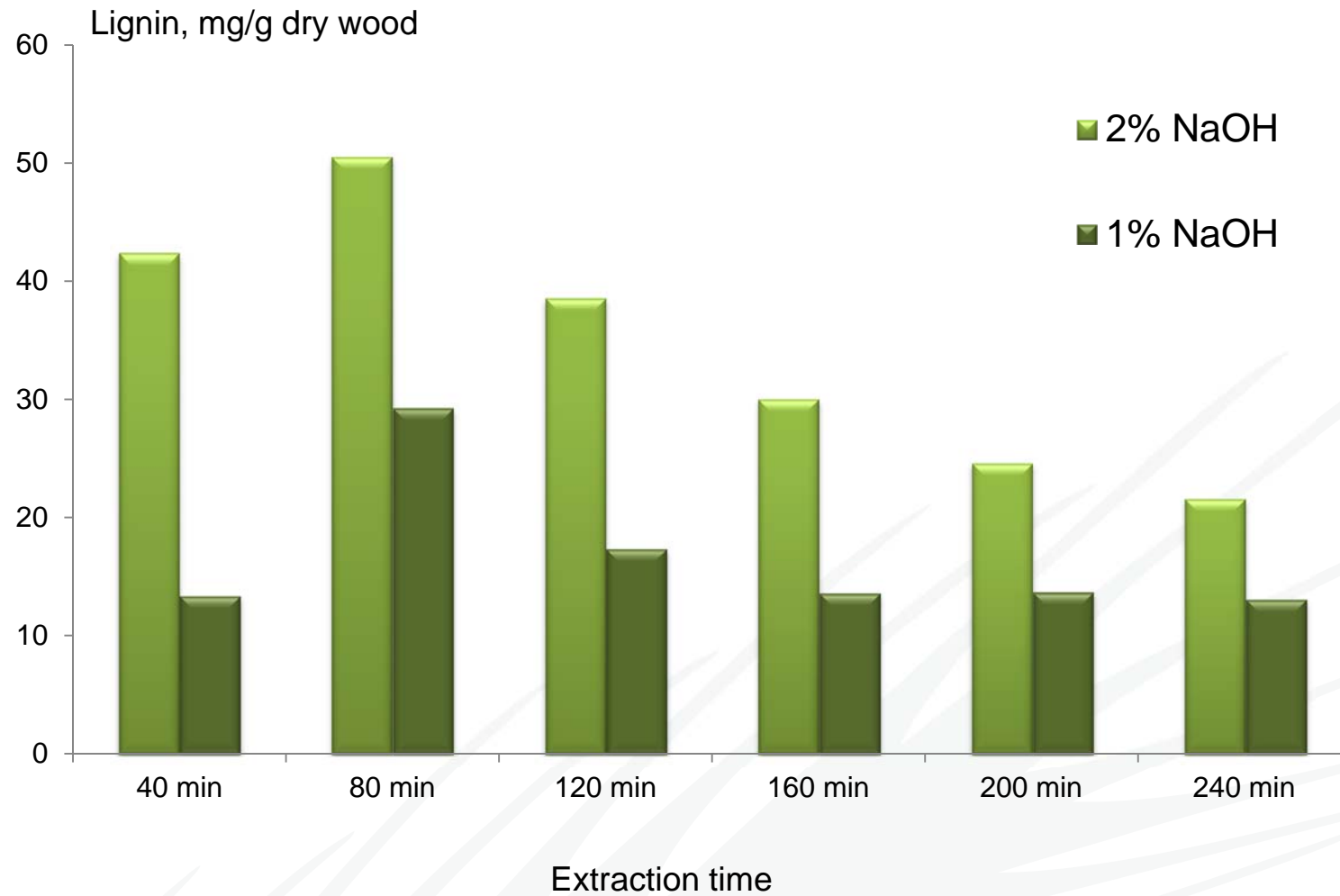
Influence of extraction mode on amount of isolated lignin (2% NaOH)



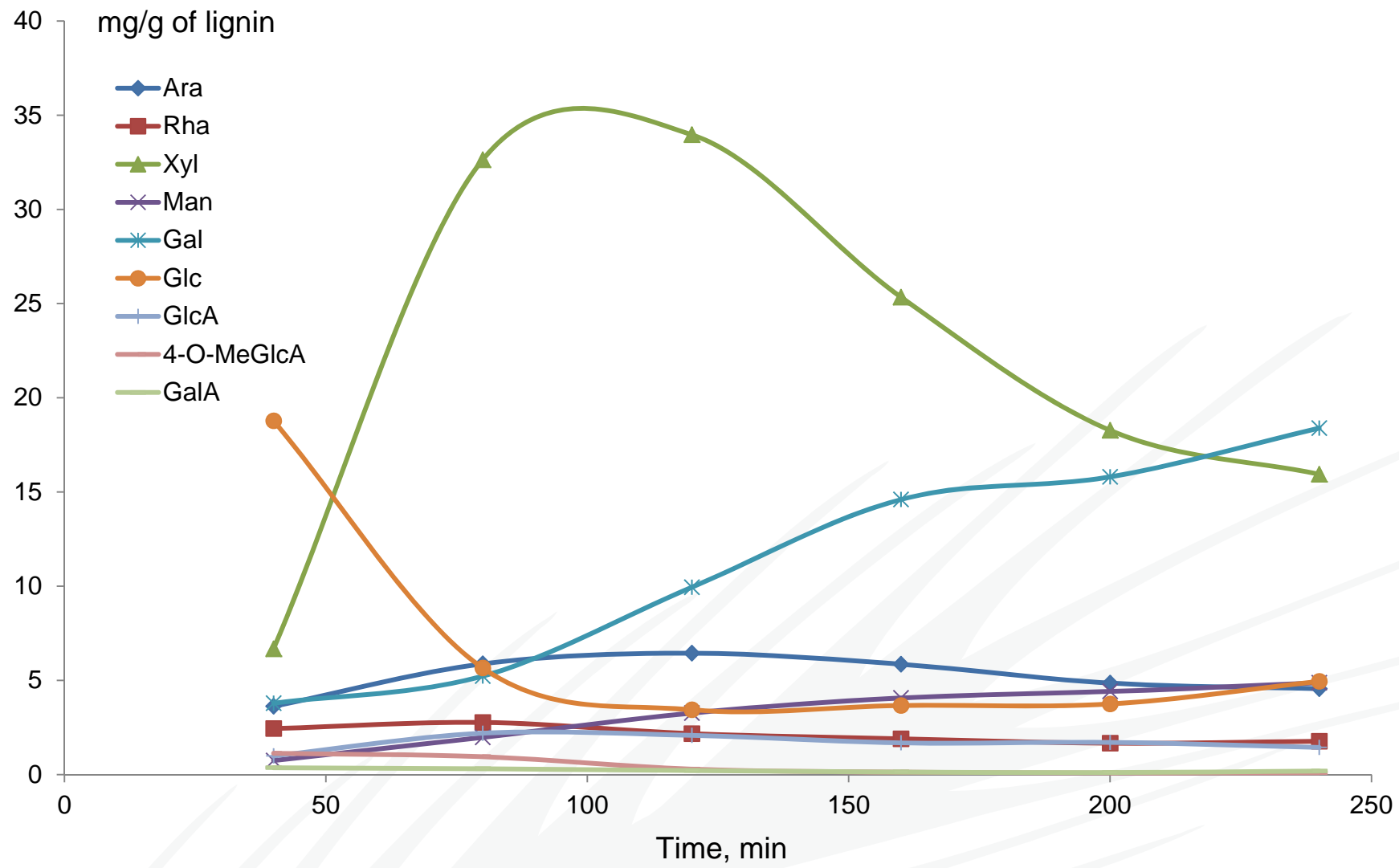
Influence of extraction mode on amount of isolated lignin (1% NaOH)

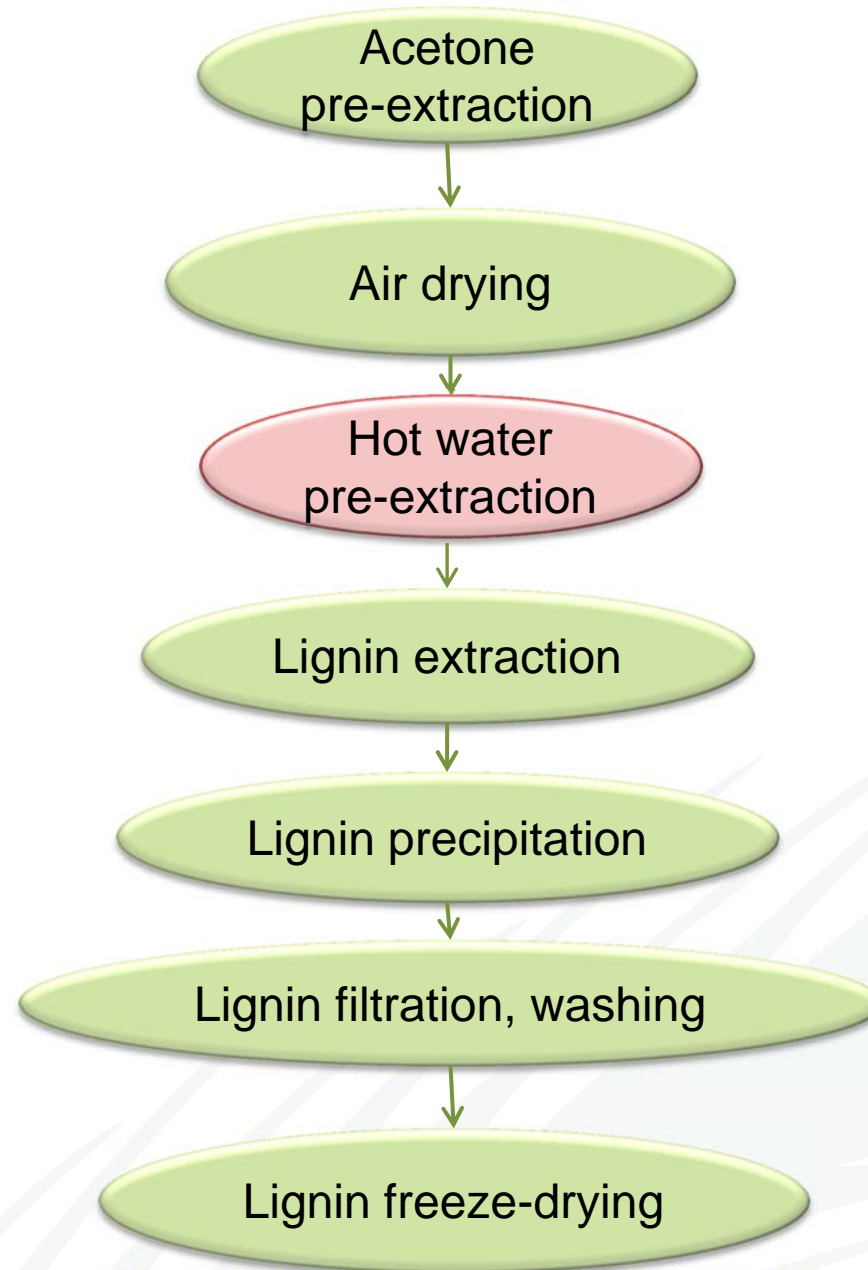


Amount of isolated lignin (6x40 min mode)

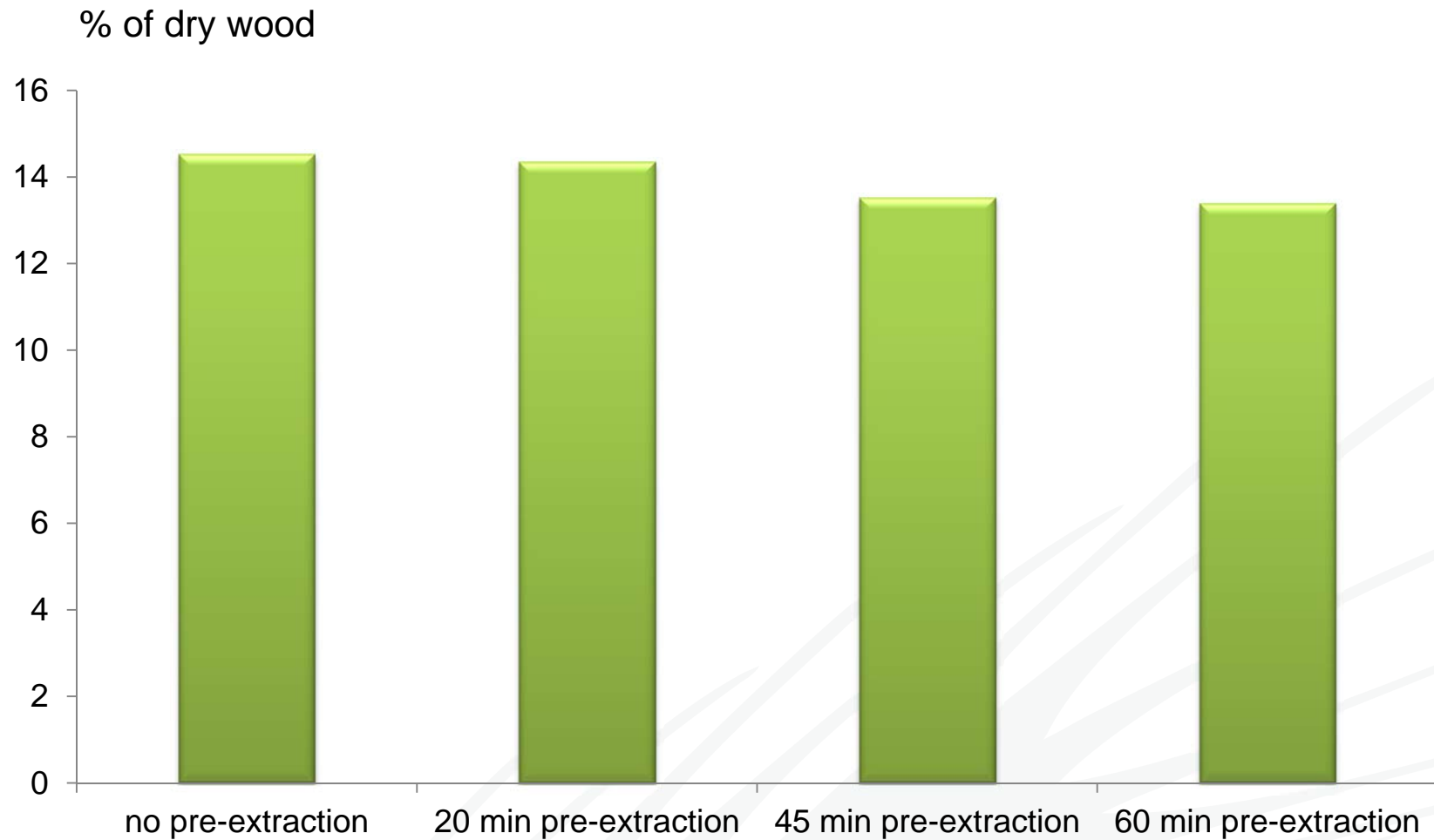


Sugar composition in isolated lignins (2% NaOH, 6x40 min mode)

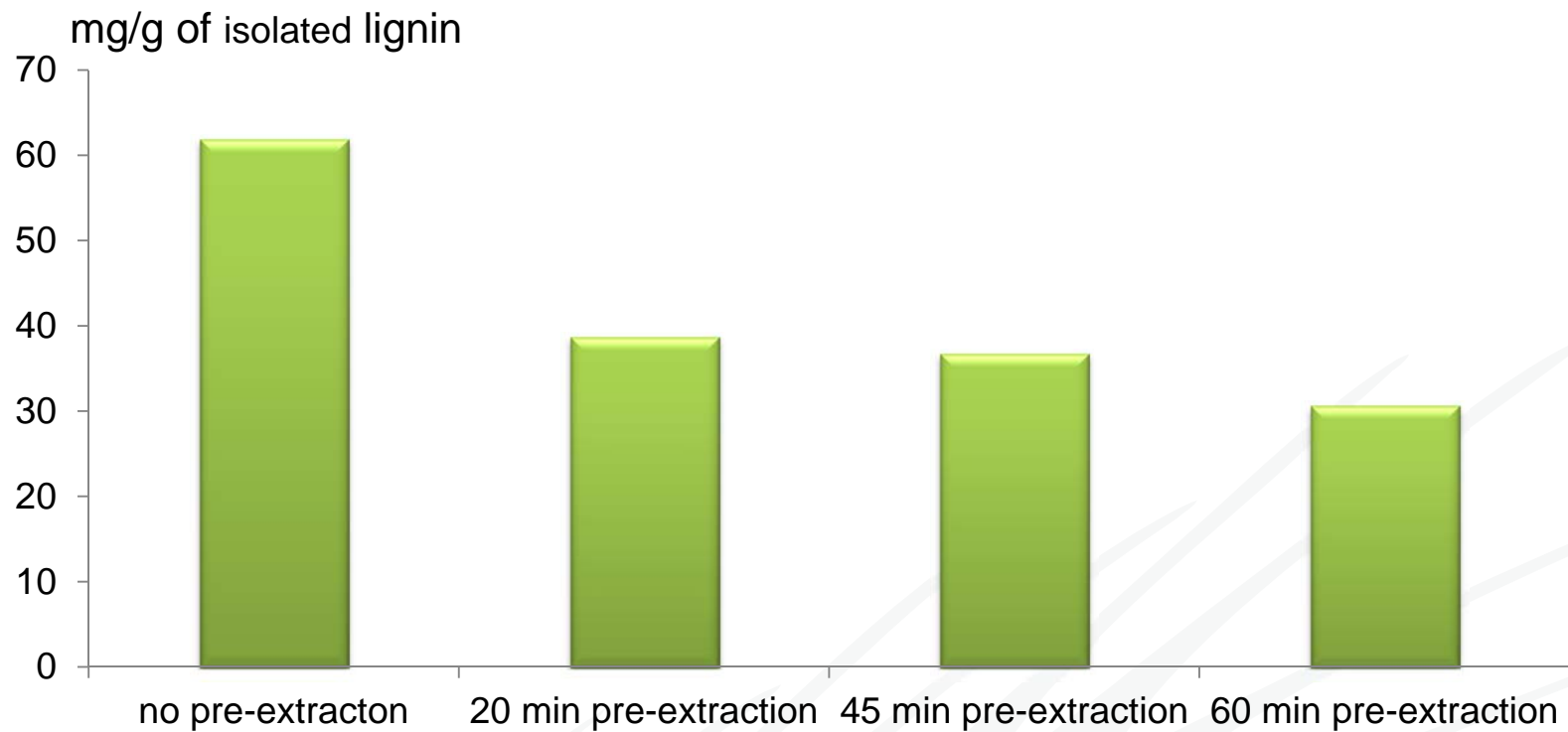




Amount of isolated lignin from hot-water pre-extracted wood



Sugar content in isolated lignin before and after hot-water pre-extraction



*Xyl and Gal were the most abundant sugar units in isolated lignins



Conclusions

- Obtained lignin has no unpleasant odour
- Within 4 hours of total extraction time:
 - Shorter runs are more effective for yield of isolated lignin; however more solvent is used
 - Higher alkali concentration allows extracting more lignin from spruce wood
- Pre-extraction with hot water decrease the amount of sugars in the isolated lignins



Thank you for your attention!



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