

## GEA Messo PT Crystallization and Separation

Industry must operate under increasingly rigorous ethical and legislative restrictions for the discharge of harmful compounds. The drive for the “zero discharge” plant is desirable today, but may be a mandatory requirement in the future.

### Zero Discharge within Reach

Crystallization can provide an efficient and economic alternative process, designed to produce a pure water stream from dilute multi component waste streams. The process is generally referred to as Freeze Concentration (FC).

### Crystallization as a Separation Process

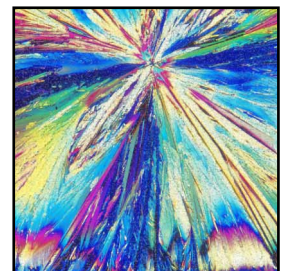
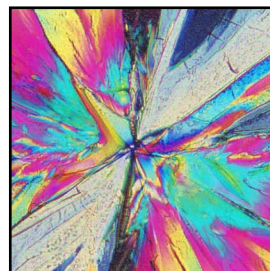
The production of pure crystals in the solution is the starting point. Water is crystallized into ice and the impurities present in the feed, are concentrated in the remaining liquid. Suspension based crystallization is a highly selective process that produces extremely pure crystals, due to the extreme low crystal growth rate. Separation of the pure ice crystals from the concentrated waste water is completed in a packed-bed wash column. Effectively, the pure ice crystals are transferred into pure water. The pure water can be re-used as e.g. process water, cooling water or can be discharged without additional treatment.

### Application in Hazardous Waste Streams

The feasibility of the FC process has been successfully assessed on several waste solutions containing a range of organic and inorganic compounds. The FC process focuses on the crystallization of water in the waste solution; the organic and inorganic compounds are simply concentrated in the remaining liquid.

# Concentration of Waste Water

## Freeze Concentration Technology



Process Engineering

### GEA Messo PT

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## Concentrate and incinerate

A commercial application of the process is the concentration of a waste water stream prior to incineration. Seraya Chemical Singapore Ltd. (SCSL) and Shell Chemicals Moerdijk B.V. have chosen FC as the pre-concentration step for their liquid hazardous waste water, which is subsequently incinerated. Many of the components in the stream are harmful to standard bio treatment systems. Incineration was chosen as the preferred method of destruction. The low solute concentration, however, reduced the efficiency of the incinerator and increased the processing costs for this waste stream. In this case, FC is able to remove 75% of the water originally in the waste stream at a much lower cost than direct incineration. Concentrating the waste water will increase capacity of your down stream incinerator, increase the caloric value of your waste "fuel", reduce transportation and intermediate hold-up volumes along with the related hazards and cost.

## Other Hazardous Effluents

Pre-concentration with FC is one possibility for hazardous waste water treatment. We can quickly provide budget data, based on available information, for you to examine the FC concept. Recovery of certain components has been demonstrated by concentrating a dilute waste stream to a level where it can be reintroduced into the reaction process. Salts can be precipitated and removed from the concentrated waste water prior to disposal.

The main activities of GEA Messo PT are:

- ◆ Development and research in crystallization- and separation technology. Constant innovative research and development is taking place for process and equipment development in order to create industrial systems to purify and separate crystals from an organic or aqueous liquid. The separation technology is based on the wash column principle where a selective separation of pure crystals is performed.
- ◆ Design and engineering of crystallization and separation equipment.
- ◆ Assembly of equipment for crystallization and separation
- ◆ Delivery of systems:
  - ♣ Freeze concentrators
  - ♣ Scraped surface heat exchangers
  - ♣ Crystallizers
  - ♣ Wash column separators
- ◆ Research, testing, training and maintenance

These activities are practiced in:

- ◆ the liquid food industry
- ◆ the chemical industry
- ◆ the pharmaceutical/biotechnological/ cosmetic industry
- ◆ the waste water industry

## Pilot Plant Service

A more detailed analysis can be completed using pilot plant data and additional information from your specific operation. Pilot plant equipment is available for installation on-site or at our premises, to allow easy testing of your particular application.

## Benefits:

- ◆ Applicable for most aqueous streams containing toxic, hazardous and volatile organic solutions
- ◆ Closed system prevents loss of volatile components
- ◆ Low temperatures reduce equipment corrosion problems
- ◆ Stable operation allows for simple control system
- ◆ Insensitive to normal variations in waste composition
- ◆ High service factors, continuous operation > 8,000 hours per year
- ◆ Modular design provides operation flexibility
- ◆ Proven technology – commercial application for over 30 years
- ◆ Capacity range from 10 kgs/hour to 50,000 kgs/hour

FC can make a clean separation of water from most aqueous solutions. This is possible through the unique use of a patented ripening recrystallization and separation system.

## 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.

