

# Nutraceuticals

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A shift towards healthier lifestyles has dramatically increased interest in, and consumption of, nutraceuticals and functional food ingredients worldwide. The preparation of active ingredients into a readily usable form typically requires three process steps:

- Extraction of the active ingredient from the naturally occurring raw material using water or an organic solvent.
- Evaporation by removal of water or solvent in order to increase the concentration of the active ingredient and produce a concentrated, liquid extract.
- Drying into powder for, possibly, further processing, such as blending or tablet production.

The minimisation of loss and / or damage to the compounds of interest is critical to the efficacy of the finished product. Active ingredients are generally regarded as heat sensitive and, as such, the preservation of these compounds is of paramount importance during the concentration stage as heat is applied to evaporate the solvent.

The Centritherm® evaporator is a unique system for the concentration of, and solvent removal from, a range of health industry products including, nutraceuticals, plant extracts, biological derivatives, enzymes and pharmaceuticals. Concentrates produced by the Centritherm evaporator are of extremely high quality as the thermal impact they experience during processing is negligible. In fact, solutions containing active ingredients may be concentrated with no loss of functionality.

Key benefits of the Centritherm evaporator are:

- No damage to active ingredients during concentration (or solvent removal).
- Exceptionally short residence times (about 1 second).
- Low operating temperatures of around 50°C (i.e. vacuum evaporation).
- Negligible thermal impact resulting in high quality concentrates.
- Low hold-up volume means it is perfect for concentrating small batches.
- High concentrations can be achieved without product recycle.



Centritherm model CT-2 - An ideal unit for small scale operations

- Hygienic system well suited to Nutraceutical / Pharmaceutical production.

Centritherm evaporators have been installed in many countries for the production of premium quality, concentrated extracts for the health industry.

## The Centritherm® evaporator

The Centritherm evaporator is a thin-film, spinning cone system. With its unique design, the unit, develops the thinnest liquid film possible in any evaporator system. This film is only 0.1 mm thick and crosses the surface in about 1 second resulting in a well defined residence time. In this brief time the liquid receives all the heat it needs to evaporate the product to its final concentration.

Further details regarding the operating principle of the Centritherm evaporator may be found at [www.flavourtech.com](http://www.flavourtech.com)

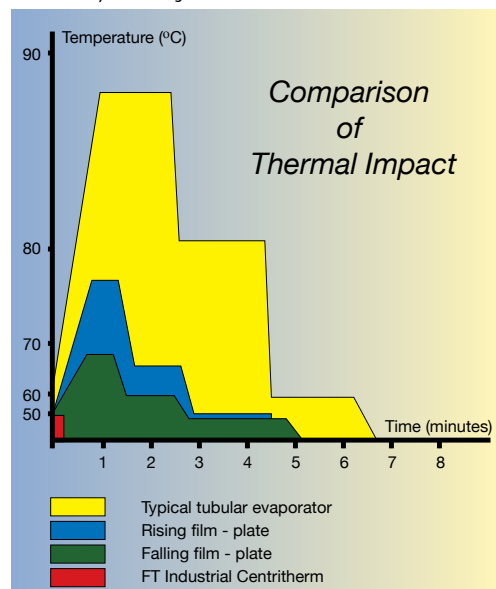
## No Reduction of Active Ingredient Functionality

The active ingredients contained in many nutraceutical or functional food extracts are prone to heat denaturation. To minimise thermal degradation and consequent loss of functionality, these compounds must not be exposed to elevated temperatures for any longer than is absolutely necessary.

In the Centritherm evaporator, the action of the spinning cones reduces the contact time between the heating surface and the extract to approximately

1 second.

Centritherm evaporators are usually operated with an evaporation temperature of 50°C and a steam temperature of 120°C. However, due to the heat sensitive nature of some specific compounds, these conditions may be adjusted to reduce the



temperature difference and further reduce the thermal impact. Lower operating temperatures, such as an evaporation temperature of 40°C and a steam temperature of 70-90°C, are not uncommon.

## Viscous products

A principle of evaporation is that the heating surface must be wetted at all times. Poor coverage of the heating

surface or a discontinuity in the product film leads to “burn on” of the product onto the heating surface. This degrades the concentrate quality, decreases evaporator performance and can cause cleaning problems.

In conventional evaporators, this is overcome by maintaining a high flow rate. Achieving the required target concentration and maintaining an acceptable flow rate requires high levels of product recycle. As a result, product residence time is increased giving rise to thermal degradation.

The Centritherm evaporator uses centrifugal force to ensure that the extract is evenly distributed across the heating surface. In fact, the thickness of the product film on the spinning cones can be reduced to just 0.1 mm before the risk of discontinuity becomes significant.

This means the unit can produce concentrates where little or no extra water removal is required to produce a final product. An example is, the removal of an organic solvent to produce oleoresins.

Where the product is to be thermally dried, using, for example, a spray or fluidised bed dryer, the Centritherm evaporator can be used as a pre-concentrator and achieve a much higher solids levels than traditional plate or tubular units, without damaging the product. This will reduce the load on the dryer hence giving the potential for more capacity and at the same time creating less damage in the drying process.

### Flexibility

The Centritherm evaporator has a low hold up volume and a high heat transfer

rate, which makes the unit particularly suitable for:

- Multiple products: Rapid turnaround to change from one product to another.
- Small batches: Easy to process a series of small batches of product.
- High value products: Can process valuable product with minimal loss during shut down and cleaning or if the operation is interrupted.

Often Nutraceutical and Pharmaceutical manufacturers process many different products and the Centritherm evaporator is an ideal choice in this situation. At least one natural extract producer uses a single Centritherm evaporator to process approximately 200 different products.

### Hygienic system

During the design process, particular care is taken to ensure that the system satisfies hygiene and cleaning requirements. All product contact parts are manufactured from high grade 316 stainless steel and an effective Clean-In-Place (CIP) function is an integral part of the Centritherm evaporator design. Further more, the evaporator body may be readily dismantled for inspection and validation of product contact surfaces.

### Quality design and construction

The Centritherm is manufactured to the highest standards and according to GMP regulations. Units can be certified to meet a number of accreditation requirements, such as CE marking.

In cases where the Centritherm evaporator is situated in a ‘hazardous area’ or is removing flammable solvents, the system can be built to meet the requirements of local regulatory bodies, such as the IEC.



CT-12 Centritherm for use in a nutraceutical application in Asia

Flavourtech is an Australian based company specialising in innovative process technologies including the:

- ◆ Centritherm® Evaporator
- ◆ Spinning Cone Column
- ◆ Integrated Extraction System
- ◆ Rotating Disc Column
- ◆ Resin Adsorbing Column

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## Products

Listed are just some of the products that have been processed in the Centritherm evaporator.

### Enzymes:

Amylase  
Cellulase  
Papain  
Pepsin  
Rennet

### Plant extracts:

Alacin  
Alkaloids  
Aloe vera  
Carrageenan extract  
Grape seed extract  
Green Tea  
Indian snakeroot extract  
Malt extract  
Pumpkin seed extract  
Pine bark extract  
Rosehip extract  
Tobacco extract  
Valerian root extract

### Antibiotics:

Allicin  
Bacitracin  
Cycloserine  
Oxytetracycline  
Penicillin  
Streptomycin

### Pharmaceuticals & their intermediates:

Cyclocapron  
Dextran  
Ephedrine  
Glyoxal

### Biological derivatives:

Albumin  
Blood plasma  
Collagen  
Gamma globulin  
Gelatin  
Gland extract  
Insulin  
Liver extract  
Pancrease extract  
Pancreatin  
Rennet  
Fish oil extract

### Amino Acids:

Glutamic Acid  
Lysine  
Tryptophan



Contact details are continually updated at [flavourtech.com](http://flavourtech.com)