

ET2GREENPHENOLIC: NOVEL CLEAN EXTRACTION PROCESSES FOR THE RECOVERY OF POLYPHENOLS FROM FOOD BY-PRODUCTS

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INTRODUCTION

Food by-products and wastes are potential sources of bioactive compounds, including phenolic compounds, which are of great interest for food, cosmetic and nutraceutical industries. There is growing interest in the development of initiatives for the treatment of food by-products and the recovery of compounds of interest from them. This presents double advantage: *Reducing the volume of waste and minimizing the costs involved in waste management, * The by-product is recovered in a new product that can be marketed, with the consequent benefit from an economic point of view. The revalorization of these by-products leads to a reduction in environmental pollution due to the reduction of waste, as well as improving the profitability of industries by adopting a circular economy economic model in their production systems. In this project, different low-cost extraction and purification methods, alternative to traditional ones, will be developed to obtain phenolic compounds of interest in food industry waste by using green technologies, which have high yields and provide a viable economy.

OBJECTIVES

- ✓ Development of low-cost green extraction methodologies to obtain extracts rich in phenolic compounds.
- ✓ Analysis and characterization of the different extracts obtained.
- ✓ Development and validation of the methodology at pilot scale: Extraction, purification and dehydration.
- ✓ Comparison of the proposed methodology with traditional extraction process.

METHODOLOGY

The methodology for obtaining phenolic compounds from pomegranate, lemon and artichoke industry by-products (fig.1) consisted of ultrasound-assisted extraction and subsequent recovery of these compounds by adsorption-desorption methods. Table 1 shows the phenolics compounds presents on by-products used.

Table 1. Food by-products and their characteristic phenolic compounds	
Food By-Product	Phenolic Compound
Pomegranate	Punicalagin
	Ellagic Acid
Lemon	Hesperidin
Artichoke	Cynarin
	Chlorogenic Acid
	Caffeic Acid

Subsequently, the aqueous extract obtained was purified by means of an adsorption-desorption process using natural adsorbents such as zeolite.

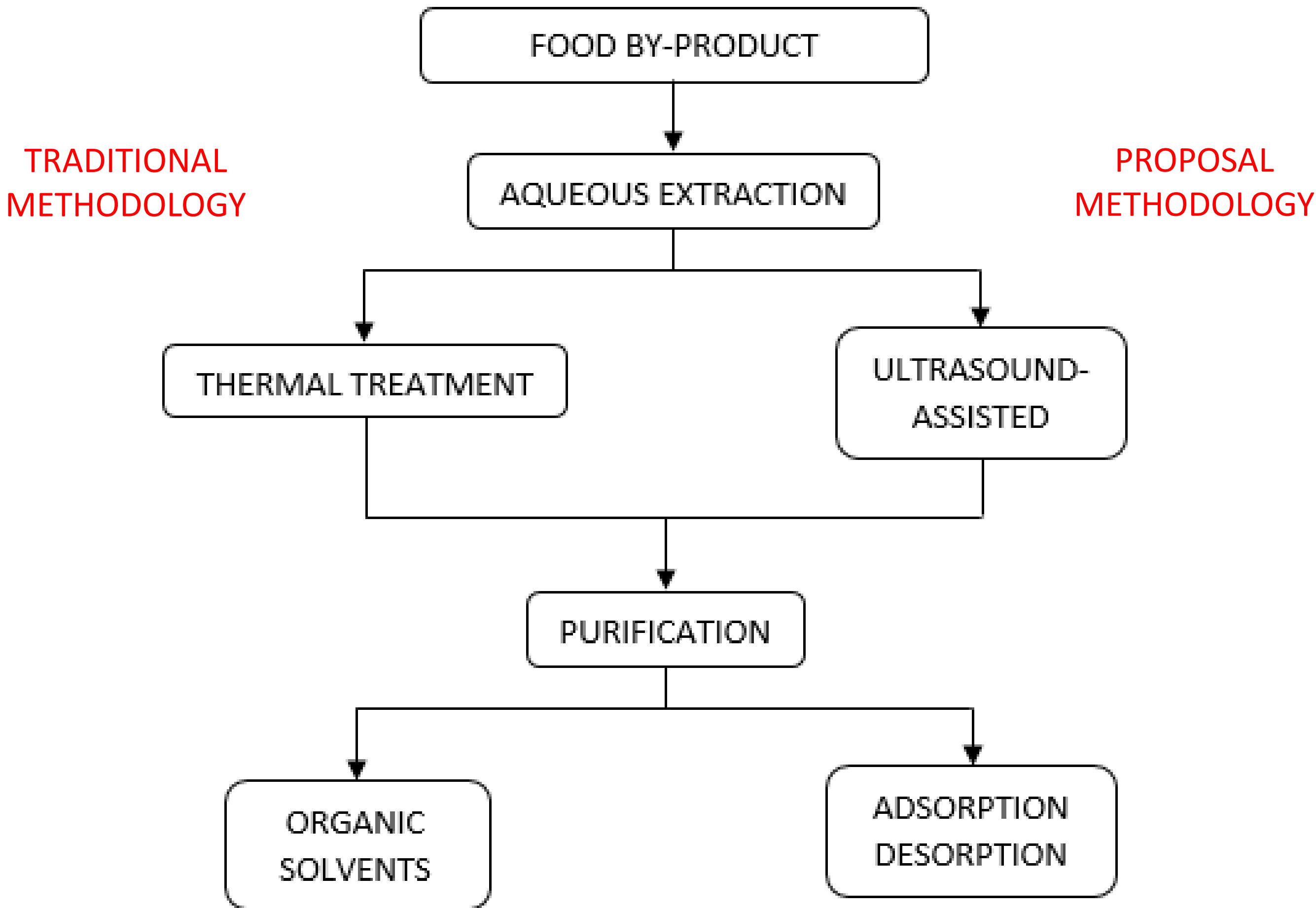


Figure 1. Extraction methodology

After purification of the extract rich in phenolic compounds, a dehydration treatment and subsequent characterisation is carried out.

RESULTS AND DISCUSSIONS

A low-cost methodology has been developed through ultrasound-assisted aqueous extraction with the objective of the extraction of phenolics compounds from pomegranate by-product (figure 2). The aqueous extract was purified through adsorption-desorption processes with zeolite and lyophilized. Table 2 shows the concentration in Punicalagin, 7,9%, of the extract obtained.

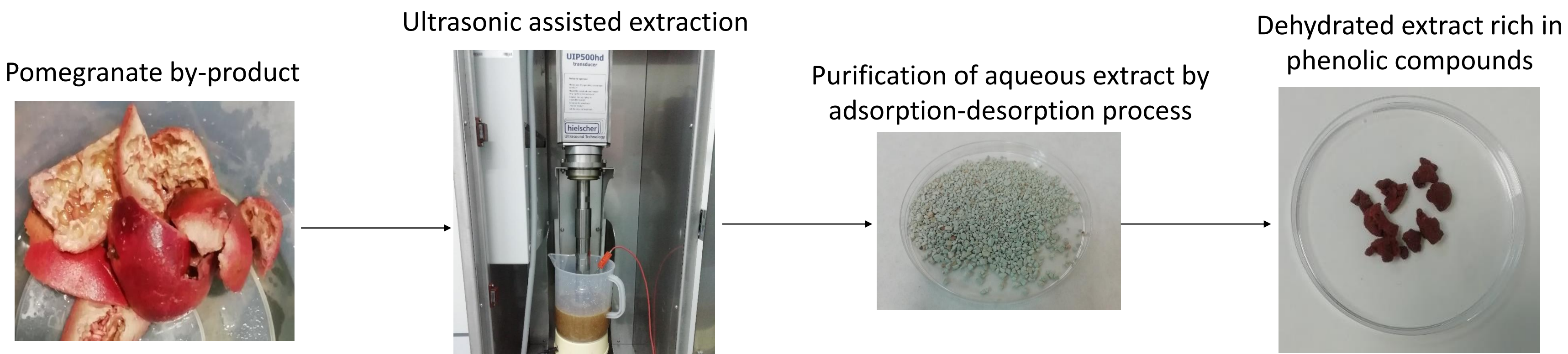


Figure 2. Extraction methodology

Table 2. Pomegranate extract analysis	
Phenolic Compound	Result (mg/kg)
Punicalagin	79255,2

Due to its high concentration of Punicalagin, a study of the antioxidant capacity was carried out using electrical impedance.

Figure 3. Measurement of antioxidant capacity by electrical impedance of pomegranate by-product extract.

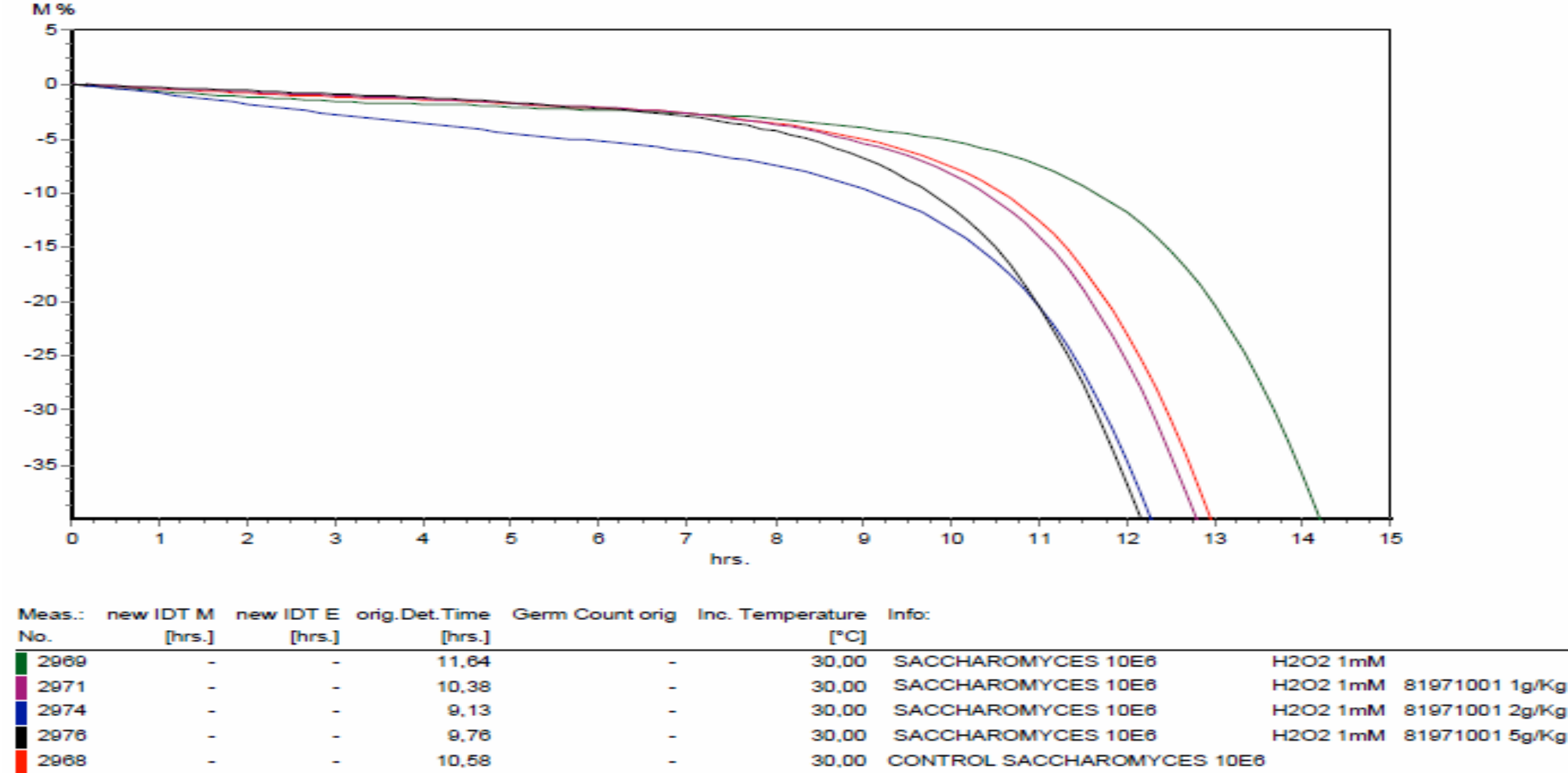


Figure 3 shows the results of the antioxidant capacity from pomegranate extract. When the extract is used at different concentrations, the detection time from Saccharomyces is shorter than the control sample. So, it can be concluded that pomegranate extract has antioxidant activity.

This extraction methodology is been applied to lemon and artichoke by-products.

CONCLUSIONS

- ✓ **A METHODOLOGY FOR THE EXTRACTION AND PURIFICATION OF PHENOLIC COMPOUNDS FROM POMEGRANATE, LEMON AND ARTICHOKE BY-PRODUCTS HAS BEEN DEVELOPED.**
- ✓ **AN EXTRACT RICH IN PHENOLIC COMPOUNDS HAS BEEN OBTAINED AND CHARACTERISED FROM POMEGRANATE BY-PRODUCT.**
- ✓ **THIS METHODOLOGY IS BEING DEVELOPED TO OBTAIN DIFFERENT EXTRACTS RICH IN PHENOLIC COMPOUNDS FROM LEMON AND ARTICHOKE BY-PRODUCTS.**

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