STUDY OF THE EFFECT OF THERMAL PROCESSING ON PASSION FRUIT JUICE BY MEANS OF 1H NMR SPECTROSCOPY AND CHEMOMETRICS

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The temperature and processing time of thermal treatment (pasteurization and sterilization)1 may cause modifications on the chemical composition of products. The aim of this study was to use the 1H NMR to evaluate chemical changes of fresh passion fruit juice subjected to thermal processing employing the conditions: 85 °C for 15; 30; and 60 s and 140° C for 4; 15; 30; and 60 s on a FT74 UHT/HTST Armfield pasteurizer. For 1H NMR, in 130 µL of juice was added 14 mM of EDTA, 350 µL of MeOD, and TSP 1%. The NMR experiments were performed on Agilent 600 MHz equipped with a 5 mm (H-F/15N-31P) One Probe™, at 298 K. The spectra were exported to UnscrambleX™ to perform the PCA and PLS-DA. The PC1 (46%), shows a separation of the samples in two groups: control and submitted to 85 °C, and samples submitted to 140 °C. In both a time gradient is clear increase of the scores with the pasteurization time. The PC1 loadings graphic showed the sucrose conversion to α, β-glucose, and fructose with the temperature/time increasing. Also, the PC1 (51%) of the aromatic region (9.5-5.7 ppm) was able to distinguish the juice exposed to 140°C for 60 s of all the others (control, 85 °C, and 140 °C for shorter time). The PC1 loadings showed that the harshest treatment results in the production of furfural and others unknown components. In addition, the application of PLS-DA, resulted in a model with prediction ability of 96% (calibration and validation). The conversion of sucrose to glucose and fructose was the main responsible for the classification of the data showing that these compounds content might be following to achieve best pasteurizing conditions. Thus, our results showed that 1H NMR with chemometrics is an efficient tool for the classification of the passion fruit juice submitted to thermal processing and also to identify the main compositional changes after pasteurization. References: 1. Polyderaa A.C., et al. J. Food Eng. 2003, 60(1). CNPq, CAPES, EMBRAPA