ENCAPSULATION OF ESSENTIAL OILS AND RELEASE OF HIGHER VOLATILE COMPOUNDS AT VARIOUS STORAGE CONDITIONS

RIMANTAS VENSKUTONIS,
Kaunas University of Technology, Kaunas, Lituania
Radvilenu pl. 19, Kaunas, LT-50254; rimas.venskutonis@ktu.lt

Microencapsulation has become an attractive approach to convert liquid food flavourings into a dry and free flowing powder form which is easy to handle and incorporate into a dry food system. Besides the change of the physical characteristics of the original material food flavours are encapsulated for several other reasons: (1) to retain them in a food product during storage; (2) to protect the flavour from undesirable interactions with the food; (3) to minimise flavour/flavour interactions within a mixture; (4) to guard against light, heat, moisture or air induced reactions or oxidation; (5) to provide the controlled or delayed release of flavour; (6) to mask objectionable flavours. Microencapsulation can be accomplished by different techniques: spray drying, spray chilling and spray cooling, extrusion, air suspension coating, multi-orifice centrifugal extrusion, coacervation/phase separations, liposome entrapment, inclusion complexion, co-crystallization, interfacial polymerisation.

In this study essential oils (EO) of thyme, lemongrass, sweet marjoram, oregano, peppermint, cassia, catnip and caraway were encapsulated by spray-drying into different matrixes, such as commercial modified food starches, skimmed milk powder, whey protein concentrate and maltotextrins. The efficiency of encapsulation was measured and the composition of pure and encapsulated oils was analysed by GC. Distillation, static headspace and solid phase microextraction (SPME) methods were used for the isolation of volatile constituents. The changes in the composition after microencapsulation were evaluated. The sensory analysis of ground plants, pure EO and microencapsulated products was carried out by panelists and aroma profiles of the products were expressed graphically. It was found that the majority of the used encapsulation materials were effective in retaining volatile compounds in the matrixes. The changes in the total oil composition after encapsulation were not very considerable; however, the amount of headspace constituents was different between various products. Flavour components were released at different rates by each of encapsulated products. Aroma binding capacity of different matrixes to lock EO droplets also depended on water activity and the leakage of aromas from encapsulated powder products increased with increasing water activity.

Keywords: Essential oils, spray-drying, microencapsulation, release of volatiles.