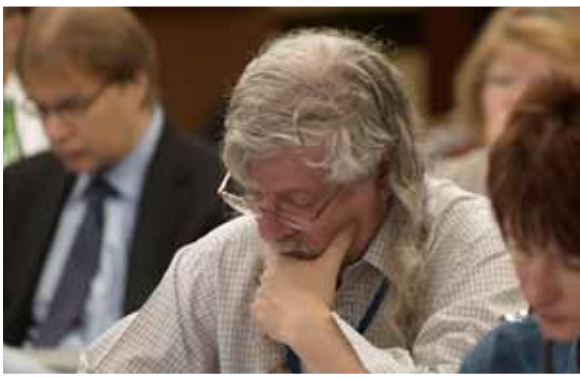
Secrets of Batch Process Scale-Up

Ensuring Effective Translation of Laboratory Processes to Pilot Plant Scale



29 September - 1 October 2010

The Radisson Blu Hotel

Nice, France

SCIENTIFIC UPDATE

We've Got Chemistry

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Course Objectives

To teach the practical aspects of designing a scaleable fine-chemical batch process and successfully implementing it at the kilo-lab and pilot plant scale, through an examination of the effects of large-scale operating methods and equipment limitations on process safety, operability, yield, selectivity and product quality.

Fee

£1275.00 including lunch & refreshments, the course dinner on Wednesday 29 September and the comprehensive course manual.

As part of the registration fee of this course, each participant will receive a copy of The Pilot Plant Real Book – A Unique Handbook for the Chemical Process Industry, authored by Mr. McConville.

Course Introduction

Operating a commercially viable chemical process requires a good chemical synthesis to start with, but is also subject to the interplay of a myriad of important physical phenomena – heat transfer, mass transfer, fluid flow, etc. which are traditionally the realm of the chemical engineer. An understanding of these scale-up phenomena is crucial for the laboratory development of processes that will scale successfully.

This course presents an overview of these issues and examines their impact on process operation in the pilot plant and beyond, including scale-up considerations for route selection, raw material charging, reaction steps, workup, crystallization, product isolation, drying, etc. Common bench techniques for each of these steps are contrasted to the safety and operability criteria for successful pilot plant operation. Numerous examples and case histories are presented, along with tips and techniques for operators and experimenters. Heavy emphasis is placed on process safety.

An underlying goal of the course is improving communication and mutual understanding between development team members of different backgrounds; thus, the course is appropriate for synthetic chemists, process development chemists, and process engineers with limited pilot plant experience, who wish to learn more about the potential pitfalls of scale-up in process development. The course complements the more chemistry-focused Scientific Update course “Chemical Development and Scale-Up in the Fine Chemical and Pharmaceutical Industries”.

Course Outline

Process Design for Scale-Up

- Process development strategies
- Importance of engineering in PD

Scale-Up – An Overview

- Role of the Pilot Plant
- Overview of scale-up issues
- Technology transfer issues

Batch Reactors

- Typical plant operations and equipment
- Characteristics of batch operations
- Course Outline - continued

Raw Materials

- Raw material and route selection
- Large-scale charging methods and issues

Temperature Control

- Large scale temperature control
- Heat transfer in batch reactors
- Controlling exothermic reactions

Following Reaction Progress

- Reaction endpoint determination
- Sampling methods / issues
- On-line analytical techniques

Agitation and Mixing

- Large scale mixing equipment
- Mixing limited reaction
- Mixing scale-up / scale-down

Quench & Work-Up

- Liquid-liquid extractions
- Phase continuity issues and emulsions

Distillation & Stripping

- Differential distillation
- Azeotropes and solvent exchange

Crystallization and Precipitation

- Basic principles / yield estimation
- Controlling supersaturation
- Scale-up issues

Product Isolation and Drying

- Large-scale solid-liquid separations
- Filtration and drying equipment
- Filtration and drying modeling

Process Hazards and Safety Assessment

- Common hazards in large-scale processing
- Process hazard assessments and evaluations

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"The course was thoroughly enjoyable ..."
Bristol Myers Squibb

Tutor

Francis X. McConville holds a B.Sc. degree in Chemistry and M.Sc. degrees in both Chemical Engineering and Biotechnology from Worcester Polytechnic Institute in Massachusetts. He offers over 26 years of experience in the chemical and related industries, including stints at the esteemed Worcester Foundation for Experimental Biology and at New England Renewable Fuels, where he was involved in such varied projects as oil recovery and biomass conversion.

He also spent 14 years at Sepracor, Inc. in the U.S. as a pharmaceutical process development engineer. His duties there included the design and operation of the company's kilo-labs, as well as the scale-up and transfer of many proprietary processes to pilot and manufacturing sites in Taiwan, Japan, England, Scotland, and Canada. He has been closely involved in the development and optimization of processes based on a variety of technologies including selective biocatalysis, fermentation, ultrafiltration, asymmetric crystallization and asymmetric synthesis.

For six years Mr. McConville has successfully operated his own consulting firm, FXM Engineering & Design, in Massachusetts. He is also affiliated with Impact Technology Consultants, Inc. of Lincoln, Massachusetts as a senior consultant and technology specialist.

Mr. McConville is perhaps best known as the author of the popular manual for process development personnel entitled "The Pilot Plant Real Book – A Unique Handbook for the Chemical Process Industry". This highly practical handbook has garnered praise from readers in the fine chemical and pharmaceutical industries worldwide. Interested readers can learn more about the book at www.pprbook.com

Venue

The Radisson Blu Hotel, Nice, France
223 Promenade des Anglais
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General Information

The course begins with registration at 8.30am on Wednesday 29 September and finishes at approximately 1pm on Friday 1 October .

The organisers reserve the right to change the published programme of events and course content as circumstances dictate.

Who Should Attend?

This course has been designed for synthetic chemists, process development chemists and process engineers in the pharmaceutical and fine chemical industries with limited pilot plant experience, who wish to learn more about the potential pitfalls of process scale-up and ways to avoid them.

Upon Completion of the course, participants will be better equipped to:

Assess process safety and scaleability

Identify process operations that may be problematic on scale-up

Design processes that will minimize or avoid scale-up issues

Select operating methods and equipment for effective scale-up

Calculate heat removal rates and safe rates of addition of reagents

Determine mixing requirements for scale-up

Design crystallizations which can be successfully operated at scale

Predict the filterability of solid products upon scale-up

Minimize the effects of scale-up on yield, selectivity and product purity

Scientific Update Training | Course Registration

Secrets of Batch Process Scale-Up

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