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Recovery of phenolic compounds from pear peels using aqueous solutions of ionic liquids

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PURPOSE OF THE ABSTRACT

Ionic liquids (ILs) have shown to be efficient and alternative solvents to extract a wide variety of compounds from biomass [1], in which the use of biomass residues plays a pivotal role within a sustainable framework. In this work, we demonstrate the ability of ILs to significantly improve the solubility of syringic acid in water, followed by the use of the most adequate aqueous solutions to extract phenolic compounds from biomass residues. Conventional volatile organic solvents were also investigated for comparison purposes. The collected data reveal a remarkable enhancement in the solubility of syringic acid in aqueous solutions of ILs, up to 85-fold when compared to pure water. The best ILs aqueous solutions were then used to extract phenolic compounds from pear peels, in which a response surface methodology was applied to optimize the operating conditions. An extraction yield of syringic acid up to 1.05 wt % was obtained under the optimized conditions. The sustainability of the extraction process was further optimized by carrying out several extraction cycles, reusing either the biomass or the IL aqueous solution. A maximum extraction yield of syringic acid of 2.06 wt% by reusing the solvent and of 2.22 wt% by reusing the biomass have been obtained. These values are markedly higher than those obtained with dichloromethane and methanol at the same operating conditions (1.51 wt% and 1.68 wt%, respectively). After the syringic acid extraction and taking advantage of its solubility data in aqueous solutions of ILs, water was added as an anti-solvent, allowing to recover 77% of the extracted target compound with a purity of 93%.

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FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

BIOMASS WASTES | PHENOLIC COMPOUNDS | ALTERNATIVE SOLVENTS | RECOVERY PROCESSES

BIBLIOGRAPHY

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