

### Why concentrate vinegar?

- ♣ reduction of transportation cost
- ♣ reduction packing/storage cost
- ♣ product development
- ♣ new market opportunities – export
- ♣ high quality concentrate as ingredient
- ♣ centralized production

### How to concentrate?

Innovation in GEA Messo PT freeze concentration technology has resulted in a new generation of low cost IceCon systems.

### Which products?

- ♣ white vinegar
- ♣ wine vinegar
- ♣ malt vinegar
- ♣ cider vinegar
- ♣ rice vinegar
- ♣ balsamic vinegar
- ♣ any other natural vinegars

### GEA Messo PT freeze concentration technology - your guarantee for:

- ♣ saving the product characteristics
- ♣ quality in = quality out
- ♣ simple and efficient operation
- ♣ no intermediate cleaning needed
- ♣ low maintenance cost

Process Engineering

#### GEA Messo PT

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## Vinegar

### Freeze Concentration of Vinegar



Pilot plant unit

## Concentration Processes

Water removal is the key to concentration of all aqueous products. Various methods are available to remove water from liquid food products. They can be divided into three main categories:

1. Vapour liquid separation  
Evaporation converts water (and other volatile components) into a vapour that can be separated from the concentrated liquid.
2. Liquid-liquid separation  
Membrane technology provides a barrier that allows water (and all smaller molecules) to pass.
3. Solid-liquid separation  
Crystallization converts the water into pure solid ice crystals. Solid-liquid separators are required to remove the ice.

Evaporation is the most common and the most applied technique for concentration. The limited selectivity and high temperatures generally result in relatively poor retention of the original product quality.

Membranes can provide low operational costs but provide a relatively poor concentration factor and limited selectivity.

Crystallization provides the highest selectivity toward water removal in that only water is included into the ice crystal. The low operating temperatures help to maintain the activity of sensitive nutritional and flavour components. Efficient solid-liquid separation technology is required and ensures that only the ice crystal (pure water) is removed from the product.

## Freeze Concentration

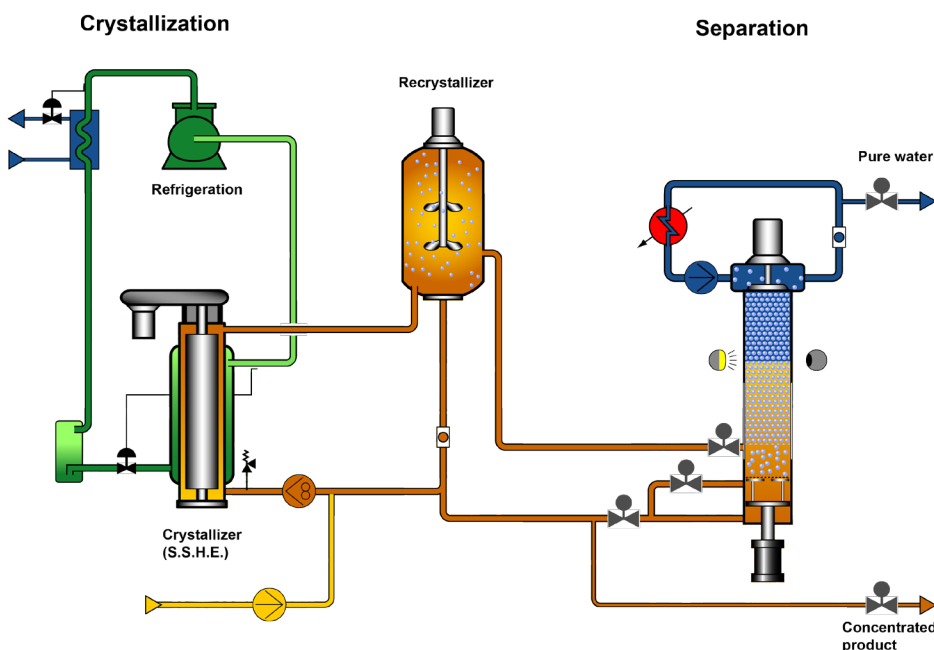
Crystallization of water from liquid products has commonly been referred to as Freeze Concentration. The process has been applied in various forms for centuries. In its earliest form it was as simple as leaving a barrel filled with product outside in the winter and then draining the remaining liquid as concentrated product. The ice is formed as pure water crystals and everything else remains in the liquid. The early forms of freeze concentration generally had problems in efficiently removing the ice crystals as pure water. The concentrated product would stick to the ice surfaces resulting in undesirable product losses. GEA Messo PT has enhanced the freeze concentration process with its unique solid-liquid separation into a sophisticated process that effectively eliminates these losses and fits perfectly into the modern processing plant. The schematic illustrates a basic single-stage freeze concentration process based on the patented GEA Messo PT process. This technique creates the optimum growth conditions for an efficient separation of the ice crystals and provides the highest concentration factor for most food liquids.

Commercial systems are designed from standard component sizes depending on your throughput requirements. Multistage systems allow for any capacity from 10 to 10,000 kg/h.

**Freeze Concentration** – precision water removal at freezing temperatures ensuring product quality at its technical best.

### Next Steps...

For more information regarding this technology and your specific configuration requirements please contact us at: [info.niropt.nl@geagroup.com](mailto:info.niropt.nl@geagroup.com) or phone +31.736 390 390.



The feed product enters the scraped surface heat exchanger (crystallizer) where the refrigerant cools the product and produces very small ice crystals (nuclei).

These small crystals flow into the recrystallizer where they are allowed time to grow into large spherical ice crystals.

Since these crystals are pure water the final step is removal in the GEA Messo PT wash column.

The separation provided by this unique device is so complete that the losses are barely measurable.

