

INTRODUCTION

Rehydrated powders, like milk and protein powders, are widely used in a wide range of food products. Food powder offers longer preservation and a lower carbon foot print (less water carried/shipped). The quality and the stability of the final product is highly related to the complete rehydration and redispersion process of the food powder. Many parameters impact the reconstitution quality like the mixing process, the water quality and temperature but also the powder properties itself (size, porosity, surface tension...).

The aim of this application note is to present a methodology to study the reconstitution of food powders via an online, non dilution and fast measurement.



Online

Powder quality

Reconstitution speed

DEFINITION

Powder reconstitution ability is the combination of several properties proceeding simultaneously and interrelated :

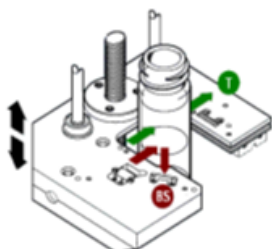
- Powder properties: wettability, particle size, solubility, dispersibility...
- Water properties: temperature, hardness, pH...
- Reconstitution process: manual or mechanical, mixing time...

Based on SMLS (Static Multiple Light Scattering) technology associated to online capabilities of the Turbiscan® DNS, powder reconstitution kinetic can be study online and at high frequency for a complete understanding of the hydration process.

TURBISCAN®: HOW IT WORKS

Turbiscan® technology, based on Static Multiple light scattering (SMLS), consists of illuminating a sample with an infrared light source and acquiring Backscattered (BS) and Transmitted (T) signals.

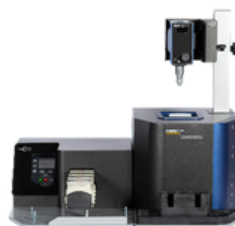
$$BS \text{ and } T = f(\varphi, d, np, nf)$$



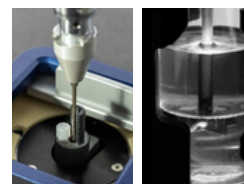
The signal is directly linked to the particle's concentration (φ) and size (d) according to the Mie Theory, with refractive index of continuous (nf) and dispersed phase (np) being fixed parameters. The measurement of the BS and T can be performed either on scanning mode, to provide homogeneity and stability measurement, or with high frequency for fast time resolved and online measurement. The measurements are done without any dilution & on native sample up to 95% V/V and from 10nm up to 1mm.

The Turbiscan® DNS ,for Dispersibility and Stability, is composed of 2 modules allowing online measurement of the dispersion state to follow the reconstitution process.

- **T-MIX** (*used for this study*) for automated and fast formulation screening with a stirring bar directly adapted inside the measurement cell. The mixing speed goes up to 2000 rpm.
- **T-LOOP** for online measurements and scale up/ process optimizations.



Turbiscan® DnS



The T-Mix Module