

FREEZE-DRIED NUTRACEUTICALS

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FREEZE-DRY AT BARNALAB



Freeze-drying is a technique used to dehydrate products, such as nutraceuticals, preserving their nutritional characteristics and beneficial properties. It consists of freezing the product at very low temperatures and then placing it under low pressure so that the water contained in it sublimates directly from solid to gaseous state, without passing through the liquid phase.

Freeze-drying is widely used in the nutraceutical industry because it preserves the biological and functional properties of these products. By removing water, water activity is reduced and microbial growth is inhibited, which contributes to its stability and prolongs its shelf life.

In addition, freeze-drying preserves the bioactive compounds and nutrients present in nutraceutical products by avoiding degradation that can occur in other dehydration methods, such as heat drying. This ensures that the products retain their properties and health benefits.

WHAT ARE NUTRACEUTICALS?

Nutraceuticals are food-derived products that offer health benefits beyond their basic nutritional properties. These functional foods and nutraceuticals are designed to provide specific health benefits and promote wellness through natural ingredients or bioactive compounds such as vitamins, minerals, amino acids, enzymes, antioxidants and essential fatty acids.

The word “nutraceutical” is a combination of “nutrition” and “pharmaceutical”, reflecting the intermediate nature of these products between food and medicines. Although nutraceuticals are not considered medicines, they can have positive health effects and some studies suggest that they may help prevent disease and promote general well-being.

TYPES OF NUTRACEUTICALS

There are several types of nutraceutical products, each with different properties and health benefits. Some of the most popular types include:

- **Vitamins and minerals:** Vitamin and mineral supplements are a common form of nutraceuticals. They can help compensate for nutritional deficiencies and promote the proper functioning of the body.
- **Antioxidants:** Antioxidants are compounds that help protect cells from damage caused by free radicals. Examples of antioxidant nutraceuticals include resveratrol (found in red wine and grapes), lycopene (found in tomatoes), and vitamin C.
- **Omega-3 fatty acids:** Omega-3s are essential fatty acids found in foods such as fish, chia seeds and walnuts. These nutraceuticals have benefits for cardiovascular health, the brain and the immune system.
- **Probiotics:** Probiotics are beneficial bacteria that are consumed to improve the health of the digestive system. These nutraceuticals are found in foods such as yoghurt and can be taken in supplement form.

- Dietary fibre: Dietary fibre is essential for digestive health and may help in regulating cholesterol and blood sugar. Dietary fibre nutraceuticals can be consumed in the form of supplements or through fibre-rich foods such as fruits, vegetables and whole grains.
- Medicinal plant extracts: Nutraceuticals may also consist of extracts from medicinal plants that are traditionally used for their healing properties. Examples are green tea, ginseng and turmeric.

WHAT IS THE PURPOSE OF FREEZE-DRYING NUTRACEUTICALS?

Freeze-dried nutraceuticals have several advantages and benefits:

1. Greater stability: Freeze-drying helps to preserve the properties of the functional and nutraceutical food by protecting sensitive components from heat and moisture. Eliminating water reduces the possibility of spoilage and decomposition.
2. Nutrient concentration: The freeze-drying process does not involve the use of high temperatures, thus preserving most of the nutrients present in nutraceuticals. Thus, freeze-dried products can offer a higher concentration of vitamins, minerals and other beneficial compounds.
3. Longer shelf life: The absence of water in freeze-dried products prevents the growth of micro-organisms, which significantly prolongs their shelf life. This allows freeze-dried nutraceuticals to be stored longer without losing their quality and properties.
4. Ease of transport and storage: By removing most of the water, freeze-dried products become lighter and less bulky, making them easier to transport and store. Moreover, because these products are stable at room temperature, they do not require refrigeration, which is convenient in terms of logistics and storage.

In short, freeze-drying of nutraceuticals is used to preserve, concentrate and increase their stability, thus providing high quality products with a long shelf life.



STEPS TO FREEZE-DRY NUTRACEUTICALS

The process of freeze-drying nutraceutical products generally follows the following steps:

1. **Pre-treatment:** Prior to freeze-drying, nutraceuticals usually undergo pre-treatment which may include washing, grinding or blending, depending on the type of product and its form.
2. **Freezing:** The product is frozen at very low temperatures, usually between -40°C and -50°C . This can be achieved by using special freezers that allow rapid freezing to obtain small ice crystals or in freeze dryers as Barnalab does.
3. **Vacuum and dehydration:** Once frozen, they are placed in a freeze-drying chamber. The pressure in the chamber is reduced, causing the frozen water to pass directly from solid to gaseous state, through a process called sublimation. This step removes water from the product and dehydrates the nutraceutical.
4. **Heating and desorption:** After the sublimation stage, a heating stage is carried out to remove any residual moisture that may have remained in the product. This is achieved by applying gentle heat to the sample, which allows the remaining moisture to evaporate.
5. **Sealing and storage:** Once freeze-drying is complete, functional and nutraceutical foods are removed from the freeze-drying chamber and are usually packaged in airtight containers such as jars or sealed bags. The aim is to avoid exposure to moisture and air, which could affect the quality and stability of the product. Freeze-dried nutraceuticals are stored under appropriate conditions, such as cool temperatures and in a dry place, to prolong their shelf life.

It should be noted that the freeze-drying process may vary depending on the type of nutraceutical product and the properties to be preserved. It is important to carry out tests and quality controls throughout the process to ensure the efficiency of the freeze-drying process and the final quality of the product



NUTRACEUTICALS THAT WE FREEZE-DRY

There are several types of freeze-dried products available on the market. Here are some of them, which we freeze-dry at Barnalab:

FRUITS AND VEGETABLES



Freeze-dried fruits and vegetables are very popular due to their high content of vitamins, minerals and antioxidants. You can find a wide variety of options, such as strawberries, blueberries, apples, bananas, spinach, carrots and freeze-dried beets. These products are ideal for adding flavour and nutrition to smoothies, cereals, yoghurts and other foods.

Here is a list of commonly available fruits in freeze-dried form that we make at Barnalab, along with some of their characteristics:

- Strawberries: Freeze-dried strawberries retain their sweet and juicy taste.
- Apples: Freeze-dried apples retain their flavour and crispness.
- Bananas: Freeze-dried bananas have a sweet taste and a crunchy texture.
- Mangoes: Freeze-dried mangoes retain their tropical flavour and sweetness.
- Pineapples: Freeze-dried pineapples have a characteristic sweet and sour taste.
- Blueberries: Freeze-dried cranberries retain their sweet and sour taste and smooth texture.
- Cherries: Freeze-dried cherries have a sweet and juicy taste.
- Raspberries: Freeze-dried raspberries retain their succulent taste and crunchy texture.
- Blackberries: Freeze-dried blackberries have a sweet and tart taste and a crunchy texture.
- Grapes: Freeze-dried grapes have a sweet and juicy taste.

HERBS AND SPICES



Freeze-dried herbs and spices retain their flavour and aroma, and are usually more concentrated than fresh versions. There are options such as freeze-dried coriander, oregano, basil, thyme, turmeric and ginger. These spices can be used to season dishes, herbal teas and baked goods.

Barnalab's experience is centred on the following products:

- Basil: Freeze-dried basil retains its distinctive flavour and aroma. It is widely used in Italian cuisine and can be added to sauces, salads and pasta dishes.
- Parsley: Freeze-dried parsley is a popular choice for seasoning dishes such as soups, stews and dressings. It adds a fresh and pleasant taste.
- Coriander: Dried coriander in freeze-dried form retains its characteristic flavour. It is commonly used in Mexican, Asian and Middle Eastern cuisine.
- Rosemary: Freeze-dried rosemary can be used to season meats, poultry, sauces and stews. It has a distinctive aroma and flavour that enhances the flavour profile of many dishes.
- Oregano: Freeze-dried oregano retains its intense flavour and is widely used in Mediterranean cuisine. It is an excellent choice for pizzas, pastas and tomato sauces.
- Thyme: Freeze-dried thyme is used in marinades, soups, sauces and meat dishes. It brings an earthy and aromatic flavour to dishes.
- Mint: Freeze-dried mint is commonly used in herbal teas, teas and desserts. It can also be added to sauces, savoury dishes and cocktails.
- Ginger: Freeze-dried ginger retains its spicy and refreshing taste. It can be used in savoury and sweet dishes, as well as in teas and smoothies.
- Garlic: Freeze-dried garlic can be used as a convenient substitute for fresh garlic. It adds flavour to a wide variety of dishes such as meat, poultry, soups and sauces.

It should be borne in mind that, as with any ingredient, it is important to use freeze-dried herbs and spices in appropriate quantities so they do not dominate the flavour of the dish.

SUPERFOOD



Freeze-dried superfoods are those that contain a high concentration of health-promoting nutrients. Common examples include goji berries, acai, spirulina, wheatgrass, maca and chlorella. These products are widely used in shakes, superfood blends, supplements and sports products. Some examples that we freeze-dry at Barnalab would be:

- Goji berries: They are rich in antioxidants, vitamin C, iron and fibre.
- Chia seeds: Source of omega-3 fatty acids, fibre and protein.
- Spinach: It contains vitamin K, vitamin A, iron and calcium.
- Beetroot: Rich in vitamin C, magnesium and antioxidants.
- Kale: Contains vitamin K, vitamin C, calcium and iron.
- Spirulina: Rich in protein, B vitamins and minerals such as iron and zinc.
- Green tea: Source of antioxidants, including catechins and polyphenols.
- Cocoa powder: It contains antioxidants, minerals such as magnesium and iron, and compounds that can improve mood.

PROTEINS

Freeze-dried proteins are often used by people looking to increase their protein intake in a practical and convenient way. There are options such as whey protein, vegetable proteins (such as soy, pea or hemp) and freeze-dried collagen. These proteins can be added to shakes, smoothies, energy bars and other food products.

Benefits of freeze-dried proteins:

1. Preservation of nutritional quality: Freeze-drying preserves the structure and protein content of the food, minimising the loss of nutrients during the dehydration process.
2. Longer shelf life: By removing moisture, the activity of micro-organisms that can affect the quality and shelf life of proteins is reduced.
3. Versatility of use: Freeze-dried proteins can be used as ingredients in shakes, drinks, energy bars, food supplements and other products. They can also be added to foods and recipes to increase their protein content.