PREPERATION OF WATER-SOLUBLE BETA-CAROTENE-XYLAN COMPLEX

Elžbieta Karvovska[1], Rūta Gruškienė[2]

[1]Vilnius Tech
elzbieta.karvovska@stud.vilniustech.lt

Beta-carotene the most widely distributed carotenoid is usually used as a colorant to field yellow-orange color in various foods and drinks. Also, it's a precursor of vitamin A and an excellent antioxidant, that scavenges free radicals in the human body and can help to prevent cancer, tumor metastasis, and cardiovascular diseases, and improve reproducibility [1]. However, due to its highly conjugated structure, beta-carotene is very unstable and can be easily degraded when opposed to oxygen or light during the storage or manufacture of foods. This can cause the loss of the nutritive and biologically desirable preparation as well as the production of on the side of flavor or aroma compounds. Furthermore, beta-carotene is soluble in oil, and organic solvents but not in water. These characteristics limit the use of beta-carotene in beverages and other applications.

Micro/nano encapsulation strategy can be used to overcome these drawbacks. Encapsulation entraps the sensitive bioactive ingredients in a coating material to protect its biological activity from environmental factors and enhance its physicochemical stability. Recently, different formulations of carotene with various macromolecules have received much attention. Macromolecules such as cyclodextrins, amylose, chitooligosaccharides, apoferritin, arabinogalactan, and others were studied [2,3].

There are studies demonstrating the successful application of xylan to encapsulate beta-carotene [3], this area of research can still be developed.

This study aims to prepare a water-soluble system of beta-carotene by applying the encapsulation technique. Xylan, derived from beechwood, was used as wall material. The complex was prepared by co-precipitation method by adding CAR solution in acetone to the aqueous xylan solvent heated to 65 C. In order to optimize the preparation of beta-carotene-xylan complexes, different ratios of compounds (carotene:xylan), i.e., 1:1, 1:3, 1:5, and 1:10 (w/w), were tested. It was found that the largest amount of carotene equal to 9,1014μg/mg of the complex is incorporated when a ratio of 1:5 is used. To check whether the carotene degradation process does not take place during the synthesis of the complexes, HPLC analysis was used.Also, the stability of entrapped CAR in the complexes was investigated. For this purpose, the complexes were kept in the dark for one nd the relative beta-carotene content was measured periodically to observe how it depends on the ratf components. Encapsulation of beta-carotene with xylan improves its solubility in water and provides new properties, and such systems may find applications in the food industry or other fields.

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