

BENEFITS OF FLAVOR ENCAPSULATION

Let's start at the beginning: What is microencapsulation? It's a process of covering individual flavor particles with a coating for protection against a broad range of environmental factors. It's like wrapping a protective shell around a core or grouping of flavor materials. Microencapsulation is often used to provide uniform taste, time-release tastes and smells, colorings, increased shelf-life, improved taste, and protection from harsh conditions (e.g. heat) during production of the finished product.

There are many types of encapsulation, each with its own set of targeted applications and benefits. Michael Gundlach of our Research & Innovation team will explain a few of these types and how they help your flavor and your finished product performance.

1. Spray Drying

Spray drying is the most common encapsulated flavor system, accounting for 80% of the category. It involves spraying an emulsified flavor system into a heated chamber with any combination of ingredients including fibers, gums, lipids (fats and waxes), proteins or sugars. As the added ingredients mix with and coat the flavor, the heat causes the water to evaporate, and the added ingredients form a crust around the essential flavor oils. Spray dried flavor can stand alone or be the base used in a multiple-encapsulated flavor system, as discussed later.

Applications best suited for:

- Chewing gum
- Bake mixes
- Cereal and oatmeal
- Snack food

Benefits

Increased shelf-life stability

Prevents flavor from interacting with other elements in the products, which can change food color, properties, texture.

Improved heat & oxidative resistance

Protects the flavor from processing heat, reducing volatility/evaporation of molecules. Protects flavor from degradation caused by air. This applies to all encapsulation methods.

Improved flavor impact and profile

When a liquid flavor is incorporated into food material during processing, part of the flavor is driven off, creating an altered flavor that is not consistent with the original formulation. Using an encapsulated flavor, rather than a liquid form, prevents this loss and results in a flavor that stays truer to the originally designed profile.

2. Spray Congealing/Chilling

Spray congealing (also referred to as spray chilling) can be used to create a secondary shell around a spray dried flavor. Molten fats or waxes are mixed with the spray dried flavor and sprayed into a refrigerated chamber. The temperature drop causes the liquid fats or waxes to rapidly solidify and entrap the flavor materials.

Benefits

Provides texture/mouthfeel in finished products

The fat/wax material results in larger particles that provide texture when consumed (melted), as you find in refrigerated biscuits, microwave popcorn and even ice cream.

Flavor release at low-to-mid temperatures

Flavor can be released at lower temperatures, where it is advantageous to deliver a flavor experience at the point of consumption (in the mouth, for example).

Improved shelf-life stability

The spray chilled coating is very resistant to water, which can degrade a flavor. This shell is the arch nemesis of water!

Applications best suited for:

- Frozen and refrigerated dough (biscuits, croissants, cookies)
- Microwave popcorn
- Frosting
- Ice cream

3. Fluid Bed Coating

Food ingredients (which may be encapsulated flavor themselves) are suspended in a current of upward air flow and shell materials are sprayed onto them.

Benefits

If sprayed from top

The small food ingredients stick together and form larger particles. The larger the particle, the faster it dissolves, making this process ideal for products such as protein powders where consumers seek quick, easy dissolution in liquid.

If sprayed from bottom

Very precise, uniform shell coatings are created on the food ingredients. This enables them to be released in a uniform manner, producing even and reproducible flavor experiences.

Improved flavor impact and profile

Products can be coated with diverse secondary shell materials customized to the finished product application.

Applications best suited for:

- Flavor and color change
- Controlled flavor release
- Water-soluble materials

Products can be coated with diverse secondary shell materials customized to the finished product application.

4. Glass Encapsulation

Did you know that window glass is technically not a solid, but rather a supercooled liquid that has very slow flow properties? While we're certainly not putting window glass in flavors, the same idea of using materials that form supercooled liquids is used in the creation of glass encapsulations. A hot extrusion including melted glass shell materials, typically sugar and sugar alcohol materials, are combined with liquid or dry food ingredients and then cooled. Once the resulting "glass" has cooled it can be pulverized to the size needed for the application.

Applications best suited for:

- Tea mixes
- Pressed tablets
- Chewing gum
- Bake mixes
- Panned confections
- Dry mix beverages

Benefits

24+ month shelf life stability

Prevents flavor from interacting with other elements in the products, which can change food color, properties, texture.

Manufactured in multiple particle sizes

Small particles to fit in a certain machine or large ones that don't dust, or a combination of the two to extend perception of flavor duration.

Reason

Ability to deliver diverse colors provides consumers with visual reasons to believe in a flavor experience (e.g. a bright green lime flavor instead of a colorless one).

Create inclusions

Ability to deliver diverse colors provides consumers with visual reasons to believe in a flavor experience (e.g. a bright green lime flavor instead of a colorless one).