

Scientific Update | Training Courses 2010



Bridging the Gap Between Lab and Plant

A Physicochemical Approach
to Process Development



21 - 23 September 2010
The Fira Palace Hotel
Barcelona, Spain

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Bridging the Gap Between Lab and Plant

A Physicochemical Approach to Process Development

21 - 23 September 2010 | The Fira Palace Hotel, Barcelona, Spain

General Information

The course will begin with registration from 8.30am on Tuesday 21 September and ends at approximately 3pm on Thursday 23 September.

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

Fee

£1195.00 including lunch & refreshments, the course dinner on 21 September and comprehensive course manual.

Introduction

Process development tends to be 'recipe' based and, in the inevitable rush to develop a process, the science tends to get ignored. This series of modules deals with an area at the interface between organic chemistry and chemical engineering. It seeks to provide an awareness of the physicochemical principles that underpin process development in the fine chemicals and pharmaceuticals area.

Throughout the course, many real examples are presented. Numerous short worked examples are designed to reinforce understanding. There is extensive use of video examples to illustrate the principles involved in fluid-fluid mixing and dispersion, fluid-solid dispersion and phase separation in fluid-fluid systems.

Statistical Design techniques are a frequently used tool in process development. Proper use of the techniques requires an understanding of the physicochemical concepts underlying process development. This course is therefore seen as complementary to a statistical design approach.

Programme

Day 1

From recipe to process design – what information is needed?

Principles of process development. How to assess minimum data requirements, especially in complex reaction systems. How to get more useful data from your experiments.

A refresher in reaction kinetics.

Understanding reaction kinetics can be very useful and doesn't have to be difficult. Some worked examples should demonstrate this.

Pre-reaction equilibria.

Equilibria involving protonation or deprotonation of reactants are common and can have an enormous effect on reaction rates and on workup processes. This module explains the principles involved, and sets the scene for later modules.

Mixing effects on reactivity in pseudo-homogeneous systems

An introduction to mixing in single phase systems. Agitators and baffles. Explains why the selectivity in some reactions in single-phase systems can be sensitive to the mixing procedures used, and shows how to mitigate these effects. Videos illustrate the principles.

Day 2

Competing reactions

Understanding competing reactions is key to understanding process yield (selectivity). This module discusses the some factors influencing selectivity, including catalysis, pre-reaction equilibria and reactor configuration. Simple methods for optimising reaction pH in aqueous systems are described.

Phase equilibria and species distribution in reaction and workup.

Many reactions and most work-up processes involve more than one phase. Simple partitioning and partitioning coupled to ionisation processes in one phase are presented. The relevance to phase-transfer catalysis is discussed.

Solvent effects on reaction rates and selectivity

This module seeks to introduce the fundamental science behind solvent selection, and to apply these principles to practical problems.

Dispersion and mixing in two-phase systems

Explains the principles behind mixing and separation in two-phase systems, and illustrates good laboratory and scale-up practice. Discusses phase continuity and phase separation. Shows how to ensure that your washes actually separate!

Day 3

Chemistry in multiphase reactions

Shows that the overall reaction kinetics and selectivity in multi-phase systems can be greatly different from those observed in single phase systems, and explains the principles and laboratory practice required to understand such processes.

Scale-up

Shows how to minimise scale up problems by applying an understanding of basic physicochemical aspects of the process. Chemical reaction rate constants stay the same on scale up, but related physical processes are scale dependent. This simple principle can be used to think through possible scale-up difficulties. A protocol to identify potential scale up problems is presented.

Worked example – scale-up

“Excellent course.”
GSK

Tutors



Professor John Atherton

John Atherton took a 1st Class Honours degree at Manchester University, where he also studied for his PhD. He has had 37 years experience in industry, most of them in process development, starting with ICI, and more recently with Zeneca and Avecia. Following five years work as a Group Leader in process development, he was for 23 years responsible for a Physical Organic Chemistry Group, whose rationale was to develop and assist in the development of efficient processes by the application of physicochemical thought processes and experimental techniques. The group at times provided a service across four development and manufacturing sites within the UK, two in France, and one in Canada. He has been pro-active in recognising the need for development of physical organic chemistry skills in process technology departments, and has developed and presented extensive training materials over a number of years.

He was Chairman of the Organic Reaction Mechanisms Group of the Royal Society of Chemistry from 1997 until 2001. In 2004 he was appointed visiting professor at the University of Huddersfield. He is co-author of the textbook 'Process Development: Physicochemical Concepts,' published by Oxford University Press, has authored book chapters on 'Mechanism in multiphase reaction systems' and 'Solvent Selection,' and has co-authored 34 refereed papers and 24 patents. He has lectured widely at events associated with process development and with organic reaction mechanisms.

Since his retirement from full-time employment in industry he has been active in consultancy work for a number of companies. He was appointed Professor of Chemistry at Huddersfield University in August 2008.



Dr Nick Powles

Since October 2006 Dr Nicholas Powles has been working at the University of Huddersfield as a founding member of a commercial research group called IPOS, Innovative Physical Organic Solutions. The primary objective of IPOS is the rational design of processes/technologies through fundamental understanding and his roles are delivery of customer research projects, and development of the group.

For the previous eleven years he worked for Zeneca in Agrochemicals Process Development and later for Avecia in synthesis of pharma intermediates. During this time he acquired a 1st class honours degree at Huddersfield University by part-time study and received several awards. As a result of his achievements, Avecia (formally Zeneca specialities) funded him through a full time Ph.D. at Huddersfield University on 'Mechanistic Investigations into DNA Synthesis.' After completing his PhD, Nick was manager of the Physical Organic and Proof of Concept team at Avecia/NPIL Pharma, the work included route selection and the application of new technologies to currently manufactured molecules, strategic molecules and customer enquiry molecules. Once a route was established to customer enquiry he was responsible for the preparation of samples (normally between 1-50g) and the development of the route for a possible kilo-scale manufacture.

During the last 10 years Nick has worked closely with Professors John Atherton and Mike Page to utilise Physical Organic methodologies for Process Development, Technology Optimisation and Scale-up. Recent projects completed at IPOS include converting a batch polymerisation to a continuous process, laboratory optimisation of a 300 t/a pharma intermediate, development of novel catalytic technologies and understanding of gas-liquid diffusion layer reactions.

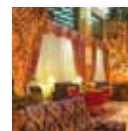
Who Should Attend?

Chemists and chemical engineers wishing to develop a more in-depth understanding of the fundamental science that underpins process development.

Course Manual

Participants will receive a comprehensive course manual containing copies of all the slides presented. Delegates will also receive a free copy of the textbook *Process Development: Physicochemical Concepts*, by JH Atherton and KJ Carpenter

Venue



The Fira Palace Hotel
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www.fira-palace.com

Hotel Fira Palace is centrally located in Barcelona, very near to the well known Plaza España, and a short distance away from the famous Ramblas and the sea front. The Hotel is easily accessible, being 15-20 minutes from the International Airport by taxi.

A limited number of rooms have been reserved at the hotel for the special rate €145+ taxes per night, double room for single use, including breakfast. A hotel booking form will be sent when you register - please use this form to make your reservation directly with the hotel.

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For late applications please register on line at www.scientificupdate.co.uk or fax the completed registration form, including credit card payment information.

Venue/Accommodation You will be sent details of how to reserve your accommodation with your event confirmation details.

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