



# SCIENTIFIC UPDATE

*We've got chemistry*



**Graz, Austria**  
Das Weitzer

# FLOW CHEMISTRY

22-23 MAY 2019

**NEW**

Flow Chemistry  
**MASTERCLASS**  
24 MAY 2019

A 2 day course  
presented by  
**Prof. C Oliver Kappe**  
& **Dr Will Watson**  
A 1 day Masterclass  
in Flow Chemistry  
presented by  
**Prof. C Oliver Kappe**

# FLOW CHEMISTRY

22-23 May 2019 Graz, Austria, Das Weitzer

Multiple attendees discounts  
**UP TO 15% available**

## INTRODUCTION

Flow chemistry has been used in petrochemical and bulk chemical production for over 100 years but has only really been taken up in the pharmaceutical and fine chemical industries over the last 10 years or so.

This course aims to give an introduction to the subject and an overview of the current state of the art. A variety of chemical reactions in flow and how to translate a conventional reaction in to a flow process will be described.

This also entails choosing the right type of flow reactor for the chemistry, and a number of different flow reactor systems will be discussed and compared. Handling solids in flow systems, inline and online monitoring of flow reactions will also be covered along with the hazards and pitfalls associated with scaling up flow reactions.

## WHAT WILL ATTENDEES GAIN?

- > What is flow chemistry/ microreaction technology and why go flow
- > Which types of chemistry are most likely to benefit from being run in flow systems
- > How to convert an existing lab reaction in to a flow process
- > The choice of flow reactors available and when the choice of reactor is likely to be important
- > Practical tips associated with safety and scale up of flow reactions

## COURSE OUTLINE

### 1. Introduction to Flow Chemistry and Microreactors

- General references
- Basic principles/advantages of microreactor technology: definitions, mixing efficiency, flow regimes, heat and mass transfer
- Equipment review: microreactors, mesofluidic/tubular reactors, cartridge-based systems
- Operative principles in flow: residence time, flow rate, back pressure, yield

### 2. Microreactor Chemistry Concepts / Examples

- Strongly exothermic and/or fast reactions, "flash chemistry", hazardous chemistry and processes
- Special techniques: flow photochemistry, electrochemistry, enzymatic reactions

Problem Session 1 - Group Work

### 3. General Flow Chemistry Examples

- Homogeneous liquid-phase reactions
- Multi-phase reactions (liquid/liquid, liquid/solid)
- Reactions with gaseous components: gas, gas/liquid, gas/liquid/solid

### 4. High-Temperature / Pressure Flow Chemistry

- Flow chemistry in high-T/p process windows (Novel Process Windows), translating microwave protocols to flow, flow microwave chemistry

### 5. Physical and Analytical Aspects of Flow Chemistry

- Handling solids in flow systems
- Inline / online reaction monitoring
- Regulatory aspects related to the development of flow processes

Problem Session 2 - Group Work

### 6. Scaling up Flow Reactions

- Industrial examples of microreactor technology
- Choice of equipment
- Reaction conditions

### 7. Case Studies in Flow Chemistry

- Examples from Pharmaceuticals and fine chemicals

### Question and Answer Session

## VENUE

Das Weitzer  
Grieskai 12-14, 8020 Graz, Austria

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

It's a hotel that has been in the city for more than 100 years, and will always be state-of-the-art. Modern mixed with traditional. Florian Weitzer is managing the hotel in the fourth generation, and with character and contemporary ideas. And the Weitzer has even more to offer. Located right in the Old Town, directly by the Mur, just a few steps from the Kunsthau and very near to Schloßberg, Hauptplatz und Congress Graz.

We have organised a special accommodation rate of €125.50 per night. Information on how to book will be provided on your registration confirmation.





# SCIENTIFIC UPDATE

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**Start** 9.00am - Wednesday 22 May

**Finish** 3.30pm - Thursday 23 May

**Course dinner** 7.30pm - Wednesday 22 May

**Course Fee:** €1,899

Which includes comprehensive course manual, refreshments throughout the day, lunch and one course dinner.

**Course fee:** €1,899

## COURSE TUTORS

### Professor C Oliver Kappe

University of Graz

C. Oliver Kappe received his diploma- (1989) and his doctoral (1992) degrees in organic chemistry from the University of Graz where he worked with Professor Gert Kollenz on cycloaddition and rearrangement reactions of acylketenes. After periods of postdoctoral research work on reactive intermediates and matrix isolation spectroscopy with Professor Curt Wentrup at the University of Queensland in Brisbane, Australia (1993-1994) and on synthetic methodology/alkaloid synthesis with Professor Albert Padwa at Emory University in Atlanta, USA (1994-1996), he moved back to the University of Graz in 1996 to start his independent academic career. He obtained his "Habilitation" in 1998 in organic chemistry and was appointed Associate Professor in 1999. Since 2011 he holds the position of Professor of "Technology of Organic Synthesis" (Organische Synthesetechnologie) at the University of Graz. He has spent time as visiting scientist/professor at e.g. the Scripps Research Institute (La Jolla, USA, Professor K. Barry Sharpless, 2003), the Toyko Institute of Technology (Toyko, Japan, Professor T. Takahashi, 2008), the University of Sassari (Sassari, Italy, 2008), the Sanford-Burnham Institute for Medical Research (Orlando, USA, 2010) and the Federal University of Rio de Janeiro (Rio de Janeiro, Brazil, 2013). The co-author of more than 400 publications, his main research interests have in the past focused on multicomponent reactions, combinatorial chemistry and the synthesis of biologically active heterocycles. More recently his research group has focused on the use of enabling and process intensification technologies for synthetic chemistry, including microwave and continuous flow processing. For his innovative work in microwave chemistry he received the 2004 Prous Science Award from the European Federation for Medicinal Chemistry and the 2010 Houska Prize (€100.000) in addition to a number of other awards.



### Dr Will Watson

Technical Director,  
Scientific Update

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 also active in the consultancy side of the business.



@ [will@scientificupdate.com](mailto:will@scientificupdate.com)

## IN-HOUSE COURSE

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

## REGISTRATION

You can either use our fast online booking system or 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 (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 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 (or equivalent in €/£) processing fee. Unfortunately refunds are not possible after that date. Substitutions can be made at any time.

# Optional Flow Chemistry MASTERCLASS

24 May 2019 University of Graz, Austria

NEW!

Although attendees of the Flow Chemistry Course will be well acquainted with the basic principles of flow chemistry and the advantages it can offer, the real “tricks of the trade” can only be learned in the lab. This one-day flow chemistry lab session, hosted by the “Center for Continuous Flow Synthesis and Processing” (CCFLOW), offers a unique hands-on experience of flow chemistry in action.

Participants will learn to select and operate a suitable flow reactor, gaining an understanding of the equipment and techniques involved. The experienced team at CCFLOW will offer practical advice on the set-up and execution of continuous processes. In the state-of-the-art laboratory space, small groups of participants will see live demonstrations of flow reactor technologies, including:

- > Single- and multiphase flow chemistry
- > Gas-liquid flow chemistry, mass flow controllers
- > High-temperature/pressure process windows
- > Glass, Hastelloy and silicon carbide plate-based flow platforms
- > Flow photochemistry and electrochemistry
- > In-line and at-line process analytics (IR, NMR, UV, UHPLC)
- > Liquid-liquid and gas-liquid separations
- > Piston-, syringe- and peristaltic pumps
- > 3D printed reactors (steel, ceramics)

## DETAILS

### DATE & TIME

Friday 24 May 2019  
9.00am - 4.30pm

### VENUE

University of Graz, Austria

### TUTOR

Professor C. Oliver Kappe  
and members of his research  
group

### Masterclass fee includes:

- > one-day flow chemistry lab session
- > coffee/tea refreshment breaks throughout the day
- > buffet lunch

## HOW DO I ATTEND?

Places for the Masterclass are limited and first option will go to those delegates who are booked onto the Flow Chemistry Course in Graz.

If you are booked onto the course you have the option to select the Masterclass at an additional cost of €700 per person.

If you would like to attend only the Masterclass, please email [sciup@scientificupdate.com](mailto:sciup@scientificupdate.com) to register your interest. You will be placed on a waiting list where we will keep you posted – the cost will be €850 per person.

No. of attendees  @ €1,899**Special Offer!** Register 2 delegates and receive 5% on 2nd booking  
Register 3 delegates and receive 10% on 3rd booking  
Register 4 or more delegates and receive a 15% discountDo you wish to attend the Masterclass?  @ €850 / €700**First attendee**

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Title (Dr/Prof/Mr/Mrs/Ms)

First name

Surname

Job Title

Address

Post Code / Zip

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Payment will be made by:

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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 GBP, or Dollars 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:

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