

Wine - grape juice

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There are many reasons why the concentration of grape juice may be desirable. Concentrated grape juice may be required for convenience, reduced transportation or storage costs, or for product sweetening. Alternatively, a small increase in total sugar levels may be required to improve the alcohol potential of grape juice prior to fermentation.

The Centritherm® Spinning Cone Evaporator is a unique system for concentration of grape juice up to 68°Brix. The concentrate produced is of extremely high quality – with regards to both colour and flavour – as the thermal impact experienced by the product is negligible due to the Centritherm evaporator's short residence times and low evaporation temperatures.

Key benefits of the Centritherm are:

- A range of concentration factors readily achievable (without product recycle).
- Viscous juice concentrate (up to 68°Brix) easily handled.
- Exceptionally short product residence times (about 1 second).
- Low operating temperatures (around 50°C)
- Negligible thermal impact resulting in high quality concentrates

Centritherm evaporators are in use in wineries around the world for production of grape juice concentrate, to increase the sugar content of low Brix juices and for production of preservative-free juice concentrates.

The Centritherm® evaporator

The Centritherm is a thin-film, spinning cone evaporator. With its unique design, the Centritherm develops the thinnest liquid film possible in any evaporator system - the 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.

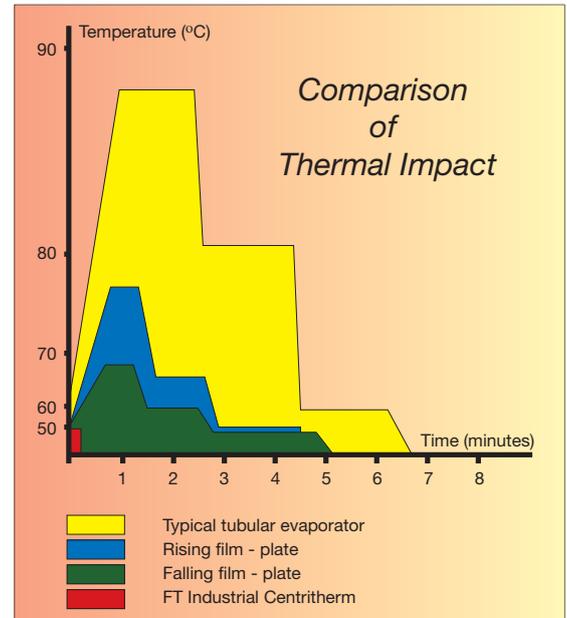
Further details regarding the operating principle of the Centritherm evaporator may be found at www.flavourtech.com

High Quality Concentrates

Grape juice is extremely sensitive to heat. Exposure to elevated temperatures for prolonged periods may initiate changes to the flavour of the juice. In extreme cases, this "thermal impact" can cause caramelisation of naturally occurring sugars within the juices, thus generating "cooked" or "jam" characters. To ensure a high quality concentrate, grape juice must not be exposed to high 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 grape juice to approximately 1 second.

Centritherm evaporators are usually operated with an evaporation temperature of 50°C and a steam temperature of 120°C. These conditions



may be adjusted to reduce the temperature difference and further minimise 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.

A comparison of the thermal impact of traditional evaporators compared with the Centritherm is shown above.

The flexibility of the Centritherm means that the same evaporator can be used to produce a wide range of concentration factors all at the same optimal processing conditions.

High Juice Concentrations

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.

At high concentrations, grape juice can become extremely viscous making complete coverage of the heating surface difficult. In conventional evaporators, this is overcome by



Centritherm Model CT-12 designed to concentrate approximately 6000 L/hr of grape juice.

maintaining a high flow rate. To achieve the required target concentration and maintain an acceptable flow rate requires high levels of product recycle. As a result, product residence time is increased and gives rise to thermal degradation. In grape juices, this is evident as “stewed”, “jam” or burnt characters in the concentrate.

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



A high speed photo of the liquid distribution on the Centritherm Cone

Increasing Concentration of Low Brix Juice

In many cold-climate wine making regions, the sugar levels in freshly harvested grapes are below that required for optimum fermentation.

An increase in the sugar concentration to desired levels may be achieved in two ways. Both approaches are illustrated in diagrams 1(a) and 1(b). In this example, the sugar content, and hence alcohol

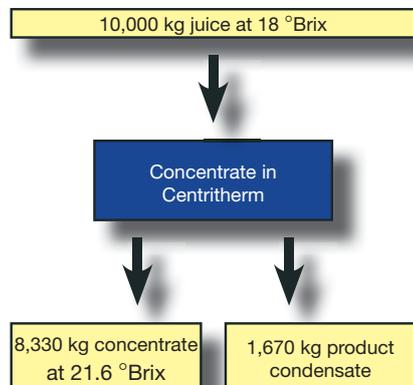


diagram 1 (a)

potential, of a grape juice is increased by 20%.

In example 1(a) the total volume of juice is concentrated using a concentration factor of 1.2, while in example 1(b) part

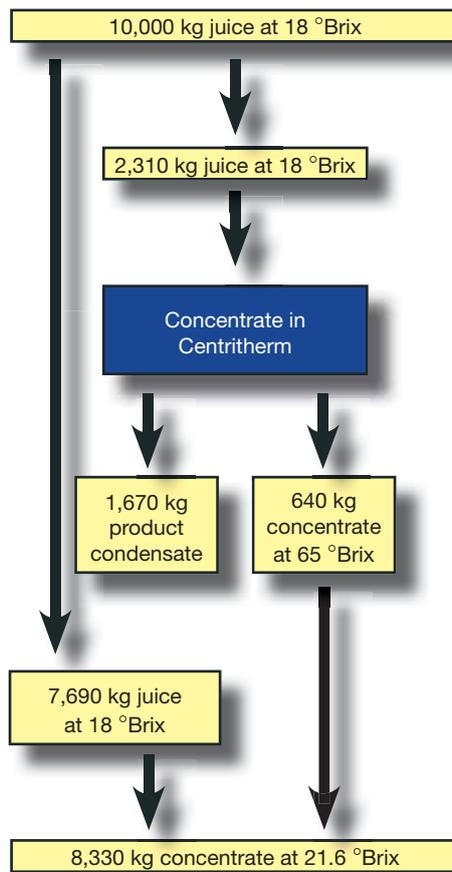


diagram 1 (b)

of the juice is concentrated to a higher level than required and is then blended with the remaining unprocessed juice.

In some wine producing countries, the condensate generated by the evaporation processed is recognised as being of grape origin and may therefore be legally added to other wine products as required.

Production of Preservative Free Juice Concentrates

Many end users of grape juice concentrate require that it be free of preservatives. If, after crushing, the juice is promptly processed and concentrated using the Centritherm evaporator, a high quality preservative free juice may be produced.

MODEL	NO. CONES	KG/HR	LB/HR
CT-1	1	50	110
CT-2	2	260	575
CT-3	3	400	880
CT-6	6	800	1,765
CT-9	9	2,400	5,290
CT-12	12	4,800	10,680

The Centritherm evaporator is capable of concentrating juice to sugar levels above which fermentation will not occur. Moreover, the water activity of the concentrated juice is at a level prohibitive to the majority microbial growth. The colour and quality of the original juice, however, is retained when reconstituted.

Aroma Recovery Prior to Concentrate Production

For highly aromatic varietal grape juices, it may be desirable to incorporate an aroma recovery process prior to the Centritherm evaporator. In this way, the delicate aroma of the juice can avoid all thermal impact of the evaporator.

As one example, Flavourtech's Spinning Cone Column (SCC) is used by a number of juice processors to produce very high quality Muscat concentrate whereby the Muscat aroma is recovered from the juice, without damage, prior to concentration of the juice. The aroma that is recovered in a single pass of the juice through the SCC is returned to the concentrate to produce a finished concentrate with fresh Muscat flavour of exceptional quality.

Further information on the Spinning Cone Column may be found at www.flavourtech.com.

Models

Six models of Centritherm are available and nominal capacities for evaporating water from a sugar solution are shown below. These figures are based on the Centritherm's optimum performance which is achieved when the product evaporation temperature is 50°C (122°F) and the steam temperature is 120°C (248°F). The actual capacity of any evaporator system depends on a number of variables.



Contact details are continually updated on our website. Please visit: www.flavourtech.com

Flavourtech is an Australian based company specialising in innovative process technology, particularly thin film distillation and concentration systems. Technologies include:

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

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