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(54) Title: PRODUCTION OF MICRO-ENCAPSULATED BITTER APRICOT KERNEL

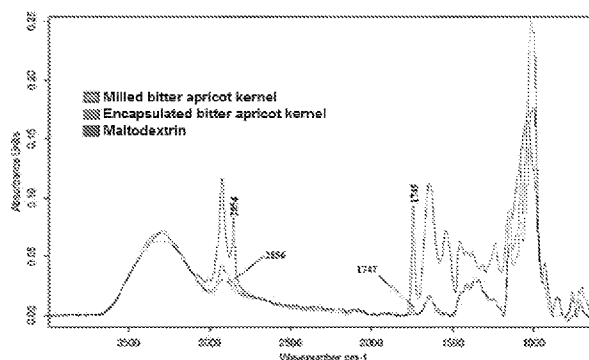


Figure 1. FTIR spectra of Bitter apricot kernel, maltodextrin and encapsulated bitter apricot kernel.

(57) **Abstract:** The present invention relates to the development of an encapsulation technique which is currently used in the food, pharmaceutical and healthcare industries. This encapsulation technique contains of bioactive components such as amigla which allows the controlled release of the bitter apricot kernel, one of the functional food ingredients, as well as the production of microencapsulated bitter apricot kernel. For this purpose, the amigla, which is a bioactive component, targeted for controlled release after being taken into the body. Subsequently, the bioactive component reduced to micro-size by grinding without biting the bitter apricot kernel and directly processed with the spray-dried desiccant which was homogenized with maltodextrin, a biocompatible carrier, and then encapsulated.



DESCRIPTION

PRODUCTION OF MICRO-ENCAPSULATED BITTER APRICOT KERNEL

The bitter apricot kernel was milled to reduce the particle size to micron-scale dimensions and passed through a sieve to obtain homogeneous dimensions (~ 500 microns). In the mixture, the bitter apricot kernel/maltodextrin ratio was optimized to 1:10 and the optimum dry matter of the mixture that fed to the spray drier was determined to be 20%. The final mixture of bitter apricot kernel and maltodextrin were mixed to obtain 20% dry matter that was homogenized by mixing under optimized ranges (5000 rpm, 10 min). Encapsulation was carried out with a spray drier (noode diameter, 150 microns) under certain conditions (180°C inlet temperature, 15% feed rate).

Apricot kernel consists of fat, protein and sugar components. In the literature, 31 different types of apricot kernel were investigated and the content of protein in these seeds ranged between 22.4% and 29.3%, the sugar content varied between 4.5% and 6.5% and the fat content varied between 40% and 50%. Apparently, the apricot kernel is quite rich in terms of fat (Femenia, Rossell, Mulet, & Caiellas, 1995).

As part of the study, apricot kernel was encapsulated using maltodextrin coating material. The substances in the chemical composition of the final product are expected to be apricot kernel and maltodextrin. Figure-1 showed the Fourier Transformed Attenuated Total Reflectance (ATR-FTIR) spectra of apricot kernel, maltodextrin and the final product.

As seen here, the peaks at 1747-2856 cm^{-1} are related to the absorbances bands of the final product. These bands are not seen in the FTIR spectra of maltodextrine, so it is possible to say that they are related to the chemical structure of the apricot kernel. The highest component of the apricot kernel is oil, and the final component is the oil component originating from the apricot kernel. The vibrational band of the methyl ($-\text{CH}_3$) group at 2856 cm^{-1} was seen (Birkel & Rodriguez-Saona, 2011; Maurer, Hatta-Sakoda, Pascual-Chagman, & Rodriguez Saona, 2012). The peak at 1747 cm^{-1} relates to the the triglyceride ester bond ($-\text{C}=\text{O}$) (Henna Lu & Tan, 2009, Setiowaty. Man, Jinap, & Moh, 2000). Additionally, it is possible to say that the chemical structure of the apricot kernel is included in the final product composition, as the betting tapes can not be maltodextran. Furthermore, successful encapsulation of the apricot nucleus is achieved by this technique as well.

Technical field where the invention is relevant:

The present invention relates to food technology, pharmaceuticals and healthcare.

State of the art

The spray dryer, an economical and effective method to protect the materials with no need for require special equipment, has wide use especially in preserving the aroma especially in the milk industry in the food industry. For encapsulation, carrier or coating materials such as maltodextrin, modified starch and gum are mixed with water and the water is evaporated with hot air to obtain microparticles (Gibbs *et al.* 2009). Bitter apricot is a bitter taste due to its amigla content, which has a toxic effect on a certain level and Ictal dose for 1.71 g (Silem *et al.* 2006). On the other hand, it is also known that the amigdal in the bitter apricot kernel causes a programmed cell death (Li *et al.* 2016). The encapsulation technique makes it possible to reach the desired cell by providing controlled release of the active substances, as well as increasing the bioavailability. In this invention, without the need for the use of bitter apricot kernel extract containing amigdal substance, a spray drying drier was carried out for encapsulation into the maltodextrin.

The technical problem that the invention aims to solve

This encapsulation technique allows to reduce the need for extraction and thereby reduce the increasing in the costs. In addition, by encapsulating the bioactive component directly in the food matrix, the composition of the body is metabolized more efficiently, thereby increasing its bioavailability.

Industrialization of the invention

Spray dryer is an industrially used drying system in the food industry. The bitter apricot kernel causes bad taste and this bad taste leads to the problem of daily consumption due to the toxic amigaline content. Anticancer effect of amygdalin: It was argued that the debate on the anticancer effect of amigalin was due to the inactivation of isoforms and the induction of Persicae sperm extract to apoptosis. Despite the growing interest and reports of amigdal in as a cancer drug, the anti-cancer mechanism of amygdalin has not been reported. The use of direct ingestion of the product will also make the product unique because the bitter apricot kernel is crushed between teeth and the risk of cyanogenesis is high and it will only be swallowed. Moreover, the authenticity of this product will be the first time in our country and in the world where it has not been previously encapsulated.

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CLAIMS**We claim:**

1. The encapsulation process with the natural food matrix (bitter apricot kernel) without the extraction of the bioactive substance amigla.
2. Encapsulation according to claim 1 provides controlled release and increases the bioavailability of the amigla with direct metabolism as it is taken in the body under better conditions in the food matrix.
3. According to claims 1 and 2, the bad taste will be masked by the encapsulation technique of the bitter apricot kernel which is difficult to consume due to bitter taste.
4. The encapsulation process will achieve the same bioactive effect as the bitter apricot kernel in a much lesser amount.

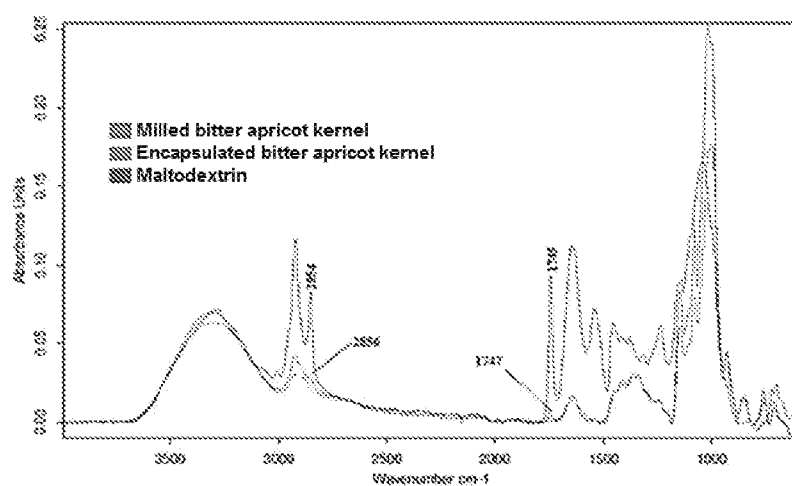


Figure 1. FTIR spectra of Bitter apricot kernel, maltodextrin and encapsulated bitter apricot kernel.