

Sorption isotherms for apple pomace

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Apple is one of the world's most consumed fruits. Its use in the production of juice, concentrated, pulp and cider generates large amounts of apple pomace (AP) as a byproduct, which has a potential for valorization. Apple pomace represents around 30% of the apple's weight and contains several valuable extractable compounds (pectin, phenolic compounds, etc.). In order to store AP for further processing, it must be dried to stop microbiological deterioration. Sorption isotherms are essential for an optimal design of the drying stage, assessing the stability of the dehydrated product and evaluating storage conditions. However, very little information regarding AP's sorption isotherms can be found in published literature. Moreover, the behavior of the sorption isotherms is heavily dependent on the particular characteristics of AP. The aim of this work is to experimentally obtain AP sorption isotherms in order to fit a model that can be used to predict AP behavior on the drying stage and in the storage conditions. Sorption isotherms were experimentally determined at three different temperatures (36, 50 and 60 °C). Sorption isotherms at 50 and 60 °C were obtained through the static gravimetric method and the sorption isotherm at 36 °C was obtained through direct measurement of water activity in AP samples with different moistures. Guggenheim-Anderson-de Boer equation (GAB) was selected within classical mathematical models derived to predict sorption isotherms of moisture in food, as it is one of the most versatile for different types of products. GAB parameters were fitted using the data obtained at 36 and 60 °C and the model was validated with the data obtained at 50 °C. Correlation coefficient (r^2) between the experimental and fitted data was 0.989, whereas the correlation coefficient for the validation was 0.996. The shape of the obtained sorption isotherm corresponds to a Type III curve, characteristic of food rich in soluble compounds. The obtained model allows predicting sorption isotherms for AP within a broad range of water activities (0.1 to 0.8) and temperatures of practical application (36 to 60 °C).