

COUPLING OF REVERSE OSMOSIS AND SPRAY DRYING PROCESSES TO OBTAIN GRAPE JUICE POWDER

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Spray drying is the most common method to obtain fruit juice powders, resulting in products with good quality, low water activity and easier transport and storage. However, fruit juices usually have high water content, which implies in a high amount of energy to evaporate it. In this sense, pre-concentration aiming at obtaining a feed juice with higher solids content can be suggested as an alternative method prior to spray drying. Reverse osmosis is a membrane process that has been used to concentrate several kinds of fruit juices, operating at mild temperatures and preserving bioactive compounds. The objective of this work was to evaluate the potential of coupling reverse osmosis (RO) and spray drying in order to obtain grape juice powder. The juice (with 150 g/kg of total solids) was firstly concentrated by RO in a plate and frame reverse osmosis system composed by thin film composite membranes. Then, the concentrated juice was spray-dried in a laboratory scale dryer, using maltodextrin, gum Arabic and the modified starch Capsul® as carrier agents, in a ratio of juice solids:carrier agent of 1:2. The juice and the powders were characterized for total anthocyanins and antioxidant capacity. The powders' physical properties (moisture content, bulk density, hygroscopicity and morphology) were also analyzed. As results, the concentrated juice achieved 245 g/kg of total solids and showed no anthocyanins losses. Although the powders produced with maltodextrin were the most hygroscopic ones, they showed the highest anthocyanin retention (99.4%). The powders produced with Capsul® showed the lowest moisture content, hygroscopicity and antocyanin retention values. The antioxidant capacity showed similar behavior to total anthocyanin content. This work suggests that the coupling of reverse osmosis and spray drying may result in good quality products, satisfactorily preserving bioactive compounds. However, further studies are necessary to evaluate its economical viability.

Keywords: membrane processes, spray drying, anthocyanins, physical properties.