Course Description

This course provides a practical treatment of crystallization technology, presented in light of the many recent advances in the understanding of crystallization processes. Emphasis will be given to the practical problems of crystallizer operation, and a logical way of understanding the potential and limitations of crystallizer performance will be presented. Both organic and inorganic systems will be treated in batch and continuous mode. Elementary topics in the analytical description of particle-size distributions will be presented. The treatment will not emphasize the mathematics of particle distributions, but rather the basic principles involved and the results that can be applied.

Practical problems to be considered are Crystal Size Distribution (CSD) and its interaction with crystal habit, purity, and fouling; secondary nucleation; crystallizer configuration, e.g., seeding, classification, fines removal, scale-up considerations, the impact of mixing, polymorphism, crystallizer transients and stability, and online measurement of crystallization parameters. Efficient techniques for scanning crystal growth, nucleation and habit modifiers will be discussed. These problems will be considered from both analytical and operational points of view.

Participants are asked to bring a hand-held calculator to the course.

Who should Attend

The course is intended for engineers, chemists and technicians involved with the design, analysis or operation of organic or inorganic crystallization processes at the bench-scale, pilot plant or commercial-scale level including:

- Design Technologists
- Pilot Plant Technologists
- Process Development Technologists
- Plant Operation Technologists
- Vendor Testing

Their supervisors and others working with them can profit from a detailed practical knowledge of crystallization technology.

Learning Objectives

Upon completion of this course, you will be able to:

- Identify the fundamentals of crystallization technology and its application to plant-scale equipment
- Prepare flowsheets and control strategy
- Plan and carry out basic experiments
- Define polymorphism
- Analyze laboratory, pilot plant and plant data
- Perform basic troubleshooting
- Define scale-up techniques

Course Director

Dr. Wayne J. Genck is President of Genck International, a consulting firm who specializes in crystallization and precipitation. He has consulted for over 180 companies producing inorganic and organic commodity, specialty chemical, fine chemical and pharmaceutical products. Areas of consultation include the effect of additives, caking, design, the impact of impurities, mixing, polymorphism, scale up and troubleshooting.

Dr. Genck authored the chapter on Crystallization for the new 8th Edition of Perry’s Handbook and for the 3rd Edition of McGraw-Hill’s Handbook of Separation Techniques for Chemical Engineers. He has authored over 25 papers in the field of crystallization and precipitation in Chemical Engineering Progress, Chemical Engineering and Chemical Processing Magazines. Dr. Genck is a member of the steering committee for the Association of Crystallization Technology and is a member of the AIChE Crystallization Program Committee, 2b. He has frequently presented lectures at AIChE meetings and Chemical Engineering Magazine seminars. In addition, he has made presentations at CPhI Conferences and the 1999 Symposium of Industrial Crystallization at Cambridge. He received his B.S. and his Ph.D. from Iowa State University where his thesis was on the kinetics of crystallization.
FIRST DAY
8:00 - 8:30
Registration
8:30 - 17:00
Introduction
- Production Specification
- Determining what Precipitates
- Solubility and Supersaturation
- Metastability
- Habit and Internal Symmetry of Crystals

Crystallization Basics
- Crystal Growth
- Nucleation Fundamentals/Controlling Nucleation
- The Interplay of Growth and Nucleation in Batch Crystallizations

Crystal Size Distribution (CSD)
- Properties
- Measurement
- Number Distributions

The Mixed-Suspension Mixed-Product Removal (MSMPR) Crystallizer
- Population Balance
- Process System Feedback

SECOND DAY
8:30 - 17:00
Crystal Shape and Form
- Controlling Factors
- Complex Forms and Aggregates
- Crystal Aging and Ripening

Crystal Purity/Effects of Additives
- How Impurities Incorporate Into the Crystal
- Liquid Inclusions
- Minimizing Impurities
- Habit Modifiers
- Nucleation Inhibitors

Chiral Crystals and Polymorphs
- Definition
- Thermodynamics
- Monotropic and Enantiotropic Systems
- Polymorph Investigations
- Transformation
- Process Development
- Case Histories

Non-Ideal Conditions
- Size Dependent Growth
- Growth Rate Dispersion
- Agglomeration and Breakage
- Classified Product Removal
- Fines Removal
- CSD Dynamics

THIRD DAY
8:30 - 15:30
Batch Crystallizers
- Population Balance
- Cooling Curves
- Analysis and Control

Scale Up of Crystallizers
- From Beaker to Plant
- Impact of Mixing
- Vessel Configuration
- Secondary Nucleation

Industrial Crystallizers
- Continuous and Batch
- FC
- DTB
- OSLD
- Surface Cooled and Mechanical

Operating Characteristics
- Instrumentation
- Control
- Flowsheets
- Reaction Crystallization

Summary of Calculations and Questions

TUITION AND PAYMENT

Early registration:
(received before March 11, 2010)
Euro 1600+VAT/1440+VAT (group discount*)

Regular registration:
(received after March 11, 2010)
Euro 1800+VAT/1620+VAT (group discount*)
(Fee includes course materials, lunches and coffee breaks)
Participants are responsible for their own hotel reservations.

*Group discount is for two or more enrollments from the same company.

Payable by bank transfer upon issuing an invoice to:
SITEC PHARMA BIO, SL
BANK: CAIXA CATALUNYA - 0248 - Barcelona - Emancipacio
IBAN: ES55 2013 0248 4502 0070 7044 - BIC: CESCESBBXXX

Registration

Name ..................................................................................................................................
Surname ..............................................................................................................................
Position ..............................................................................................................................
Organization .......................................................................................................................
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Postal Code ....................................................................................................................... 
City ....................................................................................................................................
Country ........................................................................................................................... 
Phone/Fax .......................................................................................................................... 
Participant e-mail .............................................................................................................
Billing e-mail ......................................................................................................................


General information
Cancellations received after April 14 will be invoiced completely. Substitutions may be made at any time. Payment is due once the participant receives an invoice. Certificates will be issued to participants upon completion of the course.

For Information please contact us at:
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PLEASE RETURN BY FAX OR E-MAIL