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Differential Recovery of Terpene Hydrocarbons and Oxygenated Compounds from Condensates Containing Essential Oil Discharged during Concentration of Citrus Juices Using a Ceramic Membrane

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Essential oils of citrus fruits have many uses in consumer products so that efficient methods for their isolation are needed. Membranes are often used in the separation process but a common problem is that the flux through the membranes decreases with time. In the present study we examined whether ceramic membranes might be better at maintaining the flux at acceptable levels. To test the membranes, we attempted differential recovery of nonpolar terpene hydrocarbons and aqueous oxygenated compounds from condensates produced as a by-product during the concentration of citrus juices. When zirconia membranes (ZrO_2-UF, cut-off molecular weight 50,000 and ZrO_2-MF, pore size 0.08 μm) were used, little decrease in the flux was observed during filtration. The nonpolar terpene hydrocarbons were retained while more polar oxygenated flavor compounds passed through the membrane. The percentages of alcohols, esters, and aldehydes in the permeate increased markedly compared with their percentages before filtration. When the condensate from the concentration process of citrus juice sampled from a juice factory was filtered using ZrO_2-UF, the hydrocarbons was concentrated, and a water-soluble essence consisting primarily of oxygenated compounds was obtained in the permeate.

Keywords: ultrafiltration, ceramic membrane, zirconia membrane, essential oil, terpene

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