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IMPACT OF DRYING TEMPERATURE ON THE DYNAMIC VAPOR SORPTION PROPERTIES OF CORN FLOUR

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Abstract: The use of corn flour in bakery has recently shown a growing interest, particularly in the development of gluten-free baked products. Indeed, corn flour represents a good alternative for wheat and corn based products can be used in the diet of people affected with coeliac disease. A full development of gluten-free formulation with corn flour would however be achieved through an in-depth knowledge of its technofunctional characteristics. During drying, the major components (starch and protein) of corn grain undergo some structural changes (partial gelatinization of starch and protein denaturation). All of these changes may affect flour suitability for manufacturing gluten-free products. Nevertheless, there is a lack of studies on how drying conditions may affect the functional properties of corn flour including hydration properties and their adequacy to different gluten-free products. This study aimed at assessing the impact of drying temperature on the hydration properties of corn flour by using Dynamic Vapor Sorption (DVS) analysis. Corn grain dried in a fluidized-bed dryer at 54, 90 and 130°C were milled and separated in different fractions according to their particle size ($\Phi \leq 224$; $224 < \Phi \leq 355$; $355 < \Phi \leq 500$) and their chemical composition (starch, protein, fat neutral and acid detergent fibres) were determined. Moisture sorption and desorption isotherms obtained at different temperature (25, 40 and 50°C) present as expected, a sigmoidal shape depicting an increase with the equilibrium moisture content with the water activity. Analysis of the DVS data was performed using the Brunauer-Emmett-Teller (BET) and Guggenheim, Anderson, and de Boer (GAB) theories to obtain the monolayer moisture content value (Xm). This parameter which varied between 3.61 and 5.59, decreased with the increase in corn grain drying temperature. This suggests that the structural modification occurred within the corn kernel during drying lead to a reduction in the number of active sites for water binding because of the physical and chemical changes in the product induced by drying temperature.