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Company.....

Address.....

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PostcodeTel :.....

E-mail :.....

Course fee £500 + VAT as applicable

Address for invoice, if different from above :

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Please return to :
Dr N Powles
Department of Applied Sciences
University of Huddersfield
Queensgate
Huddersfield
HD1 3DH

University of Huddersfield

IPOS

A two-day course

The Science of Fine Chemicals Process Development

presented by

Professor John H Atherton

Dr Nick Powles

and Dr Matthew Stirling

20th and 21st October 2010

at Runcorn Heath



University of
HUDDERSFIELD

Synopsis

This series of modules deals with an area at the interface between chemistry and chemical engineering. It seeks to provide an awareness of the physicochemical principles that underpin process development in the Fine Chemicals area. Systematic approaches to process development and scale up are discussed. Each session finishes with a discussion of the application of material presented, and a 'things to do' list.

The course is targeted at postgraduate and post-doctoral level scientists, both chemists and chemical engineers, involved in process development in the Fine Chemicals and Pharmaceuticals sectors. Both recent appointees and experienced personnel will benefit.

The Course Presenters

Dr John H Atherton is Professor at the University of Huddersfield. He has 30 years experience in applying physical organic chemistry to process development in industry, and has presented this course both within his own organisations and externally. Drs Nick Powles and Matt Stirling have together over 20 years experience in the same area.

Programme

Day 1		Day 2	
0900	Module 1	0900	Module 7
1000	Break	1000	Break
1015	Module 2	1015	Module 8
1115	Break	1115	Break
1130	Module 3	1130	Module 9
1230	Lunch	1230	Lunch
1330	Module 4	1330	Module 10
1430	Break	1430	Break
1445	Module 5	1445	Module 11
1545	Break	1600	Break
1600	Module 6	1615	Review
1700	Finish	1700	Finish

A course manual will be provided containing the overheads from each module.

Tea/coffee will be provided on arrival, mid morning and afternoon.

A buffet lunch will be provided

Module Descriptions

1. Process Development Principles – a strategy for data acquisition

This module demonstrates the need for an interdisciplinary working culture in process development and illustrates the range of information that may be required to provide a robust and scaleable process description. The use of reaction pictures to clarify and share understanding is exemplified.

2. Refresher on reaction kinetics

A basic understanding of reaction kinetics is necessary to understand our processes. Here a reminder of the basic minimum is provided, and some useful 'rules of thumb' requiring no maths are provided. An introduction is provided to numerical modelling.

3. Pre-reaction equilibria

Pre-reaction equilibria have a major influence on the rate of reaction of ionisable species. This module exemplifies common types of pre-equilibria, and shows how to calculate the availability of the reactive species and how to relate this to reaction rates. Relevance to workup processes is also explained

4. Competing reactions

Identification of competing, undesired reactions is fundamental to achieving an improvement in selectivity at the reaction stage. The concept of reaction pictures is further developed and exemplified using the acylation of amines in aqueous conditions. Understanding the characteristics of the process enable optimum conditions to be selected with a minimum of data and experimentation.

5. Phase equilibria in reaction and work-up

This module covers a number of topics which are not generally part of the thought processes in process development. They can have a major influence on process efficiency, particularly at the work-up stage.

6. Mixing effects on reaction selectivity

Degradation of performance on scale-up due to inadequate agitation is quite common in multipurpose equipment. Extensive use is made of video material to illustrate the principles. Simple diagnostic tools and general solutions to these problems are presented

7. Solvent effects on reaction rates and selectivities

The fundamental science behind solvent selection is outlined, and application of these principles to several practical problems is demonstrated..

8. Mixing and separation in two-phase systems

A majority of reactions in Fine Chemicals manufacture involve multi-phase reaction systems. Scale-up of such systems is frequently problematic. This module covers the concepts necessary to identify potential problem areas, and gives guidance on scale-up criteria.

9. Chemistry in multi-phase systems

Multiphase reactions cause more than their fair share of difficulty in development and scale-up. Overall reaction kinetics and selectivity in multi-phase systems can be greatly different from those observed in single phase reactions. The science behind such processes is explained and some general guidance for process development is provided.

10. Scale-up

Explains the science behind scale-up and shows how to identify and avoid potential problems

11. Worked example – a scale-up problem

A worked example involving multiple concepts from the earlier sessions will help to gel the various concepts introduced in earlier modules.