



O2P vs. Other Drying Methods

A Brief Overview:

As a unique, proprietary process oil-to-powder conversion technology, O2P™ provides NPRI with both unique intellectual property and a marketable difference versus other drying technology.

Technology

First the technology: *Spray drying* is a well-entrenched technology. It involves spraying microscopic droplets of oil onto a granular carrier such as maltodextrin to create a powder. In order to achieve a viscosity whereby the oil will pass through the spray mechanism, the oil and vessel temperature is typically heated in the range of 130°C to over 220°C. For many popular Omega-3 oils such as flaxseed and fish, other Omega Oils including CLA, primrose and borage, Anti-Oxidants such as Vitamin E or other Vitamins such as Vitamin D and K, exposure to heat can significantly reduce or totally destroy the active (or therapeutic) component rendering the active in the powder form useless or significantly underrated. Spray dry will typically produce an oil with a load factor (the percent of oil in the powder) in the range of 35-45%, meaning 35-45% of the powder is oil, the remainder is the carrier. A cost-effective drying method, spray dry is typically 10-15% less than O2P on a cost/kg basis

Freeze-drying, popularized out of the space age technologies of the 1960's, involves exposure to extreme cold to separate out excess water, then extreme atmospheric pressure to remove the water crystals from the material. Many oils will change

molecular structure under pressure affecting their isomer or fatty acid profile (molecular structure). As freeze-dried powders are exposed to air, water or ambient temperatures, oxidation levels can significantly increase, affecting the powders quality and stability over time. Both loading and cost/kg are similar to spray dry.

Micro-encapsulation is a relatively new technology that involves initially atomizing oil, exposing it to heated air as a protective enzyme, lipid or protein shell (coating) is applied. Not only is there the potential effect of heat, the shell coating may dissolve prematurely or delay release of an active beyond the calculated release point in the body. It is an expensive technology, over 20% higher than O2P™.

O2P™ does not alter the molecular structure, isomeric or fatty acid profile, or the nutritional value of the base oil. There is no introduction of heat or oxygen anywhere in the conversion process. O2P™ uses a proprietary process without the need for sprayers, blenders or other equipment that will generate heat and destabilize the oil. It operates at room temperature, in a nitrogen-rich environment at normal atmosphere throughout the process, thus preserving the original oil profile and limiting potential oxidation and stability problems. As a result, oil or other liquids are not merely deposited over the carrier's surface area; they are actually imbedded into the carrier particle itself, increasing oil load and maintaining low peroxide levels for extended shelf life.

* O2P is a trademark of Nutri Pharmaceuticals Research, Inc.
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