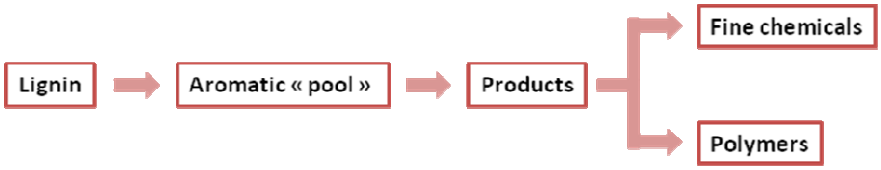
Proposal for a PhD thesis in sustainable chemistry

In the field of a broad project aiming at the chemical valorization of lignin available through paper and biorefinery industries, we propose to explore the transformation of lignin toward an aromatic pool that can be further engaged as an aromatic resource for fine chemical syntheses and polymer chemistry. This project implies three academic partners from the University of Lyon and three industrial partners, and is supported by the ANR (Chemlival project).

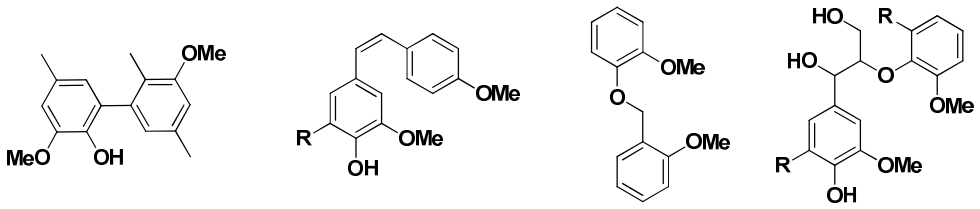


Lignin is with cellulose one of the most abundant biopolymer issued mainly from wood. It represents a massive source of phenolic compounds available through the paper industry and the development of the second generation of bio-ethanol. Additionally, we would like to mention that the use of lignin to produce chemicals does not compete with human or animal nutrition, lignin being not reputed as nutriment.
Several research groups studied the degradation of lignin toward phenolic derivatives, vanillin being the main target compound, but none of them engaged these building blocks in the synthesis of more elaborated organic compounds. This is the challenge we will face within this ambitious project, the approach covering all aspects from lignin to target chemicals:

1. the selective oxidative catalytic degradation of lignin to aromatic building blocks
2. the transformation of these building blocks toward target chemicals.

PhD student profile

We are looking for a talented PhD student in organic chemistry highly interested in "green" homogeneous catalysis. Before studying the lignin itself, model lignin compounds (some examples on the figure below) and oxidation catalysts will be synthesized, and the catalytic oxidation of the models will be evaluated using GC-MS. Classical spectroscopic techniques like homonuclear and heteronuclear (1D & 2D) NMR will be used. The candidate will interact with a 2nd year PhD student of the group who is currently working on the project. Thanks to the multi-disciplinary character of the proposal and its direct industrial applications, the candidate will interact both with people in academia and in industry.



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