

# Biological Potential of Cork Wastewater Ultrafiltration Fractions

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**1. Introduction** – The occurrence of disorders, such as cancer, degenerative and cardiovascular diseases have been increasing over the years due to increasing contact with toxic products. Due to this, many processes have been developed to combat them.

In this work, a biological activity systematic study of fractionated wastewater from the cork processing industry was carried out. This wastewater is rich in organic compounds like phenolic compounds, known to have high antioxidant and anticancer properties [1].

**2. Experimental** - To assess the biological potential of the effluent different compounds, it was fractionated using ultrafiltration membranes into several different size fractions: light fraction, heavy fraction and average fraction. For this, ultrafiltration membranes were prepared according to the phase inversion method, composed of cellulose acetate, formamide and acetone. Two membranes (CA36.5 and CA28) were prepared with molecular weight cut-offs of 65.5 kDa and 9.5 kDa, respectively. The heavy fraction was the concentrate stream obtained after diafiltration of the raw effluent (solutes retained by 65.5 kDa membrane). The average fraction was obtained after diafiltration of the permeate obtained in the previous step (solutes retained between the 9.52 kDa and 65.48 kDa membranes), and the light fraction was the final permeate obtained (solutes that permeate through the 9.52 kDa membrane).

The raw effluent and its fractions were quantified using the high-performance liquid chromatography (HPLC-DAD), Folin-Ciocalteu (quantification of total phenols), DPPH (antioxidant activity), TBARS (inhibition of lipid peroxidation) and the ability to inhibit acetylcholinesterase (AChE) was also analysed.

**3. Results and Conclusions** - The biological activity best results were obtained for the heavy fraction showing  $0.176 \pm 0.065$  mg of total phenols and  $0.085 \pm 0.009$  mg of tannins per mg dried mass, with an EC<sub>50</sub> of 21.97 µg/mL antioxidant activity and an IC<sub>50</sub> of 0.34 mg/mL for AChE inhibition. The phenolic compounds identified in this fraction by HPLC-DAD were the quinic, ellagic, gallic, siringic and vanillic acids.

The cytotoxicity of the compounds in liver cancer cell lines (HEP-G2) and skin melanoma (A375) was accessed and compounds showed not to be toxic against these cell lines. The compounds were seen to have the potential to protect A375 cells against oxidizing agents (H<sub>2</sub>O<sub>2</sub> e TBHP). Finally, the effect of the compounds in A375 cells were visualized by scanning electron microscopy (SEM) and fluorescence.

## 4. References

[1] L. Gomes, C. Borges, M. Serralheiro, M. Minhalma, R. Pacheco, *Journal of Chemical Technology Biotechnology*, **93** (3), (2017) p. 861.