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Technical grass lignins engineering with ionic liquids as a method for improving antioxidant activity

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PURPOSE OF THE ABSTRACT
Within the Zelcor European project, INRA applied a newly-developed process in ionic liquids to depolymerise and functionalise lignin (increase the phenol content) to two reference lignin samples (Protobind 1000 from GreenValue and Futurol residue) and their fractions. Advantages of the process are to combine short reaction time (max 40 min) and low temperatures (max 110°C) compared to alternative catalytic processes. The process conditions were selected according to the prior optimisation performed on phenolic model compounds (monomer, dimer and milled wood isolated lignins).[1] Thioacidolysis, 31P NMR, and SEC were applied to the ethyl acetate soluble and insoluble reaction products so as to assess the degree of depolymerisation and demethylation. The results indicate that: i) a prior extraction of the ethyl acetate soluble compounds is beneficial to the process; ii) up to 30% solubility can be reached after the treatment of insoluble fractions; iii) demethylation occurs for all samples. The samples were then tested for antioxidant properties study to assess whether the process generates fractions with improved performances compared to the lignin samples and fractions already available.[2] In parallel to the technical development of the process, security assessment has been undertaken through close interaction with INERIS to identify possible safety advantages of the process and to check that there is no major obstacle to future industrial development of the process.[3]

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
biorefinery | grass lignins | antioxidant | ionic liquids

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