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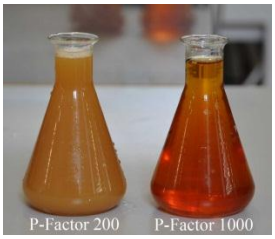
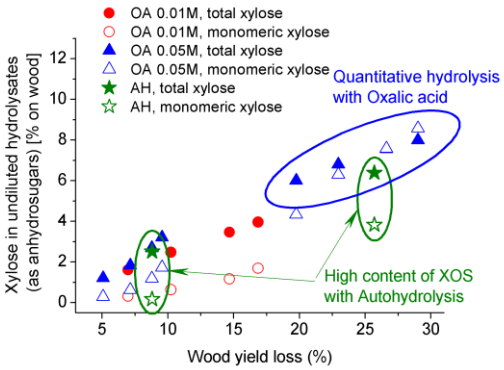
Acid hydrolysis of wood is a well-known process utilised as a step prior to kraft cooking for the manufacture of dissolving pulps. During this prehydrolysis step, between 10 and 30 % of the dry matter of hardwoods is dissolved, depending on the intensity of the treatment. The resulting prehydrolysate contains mainly degradation products of xylan but also substantial amounts of degraded lignin. Until now, water prehydrolysis and thus the recovery of the dissolved material are not practiced mainly because of the formation of hardly controllable precipitates. Since the water prehydrolysate is a very rewarding source of carbohydrates, which could be converted to high-value products, the development of a technically feasible prehydrolysis process remains an important aim of the research work.

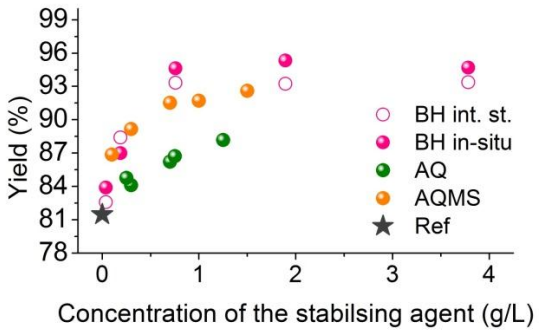


Birch wood hydrolysates

The doctoral study pursues a comparative evaluation of known but industrially not yet established aqueous prehydrolysis methods (autohydrolysis and acid-catalysed hydrolysis), their effect on subsequent alkaline pulping and final pulp properties. In-depth characterisation of the prehydrolysis products and development of the solutions to improve the final pulp properties are also investigated. Analysis of technical and economical feasibility of prehydrolysis as basis for production of value-added sugar-derived building block chemicals is also a part of the study.



Oxalic acid (OA) pre-treatment produces more monomeric xylose than autohydrolysis (AH) at the same wood yield loss.



Sodium borohydride (BH) and anthaquinone monosulfonate (AQMS) have similar stabilising effects on cellulose in cotton linters in alkaline environment