

Alkaline-Enzymatic Valorization of Chicken Feathers: A Process for Extracting Functional Keratin Biopolymers

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Abstract

This study proposes an efficient chemo-enzymatic strategy to upcycle chicken feather waste into bioactive keratin hydrolysates. A mild alkaline pretreatment (0.5 M NaOH) was combined with enzymatic hydrolysis using commercial proteases to enhance keratin recovery. Compared with the control process, the sequential process increased keratin yield by 50%, and raised the protein content to 71.11%. Fourier transform infrared (FTIR) spectroscopy confirmed disruption of the keratin structure, including cleavage of disulfide (S–S) linkages, evidenced by the disappearance of the S–H band at $\sim 2574.6\text{ cm}^{-1}$. The enzyme-assisted treatment also released peptide fractions enriched in glutamic acid, proline, and leucine, resulting in improved antioxidant potential (DPPH, ABTS and FRAP). Overall, the proposed process offers a scalable and environmentally favorable route for poultry-waste valorization while producing functional keratin-derived biopolymers suitable for applications in cosmetics, functional foods, and biomaterials.

References

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