

## Optimization of antioxidant phenolic compounds extraction from Thomson orange peels and their incorporation in yogurt

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### ABSTRACT/RESUME

**Abstract:** The present work was carried out to valorize phenolic compounds of Thomson orange peels which considered as great industrial waste all over the world. Extraction conditions of the phenolic compounds from orange peels and incorporation process of the obtained extract in yogurt were set as objectives of the present study. The effects of solvent concentration (30-100%), extraction time (15-120 min), particle size (125-710 $\mu$ m), and sample to solvent ratio (0.1/20-0.5/20 g/ml) on the extraction of antioxidant phenolic compounds from orange peels were assessed. Evaluated factors affect significantly ( $p < 0.05$ ) the extraction of bioactive compounds. It is established that the best extraction conditions were 70% acetone, 30 min, 250  $\mu$ m, and 0.2 g/20 mL for solvent concentration, extraction time, particle size, and sample to solvent ratio, respectively. Under these optimal conditions, total phenolic content and antiradical activity were respectively 6.26 g GAE/100g DM, and 33.64 g AAE/100g DM. The incorporated extract in yogurt had demonstrated an antioxidant quality (895.39 mg AAE/100g of yogurt), and total phenolics, flavonoids, flavonols, and ortho-diphenols were determined in 100 g of yogurt with respective contents of 258.60 mg GAE, 106.86 mg QE, 17.74 mg RE, and 52.43 mg CAE. Orange peel waste has a potential source of phenolic compounds, which could play a major role in human health. As a new eventual developed functional food, the yogurt enriched with phenolic compounds of orange peels is also could be considered as a good source of natural antioxidants, free of synthetic additives, which could play good roles as protector of yogurt against oxidation.

### I. Introduction

Citrus-fruit cultivation is the greatest sector of fruit production around the world, and has expanded over the last decade with annual world production more than 90 million tons [1]. This over production is technologically transformed to other food products, such as juices, nectars and jams, in order to (1) avoid damage of fresh foods and (2) provide to the consumers these products conserved around

months, and may be years. For these reasons, more than a third of this production is destined to food proceedings, particularly to juice production. However, these transformations produce annually more than 15,000 tons of wastes [2]. Generally, these by-products can be seeds, pulps residues, and citrus peels.

Citrus peels are among highly valuable constituent sources which have varied applications in food, nutraceutical and cosmetic industries, and for the