ATOMIZATION AND SPRAY DRYING: Applied and Practical Approach

25 - 26 June 2015

Parc Científic de Barcelona

Baldiri Reixac, 10 - 08028 Barcelona - Spain

Course Topics Include:

- Design
- Specification, Selection and Application
- Optimization and Maintenance
- Effects of Process Variables on Performance

Who Should Attend

This course combines atomization and spray drying. Professionals in the chemical, biotechnology, pharmaceutical, cosmetic, agricultural sprays, petrochemical, biochemical, food, pulp and paper, combustion, medical areas and other high tech industries are encouraged to attend. Those involved with drying and with spray-dependent processes, including chemical reactors, coatings, spray drying, powder metallurgy, evaporative cooling, specialty chemicals, combustion and medical sprays, will benefit.

Engineers involved in specialty chemical manufacture, pilot plants, process and project design, waste processing and waste minimization should attend. The training will be especially valuable to:

- Biotechnologists
- Coating Engineers
- Pharmaceutical Technologists
- Food Technologists
- Combustion Engineers
- Agricultural Engineers

Learning Objectives

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

- State the various types of nozzle atomizers, their expected performance, capabilities and limitations
- State the various types of wheels and two-fluid atomizers, their expected performance, capabilities and limitations
- Calculate drop size for different atomizers
- Explain the design and operating variables and their effects
- Perform proper equipment selection, optimization and maintenance
- Explain the reasons for drying
- Select the spray dryer design needed for their process
- Perform the basic dryer calculations using psychrometric charts
- Select the proper inlet and outlet temperatures
- Increase plant throughput and product quality
- Improve drying, operations and troubleshooting techniques

Course Description

The first day of this intensive course provides an introduction to atomization for engineers, scientists and technologists. Key areas covered include the various atomization methods, atomizer design, factors affecting operation, flow in atomizers, drop size, spray angle and other spray characteristics, atomizer performance criteria, atomizer maintenance and drop size distributions. Proper atomizer selection will be emphasized. Nozzles, rotary and two-fluid atomization will be covered.

On day 2, in the spray drying portion, participants will gain a fundamental understanding of the practical designs and operation of spray dryers. They will learn the reasons for drying and the advantages and disadvantages of the spray drying technology. The importance of pilot plant studies, residence time, dryer layout and non-aqueous systems will be emphasized.

Course Director

Dr. Gary Tatterson is a professor of Chemical Engineering at North Carolina A&T State University (NC A&T SU) where he teaches full time. Specializing in plant design and various unit operations, Dr. Tatterson has taught individual specialized courses in drying and has been teaching and consulting since 1972. His scaleup and two plant design courses at NC A&T SU follow a philosophy of fundamental and practical understanding that is important to the proper operation of multiphase processes.
Gary Tatterson has written extensively in the area of multiphase processing and the application the theories of fluid and solid mechanics to such work. He has over 40 refereed publications and three texts. One text is on scaleup of processes in general.

Course offered by CfPA THE CENTER FOR PROFESSIONAL ADVANCEMENT FOUNDED 1967

COURSE OUTLINE

FIRST DAY

8:30-9:00

Registration

9:00-17:00

Review of Learning Objectives/Introduction

Nozzle Atomization
- Objectives of Atomization
- Applications
- Atomizer Selection
- Fluid Effects
- Surface/Volume Ratios

Nozzle Atomizers
- Pressure Atomizers:
  - plain orifice
  - pressure swirl or whirl
  - solid cone type
  - square cone type
  - fans

Factors Affecting Atomization
- Size & Geometry of Atomizer
- Liquid Properties
- Ambient Conditions

Drop Sizes Information
- Pressure Atomizers
  - plain orifice
  - pressure swirl or whirl

Other Performance Criteria
- Pattern
- Cone Angle

Wheel and Two-Fluid Atomization

Introduction
- Objectives of Atomization
- Applications
- Atomizer Selection
- Flow Regimes
- Surface/Volume Ratios

Wheel Atomizers
- Wheel and Cups
- Factors Affecting Atomization
- Size & Geometry of Atomizer
- Liquid Properties
- Ambient Conditions
- Drop Sizes Information and Correlations
- Spray Drying

Two-Fluid Atomizers
- Types of Atomizer
- Factors Affecting Atomization
- Ambient Conditions
- Air to Liquid Ratio
- Drop Sizes Information and Correlations

SECOND DAY

9:00-17:00

Drying

General Drying Information
- Reason for Drying
- Types of Solids
- Moisture Content
- Product Size
- Profitable Operations
- Psychrometric Charts
- Dryer Calculations
- Operating Ranges
- Solids & Air Handling
- Design Variables
- Feeding
- Temperature Limits

General Aspects of Spray Drying
- Advantages & Disadvantages
- Surface Area
- Steps in Spray Drying
- Atomization
- Particle Size
- Chamber Design
- Drying Rates
- Product Discharge
- Open, Closed Cycles

Semi Closed, Self Inertizing & Two Stage Layouts
- Semi-Closed Systems
- Self-Inertizing Systems
- Pharma Layouts
- Environmental Design
- Two Stage Systems
- Fluid Beds
- Spray Beds
- Fines Recycle

Additional Information and Comments
- Effects of Different Variables
- Nozzle and Rotary Atomizers
- Two Fluid Nozzles
- Chambers and Residence Times
- Dryer Calculations
- Evaporation Rates
- Air flow Rates
- Heating Rates

Psychrometric Charts, Operating Conditions, Design
- The Other Psychrometric Chart
- Moisture Evaporated
- Air Flow Rate
- Heating Rate
- Operating Variables
- Heat Consumption
- Drying Temperature
- Feed & Recycle
- Fan Options
- Product Discharge

Pilot Plant Studies, Residence Time, Dryer Layout
- Art & Design
- Limitations
- Pilot Plant Studies
- Atomizer Selection
- Pilot Results
- Residence Time
- Steps in Design
- Hazards
- Wall Deposits

Assessment Opportunity

TUITION AND PAYMENT

Early registration:
(received before April 30th, 2015) - Euro 1500+VAT/1350+VAT (group discount*)

Regular registration:
(received after April 30th, 2015) - Euro 1700+VAT/1530+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. Payment instructions will be provided upon registration.

Registration

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

PLEASE RETURN BY FAX OR E-MAIL

General information

Cancellations received after June 8, 2015 will be invoiced completely. All cancellations will be subject to euro 250 processing fee. 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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