APPLICATION NOTE
## VELOCITY DISTRIBUTION OF WHEY DRINKS, PARTICLE SIZE DISTRIBUTION ACCORDING TO ISO 13318

Introduction

For a successful positioning on the market for whey drinks innovative product concepts are required. Functional whey drinks feature e.g. additives like peptides. Exotic flavours are designed and introduced. The new products meet the same requirements for quality from retailers and end-consumers as for existing whey drinks.

The velocity distribution respectively the particle size distribution for whey drinks provide an additional parameter for quality control and process optimization. The distributions are calculated from the transmission profiles, measured in the Dispersion Analyser LUMiSizer®, based on analytical centrifugation and STEP®-technology.

Measurement

The example below displays the typical evolution of the transmission profiles.
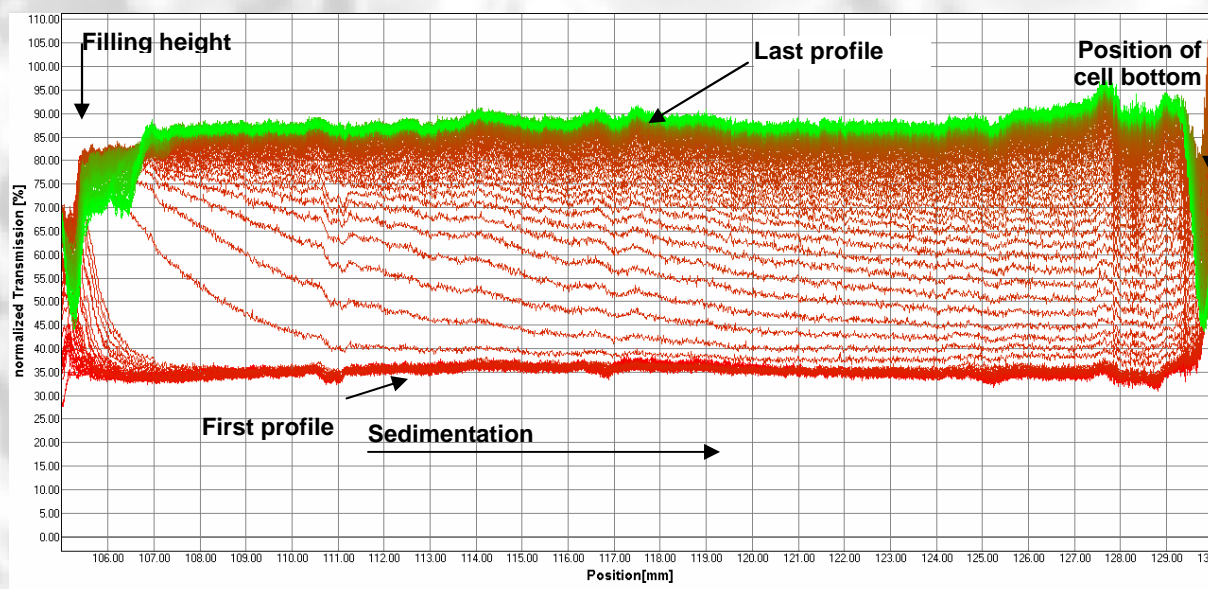
Whey drink A, diluted to 79 % of its original concentration, evolution of transmission profiles with time at stepwise increase from 36-2300 xg for detection of entire particle range, 10 °C

The separation process is characterized by a very polydisperse sedimentation, particles move with different speed. Prior to measurement in the Dispersion Analyser LUMiSizer® the whey drinks were diluted to 79% (A) respectively 74% (B) of their original concentration to achieve a basic transmission of >30%, as precondition for particle sizing.

On the basis of two analysis modi different distribution types are calculated from one measurement:
1. "Constant position" –concentration detection over time at one position and
2. "Constant time" – concentration detection over the entire sample length at least for one time.

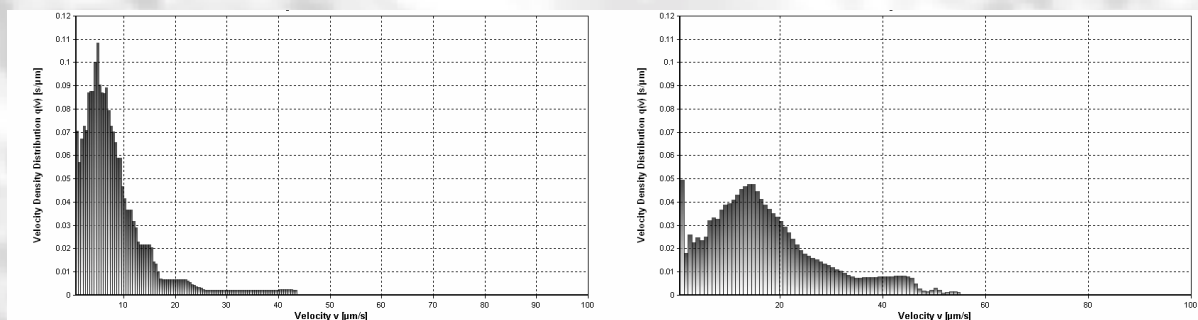## Velocity distribution according to ISO 13318-1 and ISO 13318-2

The intensity weighted velocity distributions, calculated according to ISO 13318, derived by analysing the time course of transmission at the constant position of 121 mm are shown in the following figures.
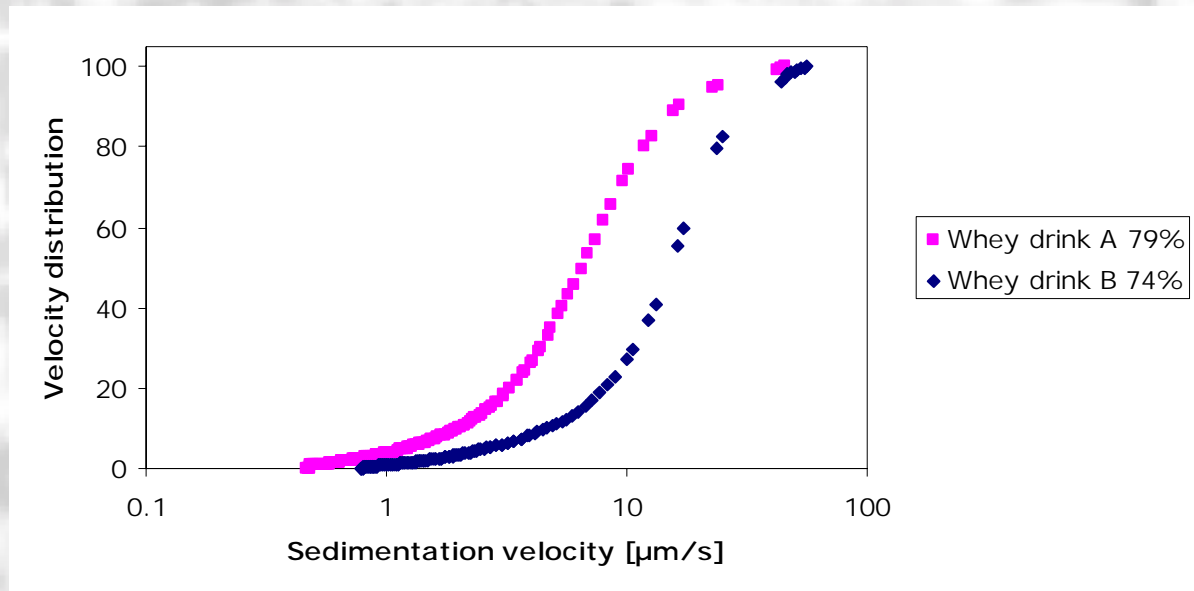
Cumulative intensity weighted velocity distribution

Velocity Density Distributions of Whey drink A (left) and of Whey drink B (right)

Summary

Whey drink A is characterized by a higher amount of slower sedimenting particles. Both drinks feature a broad distribution, i.e. relatively fast and slow sedimenting particles. When knowing the material parameters (densities, dynamic viscosity of the fluid, refractive indices) the intensity weighted and the volume weighted particle size distributions can be calculated from the velocity distribution.

Within the analysis protocol of SEPView® software further details, including measurement protocol, different distribution types, harmonic mean values, standard deviations, fit functions etc. are provided.

References

- Fast stability ranking of whey drinks, Application note L.U.M. GmbH
- STEP-Technology see www.lum-gmbh.com/pages/technology.htm
- Determination of stability, consolidation and particle size distribution of liquid or semi-liquid food products by multisample analytical centrifugation, D. Lerche, T. Sobisch, T. Detloff, Proceedings ISFRS 2006, 221-225
- Particle Size Distribution by Space or Time Dependent Extinction Profiles obtained by Analytical Centrifugation, T. Detloff, T. Sobisch, D. Lerche, Part. Part. Syst. Charact. 23 (2006), 184-187