MONASH University
Engineering

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Title **How should I sprinkle this? Understanding Wetting and Dissolution of Powders and Products**

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Pre requisites to do this project: CHE2161, CHE2162, CHE2163

The Problem

Dissolution of powdered ingredients and products into a fluid is a common step in many manufacturing and production processes. Clumping of the powder on the surface of the fluid slows down the wetting process and prevents the powder from full contact with the fluid. This creates problem both for manufacturers, who often need to disperse a powdered ingredient into a large mixing vessel, and for consumers, who want their hot chocolate granules to disperse quickly without forming lumps at the surface of the drink.

It is generally understood that controlling the rate of powder addition, compared to the velocity of the fluid surface, is an important factor in whether clumps of powder are formed. Adding the powder slowly to a fast moving fluid (ie “Sprinkling”) will help avoid lumps. The particle size and flow properties of the powder are also important factors in wetting, dispersion and dissolution of powders.

The Project

Currently, the rate of addition of the powder, relative to the liquid, cannot be predicted. Experiments with various powders will be conducted to investigate this problem and try to predict a suitable powder flowrate for a given powder size and liquid surface velocity. A vibrating feeder will be used to add powders of varying sizes at a range of flow rates to a special long laminar flow channel with a known fluid velocity. Pictures will be taken of the clumping behaviour (if any) and the time taken for wetting into the fluid. From the results, general rules for maximising powder contact with the fluid will be developed. These rules can be used in designing powder-liquid mixing processes and designing reproducible powder dissolution testing techniques.