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# Optimization of the experimental parameters for DSC characterization of high-protein materials: the case of raw and roasted peanuts

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## Résumé

Thermal analysis is quite a routine experimental technique for food characterization. It provides information about the physical state of several components over a relatively wide temperature range, which is useful to improve the control over food processing. This paper discusses the signal quality of differential scanning calorimetry (DSC) measurements performed on high-protein materials, and takes grinded peanuts as an example. Four different samples were used, including three grades of roasted peanuts along with their raw counterpart. DSC signals with complex shapes were obtained, containing not only the contributions due to the denaturation of the arachin and non-arachin (conarachin) protein fractions, but also the endothermic responses for the fatty and/or starchy fractions. This study investigates how the recorded DSC signals are affected by selected experimental factors, such as the type of DSC pans used, the choice of the reference, and the sample preparation. The results show that high-volume stainless-steel (HVSS) pans should be preferred to standard aluminum pans, for they allow adding a large amount of water to the sample, which appears to improve the resolution of the measurements and makes it possible to measure the denaturation temperature ( $d$ ) of peanut proteins. The use of HVSS pans does not require to choose a specific reference. The measurements can be performed as soon as the water is added to the sample. Waiting for water homogenization has no influence on the quality of the DSC signals in the case of peanut samples. Finally, it may be interesting to add NaCl to the hydrated samples, for it increases the intensity of the enthalpy measurement for arachin's denaturation. With this set of parameters, DSC measurements can be successfully used to evaluate the integrity of peanut proteins before and after heat treatments, such as dry-roasting.

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