

Oligosaccharide and furan obtaining from apple pomace by means of a biphasic reaction system

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Oligosaccharides are short chains of sugars linked by glycosidic bonds, which play crucial roles in cellular communication, molecular recognition, adhesion functions, and serving as prebiotics in the digestive system. Due to its prebiotic and antimicrobial activities, they have gained interest in pharmaceutical, cosmetic or food industries (Dávila et al., 2019). This study focuses on the evaluation of the suitability of a biphasic system (water/organic solvent) for the obtaining and purification of oligosaccharides in a single step. The use of a biphasic system provides several advantages in terms of efficiency, selectivity and process control, leading to a more effective investigation. For that, the main objective of this work is the extraction of oligosaccharides by means of a biphasic system and production and separation of furans (furfural and hydroxymethylfurfural).

The experiment involves a pretreatment step of the apple pomace (previously dried at 50°C) by ultrasound system (US) to remove non-structural sugars or monosaccharides. After filtration, the solid part containing oligosaccharides is subjected to an autohydrolysis treatment by microwave (MW). The choice of organic and acid solvents for the MW is the result of a preliminary design. In the case of acids, citric acid and sulfuric acid were tested with concentrations of 0.01 and 0.05 M. On the other hand, several organic solvents are evaluated, according to its polarity and immiscibility with water such as MIBK, butanol or THF. Microwave assisted experiments were performed in the following conditions: 180°C, 15 mins, 500W.

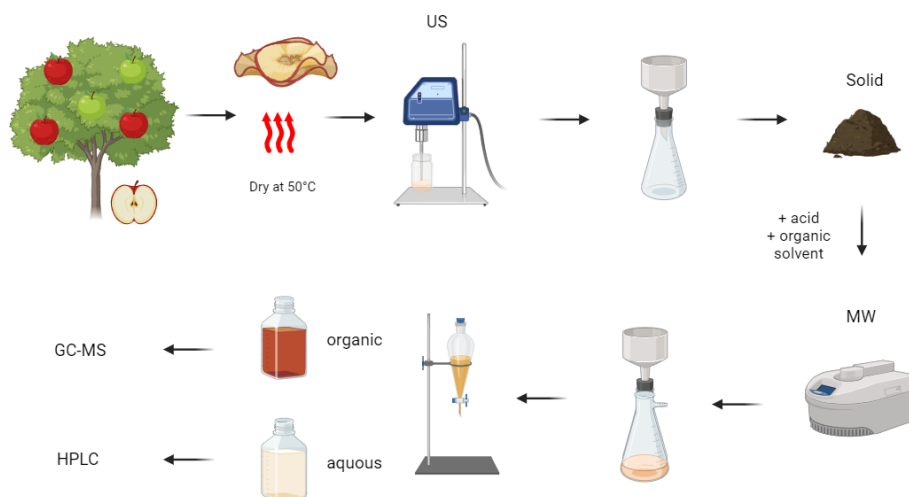


Figure 1. Schematic representation of oligosaccharide and furan obtaining.

For the purification step, liquid-liquid extraction was performed, which offers several advantages in comparison with other purification methods, such as elimination of toxic compounds without losing carbohydrates. The aqueous phase obtained containing oligosaccharides was analyzed by high performance liquid chromatography (HPLC). The organic phase containing furans was analyzed by gas chromatography-mass spectrometry (GC-MS).

References:

Dávila, I., Gullón, B., Alonso, J. L., Labidi, J., & Gullón, P. (2019). Vine shoots as new source for the manufacture of prebiotic oligosaccharides. *Carbohydrate Polymers*, 207(November 2018), 34–43. <https://doi.org/10.1016/j.carbpol.2018.11.065>