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Microencapsulating Food Ingredients

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I. Introduction

People love food...its taste, its appearance, its aroma. Besides aesthetics, people purchase prepared foods based on convenience, cost, and perceived value or nutritional content.

Micro encapsulation, the science of capturing a core material in a shell or coating for controlled release, can provide the food industry with a distinct market advantage in all these product purchase points. Microencapsulated products can add that extra zing, mask the taste of nutrients, alleviate processing problems, and increase the shelf life of food products.

Microencapsulation is a useful technique in protecting the integrity of food ingredients such as flavors, vitamins, salts and water. It can also aid the incorporation of ingredients that are not in a desirable form in their original state by modifying the nature of the substance. As the interest in "wellness" foods or "nutraceuticals" grows, microencapsulation will play a key role in putting the function in functional foods, without sacrificing smell, taste, or convenience.

Microencapsulation is defined as a process in which tiny particles or droplets are surrounded by a coating, or embedded in a homogeneous or heterogeneous matrix, to give small capsules with many useful properties. Microencapsulation can provide a physical barrier between the core compound and the other components of the product. More especially, in the food field, microencapsulation is a technique by which liquid droplets, solid particles or gas compounds are entrapped into thin films of a food grade microencapsulating agent. The core may be composed of just one or several ingredients and the wall may be single or double-layered. The retention of these cores is governed by their chemical functionality, solubility, polarity and volatility. In its simplest form, a microcapsule is a small sphere with a uniform wall around it. The material inside the microcapsule is referred to as the core, internal phase, or fill, whereas the wall is sometimes called shell, coating, wall material, or membrane. Practically, the core may be a crystalline material, a jagged adsorbent particle, an emulsion, a suspension of solids, or a suspension of smaller microcapsules. The microcapsule may even have multiple walls.

The different types of microcapsules and microspheres are produced from a wide range of wall materials (monomers and/or polymers) and by a large number of different microencapsulation processes such as: spray-drying, spray-cooling, spray-chilling, air suspension coating, extrusion, centrifugal extrusion, freeze-drying, coacervation, rotational suspension separation, co-crystallization, liposome entrapment, interfacial polymerization, and molecular inclusion. Depending on the physico-chemical properties of the core, the wall composition, and the used microencapsulation technique, different types of particles can be obtained: simple sphere surrounded by a coating of uniform thickness; particle containing an irregular shape core; several core particles embedded in a continuous matrix of wall material; several distinct cores within the same capsule and multi-walled microcapsules.

Need for Encapsulation:

Flavor, taste and an appetizing appearance are primary factors in a consumer's decision to buy a product. In addition, volatile colorants and aromas can be stabilized and their processing made simpler through microencapsulation.

As consumers become increasingly health conscious, they are looking for more "functional foods"—many of which are augmented with ingredients to promote health. However, simply adding ingredients to food products to improve nutritional value can compromise their taste, color, texture, and aroma. Microencapsulation technology provides viable texture blending, appealing aroma release, and taste, odor and color-masking. The technology enables food companies to incorporate minerals, vitamins, and essential oils, creating foods for the "wellness" market.

In addition, microencapsulation can simplify the food manufacturing process by converting liquids to solid powder, decreasing production costs by allowing batch processing using low-cost, powder-handling equipment.

By analogy, in microencapsulation, capsules are designed and prepared to meet all the requirements in due consideration of the core material, intended use of the product, and the environment of storage.

The challenges in developing a commercially viable product depend on:

- Selecting appropriate shell formulation from FDA-approved, GRAS (generally recognized as safe) materials,
- Selecting the most appropriate process to provide the desired morphology, stability, and release mechanism, and
- Economic feasibility of large-scale production, including capital, operating, and other miscellaneous expenses, such as transportation cost, regulatory cost, and downtime losses.

References

[1] wekipedia.com
[2] preparedfoods.com
[3] scitopics.com
[4] woodheadpublishing.com

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