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SE-HPLC as a tool to guide the production of novel peptide fractions for textile application.

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As the need for more bio centered solutions within the textile industry, complex increases it has been the role of R&D industries and academia to find within themselves tools that can guide the discovery and development of biobased products and solutions. One technique that nowadays plays a key role in the sustainable development of novel textile solutions is Size Exclusion HPLC (SE-HPLC). While on its core SE-HPLC is a high-throughput analytical method that has long been used for the routine analysis of proteins and their aggregation status, it is nowadays being used as key tool in the textile industry efforts of valorizing the estimated 4 million tons of protein-rich wastes generated by the tanning industry. In this setting SE-HPLC is providing fundamental information regarding the hydrolysis of the protein-rich wastes and in selecting and producing peptide rich solutions to be applied as functional coating in textiles. This work provides an example of such process as it shows how SE-HPLC was used to explore different enzymes and hydrolysis conditions to reuse protein rich leather by-products. The commercial enzyme, Protabate P, and an alternative enzyme, Alcalase, were used to hydrolyze leather by-products. Hydrolyzations were done during 6 and 24 hours while also trying to reduce the enzyme concentration used by the industry. The peptide size of the samples was then evaluated using size exclusion (SE-HPLC) to help determine how the hydrolysis can affect the molecular weight of the peptides present within the leather by-products and the prevalent molecular weight was between <0.2, 3-5, and 5-10 kDa. The hydrolysis percentage rate was also determined by using TNBS methodology and both enzymes tested affected the leather by-products, being Alcalase the one with a higher hydrolysis rate (70%). The utilization of this technique can assist in identifying the optimal time/enzyme concentration ratio, thereby enabling the industry to simultaneously repurpose waste and develop new bio-based products through hydrolysis, such as functional coatings.

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