**Hydroxytyrosol enrichment in olive leaves extract via membrane separations**

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**ABSTRACT**

Membrane separation processes are gaining more popularity because of their ease of operation and possibility for continuous treatment when treating fluid streams. They can be used in various processes from water treatment and extract purifications to gas separation with specifically tailored membranes. The present study is a continuation from a previous work conducted in our laboratory. In the first part, an effort was made to extract oleuropein from dry olive leaves, it to obtain hydroxytyrosol and use liquid-liquid extraction to obtain an extract rich in hydroxytyrosol. Carefully tuning the pH of the aqueous phase before liquid-liquid extraction managed to obtain high purities of hydroxytyrosol (> 40%) without compromising the yield of the extracted compound (> 10 g HT/g dry leaves). In this study, an expansion was made to the proposed process by including a membrane separation step. Membrane separation has been proposed to purify wastewaters and fractionate the waste into substances that can be utilized. The idea of “molecular sieving” was applied with two goals in mind being tested separately in different experiments. Firstly, try to separate oleuropein from larger molecules before hydrolysis to reduce unwanted reactions and complications from impurities, and secondly to first hydrolyse oleuropein and then use very “tight” Nanofiltration membranes to separate this small molecule from larger ones before liquid-liquid hydrolysis. Small molecules in the hydrolysate usually include small phenolics and monosaccharides. Separating small molecules from large ones would make it easier for hydroxytyrosol to be separated with liquid-liquid extraction because polar molecules like sugars would end up in the aqueous phase anyway and phenolics with small pKa would also end up in the aqueous phase with proper pH tuning, thus further increasing the purity of hydroxytyrosol in the final product. The results of this study are promising, showing an increase of hydroxytyrosol purity from about 40% to close to 70%. The recovery is compromised however with a reduction of hydroxytyrosol in the final extract from about 6 g/kg dry leaves to approximately 1.5 g/kg dry leaves. This 75% reduction in recovery seems excessive but it is still very satisfactory considering the high value of the product.

**KEYWORDS:** Hydroxytyrosol, Membranes, Extraction, Olive Leaves, Oleuropein

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