CONCENTRATION OF ORANGE JUICE BY COUPLING REVERSE OSMOSIS AND OSMOTIC EVAPORATION.

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Reverse osmosis (RO) and osmotic evaporation (OE) are membrane concentration processes that can be used for fruit juice concentration while maintaining its nutritional and sensorial properties as they are often conducted at room temperature. RO is a pressure driven process used when low molecular weight solutes such as inorganic salts or small organic molecules as glucose have to be separated from a solvent. One of the most important advantage of RO is its low energy consumption. OE allows the selective water vapour extraction from a diluted aqueous solution (fruit juice) to a concentrated solution (brine) due to the water activity gradient between these two streams that are separated by a hydrophobic membrane. This work aimed to study the concentration of orange juice by reverse osmosis coupled with osmotic evaporation. Orange juice from Brazil, at 11°Brix was used as raw material. The juice was previously concentrated by reverse osmosis at Embrapa, Brasil in a pilot scale equipment using a composite membrane with 95% NaCl rejection and a transmembrane pressure of 60 Bar. The pre concentrated juice was frozen and sent to France, where it was concentrated by osmotic evaporation at Cirad, in a lab scale system composed by two independent circuits, one for the juice and the other for the brine. A PFTE 0.2 μm flat sheet membrane was used. A calcium chloride solution was used as brine. During the reverse osmosis experiments, the permeate flux was about 28 kg/hm^2. The maximum concentration factor reached was 5.8 resulting in a 35.7ºBrix juice. The evaporatory flux during osmotic concentration trials ranged from 12 kg/hm^2 to 7 kg/hm^2 allowing the concentration of the juice rise up to 61°Brix. The concentration factor reached by coupling reverse osmosis and osmotic evaporation is interesting and suggest the applicability of the membrane technologies to fruit juice concentration.