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SPRAY DRYING NANOSUSPENSIONS

A Novel Approach for Improved Bioavailability in Solid Dosage Forms

Over 70% of new chemical entities have low aqueous solubility. Poor solubility hinders a drug's ability to dissolve in the body, which is essential for absorption, bioavailability, and ultimately, therapeutic effectiveness.

Nanomilling and spray drying technologies, *when integrated*, offer a scalable solution to overcome dissolution challenges and improve therapeutic efficacy.

COMPLEMENTARY TECHNOLOGIES

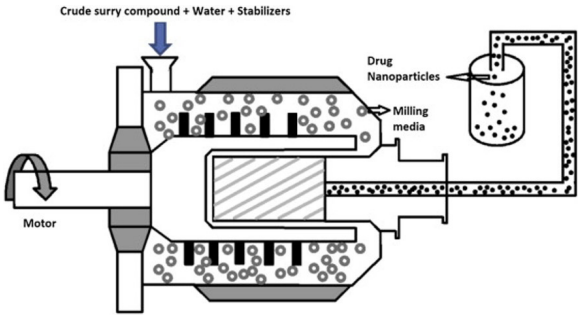
The combination of nanomilling and spray drying offers a powerful solution to the persistent challenge of poor dissolution and variable bioavailability.

NANOMILLING

Particle Size Reduction Technology

Nanomilling is a top-down particle size reduction technique that transforms coarse drug crystals to nanometer-scale particles (100-500 nm) using high-shear mechanical energy with milling media such as zirconia beads. This process significantly increases the surface area while maintaining the crystalline form, making it more stable than amorphous dispersions.

- Requires drug API, stabilizers (surfactants/polymers), and milling media.
- Improves dissolution rate through increased surface area.
- Compatible with various APIs and scalable for production.

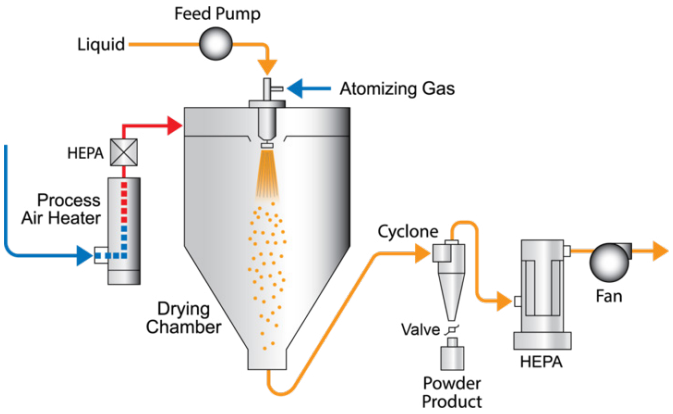


SPRAY DRYING

Converting Liquid to Solid

Spray drying is a continuous, scalable process that converts liquid feed into dry powder through atomization into a hot air stream, causing rapid solvent evaporation. When applied to nanosuspensions, it preserves the nanocrystal size while creating a stable, solid dosage form.

- Involves feed preparation, atomization, drying, and collection.
- Controls particle morphology, size, and flowability.
- Enables better dose uniformity and dissolution.



EFFECTS AND BENEFITS OF A COMBINED APPROACH

The advantages of an integrated approach include eliminating the need to dissolve API (particularly advantageous for poorly soluble drugs), preserving nanocrystal size post-drying when properly formulated, and enhancing dispersion, dissolution rate, and bioavailability of the final powder.

Enhanced Bioavailability

Nanosizing improves dissolution rate of poorly soluble APIs, while spray drying creates a physically stable solid state that maintains the high surface area advantage.

Improved Stability

The combined approach transitions liquid nanosuspensions into stable, free-flowing powders with preserved nanoscale properties and enhanced physical stability.

Scalable and Versatile

Both processes are industry-validated and can be scaled for commercial production, enabling either reconstitution for suspension dosing or direct compaction into solid forms.

Struggling with solubility or bioavailability challenges?

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