

## Effect of high-intensity ultrasound processing on carbohydrates of freshly squeezed orange juice

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### Objective

Orange juice although it is the top selling and consumed, 100% fruit juice worldwide, due to its superior sensorial and nutritional characteristics, it consists of significant content of sugars making its consumption forbidden for specific groups of people. The World Health Organization recommendation for at least 10% reduction on free sugars leads the juice industries to the need of the production of low-caloric juices by reducing the free sugars present in the natural fruit juice. The ability of non-thermal technologies, such as ultrasound, to cause significant changes in the structure and functionality of carbohydrates may lead to sugar breakdown conversion. The target of the research was to study the effect of high-intensity ultrasound to the structure of carbohydrates in orange juice.

### Method

Freshly squeezed orange (Valencia cv.) juice was processed under different conditions of high-intensity ultrasound (frequency 10-30 kHz, temperature 20-60°C, 0-20 min) and conventional heat treatment (40-110°C). The effect of each technology and process parameters on the potentiality to break down juice sugars was assessed through high performance liquid chromatography and SDS-PAGE electrophoresis. Physicochemical (color, pH), nutritional (vitamin-C, antioxidant activity, total phenolic content) and sensory characteristics of the processed juices, as well as enzymes activity (pectinmethylesterase), were also evaluated.

### Results

The combination of ultrasound treatment up to 20 kHz combined with temperatures up to 40°C and processing times till 5 min did not affect the quality characteristics of the juices. Ultrasound processing conditions of increased intensity led to carbohydrates degradation as derived from the HPLC-profiles, as well as to a decrease of the average molecular weight of polysaccharides in the orange juice.

### Conclusions

The results indicate that ultrasound processing could be used as a potential processing technique for sugars molecular weight degradation in fresh juices.