ALKALINE AND ENZYMATIC KERATIN HYDROLYSATES OBTAINED FROM SHEEP WOOL

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Keratin has an important chemical functionality, being a rich source of proteins that can be used in a wide range of biomaterial applications.The experiments in this paper consist in obtaining keratin hydrolysates from non-marketable wool resulting from sheep breeding, a renewable waste with potential applications in industrial fields (pharmaceutical, cosmetic, medical), agriculture or niche areas.

Keratin hydrolysates were obtained by alkaline and alkaline-enzymatic processes in the presence of CaO, NaOH and enzyme *(Alcalase* 2,4L). For the alkaline hydrolysis the degreased and minced wool and CaO, 10% or NaOH, 5% in the bath (1:20) were processed at 80^{o}C with mechanical stirring, for 3 hours, followed by decanting and filtration. The enzymatic hydrolysis consisted in continuing the hydrolysis process by the addition of 1% *Alcalase* 2,4L in the filtered alkaline hydrolysate obtained and maintaining the optimum conditions of enzyme activity (60^{o}C and pH = 8.5) for 3 hours with mechanical stirring, followed by decanting and filtration.

The physico-chemical characterization of keratin hydrolysates shows important values for protein substance between 73.33% - 76.10% (total nitrogen 13.05% - 13.52%) for the hydrolysates obtained with CaO, and for the hydrolysates obtained with NaOH the protein substance has values between 76.67% - 78.64% (total nitrogen 13.65% - 14.40%). The particle size of protein polydispersions was determined by DLS. The results showed that the particle sizes of alkaline hydrolysates are higher as compared to alkaline-enzymatic hydrolysed keratin. It could be noticed too that the influence of NaOH on particle size was more important as compared to CaO, when the target is to have low particle sizes. FTIR analysis allows the identification of the specific bands for the cleaved proteins, highlighting the specific bands for the sulfur groups at 670-541cm^{-1} of the various keratin hydrolysates. SDS- PAGE analysis of keratin hydrolysates shows the presence of proteins with various molecular weights, in the range 3-30 kDa, but also small molecular weights especially in the range 3-14 kDa, in the case of enzymatic hydrolysates, due to the increased degree of splitting of keratin macromolecular chains.

Versatile particle sizes and compositions can be processed by using different alkaline chemicals with or without enzymatic additional hydrolysis. The use of enzymes in keratin extraction results in the obtaining of hydrolysates with a high degree of split of macromolecular chains.

Valuable alkaline and enzymatic keratin hydrolysates were obtained due to their content in protein and total nitrogen with potential applications in chemical auxiliaries for leather industry, fertilizers for agriculture, bioactive additives for medical or cosmetic applications.

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