Spray-Drying of Biopharmaceuticals

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Introduction

Spray-drying has been utilized in the pharmaceutical industry for more than five decades. Spray-dried granules possess excellent flow properties and, when used for tablet or capsule formulations, result in excellent batch-to-batch dose uniformity. A typical spray-dryer atomizes a stream of sprayed liquid into a fine, uniform dry powder. Sprayed liquids range from simple solutions of drugs to emulsions and suspensions. Even though the principles of spray-drying were established decades ago, spray-drying has gained popularity in recent years, especially for the production of biopharmaceutical formulations. While exposure to high temperature during the drying process is always a concern for spray-dried biopharmaceuticals, spray-freeze-drying, a recent permutation of the conventional spray-drying process, does not require high drying temperatures and has expanded the range of biopharmaceuticals suitable for formulation. This chapter reviews the basics of spray-drying from equipment design to optimization, highlights the advantages and challenges of spray-drying biopharmaceuticals, and explores especially rich areas of research within spray-dried biopharmaceuticals, specifically, pulmonary delivery for vaccines and inhaled insulin.

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