THE DRYING OF KIWI: MODELLING OF DRYING KINETICS AND DESORPTION ISOTHERMS

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Abstract

Dried fruits constitute an alternative to the consumption of fresh fruits and can be consumed during the off-season. In some regions, the production of kiwi fruit oversupplies the fresh consumption and, consequently, the drying process can be used to make processed products. Hence, this work aimed to study the effect of air temperature on the drying kinetics and sorption isotherms of kiwi.

The kiwi samples were obtained from a local market for realization of the experiments. The peel was removed and then the kiwis were cut into slices with 6 mm thickness. Convective drying was performed in an electrical chamber with an air flow rate of 0.5 m/s in the range temperature from 50 to 80 ^{0}C. The drying was carried out until the slices reached a desirable moisture content of about 10% (wet basis). Experimental data were fit to seven mathematical models commonly used to describe the drying kinetics of food products and the performance of the models was compare according to six statistical indicators. To determine the desorption isotherms the water activity was also measured along drying, using a hygrometer, coupled to an isothermal bath. Experimental values were fitted to models available in the literature to describe sorption isotherms.

The results showed that increasing the drying air temperature shortened drying time, so that the drying at 80 ^{0}C allows a reduction of about 71% in the drying time if compared with the temperture of 50 ^{0}C, thus representing an important energy saving. The fitting was evaluated through several indicators commonly used and from the tested kinetic models it was possible to conclude that although the Page, Logarithmic and Wang & Singh models satisfactorily described the drying behaviour of kiwi slices, the best was the Vega & Lemus model. Finally, it was established a nonlinear relation between the Vega & Lemus *k* constant and temperature. When speaking about prediction of sorption isotherms for the dried kiwi slices at different temperatures, the Chen model was confirmed to be very accurate in predicting the equilibrium moisture content at different temperatures. An increase in temperature caused a decrease in the amount of adsorbed water for the same water activity, allowing the kiwi slices to become less hygroscopic at higher temperatures.

Dried kiwi can be used as a functional ingredient in the industry to innovate on its commercialization in diverse processed forms, such as sweets, snacks, breakfast cereals, among other products.

***Key words**: Kiwi, Convective drying, Drying kinetics, Thin layer model, Sorption isotherm.*