



SCIENTIFIC  
UPDATE

*We've got chemistry*

# SECRETS OF BATCH PROCESS SCALE-UP

Ensuring Effective Translation  
of Laboratory Processes to  
Pilot Plant Scale

Also available ONLINE.  
Check website for details.



VIRTUAL  
*Events Online*

3 day  
Course

2020

## Who should attend?

Chemists, engineers, technicians and managers in fine chemicals and pharma with limited pilot plant experience who wish to learn more about the potential pitfalls of process scale-up and ways to avoid them.

# SECRETS OF BATCH PROCESS SCALE-UP

## ENSURING EFFECTIVE TRANSLATION OF LABORATORY PROCESSES TO PILOT PLANT SCALE

A 3 day course



## INTRODUCTION

This popular course, designed for those with limited or no pilot plant or scale-up experience, provides a comprehensive overview of the most common problems experienced during the scale up of laboratory batch processes, and ways to avoid or mitigate them.

The difference between laboratory scale techniques and how the major unit operations are carried out in the pilot plant is a key focus of the course. Thus, along the way attendees will examine the many issues associated with raw material handling, conducting synthetic reactions, reaction workup, product crystallization, isolation and drying at the pilot plant or commercial scale.

The course also explores some important engineering concepts such as batch mixing, heat transfer, mass transfer, fluid flow and the influence of these factors on the success of large scale chemical operations. With an awareness of these phenomena, the laboratory researcher will have a better understanding of the types of experiments that should be conducted and the types of data that should be collected to ensure a more successful scale-up. Heavy emphasis is placed on process safety.

## COMPLEMENTARY LITERATURE

Each participant will receive a copy of The Pilot Plant Real Book – A Unique Handbook for the Chemical Process Industry, written by Mr. McConville and a course binder containing the full content of the course.

## IN-HOUSE COURSE

For 13+ people contact us to discuss holding this event In-House - [sciup@scientificupdate.com](mailto:sciup@scientificupdate.com)

## 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

### 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 reactions
- > Mixing scale-up / scale-down

### Quench and Work-Up

- > Liquid-liquid extractions
- > Phase continuity issues and emulsions

### Distillation and 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



"Having worked with others who have attended this course, I can now see where their mentality towards scale-up comes from. Invaluable teachings and principles."

GEO Speciality Chemicals



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Registration 8.30  
Course commences 8.45 on Day 1  
Course adjourns 12.30 on Day 3  
Course fees include a comprehensive course manual, refreshments throughout each day, lunches and one course dinner on the first evening

For all prices and dates please refer to our website



IT'S EASY TO REGISTER ONLINE

## COURSE TUTORS

### Francis X. McConville

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 has some 35 years of experience in the chemical and related industries, including positions at the Worcester Foundation for Experimental Biology and 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. (now Sunovion) 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 API processes to pilot and manufacturing sites in Taiwan, Japan, England, Scotland, and Canada. He was closely involved in the development and optimization of processes based on a variety of technologies including selective biocatalysis, fermentation, ultrafiltration, and asymmetric crystallization.

For the past 16 years, Mr. McConville has worked at Impact Technology Development, Inc. in Devens, Massachusetts as a consultant, technology specialist and senior team leader. At Impact, Mr. McConville has been involved in such diverse projects as biomass conversion, emulsion polymerization, medical adhesives development, novel molten metal technology, and pharmaceutical crystallization optimization.

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



Francis X. McConville

 [www.pprbook.com](http://www.pprbook.com)

## COURSE AIMS AND 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.

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

## REGISTRATION

Use our **fast online booking system by visiting**

**[www.scientificupdate.com](http://www.scientificupdate.com)**

Alternatively you can mail or fax the attached registration form to:  
Scientific Update  
Maycroft Place, Stone Cross,  
Mayfield, East Sussex, TN20 6EW, UK  
Fax Number +44 1435 872734

### How to Pay

When you register online, you can have the option to pay via credit card (Amex, MasterCard or Visa). A receipted invoice will be automatically generated once paid and sent via email. Should your company wish to pay by cheque or bank transfer, on booking, bank details will be supplied with an invoice.

### Group Discounts

Group discounts are available on two or more attendees - see registration form. This offer only applies if bookings are made simultaneously and from the same billing address.

### Confirmation of your registration

These will be sent via email.

### Late Applications

For late applications, please register online or fax the completed registration form, including credit card payment information.

### Cancellations/Refunds

Should you be unable to attend and cancel in writing no later than 1 month before the start of the course, Scientific Update will refund your registration less £300.00 (or equivalent in €/€) processing fee. Unfortunately refunds are not possible after that date. Substitutions can be made at any time.

**DON'T MISS OUT - REGISTER TODAY**

**EVENT:****DATES:****LOCATION:****No. of attendees****Price****NEW FAST ONLINE REGISTRATION**

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\*payments via Amex can only be made in US dollars

**Currency Payments**

If you select to pay in a different currency than the event is advertised in, the amount charged will be based on the exchange rate at the time of preparing the invoice.

**Discounts**

Complete the details for either two or three delegates and your discount will automatically be applied. This offer only applies where all delegates are booked simultaneously and at the same billing address.

**Cancellations**

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