

Effect of the degree of cross-linking in nanosponges on the efficiency of piperine encapsulation

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Nanosponges (NSs) are a novel method of encapsulation, formed by the bonding of microscopic particles that form cavities of nanometric diameter (less than 1 µm) capable of encapsulating a great variety of compounds of food interest. These cavities can incorporate lipophilic and hydrophilic compounds.The objective of this work was to evaluate the effect of the cross-linking degree in NSs. NSs were formed with betacyclodextrin (β-CD) and diphenyl carbonate (DPC) through the microwave-assisted method. ß-CD: DPC molar ratios of 1:2, 1:6 and 1:10 were tested and NSs were characterized through FTIR, the degree of sustituion (DS) and specific surface (S_{BET}) analysis.
The appearance of characteristic peaks of ß-CD at 1155 cm^{-1} belonging to the glycosidic bonds was observed. In addition, a peak was identified at 1750 cm^{-1} which is an indicator of the carbonyl group (C = O), which also demonstrate the esterification between DPC and the hydroxyl groups of the ß-CD.. The results showed NS 1:2 DS=0.345, NS 1:6 DS=0.629 and NS 1:10 DS=0.878 and NS 1:2 SS=0.77, NS 1:6 SS=1.22 and NS 1:10 SS=2.00 m2/g. Therefore, the higher the molar ratio, the higher the DS and the higher the specific surfaces of NSs. In addition, the pore size range was from 23 to 63 Å classified as mesopores. It confirms the crosslinking process between the ß-CDs, obtaining NS synthesis. Therefore, increasing the amount of substituents increases the probability of generating greater cross-linking and specific area to facilitate the inclusion of lipophilic compounds.

Biography
Juan Pablo Guineo is a Food Engineer from the Universidad de La Frontera, Temuco Chile. Currently, he is a student of the Master's Program in Engineering Sciences with Specialization in Biotechnology. His thesis is entitled “Effect of the degree of cross-linking in nanosponges on the encapsulation efficiency and release of piperine”, supported by FONDECYT project N°1160558. “Nanoencapsulation of polyunsaturated fatty acids and pungency alkaloids using nanosponges as carrier model to deliver lipophilic compounds of high biological value”.
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