



**SCIENTIFIC  
UPDATE**

*We've got chemistry*

# CHEMICAL DEVELOPMENT & SCALE-UP IN THE FINE CHEMICAL & PHARMACEUTICAL INDUSTRIES

Principles and Practice

2020

**3** day  
Course

"The course is well done! There are a lot of useful references from literature and the problem sessions help to develop troubleshooting and new ways of thinking."

INDENA SpA

**30**

Celebrating 30 years serving  
the global chemistry industry

1989 - 2019

# CHEMICAL DEVELOPMENT & SCALE-UP IN THE FINE CHEMICAL & PHARMACEUTICAL INDUSTRIES

A 3 day course

## INTRODUCTION

Chemical process development is generally not taught as part of degree courses in higher education; the conversion of a synthetic route used for making milligram or gram quantities of a chemical into a process for manufacturing multi-kilogram and tonne quantities is typically learnt "on the job" by chemists in industry.

For many years, little chemical development work was published in the literature, until the establishment of the Organic Process R & D journal by Dr Trevor Laird (founder of Scientific Update). Even now, "tricks of the trade" are handed down within individual company organisations, and it can be difficult to gain an awareness of what is involved in chemical development, and of the skills and techniques required to efficiently scale-up chemical processes.

This three-day course, written and presented by highly experienced process chemists from the pharmaceutical and fine chemical industries, provides a comprehensive overview of this fascinating and important element of the chemical industry. A logical investigative approach to all aspects of chemical development is described, with an abundance of case studies from literature, conferences and private communications.

The multi-disciplinary nature of chemical development is emphasised, from the initial interaction with laboratory research scientists to the vital partnership with chemical engineers in the pilot plant and in the production environment. The lectures are interspersed with interactive problem sessions, enabling participants to share in the problem solving and troubleshooting typically experienced during chemical development.

## IN-HOUSE COURSE

For 8+ people contact us to discuss holding this event In-House - [sciup@scientificupdate.com](mailto:sciup@scientificupdate.com)

## COURSE OUTLINE

### Introduction

- > The purpose of chemical development

### Synthetic Route Discovery

- > Route design
- > Selecting the best route for scale-up
- > Choice of raw materials, reagents etc

### Costing of Chemical Processes

- > Raw materials
- > Overheads
- > Context

### The Investigative Approach to Chemical Development

- > Optimising Chemical Reactions
- > Making processes robust
- > Minimising scale-up difficulties

### Solvent Effects

- > Often overlooked
- > Key to making a modest process a great process

### Statistical Methods of Optimisation

- > Vital, but under-utilised
- > Design of Experiments
- > Simplex
- > Factorial design

### Analytical Issues

- > In Process Control
- > Quality Control and Specification Setting
- > Regulatory Guidelines
- > GMP, Validation
- > Use of analysis to aid process optimisation

### Work Up

- > Product isolation

### Planning for Scale-Up

- > Key points to consider

### Appreciation of Chemical Engineering Principles

- > Mass Transfer
- > Mixing
- > Heat Transfer
- > Kinetics

### Crystallisation and Polymorphism

- > Particle size control
- > Polymorph control
- > Methods of analysis
- > Crystallisation of chiral compounds

### New and Emerging Technologies in Process R&D

- > Microwave chemistry
- > Continuous flow chemistry
- > Process intensification

### Thermal Hazard Testing and Runaway Reactions

- > Essential process safety considerations
- > Equipment and screening approaches

### Effluent Minimisation and Control

- > Environmental considerations
- > Cost considerations
- > Green chemistry





# SCIENTIFIC UPDATE

We've got chemistry

Start 9.00am on Day 1

Finish 3.30pm on Day 3

Course dinner 6.30pm

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



**Dr Will Watson**  
Technical Director,  
Scientific Update



**Dr Andy Jones**  
Consultant,  
Scientific Update



**Dr John Studley**  
Scientific Director,  
Scientific Update

You can find the full tutor biographies on our website, tutors will depend on location.

### At the end of the course, participants will have gained:

- > A logical investigative approach to chemical development and optimisation
- > An insight into the factors involved in scale-up
- > An appreciation of chemical engineering concepts, particularly mixing, heat transfer and process control
- > A preliminary knowledge of statistical methods of optimisation
- > Improved ability to decide which parts of the chemical process to examine in detail
- > Ideas for efficient resource allocation
- > Improved troubleshooting and problem solving ability

## CONSULTANCY SOLUTIONS

### OUR EXPERTISE

We are specialists in Industrial Organic Chemistry, solving problems and managing projects in Process Research and Development covering the following industries:

- > **Pharmaceuticals**
- > **Fine Chemicals**
- > **Agrochemicals**
- > **Flavour & Fragrance**
- > **Specialty Chemicals**

### OUR TEAM

You will be assigned one leading consultant but you will benefit from our team with over 100 years collective industrial experience.



### OUR APPROACH

We will sign a CDA and discuss your project by telecom or webinar to assess what benefits we can offer. This initial consultation (up to 4 hours) is free of charge. After which we will offer a detailed proposal with the service we can provide tailored to your individual requirements.

## 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). For email payments please include course title, card number, expiry date and security code. A receipted invoice will be automatically generated once paid and sent via email. Should your company wish to pay by cheque or bank transfer bank details will be supplied with an invoice.

### Bank Transfer or Cheque

Should your company wish to pay by cheque or bank transfer, on booking you can choose between paying in either €, \$ or £. All 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**

Why not register quickly online and receive instant confirmation? Look for the **register** button on the event of your choice. [www.scientificupdate.com](http://www.scientificupdate.com)

**First attendee**

Company   
 Title (Dr/Prof/Mr/Mrs/Ms)   
 First name   
 Surname   
 Job Title   
 Address   
  
  
 Post Code / Zip   
 Country   
 Tel   
 Fax   
 Email   
 Mobile   
 Special Diet   
 I would like to subscribe to your FREE bi-monthly newsletter  
 What's new in Process Chemistry?

**Invoice Address** (if different to delegate address)

Address   
  
  
 Post Code / Zip   
 Country   
 Tel   
 Fax   
 Please invoice my company  
 Purchase Order:   
 Promotion Code:

**Second attendee**

Title (Dr/Prof/Mr/Mrs/Ms)   
 First name   
 Surname   
 Job Title   
 Tel   
 Fax   
 Email   
 Special Diet   
 I would like to subscribe to your FREE bi-monthly newsletter  
 What's new in Process Chemistry?

**Third attendee**

Title (Dr/Prof/Mr/Mrs/Ms)   
 First name   
 Surname   
 Job Title   
 Tel   
 Fax   
 Email   
 Special Diet   
 I would like to subscribe to your FREE bi-monthly newsletter  
 What's new in Process Chemistry?

**Payment Methods**

Payment will be made by:

 Cheque     Bank Transfer     Credit Card

In Currency:

 Euros     GBP     or Dollars

We accept the following credit cards:



Amex\*



Mastercard



Visa

To pay by credit card a secure link will be provided once you receive your booking confirmation email, this will then take you to a secure payment gateway.

\*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**

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 fee less £300 (or equivalent in €/£) processing fee. Unfortunately refunds are not possible within 1 month of the course date. Substitutions can be made at any time.

**Data Protection**

Scientific Update Ltd is registered under the Data Protection Act 1998. We will store your information securely and only share your contact details with other attendees at this event. If you are happy for your details to be passed to any third parties please tick here:

For full terms of business and payment details please see our website

**Please complete this form and fax to +44 (0)1435 872734**

You can also download the PDF from [www.scientificupdate.com](http://www.scientificupdate.com), complete the form online and email back  
 Scientific Update, Maycroft Place, Stone Cross, Mayfield, E. Sussex TN20 6EW, UK  
 +44 (0)1435 873062 [sciup@scientificupdate.com](mailto:sciup@scientificupdate.com)