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Chromatographic Purification of Polyphenolic Compounds from a By-Product of Rapeseed Protein Isolation

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Polyphenols are an important class of plant secondary metabolites, valued for their antioxidant properties and wide-ranging applications in the food, pharmaceutical, and cosmetic industries. Rapeseed (*Brassica napus*) represents a significant source of polyphenolic compounds, particularly sinapic acid and its derivatives. During the industrial isolation of rapeseed proteins, a polyphenolic-rich by-product is generated, offering an opportunity for further valorization.

The aim of this work was to investigate the efficacy of chromatographic techniques for the purification of polyphenolic compounds from this by-product. The study focused on adsorption-based separation using a non-polar polymeric adsorbent, with a specific emphasis on how key process parameters, namely pH and column loading, influence separation efficiency.

The adsorption behavior of the target polyphenolic compounds was evaluated under varying conditions, and chromatographic experiments were carried out to assess the feasibility of their separation from complex mixtures. Our results indicate that separation efficiency is governed by both the physicochemical properties of the target compounds and operating conditions. The distinct elution profiles observed for individual polyphenols demonstrate the potential for selective purification through the optimization of process parameters.

Overall, these findings confirm that chromatographic purification is a promising approach for the recovery of valuable polyphenolic compounds from rapeseed processing by-products. This strategy supports the sustainable utilization of agro-industrial residues and facilitates the development of high-value functional ingredients. Future research should focus on further process optimization and considerations for industrial scale-up.

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