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PB48 – RECOVERING AND CONCENTRATION OF AROMA COMPOUNDS FROM INDUSTRIAL WASTE OF CASHEW APPLE (ANACARDIUM OCCIDENTALE VAR. NANUM) BY PERVAPORATION

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INTRODUCTION: The cashew apple is a pseudo fruit that can be consumed fresh, although interesting features leads to its industrialization because of its attributes as juicy, soft peel, seedless, high sugar content and a marked exotic flavour. Studies about the typical aroma composition of the cashew apple have been increasing (GARRUTI et al., 2003). The biotechnological (bacteria, fungi and yeasts) generation of natural aroma compounds is rapidly expanding in food (Krings & Berger, 1998), however, in bibliographic research using keywords such as aroma, fruit, waste, residue and stalk on the Science Direct and ISI Web of Knowledge Portals to date there has been no study reporting the achievement of reusing the aroma compounds naturally present in industrial wastes of fruits. This work aims to recover and concentrate the aroma compounds from the cashew apple juice industrial waste with the purpose of flavoring juices and other flavoring purposes.

MATERIAL AND METHODS: Industrial residue from the cashew apple juice processing was obtained at the Northeast of Brazil. It was packed and frozen (-18°C) until use. The residue was processed with water in a blender and pressed to obtain an aqueous extract, keeping a proportion of 50g of cashew apple residue to 150mL of water. The extract obtained was used as feed stream in the pervaporation processes. Pervaporation processes were carried out in a plane module with 28.3 cm2 of total permeation area using a Polydimethylsiloxane - PDMS composite membrane from Velterop, Pervatech®, Netherland. The feed stream was continuously pumped to the membrane module, with the aid of a centrifugal pump. The temperature of the juice was kept constant, being controlled by a thermostatic bath. The difference in partial pressure was maintained by using a vacuum pump on the permeate side. The obtained permeate was collected in a condenser immersed in liquid nitrogen. The pervaporation was carried out at three different temperatures: 20°C, 30°C and 40°C. Samples of each experiment consisted of feed, retentate and permeate. Samples were analyzed by head space - solid phase microextraction - gas chromatography - mass spectrometry (HS-SPME-GC-MS). One gram of each sample was kept into a 4 mL vial at 50°C, with stirring, during one hour. After this time, a divinylbenzene / Carboxen / PDMS (DVB/CAR/PDMS) SPME fiber was exposed to the headspace for 15 minutes, withdrawn and immediately inserted into the GC injector, kept at 250°C in splitless mode. The separation was performed in a 5%-phenyl-95%-methylsilicone capillary column (30m X 0.32mm X 0.25μm). Oven temperature program was 40°C (3min) to 240°C at 3°C/min. Identification of compounds was done by comparison of mass spectra with Wiley 6th ed library.

RESULTS: The number of compounds observed in the chromatograms for the three temperatures tested was different, and at that of the experiment at 30°C was the richest one: 797 components and 49 compounds identified. The profile of the main functional groups was similar in all three temperatures: esters > alcohols > ketones > aldehydes > hydrocarbons > acids. The chromatogram of the permeate fraction obtained at 200C had 39% esters, 14.6% alcohol, ketone and aldehyde, 12% of terpenes, 2.4% of acids and hydrocarbons. When the temperature was increased to 30°C it was verified 26% ester, 25.4% alcohols, 12% aldehydes, 11% ketones, 9.5% terpenes, 3.2% acids, 1.5% hydrocarbons. And when 400C was used the chromatographic profile of the peaks was 39.5% esters, 18.6% alcohols, 13.9% aldehydes, 11.6% ketones, 4.6% terpenes, 2.32% hydrocarbons and acids. Some differences were found among the profiles obtained at the three temperatures, but best results in terms of number of volatiles were observed with samples processed at 30°C. Assis and coworkers (2007) evaluated the cashew apple juice pervaporation. They verified an increase of the number of peaks on the chromatograms of 2.4 times and they identified 49 compounds. In this study evaluating the pervaporation process of the aqueous extract of cashew apple the number of peaks increased 2.3 fold and 63 compounds were

identified when the process was carried out at 30°C.

CONCLUSION: The application of pervaporation in the concentration of aroma compounds obtained from aqueous extract of cashew apple waste was efficient. It was possible to identify a higher number of aroma compounds in the permeate fraction than in the cashew apple juice. The cashew apple residue seems to be an interesting source of aroma compounds and further work should be performed in order to explore its application as a source of natural flavor compounds in cashew apple juice and other products.

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