CLEARWATERBAY TECHNOLOGY, INC.
The Process Development Company

CLEARWATERBAY TECHNOLOGY

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TECH TIP: CONTINUOUS CRYSTALLIZER TYPES

INSIDE THIS ISSUE:

SPECIAL POINTS OF INTEREST:

- Continuous Crystallizer Types
- Energy Course at AIChE Spring Meeting in Texas
- Process Development Course in Tennessee
- NEW YEAR GREETINGS

The design and operation of an industrial crystallizer are optimized based upon various operating mechanisms. The table below summarizes the operating mechanisms in the various crystallizer configurations. These are the most commonly used ones (but not the only ones) in industrial practice. Important points of consideration when operating a continuous crystallizer:

1. Residence time should be enough to ensure low supersaturation in the active crystallization volume
2. The impact of possible changes in residence time due to future changes in operating conditions should be taken into account.
3. Changes in operating conditions that cause significant changes in residence times should be avoided
4. The recirculation rate should be high enough to control the generation of supersaturation
5. The recirculation rate should be compatible with the degree of mixedness required to sustain the recirculation type
6. When magma recirculation is used, the recirculation should not cause crystal breakage.
7. When liquor recirculation is used, changes in operating conditions can impact the ability to maintain a mixed suspension.

Consider both capital and operating costs when designing a particular type of crystallizer, such that it gives a higher quality product and trouble-free operation. In general, the rule of thumb for rankings from highest to lowest capital costs is DTB/DT, Oslo, FC, SCB/SC. However, the operating costs are the ones that dominate process economics.

More details on continuous crystallizers and their selection criteria can be read in our paper by Ketan Samant and Lionel O'Young of ClearWaterBay Technology, "Understanding Crystallization and Crystallizers", CEP Magazine, October 2006, p28-37.

Mechanism	Forced-Circulation	Draft-Tube Baffle	Draft Tube	Surface-Cooled Baffle	Surface-Cooled	Oslo
Supersaturation Generation						
Cooling	—	✔Direct-contact	✔Direct-contact	✔Surface	✔Surface	✔Surface
Evaporation	✔	✔	✔	—	—	✔
Adiabatic Evaporative Cooling	✔	✔	✔	—	—	✔
Relieving the Supersaturation						
Mixed Suspension	✔	✔	✔	✔	✔	—
Classified Suspension	—	—	—	—	—	✔
Control of Supersaturation Generation						
Magma Recirculation	✔	✔Internal	✔Internal	✔	✔	—
Liquor Recirculation	—	—	—	—	—	✔
Particle-Size Manipulation						
Fines Dissolution	—	✔Type based on supersaturation generation	—	✔Type based on supersaturation generation	—	✔Internal
Classified Product Removal	✔With elutriation leg	✔With elutriation leg	✔With elutriation leg	—	—	✔Internal

AICHE SPRING MEETING COURSE ANNOUNCEMENT

We are conducting a training course at AIChE Spring Meeting 2012 in Houston, TX, to be held on Sunday, Apr 1, 2012. The course title is **Practical Strategies for Energy Issues of Chemical Plant Complexes**.

To register, visit www.aiche.org/Conferences/SpringMeeting/2012/ShortCourses/s6.aspx

This course focuses on analysis methods and strategies to design a minimum energy consumption process, including the evaluation of the thermodynamically lowest energy requirement of the process.

What Do You Expect to Learn? Contd. On Pg2

PROCESS DEVELOPMENT COURSE IN TENNESSEE

Vaibhav Kelkar, PhD, Principal Engineer and Lionel O'Young, Ph.D., President, ClearWaterBay Technology conducted a course on Process Development on Nov. 1-2, 2011 in Kingsport, TN. This course was held in partnership with ASME and the East Tennessee Local AIChE Section.

Course Title: **CH757 - Multi-Disciplinary Process Development: From Lab to Plant**

Participants were provided with an overview of process development starting from the time a process chemistry is invented in the lab to the development of a commercial scale process. The course also examined critical issues at each level in the development workflow, the available technologies for solving problems, and the key information required.

Topics

- A systematic workflow for process development
- Overview of process flowsheeting, reactor synthesis, separation system synthesis, and heat integration
- Effective use of experimental data, modeling and software tools in process development
- Use of VLE, LLE and SLE phase diagrams in synthesizing separation processes
- Scale-up issues in process development

This course is invaluable for chemists, engineers and technology managers involved in chemistry, design, development, scale-up, or production of new and existing chemical processes.

The next public course on this topic will be held in Las Vegas, NV on Mar. 22-23, 2012. For details, or to register, please visit:

www.asme.org/products/courses/multi-disciplinary-process-development--from-lab-t

COURSE REVIEW

The following topics in the course received good feedback by the audience:

- The Onion Diagram
- The Methodology of Process Development
- Separation Layer and Separation /Reaction Interface/ Reactor Design
- Pinch Analysis
- Conceptual Design of Crystallization Systems
- Process Integration with Heat and Utilities

SOUTHERN CALIFORNIA AICHE NOVEMBER 15TH DINNER MEETING

Joseph Schroer, PhD, Principal Engineer at ClearWaterBay Technology gave a talk at the local Southern California AIChE chapter meeting, held on **Tuesday, November 15, 2011 in Montebello, CA**

The topic was **"Crystallization Basics and Process"**

This presentation gave an overview of how to design crystallization processes, with emphasis on using crystallization as a separation method. Other topics included solid-liquid equilibrium (SLE) phase diagrams, measurement and calculation of, and use in flowsheet synthesis for crystallization processes. Integration of these efforts in the process development workflow was also emphasized.

AICHE SPRING MEETING COURSE ANNOUNCEMENT (CONTD.)

What can you expect to learn?

- How to determine the utility consumption of plants and processes.
- The basic theory and applications of Pinch Analysis.
- Why certain process modifications will reduce the energy consumption.
- How to determine the true cost of steam and electricity.
- What you should know about your plant when making fuel purchase contracts.
- Tools to better evaluate projects for energy related capital expenditures.
- How to identify mistakes that your operations are making that cost you money.
- How to develop comprehensive energy reduction programming for your company.

HAPPY NEW YEAR FROM CWBTECH

All of us at ClearWaterBay Technology would like to wish you and your family a very Happy and Prosperous New Year!

For detailed information on our upcoming training courses, contact us at shortcourse@cwbtech.com, or or **Gary Koehler** of Garlind Associates at garlind2@verizon.net, or **Hideo Iketani** of I.T. Solutions at iketani@its-ykh.co.jp or, **Abdul Rahman Hariri** of Winmore Engineering Sdn Bhd at rahman.hariri@winmore-engineering.com

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