

STEM

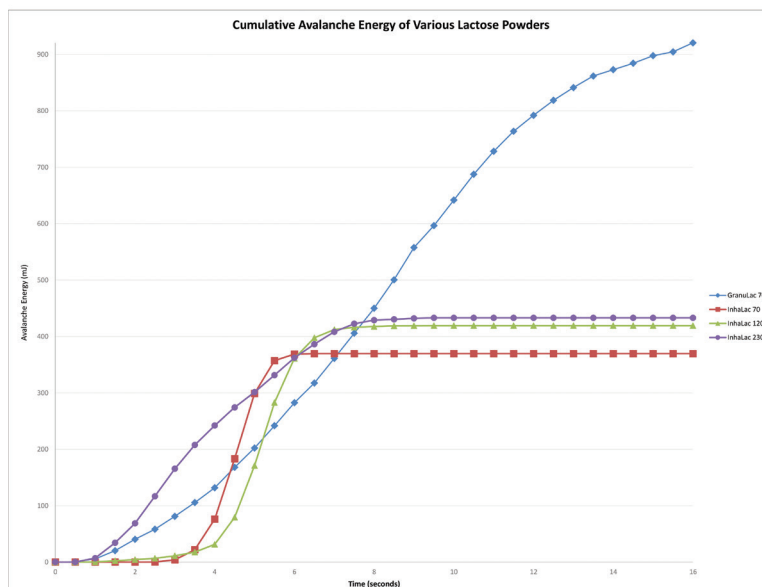
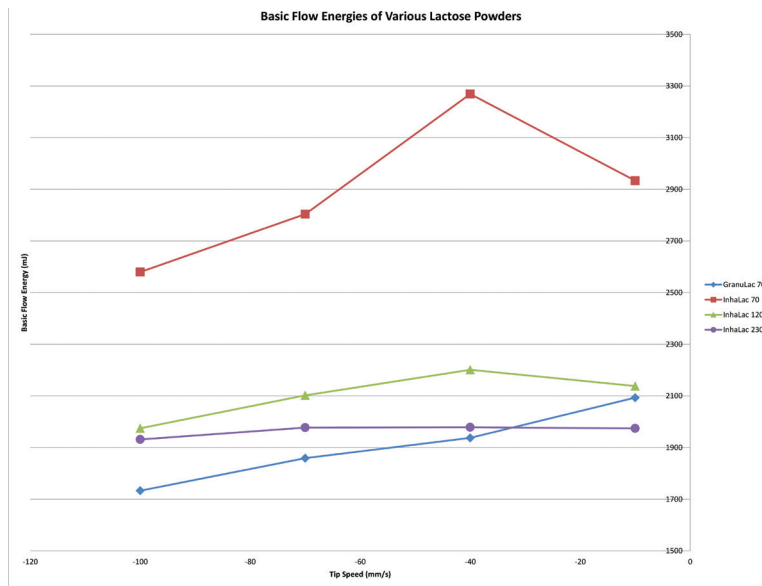
Assessing Powder Flow: An Analysis of Starch and Lactose Powders Under Static and Dynamic Conditions

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Powders are widely used in industry, and understanding their behavior is vital to control manufacturability, stability, and quality. Particles in a powder are complex and irregular, with different physicochemical properties that make predicting powder flow a challenge. Although there have been recent developments with various powder analyzers, still there is not a clearly defined parameter to predict powder flow. A variety of methods have been considered, both static and dynamic in nature, to assess powder flow under certain conditions. In this study, we analyzed the flow of various lactose and starch powders, using the REVOLUTION Powder Analyzer and the FT4

Powder Rheometer to systematically evaluate powders for food and pharmaceutical relevance. The results suggest that the properties such as particle size and particle shape are partially responsible for flowability. The results of this study provide a better understanding of how to properly characterize and predict the flow of powders. Other approaches are underway for the full characterization of materials so we may have a fundamental insight on their flow behavior.

Research advisor Teresa Carvajal writes, "Powder behavior challenges the development of powder goods, and the need to understand and address powdered systems continues. Powder behavior is a function of particulate properties such as cohesion/adhesion interactions at the particle level, and the collective surface characteristics account for bulk powder flowability performance."



The top graph shows data collected from the FT4 Powder Rheometer; energy was calculated from a rotating blade going down a vessel. The bottom graph shows data collected from the REVOLUTION Powder Analyzer; energy was calculated based on both the distance and the length of time the powder fell. Because of the differences in particle size and crystal habit among lactose powders, various powders are shown.