Spray Drying and Atomisation of Formulations
Tuesday 20 – Thursday 22 March 2018

Tuesday 20 March 2018
Spray Drying and Atomisation Basics

09:00 Registration and coffee
09.30 Welcome and group introduction – What do delegates want to get from the course?
   Dr Jim Bullock, iFormulate Ltd
09:40 Introduction to spray drying, how does it compare with other drying techniques, mechanisms and impact of the Formulation on process and plant design
   Professor David York, University of Leeds (formerly of Procter and Gamble)
10:20 Fluid properties and rheology
   Professor Andrew Bayly, University of Leeds (formerly of Procter and Gamble)
11.00 Atomisation
   Professor Phil Threlfall-Holmes, TH Collaborative Innovation & Visiting Professor at the University of Leeds, (formerly of AkzoNobel)
11:40 Coffee
11.55 Drying and Congealing the particle
   Filip Van der Gucht, ProCept
12:45 Spray drying hazards and safe operation
   Paul Dewhirst, HSD Safety Ltd
13.20 Lunch
14.05 Hands-on laboratory demonstration sessions
   (a) Feedstock/Rheology: Professor Andrew Bayly, University of Leeds
   (b) Particle Sizing: Dr Tina Bonakdar, University of Leeds
   (c) Drying Parameters: Filip Van der Gucht, ProCept
   (d) Atomisation: Dr Phil Threlfall-Holmes, TH Collaborative Innovation & Visiting Professor, University of Leeds, (formerly of AkzoNobel)
   (e) Characterisation of spray dried powders: Professor David York
   (f) Avoiding extreme behaviour of materials: Paul Dewhirst, HSD Safety Ltd
15.50 Tea
16.10 Spray drying: Basic models, energy balance
   Professor Andrew Bayly, University of Leeds
16.40 Scale up of spray drying processes
   Henrik Schwartzbach, GEA
17.10 Water in our World, Water in our Materials
   Dr Daryl Williams, Imperial College London
17.45 End of day one
19.00 Course Dinner

Wednesday 21 March 2018
Industrial Formulation Case Studies

08:45 Coffee
09:00 Welcome
   Dr Jim Bullock, iFormulate Ltd
09:10 Phase changes in spray drying
   Professor David York, University of Leeds
09:35 Spray drying with two-fluid nozzles; atomisation, scale-up and modelling
10:10 Coffee

10:25 **Agglomeration, build-up and the potential for charring in the spray drying tower**
Luis Martin de Juan, Procter and Gamble

11:00 **Spray drying of pharmaceuticals**
Andrew Naylor, Upperton

11:35 **Application of spray dried materials in the pharmaceutical industry – what, where and how much?**
Andrew Parker, Juniper Pharma Services

12:10 **Processing science in an infant milk formulae factory**
Koen van Dijke, Danone

12:45 Lunch

13:30 **Hands-on laboratory demonstration sessions**
- (a) **Feedstock/Rheology**: Professor Andrew Bayly, University of Leeds
- (b) **Particle Sizing**: Dr Tina Bonakdar, University of Leeds
- (c) **Drying Parameters**: Jim Tyzack and Ben de Schepper on behalf of Filip Van der Gucht, ProCept
- (d) **Atomisation**: Dr Phil Threlfall-Holmes, TH Collaborative Innovation & Visiting Professor, University of Leeds, (formerly of AkzoNobel)
- (e) **Characterisation** of spray dried powders: Professor David York
- (f) **Avoiding extreme behaviour of materials**: Paul Dewhirst, HSD Safety Ltd

15:15 Tea

15:35 **Modelling of the spray drying process using empirical inputs**
Henrik Schwartzbach, GEA

16:10 **Cyclone design and operation**
Professor Mojtaba Ghadiri, University of Leeds

16:45 **Engineering particle structure and applications**
Professor Andrew Bayly, University of Leeds

17:20 **Panel Discussion (all speakers): Future challenges and opportunities**

17:30 Wrap-up: What would delegates still like covering?

17:40 Networking Drinks Reception, Nibbles and Poster Session

18.30 End of day two

**Thursday 22 March 2018**

**Powder finishing, modelling and future developments**

08.45 Coffee

09.05 Welcome
Dr Jim Bullock, iFormulate Ltd

09.15 Managing moisture in practice
Sophie Salmain, Nestle Ireland

09.50 Product design by fluid bed systems as downstream units of spray dryers
Henning Falck, Neuhaus Neotec

10.20 Coffee

10.40 Modelling and scale up of spray drying
Dr Pedro Valente, Hovione

11.10 Future directions in atomisation technologies for pharmaceutical applications
Dr Pedro Valente, Hovione

11.45 Mechanistic model enhanced digital design and digital operation of spray drying processes
Dr David Slade, Process Systems Enterprise Ltd (PSE)

12.15 Lunch

13.15 Trouble shooting forum

15.00 Coffee and close