Cleaning and Disinfection – Importance of cleaning and disinfection in aseptic processing areas

Your Objectives:

At the end of this lesson, you will be able to explain how to clean and disinfect aseptic processing areas.

Cleaning

Surfaces, walls, and work areas in clean-rooms are made of materials that are easily cleanable and that do not deteriorate from exposure to cleaning chemicals. All the surfaces are cleaned and disinfected frequently.

What is clean and what is considered unclean?

Since having micro-organisms in a manufacturing environment is commonplace, it is important to keep possible contaminants in check. As such, frequent testing is performed to ensure maximum sanitisation of the manufacturing environment (i.e. aseptic processing areas).

Biogen sees to it that it implements effective cleaning processes and techniques by environmental monitoring, using several methods not just for sampling surfaces but also for detecting the presence of contaminants on personnel. Either type of monitoring is typically performed by QC personnel (quality control), but it may also be performed by a technician.

Cleaning Manufacturing Rooms

At Biogen, production facilities and rooms must be kept clean and organized. The information included here provides some general considerations for cleaning Biogen production rooms and cold-rooms.

Production Rooms

SOPs (standard operating procedures) provide specific steps related to cleaning specified areas. These include such things as Personal Protective Equipment (PPE) and gowning requirements, trash disposal, cleaning schedules, cleaning products, and the required contact time that cleaning solutions must be on a surface.

Certain protocols are followed, depending on whether the rooms are being used for production (active) or are in a non-production mode (idle).

There is a specified cleaning schedule for the various production rooms at Biogen.

Daily cleanings include, but are not limited to:

- Removing and disposing of debris from the floor
- Mopping of floors
- Emptying trash receptacles
- Removal of any broken glass
- Wiping down, with a 70% alcohol solution, of all horizontal surfaces, door handles, stainless-steel airlock door, sinks, and trash receptacles
- Wiping down, with a 70% alcohol solution, of glass and stainless-steel surfaces

Weekly cleaning chores include performing daily cleaning with the addition of:

- Mopping, with the appropriate cleaning solution, of ceilings, walls, doorframes and floors

Monthly cleanings include performing daily cleaning with the addition of:

- Mopping ceilings, walls, doorframes, and floors with the appropriate cleaning solution
- Cleaning exterior surfaces of all fixed stainless-steel equipment (mix tanks, bioreactors) with stainless steel cleaner followed by 70% alcohol solution
- Wiping down all furniture, stainless steel surfaces, cabinets, and glass with 70% alcohol
- Pouring 5.0% Sodium Hypochlorite solution into all open drains
- For semiannual and post-shutdown cleaning requirements, see the specific SOPs

Cleaning Manufacturing Equipment

In addition to the production room itself, the equipment in the room must be cleaned regularly. Several cleaning processes are applied. These cleaning processes help to prevent equipment malfunction or contamination that might alter the safety, identity, strength, quality, or purity, of the drug product.

Clean-Out-of-Place (COP)

A Clean-Out-of-Place (COP) system requires operators to take equipment apart and move it from the production area to the cleaning appliance. In most instances this involves the use of a washer, called a COP unit or water bath.

The COP system can clean a variety of small equipment, including but not limited to:

- Valves
- Clamps
- Test tube racks
- Hoses
- Gaskets
- Sparge tubes
- Small carboys

Once a COP operation takes place, operators must reassemble the cleaned parts and equipment.

Manual Cleaning

Where COP baths are not available, small equipment is cleaned manually. This may include, but is not limited to, such items as:

- Plasticware
- Utensils
    - Small transfer hoses
- Sanitary fittings

In general, these items are gathered and moved to a designated cleaning area. Small parts are placed in a soaking tray for a time period specified in the SOPs. In some cases, visible residue is removed using a small scrub brush.

Items are rinsed with WFI as specified in the SOPs. Some items require specific conductivity values on the rinse water. Clean parts are placed in trays and allowed to air dry. Other items must be cleaned using an acid wash.

Appropriate cleaning information must be logged in the logbook. Clean equipment must be properly labelled.

Autoclaving

An autoclave consists of a stainless-steel chamber, which is surrounded by a jacket. Items for cleaning are loaded into the chamber through a door. When the device is activated, clean steam circulates through the jacket and into the chamber. The steam displaces the air in the chamber. The steam reaches a temperature of 121°C and 1bar. After an appropriate cycle time, the steam is shut off and the chamber slowly cools.

Some autoclaves have a loading door (to load dirty items) and an unloading door (to remove clean items). Others have single doors for both loading and unloading. Autoclaves also include a printer, or recording device, which provides process information such as temperature, pressure and cycle progress.

<u>Biogen uses autoclaves to sterilize such items as:</u>

- Small vessels
- Bottling apparatus
- Spinner flasks
- Cylinders
- Sampling apparatus
- Glassware
- Valves
- Liquids in containers
- Small instruments

NB: Because of the high temperature, very few plasticware items are autoclaved. Please check the SOPs and other guidelines before autoclaving plastics.

Clean-In-Place (CIP)

Clean In Place (CIP) refers to the process used to clean a piece of equipment that is too large to clean manually. This includes, but is not limited to, bioreactors, tanks, hoses, liquid transfer lines, and any associated stationary piping.

CIP is performed on processing equipment and systems, and serves to:

- Remove residue left by processing batch components
- Control bioburden
- Reduce endotoxin levels

CIP uses a combination of hot water, heat, chemicals, and in some cases compressed air, to sanitize equipment according to specified parameters.

CIP helps to prevent equipment malfunction or contamination that might alter the safety, identity, strength, quality, or purity of the drug product.