

Evaluation of Roasted Coffee Beverage Pervaporation to Aroma Concentration: Process Efficiency and Enrichment Factor

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SUMMARY

Pervaporation is a selective membrane technique in which a liquid mixture is fractionated by means of partial vaporization through a non porous permselective membrane. This process has been considered an alternative for the recovery and concentration of volatile substances from liquids mixtures, which indicates its potential for utilization in the recovery of aroma compounds. This process has as advantages over the classical processes of solvent extraction, steam extraction and supercritical extraction, such as no utilization of organic solvents and the operation under mild conditions of temperature and pressure. This work had as objective to study the pervaporation of coffee beverage in order to obtain a natural concentrated essence to be used as an additive in the food industry. Two flat sheet membranes were evaluated, polydimethylsiloxane (PDMS) and ethylene-propylene-diene terpolymer (EPDM), at three process temperatures (25 °C, 35 °C and 45 °C). Total permeate flux and the enrichment factor of some compounds were calculated for evaluating the process performance. The aromatic profile of the coffee beverage was determined by gas chromatography and mass spectrometry (GC-MS). PDMS membrane exhibited a higher permeate flux when compared to the EPDM. By increasing the temperature of the process a positive effect on the permeate flux was observed, according to the Arrhenius equation. The EPDM membrane presented higher enrichment factors for many substances, indicating that this membrane is more selective for the recovery of aroma compounds from coffee beverages. Experimental results showed that pervaporation process is a membrane technology able to recover and to concentrate coffee beverage aroma and that EPDM membrane exhibits a higher performance than PDMS membrane during such a process.