

Freeze-Drying Technology

Principles
and current
practice

Design and Engineering

Freeze drying experts **Biopharma Technology Ltd (BTL)** present a practical two-day course covering the science and engineering of freeze dryers.

Freeze dryers are complex machines, comprising a vacuum chamber, refrigeration system, condensers, sensors and often stoppering and sterilisation systems. This in-depth course will offer an overview of the key systems at work in your freeze dryer. It will provide information on maintenance and basic faultfinding to help you keep your equipment running smoothly. It will also give you an insight into the mechanical aspects of the freeze drying process.

This course is suitable for those involved in using and maintaining freeze drying equipment, from technicians and engineers to production and facilities managers.

Price:
£850.

Discounts are available for early registration & payment, for academia and for multiple bookings. Please contact us for more information.

Freeze Drying: Design and Engineering

11th-12th May 2010

We also hold courses in Freeze Drying: Product and Process. For more information check online at www.lyophilizationtechnology.com/training.htm or contact us at btl@biopharma.co.uk.



About the course

Topics covered

Introduction to Freeze Drying Technology: -Definitions and basics; the advantages of freeze drying; the different stages of the freeze drying cycle, from freezing to stoppering
Design of a Freeze Dryer: - Essential components: chamber, condenser, vacuum, etc; optional components: stoppering, sterilisation, inlet gas filter; accessories; operating ranges
Vacuum System: - Vacuum measurement and uncertainty around it; types of pumps & accessories; methods of vacuum control; leak detection
Refrigeration: - Basic laws & principles; the temperature-pressure relationship; different refrigerants and regulations around their use; retrofitting
Refrigeration System: - Parts of a refrigeration system; the vapour compression cycle, and the other components within it; refrigerant flow control; cascade and LN2 systems
CIP and SIP systems: - Typical systems and design considerations; methods & issues
Temperature Measurement: - Temperature measurement around the freeze-drying system; product temperature; methods of measurement and recording; data presentation and 21CFR11; calibration
Process Condensers: - Purpose and designation; design details and construction; capacities and calculating load sizes; solvent traps and de-icing
Faultfinding: - Faultfinding in the major systems of a freeze dryer: refrigeration, vacuum, and control system; typical problems and their causes; preventative maintenance and spare parts
Validation: - Validation Master Plan; URS, FAT, IQ, DQ, OQ and other types of qualification; shelf & sterilisation mapping; protocols; GAMP
ALUS: - Main components and control systems; safety features and documentation; isolation vs barriers
PAT: - Definitions; an introduction to devices currently used to control freeze drying cycles, including thermocouple probes, pressure rise testing, cold plasma, and micro balance

Please note timetable shown is an example and may be subject to change.

About Biopharma Technology Ltd

BTL has assisted in the development of more than 500 freeze-dried products including small and large molecules and whole organisms. In our dedicated freeze-drying laboratory we also use two specialist analytical instruments that we have developed in-house, the *Lyostat2* freeze drying microscope and *Lyotherm2* DTA / Impedance analyser. These enable us to tackle freeze drying problems scientifically, characterising formulations qualitatively in terms of thermal properties as well as specific lyophilisation-related parameters such as collapse temperatures.

About the course leaders

Tony Gaster is a chemical engineer by training and has been working in freeze-drying for more than 20 years. While working for a major freeze-dryer manufacturer Tony helped design, improve and innovate different aspects of production freeze-drying systems. In 1989 Tony started Biopharma to provide a range of products and services in freeze drying. He has lectured with the PDA, ISPE and CFPA in this field.

Richard Wood trained as a marine engineer specialising in control system engineering, refrigeration and training. As Technical Director for Biopharma Technology's sister company, Biopharma Process Systems, Richard has built up a service department responsible for the installation, commissioning and validation of new machines and servicing of installed machines. Richard has personally managed or assisted with over 120 qualifications and installations in the last 20 years and continues to write documentation concerned with the operation, maintenance and qualification of freeze-dryers.

Course details and booking form

Dates: 11th-12th May 2010

Location: Biopharma House, Winnall Valley Road, Winchester, SO23 0LD, UK

Please note that the cost of accommodation is not covered by the course fees. Details of travel and local hotels will be mailed to you with your confirmation for you to make your own booking.

Fees: £850

Academic Discount: A lower fee is available for the academic sector. Please enquire for further details. (*proof of academic status is required.*)

Early Bird Discount: When booking and payment is made before 6th April, a reduced fee of **£750** is available.

Fees include morning and afternoon tea/coffee, lunch and full lecture notes.

Name	
Job Title	
Organisation	
Address	
Invoice Address (if different)	
Purchase order no.	
Phone	
Fax	
Email	
Please reserve	places

Fax to: +44 1962 841147 or book online at www.lyophilizationtechnology.com/application.htm

Payment must be made in full 2 weeks before the start of the course. Payment by BACS, cheque, Visa or Mastercard is acceptable. An invoice will be issued on receipt of booking.

Multiple registration from the same company or organisation will attract a discount, please contact us for details.

Cancellation in writing before 6th April will incur a service charge of 30% of the applicable fee. No refunds can be made for cancellation after this date. Substitutes will be accepted at any time.

For information on more upcoming courses, visit our website www.LyophilizationTechnology.com.

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