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NEW FULLY BIO-BASED PHENOLIC BUILDING BLOCKS FROM CONDENSED TANNINS

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PURPOSE OF THE ABSTRACT

Despite the emergency of substituting fossil carbon by renewable carbon to produce chemicals and materials, the prices of oil, gas and coal are currently too low to provide a strong drive to the development of sustainable economies. However, beyond the simple, but necessary, replacement of fossil-based chemicals, the large range of functionalities present in natural biomolecules offer new opportunities to develop more efficient processes and to provide original products with higher added value.

Natural aromatic compounds are especially rich in terms of diversity and functionalities. They are widely present in the plant kingdom in the form of phenolic compounds, mainly as polymers. Lignins are the most abundant resource within natural phenols, but their recovery in the native form as well as their depolymerization into monomers are still currently highly challenging. While the biorefining of lignocellulosic biomass has become a big hit in the world research strategy, condensed tannins, the second most abundant phenolic bioresource, seem to be overlooked. This is especially odd since tannins are particularly present in soft and fast regenerating tissues of plants, making them probably a more sustainable bioresource than lignins, which are more concentrated in hardwoods.

Our research has thus focused for several years on getting a new access to (poly)phenolic compounds from condensed tannins. Especially, we have investigated optimized route for their depolymerization into flavanoids monomers and their subsequent functionalization into building blocks for specialty chemical industries. Our recent works have led to a new class of fully biosourced flavanoids derivatives. These new platform molecules are obtained by depolymerization of tannins in very mild conditions, using furfural derivatives as nucleophiles. The reaction can be carried out on tannin extracts as well as raw biomass, thus avoiding an extraction step. The products can be isolated by liquid/liquid extraction, and the reagent in excess can be easily recovered by simple distillation. The products are stable on a broad pH range, allowing their potential uses as building blocks for many applications. The process can be easily implemented and is compliant with industrial production constraints.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Condensed tannins | Flavanoids | Phenolic building-blocks

BIBLIOGRAPHY