

Calorimetric observation of lactose crystallisation in skim milk and whey protein concentrate powders

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During the manufacture and storage of dairy powders and ingredients, physical changes such as lactose crystallisation and chemical modifications such as Maillard reactions may change the functionality of the powders.

The main goal of the present calorimetric study was to investigate lactose crystallisation in skim milk (SMP) and whey protein concentrate (WPC) as well as the effect of water activity.

Microcalorimetry at low heating rates is shown to be efficient in this context as it allows to obtain good peak resolution in addition to the high sensitivity of the instrument.

The main results showed that lactose crystallisation was easily induced in SMPs, whereas it was delayed or inhibited in WPCs, even when the lactose content of both powders were the same.

These results help to understand the role played by protein structure and protein/sugar/water interactions in the physico-chemical stability of dairy powders and ingredients.

References

- 1) Raemy, R. F. Hurrell and J. Löliker, Thermal behaviour of milk powders studied by differential thermal analysis and heat flow calorimetry, *Thermochim. Acta*, 65 (1983) 81-92
- 2) G. Vuataz, The phase diagram of milk: a new tool for optimising the drying process, *Lait* 82 (2002) 485-500
- 3) M. K. Haque and Y. H. Roos, Water plasticization and crystallization of lactose in spray-dried lactose/protein mixtures, *J. Food Science*, 69, 1 (2004) FEP23-FEP29