



- New mixer-type freeze dryer
- Spray freezing and drying without trays
- Faster process times (up to 80%) and shortened overall process: No post-drying and blending required, no individual tray handling
- Superior product quality, preserved molecular integrity
- Direct discharge in powder form
- Maintenance friendly
- No external freezing agents required
- GMP-compliant: ready for pharmaceutical production
- Scalable capacity: From lab-scale to full production

Keep the Earth Sky-blue
KOBELCO ECO-SOLUTIONS CO., LTD.

Lyophilization RHEOFREED®



RHEOFREED® is a next-generation freeze dryer developed by our partner Kobelco Eco-Solutions in Japan to overcome the limitations of conventional shelf-type systems.

By integrating controlled mixing into the freeze-drying process, it delivers a transformative leap in efficiency, uniformity, and speed - setting a new benchmark for lyophilization technology.

RHEOFREED® has been developed to drive efficiency, both economically and operationally. The process begins by cooling the vessel and inserting an ultrasonic freezing nozzle. Once vacuum is achieved, liquid material is pumped into the vessel and instantly transformed into frozen powder via spray freezing. The nozzle is then removed, and the vessel is heated while it rotates. This ensures uniformity. After drying, the powder is directly discharged via a bottom valve - completing the cycle with minimal handling.

Thanks to RHEOFREED®'s innovative ultrasonic freezing nozzle, residual solvent levels are significantly reduced by enabling rapid solvent evaporation during the spray-freezing stage. This instantaneous transformation minimizes solvent retention and enhances drying efficiency.

To verify product integrity, structural analysis of the peptide using high-performance liquid chromatography (HPLC) have been conducted. The results confirmed that the molecular structure remained fully intact before and after the drying process - demonstrating that RHEOFREED® preserves product quality without compromise.

Key Advantages

- **No external freezing agents required**
- **Compact footprint:** Compared to systems with external freezing chambers
- **Built on proven CDB platform:** Utilizes the Conical Dryer Blender (CDB) design with a conical vessel without internal

moving parts

- **No trays to load or clean**
- **Dynamic drying vs. static shelf drying:** Traditional shelf dryers rely on static drying, often resulting in uneven performance and extended processing times. RHEOFREED® introduces agitation for consistent and accelerated results.
- **Preserved molecular integrity**
- **Contamination-free operation**
- **Deep vacuum:** Low-temperature drying for sensitive compounds
- **Uniform moisture content**
- **Lower residual solvents:** e.g. acetonitrile: 1500 ppm to 162 ppm
- **Eliminates post-drying milling and blending**

Design

- Material: Stainless Steel 316
- Scalable Design: from 0.1 l to 100 l liquid charge amount capacity
- Ultrasonic nozzle for spray-freezing
- Design temperature -30°C to +40°C

