

Effects of Different Mechanical Treatments on the Physical and Chemical Properties of Turmeric

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Abstract : Turmeric (*Curcuma Longa* L) is an Indian rhizome known for its biological properties, derived from its active compounds such as curcuminoids. Curcumin, the main polyphenol in turmeric, only represents around 3.5% of the dehydrated rhizome and extraction yields between 41 and 90% have been reported. Therefore, for every 1000 tons of turmeric powder used for the extraction of curcumin, around 970 tons of residues are generated. The present study evaluates the effect of different mechanical treatments (waring blender, grinder and high-pressure homogenization) on the physical and chemical properties of turmeric, as an alternative for the transformation of the entire rhizome. Suspensions of turmeric (10, 20 y 30%) were processed by waring blender during 3 min at 12000 rpm, while the samples treated by grinder were processed evaluating two different Gaps (-1 and -1,5). Finally, the process by high-pressure homogenization, was carried out at 500 bar. According to the results, the luminosity of the samples increases with the severity of the mechanical treatment, due to the stabilization of the color associated with the inactivation of the oxidative enzymes. Additionally, according to the microstructure of the samples, the process by grinder (Gap -1,5) and by high-pressure homogenization allowed the largest size reduction, reaching sizes up to 3 μ m (measured by optical microscopy). This processes disrupts the cells and breaks their fragments into small suspended particles. The infrared spectra obtained from the samples using an attenuated total reflectance accessory indicates changes in the 800-1200 cm^{-1} region, related mainly to changes in the starch structure. Finally, the thermogravimetric analysis shows the presence of starch, curcumin and some minerals in the suspensions.

Keywords : characterization, mechanical treatments, suspensions, turmeric rhizome

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