

507f Batch Preparative Chromatography Applied to the Separation of Sugars from Cashew Apple Juice

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The cashew apple is the pseudo-fruit of the cashew tree; it contains approximately equal amounts of fructose and glucose and is presently an agricultural waste largely found in Northeastern Brazil. This work shows experimental results for the separation of fructose from glucose using clarified cashew apple juice (free of tannins). Batch chromatography experiments (pulse and frontal analysis) were performed using cation-exchange resins (Ca²⁺ form) as the stationary phase. Initially, equilibrium isotherms of fructose and glucose were measured by frontal analysis using synthetic binary solutions in the range of 0 to 60 g/l for each sugar. The clarified cashew apple juice was then used as feed in frontal chromatography experiments and the isotherms obtained matched those previously obtained with synthetic binary mixtures. Experiments were carried out under diluted conditions using ultra-pure water as mobile phase at 25°C, 40 and 60°C. Hydrodynamic parameters (bed porosity and axial dispersion) were also determined using blue dextran as tracer. By using a convenient process model for mass transfer, it was also possible to estimate the mass transfer time constant (LDF approximation) from breakthrough and elution experiments. The packing adsorbs fructose preferentially and the isotherms of both sugars are approximately linear in the concentration range under study (0-50 g/l each sugar). Temperature showed to have a strong influence both on the equilibrium isotherms and on the adsorption kinetics. Pulse experiments under loaded conditions were performed and the two sugars were successfully separated with product purities around 80%. The results presented herein should provide scientific support for economic alternatives to the industrial processing of the cashew crop.