Session #

MICROENCAPSULATION BY COACERVATION OF BIODEGRADABLE POLYMER WITH THYME OIL

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Microcapsules of polylactide (PLA) were produced by coacervation to encapsulate the antioxidant and antimicrobian agent - essential oil of Thymus Vulgaris L. (thyme oil). Biodegradable microcapsules of polylactide have received extensive attention as delivery systems for drug encapsulation. This type of biodegradable polymeric carriers can be hydrolyzed in the body to form products that are easily resorbed or eliminated. The core material, thyme oil, is an aromatic and medicinal plant of increasing economic importance for North America, Europe and North Africa. This essential oil is used in the flavour and food industries. As pharmaceutical, the oils thymol and carvacrol are used in mouthwashes, soaps and creams. The thyme oil is also used in manufacture of perfumes and cosmetics.

The objective of this work is to develop a novel coacervation process to produce microcapsules of PLA to encapsulate thyme oil that will be used in cosmetics. PLA is soluble in organic solvents but insoluble in water. Generally, PLA is used to encapsulate water soluble active principles such as drugs, pesticides and dye-stuffs by coacervation, mainly by means of microspheres production or by using double emulsion techniques (o/w/o). However, the objective of this work is to encapsulate thyme oil, a water insoluble active principle that needs, in a first step, the preparation of an oil-in-water emulsion. The novelty of our process consists on dissolving PLA in dimethylformamide (DMF) which is a good solvent for PLA but in addition has high solubility in water. Upon contact with water, the homogeneous solution of PLA in DMF, promotes the precipitation of PLA around the thyme oil core. With this work we demonstrate a new, easy and executable method of coacervation by introducing modifications on microencapsulation process that allow the encapsulation of an oily active principle by simply preparing an o/w emulsion. Control of size and wall thickness of microcapsules, encapsulation efficiency, the influence of surfactants and release of thyme oil were studied. The produced microcapsules have bimodal particle size distributions in volume with a mean particle size of 40 µm. Microcapsules analysis by microscopy have confirmed the spherical shape, the rough surface, and allowed the estimation of the wall thickness around 5 µm. Quantification of the encapsulated thyme oil was performed by gas chromatography and allowed to evaluate the quality of the encapsulated oil and pointed out for a preferential encapsulation of thyme oil apolar compounds.

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