

Microencapsulation of Tuna Oil and Mentha Piperita Oil Mixture using Different Combinations of Wall Materials with Whey Protein Isolate

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Abstract : Tuna oil (omega-3 oil) has become increasingly popular in the last ten years, because it is considered one of the treasures of food which has many beneficial health effects for the humans. Nevertheless, the susceptibility of omega-3 oils to oxidative deterioration, resulting in the formation of oxidation products, in addition to organoleptic problems including “fishy” flavors, have presented obstacles to the more widespread use of tuna oils in the food industry. This study sought to evaluate the potential impact of Mentha piperita oil on physicochemical characteristics and oxidative stability of tuna oil microcapsules formed by spray drying using the partial substitution to whey protein isolate by carboxymethyl cellulose and pullulan. The emulsions before the drying process were characterized regarding size and ζ -potential, viscosity, surface tension. Confocal laser scanning microscopy showed that all emulsions were sphericity and homogeneous distribution without any visible particle aggregation. The microcapsules obtained after spray drying were characterized regarding microencapsulation efficiency, water activity, color, bulk density, flowability, scanning surface morphology and oxidative stability. The microcapsules were spherical shape had low water activity (0.11-0.23 aw). The microcapsules containing both tuna oil and Mentha piperita oil were smaller than others and addition of pullulan into wall materials improved the morphology of microcapsules. Microencapsulation efficiency of powdered oil ranged from 90% to 94%. Using Mentha piperita oil in the process of microencapsulation tuna oil enhanced the oxidative stability using whey protein isolate only or with carboxymethyl cellulose or pullulan as wall materials, resulting in improved storage stability and mask fishy odor. Therefore, it is foreseen using tuna-Mentha piperita oil mixture microcapsules in the applications of the food industries.

Keywords : Mentha piperita oil, microcapsule, tuna oil, whey protein isolate

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