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Thesis Abstract (1994)

COMPARISON OF RESPIRABLE PARTICLES GENERATED BY TWO PROCESSES: NEBULIZATION DRYING AND SPRAY DRYING

Particle size reduction enhances the pharmaceutical utility of many drug substances, and is achieved through mechanical milling, controlled crystallization, or spray drying. This research compared a novel nebulizer dryer to a Buchi 190 Mini-Spray Dryer in terms of particle size, size distribution and product yield. A nebulizer, by selectively impacting the larger droplets on baffles and recirculating them into the feed solution reservoir, produced small droplets, while a spray dryer propels all droplets into the drying air stream. Droplet size is a critical determinant of final particle size. Optimum operating conditions to yield sub-5 μ m particles for both pieces of equipment were determined by testing at high, medium and low inlet temperatures and drying airflows. Dry, spherical particles were produced in both the spray dryer (1.5 μ m + 0.1) and the nebulizer dryer (1.3 μ m + 0.2) at optimized settings with a 1% w/v feed solution. The nebulizer dryer gave significantly higher average yields of 92.6, 74.9, 79.1, 87.4, and 75.9% compared to spray dryer average yields of 57.8, 52.9, 55.9, 57.3, and 44.6% at lactose/dye concentrations of 0.06, 1.0, 5.0, 10.0, and 15.0% w/v, respectively. The nebulizer dryer produced high yields at low inlet temperatures and drying airflows, provided better energy efficiency, and was convenient for use with small volumes of feed solution.

Education Summary

- 1988 – 1994, Graduated with M.S. in Pharmaceutical Sciences, University of Maryland, Baltimore.
- 1978 – 1981, B.S. in Pharmacy, University of Maryland School of Pharmacy, Baltimore.
- 1967 – 1971, B.S. in Chemistry, University of Pennsylvania, Indiana, PA.

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