Thermal characterization of micro encapsulated polyphenols extracted from olive leaves

Maria PACIULLI[1], Paola LITTARDI[1], Federica FLAMMINII[2], Carla DI MATTIA[2], Massimilano RINALDI[1], Eleonora CARINI[1], Paola PITTIA[2], Emma CHIAVARO[1]

[1] Department of Food and Drug**,** University of Parma, Parco Area delle Scienze 47/A, 43124 Parma, Italy.

[2] Faculty of Bioscience and Technology for Agriculture, Food and Environment, University of Teramo, Campus Coste S. Agostino Via R. Balzarini 1, 64100 Teramo, Italy.

Olive leaves are waste material of the olive industry; they are rich of polyphenols, especially oleuropein, with high antioxidant activity. These molecules are very sensitive to environmental conditions such as high temperature, pH and oxygen, limiting their applications as ingredients for healthy foods. Encapsulation techniques are proposed as a way to protect polyphenols from adverse conditions [1]. The aim of the present work is to study, by DSC, the thermal stability of different encapsulation systems for olive leaves polyphenols, in order to add them as ingredient for bakery products.

The phenolic extract was encapsulated in microbeads of sodium alginate, obtained by emulsification/internal ionotropic gelation, in combination with either plant and animal polymers (pectin, whey proteins and sodium caseinate). The thermal analysis was conducted on the original ingredients and on freeze-dried microbeads by DSC Q100 (TA Instruments, New Castle, DE, USA), heating from 25 to 350°C at a scanning rate of 10 °C/min.

Alginate and pectin ingredients showed a huge exothermic peak around 240 °C, previously associated to the biopolymers thermal breakdown [2]. The intensity of that peak was lowered after calcium gelation, indicating the higher thermal stability of the egg-box structure [2]. All the studied systems showed an endotermic peak, in the range 75-85°C, related with the water loss [3]. A single endothermic peak in the microbeads indicate the chemical interaction between polymers and extract and a good thermal stability [3]. The peak was observed at around 75, 77, 79 and 85°C, for alginate-whey proteins, alginate-caseinate, plain alginate and alginate-pectins microbeads respectively, in order of growing thermal stability [3].

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