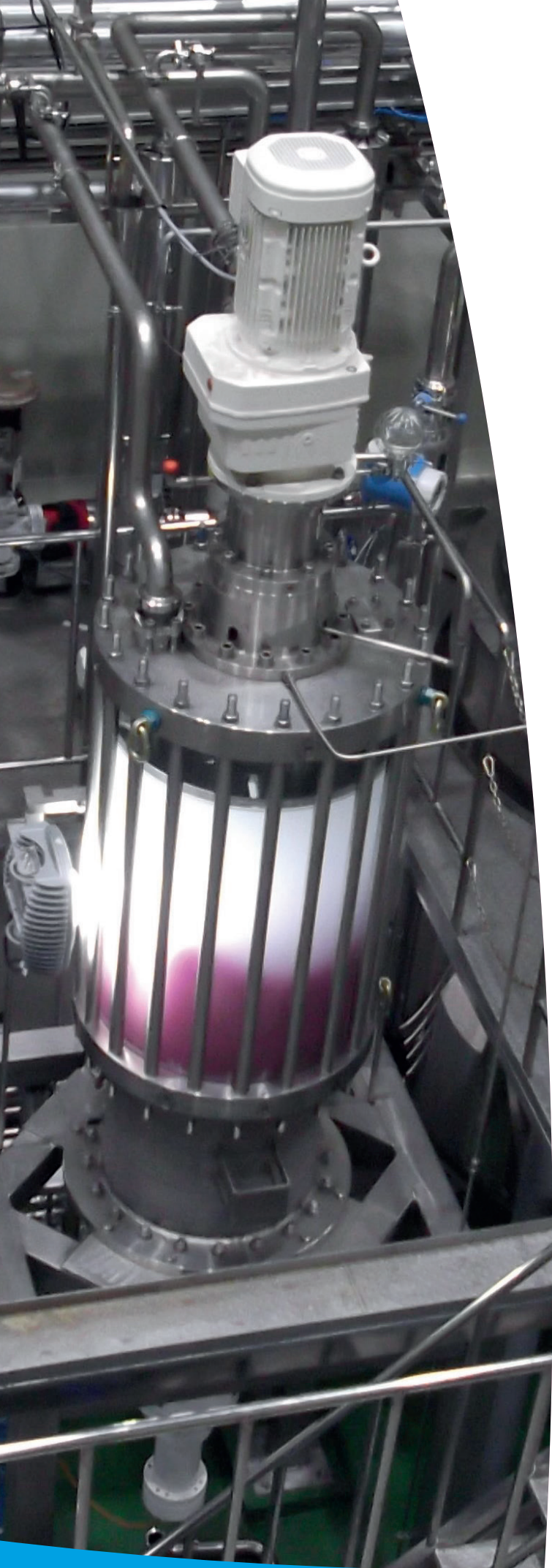




# IceCon<sup>®</sup> Freeze Concentration

Continuous freeze concentration systems



# GEA Group

GEA is one of the largest technology suppliers for food processing and a wide range of other industries.

GEA Group is a global player focussing on technologies, components, and sustainable solutions for sophisticated production processes in diverse end-user markets.

GEA offers a variety of technology-based process engineering services, beginning with the process development and ending up with the complete supply of technology equipment.

## GEA Niro PT

As the GEA Center of Competence for Freeze Concentration and Melt Crystallization, GEA Niro PT B.V. invented, developed and commercialized the present day freeze concentration technology.

The successful installation of a broad range of freeze concentration plants and 60 years of trend setting innovation confirms the reliability of our services and makes GEA the supplier of choice in a broad selection of food applications.

# Freeze concentration

In many industries, the concentration of aqueous solutions is an important issue. The objectives for concentrating products differ per industry and application, but all with a common objective: to concentrate without sacrificing quality. The solution to achieve this goal is freeze concentration.

## Freeze concentration equals quality

For the concentration of aqueous food liquids, freeze concentration is the technology of choice. Evaporation based technology is typically used to remove water and generally at elevated temperatures. The freeze concentration process removes water as ice at sub zero temperatures with unprecedented product quality as the final result. Freeze concentration will produce the highest quality liquid food concentrates when compared to other thermal concentration processes.

IceCon® is newly developed low cost freeze concentration system. No other concentration process or technology can obtain the outstanding product quality as achievable by freeze concentration. The very gentle concentration at subzero temperatures allows product freshness to be maintained and practically eliminates all biological degradation. Since the crystallization process is highly specific for water and no vapor phase is present, all volatile aromas and flavors will be preserved in the liquid concentrate.

## ADVANTAGES OF THE ICECON® PROCESS

- ❄ Avoids thermal degradation
- ❄ Pure water discharge
- ❄ Preserves volatiles
- ❄ Prevents oxidation
- ❄ Inhibits bacterial growth
- ❄ Natural freshness, functionality, and nutritional value of the original products is secured

# Your business and freeze concentration



## Premium quality concentrates

The process provides concentrates in premium quality and can be used for the development of new products. The improved quality of the concentrates is eminently suitable for being combined with spray drying. In combination with freeze drying, there is a considerable cost reduction. Product properties can be modified and improved, while the stability of concentrates is increased.

## Liquids

Concentration by water removal has been a common procedure among liquid food processors for many years. Rather than moving tons of water around the world, they reduce volume to economize on packaging, storage and transportation. Conventional thermal concentration methods often compromise quality by heat damage and loss of important flavor components. IceCon® freeze concentration process eliminates these quality losses. This highly specific and low temperature water removal technique has proven to be superior in retaining the food product's original properties.

## Nutraceutical products

Many nutraceutical products experience a loss of activity if processed through other concentration processes. IceCon® is ideal for treating heat-sensitive substances. The valuable components can now be concentrated from their natural source.

# Economy, plant design, and piloting

## Economics

Freeze concentration yields premium quality products. Additional advantages include low energy cost and a continuous process that enables long operating periods without intermediate cleaning. This will help to reduce the need for cleaning detergents and reduces the costs for effluent treatment. The total production cost can compete with conventional systems. You receive unmatched quality as an extra reward.

Our specialists will be happy to provide detailed insight into the feasibility of the process for your product.

## Capacities

GEA works with standardized 'building blocks'. Each combination operates within an optimum design capacity. The capacity range for our units is in the range of 5 to 5,000 liter of water removal per hour. Customized plants can be designed up to a water removal of 30,000 liter per hour.

## Tests and piloting

Seeing is believing. Where calculations may suffice for proven applications, new applications and products demand that the technical feasibility is demonstrated prior to the investment. With various pilot plants available you can rent a fully transportable unit to conduct in-house trials. We have various pilot plant available for testing, you simply supply the feed stock and allow us to produce the concentrate samples for you, with the option to be present and attend as a witness.



## ACID WHEY

APPLE CIDER

CARROT JUICE

## APPLE JUICE CLOUDY

APPLE JUICE CLEAR

APRICOT JUICE

## BEER

BANANA JUICE

## AROMA EXTRACT

BLOOD SERUM

BARLEY EXTRACT

## BEER ALCOHOL FREE

BLACK CURRANT JUICE

CHERRY JUICE

## COFFEE EXTRACT

BLACK BERRY JUICE

BLOOD ORANGE JUICE

## COCONUT

CHAMOMILLE TEA

BUTTERMILK

CELERY EXTRACT

HYDROLYSATED MEAT PROTEIN

## LEMON JUICE

## FISH EXTRACT

## GRAPE JUICE

EGG WHITE LIQUID

HERB EXTRACT

MEAT EXTRACT

## GRAPEFRUIT JUICE

PEACH JUICE

## PINEAPPLE JUICE

MANDARIN JUICE

## ORANGE JUICE

MUHROOM JUICE

TEA EXTRACT

PHYTASE

## SKIM MILK

SAKE

WHOLE MILK

## CIDER

LYCHEE JUICE

## MEAT EXTRACT

GUAVA JUICE

CRANBERRY JUICE

WHEAT EXTRACT

## TEA

SOY MILK

PINEAPPLE JUICE

## VINEGAR

PASSION FRUIT JUICE

STRAWBERRY JUICE

GREEN TEA EXTRACTS

## COLD BREW COFFEE

PEPPERMINT EXTRACT

WORT

SEAWEED EXTRACT

TOMATO SERUM

## WINE

WHEY PROTEIN

WHEY

# Proven applications

Our list of proven application is endless

Soluble/liquid  
coffee and tea



max. 40 wt%

Citrus juices, fruit  
and vegetable  
juices



max. 50 °Brix

Beer and wine



max. 25 %ABV

Vinegar



max. 40 wt%

Dairy products



max. 40 wt%

Protein, plant,  
meat and fish  
extracts



max. 40 wt%

Herb and  
vegetable extracts

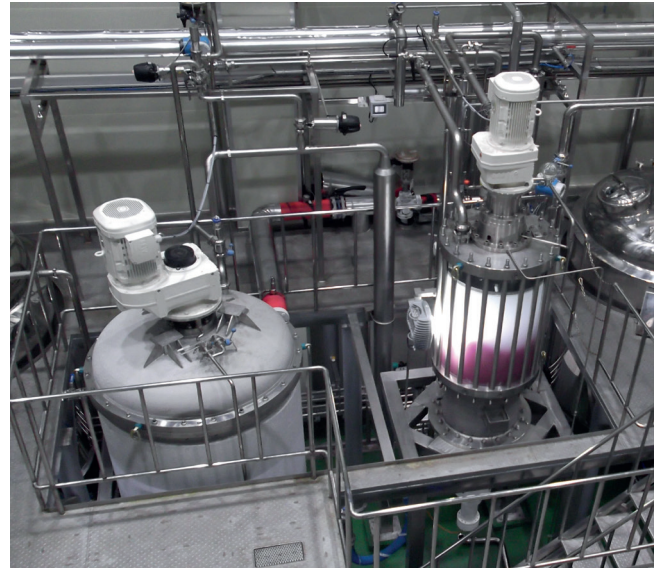


max. 45 wt%

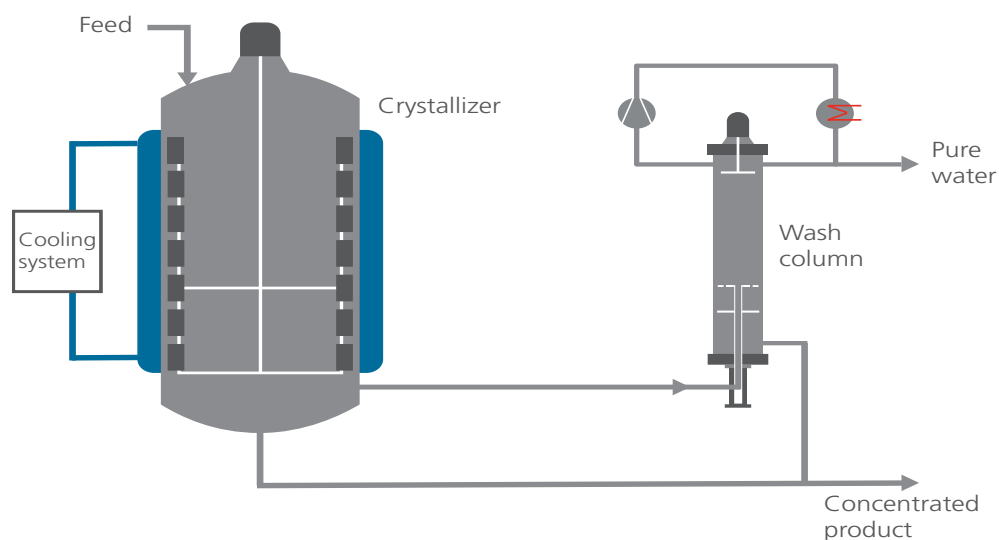
# IceCon<sup>®</sup> freeze concentration

## How the process works

Freeze concentration is the removal of pure water in the form of ice crystals at sub-zero temperatures. IceCon<sup>®</sup> is the latest innovation of freeze concentration design. The diagram below shows the complete process in its simplest form. This single-stage process consists of one crystallizer and one wash column. The crystallizer is a vessel with a cooling jacket. The inner wall of the vessel is scraped. The outer wall is cooled by a circulating refrigerant. Ice production and ice crystal growth take place inside the crystallizer. By generating residence time, ice crystals grow, creating an optimal crystal size distribution for efficient separation. In the wash column, the concentrated liquid is separated efficiently from the ice crystals. A compressed ice crystal bed is washed with melted ice to remove all traces of concentrated liquid. Freeze concentration ensures that all original product characteristics are retained in the concentrate.



Single-stage freeze concentration plant IceCon<sup>®</sup>



## We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

“Engineering for a better world” is the driving and energizing principle connecting GEA’s workforce. As one of the largest systems suppliers, GEA makes an important contribution to a sustainable future with its solutions and services, particularly in the food, beverage and pharmaceutical sectors. Across the globe, GEA’s plants, processes and components contribute significantly to the reduction of CO<sub>2</sub> emissions, plastic use as well as food waste in production.

GEA is listed on the German MDAX and the STOXX® Europe 600 Index and also included in the DAX 50 ESG and MSCI Global Sustainability indexes.

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