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Valorization of poultry-processing industry waste by keratin extraction using ionic liquids

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PURPOSE OF THE ABSTRACT

Chicken feathers waste produced on poultry-processing industry represents 10 wt % of the total chicken mass, highlighting the urgency on the development of sustainable processes for waste valorization. Feathers are rich in keratin (90 wt %), an important protein for the preparation of biomaterials and food packaging. Although keratin use for this purpose was already reported [1], keratin extraction from feathers was barely evaluated and in most of the cases reducing agents are applied [2]. Thus, in line with Green Chemistry principles, this study aims to overcome these limitations by recovering keratin from chicken feathers waste through the application of ionic liquids (ILs) as alternative and greener solvents. The extraction and regeneration conditions were optimized to achieve the best recovery yield. The results demonstrated that the dissolution capability significantly depends on the cation and anion that compose the IL. Furthermore, the addition of controlled amounts of water allow to improve the dissolution performance. The conditions used at the regeneration step, namely coagulant agent, temperature and time, also substantially influence the recovery yield. Recovered keratin was characterized by Sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE), Fourier-transform infrared spectroscopy (FTIR), Thermogravimetric analysis (TGA) and Differential scanning calorimetry (DSC). Overall, the results obtained demonstrate a high-value-added protein and related biofilms with application in the biomedical field can be efficiently obtained using ILs as alternative solvents.

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FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
chicken feathers | keratin | ionic liquids | solid-liquid extraction

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