

With full commercialization of sterile spray-drying, the full advantages that the technology offers over lyophilization will be fully realized. One of those advantages is discussed in a section below on innovative, lower cost packaging, and delivery solutions that require a flowable powder or liquid product.

Bulk Tank Freeze-Drying

This section describes new technologies for producing sterile powders by freeze-drying in tanks. The processes used by each are similar to drying on lyophilizer shelves, except that freeze-drying is carried out in tanks that agitate the product as it is progressed through the freezing, primary drying, and secondary drying steps. With some systems it is possible to attach a separate spray-freezing chamber. Such systems offer the prospect of greatly reduced drying times compared to conventional tray freeze-drying with product pre-filled into vials.

The “Active Freeze-Dryer” from Hosokawa Micron Powder Systems uses a conical tank with a mixer/wall scraper to mix the material, as well as to remove and refresh it from contact with the wall. The drying tank is jacketed for heat transfer. Figure 1 shows a schematic of the system components, which includes a separate freezing tank [14]. Below is a quote from the Hosokawa literature on how the process works:

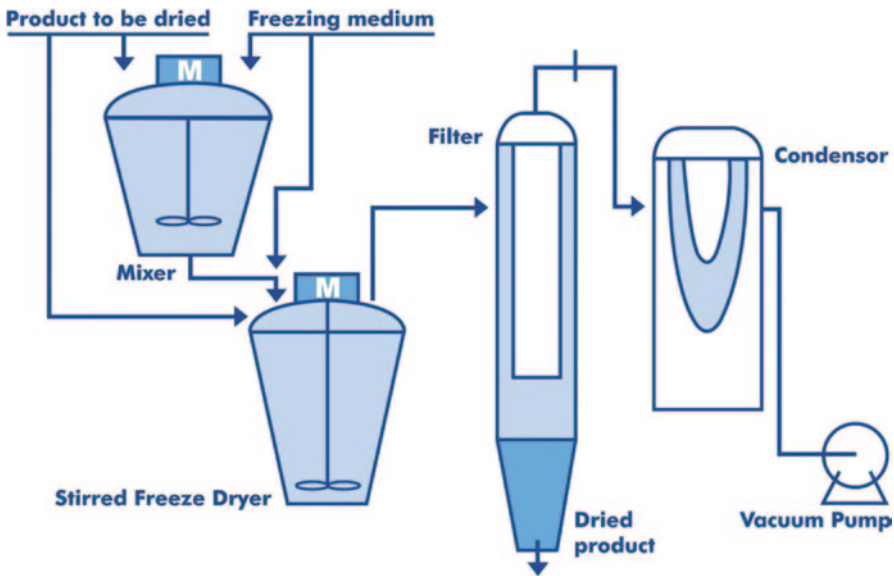


Fig. 1 Schematic of Hosokawa “Active Freeze Dryer” system (Image courtesy of Hosokawa Micron Powder Systems)