COBBLESTONE

COURSE ID 0435

Sterile Products: Formulation, Manufacture and Quality Assurance

DIRECTED BY

Dr. Gregory A. Sacha — Associate Director of R&D for Baxter BioPharma Solutions in Bloomington, IN

18 HOUR

ACCREDITED COURSE

Course Topics Include:

- Formulation and Manufacture of Solutions, Suspensions and Lyophilized Products
- Freeze-Drying Process Development
- Packaging for Sterile Products
- Aseptic Unit Operations
- Sterilization Principles
- Sterile Filtration
- Particulate Matte

about the course

Parenteral product development and aseptic manufacturing can be intimidating to people new to the topics. The approach to formulation and process development is substantially different than for oral and topical medications. Product development and manufacturing must consider how all of the manufacturing processes align to ensure chemical, physical, and microbiological stability with particular attention to proper aseptic technique.

This 18-hour accredited course introduces participants to aseptically manufactured products, routes of administration, and how routes of administration and other requirements affect product development. Interactive discussions are encouraged to ensure questions about the manufacturing processes are raised and different experiences are shared. Demonstrations are provided for gowning, reconstitution of a freeze-dried solid, and preparation of an infusion using proper aseptic technique.

who should attend

This intensive course is intended for those new to the topics of parenteral product development and aseptic manufacturing and those needing a refresher on the topics as well as those seeking confirmation of acceptability of existing practices. It will be of particular value to those in:

• Research	• Production
• Development	• Quality Assurance and Control

Those who wish to broaden their appreciation of these technologies and review the latest developments, as well as managers who have responsibility for a broader base of activities will find the course of interest.

learning objectives

Upon completion of this course, you will be able to:

- Define the unique characteristics of sterile dosage forms, how these characteristics are achieved and maintained
- Examine approaches to formulation and process development for parenteral products that include small and large molecules
- Describe the aseptic manufacturing processes and all unit operations involved in sterile product manufacturing and control, including sterilization, filtration and lyophilization
- Outline the facility, personnel, and microbial control requirements, fostering an appreciation of the distinctive requirements of sterile products and acquaintance with quality control procedures and international regulations
- Define the factors affecting aseptic technique and demonstrate the technique

course outline

Review of Learning Objectives
Overview of the Sterile Dosage Form:

- Examine currently marketed parenteral products including those for the eye
- Discuss the basic characteristics and requirements of sterile products
- Discuss routes of administration and why they matter
- Review historical perspectives that changed the approaches to developing parenteral products

Formulation of Solutions:

- Thoroughly discuss factors affecting solubility and stability
- Examine development of formulations for small and large molecules with a focus on large molecules
- Excipients for parenteral products will be examined and examples will be provided on how and when to use them
- Excipients and concentrations used for multi-dose products will be discussed
- Tonicity will be discussed, and examples provided for when and how to adjust formulations based on their routes of injection

Formulation of Dispersed Systems:

- Examples of marketed dispersed systems and how they improved previous formulations will be provided
- Discussions include traditional suspensions, emulsions, colloidal dispersions, and liposomes
- Examples of manufacturing techniques

Visual Inspection and Particulate Matter:

- All products contain particles, but they should be non-specific and too small in number and size to find and identify
- Discuss visual and subvisible inspection, the equipment used, and the regulatory requirements
- Examine isolation and identification of visible particulate matter and considerations for quality control testing will be provided

Formulation and Process Development of Lyophilized Products:

- Examine how lyophilized formulations and the process to make them are intimately connected
- Consider formulation excipients needed for small and large molecules with a focus on large molecules
- Introduce how thermal analyses aid in development of the process
- Examine and thoroughly discuss the steps of a lyophilization process

Preparation for Sterile Manufacturing:

- A detailed review of the aseptic manufacturing facility and personnel requirements is conducted with examples of actual situations affecting GMP regulations
- Types of Aseptic Filling and Processing Environments
- Processes for cleaning, preparing, and monitoring the environment are discussed

Sterile Manufacturing Unit Operations:

- Discussions include descriptions for typical operations of component/equipment preparation, compounding and mixing, and other common processing steps.
- Filters and filtration are examined with respect to types available, how they are used, and how they are tested.

Parenteral Product Packaging:

- Materials of construction and primary packaging containers created from the materials is examined
- Challenges with glass and plastic materials with real examples are provided
- Currently marketed products and possible future products are discussed, and examples are available for evaluation

Demonstrations

- A demonstration of gowning for entering an aseptic processing area is provided.
- Proper aseptic technique is demonstrated through reconstitution of a lyophilized sample and transfer of the solution to an infusion bag.
- Demonstration of reconstitution and preparation of an infusion while focusing on aseptic technique

QC Testing:

- Examine the basic principles and methods for sterility testing, pyrogen testing, and GMP stability testing.
- Examine testing specific for certain products such as lyophilized formulations and pre-filled syringes.

Sterility Assurance:

- Discussions include the basics of microbiology and contamination control
- Examine the differences between cleaning, sanitization, depyrogenation, sterilization, and aseptic processing
- Review the methods used for depyrogenation and sterilization
- Examine when to use certain methods of sterilization for different materials used during manufacturing

Assessment Opportunity

Formulation and processing case studies and answers will be included in the course notes, but not necessarily covered in lecture. References and certain tables/ attachments also in back of course notes.

course instructor

Dr. Gregory A. Sacha, is Associate Director of R&D for Baxter BioPharma Solutions in Bloomington, IN. He received a BS in Pharmacy from Butler University in 1993 and earned a PhD in Industrial and Physical Pharmacy from Purdue University in 1999. Dr. Sacha specializes in the formulation of sterile solutions and lyophilized solids for large and small molecules. His research includes thermal characterization of pharmaceutical solutions, development and optimization of lyophilization cycles, and identification of particles through microscopic and spectroscopic methods. Dr. Sacha is experienced in technology transfer, scale-up and process improvement for solid oral and parenteral manufacturing processes and has presented lectures for this course since 2005 in Europe and the United States.

additional faculty

J**ames K. (Jamey) Jarman** is a Manger of Technical Services for Baxter BioPharma Solutions in Bloomington, Indiana. He has over 25 years of pharmaceutical manufacturing experience, specifically in sterile parenteral manufacturing. Mr. Jarman's background includes aseptic filling operations for vial, syringe, and cartridge products; suspension filling, lyophilized product manufacturing, formulation activities, equipment, and component preparation, and capping related operations. He also has experience in quality assurance, regulatory auditing, technical transfer, and process validation activities. Mr. Jarman received his BS degree from Indiana State University in 1990.

Accreditations

International Accreditors for Continuing Education and Training (IACET)
Cobblestone has been approved as a CEU Accreditor by IACET and awards CEUs for participation in qualified courses. Cobblestone has demonstrated that it complies with the ANSI/IACET Standards and is authorized to offer IACET CEUs for its programs. CEUs will be awarded for participation in Cobblestone's courses at the rate of .1 CEU per contact hour upon successful completion of the entire course and 70% accuracy in the required Learners' Assessment. A minimum score of 80% is required for all courses within a Cobblestone Certification Program. This course offers a total of 18 contact hours, or 1.8 CEUs. For further information, visit www.iacet.org