

Chemical Development & Scale-Up in the Fine Chemical & Pharmaceutical Industries

Principles and Practice

14 - 16 March 2011

Sheraton Fisherman's Wharf Hotel, San Francisco, USA



“The course was helpful and the presenters were fantastic - extremely knowledgeable and easy to talk to.”

Millennium: The Takeda Oncology Co

PROFESSIONAL DEVELOPMENT TRAINING

Scientific Update provides training courses for industrial chemists and chemical engineers in chemical development and scale-up and many other specialist topics in organic and process chemistry.

Our short intensive training courses enable scientists to learn about highly relevant topics, to broaden their knowledge and to keep abreast of new science, new technology and new techniques.

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We've Got Chemistry

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"I love the small group problem solving sessions."

Vertex

Fee & General Information

\$1850.00

Includes lunch & refreshments, course dinner and comprehensive course manual.

The course begins with registration at 8.30am on Wednesday 14 March and finishes at approximately 3pm on Friday 16 March.

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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 solving sessions, enabling participants to share in the problem solving and troubleshooting typically experienced during chemical development.

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

Chemical Development of Enantiomerically Pure Compounds

- Resolution
- Chemocatalysis
- Biocatalysis
- Crystallisation-induced asymmetric transformations

Thermal Hazard Testing and Runaway Reactions

- Essential process safety considerations
- Equipment and screening approaches

Effluent Minimisation and Control

- Environmental considerations
- Cost considerations
- Green chemistry

Course Tutors



Will Watson gained his PhD in Organic Chemistry from the University of Leeds in 1980. He joined the BP Research Centre at Sunbury-

on-Thames and spent five and a half years working as a research chemist on a variety of topics including catalytic dewaxing, residue upgrading, synthesis of novel oxygenates for use as gasoline supplements, surfactants for use as gasoline detergent additives and non-linear optical compounds. In 1986 he joined Lancaster Synthesis and during the next 7 years he was responsible for laboratory scale production and process research and development to support Lancaster's catalogue, semi-bulk and custom synthesis businesses. In 1993 he was appointed to the position of Technical Director, responsible for all Production (Laboratory and Pilot Plant scale), Process Research and Development, Engineering and Quality Control. He helped set up and run the Lancaster Laboratories near Chennai, India and had technical responsibility for the former PCR laboratories at Gainesville, Florida. He joined Scientific Update as Technical Director in May 2000. He is also involved in an advisory capacity in setting up conferences and in the running of the events. He is active in the consultancy side of the business and sits on the Scientific Advisory Boards of various companies.

Will can be contacted by email: will@scientificupdate.co.uk



John Knight gained a first class honours degree in chemistry at the University of Southampton, UK. At Southampton he studied for

his PhD in synthetic methodology after which, John moved to Columbia University, NY, USA where he worked as a NATO Postdoctoral Fellow with Professor Gilbert Stork. John joined Glaxo Group Research (now GSK) in 1987 as a medicinal chemist before moving to the process research and development department within Glaxo. During his time at Glaxo, John worked on a number of projects and gained considerable plant experience (pilot and manufacturing). In 1994 whilst working at Oxford Asymmetry he worked with a consultant project manager to design, build and commission a small pilot plant, whilst in parallel developing the chemistry PRD effort at Oxford Asymmetry. The plant was fully operational within 18 months. He had considerable input into the design of a second plant, which was completed and commissioned in 2000. During his time at Evotec he established a team to perform polymorph and salt screening studies and established and maintained high standards of development expertise across the department. John has managed the chemical development and transfer of numerous NCE's into the plant for clients and been involved in process validations. He joined Scientific Update in January 2008 as Scientific Director.

Email: john.knight@scientificupdate.co.uk

Who Should Attend?

Young Chemists who have just started work in industry as development chemists.

Organic Chemists/Medicinal Chemists in Research and Development who would like to gain an appreciation of development and scale-up and who are perhaps contemplating moving into chemical development.

Development and Production Chemists in industry who would like to improve their efficiency and gain an insight into alternative approaches to chemical development.

Chemical Engineers who wish to understand a chemist's approach to chemical development of batch processes. (Engineers would, however, need a good grounding in organic chemistry.)

Students who are about to enter the industry & can obtain company sponsorship.

Experienced Chemists looking to refresh and/or augment their knowledge of chemical development.

Analytical Chemists who wish to gain a broader appreciation of process chemistry.

Managers who might benefit from a comprehensive and up to date overview of chemical development.

What does the course set out to achieve?

To train R&D chemists and engineers in the most efficient methods for developing cheap, robust processes for the manufacture of fine organic chemicals in the minimum amount of time.

To educate chemists in the principles of scale-up and development, in basic engineering concepts and in techniques for the optimisation of processes.

To teach chemists to learn from the experience (*and mistakes*) of others by examining case studies from industry.

Venue

Sheraton Fisherman's Wharf Hotel 2500 Mason Street, San Francisco, CA, USA
Tel: 001 415 362 5500 Fax: 001 415 956 5275 www.sheratonatthewharf.com

The Sheraton Fisherman's Wharf hotel is ideally situated in the heart of Fisherman's Wharf, but only two blocks from San Francisco's cable cars. It has 529 modern, well-equipped, air-conditioned rooms. There is a fully equipped business centre and fitness suite.

A limited number of rooms have been reserved at the hotel for the special rate of \$169 per night (\$20 for an additional person) plus taxes until February 12 2012. Details about making your reservations directly with the hotel will be sent to you when you register. Full details on scientificupdate.co.uk.

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

Register for this course by using the form overleaf or contacting us by: tel +44 (0)1435 873062 info@scientificupdate.co.uk fax +44 (0)1435 872734



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Please register attendee(s) @ \$1850.00

First Attendee Name

Company	
Title (Dr/Prof/Mr/Mrs/Ms)	
Job Title	
Name	
Surname	
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