

Microencapsulation of Protein with EUDRAGIT S 100 Polymer

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SUMMARY

Lactose intolerance is a common and inconvenient medical condition and can cause severe discomfort. People who experience lactose intolerance often take lactase enzyme supplements when they wish to consume dairy products. As a consequence, they normally consume dairy products that are rendered lactose free or else a lactase enzyme supplement is taken concurrently. Normally, these are pills or tablets that dissolve and release the enzyme in the stomach. However, the enzyme may be denatured in the low pH conditions of stomach. Hence, a higher dose is required to ensure that an effective concentration can survive and pass into the small intestine – the site of the enzyme’s physiological action. This problem is being addressed by microencapsulation methods: surrounding the enzyme with protective materials in the form of small particles. These protect the enzyme in the stomach and allow release in the small intestine.

The goal of this research was to investigate an appropriate microencapsulation method for this purpose. An oil-in-oil solvent evaporation method was used to produce microparticles containing BSA protein with a EUDRAGIT S 100 – methacrylic acid and methyl methacrylate copolymer. BSA was used as a cost-effective surrogate for lactase during the research. Sonification was employed during the emulsification step. The microparticles produced at different sonication amplitudes or power outputs were uniform with similar morphologies, typically spheres. Microparticle size decreased with sonicator energy output from 120 μm to 12 μm as the amplitude changed from 40% to 70%. The encapsulation efficiency at amplitude levels of 50%, 60% and 70% was between 70% and 80%. However, the encapsulation efficiency recorded at the 40% setting was much lower, around 40%. The release profiles of those microparticles were studied at different pH. There was a slight leakage from the microparticles at low pH. Above pH 7, total release was achieved within 2 hours. The results of this research confirm that the microparticles could encapsulate lactase as part of a treatment of lactose intolerance.

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