

Advanced Spray Drying Techniques

As a pivotal process in pharmaceutical manufacturing, pharmaceutical spray drying transforms liquid formulations into dry powders, serving a range of purposes from enhancing drug solubility to facilitating inhalable drug delivery systems. Let's delve into the advancements in pharmaceutical spray drying techniques that are shaping the landscape of drug formulation and delivery.

Spray Drying Advantages



Increasing Bioavailability with Amorphous Solid Dispersions (ASDs)

- ASDs enhance poorly soluble APIs' bioavailability.
- Spray drying increasingly adopted for ASD production.

Optimizing Solubility and Dissolution

- Optimizes solubility of low aqueous solubility compounds.
- Widely recognized as a reliable strategy.

Enhancing Bioavailability with SDDs

- Solid dispersion systems enhance bioavailability.
- Improves drug solubility and dissolution rates.

Uniform Drug Delivery

- Enables production of solid dosage forms.
- Ensures uniform drug delivery and dosage accuracy.

High-Dose Delivery to Lungs

- Spray drying enables high-dose delivery.
- Overcomes limitations of powder mass.

Inhalation for Non-Respiratory Indications

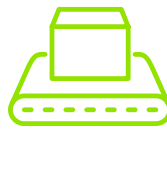
- Utilization of respiratory tract for systemic drug delivery.
- Enhances drug delivery efficiency.

Processing and Scale Benefits



Continuous Manufacturing Capability

- Spray drying offers continuous manufacturing.



Scaling Up Challenges and Strategies

- Challenges in scaling up from development to commercial scale.
- Strategies to mitigate risks.



Versatile Particle Engineering

- Applications in pulmonary and nasal delivery systems.
- Ensures precise particle size and distribution.



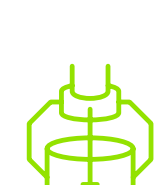
Capacity Expansions and Collaborations

- CDMOs expanding capacity to meet demand.
- Collaborations enhance manufacturing capabilities.



Reproducible and Scalable Process

- Highly reproducible and scalable process.
- Facilitates straightforward scale-up.



Efficient Formulation Development

- Introduction of methodologies like ASD-HIPROS.
- Quality by design approaches for process control.

Flexible Applications and Optimization Techniques

Versatility in Application

- Utilized in microencapsulation, nanotechnology, and vaccines.
- Beyond ASDs, spray drying finds various applications.

Manipulating Feed Solution for Desired Properties

- Control over physical and aerodynamic properties.
- Facilitates precise particle engineering.

Engineering Powder Properties

- Spray drying offers versatility in processing.
- One of the fastest-growing processing technologies.

Atomization and Formulation Optimization

- Tunability of particle size with two-fluid atomizers.
- Optimization of solids loading and excipients.

Fast and Efficient ASD Development

- Advanced tools for de-risked ASD development.
- Minimize API quantities required.
- Facilitates efficient scale-up.

Efficient Product Collection

- Cyclones and filter baghouses for powder collection.
- Challenges and strategies for improving efficiency.

Enhancing Biologic Stability



Biologics Manufacturing for Inhalation

- Growing demand for spray drying in biologics manufacturing.
- Especially for inhalation delivery systems.

Formulating Biologics

- Challenges in stability and degradation.
- Effective moisture control ensures long-term stability.